

# **DREDGED MATERIAL MANAGEMENT PLAN**

**UPPER MISSISSIPPI RIVER  
POOL 20  
RIVER MILES 343.2-344.3**

**LOCK 20 UPPER DREDGE CUT**

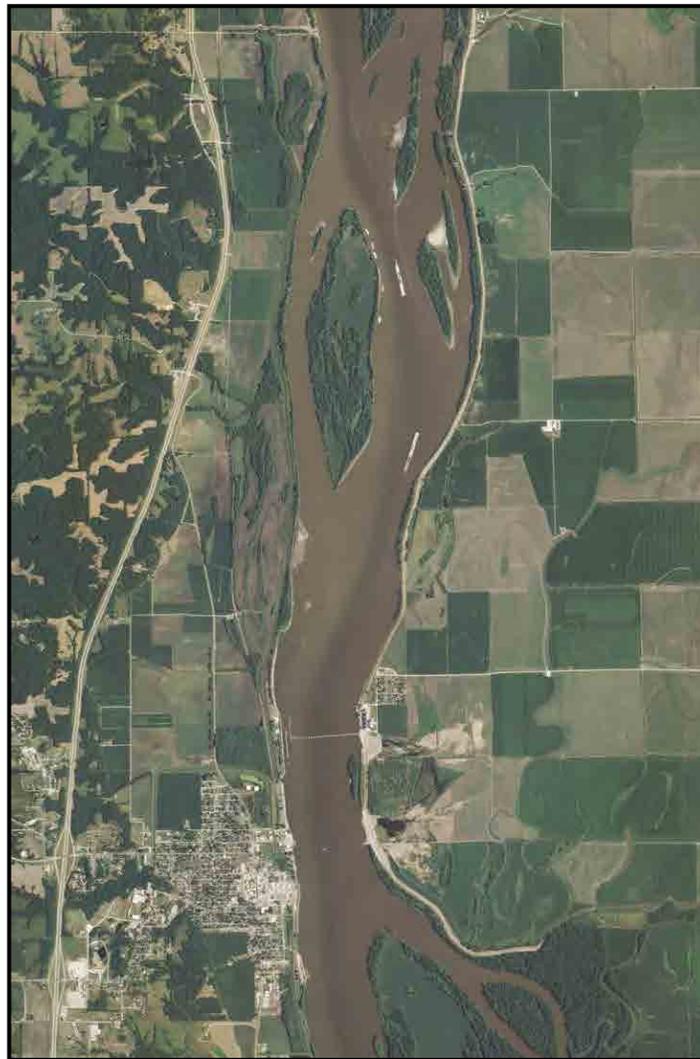
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**PUBLIC REVIEW DRAFT**

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**SEPTEMBER 2015**



**US Army Corps  
of Engineers** ®  
Rock Island District



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#### **EXECUTIVE SUMMARY**

The U.S. Army Corps of Engineers, Rock Island District, proposes to place dredged material from the Lock 20 Upper Dredge Cut at dredged material placement sites in the vicinity of river miles 343.0 to 346.0 on the Upper Mississippi River (Figure ES-1). An estimated placement capacity of 1 million cubic yards (CY) is required over the 40-year life of the Dredged Material Management Plan (DMMP).

Historically this dredge cut was inactive between the late 1960s and early 2000s. Currently, a large sand bar is building just above the Lock 20 approach that requires considerable maneuvering by down bound towboats to access the Lock chamber. There is an immediate need to dredge approximately 500,000 CY to alleviate the towboat access problem.

Over 16 placement sites were identified, investigated, screened, and combined into 6 alternatives, including the No Action Alternative, which were then evaluated using numerous factors including cost effectiveness, environmental acceptability and operational feasibility. Alternative 6-All Potential Sites best met these criteria, and therefore has been selected as the Preferred Plan. Implementation of the Preferred Plan will require fee title acquisition of one site that will be pursued following DMMP approval and preparation of a Real Estate Design Memorandum.

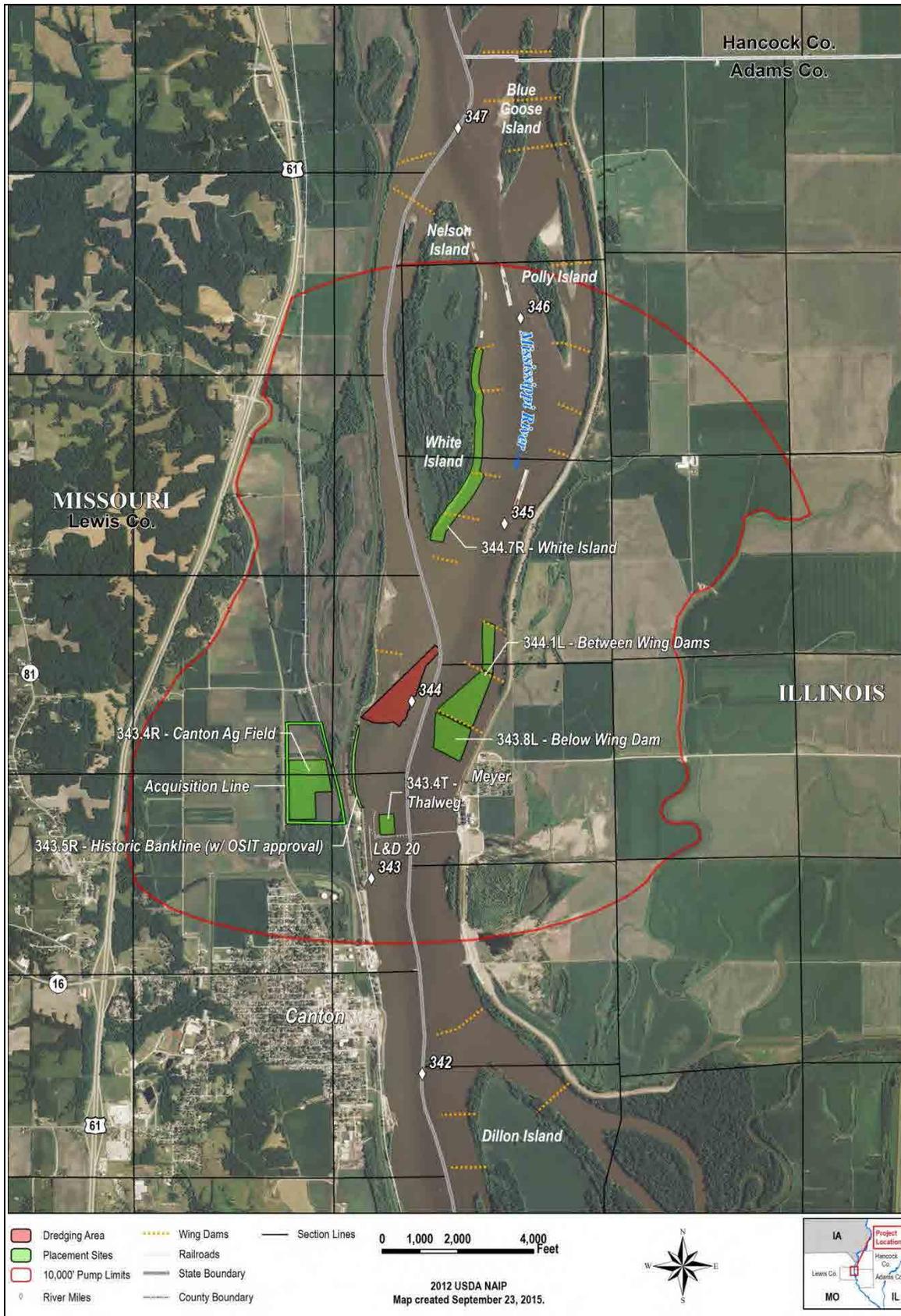


Figure ES-1. Sites Selected

**DREDGED MATERIAL MANAGEMENT PLAN**

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POOL 20  
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*Lock 20 Upper  
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# DREDGED MATERIAL MANAGEMENT PLAN

## UPPER MISSISSIPPI RIVER POOL 20 RIVER MILES 343.2-344.3

### LOCK 20 UPPER DREDGE CUT

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#### SECTION 1. PROJECT DESCRIPTION

**1.1. Location.** The *Lock 20 Upper Dredged Material Management Plan* (DMMP) project area is located on the Upper Mississippi River (UMR) between river miles (RM) 343.2 and 344.3 immediately upstream of Lock and Dam 20 and .5 miles upstream of Canton, Missouri, in Adams County, Illinois, and Lewis County, Missouri. Material dredged from the Lock 20 Upper dredge cut consists predominantly of medium to fine brown sand and historically has been placed along the right descending bank, just upstream of the lock guide wall.

**1.2. Purpose.** The purpose of a DMMP is to find suitable long-term placement alternatives for dredged material as described in the *Long-Term Management Strategy for Dredged Material Placement, Upper Mississippi River Miles 300.0-614.0, Main Report* (1990). Dredged material placement alternatives are developed and recommended for implementation in a DMMP report.

**1.3. Scope of Study.** One of the missions of the U.S. Army Corps of Engineers (Corps), Rock Island District (District) is to provide safe, reliable, efficient, and environmentally sustainable waterborne transportation systems. Channel maintenance, including dredging and dredged material placement, supports this mission. This report documents the Corps' planning process:

- 1) Identify Problems and Opportunities: purpose, scope and authorization
- 2) Inventory and Forecast Conditions: potential dredging requirements with associated environmental concerns
- 3) Formulate Alternative Plans: potential placement sites that satisfy project objectives and constraints (including beneficial use opportunities)
- 4) Evaluate Alternative Plans: assess plan alternatives
- 5) Compare Alternative Plans: plan implementation viewpoints from the public and agencies
- 6) Select a Plan: recommend plan approval for implementation

This DMMP report is a single-purpose project that focuses on the Lock 20 Upper dredge cut and its potential placement sites. This dredge cut has limited dredged material placement capacity and an eminent need to dredge approximately 500,000 cubic yards (CY).

**1.4. Authorization.** The Rivers and Harbors Acts of July 3, 1930; February 1932; and August 30, 1935; and a Resolution of the House Committee on Flood Control of September 18, 1944, authorized the 9-foot navigation channel and subsequent channel maintenance dredging.

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Under the authority delegated by the Secretary of the Army and in accordance with Section 404 of the Clean Water Act (CWA) of 1977, as amended, the Corps regulates the discharge of dredged or fill material into waters of the United States. In addition, the Corps is guided by the dredging regulations published in the Code of Federal Regulations (CFR), 33 CFR Parts 335-338. This CFR includes language that encourages the Corps to pursue a Long-Term Management Strategy for dredged material placement. The regulation states, “District Engineers should identify and develop dredged material management strategies that satisfy the long-term (greater than 10 years) needs for Corps projects.”

The Corps regulation providing guidance for the conduct of Civil Works Planning Studies is contained in Engineering Regulation (ER) 1105-2-100. Plans are to be developed to meet dredging needs for a minimum of 20 years. In order to allow for long-term flexibility, the District’s preference is to develop a minimum of 40-year plans, as in this case. The regulation also requires an assessment of the potential for beneficially using dredged material for numerous purposes including environmental restoration.

## **SECTION 2: DESCRIPTION OF EXISTING CONDITIONS**

**2.1. Historic Channel Maintenance Dredging.** The Lock 20 Upper dredge cut has been dredged 9 times since construction of the 9-foot navigation project totaling 517,414 CY for a per dredging event average of 57,490 CY. Dredging quantities have ranged from 3,727 CY to 189,599 CY in 1944 and 1967, respectively. The dredging history is summarized in Table 1.

**Table 1.** Lock 20 Upper Historical Dredging 1940 to 2015

<b>Year Dredged</b>	<b>Dredging Amount (CY)</b>	<b>Dredging Site<sup>1</sup></b>	<b>Placement Site</b>
1942	4,336	343.2-343.4	343.4L
1944	3,727	343.1-343.2	--
1946	5,565	343.3	342.9-343.1L
1963	135,607	343.4-343.9	343.7-343.9R
1966	101,434	343.8-344.2	344.0-344.3R
1967	189,599	343.6-344.3	343.8-344.2R
2006	4,106	343.2M	343.2 (stockpile at lock)
2009	33,040	343.6-344.3M	343.3-343.6R
2015	40,000	343.7-344.0M	343.5-343.8
	<b>Total: 517,414</b> <b>Average: 57,490</b>		

<sup>1</sup>”M” indicates a mechanical dredging event, other dredging events done hydraulically.

**2.2. Assessment of Dredged Material.** Samples were collected from the Lock 20 Upper Dredge Cut and classified in accordance with the Unified Soil Classification System. Samples ranged from medium to fine grained sand. Gradation curves are provided in Appendix D, *Geotechnical Data*.

Four samples were taken on April 22, 2015; results are shown in Table2.

**Table 2. Grain Size Analysis of Sediment Samples**

**Percent Finer by Weight**

	Sample Numbers:	343.91R	343.85R	343.82R	343.80R
	1 1/2"				
S	3/4"				
I	3/8"	100.0%		100.0%	
E	#4	97.6%	100.0%	99.3%	100.0%
V	#10	92.1%	98.9%	96.1%	97.9%
E	#16	85.1%	96.1%	88.8%	92.5%
	#30	59.4%	77.9%	62.7%	67.5%
S	#40	31.5%	51.4%	36.0%	38.6%
I	#50	7.1%	20.2%	10.3%	10.8%
Z	#70	0.2%	6.8%	1.6%	2.6%
E	#100	0.0%	2.8%	0.6%	0.8%
S	#200	0.0%	1.0%	0.3%	0.3%
<b>CLASSIFICATION:</b>		SP, Medium to Fine Sand	SP, Medium to Fine Sand	SP, Medium to Fine Sand	SP, Medium to Fine Sand

**2.3. Future Dredging Requirements.** To the extent possible, the District has projected a channel maintenance dredging need of 1,000,000 CY for the next 40 years at the Lock 20 Upper cut based on historic dredging and current site conditions. After a significant change in channel conditions following the 2008 flood event, there is an immediate need to dredge 500,000 CY (based on recent hydrographic surveys) that impacts the upstream lock approach. See dredging area on Figure 1. Figure 1 also shows the 2009 dredge cut location and how the dredging requirement has grown. The remaining capacity is based on a projected need for 8 events of 62,500 CY over the 40 year project life. It is important to note that the projections beyond the immediate 500,000 CY need are simply an estimate of future dredging needs. Because of the dynamic nature of the river, actual dredging needs could differ from those projected. Currently, historic bankline placement just upstream of the lock is the only placement site available. This site lacks capacity for long-term placement as well as the planned large initial dredging event.

**2.4. Projections of Future Conditions in the Absence of a Management Plan.** The historic bankline placement site is too small for the projected dredging volume, over use would block access to the lock immediately downstream, and may reintroduce dredged material into the river during high water events. Continued long-term placement along the historic bankline site would also lead to higher aquatic natural resource impacts and possible channel closures because limited placement capacity would narrow channel widths, resulting in a stoppage of commercial navigation.

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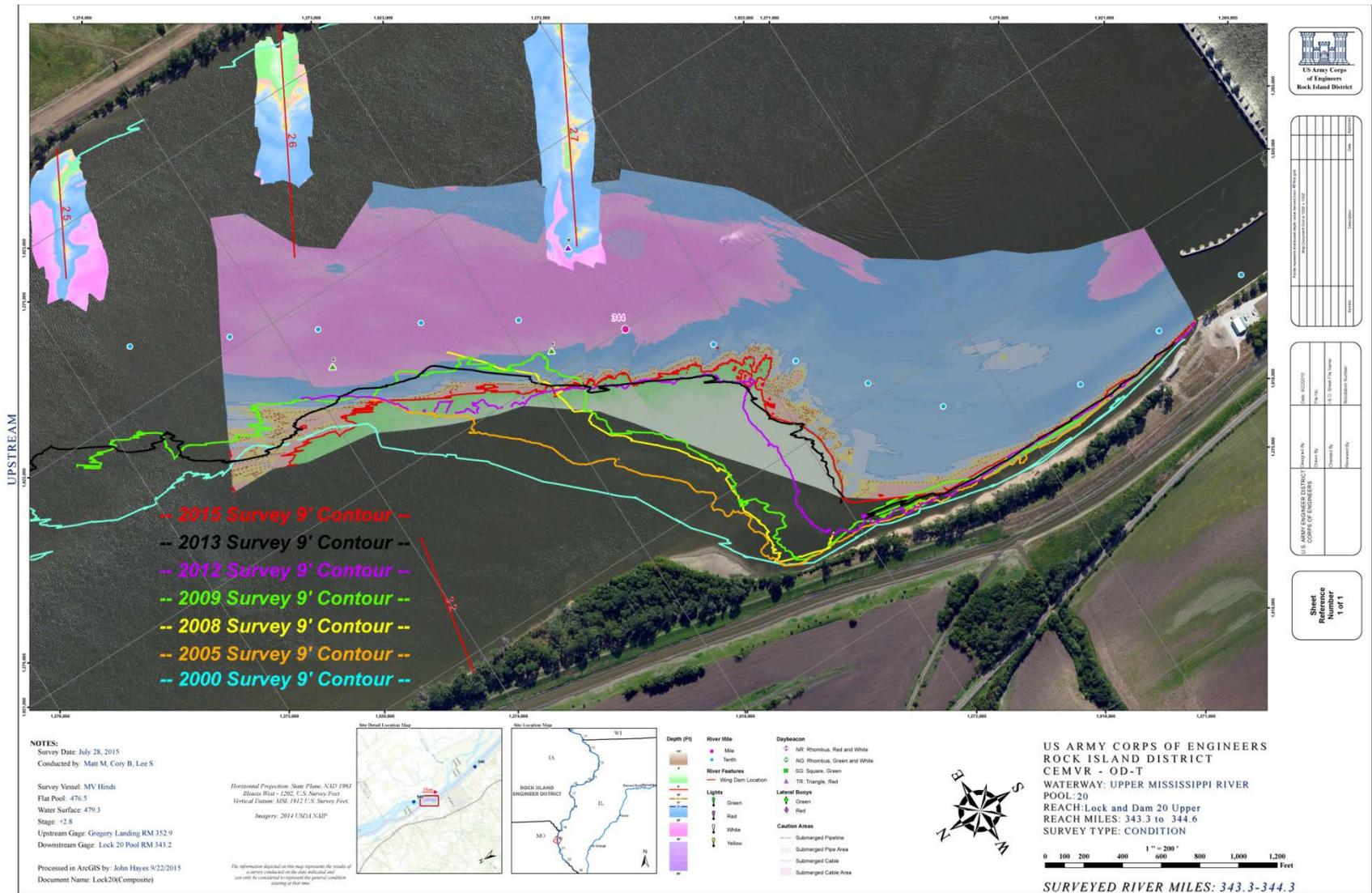


Figure 1. Lock 20 Dredging Area

**2.5. Problems and Opportunities.** Current conditions require considerable maneuvering by towboat pilots to enter the lock chamber because of the building sand bar on the Missouri channel side.

**2.5.1. Problems**

- Sedimentation causes shoaling within the 9-foot navigation channel that results in areas of required dredging to maintain authorized channel depths.
- Continued use of existing placement options, at the volume and frequency used in the past, could result in unacceptable impacts to the environment and navigation.
- Prior to this plan, no new placement sites had been identified.
- Significant amounts of material need to be removed initially to alleviate access problems for down bound towboats entering the lock.
- Historically, funding and placements sites have not been available to dredge the additional material.
- Safety of upstream lock approach for down bound towboats

**2.5.2. Opportunities**

- Evaluate and recommend long-term placement site alternatives that reduce natural resource impacts and impacts to navigation
- Consider any beneficial use opportunities, both environmental, and commercial
- Evaluate and recommend cost-effective alternatives, potentially reducing navigation Operations and Maintenance (O&M) costs
- Coordinate information among local, state, and Federal agencies and the affected public to facilitate prudent decisions on the placement of dredged material

**2.6. Beneficial Use.** Dredged material is a manageable resource suitable for beneficial use, such as natural resource habitat development (e.g., moist soil unit creation and refuge levee repairs) and island creation or elevation diversity. Potential fish or wildlife restoration and enhancement projects that could utilize dredged material would be pursued under Section 1135, Section 204, section 519 or Section 206 program authority. These programs are authorized by various Water Resources Development Acts and require a non-Federal sponsor to cost-share a percentage of DMMP costs. Cost share varies among programs.

Dredged material stockpiles may also be placed in locations where the public has access to the stockpile and may haul away material for its own use. Early coordination in the long-term planning process helps to inform potential users of such opportunities. The District regularly sends out Corps-wide and site-specific news releases, advertising the availability of dredged sand.

**2.7. Objectives and Constraints.** Following are objectives and constraints for channel maintenance dredging projects in accordance with the Federal standard:

### **2.7.1. Objectives**

- Maintain the 9-foot navigation channel in such a manner as to avoid the potential loss of life or personal injury, or property damage that may result from inadequate maintenance of the channel and subsequent channel closures and groundings
- Reduce O&M costs where possible
- Identify existing and develop new placement sites as necessary that allow for suitable dredged material placement in an environmentally acceptable and cost-effective manner
- Strive to find suitable placement site options providing dredged material placement capacity for at least 40 years of maintenance dredging where possible
- Maximize beneficial use of dredged material
- Enable rapid response dredging and material removal while minimizing impacts to navigation traffic
- Allow for adaptive management to improve dredged material placement as conditions change

### **2.7.2. Constraints**

- Assess site access and equipment limitations. Under ideal conditions with current equipment hydraulic placement sites should not exceed 10,000 feet in distance upstream or downstream from the dredge cut, should not exceed 1,000 feet inland from the dredge cut and should not exceed +/- 28 feet in height from the dredge cut. Identify placement sites that can accommodate hydraulic and mechanical placement
- Immediate dredging need is over half the capacity of the 40-year estimated placement need
- Final plan must provide dredged material placement capacity to accommodate a minimum 40 years of maintenance dredging
- Feasible placement sites are scarce
- Placement Site opportunities are limited by hydraulic impacts
- Current dredging equipment allows for a maximum of 10,000 feet of pipe to get from placement site to dredge cut
- Many sites nearest the dredge cut include environmentally or archeologically sensitive areas and cannot be disturbed

**2.8. Strategies.** The overall DMMP would identify, evaluate and acquire placement sites that meet the District's needs for a minimum of 40 years, using the three-phase interagency DMMP process as follows:

Phase 1 - Preliminary assessment and site/alternative site identification and screening

Phase 2 - Alternative evaluation, including environmental assessment and engineering considerations

Phase 3 - Acquisition of placement sites (as needed) and implementation of the Preferred Plan

This report represents completion of the first two phases of the process for the Lock 20 Upper DMMP. Upon review, final approval, and subject to the availability of funding, the District will begin Phase 3.

### **SECTION 3: ALTERNATIVE PLANS**

**3.1. Alternative Planning Process.** The first step in the alternative planning process is to identify sites for screening. All sites evaluated are listed in Table 3. Identified sites are then screened based on criteria outlined in Section 3.2. After this initial screening, sites meeting these criteria are then evaluated for additional considerations concerning capacity, natural resources, hydraulic impacts, operability and socio-economic impacts. Alternative plans are then developed from sites that have met the criteria of Section 3.2 and have remained potentially feasible after further evaluation.

The second step is to formulate and evaluate combinations of placement sites, which make up the alternatives considered. Formulation, evaluation and comparison of these alternatives, including the No Action Alternative, are discussed in Sections 3.4 and 3.5.

**3.2. Site Identification and Screening Process.** Based on the DMMP Quality Control Plan and Project Management Plan, as applicable, potential dredged material placement sites are identified and screened in this initial phase of the alternative development process:

- The District estimated available capacities of historic placement sites to determine the additional placement capacity required for the plan life. It was agreed that no suitable placement capacity was available for the long-term. In addition, new placement sites are needed for the 40-year projected volume of 1,000,000 CY.
- The District assembled historic placement site information along with potential new placement site information. Potential placement sites were identified from analysis of the dredging density by river mile. The PDT and applicable members from state and Federal natural resource and regulatory agencies, along with other interested local officials, met to review the preliminary information and to provide input on these and any other sites proposed at an OSIT (On-Site Inspection Team) meeting. Members of this multi-agency review team discussed potential environmental, cultural and other impacts of each site. Preference was given to site(s) having the least adverse impacts to natural and cultural resources and/or impacting the smallest area that also were cost efficient. Any site(s) not meeting this group's requirements were eliminated from consideration as part of the initial screening process. All sites evaluated are listed in Table 3 and shown in Figure 2.
- The District reviewed the identified placement sites in the Great River Environmental Action Team (GREAT) II Channel Maintenance Handbook for the Lock 20 Upper dredge cut (Figure 3). The 6 GREAT Sites (GS) resulted in no new placement options for the following:
  - GS 20.32 was located on an island that has since eroded away;
  - GS 20.33 is located on a short section of bankline that is highly erosive and would have a small capacity;
  - GS 20.34 is an historic site that may erode back into the proposed dredging area;
  - GS 20.35 is an agricultural field that is already an identified potential site;
  - GS 20.36 is an agricultural field that is already an identified potential site; and
  - GS 20.37 is an historic site that is currently used for placement.

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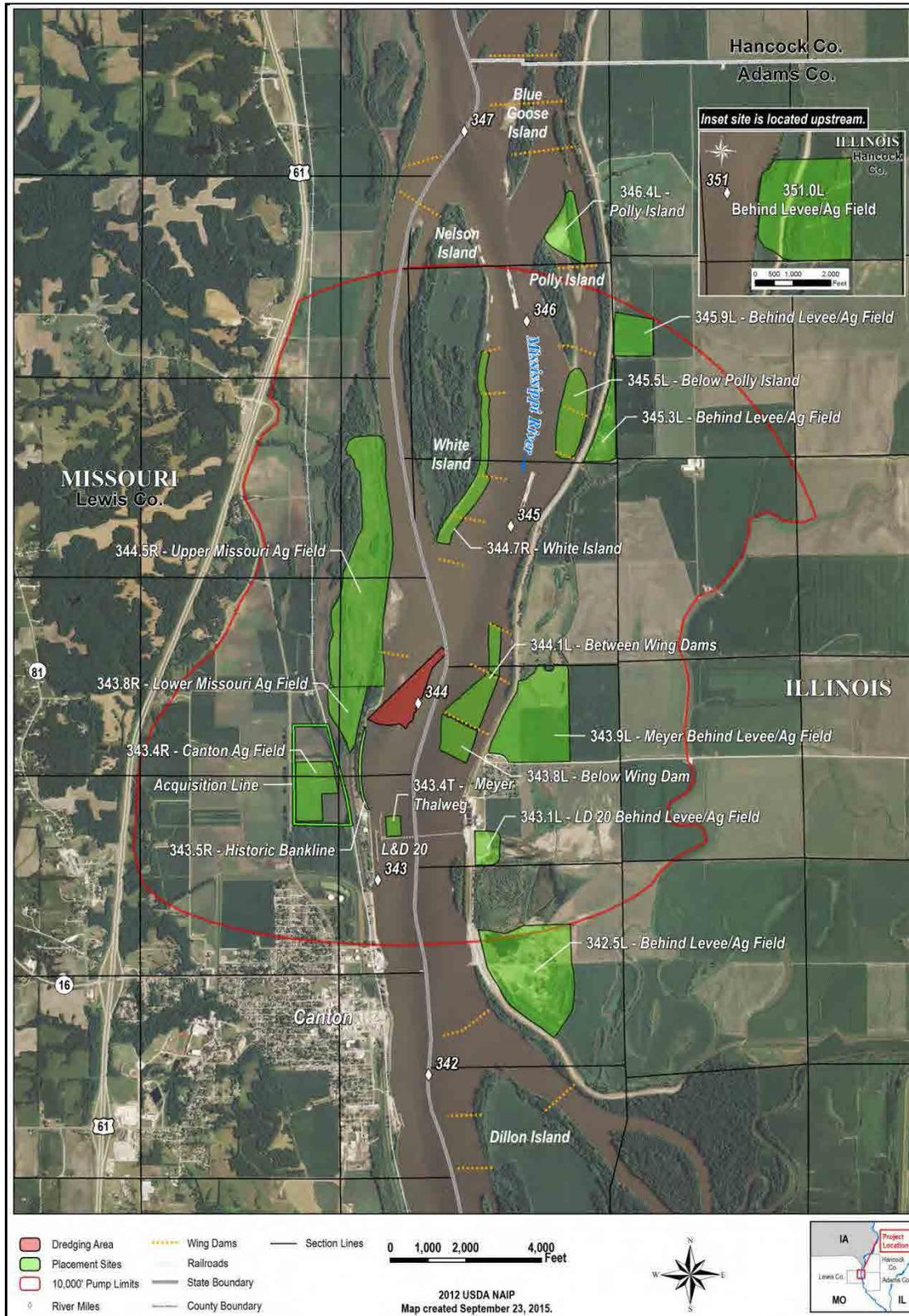


Figure 2. Sites Evaluated

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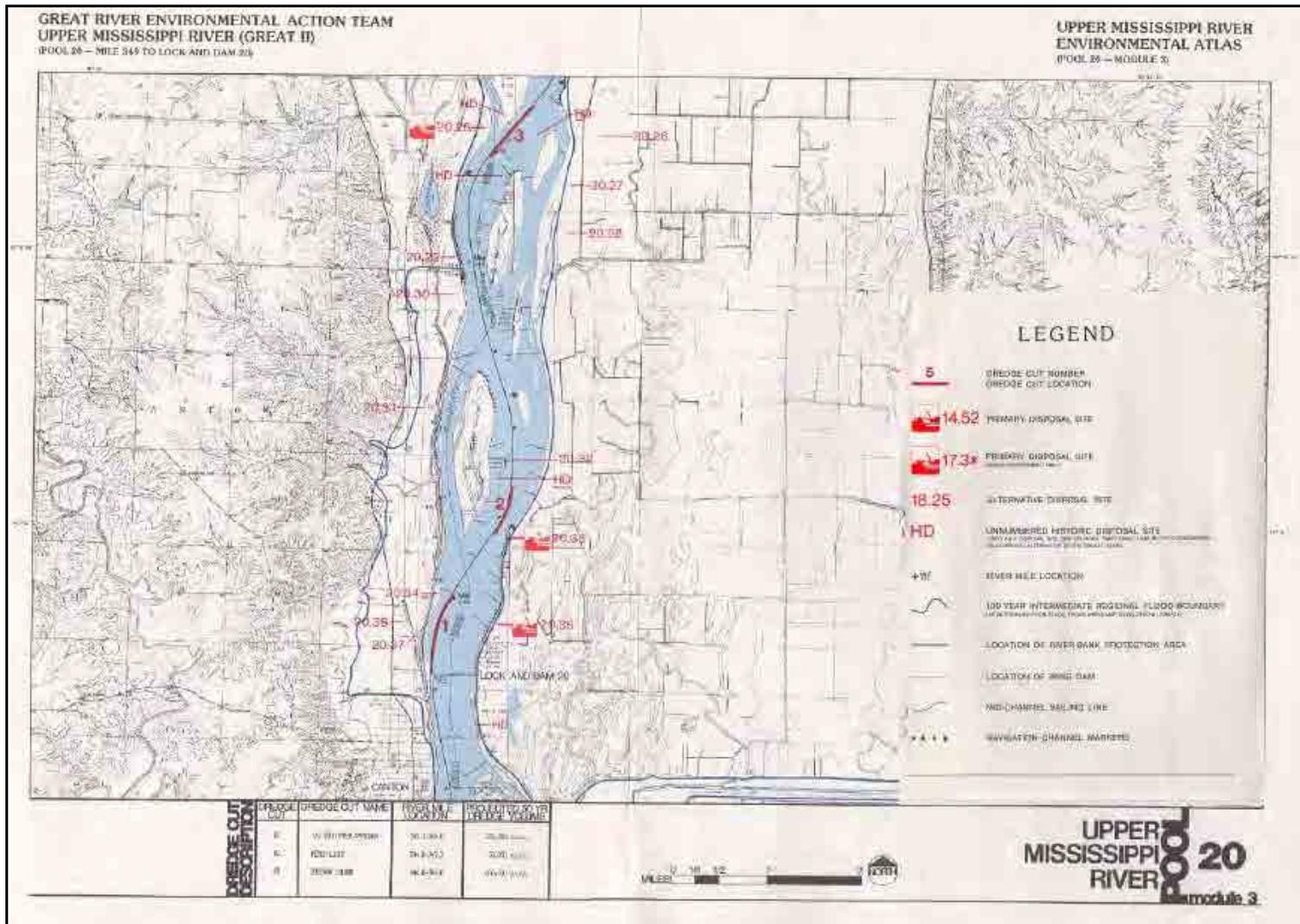


Figure 3. GREAT II Channel Maintenance Handbook Identified Sites

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- Channel maintenance personnel from the District's Operations Division evaluated each potential site to ensure operational feasibility. Sites considered operationally infeasible were eliminated from further consideration and are noted in the remarks column on Table 3. Reasons for sites being considered operationally infeasible include but are not limited to unsuitable site access for equipment to deliver/unload dredged material; site dimensions that are not large enough for material containment and/or drainage capabilities; and locations too far from the dredge cut to allow for hydraulic or manageable mechanical dredging operations.
  
- The District performed a preliminary search of existing databases, maps and other sources to identify any known issues or concerns including:
  - Environmental acceptability (wetlands, threatened or endangered species, water quality, aquatic and terrestrial resources);
  - Floodway conveyance, flood height, and flood storage impacts;
  - Prime and unique farmland;
  - Existing land use (land use plans, local zoning ordinances, private, commercial, municipal, county or state development);
  - Social impacts;
  - Real estate issues (cost, property liens, landowner willingness, multiple landowners, permits/leases/purchase);
  - Cultural resources;
  - Hazardous, toxic, or radioactive waste (HTRW);
  - Recreation potential;
  - Commercial navigation (channel maintenance, fleeting areas);
  - Beneficial use potential; and
  - Features consistent with best planning and engineering practice.

The Product Delivery Team (PDT) and applicable members from the State and Federal natural resource and regulatory agencies reviewed the preliminary site information for potential environmental, cultural and other impacts of each site. Preference was given to site(s) having the least adverse impacts to natural and cultural resources and/or impacting the smallest area. Any site(s) not meeting these requirements were eliminated from consideration as part of the initial screening process. Table 3 shows the sites evaluated, a brief reason for elimination, and the sites included for further analysis. Justification for sites eliminated is as follows:

- **Site 351.0L-Behind Levee/Ag Field.** This site is operationally infeasible because being ~6 miles away and behind a levee would require mechanical dredging, pushing loaded barges upstream, and rehandling the dredged material over the levee to reach the placement area, which would be very expensive and slow to accomplish.
- **Site 346.4L-Polly Island.** This site is operationally infeasible because only mechanical dredging can be used to reach the site, which would be very expensive and slow to accomplish. Environmental impacts are also a concern due to potential impacts to forested portions of the island and potential migration of the dredged material into backwater areas and the adjacent side channel.

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- **345.9L-Behind Levee/Ag Field.** This site was eliminated because its smaller size limits placement capacity and is difficult to use under a pond and pump placement scenario (down time for dewatering). Pond and pump is a confined placement site that employs pumps brought to the site for each event that pumps all the dredged water directly back to the river (avoids using levee drainage ditches).
- **345.5L-Below Polly Island.** This site was eliminated for environmental reasons. Placing material here may close off the side channels and could impact mussels along the Illinois shore and the two wing dams.
- **345.3L-Behind Levee/Ag Field.** This site was eliminated because its smaller size and shape limit placement capacity and are difficult to use under a pond and pump placement scenario (down time for dewatering).
- **344.5R-Upper Missouri Ag Field.** This site was eliminated due to its location in the floodway, which would likely result in increased flood heights and no floodplain permit.
- **343.9L-Meyer Behind Levee/Ag Field.** This site was eliminated due to cultural resources concerns that left only a small, difficult to use, portion of the site for placing material.
- **343.8R-Lower Missouri Ag Field.** This site was eliminated due to its location in the floodway, which would likely result in increased flood heights and no floodplain permit.
- **343.1L-LD20 Behind Levee/Ag Field.** This site was eliminated due to its small size (<10 acres) and capacity. The site also would require road closures.
- **342.5L-Behind Levee/Ag Field.** This site was eliminated due to cultural resources concerns and that it lies just at the edge of being accessible to hydraulic dredging (shore pipe limitations).

**Table 3.** Placement Sites Evaluated

Site	Site Name	Remarks
351.0L	Behind Levee/Ag Field	Eliminated-operationally infeasible (~6 miles upstream)
346.4L	Polly Island	Eliminated-operationally infeasible/environmental impacts
345.9L	Behind Levee/Ag Field	Eliminated-operationally infeasible
345.5L	Below Polly Island	Eliminated- environmental impacts
345.3L	Behind Levee/Ag Field	Eliminated-operationally infeasible
344.7R	White Island	Potential site
344.5R	Upper Missouri Ag Field	Eliminated-potential floodway impacts
344.1L	Between Wing Dams	Potential site
343.9L	Meyer Behind Levee/Ag Field	Eliminated-cultural considerations
343.8R	Lower Missouri Ag Field	Eliminated-potential floodway impacts
343.8L	Below Wing Dam	Potential site
343.5R	Historic Bankline	Potential Site-limited capacity (use if recommended by OSIT)
343.4R	Canton Ag Field	Potential site
343.4T	Thalweg	Potential site
343.1L	LD 20 Behind Levee/Field	Eliminated- operationally infeasible (too small)
342.5L	Behind Levee/Ag Field	Eliminated-operationally infeasible

**3.3. Description of Potential Sites for Further Study.** Potential placement sites that met overall criteria and Project objectives for further study are Site 344.7R – White Island, Site 344.1L – Between Wing Dams, Site 343.8L-Below Wing Dam, Site 343.5-Historic Bankline (with OSIT recommendation), Site 343.4R-Canton Ag Field, and Site 343.4T-Thalweg . The following descriptions provide approximate site dimensions and capacities, and represent the placement sites without river access, land access or return water areas.

**Site 344.7R – White Island** (hydraulic and mechanical dredging; Figure ES-1 and App E, Plate C-103).

**Location.** White Island is located ~2 miles north of Canton, Missouri, in Adams County, Illinois, between RM 344.8 and 345.5R. The site is in Section 12 of Township 2 North, Range 10 West of the 4<sup>th</sup> Principal Meridian.

**Ownership.** White Island is privately owned. Navigational Servitude applies to bankline sites below ordinary high water.

#### **Size and Capacity**

- Located along the east bank from the upper most wing dam, south to the downstream end of the Island.
- Material would be placed up to the Ordinary High Water Line (481 ft MSL 1912).
- Side slopes are assumed to fall at a 3H:1V slope.
- The site widens from about 165 feet wide from the edge of the island on the upstream end to about 330 feet from the edge of the island on the downstream end.
- The approximate river bottom elevation once you get away from the bank is 470.
- Acreage is around 33 acres.
- Capacity is about 340,000 CY

**Natural Resources.** This bankline was previously used for dredged material placement in 1964 from the Brownsville Island dredge cut (47,400 CY). This Site has very limited wildlife value. There is some use by wading birds and shorebirds. Eleven species of mussels were found during the July 2015 survey. Mussel density is generally low and no Illinois State or Federally listed species were present. See Appendix A for mussel survey results.

**Hydraulic Assessment.** Placing dredged material on the south end of White Island to an elevation of 481 ft (MSL 1912), has no impact on flow velocity and bed shear stress. Therefore, the White Island placement site provides a stable location for the dredged material. Based on the comparison of water surface profiles before and after placement of dredged material at this site for the 50 percent and 1 percent annual chance of exceedance (ACE) flow, there is no-rise in the water surface elevations at this site or upstream of this site. This placement site complies with the state floodplain ‘no-rise’ requirement. Appendix B, *Hydraulic Data*).

**Evaluation of the Operational Feasibility of the Dredged Material Placement Site.** This site is operationally feasible for hydraulic and mechanical placement and requires no site preparation. Return water is immediately discharged back into the river.

**Socioeconomic Impacts.** There would be no adverse impacts on area sand and gravel firms, area employment, or community cohesion. No public opposition is expected. No residential or farmstead relocations would be required. Utilization of this site would not adversely impact life health or safety, property values/tax revenues, or the aesthetic resources of the area. There would be no permanent impacts on noise levels in the area. Maintenance of the navigation channel provides positive impacts to public facilities and services.

**Site 344.1L – Between Wing Dams** (hydraulic and mechanical dredging; Figure ES-1 and App E, Plate C-104).

**Location.** The Between Wing Dams site is located ~1 mile north of Canton, Missouri, in Adams County, Illinois, between RM 344.0 and 344.2L. The site is in Sections 13 and 24 of Township 2 North, Range 10 West of the 4<sup>th</sup> Principal Meridian.

**Ownership.** This site is privately owned, but Navigational Servitude applies to areas below the ordinary high water mark (481 ft MSL 1912).

#### Size and Capacity

- Material would be placed between wing dams #25, #26, and #27 to a top elevation of 470 ft (MSL 1912).
- Material would be placed a minimum of 250 feet from the Illinois bank line to avoid impacts to an existing mussel bed.
- The maximum height, elevation 470, is lower than the adjacent wing dams and was selected after flow analyses by EC-H (see hydraulics assessment below).
- River bottom elevation varies in this area, but averages around 456 ft MSL 1912.
- The dredged material would be allowed to slope at 3H:1V and placed so that the slope ends at the toe of the wing dams, 250 feet from the Illinois shore, and/or meets existing ground.
- The wing dams were reconstructed in the spring of 2015 as follows:

RM	Wing Dam Number	Design Length (ft)	Design Elevation (ft MSL 1912)	Top Width (ft)	Side Slope (#H:1V)
344.5L	25	620	473.30	10	1.50
344.3L	26	1,220	473.20	10	1.50
344.0L	27	1,350	473.00	10	1.50

- Approximate acreage between these three wing dams is 32 acres (9 acres between upper two, 23 acres between lower two).
- Total capacity between the three wing dams is 360,000 CY (110,000 CY between upper two, 250,000 CY between lower two).

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**Natural Resources.** This site has not previously been used for dredged material placement. This Site has very limited wildlife value. There is some use by wading birds and shorebirds. Fourteen species of mussels were found during the July 2015 mussel survey; most were located within 200 feet of the shoreline. Mussel density is higher than Site 344.7R-White Island and two Illinois State listed species were identified. See Appendix A for mussel survey results.

**Hydraulic Assessment.** Placing dredged material between wing dams #25 and #26 and between wing dams #26 and #27 to an elevation of 470 ft (MSL 1912), increases the flow velocity and the bed shear stress within both placement sites, but the increased flow velocity and the bed shear stress is not large enough to move the sediments. Therefore, placing dredged material between wing dams #25 and #26 and between wing dams #26 and #27 provides a stable location for the dredged material. Based on the comparison of water surface profiles before and after placement of dredged material at this site for the 50 percent and 1 percent ACE flow, there is no-rise in the water surface elevations at this site or upstream of this site. This placement site complies with the state floodplain ‘no-rise’ requirement. See Appendix B, *Hydraulic Data*). This hydraulic assessment was completed prior to moving the site location to avoid impacts to mussels and adjusting the site capacity to 360,000 CY. Since a larger capacity (480,000 CY) was used in the assessment, the results are unchanged.

**Evaluation of the Operational Feasibility of the Dredged Material Placement Site.** This site is operationally feasible for hydraulic and mechanical placement and requires no site preparation. Return water is immediately discharged back into the river.

**Socioeconomic Impacts.** There would be no adverse impacts on area sand and gravel firms, area employment, or community cohesion. No public opposition is expected. No residential or farmstead relocations would be required. Utilization of this site would not adversely impact life health or safety, property values/tax revenues, or the aesthetic resources of the area. There would be no permanent impacts on noise levels in the area. Maintenance of the navigation channel provides positive impacts to public facilities and services.

**Site 343.8L – Below Wing Dam** (hydraulic and mechanical dredging; Figure ES-1 and App E, Plate C-104)

**Location.** The site is located ~.5 miles upstream of Lock and Dam 20 and immediately below Site 344.1L – Between Wing Dams in Adams County, Illinois, between RM 343.6 and 344.0L. The site is in Section 24 of Township 2 North, Range 10 West of the 4<sup>th</sup> Principal Meridian.

**Ownership.** This site is privately owned, but Navigational Servitude applies to areas below the ordinary high water mark (481 ft MSL 1912).

**Size and Capacity.**

- Material would be placed downstream of the wing dams.
- Material would be placed a minimum of 250 feet from the Illinois bank line to avoid impacts to an existing mussel bed.
- The maximum height, elevation 470, is lower than the adjacent wing dams and was selected after flow analyses by EC-H (see hydraulics assessment below).

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- River bottom elevation varies in this area, but averages around 456 ft MSL 1912.
- The dredged material would be allowed to slope at 3H:1V and placed so that the slope ends at the toe of the wing dams, 250 feet from the Illinois shore, and/or meets existing ground.
- Approximate acreage is 18 acres.
- Approximate capacity is 200,000 CY

**Natural Resources.** This site has not been previously used for dredged material placement. This Site has very limited wildlife value. There is some use by wading birds and shorebirds and some mussels are located within 200 feet of the Illinois shoreline. See Appendix A for mussel survey results.

**Hydraulic Assessment.** Placing dredged material below wing dam #27 to an elevation of 470 ft (MSL 1912), increases the flow velocity and the bed shear stress within both locations, but the increased flow velocity and the bed shear stress is not large enough to move the sediments. Therefore, placing dredged material below wing dam #27 provides a stable location for the dredged material. Based on the comparison of water surface profiles before and after placement of dredged material at this site for the 50 percent and 1 percent ACE flow, there is no-rise in the water surface elevations at this site or upstream of this site. This placement site complies with the state floodplain ‘no-rise’ requirement. See Appendix B, *Hydraulic Data*.

**Evaluation of the Operational Feasibility of the Dredged Material Placement Site.** This site is operationally feasible for hydraulic and mechanical placement and requires no site preparation. Return water is immediately discharged back into the river.

**Socioeconomic Impacts.** There would be no adverse impacts on area sand and gravel firms, area employment, or community cohesion. No public opposition is expected. No residential or farmstead relocations would be required. Utilization of this site would not adversely impact life health or safety, property values/tax revenues, or the aesthetic resources of the area. There would be no permanent impacts on noise levels in the area. Maintenance of the navigation channel provides positive impacts to public facilities and services.

**Site 343.4R – Canton Ag Field** (hydraulic dredging; Figure ES-1 and App E, Plate C-102)

**Location.** The Canton Ag Field site is located ~.5 miles north of Canton in Lewis County, Missouri, between RM 343.2 and 343.9R. The site is in Sections 23, 24, 25 and 26 of Township 62 North, Range 6 West of the 5th Principal Meridian.

**Ownership.** This site has one private owner. See Section 4.2.1. for further information.

**Size and Capacity.**

- A containment berm will likely be constructed from soil on site (116,000 CY). During plans and specs, borings will be done to assure material is sufficient for berm construction. If it is insufficient, sand from the dredge cut will be used. Existing ground is approximately 480 ft MSL.

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- The containment berm will have 3:1 side slopes with a 5-foot top width and extend ~5,300 linear feet.
- Most of the containment berm will be built to 494.2 (~14 feet high). A section of the berm near the drainage creek will be built to 487.8. The berm elevation was selected to avoid impacts to other leveed areas (City of Canton 487.8 per 2010 O&M Manual and Hunt Lima Levee District 494.2 per 2012 O&M Manual).
- The MODNR (Paul Simon) has concurred that “dams” under 35 feet do not require a permit.
- About 74 acres will be acquired with about 36 acres used for placing dredged material. The area above the small creek that crosses the site and the site’s southeast corner will not be used for placement because of potential cultural impacts found during a recent survey. The placement capacity of the site is 440,000 CY, which when full would be ~2 feet from the top of the containment berm (elevation 492).
- The dredge’s pipeline and return water from placement operations will pass under the railroad bridge that crosses a small-unnamed creek. The return water will then enter Buck Run and flow back to the river below Lock and Dam 20. An easement or other real estate agreement will be needed with the railroad for these actions. During placement operations, special attention will be needed to guard against backing up return water onto the road and/or fields located west of the site.

**Natural Resources.** Because of its exclusive use in private agricultural production, this site contains no known critical wildlife habitats. Minor natural resource impacts at this site are anticipated. However, crop field/old field habitats are abundant and available on this reach of the Mississippi River. Use of this site would result in no off-site erosion or migration of dredged material. Placement at this site was evaluated for impacts to waters of the United States under the Clean Water Act (CWA). The dredged solids would not be the dredging component that would trigger CWA evaluation, as they are not being placed in the waters of the United States. However, the return water generated from the hydraulic dredging process is considered dredged or fill material and is evaluated in the CWA 404(b)(1)Evaluation.

**Hydraulic Assessment.** A hydraulic analysis was not performed at this site because it is outside the floodway, which indicates that the impact to water surface profiles, conveyance and storage due to placing material is negligible.

**Evaluation of the Operational Feasibility of the Dredged Material Placement Site.**

Dredged material would be placed by hydraulic means with the return water going into a small creek on site, under railroad tracks, and then into Buck Run before reaching the Mississippi River. Adequate water depths and bankline access are available to reach the site. The pipeline from the dredge will enter the placement site under the same railroad tracks that the return water uses.

**Socioeconomic Impacts.** There would be no adverse impacts on area sand and gravel firms, area employment, or community cohesion. No public opposition is expected. No residential or farmstead relocations would be required, but 68.3 acres of prime farmland would be removed from production (Natural Resources Conservation Service (NRCS) rating was 173 out of a possible 260 with 160 the lowest rating for prime designation). Utilization of this site

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would not adversely impact life health or safety, property values/tax revenues, or the aesthetic resources of the area. There would be no permanent impacts on noise levels in the area. Maintenance of the navigation channel provides positive impacts to public facilities and services.

**Site 343.4T – Thalweg** (hydraulic or mechanical dredging; Figure ES-1 and App E, Plate C-105)

**Location.** The thalweg is located immediately upstream of Lock and Dam 20 in Lewis County, Missouri, between RM 343.1 and 343.4 of the main channel. The site is in Section 25 of Township 62 North, Range 6 West of the 5th Principal Meridian.

**Ownership.** This site is privately owned, but Navigational Servitude applies to areas below the ordinary high water mark (481 ft MSL 1912).

**Size and Capacity.**

- Dredged material would be placed upstream of tainter gates 1 through 11 of Dam 20. Placement will not go upstream of the lock chamber entrance. This area is currently deeper than 20 feet below flat pool.
- Top elevation of thalweg placement shall not be higher than the sill of the tainter gates (459.0). This is about 17.5 feet below flat pool.
- Thalweg has a capacity of 50,000 CY per event. Pre-dredging survey prior to additional placement actions is required to determine if there is sufficient capacity to reuse the site. Typically, a high water event is needed to move the material, which is then incorporated into the moving bedload. In addition, OSIT approval and concurrence from OD that previous placement actions were not detrimental to operation of the Lock and Dam would be required before additional dredged material is placed in the thalweg.

**Natural Resources.** This site has not been previously used for dredged material placement. Conditions at this site are dynamic due to its high flows, depth (>20 feet), and proximity to the Lock and Dam. Because of this, the site has very limited wildlife value.

**Hydraulic Assessment.** Previous hydraulic studies of thalweg placement (Rock Island District 2005) indicate that dredged material be placed in the deepest part of the thalweg at a depth of at least 20 feet below flat pool. The deepest thalweg site upstream of L/D 20 is in front of the tainter gates 1 through 11 in the area west of the roller gates. The tainter gates in this area operate with minimal gate opening to minimize the eddy action that pulls tows back into the lock chamber while the tows are exiting the lock chamber. Similar gate operation would be required to minimize eddy action so that the dredged material would not deposit in the lock chambers.

**Evaluation of the Operational Feasibility of the Dredged Material Placement Site.** This site is operationally feasible for hydraulic and mechanical placement and requires no site preparation. Return water is immediately discharged back into the river.

**Socioeconomic Impacts.** There would be no adverse impacts on area sand and gravel firms, area employment, or community cohesion. No public opposition is expected. No residential or farmstead relocations would be required. Utilization of this site would not adversely impact life health or safety, property values/tax revenues, or the aesthetic resources of the area. There would be no permanent impacts on noise levels in the area. Maintenance of the navigation channel provides positive impacts to public facilities and services.

**3.4. Alternative Plan Development.** Alternative plans were developed using the available placement sites discussed in Section 3.3. Sections 3.4.1 through 3.4.6 describe plan development and the alternative screening and selection process utilized to determine the “Preferred plan.” The Preferred Plan is considered as the least costly solution consistent with sound engineering practice and meeting all Federal environmental standards. Further discussion of the Preferred Plan can be found in Section 3.5.

**3.4.1. Preliminary Alternative Screening Process.** The PDT reviewed the potential sites to determine which potential site or group of potential sites met the 40-year plan capacity. The PDT and the OSIT decided to screen multiple alternatives using the following criteria:

- For operational flexibility, responsiveness, efficiency and cost effectiveness, each potential alternative considers both hydraulic and mechanical dredging options for each dredge cut.
- Hydraulic placement sites must be within close proximity to the dredge cuts.
- Access for each placement site should provide sufficient flexibility as appropriate so additional shoaling, dredging, or other changes in the river would not reduce or eliminate site access and/or capacity.
- Potential alternatives must consider the timing and order of dredging and placement events to ensure consistent comparison and reliable implementation.
- Provide sufficient placement capacity to meet the estimated 40-year dredging volume (1 million CY).
- Consider beneficial use potential, whether for environmental restoration or removal for fill or other uses

**3.4.2. Evaluation of Alternative Plans.** Out of the 16 potential sites evaluated for placement, only 5 remain as feasible placement sites. Site 343.5R - Historic Bankline will be included with each alternative, but would only be used with OSIT recommendation. From the five feasible sites, six potential alternatives, including the no action alternative, were identified using the above alternative screening criteria. In order to hydraulically dredge material, it is essential that placement sites be located within 10,000 ft (~6,000 ft. floating pipe, ~4,000 ft. shore pipe) or less of the dredge cut (Figure 3).

**3.4.2.1. Alternative 1 - No Action.** The No Action Alternative is to be considered along with the alternatives developed and documented in this report. The No Action Alternative has in the past been interpreted two different ways. One interpretation is that no dredging is conducted at all, which has been referred to as the No Project Alternative. Without dredging, it is probable that shoaling of the main channel would occur, resulting in the closure of the channel to commercial navigation. The No Project Alternative is not feasible because it is contrary to the congressional mandate to maintain a commercial navigation channel.

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The second interpretation is that dredging would continue as has been done in the past without a new plan for dredged material placement. This interpretation has been referred to as the No Change Alternative. Complying with the Federal mandate to maintain commercial navigation, the District would continue to place material on historic placement sites in small amounts to provide as much channel as possible, which would continue the high-risk conditions present to navigation and infrastructure. The existing historic placement sites are not able to accept the anticipated amount of future dredged material without causing impacts to aquatic natural resources as compared to more suitable planned and constructed placement sites away from the bankline.

For the remainder of this report, the No Action Alternative will be read as “no change” and “business as usual.” This essentially means that no new dredged material placement plan for the Lock 20 Upper dredge cut would be introduced. The No Action Alternative will be considered as Alternative 1.

**3.4.2.2. Alternative 2. Site 344.7R – White Island  
Site 343.8L - Below Wing Dam  
Site 343.4R - Canton Ag Field  
Site 343.4T - Thalweg**

This alternative meets all the screening criteria, provides over 40 years of placement capacity and adaptive management, providing for future flexibility. Total capacity of the four sites is 1.03 million CY.

**3.4.2.3 Alternative 3. Site 344.7R – White Island  
Site 344.1L – Between Wing Dam  
Site 343.8L – Below Wing Dam  
Site 343.4T - Thalweg**

This alternative meets all the screening criteria except, beneficial use of the material is not possible. It also meets the objectives of a minimum of 40 years of placement capacity and adaptive management, providing for future flexibility. Total capacity of the four sites is 950,000 CY.

**3.4.2.4 Alternative 4. Site 344.7R – White Island  
Site 344.1L – Between Wing Dams  
Site 343.4R - Canton Ag Field  
Site 343.4T – Thalweg**

This alternative meets all the screening criteria, provides over 40 years of placement capacity and adaptive management, providing for future flexibility. Total capacity of the four sites is 1.19 million CY.

**3.4.2.5 Alternative 5. Site 344.1L – Between Wing Dams  
Site 343.8L – Below Wing Dam  
Site 343.4R - Canton Ag Field  
Site 343.4T – Thalweg**

This alternative meets all the screening criteria, provides over 40 years of placement capacity and adaptive management, providing for future flexibility. Total capacity of the four sites is 1.05 million CY.

**3.4.2.6 Alternative 6. All Potential Sites**

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This alternative meets all the screening criteria, provides over 40 years of placement capacity and adaptive management, providing for future flexibility. Total capacity of the five sites is 1.39 million CY.

**3.4.3. Other Alternatives Evaluated.** Other combinations of feasible sites did not provide the needed 40-year placement capacity (1 million CY).

**3.4.4. Flood Profile.** Figures 26 through 29 and Table 5 in Appendix B, *Hydraulic Data*, show water surface profiles on the Mississippi River between RM 343.2 and RM 351.3 for the 1 and 50 percent exceedance events. These frequency events are the basis of the hydraulic model analysis used to evaluate the potential placement sites in the Lock 20 Upper DMMP reach. Alternatives 1 and 2 were modeled (for wing dams restored) and showed negligible impacts to the Mississippi River water surface profile (less than 0.04 feet). The analysis indicates that the impact to water surface profile, conveyance and storage of the potential placement sites in the Lock 20 Upper DMMP reach is negligible.

**3.4.5. Water Quality.** Implementation of any alternative would not significantly affect water quality and would improve the integrity of an authorized navigation system as explained in the Clean Water Act Section 404(b)(1) Evaluation found in Appendix A, *Environmental Assessment*.

**3.4.6. Hazardous, Toxic and Radioactive Waste.** A Phase I HTRW Environmental Site Assessment was performed for the Lock 20 Upper DMMP in March 2015 for sites 343.4R-Canton Ag Field, 344.7R-White Island and 344.1L-Between Wing Dams. The information was obtained through site reconnaissance, informal interviews, and a review of maps and aerial photographs, District records and Federal and state environmental databases. These screening methods have been selected based on the particular nature of the proposed placement sites and the characteristics of the dredged material.

The report revealed no evidence of a Recognized Environmental Condition that could potentially impact the project areas; therefore, no further HTRW Environmental Site Assessments are recommended. A full report of the HTRW Analysis is available upon request (Attn: CEMVR-EC-DN).

If any evidence of recognized environmental conditions is discovered during construction activities, operations should cease until the District's Environmental Engineering Section is able to reassess the project area.

**3.5. Selection of Preferred Plan.** Alternative 6-All Potential Sites is the Preferred Plan for the Lock 20 Upper DMMP. Alternative 6 provides the greatest flexibility in placement locations and exceeds the minimum placement capacity (1 million CY), which will safeguard against the possibility of increased dredging volumes over the 40-year life of the DMMP or should a site become unusable prior to placement due to changed site conditions. Alternative 6 was selected over Alternative 3 because of its beneficial use potential, which could be significant enough to preclude the use of other in water sites after completing acquisition of Site 343.4R-Canton Ag Field. Alternative 3 also was not selected as the Preferred Plan because it was slightly under the desired 1 million CY placement capacity and it had no beneficial use potential.

The Rock Island District has used an Evaluation Matrix to evaluate alternatives and establish the Base Plan or Preferred Plan. The matrix uses six weighted categories; dredging/placement costs (weight factor 30), natural resource impacts (w.f. 30), beneficial use potential (w.f. 10), recreation potential (w.f. 10), cultural resource impacts (w.f. 10), and social impacts (w.f. 10). The values assigned each

category are multiplied by their weight factor and the alternative with the highest total points becomes the Preferred Plan. A detailed matrix evaluation was not done because estimated costs for dredging and material placement were not established. However, by making generalizations about the alternative sites a quasi matrix evaluation can be done. The in water and bankline placement sites would have similar costs and impacts for all categories except beneficial use potential, which is low. Site 343.4R-Canton Ag Field has costs for acquisition and higher placement costs, but lower natural resource impacts and high beneficial use potential. Based on these site generalizations, Site 343.4R-Canton Ag Field drives selection of the Preferred Plan alternative because while it may be slightly higher in placement cost, it would receive the best natural resource impact and beneficial use potential values. Site 343.4R-Canton Ag Field appears in 5 of the 6 alternatives, so selection of the Preferred Plan comes down which of these 5 alternatives best meets the future dredging needs. Alternative 6 was selected based on the description above.

## SECTION 4: DESCRIPTION OF THE PREFERRED PLAN

**4.1. Description of Site Usage.** The Preferred Plan has sufficient capacity to meet and exceed the estimated 40-year volume of dredged material. This capacity may increase following implementation based on how much dredged material is removed from Site 343.4R-Canton Ag Field for beneficial use by commercial, government, and private concerns. Acquisition of Site 343.4R-Canton Ag Field will be pursued following approval of this DMMP and the subsequent Real Estate Design Memorandum (REDM). An initial 50,000 CY placement event at Site 343.4T-Thalweg will be closely monitored to ensure no impacts occur to dam operation, navigation, or downstream side channel and backwater areas. Further use of the thalweg may occur with approval from the OSIT and Rock Island District's Operations Division. Placement actions at Site 344.7R-White Island and Site 344.1L-Between Wing Dams may require additional mussel surveying should placement occur after July 2017. Site 343.5R-Historic Bankline is considered full at this time, but may be used in the future with OSIT approval (no capacity was included in the Preferred Plan). The Preferred Plan is shown on Figure 3.

Priority of site use (presuming site acquisition and further investigations at the thalweg site were complete) is as follows:

- Site 343.4R - Canton Ag Field
- Site 343.4T – Thalweg
- Site 344.7R – White Island
- Site 343.8L – Below Wing Dam
- Site 344.1L – Between Wing Dams

**4.1.1. Beneficial Use.** Site 343.4R-Canton Ag Field has excellent road access from U.S. Highway 61 (business route) that will allow for potentially heavy beneficial use.

**4.1.2. Design and Construction Considerations.** Design consideration assessed the location of the dredge cuts and the capability of reaching placement sites with the dredged material. Historical dredge cut information was checked to determine the range of potential placement sites within the reach. Each potential placement site of the Preferred Plan was designed to provide adequate capacity and flexibility to handle the uncertainty of actual dredging requirements.

No recognized environmental concerns were identified at any potential sites; therefore, no further HTRW investigations are warranted at this time. If any recognized environmental conditions are identified during construction of placement of dredged material, work should cease immediately.

Plans and specification documentations shall be prepared to support the implementation of the Preferred Plan. Engineering considerations for hydraulics and hydrology, site preparation, dredged material placement, and post-placement considerations are provided in the following sections.

#### **4.1.2.1. Site Preparation.**

**Land Placement.** Site 343.4R-Canton Ag Field would be prepared for dredged material placement in accordance with subsequent plans and specifications to support hydraulic dredged material placement operations and maintenance. Overall, the site preparation consists of delineating the site boundaries for the construction limits. Containment berms would be constructed to control water release from the hydraulic dredging operations and to ensure that no dredged material is allowed offsite per the 401 permit. Berms would be constructed of resident soil from the placement site by first stripping the topsoil, stockpiling the topsoil for capping at a later date and forming a berm using the soils just below the topsoil. Berm heights would be at 494.2, except for a section of berm constructed to 487.8 that allows for drainage on the placement site's north end. See Appendix E, *Design Plates*).

**Water Placement.** All other placement sites should have boundaries delineated or marked before placement activities commence.

**4.1.2.2. Access Area.** All placement sites would be accessed by the river during dredging operations. Site 343.4R – Canton Ag Field would also have land access. The avoidance of wetlands and other environmentally sensitive areas would follow guidelines specified in Appendix A, *Environmental Assessment*. All access areas would be restored to their original design and grade after dredging operations have been concluded.

**4.1.2.3. Dredged Material Placement.** All dredged material placement would be placed within the construction limits, i.e., heights, widths and final shaping, as shown in the Design Plates located in Appendix E and in future plans and specifications. In addition, dredged material placement activities must avoid above ground and buried utilities.

**4.1.2.4. Return Water from Hydraulic Dredging.** Return water from Site 343.4R-Canton Ag Field would exit the containment site via gravity feed using constructed ditches, swales or pipelines. Precise method and location for return water would vary depending on location of each dredging event. The construction of berms within the placement sites would be used to direct the flow of the return water to the outlet(s). Minimal ponding of water would take place within the containment sites. Once dredging operations are completed, ditches and swales would be cleared of any accumulated dredged material and returned to the placement site. Any pipeline used for return water would be removed at the completion of dredging operations. Return water from the other preferred plan sites would immediately return to the river.

**4.1.2.5. Post-Placement Considerations.** All placement site shaping and grading at Site 343.4R-Canton Ag Field must be completed soon after each dredging event has finished to ensure proper drainage and slope stability. Resident topsoil used in constructing the containment berms would be used to cap the placement site when the placement site is considered full, i.e. capacity reached. Resident soil

would provide a more suitable growth medium than the dredged material. All access areas would be restored to their former grade and design. As-built drawings would be created as specified in the plans and specifications. Until this site is considered full, removal of material for beneficial uses will be encouraged and supported. Shaping of material is not required for the remaining water placement sites, but surveying may be required to determine disposition of material following placement and/or remaining placement capacity prior to additional placement actions.

**4.1.2.6. Operations and Maintenance Considerations.** An O&M Manual would be produced for the Preferred Plan during the implementation phase of the Project. Operational considerations for each site are included in Section 3.3, *Description of Potential Sites for Further Study*. Maintenance scope may include items such as mowing, spraying, minor weeding and reshaping of material, relocating misplaced material as needed, and any other work that may be required during the plan life (additional preparation before later dredging events).

**4.1.2.7. Adaptive Management.**

**Site 344.1L-Between Wing Dams.** Initial investigations found a quality mussel bed at this location. Direct impacts to the mussel bed will be avoided by placing dredged material no closer than 250 feet offshore. However, since it is unknown whether the dredged material may be carried into the mussel bed during high flow events, the area will be monitored for indirect and or secondary impacts to the mussel assemblage. Monitoring using bathymetric surveys and sediment grab samples will determine if material is migrating. If it is determined that the material has moved into the mussel bed, near-shore mussel surveys would be conducted to determine impacts. If future monitoring reveals that the mussel bed is negatively impacted, coordination with State and Federal natural resource agencies would take place and potential compensatory action would commence.

**Site 343.8L-Below Wing Dam.** Initial investigations found a quality mussel bed immediately upstream of this location at Site 344.1L-Between Wing Dams. This site has similar substrate near-shore and the potential for material drifting into the bed is more likely than at Site 344.1L. As with Site 344.1L, Site 343.8L will be monitored through bathymetric surveys and sediment grab samples to determine if dredged material is migrating towards the shore and impacting mussel beds. If it is determined that the material has moved into the mussel bed, near-shore mussel surveys would be conducted to determine impacts. If future monitoring reveals that the mussel bed is negatively impacted, coordination with State and Federal natural resource agencies would take place and potential compensatory action would commence.

**Site 343.4T-Thalweg.** Placement within the thalweg may cause a shoaling problem in a new location of the river when the material moves during high water events. Impacts to Lock and Dam 20's downstream approach and lock chamber may occur should the dredged material drop out in the chamber and/or impede access to the lock. While placement in the thalweg site would be done with guidance from the Corps' Hydraulics Branch and Mississippi River Project Office, there is a possibility that the material may move below the dam and deposit within the approach area to the lock. Post placement, the areas of concern will be monitored through bathymetric surveys to determine negative impacts to navigation. Should shoaling occur the material may have to be re-dredged and placed at another approved DMMP placement site. Additional placement events may be modified or eliminated should impacts occur.

## **4.2. Real Estate**

**4.2.1. Plan Requirements.** There are 5 placement sites within the Preferred Plan, one site, Site 343.4R-Canton Ag Field, will require acquisition of real estate interests. Fee title would be acquired for the ~74 acre area shown on Figure 3 and an easement from the adjacent railroad for return water and the dredge pipeline route is needed prior to dredged material placement activities. Following approval of this DMMP report, an REDM will be prepared to provide further details and the needed authorization to proceed with the required real estate actions.

**4.2.2. Real Estate Regulations and Policy.** The following is general information regarding District dredged material placement and the ownership and disposition of dredged material after it has been removed from the channel and placed in the placement site.

**4.2.2.1. Dredged Material Placement on Non-Federal Land.** Dredged material placed on land not owned or administered by the Corps is the property of the landowner, unless there is a written agreement with the landowner that specifies that other parties can remove the material. If the Corps desires to place dredged material on non-Federal land and be able to remove, sell, or allow others to remove the material, an agreement between the landowner and the Corps, which contains the necessary rights and conditions, must be negotiated.

**4.2.2.2. Dredged Material Placement on Federal Land.** Dredged material placed on land owned by the United States is the property of the United States, unless there is a written agreement with another party that allows them to remove the material. If the material is placed on Federal land administered by the Corps, it can be removed or used by the Corps in accordance with applicable regulations and in compliance with the DMMP. If the material is placed on Federal lands administered by another Federal agency, the material becomes the property of that agency unless there is a written agreement with that agency that others can remove the material.

**4.2.2.3. Sale or Removal of Dredged Material.** Dredged material stockpiled on property of the United States remains the property of the United States under the control of the Corps. The Federal Property Management Regulations and the Corps' Real Estate Regulations both indicate that gravel, sand or stone that has been excavated by or for the Federal Government is classified as personal property of the United States. Dredged material stockpiled for beneficial use may be given away free for the hauling. Property, such as dredged material, also can be donated to eligible agencies or groups in certain circumstances.

**4.2.2.4. Disposal of Timber.** If the use of any of the sites would require removal of any forest resources on Corps land, this should be coordinated with the Plan's Forester for a determination if there is any merchantable timber to be sold. This determination should be made well in advance to allow adequate time to accomplish a sale of the timber, if needed.

**4.3. Implementation Requirements and Schedule.** The implementation schedule for the Preferred Plan is shown in Table 4. Site implementation may vary based on funding and river conditions.

**Table 4.** Implementation Schedule

<b>Event</b>	<b>Scheduled</b>	<b>Funded FY</b>
Real Estate Design Memorandum	FY 16	FY16
Tract Mapping/Segment Map	FY16	FY16
Acquire Real Estate	FY16 – FY17	FY16 – FY17
Plans and Specifications	FY16 – FY17	FY16 – FY17
Award Contract	FY17	FY17
O&M Manual	FY17	FY17
Complete Implementation	FY18	FY18

**4.4. Consistency with the Preferred Plan.** Engineering Regulation 1105-2-100 provides the overall direction for the Corps to place dredged material from maintenance dredging of navigation projects in the least costly manner, consistent with sound engineering practice and meeting all Federal environmental standards, including standards established by Section 404 of the CWA of 1977, as amended. This constitutes the “Preferred plan” for the navigation purpose.

#### **4.5. National Environmental Policy Act Documentation**

**4.5.1. Resource and Regulatory Coordination and Compliance.** The natural resource considerations for each placement site are covered in Section 3.3, *Description of Potential Sites for Further Study* and in Appendix A, *Environmental Assessment*. The Finding of No Significant Impact in Appendix A lists the factors that were considered in determining that an Environmental Impact Statement was not required. No mitigation actions are required for this DMMP.

**4.5.2. Permits and Requirements.** The completion and public coordination of the Environmental Assessment and the signing of the Finding of No Significant Impact, both included as Appendix A, fulfill National Environmental Policy Act compliance.

An Illinois DNR, Office of Water Resources floodplain permit would be acquired prior to placement of dredged material.

The District would coordinate and obtain CWA Section 401 water quality certification from the States of Illinois and Missouri prior to placement of dredged material.

CWA Section 404(b)(1) compliance is met with the issuance of the attached Appendix A and signing of the Findings of Compliance contained therein. Dredging permits will be issued prior to project implementation.

**4.5.3. Archaeological and Historic Preservation Act.** The District determined that no historic properties would be affected by dredging or dredged material placement in full compliance with the Archaeological and Historic Preservation Act (Appendix A).

**4.5.4. National Historic Preservation Act.** The District determined that no historic properties would be affected by dredging or dredged material placement at sites RM 344.1L-Between Wing Dams and RM 344.7R-White Island. in accordance with the National Historic Preservation Act and its implementing regulations 36 CFR Part 800. The District determined that dredged material placement at site RM 343.4R-Canton Ag Field would have no adverse effect on sites 23LE1414 and 1416 based on avoidance measures as proposed and on the determination that sites 23LE1415,

23LE1417, and 23LE1418 were not eligible for inclusion on the National Register of Historic Places. This determination was provided to the Missouri Department of Natural Resource Historic Preservation Program, the Illinois Historic Preservation Agency (IHPA), and interested federally recognized tribes by letter dated July 24, 2015. The District received concurrence with this determination from the IHPA by letter dated August 6, 2015 (IHPA LOG #001072815), and the Missouri State Historic Preservation Officer by letter dated August 17, 2015 (SHPO Log Number 012-LE-15) (Appendix A).

#### **4.6. Results of Coordination with Local, State and Federal Agencies**

**4.6.1. Coordination.** Letters of coordination from Federal and state agencies are provided in Appendix A, *Environmental Assessment*. These letters help document the review process to identify and evaluate the nature and extent of significant environmental resources, historical properties, and other economic or social resources to discuss potential future conditions, both with, and without, this DMMP.

**4.6.2. On-Site Inspection Team (OSIT).** The OSIT is a coordinating team that was formed during the 1970s. It consists of state and Federal natural resource and regulatory agency representatives, as well as the District. The purpose of the OSIT is to discuss and recommend alternatives for the placement of dredged material. The OSIT is involved in the plan formulation and continued monitoring and implementation of this DMMP. Any deviations from this plan would be coordinated through the OSIT chairperson.

**4.6.3. River Resources Coordination Team (RRCT).** Also formed in the 1970s, the RRCT is an interagency coordinating committee that makes recommendations to the District Engineer for the DMMP site plans. This team approves the DMMP reports as part of the planning process.

**4.6.4. Periodic Review.** The DMMP documentation is subject to periodic review and subsequent modification. A periodic reevaluation of the individual management plans may be required due to changes in regulations, significant changes in the navigation channel, economic or environmental conditions, or changes in dredge plant availability or capability. Reevaluation also would be required when the preferred dredged material placement alternative approaches the end of its useful capacity. The District may initiate a reevaluation, or the OSIT or other participating Federal or state agency may request a reevaluation. Justification for the reevaluation would be reviewed by the District to determine if reevaluation is warranted. Modifications would be subject to the same review and approval process as the DMMP.

## **SECTION 5: CONCLUSION**

The Lock 20 Upper DMMP addresses estimated dredged material placement needs for the next 40-years. Dredging is required in the DMMP area to provide a safe and adequate channel for river navigation. Potential placement sites were thoroughly investigated and evaluated through the DMMP process. Six alternatives, including the No Action Alternative, were considered to meet a dredging capacity requirement of 1,000,000 CY. Alternative 6-All Potential Sites was selected as the Preferred Plan for the Lock 20 Upper DMMP; consisting of the following placement sites:

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Site 344.7R – White Island	340,000 CY
Site 344.1L – Between Wing Dams	360,000 CY
Site 343.8L – Below Wing Dam	200,000 CY
Site 343.4T - Thalweg	50,000 CY
Site 343.4R - Canton Ag Field	440,000 CY

The Preferred Plan exceeds the minimum placement capacity but, provides the greatest flexibility in placement locations without increasing placement costs, safeguards against the possibility of increased dredging volumes over the 40-year life of the DMMP, and allows for adaptive management to occur in the future.



**DREDGED MATERIAL MANAGEMENT PLAN**

**UPPER MISSISSIPPI RIVER**

**POOL 20**

**RIVER MILES 343.2-344.3**

**LOCK 20 UPPER DREDGE CUT**

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**DRAFT REPORT**

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**RECOMMENDATION**

I have weighed the outputs to be obtained from full implementation of this Dredged Material Management Plan and have considered the various alternatives proposed, impacts identified, and overall scope. In my judgment, this Plan justifies the expenditure of Federal funds. I approve the selection of Alternative 6-All Potential Sites as the Preferred Plan as it meets the criteria of being cost effective, environmentally acceptable, and operationally feasible.

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Date

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Craig S. Baumgartner  
Colonel, U.S. Army  
Commander & District Engineer



**DREDGED MATERIAL  
MANAGEMENT PLAN**

**UPPER MISSISSIPPI RIVER  
POOL 20  
RIVER MILES 343.2-344.3**

**LOCK 20 UPPER DREDGE CUT**

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**PUBLIC REVIEW DRAFT**

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**UPPER MISSISSIPPI RIVER  
POOL 20  
RIVER MILES 343.2-344.3**

**LOCK 20 UPPER DREDGE CUT**

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# **DREDGED MATERIAL MANAGEMENT PLAN**

## **UPPER MISSISSIPPI RIVER POOL 20 RIVER MILES 343.2-344.3**

### **LOCK 20 UPPER DREDGE CUT**

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## **APPENDIX A ENVIRONMENTAL ASSESSMENT**

### **1. AUTHORITY AND PURPOSE**

The Rivers and Harbors Acts of July 3, 1930; February 1932; and August 30, 1935; and a Resolution of the House Committee on Flood Control of September 18, 1944, authorized the 9-foot Navigation Channel project, and subsequent channel maintenance dredging in support of continued project operation.

Under the authority delegated by the Secretary of the Army and in accordance with Section 404 of the Clean Water Act (CWA) of 1977, as amended, the Corps regulates the discharge of dredged or fill material into waters of the United States. In addition, the Corps is guided by the dredging regulations published in the Code of Federal Regulations (CFR), 33 CFR Parts 335-338. This CFR includes language that encourages the Corps to pursue a Long-Term Management Strategy for dredged material placement. The regulation states, "District Engineers should identify and develop dredged material management strategies that satisfy the long-term (greater than 10 years) needs for Corps projects."

The Corps regulation providing guidance for the conduct of Civil Works Planning Studies is contained in Engineering Regulation (ER) 1105-2-100. Plans are to be developed to meet dredging needs for a minimum of 20 years. In order to allow for long-term flexibility, the Rock Island District's preference is to develop a minimum of 40-year plans, as in this case. The regulation also requires an assessment of the potential for beneficially using dredged material for numerous purposes including environmental restoration.

One of the missions of the U.S. Army Corps of Engineers (Corps), Rock Island District (District) is to provide safe, reliable, efficient, and environmentally sustainable waterborne transportation systems. Channel maintenance, including dredging and dredged material placement, supports this mission. The purpose of a Dredged Material Management Plan (DMMP) is to find suitable long-term placement alternatives for dredged material as described in the *Long-Term Management Strategy for Dredged Material Placement, Upper Mississippi River Miles 300.0-614.0, Main Report* (1990). Dredged material placement alternatives are developed and recommended for implementation in a DMMP report.

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The DMMP which necessitates preparation of this Environmental Assessment (EA) is a single-purpose project that focuses on the Lock 20 Upper dredge cut and its potential placement sites. This dredge cut has limited dredged material placement capacity and an imminent need to dredge approximately 500,000 cubic yards (CY).

To the extent possible, the District has projected a channel maintenance dredging need of 1,000,000 CY for the next 40 years at the Lock 20 Upper cut based on historic dredging and current site conditions. Currently there is an immediate need to dredge 500,000 CY that impacts the upstream lock approach. The remaining capacity is based on a projected need for 8 events of 62,500 CY over the 40 year project life. It is important to note that these projections are simply an estimate of future dredging needs. Because of the dynamic nature of the river, actual dredging needs could differ from those projected. Currently, historic bankline placement just upstream of the lock is the only placement site available. This site lacks capacity for long-term placement as well as the planned large initial dredging event.

## **2. PROJECT LOCATION AND DESCRIPTION**

The *Lock 20 Upper Dredged Material Management Plan* (DMMP) project area is located on the Upper Mississippi River (UMR) between river miles (RM) 343.2 and 344.3 immediately upstream of Lock and Dam 20 and .5 miles upstream of Canton, Missouri, in Adams County, Illinois, and Lewis County, Missouri. Material dredged from the Lock 20 Upper dredge cut consists predominantly of medium to fine brown sand and historically has been placed along the right descending bank, just upstream of the lock guide wall.

Maps of the project area and location of proposed placement sites are included in Appendix A of this EA.

## **3. ALTERNATIVES**

Of the 16 potential sites initially investigated for placement (see the Main Report for a full description of all initially investigated alternatives), only 5 remain as feasible placement sites. Site 343.5R - Historic Bankline will be included with each alternative, but would only be used with OSIT recommendation. From the feasible sites 6 potential alternatives, including the no action alternative, were identified using the screening criteria described in detail in the Main Report. In order to hydraulically dredged material, it is essential that placement sites be located within 10,000 ft (~6,000 ft. floating pipe, ~4,000 ft. shore pipe) or less of the dredge cut.

**A. New Feasible Placement Sites.** Potential placement sites that met overall criteria and Project objectives for further study are Site 344.7R – White Island, Site 344.1L – Between Wing Dams, Site 343.8L-Below Wing Dams, Site 343.5-Historic Bankline (with OSIT recommendation), Site 343.4R – Canton Ag Field, and Site 343.4T-Thalweg. The following descriptions provide approximate site dimensions and capacities, and represent the placement sites without river access, land access or return water areas.

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**Site 344.7R – White Island** (hydraulic and mechanical dredging) ( figure 1). White Island is located ~2 miles north of Canton, Missouri, in Adams County, Illinois, between RM 344.8 and 345.5R. The site is in Section 12 of Township 2 North, Range 10 West of the 4<sup>th</sup> Principal Meridian. White Island is privately owned; however, navigational Servitude applies to bankline sites below ordinary high water. Placement would extend along the east bank from the upper most wing dam, south to the downstream end of the Island. The site widens from about 165 feet wide from the edge of the island on the upstream end to about 330 feet from the edge of the island on the downstream end. The approximate river bottom elevation once away from the bank is 470. Acreage is around 33 acres. Capacity is about 340,000 CY. This site is operationally feasible for hydraulic and mechanical placement and requires no site preparation. Return water is immediately discharged back into the river.

**Site 344.1L – Between Wing Dams** (hydraulic and mechanical dredging) (figure 1). The Between Wing Dams site is located ~1 mile north of Canton, Missouri, in Adams County, Illinois, between RM 344.0 and 344.2L. The site is in Sections 13 and 24 of Township 2 North, Range 10 West of the 4<sup>th</sup> Principal Meridian. This site is privately owned, but Navigational Servitude applies to areas below the ordinary high water mark (481 ft MSL 1912). Material would be placed between wing dams #25, #26, and #27 to a top elevation of 470 ft (MSL 1912). Material would be placed a minimum of 250 feet from the Illinois bank line to avoid impacts to an existing mussel bed. The maximum height, elevation 470, is lower than the adjacent wing dams and was selected after flow analyses by EC-H (see hydraulics assessment below). River bottom elevation varies in this area, but averages around 456 ft MSL 1912. The dredged material would be allowed to slope at 3H:1V and placed so that the slope ends at the toe of the wing dams, 250 feet from the Illinois shore, and/or meets existing ground. The wing dams were reconstructed in the spring of 2015 as follows:

<b>RM</b>	<b>Wing Dam Number</b>	<b>Design Length (ft)</b>	<b>Design Elevation (ft MSL 1912)</b>	<b>Top Width (ft)</b>	<b>Side Slope (#H:1V)</b>
344.5L	25	620	473.30	10	1.50
344.3L	26	1,220	473.20	10	1.50
344.0L	27	1,350	473.00	10	1.50

Approximate acreage between these three wing dams is 50.3 acres (17.3 acres between upper two, 33 acres between lower two). Total capacity between the three wing dams is 360,000 CY (110,000 CY between upper two, 250,000 CY between lower two). This site is operationally feasible for hydraulic and mechanical placement and requires no site preparation. Return water is immediately discharged back into the river.

**Site 343.8L – Below Wing Dams** (hydraulic and mechanical dredging). The site is located ~.5 miles upstream of Lock and Dam 20 and immediately below Site 344.1L – Between Wing Dams in Adams County, Illinois, between RM 343.6 and 344.0L. The site is in Section 24 of Township 2 North, Range 10 West of the 4<sup>th</sup> Principal Meridian. This site is privately owned, but Navigational Servitude applies to areas below the ordinary high water mark (481 ft MSL 1912). This site is operationally feasible for hydraulic and mechanical placement and requires no site preparation. Return water is immediately discharged back into the river. Approximate acreage is 18 acres and capacity is estimated at approximately 200,000 cubic yards.

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**Site 343.4R – Canton Ag Field** (hydraulic dredging). The Canton Ag Field site is located ~.5 miles north of Canton in Lewis County, Missouri, between RM 343.2 and 343.9R. The site is in Sections 23, 24, 25 and 26 of Township 62 North, Range 6 West of the 5th Principal Meridian. This site has one private owner. See Section 4.2 of the Main Report for further information. A containment berm will likely be constructed from soil on site (116,000 CY). During plans and specs, borings will be done to assure material is sufficient for berm construction. If it is insufficient, sand from the dredge cut will be used. Existing ground is approximately 480 ft MSL. The containment berm will have 3:1 side slopes with a 5 foot top width and extend ~5,300 linear feet. Most of the containment berm will be built to 494.2 (~14 feet high). A section of the berm near the drainage creek will be built to 487.8. The berm elevation was selected to avoid impacts to other leveed areas; City of Canton 487.8 per 2010 O&M Manual and Hunt Lima Levee District 494.2 per 2012 O&M Manual. About 74 acres will be acquired with about 46 acres expected to be used for placing dredged material. The placement capacity of the site is 440,000 CY, which when full would be ~2 feet from the top of the containment berm (elevation 492). The dredge’s pipeline and return water from placement operations will need to pass under the railroad bridge that crosses a small unnamed creek. The return water will then enter Buck Run and flow back to the river below Lock and Dam 20.

**Site 343.4T – Thalweg** (hydraulic or mechanical dredging). The thalweg is located immediately upstream of Lock and Dam 20 in Lewis County, Missouri, between RM 343.1 and 343.4 of the main channel. The site is in Section 25 of Township 62 North, Range 6 West of the 5th Principal Meridian. This site is privately owned, but Navigational Servitude applies to areas below the ordinary high water mark (481 ft MSL 1912). Maximum capacity for a single event is 50,000 CY. This site is operationally feasible for hydraulic and mechanical placement and requires no site preparation. Return water is immediately discharged back into the river.

**B. Alternative Placement Site Combinations.**

**Alternative 1. No Action (No Change).** Under the No Federal Action plan, the assumption is that dredging would continue as has been done in the past without a new plan for dredged material placement. This interpretation has been referred to as the No Change Alternative. Complying with the Federal mandate to maintain commercial navigation, the District would continue to place material on historic placement sites in small amounts to provide as much channel as possible, which would continue the high risk conditions at present to navigation and structure.. The existing historic placement sites are not able to accept the anticipated amount of future dredged material without causing impacts to aquatic natural resources as compared to more suitable planned and constructed placement sites away from the bankline.

**Alternative 2. Site 344.7R – White Island**  
**Site 343.8L - Below Wing Dams**  
**Site 343.4R - Canton Ag Field Site**  
**Site 343.4T - Thalweg**

This alternative meets all the screening criteria, provides over 40 years of placement capacity and adaptive management, providing for future flexibility. Total capacity of the four sites is 1.03 million CY.

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**Alternative 3. Site 344.7R – White Island**

**Site 344.1L – Between Wing Dams**

**Site 343.8L – Below Wing Dam**

**Site 343.4T - Thalweg**

This alternative meets all the screening criteria except, beneficial use of the material is not possible. It also meets the objectives of a minimum of 40 years of placement capacity and adaptive management, providing for future flexibility. Total capacity of the four sites is 950,000 CY.

**Alternative 4. Site 344.7R – White Island**

**Site 344.1L – Between Wing Dams**

**Site 343.4R - Canton Ag Field Site**

**Site 343.4T – Thalweg**

This alternative meets all the screening criteria, provides over 40 years of placement capacity and adaptive management, providing for future flexibility. Total capacity of the four sites is 1.19 million CY.

**Alternative 5. Site 344.1L – Between Wing Dams**

**Site 343.8L – Below Wing Dam**

**Site 343.4R - Canton Ag Field Site**

**Site 343.4T – Thalweg**

This alternative meets all the screening criteria, provides over 40 years of placement capacity and adaptive management, providing for future flexibility. Total capacity of the four sites is 1.05 million CY.

**Alternative 6. All Potential Sites.** This alternative meets all the screening criteria, provides over 40 years of placement capacity and adaptive management, providing for future flexibility. Total capacity of the five sites is 1.39 million CY.

**Other Alternatives Evaluated.** Other combinations of feasible sites did not provide the needed 40-year placement capacity.

#### **4. AFFECTED ENVIRONMENT**

**A. Cultural Resources.** This work is being conducted under the provisions of the *Programmatic Agreement (PA) Among the Rock Island District of the U.S. Army Corps of Engineers, the Advisory Council on Historic Preservation, and the Illinois State Historic Preservation Officer, the Iowa State Historic Preservation Officer, the Missouri State Historic Preservation Officer, and the Wisconsin State Historic Preservation Officer, Regarding Implementation of the Long Term Strategy for Dredged Material Placement Program* signed by the Corps on December 7, 1995, by the Illinois State Historic Preservation Officer on January 3, 1996, by the Iowa State Historic Preservation Office on January 22, 1996, by the Missouri State Historic Preservation Officer on February 15, 1996, by the Wisconsin

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Historic Preservation Officer on February 26, 1996, and by the Advisory Council on Historic Preservation on April 29, 1996 (Appendix EA-4).

An archival search for historic properties was conducted following the “*Policy and Procedures for the Conduct of Underwater Historic Resource Surveys for Maintenance Dredging and Disposal Activities*” (DGL-89-01, March 1989). No historic properties were documented within the proposed dredged material placement sites. Historic maps indicate the town site of Tully, Missouri was located just upstream of Canton, Missouri. Corps land acquisition maps associated with the construction of Lock and Dam 20 suggest that the town site may have extended into the southern limits of the project area. The report entitled *An Investigation of Submerged Historic Properties in the Upper Mississippi River and Illinois Waterway* (October 1997) prepared by American Resources Group, Ltd. for the Corps (Contract No. DACW25-93-D-0012, Delivery Order No. 37), was reviewed. No underwater historic properties are documented within the historic dredge cut and proposed dredged material placement alternatives. The Corps Geographic Information Systems archeological site file data base for the Mississippi River was queried for the dredge cut and placement site locations, and no known historic properties were identified.

**B. Natural Resources.** Natural resources in the project area include the lands, waters and biota of the Upper Mississippi River and its floodplain in Adams County, Illinois and Lewis County, Missouri. Habitats with the potential to be directly affected by dredged material placement include the croplands, field borders and drainages within and adjacent to Site 343.4R, the Canton agricultural field; the shallow main channel border aquatic habitat and remnant wing dams within Site 344.7R (White Island); the somewhat deeper main channel border and aquatic habitat with improved rock structures within Site 344.1L (Between Wing Dams), and immediately downstream at Site 343.8L (Below Wing Dams); and Site 343.4T (Thalweg) immediately upstream of Dam 20.

### **Lands**

**Soils.** In general, soils found on floodplain lands of this reach of the Mississippi River range from nearly level to gently sloping, somewhat poorly drained to very poorly drained soils formed in silty and clayey alluvial (water-deposited) sediments. Utilizing data and search tools available through the U.S. Department of Agriculture, Natural Resources Conservation Service Web site, the Corps found that two soil types are listed for the Canton agricultural field site. Soils on the northern portion of the site (approximately 56 percent) are identified as Fatima silt loam, 0 to 2 percent slopes, occasionally flooded. Soils in the southern portion (approximately 44 percent) are identified as Chequest silty clay loam, 0 to 2 percent slopes, occasionally flooded. Both soil units are classified as hydric. Fatima silt loam is classified as prime farmland, while Chequest silty clay loam is classified as prime if drained.

**Waterbottoms.** Waterbottoms in the thalweg and other parts of the main channel are primarily composed of medium to coarse sand. Substrates in the main channel border areas of lower Pool 20 are much more varied, ranging from silt/clay to silty sand mixtures to fine/medium sand to gravel/cobble combinations.

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**Land Cover/Land Use.** Lands within the project study area lie entirely within the historic floodplain of the Upper Mississippi River. Vegetative cover in this reach of the river floodplain has been extensively shaped by human activity, primarily agricultural cultivation and land management with some urban development associated with the towns of Canton, Missouri, and Meyer, Illinois. Natural floodplain cover can still be found in some remnants of deciduous floodplain forest, grasslands and herbaceous wetlands. Most of the remnant floodplain forest is located on the Missouri side of the floodplain or on islands within the Mississippi River, but some forest cover also persists on narrow fragments of foreshore on the Illinois side of the river. In addition to the common floodplain forest components of black willow, cottonwood, green ash, and silver maple, native species such as Kentucky coffeetree, Ohio buckeye, and northern pecan are less abundant but not uncommon to the study area.

### **Waters**

**Surface Waters.** The main channel, channel border, side channels, and backwaters of lower Pool 20 of the Upper Mississippi River comprise the dominant water features of the project area. River islands located between RM 345 and 347 on the Illinois side of the state line create a mosaic of side channels and backwaters. The largest side channel is Missouri Chute on the west side of White (aka Nelson or Tully) Island. Another important side channel in this reach is Buck Run, also known as Hawkin's Slough or Gregory Ditch. Buck Run was formerly a side channel of the Upper Mississippi River that carried bluff drainage and was connected to other sloughs and backwater lakes. It now carries interior drainage from approximately 8,000 acres of agricultural lands within the Gregory Drainage District in Lewis County, Missouri.

In 2014, the Illinois Environmental Protection Agency (IEPA) listed the reach of the Mississippi River in the project study area as impaired under Section 303(d) of the federal Clean Water for: (1) fish consumption use due to elevated levels of mercury and polychlorinated biphenyls (PCBs), and (2) public and food processing water supplies use due to phenol.

### **Biota**

**General Habitat Characteristics.** All of the proposed aquatic placement sites lie within areas considered to be channel border habitat. The main channel border is considered to be the zone between the 9-Foot Navigation Channel and the main river bank, islands, or submerged river channels, including all areas in which wing dams are located. This area is commonly thought of as part of the main channel, but is considered a separate habitat from an ecological standpoint. Buoys often mark the edge of this zone [U.S. Fish and Wildlife Service (USFWS) Biological Report 85(7.6), September 1986]. Within this habitat, substrate type varies from mainly sand near the edge of the main channel and the mouths of major side channels (as well as historic dredge placement sites); to mixed sand and silt, with gravel and cobble adjacent to existing or historic (pre-dam) shorelines; with stone riprap present on wing dams and some limited areas of main channel shorelines. While minimal to no rooted aquatic vegetation is present, aquatic habitat in areas with stable and varied substrates is generally considered fair to good.

**Fisheries and Invertebrates.** The channels, channel borders, backwaters and sloughs of lower Pool 20 support a wide variety of fish and invertebrates. More than 60 species of fish (USFWS

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Biological Report 85(7.6), September 1986), and 32 species of freshwater mussels (Kelner 2011), are recorded as occurring in this pool. The Rock Island Field Office of the USFWS provided the most current version of the Upper Mississippi River Natural Resources Inventory (NRI) covering the project area as part of early coordination technical assistance. The NRI documents sport and commercial fishery habitat in lower Pool 20, as well as spawning and nursery habitat. In addition to the main channel and channel border, side channels and tributaries such as Missouri Chute and Buck Run are documented as providing overwintering, spawning and nursery habitat for sport fish including, but not limited to, northern pike.

The Corps, US Fish and Wildlife Service (USFWS), Illinois Department of Natural Resources (IL DNR) and Missouri Department of Conservation (MDOC) have historic records of mussels from Pool 20 including Federal and state-listed species. A brief diving survey of wing dams #25, #26, and #27 was conducted by the IL DNR on 30 March 2015 (prior to repair of these wing dams in April 2015). This limited survey collected 28 individuals representing 8 species (including the state-listed butterfly). For these reasons, IL DNR, MDOC and the USFWS requested MVR conduct a mussel survey to determine species composition, distribution, and relative abundance of mussels in the proposed placement area.

Biologists and divers from the Corps' Memphis District environmental office conducted a survey of the proposed aquatic placement sites from July 16 to 21, 2015. The Memphis District Dive Team conducted semi-quantitative sampling of the two sites utilizing hand collection techniques along a series of transects identified by the Rock Island District Corps. Each transect was divided into 30 meter increments, and a five minute spot dive was conducted within each increment to determine if mussels were present, to collect any mussels present, and to record substrate habitat characteristics. If live mussels or suitable substrates were identified in the initial five minute spot dive, the diver continued searching for a total of 20 minutes within each 30 meter increment. Mussels were identified, enumerated, and measurements were collected on the state listed species that were encountered. All live individuals were returned to the area in which they were collected. Individuals within the 0-5 year age class were also aged and enumerated. Relative species abundance was determined as the total number of individuals of a species expressed as a percentage of the total number of individuals of all species (percent composition). An index of mussel density was determined as the number of individuals collected during a time interval (*i.e.*, catch-per-unit-effort (CPUE)).

A final report of the July 2015 mussel survey is included with this document as Appendix EA-1. A total of 756 live individuals were collected during the entire survey effort representing 16 different species. 14 species were collected in Site 344.1L (referred to as "Site 1" in the final report) and 11 species were collected in Site 344.7R (referred to as "Site 2" in the final report). This assemblage represents half of the 32 species historically known to occur in Pool 20 of the Upper Mississippi River (Kelner 2011). Several dead shells from one additional species (*Leptodea fragilis*) were also encountered but no live individuals were collected. No federally listed endangered or threatened freshwater mussel species were collected during the survey effort. Two species listed as threatened by the state of Illinois, namely the butterfly (*Ellipsaria lineolata*) and the black sandshell (*Ligumia recta*), were encountered at Site 344.1L while none were encountered at Site 344.7R. At both sites, nearly all live freshwater mussels were encountered within approximately 60 meters of the bank (Figures 2-3 in the final mussel survey report). Outside of 60 meters from the bank, suitable freshwater mussel

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habitat was extremely limited as substrates transitioned from stable cobble, gravel, sands, silts, and clays to shifting sands with increased velocities.

**Waterbirds and Other Wildlife.** The Mississippi River is an important flyway for waterfowl and neotropical migrants. Pool 19, just upstream has historically been recognized as an important feeding and resting stopover. The aquatic plants and invertebrate food resources essential to migrating waterfowl are less abundant in the project study area. The NRI for lower Pool 20 lists White (aka Tully) Island as providing habitat for migratory waterfowl. It also lists the left descending bank of the river between RM 342.5 and 344.0 as providing habitat for feeding and roosting bald eagles; however, no nests or winter night roost areas for the species are known to occur in this vicinity. The (MDOC's) Natural Heritage Database contains a record for a bald eagle feeding aggregation and night roost (52 birds counted) just eastward of Site 343.4R (Canton Ag Field) across Hannibal Sub Road along the Mississippi River and extending 0.3 miles south. Shallow aquatic areas and exposed sandbars in the lower pool provide some habitat for wading birds and shorebirds. Numerous species of amphibians and reptiles, small and large mammals are known to occur in the floodplain areas of the project study area and some of these may potentially utilize habitats found within or adjacent to the alternative placement sites.

**Threatened and Endangered Species.** Examination of USFWS online records ([http://www.USFWS.gov/midwest/endangered/lists/cty\\_indx.html](http://www.USFWS.gov/midwest/endangered/lists/cty_indx.html)) in June 2015 revealed that federally listed threatened or endangered species known to occur or potentially occurring in Adams County, Illinois include the Indiana bat (*Myotis sodalis*), northern long-eared bat (*Myotis septentrionalis*), Higgins' eye pearl mussel (*Lampsilis higginsii*), and eastern prairie fringed orchid (*Platanthera leucophaea*). Correspondence with the Service's Rock Island Field Office for Ecological Services in July 2015 also listed the spectaclecase mussel (*Cumberlandia monodonta*) as having a territory that occupies the project area. See species table on the following page where the IL DNR lists the species as historically occurring in Pool 20).

Federally listed threatened or endangered species noted in the USFWS online records as known to occur or potentially occurring in Lewis County, Missouri, include the Indiana bat and northern long-eared bat, as well as interior populations of the least tern (*Sterna antillarum*); the piping plover (*Charadrius melodus*); Rufa red knot (*Calidris canutus rufa*); the pallid sturgeon (*Scaphirhynchus albus*); and the sheepsnose mussel (*Plethobasus cyphus*).

The IL DNR Natural Heritage Database documents 25 state-designated threatened or endangered plant and animal species as occurring in Adams County. Two of the state-listed species (decurent false aster, spectaclecase) are also federally listed. State-designated species are listed as follows:

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**Adams County, Illinois, State-listed Species<sup>1</sup>**

Scientific Name	Common Name	State Protection
<i>Acipenser fulvescens</i>	Lake Sturgeon	LE
<i>Carex prasina</i>	Drooping Sedge	LT
<i>Cumberlandia monodonta</i>	Spectaclecase	LE
<i>Delphinium carolinianum</i>	Wild Blue Larkspur	LT
<i>Dendroica cerulea</i>	Cerulean Warbler	LT
<i>Ellipsaria lineolata</i>	Butterfly	LT
<i>Elliptio crassidens</i>	Elephant-ear	LT
<i>Fusconaia ebena</i>	Ebonyshell	LT
<i>Hybognathus hayi</i>	Cypress Minnow	LE
<i>Ictinia mississippiensis</i>	Mississippi Kite	LT
<i>Lanius ludovicianus</i>	Loggerhead Shrike	LT
<i>Liatris scariosa</i> var. <i>nieuwlandii</i>	Blazing Star	LT
<i>Ligumia recta</i>	Black Sandshell	LT
<i>Melanthium virginicum</i>	Bunchflower	LT
<i>Myotis grisescens</i>	Gray Bat	LE
<i>Myotis sodalis</i>	Indiana Bat	LE
<i>Pandion haliaetus</i>	Osprey	LE
<i>Plethobasus cyphus</i>	Sheepnose	LE
<i>Poa wolfii</i>	Wolf's Bluegrass	LE
<i>Scirpus polyphyllus</i>	Bulrush	LT
<i>Thryomanes bewickii</i>	Bewick's Wren	LE
<i>Tomanthera auriculata</i>	Ear-leafed Foxglove	LT
<i>Trifolium reflexum</i>	Buffalo Clover	LT
<i>Trillium viride</i>	Green Trillium	LE
<i>Viburnum molle</i>	Arrowwood	LT

<sup>1</sup> LE = Endangered, LT = Threatened

Source: [http://www.dnr.illinois.gov/ESPB/Documents/ET\\_by\\_County.pdf](http://www.dnr.illinois.gov/ESPB/Documents/ET_by_County.pdf)

None of the listed plant or vertebrate animal species is known to reside within any of the potential placement sites. The spectaclecase, butterfly, elephant ear, ebonyshell, black sandshell, and sheepnose are all freshwater mussel species historically recorded as occurring in Pool 20.

Coordination with the MDOC revealed records in the Department's Natural Heritage Database documenting the eastern fox snake *Pantherophis vulpinus* (State Rank S1 – Critically Imperiled; Global Rank 5 – Secure) within 0.2 miles of the agricultural field proposed placement site, and a feeding aggregation/night roost site for the bald eagle (*Haliaeetus leucocephalus*) to the east of the Canton agricultural field placement site 343.3R, across Hannibal Sub Road along the Mississippi River and 0.3 miles south on the Mississippi River. While the MDOC found no historic records in the historic mussel database or Heritage Database at the two proposed aquatic placement sites, between 1 and 2 miles south of the wing dam site at 344.1L are historic records for the Missouri listed

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ebonyshell, black sandshell, wartyback, and hickorynut, as well as a record for the State and federally listed sheepnose two miles south of the wing dam site RM 344.1L.

**C. Human-Constructed Resources.** The infrastructure of the Nine-Foot Channel Navigation System is the primary human-constructed resource within this reach of the river. On the floodplains within the project area, the large agricultural levees and associated interior drainage structures of the Hunt-Lima Drainage District in Illinois and the Gregory Drainage District in Missouri are notable human-constructed features. In addition to these, the roadways, utilities, private and public buildings, and recreational spaces of Lewis and Adams Counties are important constructed resources. Both counties within the project study area are primarily rural.

**D. Physical Environment**

**Climate.** The published soil surveys for Lewis County, Missouri (1992) and Adams County, Illinois describe the climate for the region including lower Pool 20 as characterized by cold winters and long, hot summer. Annual precipitation ranges from just over 35 inches (Lewis County) to nearly 40 inches (Adams County), with the majority (65-72 percent) falling during the months of April to October. Growing season generally extends from April through September/October. Average seasonal snowfall ranges from 23 to 27 inches. Average relative humidity in midafternoon is 60-61 percent, increasing to 83-85 percent at dawn. Prevailing winds are from the south.

**Air Quality.** Air quality for both counties in the project area is generally good. No source of emissions currently exists within any of the alternative sites. The EPA *Green Book Nonattainment Areas for Criteria Pollutants* (Green Book) maintains a list of all areas within the United States that are currently designated nonattainment areas with respect to one or more criteria air pollutants. Nonattainment areas are discussed by county or metropolitan statistical area (MSA). MSAs are geographic locations, characterized by a large population nucleus, that are comprised of adjacent communities with a high degree of social and economic integration. MSAs are generally composed of multiple counties. Review of the Green Book indicates that Adams County, IL and Lewis County, MO are in attainment for all federal NAAQS pollutants (<http://www.epa.gov/oar/oaqps/greenbk/multipol.html>) and have been since at least the early 1990s.

**Noise.** The project study area is a primarily rural location where ambient noise levels are relatively low. There are many different noise sources throughout the area including commercial and recreational boats and other recreational vehicles; automobiles and trucks, and all terrain vehicles; aircraft; machinery and motors; and industry-related noise. However, these sources are somewhat widely distributed, and there are no sensitive human receptors located in proximity to the dredge cut or any of the feasible proposed placement sites.

**5. ENVIRONMENTAL EFFECTS**

**A. Effects of Preferred Alternative.** Impacts of the preferred alternative to natural resources, cultural resources, and other aspects and features of the human environment are summarized in this section of the EA. The preliminary screening of potential placement sites, and the subsequent formulation of alternative combinations of feasible placement sites, was conducted with the intent to

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minimize or reduce adverse effects, and to avoid potentially significant impacts where feasible. No significant adverse impacts are anticipated to result from implementation of the preferred alternative.

**B. Social and Economic Resources**

**Noise.** Heavy machinery would temporarily increase noise levels in the immediate project area during construction activity. No permanent changes in ambient noise levels would be expected to result from dredged material placement.

**Aesthetics.** No permanent impacts to aesthetic values would result from placement of dredged material below the water surface at aquatic sites 2 and 3. Some vegetation would be cleared to provide shore pipe access and allow placement of material on the agricultural field; however, removal of large mature trees would be avoided and herbaceous growth would be expected to recolonize the dredge pipe track within 1 to 2 growing seasons following construction. The landscape profile of the agricultural field itself would be permanently raised by several feet and would no longer support crop growth. Because the relatively rural character of the surrounding area would remain unchanged, no significant decline in aesthetic values would be anticipated.

**Life, Health, and Safety.** The purpose of the project is to maintain the commercial navigation channel in such a manner as to avoid potential loss of life or personal injury, or property damage that may result from inadequate maintenance of the channel and subsequent groundings.

**Displacement of People.** No residential relocations would be required as a result of the project.

**Farm Displacement.** No farms would be displaced as a result of the proposed project. Approximately 68.3 acres of cropland would be removed from production at the agricultural field site. An AD 1006 form was filled out by the Corps and submitted to the NRCS Area Conservationist for the area. The farmland in the proposed placement site received a rating of 173 (out of a possible 260) from the NRCS. Among the feasible alternatives evaluated in this EA, Alternative 3 would have no impacts on prime farmland. Alternative 3 was not selected as the preferred alternative because it provides no opportunities for beneficial use, has greater potential for adverse effects to aquatic resources, and has less future flexibility than the preferred alternative.

**Public Facilities and Services.** Maintenance of the channel for commercial, recreational, and environmental interests would positively impact public facilities and services.

**Community Cohesion.** No impacts to community cohesion would be realized as a result of the project. The only landowner of the agricultural site has expressed openness to the use of his land as a placement site. Natural resource agencies have previously expressed concerns regarding continued use of in-water placement sites for long-term channel maintenance. As a part of its preferred alternative, the Corps proposes to use the Illinois wing dam aquatic site for a one-time, near-term dredged material placement of up to 500,000 cubic yards beginning as early as summer 2015 if an imminent closure is indicated after summer low flows, and extending through the 2016 navigation season pending funding availability and river conditions. The agricultural field site would be used to meet future (post-2016) long-term placement needs.

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**Community and Regional Growth.** No adverse impacts to the growth of the community or region would be realized as a direct result of the proposed project. However, the Mississippi River is a vital component of the national transportation infrastructure and has provided stimulus for the growth of river communities and the entire Midwest region. Maintenance of the navigation channel would indirectly help provide for continued growth opportunities in the local communities and the region.

**Employment and Labor Force.** No significant impacts on employment or labor force would be expected to occur in the project vicinity.

**Business and Industrial Activity.** No long-term impacts to business or industrial activity would result from the proposed project. No business or industrial relocations would be required.

**Property Values and Tax Revenues.** The agricultural field site is privately owned. Use of this site would remove approximately 74.3 acres of cropland from the tax rolls. The entire parcel of farmland contains 74.3 acres, 68.3 acres of which are tillable.

**C. Cultural Resources.** The District coordinated the proposed dredging and dredged material placement alternatives, results of supporting investigations, and determinations of effect with the Missouri Department of Natural Resource Historic Preservation Program, the Illinois Historic Preservation Agency, and interested federally recognized tribes by letter dated July 24, 2015. The District defined the area of potential effect (APE) and informed the consulting parties that it was the opinion of the District that there was no potential for intact cultural resources within the dredge cut and dredged material placement sites RM 344.1L and RM 344.7R. This opinion was based on the negative evidence from literature review and on the active nature of sediment erosion and deposition at these locations. Therefore, it was the finding of the District that there was no potential to cause effects to historic properties at these three areas within the APE and that further obligations under Section 106 of the NHPA for this portion of the undertaking was not required (36 CFR 800.3(a)(1)).

The District determined that dredged material placement at site RM 343.4R had potential to impact historic properties and would require field assessment in order to determine effects to undocumented historic properties. Bear Creek Archeology (BCA) conducted and reported upon Phase I archeological survey and geomorphological evaluation of placement site RM 343.4R and prepared the report entitled *Intensive Phase I Cultural Resources Survey and Supporting Geomorphological Investigation, Upper Mississippi River Navigation Pool 20 Dredged Material Placement Site, Lewis County, Missouri, BCA# 2142*, dated May 2015. Lowell Blikre of BCA prepared the report for the District under terms of contract W912EK-12-D-0001, Work Order No. 0014.

The BCA investigation consisted of a combination of literature review, geomorphological assessment, and surface survey of the entire 74.3 acres of site RM 343.4R. The investigation resulted in the documentation of 5 newly recorded archeological sites. Subsurface testing was conducted at these archeological site locations and at areas determined to have a moderate to high potential for buried archeological deposits based on the geomorphological assessment. Two of the sites, 23LE1414 and 23LE1416, were determined to have buried components while the other three sites, 23LE1415, 1417, and 1418, were confined to surface scatters within the active plow zone. BCA concluded that sites 23LE1414 and 1416 retained sufficient archeological integrity and research potential that the project should avoid impacting these sites or conduct additional testing to determine whether these sites

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should be included on the National Register of Historic Places. BCA defined a 30 meter buffer around sites 23LE1414 and 1416 and recommended that project activities not encroach upon this area. BCA evaluated sites 23LE1415, 1417, and 1418 as confined to disturbed context and devoid of archeological integrity. They recommended no further work at these locations.

The District concurs with the management recommendations in the BCA report and is of the opinion that no historic properties will be affected by dredged material placement at site RM 343.4R because all work will be confined to land outside of the buffer zone surrounding archeological sites 23LE1414 and 1416. Therefore, it is the finding of the District that the undertaking will result in no adverse effects to sites 23LE1414 and 1416 and that no historic properties will be affected elsewhere within the APE of this undertaking as currently proposed (36 CFR 800.4(d)(1)). The District provided these determinations by letter dated July 24, 2015 to the Missouri Department of Natural Resource Historic Preservation Program, the Illinois Historic Preservation Agency (IHPA), and interested federally recognized tribes.

By letter dated August 6, 2015 (IHPA LOG #001072815) the IHPA concurred with the District determinations and had no objections to the project proceeding as proposed. By letter dated August 17, 2015 (SHPO Log Number 012-LE-15), the Missouri State Historic Preservation Office provided concurrence with the determinations and findings of the District including a no adverse effect determination to sites 23LE1414 and 23LE1416 on the basis of avoidance measures as proposed and on the determination that sites 23LE1415, 23LE1417, and 23LE1418 were not eligible for inclusion on the National Register of Historic Places. Mr. John Fox of the Osage Nation formally requested a copy of the BCA report by letter dated July 30, 2015 (1415-1838MO-7). The District provided a copy of the report to Mr. Fox by letter dated August 25, 2015. The District has received no other comments or requests regarding this undertaking. The coordination of the historic dredge cut and all proposed alternatives with the appropriate State agencies reduced the potential affects to unknown and undocumented historic properties. Based upon the District's documentation and associated State agency comments or lack thereof, the District satisfied the requirements promulgated under Section 106 of the National Historic Preservation Act, as amended. In the event that project features change, the District will coordinate with interested parties in accordance with the attached PA (Appendix EA-4) and in full compliance with Section 106 of the NHPA and its implementing regulations 36 CFR 800.

**D. Natural Resources.** Minor disruptions of daily activities of resident fish and wildlife would be expected during construction (dredging and placement) activity. These impacts would be temporary in nature and are not anticipated to be significant. The proposed placement sites contain no critical wildlife habitats, sand beaches, or unique physical features.

**Fisheries and Invertebrates** - Fish and other mobile aquatic species present in the immediate construction zone would be expected to relocate during dredging and placement activities, but should return to the area following completion of construction. Benthic organisms with limited or no mobility would be buried and probably destroyed during placement, but similar organisms would likely recolonize the aquatic placement areas post-construction. No significant impacts to overall benthic populations or trophic levels are anticipated. Hydrologic modeling of feasible aquatic placement sites indicates that dredged material should be relatively stable following placement.

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**Waterbirds and Other Wildlife** – Dredging and placement activities are not expected to adversely affect waterbirds or other wildlife beyond avoidance of the immediate area during construction. No long-term effects are expected and no significant impacts would occur either during or after construction.

**Threatened and Endangered Species** - The eastern prairie fringed orchid is found in mesic to wet prairies. This landscape is not found within any of the proposed placement areas. The least tern and piping plover utilize riverine sandbars of large rivers as nesting and feeding habitat. No exposed sandbars are present in any of the alternative placement areas. For this reason, the Corps has determined that placement of dredged material at any of the alternate sites will have no effect on these three listed species.

The Indiana bat utilizes large trees with peeling bark or cavities as summer roosts, forages in upland forests or small stream corridors with well developed riparian woods, and uses caves or mines as winter hibernacula. The northern long-eared bat similarly hibernates in caves and mines, swarming in surrounding wooded areas in autumn, and roosting and foraging in upland forests and woods during summer months. No winter hibernacula for either species are located within or adjacent to any of the alternative placement sites. No tree clearing would be required for placement of dredged material at the two aquatic placement sites. Any tree clearing that may be required for placement of dredged material on the agricultural field site would be coordinated with the USFWS to assess impacts to potential bat roost habitat and if necessary develop measures to avoid impacts to bats. For these reasons, the Corps has determined placement of dredged material at any of the alternative placement sites is not likely to adversely affect the two listed bat species.

The Rufa red knot migrates between breeding grounds in the Canadian Arctic and several wintering regions including the southeast United States, northwest Gulf of Mexico, northern Brazil, and Tierra del Fuego at the southern tip of South America. It is an occasional migrant in the Midwestern states. No resting or feeding habitat suitable for the knot is known to be present at any of the placement sites under existing conditions. Placement of dredged material in shallow water at the White Island site 344.7R could result in exposure of sandbars at low river levels, which could have a minor beneficial effect on the red knot if it should visit the project area in future. For this reason, the Corps has determined that the proposed placement is not likely to adversely affect this species.

The pallid sturgeon is a bottom-oriented, large river fish whose historic range includes the Missouri River and the Mississippi River as far north as Keokuk, Iowa. The upriver extent of this species on the Mississippi is based on a single record from 1954, and in recent years no occurrence of the pallid sturgeon has been documented farther upstream than Pool 25. For this reason, the Corps has determined that the proposed dredging and placement is not likely to adversely affect this species.

The Higgins' eye, sheepsnose, and spectaclecase mussels are all documented as historically occurring in Pool 20. The nearest recent record of any of these species occurring within or near the project study area, as reported by the MDOC, is a record for the sheepsnose approximately two miles south of the wing dam site RM 344.1L. Unstable and shifting substrates in the thalweg site do not provide suitable habitat for mussels.

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The mussel survey conducted by the Corps' Memphis District biologists on the wing dam and White Island aquatic sites in July 2015 did not result in the collection of any of the three listed mussel species. Most of the mussels that were collected were located within 60 meters (approximately 200 feet) from shore; further out, unstable sand substrates did not provide suitable habitat for mussel colonization. Based on the results of this survey, the Corps has determined that for the near term (2015 and 2016 dredging seasons), placement of dredged material on the White Island site and/or placement of dredged material between or immediately below the wing dams at a minimum distance of 250 feet from the Illinois shoreline, is not likely to adversely affect the sheepnose, spectaclecase, or Higgins' eye mussel species. However, because of the limited scope of the 2015 survey and the number of species collected (16 species between the two sites including two Illinois state-listed species), additional mussel surveys to be scoped in consultation with the USFWS, may be required if any placement on Site 344.1L is proposed to be conducted beyond calendar year 2016.

**E. Cumulative Impacts.** The proposed action is for the maintenance of the existing navigation channel. The impacts of the Nine-foot Channel navigation system are already in place. Past, present, and future operation and maintenance of the system is the primary cumulative impact. These impacts are anticipated to be short-term in nature. The total number of operation and maintenance actions along the Mississippi River and its tributaries is unknown at this time. Previous aquatic ecosystem restoration projects in the pool include the Buck Run Section 1135 project in the DMMP project study area, and the Fox Island Habitat Rehabilitation and Enhancement Project farther upstream in the pool. No other ecosystem restoration projects are planned in Pool 20 at this time.

Cumulative impacts resulting from dredging and placement of material from the Lock 20 Upper dredge cut are not anticipated to be significant. These repairs should not decrease the post-flood productivity of the UMR aquatic and floodplain ecosystem. Selection and use of placement areas either landbased or riverbased also will not contribute to cumulative impacts. Existing (historic) placement sites have been used in the past, in part to attempt to avoid sensitive areas and resources. All new feasible placement sites have been coordinated with the resource agencies in an attempt to avoid contributing to cumulative impacts.

## **6. ENVIRONMENTAL IMPACTS OF NONPREFERRED ALTERNATIVES**

Environmental impacts of the nonpreferred alternatives would generally be similar in nature to those expected with the preferred alternative, with fewer floodplain impacts and greater aquatic impacts expected for alternatives that do not include the Canton ag field site 343.4R. None of the feasible alternative placement sites are anticipated to have significant environmental impacts either individually or in combination.

## **7. COMPLIANCE WITH APPLICABLE FEDERAL LAWS**

**A. Endangered Species Act.** The Corps has determined that the proposed action is not likely to adversely affect any federally listed endangered or threatened species or their habitats. This determination has been coordinated with the U.S. Fish and Wildlife Service, Rock Island Ecological Services Field Office during informal consultation with that agency.

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**B. Archaeological and Historic Preservation Act.** The District determined that no historic properties would be affected by dredging or dredged material placement in full compliance with the Archaeological and Historic Preservation Act.

**C. National Historic Preservation Act.** The District determined that no historic properties would be affected by dredging or dredged material placement at sites RM 344.1L and RM 344.7R in accordance with the National Historic Preservation Act and its implementing regulations 36 CFR Part 800. The District determined that dredged material placement at site RM 343.4R would have no adverse effect on sites 23LE1414 and 1416 on the basis of avoidance measures as proposed and on the determination that sites 23LE1415, 23LE1417, and 23LE1418 were not eligible for inclusion on the National Register of Historic Places. This determination was provided to the Missouri Department of Natural Resource Historic Preservation Program, the IHPA, and interested federally recognized tribes by letter dated July 24, 2015. The District received concurrence with this determination from the IHPA by letter dated August 6, 2015 (IHPA LOG #001072815), and the Missouri State Historic Preservation Officer by letter dated August 17, 2015 (SHPO Log Number 012-LE-15). In the event that project features change, the District will coordinate with interested parties in accordance with the existing PA (Appendix EA-4) and in full compliance with Section 106 of the NHPA and its implementing regulations 36 CFR 800.

**D. Clean Air Act.** The proposed action is expected to be in compliance with the Act. Mobile source emissions will be temporary and limited to the construction period, and are expected to be *de minimis* for criteria air pollutants. Based on these findings, the proposed project demonstrates conformity.

**E. Clean Water Act.** A Section 404(b)(1) Evaluation has been prepared for the proposed dredged material placement plan and is attached as Appendix C to this EA. Application for State Section 401 water quality certification has been submitted to the Illinois DNR and the Missouri DNR. Certification will be obtained prior to initiation of any dredging or placement activity.

**F. Executive Order 11988.** No change in existing levels of flood risk will occur as a result of dredged material placement. This action will not adversely impact floodplains or floodplain values.

**G. Hazardous, Toxic and Radioactive Waste.** A Phase I HTRW Environmental Site Assessment was performed for the Lock 20 Upper DMMP in March 2015 for sites 343.4R, 344.7R and 344.1L. The information was obtained through site reconnaissance, informal interviews, and a review of maps and aerial photographs, District records and Federal and state environmental databases. These screening methods have been selected based on the particular nature of the proposed placement sites and the characteristics of the dredged material.

The report revealed no evidence of a Recognized Environmental Condition that could potentially impact the project areas. Therefore, no further HTRW Environmental Site Assessments are recommended. A full report of the HTRW Analysis is available upon request (ATTN: CEMVR-EC-DN). If any evidence of recognized environmental conditions is discovered during construction activities, operations should cease until the Environmental Engineering Section of the Rock Island District Corps of Engineers is able to reassess the project area.

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**H. Federal Water Project Recreation Act.** No increases or decreases in current public recreational opportunities would be realized if this project is implemented. The proposed action is in full compliance.

**I. Fish and Wildlife Coordination Act.** Project plans have been coordinated with the USFWS. Coordination responses can be found in Appendix EA-2. The proposed action is in full compliance.

**J. Migratory Bird Treaty Act and Bald Eagle Act.** No nesting areas for bald eagles or other migratory birds are known to be present within or in close proximity to any of the proposed placement sites. Dredging and placement activities at all sites are expected to be limited to periods when little or no ice cover is present on the river. During these times, eagles and other migratory birds will be relatively dispersed and unlikely to be concentrated in stopover or winter roost areas where they could be disturbed or their feeding disrupted by dredging or placement activities. For these reasons, no adverse impacts to bald eagles or other migratory birds are anticipated. The proposed action is in full compliance.

**K. Wild and Scenic Rivers Act of 1968, as amended.** The project area is not listed on the National Rivers Inventory used to identify rivers or sections of rivers that may be designated by Congress to be component rivers of the National Wild and Scenic Rivers Systems. The proposed action is in full compliance.

**L. Farmland Protection Policy Act of 1981.** The proposed action would result in the conversion of approximately 68.3 acres of prime farmland to nonagricultural uses. In accordance with the provisions of this law, alternative sites were considered that would have fewer impacts on prime farmland, but these were either found to be not feasible, would not meet the capacity requirements for long-term use and flexibility, or would have greater adverse effects on other natural resources. In addition, the natural resource value of the prime farmland soils will not be irreversibly impacted, and could potentially be restored in the event of full beneficial use of materials placed on the site. The preferred alternative would be in full compliance.

**M. National Environmental Policy Act of 1969, as amended.** The compilation of this EA and the signing of the Finding of No Significant Impact by the District Engineer would fulfill National Environmental Policy Act (NEPA) compliance.

**N. EO 11990, Protection of Wetlands.** The proposed action would not involve significant adverse impacts to wetlands.

**O. EO 13112, Invasive Species.** On February 3, 1999, President Clinton issued EO 13112 to prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive species cause by establishing the National Invasive Species Council. The proposed action is consistent with EO 13112 as it will use relevant programs and authorities to prevent the introduction of invasive species and not authorize, fund, or carry out actions likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere.

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**P. EO 12898, Environmental Justice.** Executive Order 12898 of 1994 and the Department of Defense’s Strategy on Environmental Justice of 1995, which direct 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.

Low-income populations as of 2014 cover those whose income is \$24,230 for a family of four and are identified using the Census Bureau’s statistical poverty threshold. The Census Bureau defines a “poverty area” as a Census tract with 20 percent or more of its residents below the poverty threshold and an “extreme poverty area” as one with 40 percent or more below the poverty level. This is updated annually at <http://aspe.hhs.gov/poverty/14poverty.cfm>

A potential disproportionate impact may occur when the percent minority (50 percent) and/or percent low-income (20 percent) population in an Environmental Justice study area are greater than those in the reference community. No minority or low-income populations are present in the project study area. The proposed action will not result in any change in land use or other impacts that would disproportionately affect minority or low-income populations, and is therefore considered to be in compliance with this EO.

**Q. EO 13653, Preparing the U.S. for the Impacts of Climate Change.** Executive Order 13653 requires Federal agencies to undertake actions enhancing climate preparedness and resilience, including the identification and assessment of climate change related impacts on and risks to the agency's ability to accomplish its missions, operations, and programs.

Potential climate change impacts to the Nine-Foot Channel project would be associated with changes in long-term river level variations. Water levels in the Upper Mississippi River vary in annual cycles, with highs in the summer and lows in the winter. However, over longer periods annual averages can vary significantly. Water level is influenced by many factors, including precipitation, water temperature, runoff, drought, ice cover, evaporation rates, consumption, and diversion. The location of the Lock 20 Upper dredge cut is in close proximity to Dam 20 and operation of the dam is the dominant factor controlling river levels in the project study area.

The period used to calculate historical dredging averages and predict dredging quantities includes both extreme high water levels (1993) and extreme low levels (1988). Therefore, this average is expected to be a reasonable estimate for dredging quantities over the period of analysis, even with the occurrence of extreme conditions. Extreme lows in future years could lead to a lowered pool elevation, reducing available draft in the channel. However, the critical shoal in this channel is in the area located at the existing dredge cut. Additional dredging to allow for continued use of a nine foot draft would therefore focus on this limited area and increased dredging quantities would be small with respect to the total projected dredging volume.

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USACE has considered and evaluated the risk associated with climate change on the effectiveness of the proposed action and is therefore considered to be in compliance with this Executive Order.

## **8. COORDINATION**

The proposed dredged material placement actions have been coordinated with the following Federal and State agencies:

- U.S. Fish and Wildlife Service (Rock Island Ecological Services Field Office)
- U.S. Environmental Protection Agency (Region 5)
- U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS)
- Illinois Department of Natural Resources (IL DNR)
- Illinois Environmental Protection Agency (IEPA)
- Missouri Department of Conservation (MDOC)
- Missouri Department of Natural Resources (MDNR)
- Illinois State Historic Preservation Office (IHPA)
- Missouri Department of Natural Resources Historic Preservation Program
- Sac & Fox Tribe of the Mississippi in Iowa
- The Peoria Tribe of Oklahoma
- The Iowa Tribe of Oklahoma
- The Kaw Nation
- The Osage Nation
- The Ho-Chunk Nation
- The Miami Tribe of Oklahoma
- Northeast Missouri Genealogical Society
- Lewis County Historical Society
- Historical Society of Quincy and Adams County
- Great River Genealogical Society
- Adams County Engineer
- Lewis County Engineer

Documentation of coordination with these agencies is included in Appendix B of this EA.

An After-Action Report documenting the initial public meeting for the subject project in Canton, Missouri on April 16, 2013, contained several comments from individuals and organizations concerning the proposed placement site alternatives. Several members of the Mississippi Valley Hunters and Fishermen's Association expressed opposition to use of the thalweg for dredged material placement. Others suggested stockpiling behind the Hunt-Lima drainage district levee.

By letter dated July 15, 2015, the IL DNR, Office of Water Resources, stated that placement of dredged material at Site 343.4R, the Canton ag field, would be considered authorized by IL DNR/OWR Permit No. 17603, but that an individual IL DNR/OWR permit would be required for placement at the aquatic sites.

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By letter dated July 15, 2015, the USEPA, Region 5 provided several recommendations for preparation of the EA.

By letter dated July 17, 2015, the U.S. Fish and Wildlife Service (USFWS) provided a copy of the Upper Mississippi River Natural Resources Inventory (NRI) corresponding to the project area which provides information on significant resources or other environmental concerns within that area. The USFWS also indicated that their review of available natural resources documentation suggests that Site 343.4R(Canton Ag Field) is the preferred site, followed by Site 344.7R (White Island), and that the least favorable conditions appear to exist at Site 344.1L(Between Wing Dams).

By letter dated July 21, 2015, the MDOC's Natural History Biologist provided a list of Heritage Database Records in close proximity to the project area, including one for the eastern fox snake within 0.2 miles of Site 343.4R (Canton Ag Field), and one for a feeding aggregation and night roost for bald eagles within 0.3 miles of the same site. Additionally, while the Database contained no records of State or federally listed mussels within or immediately adjacent to the aquatic placement sites, several records of the state-listed ebonyshell, black sandshell, wartyback, and sheepnose (also federally listed) within 2 miles downstream of Sites 344.1L (Between Wing Dams) and 343.8L (Below Wing Dams).

By letter dated July 29, 2015, the IL DNR, Impact Assessment Section, cited the results of the DNR's mussel survey of pre-improved wing dams 25, 26, 27 where the state-listed butterfly mussel was collected; and the preliminary results of the Corps' July 2015 mussel survey of Sites 344.1L (Between Wing Dams), where the butterfly and the state-listed black sandshell were collected, and of 344.7R (White Island), where no Illinois State or Federal listed species were collected. The DNR recommended placement of material in Site 343.4R (Canton Ag Field) as the primary option to mitigate impacts to aquatic resources, and if not feasible, recommended placement at Site 344.7R (White Island) as opposed to Site 344.1L, to mitigate impacts to mussel resources and state listed species.

By letter dated August 6, 2015 (IHPA LOG # 001072815), the IHPA concurred with the District determinations of effect and concluded that they had no objections to the project proceeding as proposed.

A webinar meeting of the OSIT to discuss results of the July 2015 mussel survey and placement alternatives, was held at the USFWS's Rock Island District Field Office on August 11, 2015, with USFWS and Corps staff present and IL DNR and MDOC staff participating by phone. At this meeting the USFWS expressed some concerns about the limitations of the mussel survey scope, and also about the potential for future movement of any material placed at Site 344.1L into shoreline mussel beds. The OSIT recommended that the Corps consider placement at Sites 343.8L (immediately below wing dam 27) and 343.4T (the thalweg immediately upstream of Dam 20). Because Site 343.4R (Canton Ag Field) is not currently in Federal ownership/jurisdiction and therefore not immediately available for placement, the OSIT further recommended that to address immediate or near term (2015/2016) placement needs, priority of placement be given first to Site 343.4T (Thalweg) if determined feasible, second to Site 343.8L(Below Wing Dams) if feasible, and third to Site 344.7R (White Island). By letter dated August 17, 2015 (SHPO Log Number 012-LE-15), the Missouri State Historic Preservation Office provided concurrence with the determinations and findings of the District including a no adverse effect determination to sites 23LE1414 and 23LE1416 on the basis of

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avoidance measures as proposed and on the determination that sites 23LE1415, 23LE1417, and 23LE1418 were not eligible for inclusion on the National Register of Historic Places.

Mr. John Fox of the Osage Nation formally requested a copy of the BCA report by letter dated July 30, 2015 (1415-1838MO-7). The District provided a copy of the report to Mr. Fox by letter dated August 25, 2015.

By letter dated August 28, 2015, the NRCS Area Soil Scientist returned the Corps' AD 1006 form for coordination of prime farmland impacts at Site 343.4R (Canton Ag Field) with Parts II, IV, and V completed, giving the site a total point score of 173.

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**DREDGED MATERIAL MANAGEMENT PLAN**

**UPPER MISSISSIPPI RIVER  
POOL 20  
RIVER MILES 343.2-344.3**

**LOCK 20 UPPER DREDGE CUT**

**APPENDIX A**

**ENVIRONMENTAL ASSESSMENT  
FINDING OF NO SIGNIFICANT IMPACT**

I have reviewed the information provided by this Environmental Assessment, along with data obtained from cooperating Federal and State agencies having jurisdiction by law or special expertise. I find that placement of dredged material at sites 344.7R (White Island), 344.1L (Between Wing Dams), 343.8L (Below Wing Dams), 343.4R (Canton Ag Field), and 343.4T (Thalweg) as proposed and described in the accompanying Environmental Assessment, together with the accompanying DMMP Report and technical appendices, will not significantly affect the quality of the human environment. Therefore, it is my determination that an Environmental Impact Statement (EIS) is not required. This determination will be reevaluated if warranted by later developments.

Alternatives considered along with the preferred action were:

- No action (no change in current placement location)
- Alternative placement locations/methods

Factors considered in making a determination that an EIS was not required are as follows:

- A. Proposed placement activities, quantities, designs, and scheduling would have only minor and short-term impacts on fish and wildlife resources and on water quality.
- B. The project would allow continued navigation on this reach of the Upper Mississippi River.
- C. Required permits for any placement events would be obtained prior to initiation of dredging activity.
- D. No adverse impacts to historic properties, or to social or economic activities, are expected to result from the proposed actions.

(Date)

CRAIG S. BAUMGARTNER  
Colonel, U.S. Army  
District Engineer



**DREDGED MATERIAL MANAGEMENT PLAN**

**UPPER MISSISSIPPI RIVER  
POOL 20  
RIVER MILES 343.2-344.3**

**LOCK 20 UPPER DREDGE CUT**

**APPENDIX A**

**ENVIRONMENTAL ASSESSMENT  
FINDING OF NO SIGNIFICANT IMPACT**

**APPENDIX EA-1  
FINAL MUSSEL SURVEY REPORT**



**Freshwater Mussel Survey Report**  
**Mississippi River (RM 343.2 to 345.9), Pool 20**  
**Lock 20 Upper Dredge Material Management Plan**  
for  
U. S. Army Corps of Engineers, Rock Island District

**Introduction**

The U.S. Army Corps of Engineers (USACE), Rock Island District (MVR) is investigating the potential feasibility of two locations in lower Pool 20 of the Upper Mississippi River to accommodate short term dredge material placement, until a suitable long-term placement site outside of the unleveed floodplain can be acquired and developed through completion of a Dredge Material Management Plan (DMMP). The purpose of this study was to determine the presence or absence, species composition, and relative abundance of freshwater mussels in the potential project area for the dredge cut immediately above Lock and Dam 20 between approximate River Miles 343.2 to 345.9 (Figure 1). These efforts assist in fulfilling regulatory requirements stipulated under the provisions of the federal Endangered Species Act of 1973 (ESA) and to determine if the proposed project would have any impacts to any Illinois or Missouri threatened or endangered species, protected under the laws of these States. USACE-MVR, US Fish and Wildlife Service (USFWS), Illinois Department of Natural Resources (IL DNR) and Missouri Department of Conservation (MO DOC) have historic records of mussels from Pool 20 including federally and state listed species. A brief diving survey of wing dams #25, #26, and #27 was conducted by the IL DNR on 30 March 2015 (prior to repair of the three wing dams). This limited survey collected 28 individuals representing 8 species (including the State listed butterfly). For these reasons, IL DNR, MO DOC and the USFWS requested MVR conduct a mussel survey to determine species composition, distribution, and relative abundance of mussels in the proposed dredge placement area.

**Study Area and Site Descriptions**

The two proposed dredge disposal areas are located just north of Lock and Dam 20 between Upper Mississippi River Miles 343.2 and 345.9. Site 1 was located between Wing Dam #s 25, #26, and #27 along the left descending bank, and Site 2 was located adjacent to the main channel side of Lower White Island (Figure 1). Both sites are within Adams County, Illinois. All of the sampling was conducted between depths of 3 and 25 feet.

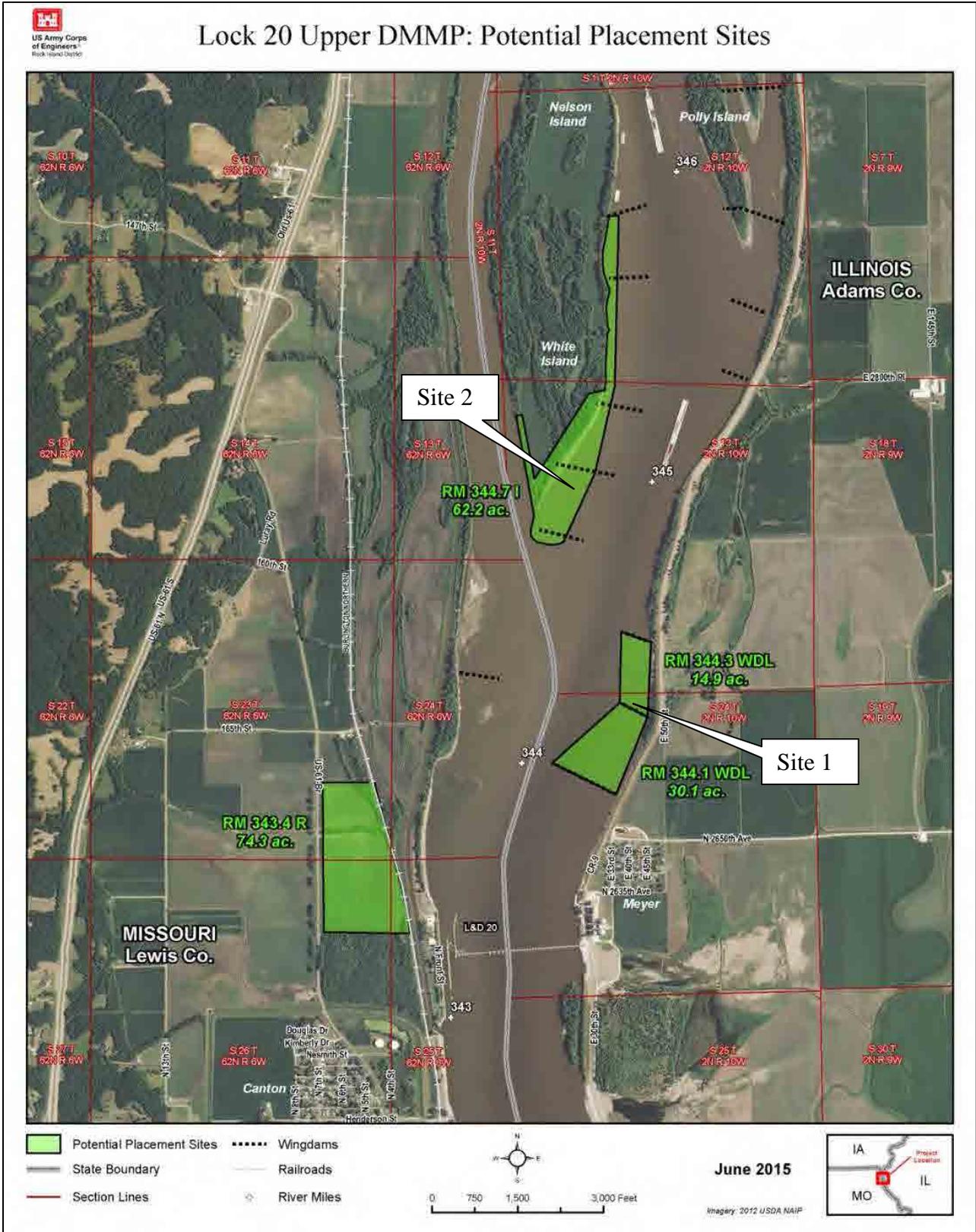


Figure 1. Potential Dredge Disposal Locations for the Lock 20 Upper Dredge Material Management Plan in the Upper Mississippi River.

## Methods

Between 16 and 21 July 2015, the USACE Memphis District (MVM) Dive Team conducted semi-quantitative sampling of the two sites utilizing hand collection techniques along a series of transects identified by USACE-MVR. Transects at Site 1 were oriented perpendicular to the bank between Wing Dam #s 25, #26, and #27, and transects at Site 2 were oriented parallel to the bank along lower White Island (Figures 2-3). All dive operations were conducted with surface-supplied air (SSA) and in accordance with all USACE regulations (USACE 2008). Each transect was divided into 30 meter increments, and a five minute spot dive was conducted within each increment to determine if mussels were present, to collect any mussels present, and to record substrate habitat characteristics. If live mussels or suitable substrates were identified in the initial five minute spot dive, the diver continued searching for a total of 20 minutes within each 30 meter increment. Divers disturbed the substrate by sweeping hands to a depth of at least 6 centimeters, and both live and dead mussels were collected, placed in a mesh collection bag, and brought to the surface for identification. Mussels were identified, enumerated, and measurements were collected on the state listed species that were encountered. All live individuals were returned to the area in which they were collected. Individuals within the 0-5 year age class were also aged and enumerated. General habitat characteristics (*e.g.*, substrate type, depth, temperature, and approximate flow at the surface) and GPS coordinates were recorded for each sample using NAD 83. Relative species abundance was determined as the total number of individuals of a species expressed as a percentage of the total number of individuals of all species (percent composition). An index of mussel density was determined as the number of individuals collected during a time interval (*i.e.*, catch-per-unit-effort (CPUE)). As the divers worked away from the bank and toward the navigation channel, there typically was a point where habitat conditions changed from suitable mussel habitat (stable cobble, gravel, sands, silts, and clays) to poor mussel habitat (shifting sands and increased velocities). Sampling ceased along the terminal ends of the transects (*i.e.*, towards the navigation channel) when it was possible to determine that poor habitat conditions remained consistent and/or when conditions became unsafe due to strong currents; thus, not every 30-meter increment was sampled at each transect.



Figure 2. Locations of mussel surveys within Site 1 of the potential dredge disposal area of the Lock 20 Upper Dredge Material Management Plan in the Upper Mississippi River.

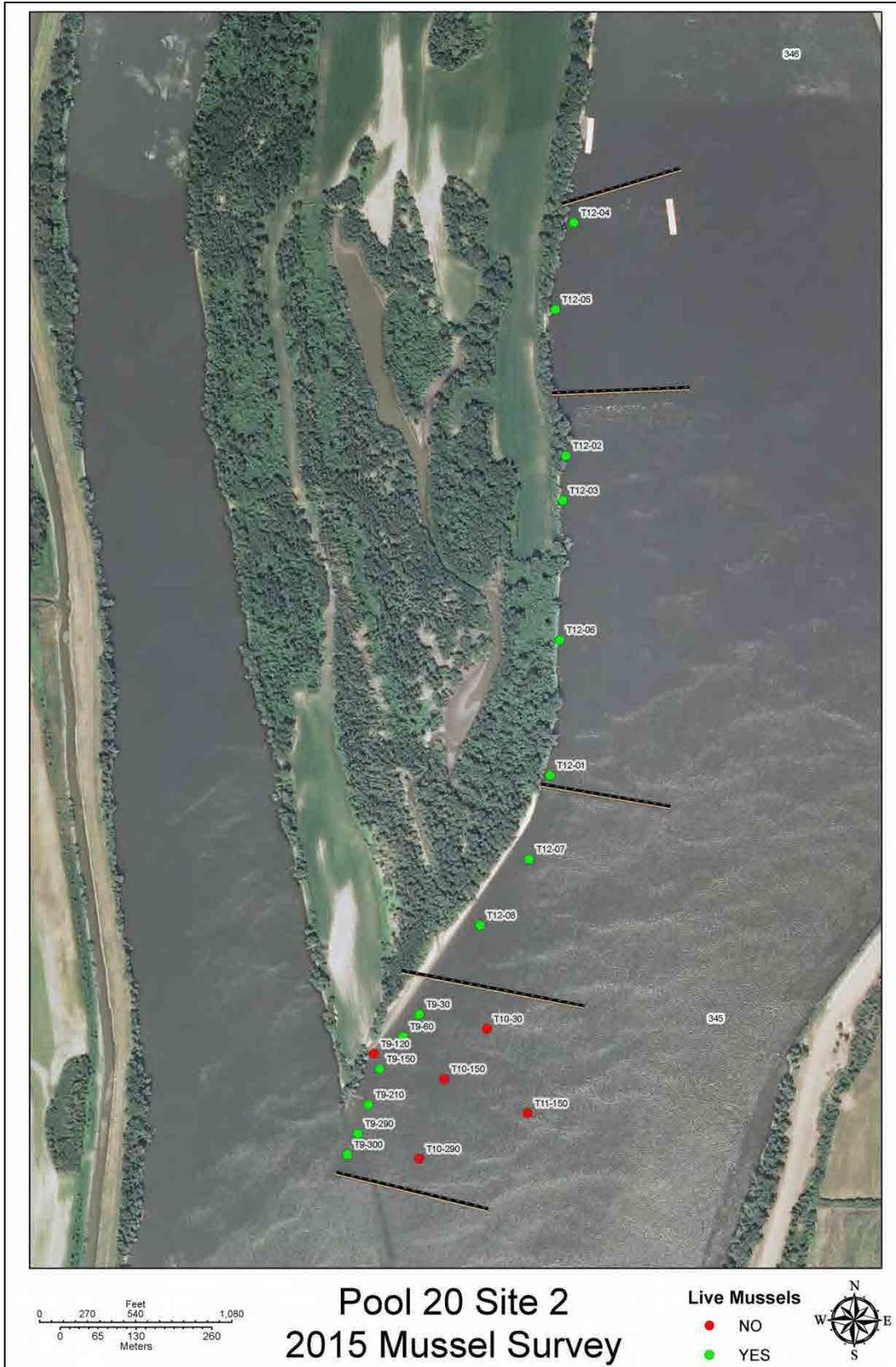


Figure 3. Locations of mussel surveys within Site 2 of the potential dredge disposal area of the Lock 20 Upper Dredge Material Management Plan in the Upper Mississippi River.

## Results

A total of 756 live individuals were collected during the entire survey effort representing 16 different species (Tables 1, 3, and 5). Several dead shells from one additional species (*Leptodea fragilis*) were also encountered but no live individuals were collected. No federally listed species were encountered at any location. There were 54 live individuals of the Illinois state listed butterfly (*Ellipsaria lineolata*) and four live individuals of the Illinois state listed black sandshell (*Ligumia recta*) encountered at Site 1, and no live or dead state listed species were collected at Site 2. Overall, the dominant taxa consisted of mapleleaf (*Quadrula quadrula*), threehorn wartyback (*Obliquaria reflexa*), pimpleback (*Quadrula pustulosa*), and threeridge (*Amblema plicata*), which made up 32.3, 16.8, 15.1, and 10.1% of total abundance, respectively. The average CPUE across all sampling locations with at least one live individual present was 1.26 live individuals per minute. At both Site 1 and Site 2, nearly all (>99%) of live individuals were encountered within approximately 60 meters of the bank where substrates and velocities were suitable for freshwater mussels (Figures 2-3).

### Site 1

A total of 568 live individuals were collected at Site 1 representing 14 different species (Tables 1 and 5). The average CPUE for samples with at least one live individual present at Site 1 was 1.78 live individuals per minute. Over 99% of all live individuals within Site 1 were collected within the 0-30 and 30-60 meter sampling increments (*i.e.*, within 60 meters of the bank) (Figure 2, Table 1). Substrates typically transitioned to 100% shifting sands around 50 meters out from the bank remaining fairly consistent all the way to the navigation channel (Figure 2, Table 2). Densities were higher between Wing Dam #s 26 and 27 compared to Wing Dam #s 25 and 26 with average CPUEs of 2.04 and 1.24, respectively. The Illinois state listed butterfly (*Ellipsaria lineolata*) was the fifth most abundant species present comprising 9.5% of total abundance at Site 1 (Tables 1 and 5). Approximately 5.5% of the total live individuals from all species at Site 1 were within the 0-5 year age class.

Table 1. Mussel survey results from the 16-21 July 2015 mussel survey effort within Site 1 of the potential dredge disposal areas for the Lock 20 Upper Dredge Material Management Plan in the Upper Mississippi River.

Location within Site 1: <b>Species</b>	Between Wing Dam (WD) #s 25-26				Between WD 26-27												Below WD 27	<b>Relative abundance</b>	
	T8- 60	T8- 30	T7- 60	T7- 30	T5- 120	T5- 90	T5- 60	T5- 30	T4- 60	T4- 30	T3- 60	T3- 30	T2- 90	T2- 60	T2- 30	T1-60	Total #s	Percent Composition	
<i>Quadrula quadrula</i>	3	9	6	6		1	29	39	56	21	6	14		8	6	4	208	36.6%	
<i>Quadrula pustulosa</i>		11	3		1	1	26	9	20	4	3	5		1	2	2	88	15.5%	
<i>Obliquaria reflexa</i>	1	18		17			4	16	9	6		3		2	3	1	80	14.1%	
<i>Obovaria olivaria</i>	5	2				1	11	5	14		3	7		2	2	4	56	9.9%	
<i>Ellipsaria lineolata</i>		1						6	12	9	2	9		3	7	5	54	9.5%	
<i>Amblema plicata</i>		4		7			2	7	4	5		2		1		1	33	5.8%	
<i>Megaloniaias nervosa</i>									3	6		4			2	1	16	2.8%	
<i>Fusconaia flava</i>		1		2				1		2		2	1				9	1.6%	
<i>Lampsilis cardium</i>	1	1	1					1	1		1		2				8	1.4%	
<i>Arcidens confragosus</i>								1					2			1	4	0.7%	
<i>Ligumia recta</i>									1	1		1			1		4	0.7%	
<i>Quadrula metanerva</i>									1			2				1	4	0.7%	
<i>Lasmigona complanata</i>							1		1		1						3	0.5%	
<i>Pyganadon grandis</i>										1							1	0.2%	
<b># OF SPECIES</b>	4	8	3	4	1	3	6	10	9	11	4	13	1	6	7	9	<b>14</b>	<b>TOTAL</b>	
<b>TOTAL # OF INDIV.</b>	10	47	10	32	1	3	73	86	120	57	14	54	1	17	23	20	<b>568</b>	<b>TOTAL</b>	
<i>CPUE (INDIV/MIN)</i>	0.50	2.35	0.50	1.60	0.05	0.15	3.65	4.30	6.00	2.85	0.70	2.70	0.05	0.85	1.15	1.00	<b>1.78</b>	<b>Avg. CPUE</b>	

Table 2. Habitat data and locations in decimal degrees (UTM NAD 1983 Zone 16 N) from the 16-21 July 2015 mussel survey effort within Site 1 of the potential dredge disposal areas for the Lock 20 Upper Dredge Material Management Plan in the Upper Mississippi River. Samples with no live mussels are shaded and shown in red; samples with live mussels are un-shaded and shown in green.

Site 1												
Transect	Identifier	Latitude	Longitude	MinDepth (m)	MaxDepth(m)	%Clay	%Silt	%Sand	%Gravel	%Cobble	%Boulder	%Woody Debris
T8-120	2015071614008	40.158135	-91.503675	7.0	7.6			100				
T8-90	2015071614007	40.158057	-91.503133	6.1	6.7			100				
T8-60	2015071614006	40.157921	-91.502462	3.0	5.2			95				5
T8-30	2015071614005	40.157891	-91.502224	0.6	3.0	90	5	5				
T7-120	2015071614004	40.156501	-91.503441	4.0	4.0			100				
T7-90	2015071614003	40.15639	-91.503055	4.0	4.5		100					
T7-60	2015071614002	40.156413	-91.502672	3.4	4.0		50	50				
T7-30	2015071614001	40.156415	-91.502286	0.9	3.0	25	50	25				
T5-90	2015071714007	40.154916	-91.503284	4.0	4.9			100				
T5-60	2015071714006	40.154818	-91.502779	4.0	6.1	20	10	70				
T5-30	2015071714005	40.154776	-91.502543	3.0	4.6			10			90	
T5-180	2015071714009	40.155246	-91.504246	4.6	5.5			100				
T5-150	2015071714010	40.155115	-91.503816	4.9	5.8			100				
T5-120	2015071714008	40.154981	-91.503468	4.6	5.5			100				
T4-120	2015071714004	40.154378	-91.503839	4.6	5.8			100				
T4-90	2015071714003	40.154195	-91.503512	4.6	5.8			100				
T4-60	2015071714002	40.153903	-91.503214	2.1	4.6		5	95				
T4-30	2015071714001	40.153861	-91.502892	0.9	2.1		40	40	20			
T3-120	2015071814010	40.153457	-91.504602	6.1	6.7		50	50				
T3-90	2015071814009	40.153204	-91.504367	5.8	6.7		50	50				
T3-60	2015071814008	40.153045	-91.504042	4.3	5.8		50	50				
T3-30	2015071814007	40.152993	-91.503582	2.7	3.4			50	5	45		
T2-120	2015071814006	40.152213	-91.505304	6.5	6.7			100				
T2-90	2015071814005	40.152003	-91.504891	6.4	7.3			100				
T2-60	2015071814004	40.151892	-91.504518	3.7	6.4			50	50			
T2-30	2015071814003	40.151811	-91.504247	2.4	3.0			20	50	30		
T1-60	2015071814002	40.151119	-91.504962	3.0	4.6			15	50	35		
T1-30	2015071814001	40.15111	-91.504611	1.2	2.7				100			

Site 2

A total of 188 live individuals were collected at Site 2 representing 11 different species (Tables 3 and 5). The average CPUE for samples with at least one live individual present at Site 2 was 0.67 live individuals per minute. Densities were highest on the extreme downstream and upstream portions of Site 2 (Table 3, Figure 3). Habitat conditions typically changed between approximately 60 and 90 meters out from the bank transitioning from stable sands and silts to shifting sands and high velocities, and the poor mussel habitat (shifting sands and high velocities) remained fairly consistent out to the navigation channel (Figure 3, Table 4). Approximately 10.6% of the total live individuals from all species at Site 2 were within the 0-5 year age class.

Table 3. Mussel survey results from the 16-21 July 2015 mussel survey effort within Site 2 of the potential dredge disposal areas for the Lock 20 Upper Dredge Material Management Plan in the Upper Mississippi River.

Location within Site 2:	Upstream													Downstream			Relative abundance	
	T12-05	T12-04	T12-02	T12-03	T12-06	T12-01	T12-07	T12-08	T9-30	T9-60	T9-150	T9-210	T9-290	T9-300	Total #s	Percent Composition		
<i>Amblema plicata</i>	6	4		1				2	3	5	9		12	5	47	25.0%		
<i>Obliquaria reflexa</i>	6	7		2	1		1	4		1	3	3	15	4	47	25.0%		
<i>Quadrula quadrula</i>	7	15						1		4	2	1	3	3	36	19.1%		
<i>Quadrula pustulosa</i>	2	2						1	3		1	1	9	7	26	13.8%		
<i>Quadrula nodulata</i>		1											5	4	10	5.3%		
<i>Lampsilis cardium</i>			2		1					1			2	3	9	4.8%		
<i>Obovaria olivaria</i>		3											1	2	6	3.2%		
<i>Fusconaia flava</i>	1			1							1				3	1.6%		
<i>Potamilus ohioensis</i>					1	1									2	1.1%		
<i>Arcidens confragosus</i>														1	1	0.5%		
<i>Lasmigona complanata</i>		1													1	0.5%		
<b># OF SPECIES</b>	5	7	1	3	3	1	1	4	2	4	5	3	7	8	<b>11</b>	<b>TOTAL</b>		
<b>TOTAL # OF INDIV.</b>	22	33	2	4	3	1	1	8	6	11	16	5	47	29	<b>188</b>	<b>TOTAL</b>		
<i>CPUE (INDIV/MIN)</i>	1.10	1.65	0.10	0.20	0.15	0.05	0.05	0.40	0.30	0.55	0.80	0.25	2.35	1.45	<b>0.67</b>	<b>Avg. CPUE</b>		

Table 4. Habitat data and locations in decimal degrees (UTM NAD 1983 Zone 16 N) from the 16-21 July 2015 mussel survey effort within Site 2 of the potential dredge disposal areas for the Lock 20 Upper Dredge Material Management Plan in the Upper Mississippi River. Samples with no live mussels are shaded and shown in red; samples with live mussels are un-shaded and shown in green.

Site 2									
<u>Transect</u>	<u>Identifier</u>	<u>Latitude</u>	<u>Longitude</u>	<u>MinDepth (m)</u>	<u>MaxDepth(m)</u>	<u>%Clay</u>	<u>%Silt</u>	<u>%Sand</u>	<u>%Woody Debris</u>
T12-08	2015072114008	40.168126	-91.50628	1.2	2.0		30	70	
T12-07	2015072114007	40.169136	-91.505264	2.1	3.6			100	
T12-06	2015072114006	40.172517	-91.50458	1.8	4.6		70	30	
T12-05	2015072114005	40.177625	-91.504555	2.4	3.0		90		10
T12-04	2015072114004	40.178962	-91.504151	1.8	3.0		50	40	10
T12-03	2015072114003	40.174671	-91.504474	0.9	3.0	10	45	45	
T12-02	2015072114002	40.175362	-91.504389	0.9	3.0		100		
T12-01	2015072114001	40.170427	-91.504819	1.2	3.1		50	50	
T11-150	2015072014007	40.165211	-91.505382	4.0	4.0			100	
T10-290	2015072014006	40.164534	-91.507582	1.5	2.1			100	
T10-150	2015072014005	40.165763	-91.507053	2.7	2.7			100	
T10-30	2015072014004	40.166526	-91.506178	2.7	2.7			100	
T9-300	2015072014010	40.164615	-91.50903	0.9	1.8		30	70	
T9-290	2015072014003	40.164936	-91.508807	0.9	1.8		80	20	
T9-210	2015072014009	40.165385	-91.508585	0.6	1.2		10	90	
T9-150	2015072014002	40.165934	-91.508345	0.9	1.5			100	
T9-120	2015072014011	40.16617	-91.508457	0.3	0.9		90		10
T9-60	2015072014008	40.166427	-91.507863	0.9	1.5		10	90	
T9-30	2015072014001	40.166768	-91.50753	1.5	2.1			100	

## Discussion

Overall freshwater mussel densities at Site 1 were more than twice as high as those encountered in Site 2 with an average CPUE of 1.78 and 0.67 live individuals per minute, respectively (Table 5). CPUE comparisons were made only for those samples where live individuals were encountered since all increments within each transect were not sampled and the number of sampling increments with unsuitable habitat varied between the sites due to site conditions. Conversely, relative abundance of live individuals within the 0-5 year age class were higher at Site 2 compared to Site 1 comprising 10.6% and 5.5% of the total live individuals, respectively. Sixteen different species of live mussels were encountered during the survey effort (14 species in Site 1 and 11 species in Site 2), representing half of the 32 species known to occur in Pool 20 of the Upper Mississippi River (Kelner 2011). No gravid females were observed during the survey effort; however, both sites contained a variety of age classes of several different species, indicating stable populations. Dominant taxa were similar between the two sites with the exception of larger numbers of threeridge (*Amblema plicata*) encountered at Site 2 (Table 5). At Site 1, the Illinois state listed butterfly (*Ellipsaria lineolata*) was the fifth most abundant species comprising 9.5% of total abundance, and no state listed species were encountered at Site 2.

Table 5. Relative abundance comparisons from the 16-21 July 2015 mussel survey effort within potential dredge disposal areas for the Lock 20 Upper Dredge Material Management Plan in the Upper Mississippi River.

<b>Overall</b>		
<b>Species</b>	<b>Relative abundance</b>	
	Totals	% Composition
<i>Quadrula quadrula</i>	244	32.3%
<i>Obliquaria reflexa</i>	127	16.8%
<i>Quadrula pustulosa</i>	114	15.1%
<i>Amblyma plicata</i>	80	10.6%
<i>Obovaria olivaria</i>	62	8.2%
<i>Ellipsaria lineolata</i>	54	7.1%
<i>Lampsilis cardium</i>	17	2.2%
<i>Megaloniais nervosa</i>	16	2.1%
<i>Fusconaia flava</i>	12	1.6%
<i>Quadrula nodulata</i>	10	1.3%
<i>Arcidens confragosus</i>	5	0.7%
<i>Lasmigona complanata</i>	4	0.5%
<i>Ligumia recta</i>	4	0.5%
<i>Quadrula metanerva</i>	4	0.5%
<i>Potamilus ohioensis</i>	2	0.3%
<i>Pyganadon grandis</i>	1	0.1%
<b># OF SPECIES</b>	<b>16</b>	
<b>TOTAL # OF INDIV.</b>	<b>756</b>	
CPUE (# of Indiv./min.)*	1.26	
* samples with at least one live indiv. collected.		

<b>Site 1</b>		
<b>Species</b>	<b>Relative abundance</b>	
	Totals	% Composition
<i>Quadrula quadrula</i>	208	36.6%
<i>Quadrula pustulosa</i>	88	15.5%
<i>Obliquaria reflexa</i>	80	14.1%
<i>Obovaria olivaria</i>	56	9.9%
<i>Ellipsaria lineolata</i>	54	9.5%
<i>Amblyma plicata</i>	33	5.8%
<i>Megaloniais nervosa</i>	16	2.8%
<i>Fusconaia flava</i>	9	1.6%
<i>Lampsilis cardium</i>	8	1.4%
<i>Arcidens confragosus</i>	4	0.7%
<i>Ligumia recta</i>	4	0.7%
<i>Quadrula metanerva</i>	4	0.7%
<i>Lasmigona complanata</i>	3	0.5%
<i>Pyganadon grandis</i>	1	0.2%
<b># OF SPECIES</b>	<b>14</b>	
<b>TOTAL # OF INDIV.</b>	<b>568</b>	
CPUE (# of Indiv./min.)*	1.78	
* samples with at least one live indiv. collected.		

<b>Site 2</b>		
<b>Species</b>	<b>Relative abundance</b>	
	Totals	% Composition
<i>Amblyma plicata</i>	47	25.0%
<i>Obliquaria reflexa</i>	47	25.0%
<i>Quadrula quadrula</i>	36	19.1%
<i>Quadrula pustulosa</i>	26	13.8%
<i>Quadrula nodulata</i>	10	5.3%
<i>Lampsilis cardium</i>	9	4.8%
<i>Obovaria olivaria</i>	6	3.2%
<i>Fusconaia flava</i>	3	1.6%
<i>Potamilus ohioensis</i>	2	1.1%
<i>Arcidens confragosus</i>	1	0.5%
<i>Lasmigona complanata</i>	1	0.5%
<b># OF SPECIES</b>	<b>11</b>	
<b>TOTAL # OF INDIV.</b>	<b>188</b>	
CPUE (# of Indiv./min.)*	0.67	
* samples with at least one live indiv. Collected.		

## **Conclusions**

No federally listed endangered or threatened freshwater mussel species were collected during the survey effort. Two species listed as threatened by the state of Illinois, namely the butterfly (*Ellipsaria lineolata*) and the black sandshell (*Ligumia recta*), were encountered at Site 1 while none were encountered at Site 2. At both sites, nearly all live freshwater mussels were encountered within approximately 60 meters of the bank (Figures 2-3). Outside of 60 meters from the bank, suitable freshwater mussel habitat was extremely limited as substrates transitioned from stable cobble, gravel, sands, silts, and clays to shifting sands with increased velocities.

## **References**

- Kelner, D. 2011. Upper Mississippi River mussel species accounts. U.S. Army Corps of Engineers, St. Paul District.
- USACE, U.S. Army Corps of Engineers. 2008. Safety and Health Requirements Manual. Engineering Manual 385-1-1. U.S. Army Corps of Engineers, Washington D.C.



**DREDGED MATERIAL MANAGEMENT PLAN**

**UPPER MISSISSIPPI RIVER**

**POOL 20**

**RIVER MILES 343.2-344.3**

**LOCK 20 UPPER DREDGE CUT**

**APPENDIX A**

**ENVIRONMENTAL ASSESSMENT  
FINDING OF NO SIGNIFICANT IMPACT**

**APPENDIX EA-2  
CORRESPONDENCE**



## **Dredged Material Management Program, Lock 20 Upper Dredge Cut, April 16, 2013**

- 1. Introduction.** This document serves as the after-action report for Huron Island Island
- 2. Public Meeting Objective.** The objective of the public meeting was to discuss dredging and placement of dredged material from the Mississippi River upstream of Lock & Dam 20, Canton Missouri.
- 3. Open House Location.** The public meeting was held at the Canton City Hall at 106 N 5<sup>th</sup> St, Canton MO.
- 4. Medium.** An announcement was mailed to approximately 100 addressees including congressional interests, federal, state and local governmental agencies; businesses, environmental organizations, media and the general public inviting them to attend. The Public Affairs Office also sent a news release to area television and radio stations and newspapers.
- 5. Public Meeting Format.**
  - a. **Date/Time:** The open house was held on April 16, 2013 from 5:00pm-7:00pm.  
5:00-5:30 – Open House  
5:30-6:00 – Presentation & Q&A's  
6:00-7:00 – Open House
  - b. **Staff:** Rock Island District. The Corps representatives were present to talk one-to-one with the attendees during the open house and to answer any questions. The representatives were:  
  
Andy Leichthy – Corps of Engineers  
Matt Afflerbach – Corps of Engineers  
Marsha Dolan – Corps of Engineers  
Jon Klingman – Corps of Engineers  
Karl Schmitz – Corps of Engineers  
Kenny Brenner – Corps of Engineers  
Nicole Mansco – Corps of Engineers  
Brant Vollman – Corps of Engineers
  - c. **Displays.** Maps of the study area were on display.
- 6. Attendance.** There were approximately 19 attendees who included one television station and one State Regional Political Director from Senator Blunt's office.. The attendees were offered a comment sheet and a copy of the presentation. Results of the returned comments are shown in paragraph 7 below.

6. **Public Comments.** Public meeting attendees were asked to fill out a comment sheet. A total of 2 sheets and one letter were received at the meeting.

Questions 1-4:

Questions 1-4	Strongly Agree	Agree	Disagree	Strongly Disagree	Totals
This open house and public meeting provided and opportunity to gain information and a better understanding of Lock 20 Upper Maintenance Dredging and Placement of Material	75%	25%	0	0	100%
This open house provided and opportunity for everyone to offer comments about the project	100%	0	0	0	100%
The displays/materials provided were informative	100%	0	0	0	100%
This public meeting was worth my time.	100	0	0	0	100%
Total Group	91.7%	8.3%	0	0	100%

Summary of Additional Responses: The comment sheet also provided space for additional participant comments.

Comments regarding the project:

*Question 5: Do you have other comments or concerns regarding this project:*

- The Mississippi Valley Hunter’s and Fishermen’s Association (MVHFA) requests that dredge spoil from proposed dredging on Mississippi River Pool 20 (lower reach) be utilized in the following priority order:
  - Creation of side-channel island with rip-rap upstream baffles
  - Stockpile of inland side of existing levee for future flood fighting efforts.
  - Utilization on existing levees to strengthen levee widths. It should not be utilized to raise existing levee heights above what is currently authorized.
- Any utilization for items #2 and #3 must be done in such a manner as to completely protect any adjacent wetlands from dredge spoil runoff or water discharge. An area of particular concern is wetlands located on the Illinois side approximately 1 mile north of Meyer, IL
- The MVHFA is adamantly opposed to any thalweg disposal of dredge material during this project.
- Avoid wetlands at Meyer (Martin Lake) and .75 miles north of Meyer
- Endangered species issues at Martin Lake. **NO THALWEG DISPOSAL!**
- Your people must have done a very good job as there were minimum questions at the end of the program
- Meeting was well presented and showed problems involved in getting to a good solution.
- During the meeting of problems and procedures at the sets few questions were asked although following the formal presentation (procedural) the various presenters were

inundated with small group questions and discussions. I am a Canton resident that wanted to hear about the dredging problem w/no particular interest or “axes to grind”.

*Question 6: Suggested placement sites:*

- My first suggestion is property at east end of Lock and Dam 20 where break occurred in 2008. I’m not sure of ownership but this is nothing but waste land now, and has about right acreage. I understand problem of pumping across river but still believe as far as land value it would be cheapest. If you stay on Missouri side, this land is mostly farmable even though very low ground.
- I would trust the judgment of the Hunt-Lima Drainage commissioners. I am the owner of the 80 acres ½ mile north of Meyer with my farm in WPR.

**8. Summary.** The open house met the objective of providing information on the proposed project. The discussion between the study team personnel and the public was informative. Attendees were generally supportive of the open house. This report is being distributed to the study team members for their consideration and analysis.

MARSHA DOLAN  
Public Involvement Specialist  
Economic & Environmental Analysis Branch

CF:  
PM-M (A. LEITCHY)  
PD-E (M. DOLAN)

**LOCK 20 UPPER MAINTENANCE DREDGING  
AND PLACEMETN OF DREDGED MATERIAL**

**April 16, 2013**

	<u>Strongly Agree</u>		<u>Agree</u>			<u>Disagree</u>			<u>Strongly Disagree</u>	
	1	2	3	4	5	6	7	8	9	10
(1) This open house and public meeting provided an opportunity to gain information and a better understanding of Lock 20 Upper Maintenance Dredging & Placement of Material										
(2) This open house provided an opportunity for everyone to offer comments about the project.										
(3) The displays/materials provided were informative.										
(4) This public meeting was worth my time										

(5) Do you have other comments or concerns regarding this project?

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(6) Suggested placement sites:

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**COMMENTS DUE BACK INTO THE OFFICE BY: APRIL 23, 2013**

(Optional) Name \_\_\_\_\_

Address \_\_\_\_\_

(Contact information will go on our mailing list for this project)

**Send Survey Back to:**  
US Army Engineer Dist Rock Island  
Clock Tower Bldg PO Box 2004  
Rock Island IL 61204-2004

**THANK YOU FOR ATTENDING THIS OPEN HOUSE  
AND YOUR COMMENTS**

# Lock 20 Upper Maintenance Dredging & Placement of Dredged Material

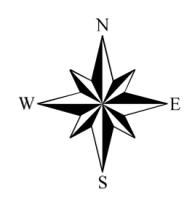


— 10,000' Pump Limits  
 ◇ River Miles  
 Wing Dams  
 Railroads  
 Section Lines

50 Acre Area for  
 Dredged Material  
 1200' Length of  
 Tow Boat & Barges

0 1,500 3,000 6,000 Feet

0 0.5 1 2 Miles





DEPARTMENT OF THE ARMY  
CORPS OF ENGINEERS – ROCK ISLAND DISTRICT  
CLOCK TOWER BUILDING -

ROCK ISLAND, ILLINOIS 61204-2004

June 25, 2014

Regional Planning and Environmental  
Division North (RPEDN)

SEE DISTRIBUTION LIST

The U.S. Army Corps of Engineer (Corps), Rock Island District (District), has identified the need for new placement sites for the long-term Dredged Material Management Plan (DMMP) for the Lock 20 Upper dredge cut located in lower Pool 20 of the Upper Mississippi River (UMR). This DMMP project area extends along the UMR between River Miles (RM) 343.2 and 345.9. Any DMMP is required to provide a minimum of a 20-year maintenance dredging plan. The District is proposing to identify areas for 40-year dredging capacities in order to meet future dredging needs based upon dredging experience in this area of the UMR.

The District has identified three sites that would meet potential long-term or short-term dredge material placement needs (Enclosure 1). One of the sites is a terrestrial agricultural field approximately 74.3 acres in size, located on the right descending bank of the river at approximate RM 343.4, just upstream of the city of Canton and Lock 20, in Lewis County, Missouri. This site would meet the projected long-term dredging requirements for this reach, but is not anticipated to be available for potential emergency use during the 2015 and 2016 navigation season. The second site is in the river channel border between wing dams #25 and #27 on the left descending bank of the river at approximate RM 344.0–344.3L in Adams County, Illinois. (These three wing dams were repaired to original design earlier this year.) This site could potentially be available in the event of emergency placement needs during the late 2015 or 2016 navigation seasons, but may not be acceptable for long-term placement depending on the results of biological investigations discussed below. The third site is located in shallow water on the right descending bank along the lower end of White (aka Nelson or Brownsville) Island at approximate RM 344.5–345.0. This site has limited capacity but could potentially accommodate a portion of future dredging requirements. Any of the identified dredge material placement areas may be evaluated for potential use by the District in developing the DMMP Project through full consideration of all DMMP planning, policies, and procedures.

The District is currently in the planning phase and will use responses to this letter to assist in developing a recommended plan for long-term placement as well as short-term placement (Fall 2015 through the 2016 navigation season). The District is preparing an Environmental Assessment to evaluate potential impacts to alternative sites from placement of dredged material. At this time we are asking you to inform us of any significant resources or other environmental concerns associated with these sites. These concerns include but are not limited to: threatened and endangered species, protected habitat, wetlands, prime farmlands, land-use plans, etc.

The District has used the U.S. Fish and Wildlife Service (USFWS), Midwest Region, endangered species website and the Illinois Department of Natural Resources, Illinois Endangered Species Protection Board website to identify Federal- and state-listed species for Adams County in Illinois and Lewis County in Missouri (Enclosures 2 and 3). At this time, the District has determined that placement of dredged material at any of the three alternate sites is not likely to adversely affect any Federal- or state-listed threatened and endangered species or their habitat. However, due to a lack of recent survey data on mussel resources in this reach of the river and following coordination of wing dam repair efforts with the USFWS and State natural resources agencies, a mussel survey of the two aquatic placement sites will be performed this summer by the Corps' Memphis District dive team. The District will review the results of the mussel survey field work and may revise its determination regarding impacts to threatened and endangered mussel species based on this new information.

Please provide any comments, concerns, or questions you may have regarding this Project within 30 days of receipt of this letter. Address your responses to Ms. Charlene Carmack of our Environmental Compliance Branch, by telephone (309) 794-5570, in writing to our address above, ATTN: Environmental Compliance Branch (Carmack), or email: [charlene.carmack@usace.army.mil](mailto:charlene.carmack@usace.army.mil)

Sincerely,

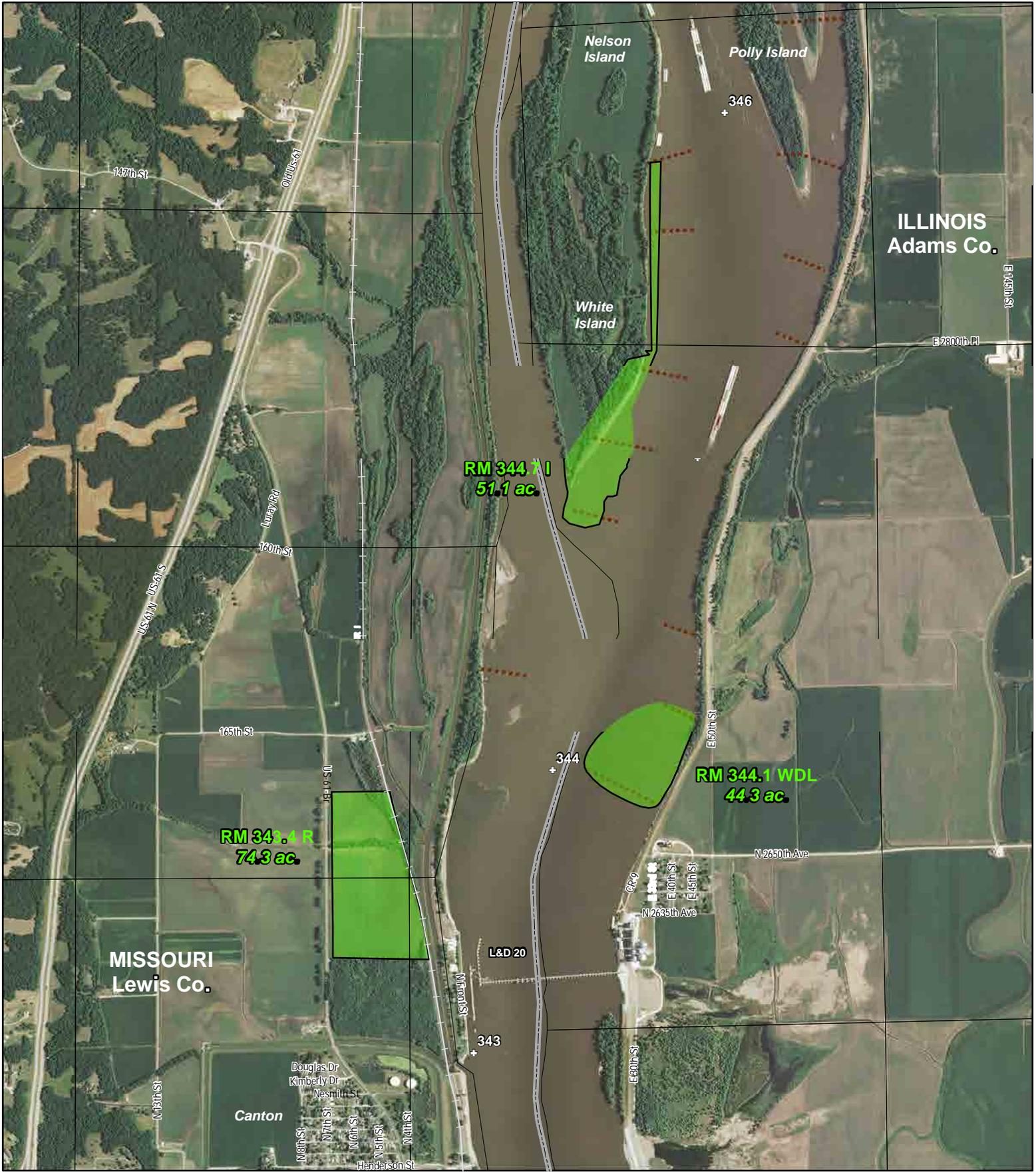


Kenneth A. Barr

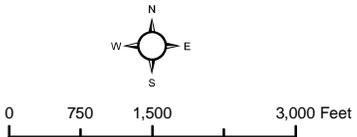
for Chief, Environmental Planning Branch (RPEDN)

Enclosures (3)

# Lock 20 Upper DMMP: Potential Placement Sites

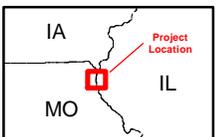


- Potential Placement Sites
- Wingdams
- State Boundary
- Railroads
- Section Lines
- River Miles



June 2015

Imagery: 2012 USDA NAIP



**FEDERALLY-LISTED SPECIES**

**Adams County, Illinois**

Indiana bat	<i>Myotis sodalis</i>	Endangered	Caves, mines (hibernacula);small stream corridors with well developed riparian woods; upland forests (foraging)
Northern long-eared bat	<i>Myotis septentrionalis</i>	Threatened	Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests and woods
Higgins' eye pearl mussel	<i>Lampsilis higginsii</i>	Endangered	Mississippi River; Rock River to Steel Dam
Eastern prairie fringed orchid	<i>Platanthera leucophaea</i>	Threatened	Mesic to wet prairies

**Lewis County, Missouri**

Indiana bat	<i>Myotis sodalis</i>	Endangered	Caves, mines (hibernacula);small stream corridors with well developed riparian woods; upland forests (foraging)
Northern long-eared bat	<i>Myotis septentrionalis</i>	Threatened	Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests and woods
Least tern (interior population)	<i>Sterna antillarum</i>	Endangered	Large rivers. Nest on sandbars.
Piping plover	<i>Charadrius melodus</i>	Threatened	Riverine sandbars
Rufa Red knot	<i>Calidris canutus rufa</i>	Threatened	Shorebird that migrates through Missouri – irregularly observed feeding on mudflats, sandbars, shallowly flooded areas and pond margins along
Pallid sturgeon	<i>Scaphirhynchus albus</i>	Endangered	Missouri and Mississippi Rivers
Sheepnose mussel	<i>Plethobasus cyphus</i>	Endangered	

Source: <http://www.fws.gov/midwest/endangered/lists/illinois-cty.html>

Adams County, Illinois

State-listed species<sup>1</sup>

Scientific Name	Common Name	State Protection
<i>Acipenser fulvescens</i>	Lake Sturgeon	LE
<i>Carex prasina</i>	Drooping Sedge	LT
<i>Cumberlandia monodonta</i>	Spectaclecase	LE
<i>Delphinium carolinianum</i>	Wild Blue Larkspur	LT
<i>Dendroica cerulea</i>	Cerulean Warbler	LT
<i>Ellipsaria lineolata</i>	Butterfly	LT
<i>Elliptio crassidens</i>	Elephant-ear	LT
<i>Fusconaia ebena</i>	Ebonysell	LT
<i>Hybognathus hayi</i>	Cypress Minnow	LE
<i>Ictinia mississippiensis</i>	Mississippi Kite	LT
<i>Lanius ludovicianus</i>	Loggerhead Shrike	LT
<i>Liatris scariosa</i> var. <i>nieuwlandii</i>	Blazing Star	LT
<i>Ligumia recta</i>	Black Sandshell	LT
<i>Melanthium virginicum</i>	Bunchflower	LT
<i>Myotis grisescens</i>	Gray Bat	LE
<i>Myotis sodalis</i>	Indiana Bat	LE
<i>Pandion haliaetus</i>	Osprey	LE
<i>Plethobasus cyphus</i>	Sheepnose	LE
<i>Poa wolfii</i>	Wolf's Bluegrass	LE
<i>Scirpus polyphyllus</i>	Bulrush	LT
<i>Thryomanes bewickii</i>	Bewick's Wren	LE
<i>Tomanthera auriculata</i>	Ear-leafed Foxglove	LT
<i>Trifolium reflexum</i>	Buffalo Clover	LT
<i>Trillium viride</i>	Green Trillium	LE
<i>Viburnum molle</i>	Arrowwood	LT

<sup>1</sup> LE: Endangered, LT: Threatened

Source: [http://www.dnr.illinois.gov/ESPB/Documents/ET\\_by\\_County.pdf](http://www.dnr.illinois.gov/ESPB/Documents/ET_by_County.pdf)

Threatened and Endangered Species in Missouri

Scientific Name	Common Name	State <sup>1</sup> Status	Federal <sup>2</sup> Status
<b>PLANTS</b>			
<i>Asclepias meadii</i>	Mead's Milkweed	Endangered	Threatened
<i>Boltonia decurrens</i>	Decurrent False Aster	Endangered	Threatened
<i>Geocarpon minimum</i>	Geocarpon	Endangered	Threatened
<i>Helenium virginicum</i>	Virginia Sneezeweed	Endangered	Threatened
<i>Isotria medeoloides</i>	Small Whorled Pogonia <sup>3</sup>	Endangered	Threatened
<i>Lindera melissifolia</i>	Pondberry	Endangered	Endangered
<i>Physaria filiformis</i>	Missouri Bladder-pod	Endangered	Threatened
<i>Platanthera leucophaea</i>	Eastern Prairie Fringed Orchid <sup>3</sup>	Endangered	Threatened
<i>Platanthera praeclara</i>	Western Prairie Fringed Orchid	Endangered	Threatened
<i>Trifolium stoloniferum</i>	Running Buffalo Clover	Endangered	Endangered
<b>MOLLUSKS</b>			
<i>Antrobia culveri</i>	Tumbling Creek Cavesnail	Endangered	
<i>Cumberlandia monodonta</i>	Spectaclecase	Endangered	
<i>Elliptio crassidens</i>	Elephantear	Endangered	
<i>Epioblasma florentina curtisii</i>	Curtis Pearlymussel	Endangered	Endangered
<i>Epioblasma triquetra</i>	Snuffbox	Endangered	Endangered
<i>Fusconaia ebena</i>	Ebonyshell	Endangered	
<i>Lampsilis abrupta</i>	Pink Mucket	Endangered	Endangered
<i>Lampsilis higginsii</i>	Higgins Eye	Endangered	Endangered
<i>Lampsilis rafinesqueana</i>	Neosho Mucket	Endangered	
<i>Leptodea leptodon</i>	Scaleshell	Endangered	Endangered
<i>Plethobasus cyphus</i>	Sheepnose	Endangered	Endangered
<i>Potamilus capax</i>	Fat Pocketbook	Endangered	Endangered
<i>Quadrula fragosa</i>	Winged Mapleleaf	Endangered	Endangered
<i>Quadrula cylindrica cylindrica</i>	Rabbitsfoot	Threatened	
<b>CRUSTACEANS</b>			
<i>Cambarus aculabrum</i>	Cave Crayfish	Endangered	
<b>INSECTS</b>			
<i>Nicrophorus americanus</i>	American Burying Beetle <sup>3</sup>	Endangered	Endangered
<i>Somatochlora hineana</i>	Hine's Emerald	Endangered	Endangered
<b>FISH</b>			
<i>Acipenser fulvescens</i>	Lake Sturgeon	Endangered	
<i>Amblyopsis rosae</i>	Ozark Cavefish	Endangered	Threatened
<i>Cottus specus</i>	Grotto Sculpin	Endangered	
<i>Crystallaria asprella</i>	Crystal Darter	Endangered	
<i>Etheostoma cragini</i>	Arkansas Darter	Candidate	
<i>Etheostoma fusiforme</i>	Swamp Darter	Endangered	
<i>Etheostoma histrio</i>	Harlequin Darter	Endangered	
<i>Etheostoma nianguae</i>	Niangua Darter	Endangered	Threatened
<i>Etheostoma parvipinne</i>	Goldstripe Darter	Endangered	
<i>Etheostoma whipplei</i>	Redfin Darter	Endangered	
<i>Forbesichthys agassizii</i>	Spring Cavefish	Endangered	
<i>Hybognathus hayi</i>	Cypress Minnow	Endangered	
<i>Notropis maculatus</i>	Taillight Shiner	Endangered	
<i>Notropis sabiniae</i>	Sabine Shiner	Endangered	
<i>Notropis topeka</i>	Topeka Shiner	Endangered	Endangered
<i>Noturus eleutherus</i>	Mountain Madtom	Endangered	
<i>Noturus placidus</i>	Neosho Madtom	Endangered	Threatened
<i>Percina nasuta</i>	Longnose Darter	Endangered	
<i>Platygobio gracilis</i>	Flathead Chub	Endangered	
<i>Scaphirhynchus albus</i>	Pallid Sturgeon	Endangered	Endangered
<i>Scaphirhynchus platyrhynchus</i>	Shovelnose Sturgeon	Threatened/SA	
<i>Umbra limi</i>	Central Mudminnow	Endangered	

Scientific Name	Common Name	State <sup>1</sup> Status	Federal <sup>2</sup> Status
<b>AMPHIBIANS</b>			
<i>Cryptobranchus a. alleganiensis</i>	Eastern Hellbender	Endangered	
<i>Cryptobranchus a. bishopi</i>	Ozark Hellbender	Endangered	Endangered
<b>REPTILES</b>			
<i>Deirochelys reticularia miaria</i>	Western Chicken Turtle	Endangered	
<i>Emydoidea blandingii</i>	Blanding's Turtle	Endangered	
<i>Kinosternon flavescens</i>	Yellow Mud Turtle	Endangered	
<i>Nerodia cyclopion</i>	Mississippi Green Watersnake <sup>3</sup>	Endangered	
<i>Sistrurus catenatus</i>	Eastern Massasauga <sup>3</sup>	Endangered	Candidate
<i>Sistrurus tergeminus tergeminus</i>	Prairie Massasauga	Endangered	
<b>BIRDS</b>			
<i>Botaurus lentiginosus</i>	American Bittern	Endangered	
<i>Circus cyaneus</i>	Northern Harrier	Endangered	
<i>Egretta thula</i>	Snowy Egret	Endangered	
<i>Falco peregrinus</i>	Peregrine Falcon	Endangered	
<i>Limnothlypis swainsonii</i>	Swainson's Warbler	Endangered	
<i>Peaocaea aestivalis</i>	Bachman's Sparrow	Endangered	
<i>Rallus elegans</i>	King Rail	Endangered	
<i>Sterna antillarum athalassos</i>	Interior Least Tern	Endangered	Endangered
<i>Tympanuchus cupido</i>	Greater Prairie-chicken	Endangered	
<b>MAMMALS</b>			
<i>Canus lupus</i>	Gray Wolf	Endangered	
<i>Corynorhinus townsendii ingens</i>	Ozark Big-eared Bats	Endangered	Endangered
<i>Lepus californicus</i>	Black-tailed Jackrabbit	Endangered	
<i>Myotis grisescens</i>	Gray Bat	Endangered	Endangered
<i>Myotis septentrionalis</i>	Northern Long-eared Myotis	Proposed Endangered	
<i>Myotis sodalis</i>	Indiana Bat	Endangered	Endangered
<i>Spilogale putorius interrupta</i>	Plains Spotted Skunk	Endangered	

<sup>1</sup>Listed in the Wildlife Code of Missouri, Rule 3 CSR10-4, 111 Endangered Species.

<sup>2</sup>Federally Listed Species under the Endangered Species Act (ESA) of 1973 as Amended:

Endangered: Any species that is in danger of extinction throughout all or a significant portion of its range

Threatened: Any species that is likely to become endangered within the foreseeable future

Candidate: Plants or animals that the USFWS is reviewing for possible addition to the list of Endangered and Threatened species

Proposed: Any species proposed for listing as Threatened or Endangered by the USFWS

Threatened/SA: Any species listed Threatened due to Similarity of Appearance by the USFWS

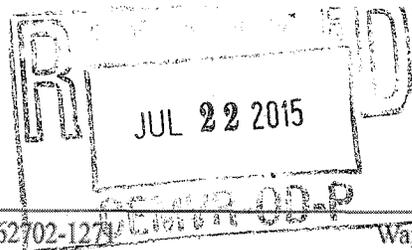
<sup>3</sup>Considered extirpated, historical or accidental occurrence in Missouri

<http://mdc.mo.gov/sites/default/files/resources/2010/04/2015speciesconcern.pdf>



# Illinois Department of Natural Resources

One Natural Resources Way Springfield, Illinois 62702-1274  
www.dnr.illinois.gov



Bruce Rauner, Governor

Wayne A. Rosenthal, Director

July 15, 2015

SUBJECT: Dredged Material Management Plan  
Lock 20 Upper Dredge Cut  
Mississippi River (Mile 343.2 – 345.9)

U.S. Army Corps of Engineers  
Rock Island District  
ATTN: Environmental Compliance Branch (Carmack)  
Clock Tower Building  
Rock Island, Illinois 61204-2004

Dear Ms. Carmack:

Thank you for your June 25, 2015 request for comments concerning the subject proposed Dredged Material Management Plan. The Illinois Department of Natural Resources, Office of Water Resources has reviewed the submitted information to determine how the State of Illinois' Rivers, Lakes and Streams Act and our Part 3700 Floodway Construction and Part 3704 Public Waters regulations would apply to the proposed work.

The terrestrial agricultural field placement site on the right descending bank of the river at RM 343.4 is located outside of the river floodway. Placement of dredged material at that site would be considered authorized by IDNR/OWR Permit No. 17603.

The river channel border sites at RM 344.0-344.3L and 344.5-345.9R are located within the river floodway, within public waters and within the depositional influence of wing dams. These sites do not meet the conditions of Permit No. 17603. Therefore, an individual IDNR/OWR permit would be required for placing dredged material at these sites and it would need to be demonstrated that placement would comply with the requirements of our Part 3700 and Part 3704 regulations. Those regulations are available on our website at:

<http://www.dnr.illinois.gov/WaterResources/Pages/Permit%20Programs.aspx>

Thank you for providing the opportunity for comment. Please feel free to contact me at 217/782-4426 if you have any questions or comments concerning this matter.

Sincerely,

Michael L. Diedrichsen, P.E.  
Acting Manager, Downstate Regulatory Programs

MLD:cjp

cc: IDNR/Impact Analysis Section (Nathan Grider)



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 5  
77 WEST JACKSON BOULEVARD  
CHICAGO, IL 60604-3590

JUL 15 2015

REPLY TO THE ATTENTION OF: E-19J

Ms. Charlene Carmack  
Environmental Compliance Branch  
U.S. Army Corps of Engineers, Rock Island District  
Clock Tower Building, P.O. Box 2004  
Rock Island, Illinois 61204-2004

**RE: Request for Scoping Comments on the Lock 20 Dredge Material Management Plan Project, Lewis County, Missouri and Adams County, Illinois**

Dear Ms. Carmack:

The U.S. Environmental Protection Agency has received the U.S. Army Corps of Engineers' (USACE) June 25, 2015 request for scoping comments for the Lock 20 Dredge Material Management Plan (DMMP) project. The project entails identifying dredge material placement sites for the long-term DMMP for the Lock 20 upper dredge cut located in lower Pool 20 of the Upper Mississippi River. We understand that USACE is currently preparing an Environmental Assessment (EA) under the National Environmental Policy Act (NEPA) to evaluate the potential impacts of alternative dredge material placement sites, and we appreciate the opportunity to provide early input into the environmental process.

**EPA Recommendations:**

We offer the following comments for USACE's consideration in preparing the EA for this project.

**Project Purpose, Need and Alternatives**

EPA recommends that USACE clearly and concisely identify the purpose and need for the proposed project in the EA. The document should also include clear descriptions and assessments of reasonable alternatives to meet the project purpose and need. It is important for the EA to include clear explanations to support the early elimination of any alternatives considered but not fully analyzed.

**Project Description**

The EA should fully describe the proposed project, including: detailed locations of proposed dredge material placement sites; environmental site characterizations for all proposed material placement sites; quantity of material to be deposited on the new placement sites; characterization of dredge material type, nutrient content, and any contaminants; location of dredging activities; dredging schedule (timing and frequency); quantity of material to be dredged annually; and the proposed methods for transporting dredged materials to the placement location(s). Please also describe how dredged materials will be contained during transport and final disposal.

### **Water Quality Impairments**

The EA should clearly describe existing water quality conditions, any potential adverse impacts to water quality from the proposed project, and measures to avoid, minimize and mitigate impacts. In 2014, the Illinois EPA listed the portion of the Mississippi River in the project area as impaired under Section 303(d) of the federal Clean Water Act for: (1) fish consumption use due to elevated levels of mercury and polychlorinated biphenyls (PCBs), and (2) public and food processing water supplies use due to phenol. It is unclear how the proposed project may impact water quality.

### **Beneficial Reuse**

We recommend that USACE consider potential alternate uses of dredged material, such as: restoring aquatic habitat areas, covering over brownfields locations, filling in basements of demolished buildings, use by the fracking or mining industries, use by the state Departments of Transportation, and use by counties or local communities as general fill or for winter road maintenance. Please specifically discuss potential reuse opportunities that could support the Upper Mississippi River Restoration Program.

To promote reuse, a solid understanding of the materials is necessary. We recommend developing material specification sheets that describe, at a minimum: physical properties, chemical properties, amounts available and times the material will be available. This information would allow interested users to more easily determine whether the material can meet their needs, add value to the material and facilitate beneficial reuse.

### **Long-Term Reliability**

EPA encourages USACE to fully assess the long-term reliability and maintenance needs of all potential placement sites. We recommend adding clear design measures to contain dredge materials during normal and flood conditions. One of the potential placements sites that USACE identified is in the river channel border between wing dams #25 and #27 on the left descending bank; another site is located in shallow water on the right descending bank along the lower end of White Island. From the information that USACE has provided, it is unclear how materials placed in river or in the river channel border would stay in place and not risk eroding back into the channel, causing the need for additional dredging and associated environmental impacts.

### **Wetlands & Other Waters of the U.S.**

The EA should identify all wetland areas and other Waters of the U.S. that could be affected by the proposed project and demonstrate that the substantive requirements of Section 404 of the Clean Water Act, as applicable to the USACE, will be met under this project. The information that USACE provided to EPA does not discuss potential impacts to wetlands, and it is unclear whether wetlands are located in or adjacent to the proposed placement sites.

### **Threatened and Endangered Species**

Before plans are finalized, we recommend that USACE coordinate with the U.S. Fish and Wildlife Service, the Illinois Department of Natural Resources, and the Missouri Department of Conservation to ensure that the proposed project will not detrimentally affect any federal or state endangered or threatened species or critical habitat. Please document coordination and describe potential impacts in the EA.

**Air Quality**

The EA should identify and discuss existing air quality conditions in the project area as well as air quality impacts that could result from this project. Please include measures to minimize emissions from dredging equipment, and consider the recommendations in the enclosed Diesel Emissions Reduction Checklist for any activities using diesel engines, including material hauling and site preparation work. The EA should also discuss compliance with existing State Implementation Plans for air quality.

**Climate Change**

Per the Council on Environmental Quality's *Revised Draft Guidance on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in NEPA Reviews*, we recommend that the environmental document consider greenhouse gas emissions from the project and implications of climate change on the environmental effects of a proposed action.

Please ensure that the EA addresses the potential for changing climate conditions to impact dredge operations and material placement needs over the life of the DMMP. We recommend using historic trends and scientifically predicted scenarios to consider potential changes in precipitation levels, Mississippi River water flow levels and flooding patterns. Please take these changes into account when assessing dredging needs and placement site capacity and resiliency needs in the DMMP. We recommend reviewing predicted changes for the Midwest in the National Climate Assessment report on [Globalchange.gov](http://Globalchange.gov).

We also recommend that USACE commit to measures to avoid, reduce and mitigate greenhouse gas emissions from the development of new dredge material placement sites and all aspects of the DMMP. Black carbon emissions from diesel have climate forcing effects orders of magnitude larger than CO<sub>2</sub> on a per mass basis. Please consider recommendations in the enclosed Diesel Emissions Reduction Checklist as a means to reduce greenhouse gas emissions.

**Permits & Approvals**

The EA should include information on any state, federal and local permits and approvals that will be required for sediment and erosion control and work in waters and floodplains.

**Agency Coordination**

To document coordination efforts, promote transparency and make agency concerns publically available, we recommend that USACE include all scoping correspondence received from agencies as an appendix to the forthcoming EA.

Thank you for the opportunity to provide scoping comments. For future projects, EPA encourages USACE to share additional details on the proposed project at the scoping stage so that we can provide more substantive comments. If you would like to discuss our comments or have questions, please contact me at 312-886-2910 or Jen Blonn, the lead reviewer for this project, at [blonn.jennifer@epa.gov](mailto:blonn.jennifer@epa.gov) or 312-886-6394.

Sincerely,



Kenneth A. Westlake, Chief  
NEPA Implementation Section  
Office of Enforcement and Compliance Assurance

Enclosure: Diesel Emission Reduction Checklist

Cc Via Email: Nathan Grider, Illinois Department of Natural Resources  
Sheldon Fairfield, Illinois Department of Natural Resources

**U.S. Environmental Protection Agency**  
**Diesel Emission Reduction Checklist**

- Use low-sulfur diesel fuel (15 ppm sulfur maximum) in construction vehicles and equipment.
- Retrofit engines with an exhaust filtration device to capture diesel particulate matter before it enters the construction site.
- Position the exhaust pipe so that diesel fumes are directed away from the operator and nearby workers, reducing the fume concentration to which personnel are exposed.
- Use catalytic converters to reduce carbon monoxide, aldehydes, and hydrocarbons in diesel fumes. These devices must be used with low sulfur fuels.
- Use enclosed, climate-controlled cabs pressurized and equipped with high efficiency particulate air (HEPA) filters to reduce the operators' exposure to diesel fumes. Pressurization ensures that air moves from inside to outside. HEPA filters ensure that any incoming air is filtered first.
- Regularly maintain diesel engines, which is essential to keep exhaust emissions low. Follow the manufacturer's recommended maintenance schedule and procedures. Smoke color can signal the need for maintenance. For example, blue/black smoke indicates that an engine requires servicing or tuning.
- Reduce exposure through work practices and training, such as turning off engines when vehicles are stopped for more than a few minutes, training diesel-equipment operators to perform routine inspection, and maintaining filtration devices.
- Repower older vehicles and/or equipment with diesel- or alternatively-fueled engines certified to meet newer, more stringent emissions standards. Purchase new vehicles that are equipped with the most advanced emission control systems available.
- Use electric starting aids such as block heaters with older vehicles to warm the engine to reduce diesel emissions.
- Per Executive Order 13045 on Children's Health<sup>1</sup>, EPA recommends operators and workers pay particular attention to worksite proximity to places where children live, learn, and play, such as homes, schools, and playgrounds. Diesel emission reduction measures should be strictly implemented near these locations in order to be protective of children's health.

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<sup>1</sup> Children may be more highly exposed to contaminants because they generally eat more food, drink more water, and have higher inhalation rates relative to their size. Also, children's normal activities, such as putting their hands in their mouths or playing on the ground, can result in higher exposures to contaminants as compared with adults. Children may be more vulnerable to the toxic effects of contaminants because their bodies and systems are not fully developed and their growing organs are more easily harmed.





# United States Department of the Interior



## FISH AND WILDLIFE SERVICE

Rock Island Field Office  
1511 47<sup>th</sup> Avenue  
Moline, Illinois 61265  
Phone: (309) 757-5800 Fax: (309) 757-5807

IN REPLY REFER  
TO:

U.S. Army Corps of Engineers  
Rock Island District  
ATTN: Environmental Compliance Branch (Carmack)  
Clock Tower Building, P.O. Box 2004  
Rock Island, Illinois 61204-2004  
[Charlene.carmack@usace.army.mil](mailto:Charlene.carmack@usace.army.mil)

Electronic Mail  
July 17, 2015

Ms. Carmack:

The Rock Island Field Office (RIFO) has considered the June 25, 2015 letter provided by Mr. Kenneth Barr requesting fish and wildlife information regarding the Dredged Material Management Plan for the Upper Mississippi River Lock 20 upper dredge cut. This site is located in between river miles (RM) 343.2-345.9 of lower Pool 20. The three potential short- or long-term dredge disposal sites have been identified as:

Site 1 is “a terrestrial agricultural field approximately 74.3 acres in size, located on the right descending bank of the river at approximate RM 343.4, just upstream of the city of Canton and Lock 20, in Lewis County, Missouri.”

Site 2 is “in the river channel border between wing dams #25 and #27 on the left descending bank of the river at approximate RM 344.0-344.3L in Adams County, Illinois.”

Site 3 is “located in shallow water on the right descending bank along the lower end of White (aka Nelson or Brownsville) Island at approximate RM 344.5-345.0.” This site is located in Adams County, Illinois.

Section 7 of the Endangered Species Act of 1973 requires that actions authorized, funded, or carried out by Federal agencies not jeopardize federally threatened or endangered species or adversely modify designated critical habitat. To fulfill this mandate, Federal agencies (or their designated non-federal representative) must consult with the Service if they determine their project “may affect” listed species or critical habitat.

In accordance with Section 7 of the Endangered Species Act of 1973, the U.S. Army Corps of Engineers (USACE), Rock Island District (District) has completed review of Federal-listed species for Adams County, Illinois and Lewis County, Missouri. A not likely to adversely affect determination was made by the District.

RIFO completed a review of the Upper Mississippi River Natural Resource Inventory (NRI) for information regarding significant resources or other environmental concerns associated with the three proposed dredge material disposal sites, as described above. A copy of the NRI corresponding to the project area is attached. USFWS understands mussel surveys will be completed on the two aquatic potential placement sites during the summer of 2015. Listed mussel species with territories occupying the project area include: Sheepsnose mussel (*Plethobasus cyphus*), Higgins eye pearl mussel (*Lampsilis higginsii*), and Spectaclecase mussel (*Cumberlandia monodonta*). If any listed species are encountered, consultation should be initiated.

Additionally, the Service removed bald eagles from protection under the ESA on August 8, 2007. However, they remain protected today under the MBTA and the Eagle Act. The Eagle Act prohibits take which is defined as, “pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, destroy, molest, or disturb” (50 CFR 22.3). Disturb is defined in regulations as, “to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) decrease in its productivity, by

substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.” The NRI identified an eagle roost and feeding area at Site 2. Consideration should be given to placement timing at this location.

Review of available natural resource documentation suggests Site 1 as the preferential dredge disposal site, followed by Site 3. Least favorable conditions appear to exist at Site 2. The pending mussel survey results will provide further guidance in making placement determinations.

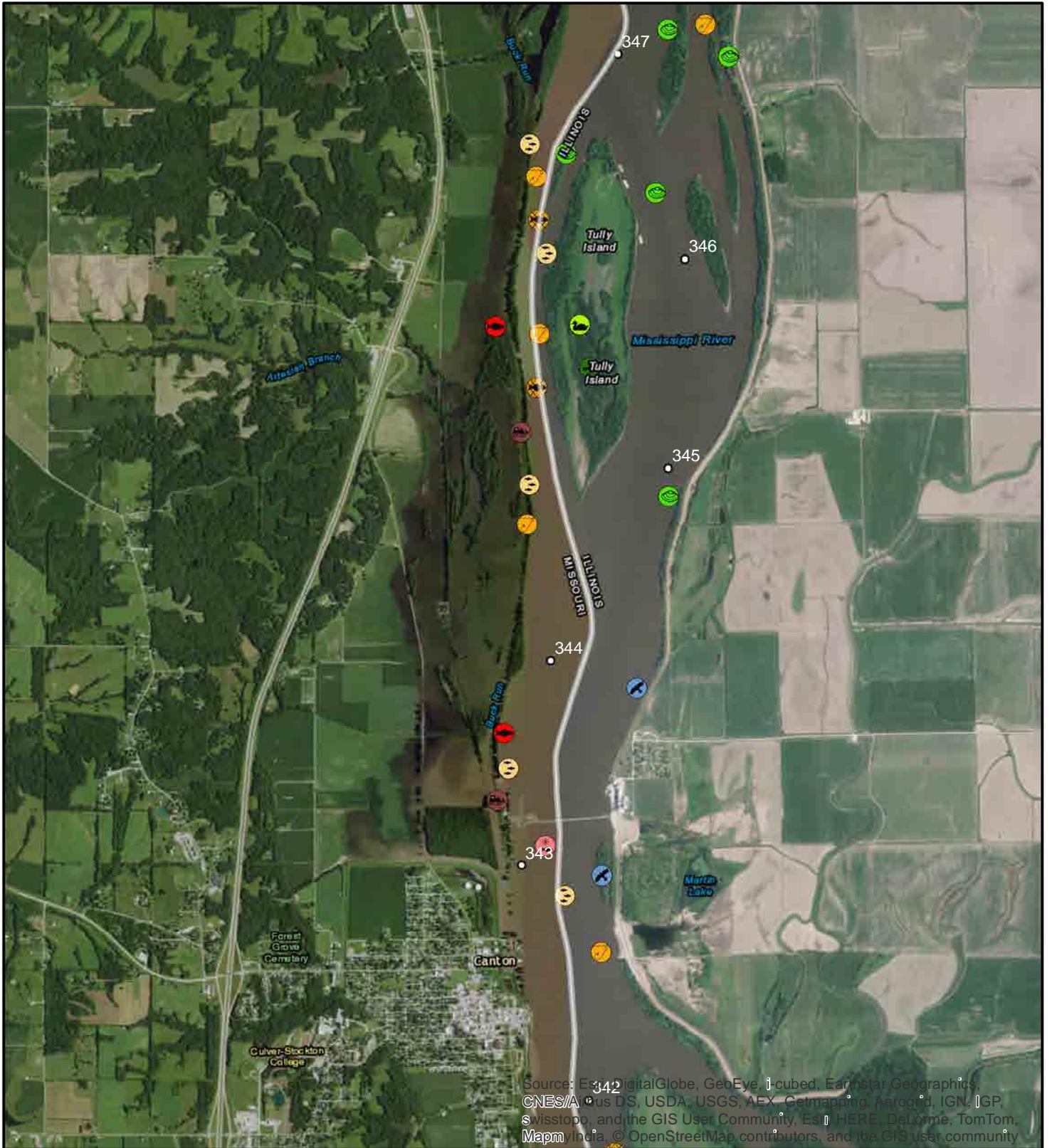
These comments provide technical assistance only and do not constitute the report of the Secretary of the Interior on the project within the meaning of Section 2(b) of the Fish and Wildlife Coordination Act, do not fulfill the requirements under Section 7 of the Endangered Species Act, nor do they represent the review comments of the U.S. Department of the Interior on any forthcoming environmental statement.

If you have any questions regarding these comments, please contact me at this email address or the number below.

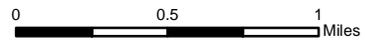
Sara Schmuecker  
Fish & Wildlife Biologist  
Ecological Services  
U.S. Fish & Wildlife Service  
1511 47<sup>th</sup> Avenue  
Moline, IL 61265  
(309) 757-5800, ext. 203  
(309) 757-5807 Fax  
[sara\\_schmuecker@fws.gov](mailto:sara_schmuecker@fws.gov)

# Dredge Material Management Plan

## Lock 20 Upper Dredge Cut Located in Lower Pool 20



- |  |            |  |                       |  |                        |  |                    |
|--|------------|--|-----------------------|--|------------------------|--|--------------------|
|  | Eagle Nest |  | Sport Fishery         |  | General Fish Habitat   |  | Commercial Fishery |
|  | Mussels    |  | Reptiles & Amphibians |  | Fish Spawning/ Nursery |  | Eagle Roost        |
|  | Waterfowl  |  | Completed Restoration |  | Fish Overwintering     |  |                    |



# Mussel Beds

Upstream RM	Downstream RM	Descending Bank	Description	Reference
345.0		Left	mussel brail survey in 1986 - 1 pimpleback	MODOC
347.3	346.8	Left	former mussel bed appears to have been covered by dredge material, a brail survey in 1987 yielded 19 species and 118 mussels; a 1998 survey yielded no mussels	MODOC
346.4		Right	mussel collection - 2 species including yellow sandshell	Perry 1979
347.0		Left	mussel brail survey in 1987 - 2 subfossils of fat pocketbook, a federally endangered species, were collected	Stanley Consultants, Inc. 1987
347.0	345.0	Right	Missouri Chute: mussel collection - 7 species	Kindschi 1980 - cited by U.S. Fish and Wildlife Service and U.S. Army Corps of Engineers 1984

# Waterfowl

Upstream RM	Downstream RM	Descending Bank	Description	Reference
347.0	345.0	Right	Tully Island: habitat for waterfowl	MODOC; ILDNR

# Reptiles & Amphibians

Upstream RM	Downstream RM	Descending Bank	Description	Reference
345.0		Right	Nelson Island sloughs: habitat for reptiles and amphibians	K. Brummett - MODOC

# Eagle Roosts and Feeding Areas

Upstream RM	Downstream RM	Descending Bank	Description	Reference
344.0		Left	habitat for feeding and roosting bald eagles	K. Dalrymple - MODOC
343.2	342.5	Left	habitat for feeding and roosting bald eagles	U.S. Fish and Wildlife Service and U.S. Army Corps of Engineers 1984

# Fish Spawning & Nursery Habitat

Upstream RM	Downstream RM	Descending Bank	Description	Reference
345.9	344.0	Right	Buck Run: habitat for spawning fish	U.S. Fish and Wildlife Service and U.S. Army Corps of Engineers 1984
343.5		Right	habitat for spawning fish along riprap	MODOC
343.1	342.5	Left	Lock and Dam No. 20 tailwaters: habitat for spawning white bass, walleye and sauger	Bertrand 1974 - cited by U.S. Fish and Wildlife Service and U.S. Army Corps of Engineers 1984; MODOC
346.7	345.0	Right	Missouri Chute and riprapped head of Nelson Island: habitat for spawning fish	MODOC
347.7	345.9	Right	Buck Run: habitat for spawning fish	U.S. Fish and Wildlife Service and U.S. Army Corps of Engineers 1984

# Other Fish Habitat

Upstream RM	Downstream RM	Descending Bank	Description	Reference
346.6	344.8	Left	Gregory Drainage District: ditches, connected by Buck Run to the tailwaters of Lock and Dam No. 20, provide habitat for spawning northern pike	K. Brummett - MODOC
344.8	343.0	Left	Gregory Drainage District: ditches, connected by Buck Run to the tailwaters of Lock and Dam No. 20, provide habitat for spawning northern pike	K. Brummett - MODOC

# Fish Overwintering

Upstream RM	Downstream RM	Descending Bank	Description	Reference
343.1	343.0	Left	Lock and Dam No. 20 tailwaters and mouth of Buck Run: habitat for overwintering fish	K. Brummett - MODOC

# Sport Fishery

Upstream RM	Downstream RM	Descending Bank	Description	Reference
346.7	345.0	Right	Missouri Chute: sport fishery	U.S. Fish and Wildlife Service and U.S. Army Corps of Engineers 1984
343.1	342.5	Left	tailwaters of Lock and Dam No. 20: important sport fishery for white bass, walleye and sauger	Bertrand 1974 - cited by U.S. Fish and Wildlife Service and U.S. Army Corps of Engineers 1984; MODOC
345.9	344.0	Right	Buck Run/Hawkin's Slough: sport fishery	U.S. Fish and Wildlife Service and U.S. Army Corps of Engineers 1984
347.8	346.7	Left	Blue Goose Island Side Channel: sport fishery for channel catfish, freshwater drum and white bass	U.S. Fish and Wildlife Service and U.S. Army Corps of Engineers 1984
347.7	345.9	Right	Buck Run and Hawkin's Slough: sport fishery	U.S. Fish and Wildlife Service and U.S. Army Corps of Engineers 1984

# Commercial Fishery

Upstream RM	Downstream RM	Descending Bank	Description	Reference
342.0	341.0	Left	commercial fishery	K. Brummett - MODOC
346.7	345.9	Right	Missouri Chute: commercial fishery	U.S. Fish and Wildlife Service and U.S. Army Corps of Engineers 1984
345.9	345.0	Right	Missouri Chute: commercial fishery	K. Brummett - MODOC; U.S. Fish and Wildlife Service and U.S. Army Corps of Engineers 1984

# Completed Restoration Projects

Upstream RM	Downstream RM	Descending Bank	Description	Reference
346.0	344.5	Right	Buck Run I I 35 Project: tree plantings and inhancement habitat for overwintering fish	MODOC; USACE
344.5	343.0	Right	Buck Run I I 35 Project: tree plantings and inhancement habitat for overwintering fish	MODOC; USACE



# MISSOURI DEPARTMENT OF CONSERVATION

## Headquarters

2901 West Truman Boulevard, P.O. Box 180, Jefferson City, Missouri 65102-0180

Telephone: 573-751-4115 ▲ [www.MissouriConservation.org](http://www.MissouriConservation.org)

ROBERT L. ZIEHMER, Director

From: Krista Noel – Natural History Biologist – Kirksville, MO Date: July 21, 2015  
To: Charlene Carmack –U.S. Army Corps of Engineers  
Subject: DMMP for Lock 20 upper dredge cut in lower pool 20 - Heritage Review

---

Per your request, I performed a Heritage Database review on the Dredged Material Management Plan (DMMP) for Lock 20 Upper dredge cut located in lower Pool 20 of the Upper Mississippi River. A review of the Department's Heritage Database did not find any threatened or endangered species records at the proposed dredge material placement sites however a state and federally endangered mussel, the Sheepnose (*Plethobasus cyphus*), is found in close proximity to RM 344.1 WDL (30.1 ac). Furthermore several records for species of conservation concern were found in close proximity to the described areas.

Heritage Records in close proximity include:

- Eastern Fox Snake (*Pantherophis vulpinus*) State Rank S1-Critically Imperiled and Global Rank 5-Secure. The current record is within 0.2 miles of the proposed dredge material placement site RM 343.3 R (74.3 ac). Eastern Fox Snakes regularly use farm ditches and wet areas so it is possible this species occurs on the RM 343.3R (74.3 ac) proposed dredge material placement site.
- Bald Eagle (*Haliaeetus leucocephalus*) State Rank S3- Vulnerable and Global Rank G5-Secure. There is a record for a feeding aggregation and night roost of 52 Bald Eagles 55 yards to the east of dredge material placement site RM 343.3 R (74.3 ac) across Hannibal Sub road along the Mississippi River and 0.3 miles south on the Mississippi River. Adhering to the U.S. Fish and Wildlife's National Bald Eagle Management Guidelines is recommended to avoid disturbance to eagles in the vicinity of the dredge material placement site RM 343.3 R (74.3 ac).
- There are no mussel records in the historic mussel database or Heritage Database at the proposed dredge material placement sites however, there are mussel records nearby which may indicate threatened and endangered species and species of conservation concern may be present at proposed dredge material placement sites RM 344.7 I (62.2 ac), RM 344.3 WDL (14.9 ac) and RM 344.1 WDL (30.1 ac). One and three tenths of a mile downstream from dredge material placement site RM 344.1 WDL (30.1 ac) are records for the State Endangered Ebonyshell (*Fusconaia ebena*) Global Rank G4G5-Apparently Secure to Secure, the Black Sandshell (*Ligumia recta*) State Rank S2-

COMMISSION

DON C. BEDELL  
Sikeston

JAMES T. BLAIR, IV  
St. Louis

MARILYNN J. BRADFORD  
Jefferson City

DAVID W. MURPHY  
Columbia



# MISSOURI DEPARTMENT OF CONSERVATION

## Headquarters

2901 West Truman Boulevard, P.O. Box 180, Jefferson City, Missouri 65102-0180

Telephone: 573-751-4115 ▲ [www.MissouriConservation.org](http://www.MissouriConservation.org)

ROBERT L. ZIEHMER, Director

Imperiled and Global Rank G4G5-Apparently Secure to Secure and the Wartyback (*Quadrula nodulata*) State Rank S3-Vulnerable and Global Rank G 4-Apparently Secure. **Two miles south of RM 344.1WDL (30.1 ac) is a record for the State Endangered and Federally Endangered Sheepnose (*Plethobasus cyphus*) and the State Endangered Ebonyshell (*Fusconaia ebena*) as well as the Hickorynut (*Obovaria olivaria*) State Rank S3-Vulnerable and Global Rank G4-Apparently Secure. One mile downstream of dredge site RM 344.1 WDL (30.1 ac) are records for the Black Sandshell (*Ligumia recta*) State Rank S2-Imperiled and Global Rank G4G5-Apparently Secure to Secure and the Hickorynut (*Obovaria olivaria*) State Rank S3-Vulnerable and Global Rank G4-Apparently Secure.**

Let me know if you have any questions or would like for me to visit the project area with you to offer onsite advice that take these species and habitats into consideration. I would be happy to help in any way possible. I can be reached at 660-785-2424 ext. 6510.

Thank you,

Krista Noel  
Natural History Biologist

## COMMISSION

DON C. BEDELL  
Sikeston

JAMES T. BLAIR, IV  
St. Louis

MARILYNN J. BRADFORD  
Jefferson City

DAVID W. MURPHY  
Columbia



REPLY TO  
ATTENTION OF

**DEPARTMENT OF THE ARMY**  
CORPS OF ENGINEERS – ROCK ISLAND DISTRICT  
CLOCK TOWER BUILDING - PO BOX 2004  
ROCK ISLAND, ILLINOIS 61204-2004

July 24, 2015

Regional Planning and Environmental  
Division North (RPEDN)

Mr. Mark Miles  
Deputy State Historic Preservation Officer  
Missouri Department of Natural Resources  
Historic Preservation Program  
P.O. Box 176  
Jefferson City, Missouri 65102

Dear Mr. Miles:

The U.S. Army Corps of Engineer (Corps), Rock Island District (District), has identified the need for new placement sites for the long-term Dredged Material Management Plan (DMMP) for the Lock 20 Upper dredge cut located in Lower Pool 20 of the Upper Mississippi River (UMR). This DMMP project area extends along the UMR between River Mile (RM) 343.2 and 345.9. Any DMMP is required to provide a minimum of a 20-year maintenance dredging plan. The District is proposing to identify areas for 40-year dredging capacities in order to meet future dredging needs based upon dredging experience in this area of the UMR.

### **Federal Undertaking**

Pursuant to the National Historic Preservation Act (NHPA) of 1966, as amended, and its implementing regulations, 36 CFR Part 800, the District has determined that this project has potential to cause effects to archeological and architectural historic properties [36 CFR 800.3(a)(1)] and as a consequence will require a determination of effect within the Area of Potential Effect (APE).

### **Area of Potential Effect**

The District has defined the APE as consisting of three sites measuring in total approximately 169.7 acres (Enclosure1). One of the sites is a terrestrial agricultural field approximately 74.3 acres in size, located on the right descending bank (RDB) of the river at approximate RM 343.4R, just upstream of the city of Canton and Lock 20, in Lewis County, Missouri. This site would meet the projected long-term dredging requirements for this reach, but is not anticipated to be available for potential emergency use during the 2015 and 2016 navigation season.

The second site is in the river channel border between wing dams #26 and #27 on the left descending bank of the river at approximate RM 344.1L in Adams County, Illinois. This site could potentially be available in the event of emergency placement needs during the late 2015 or 2016 navigation seasons, but may not be acceptable for long-term placement depending on the results of biological investigations.

The third site is located in shallow water on the RDB along the lower end of White (aka Nelson or Brownsville) Island at approximate RM 344.7R. This site has limited capacity but could potentially accommodate a portion of future dredging requirements. Any of the identified dredge material placement areas may be evaluated for potential use by the District in development of the DMMP Project through full consideration of all DMMP planning, policies, and procedures.

This work is being conducted under the provisions of the *Programmatic Agreement (PA) Among the Rock Island District of the U.S. Army Corps of Engineers, the Advisory Council on Historic Preservation, and the Illinois State Historic Preservation Officer, the Iowa State Historic Preservation Officer, the Missouri State Historic Preservation Officer, and the Wisconsin State Historic Preservation Officer, Regarding Implementation of the Long Term Strategy for Dredged Material Placement Program* signed by the Corps on December 7, 1995; by the Illinois State Historic Preservation Officer (SHPO) on January 3, 1996; by the Iowa SHPO on January 22, 1996; by the Missouri SHPO on February 15, 1996; by the Wisconsin SHPO on February 26, 1996; and by the Advisory Council on Historic Preservation on April 29, 1996 (Enclosure 2).

### **Consulting Parties**

The District finds the organizations identified on the Consulting Parties List are entitled to be consulting parties, as set out in 36 CFR 800.2, and invites them by copy of this letter to participate in the Section 106 process (Enclosure 3).

### **State Historic Preservation Officer (SHPO) Invitation**

The District invites the SHPO to:

- Identify any other consulting parties as per 36 CFR 800.3(f);
- Comment as per 36 CFR 800.2(d)(3) on the District's plan to involve the public by utilizing the Corps' normal procedures for public involvement under the National Environmental Policy Act (NEPA); and,
- Comment on or contribute to identification efforts including definition of the APE, all as per 36 CFR 800.4(a-b).

### **Identification of Historic Properties**

**Review of Existing Information and Level of Future Identification Efforts:** The report entitled *An Investigation of Submerged Historic Properties in the UMR and Illinois Waterway* (October 1997) prepared by American Resources Group, Ltd. for the District (Contract No. DACW25-93-D-0012, Delivery Order No. 37), was reviewed. No underwater historic properties

are documented within the proposed dredged cut or material placement locations. The District Geographic Information Systems archeological site file data base for the Mississippi River was queried for both offshore and shoreline locations and no previously recorded historic properties were identified.

It is the District's opinion that there is no potential for intact cultural resources within the dredge cut and dredge material placement sites RM 344.1L and RM 344.7R. This opinion is based on the negative evidence from literature review and on the active nature of sediment erosion and deposition at these locations. Therefore, it is the District's finding that there is no potential to cause effects to historic properties at these three areas within the APE and that further obligations under Section 106 of the NHPA for this portion of the APE is not required (36 CFR 800.3(a)(1)).

The District determined that dredge material placement at site RM 343.4R has potential to impact historic properties and will require field assessment in order to determine effects to undocumented historic properties. Bear Creek Archeology (BCA) conducted and reported upon Phase I archeological survey and geomorphological evaluation of placement site RM 343.4R within the present APE in support of the present undertaking. BCA prepared the report entitled *Intensive Phase I Cultural Resources Survey and Supporting Geomorphological Investigation, Upper Mississippi River Navigation Pool 20 Dredged Material Placement Site, Lewis County, Missouri*, BCA# 2142, dated May 2015. Lowell Blikre prepared the report for the District under terms of contract W912EK-12-D-0001, Work Order No. 0014 (Enclosure 4).

The investigation consisted of a combination of literature review, geomorphological assessment, and surface survey of the entire 74.3 acres. Subsurface testing was conducted at archeological site locations recorded by the surface survey and at areas determined to have a moderate to high potential for buried archeological deposits based on the geomorphological assessment. The investigation resulted in the documentation of five newly recorded archeological sites. Two of the sites, 23LE1414 and 23LE1416, were determined to have buried components while the other three sites, 23LE1415, 1417, and 1418, were confined to surface scatters within the active plow zone. BCA concluded that sites 23LE1414 and 1416 retained sufficient archeological integrity and research potential that the project should avoid impacting these sites or conduct additional testing to determine whether these sites should be included within the National Register of Historic Places (NRHP). BCA defined a 30 meter buffer around sites 23LE1414 and 1416 and recommended that project activities not encroach upon this area. BCA evaluated sites 23LE1415, 1417, and 1418 as confined to disturbed context and devoid of archeological integrity. They recommended no further work at these locations.

The District concurs with the management recommendations in the BCA report and is of the opinion that no historic properties will be affected by dredge material placement at site RM 343.4R because all work will be confined to land outside of the buffer zone surrounding archeological sites 23LE1414 and 1416. Therefore, it is the District's finding that no historic

properties will be affected by this undertaking as currently proposed (36 CFR 800.4(d)(1). In the event that project features change, the District will coordinate with interested parties in accordance with the attached PA (Enclosure 2) and in full compliance with Section 106 of the NHPA and its implementing regulations 36 CFR 800.

***Request for Information from Consulting Parties:*** The District is seeking information from all consulting parties regarding their concerns with issues relating to this undertaking's potential effects on historic properties and, particularly, the tribes' concerns with identifying properties that may be of religious and cultural significance to them and may be eligible for the NRHP [36 CFR 800.4(a)(3-4)]. Concerns about confidentiality [36 CFR 800.11(c)] regarding locations of properties can be addressed under Section 304 of the NHPA which provides withholding from public disclosure the location of properties under several circumstances, including in cases where it would cause a significant invasion of privacy, impede the use of a traditional religious site by practitioners, endanger the site, etc.

The District has identified the consulting parties for this undertaking as set out in 36 CFR 800.2 and invites them by copy of this letter to participate in the Section 106 process (See Consulting Parties List). Note that only the Missouri SHPO received a full copy of the archeological survey report with the remainder of the consulting party list receiving a title page and management summary. We request your written comments on this project within 30 days, pursuant to 36 CFR 800.3(c)(4). Please comment or concur with our opinion and recommendations within 30 days, or the District will assume that you have reviewed the information package and agree with our findings.

If you have any questions regarding this matter, please call Mr. Jim Ross of our Environmental Compliance Section at 309/794-5540, or you may e-mail Mr. Ross at [james.s.ross@usace.army.mil](mailto:james.s.ross@usace.army.mil) or write to our address, ATTN: Environmental Compliance Section (Jim Ross).

Sincerely,



Kenneth A. Barr  
Chief, Environmental Planning Branch RPEDN

3 Enclosures (all on CD)



# Illinois Department of Natural Resources

One Natural Resources Way Springfield, Illinois 62702-1271  
www.dnr.illinois.gov

Bruce Rauner, Governor

Wayne A. Rosenthal, Director

July 29, 2015

Charlene Carmack  
Rock Island USACE  
P.O. Box 2004  
Rock island, IL 61204

**RE: DMMP Plan, Lower Pool 20, UMR**  
**Project Number(s): 1601098**  
**County: Adams**

Dear Ms. Carmack:

The Illinois Department of Natural Resources (Department) has reviewed the above-mentioned project involving proposed dredge material placement in Lower Pool 20 in Adams County, IL. Site 1 is located between wing dams 25 and 27 at approximate River Mile 344. Site 2 is located along the lower end of White Island, also at approximate River Mile 344. An alternative site not yet available is a terrestrial agriculture field on the Missouri side upstream of the City of Canton.

A mussel survey conducted by the Department in the Spring of 2015 at Site 1 identified state-threatened butterfly mussels (*Ellipsaria lineolate*). Surveys conducted by the U.S. Army Corps of Engineers in July 2015 identified 54 butterfly mussels and also 4 state-threatened black sandshell mussels (*Ligumia recta*) at Site 1. Site 2 had less mussel diversity and density consisting of common species.

The Department recommends placement of material in the terrestrial agriculture field as the primary option to mitigate impacts to aquatic resources. If not feasible, the Department recommends placement at site 2 as opposed to Site 1 to mitigate impacts to mussel resources and state-listed species. If Site 1 must be used, the Department recommends relocation of mussels before dredge material placement. The Department may be able to assist with relocation efforts at your request.

Thank you for the opportunity to comment. Please contact me if you have any questions regarding this review.

A handwritten signature in black ink that reads "Nathan Grider".

Nathan Grider  
Impact Assessment Section  
217-785-5500

cc: Jon Duyvejonck – USFWS  
Rich Lewis – IDNR, OREP  
Matt Afflerbaugh - USACE



## TRIBAL HISTORIC PRESERVATION OFFICE

Date: July 30, 2015

File: 1415-1838MO-7

RE: USACE, Rock Island District, Dredge Material Management Plan, Lewis County, Missouri

Rock Island District, USACE  
Jim Ross  
P.O. Box 2004  
Rock Island, IL 61204-2004

Dear Mr. Ross,

The Osage Nation has received notification and accompanying information for the proposed project listed as USACE, Rock Island District, Dredge Material Management Plan, Lewis County, Missouri. **The Osage Nation Historic Preservation Office requests a copy of the cultural resource survey report for review and comment.**

In accordance with the National Historic Preservation Act, (NHPA) [54 U.S.C. § 300101 et seq.] 1966, undertakings subject to the review process are referred to in 54 U.S.C. § 302706 (a), which clarifies that historic properties may have religious and cultural significance to Indian tribes. Additionally, Section 106 of NHPA requires Federal agencies to consider the effects of their actions on historic properties (36 CFR Part 800) as does the National Environmental Policy Act (43 U.S.C. 4321 and 4331-35 and 40 CFR 1501.7(a) of 1969).

The Osage Nation has a vital interest in protecting its historic and ancestral cultural resources. **The Osage Nation anticipates reviewing and commenting on the survey report for the proposed USACE, Rock Island District, Dredge Material Management Plan, Lewis County, Missouri.**

Should you have any questions or need any additional information please feel free to contact me at the number listed below. Thank you for consulting with the Osage Nation on this matter.

A handwritten signature in black ink, appearing to read "John Fox", is written over a horizontal line.

John Fox  
Archaeologist

ENCLOSURE 3.



REPLY TO  
ATTENTION OF

DEPARTMENT OF THE ARMY  
ROCK ISLAND DISTRICT, CORPS OF ENGINEERS  
CLOCK TOWER BUILDING - PO BOX 2004  
ROCK ISLAND, IL 61204-2004

August 25, 2015

Regional Planning and Environmental  
Division North (RPEDN)

John Fox, Archaeologist  
Tribal Historic Preservation Office  
627 Grandview  
Pawhuska, OK 74056

Dear Mr. Fox:

Thank you for your recent request for a copy of Bear Creek Archeology's (BCA) report pertaining to a USACE Rock Island District project (File 1415-1838MO-7). The enclosed report is entitled *Intensive Phase I Cultural Resources Survey and Supporting Geomorphological Investigation, Upper Mississippi River Navigation Pool 20 Dredged Material Placement Site, Lewis County, Missouri*. We look forward to receiving any comments from you.

If you have any questions regarding this matter, please contact Jim Ross at (309) 794-5396, by e-mail: [James.S.Ross@usace.army.mil](mailto:James.S.Ross@usace.army.mil), or in writing to our address, ATTN: Environmental Compliance Section (Jim Ross).

Sincerely,

for

Mark Cornish  
Acting Chief, Environmental Planning Branch

ENCLOSURE 4.



# Illinois Historic Preservation Agency

1 Old State Capitol Plaza, Springfield, IL 62701-1512

FAX 217/524-7525  
[www.illinoishistory.gov](http://www.illinoishistory.gov)

Adams County  
Lima  
Mississippi River Mile 344.1L & 344.7R (White Island)  
COERI  
Long-term Dredged Material Management Plan

PLEASE REFER TO: IHPA LOG #001072815

August 6, 2015

Jim Ross  
U.S. Army Corps of Engineers, Rock Island District  
Environmental Analysis Branch  
Planning, Programs, and Project Management Division  
Clock Tower Building/Post Office Box 2004  
Rock Island, IL 61204-2004

Dear Mr. Ross:

We have reviewed the documentation submitted for the referenced project(s) in accordance with 36 CFR Part 800.4. Based upon the information provided, no historic properties are affected. We, therefore, have no objection to the undertaking proceeding as planned.

Please retain this letter in your files as evidence of compliance with section 106 of the National Historic Preservation Act of 1966, as amended. This clearance remains in effect for two (2) years from date of issuance. It does not pertain to any discovery during construction, nor is it a clearance for purposes of the Illinois Human Skeletal Remains Protection Act (20 ILCS 3440).

If you are an applicant, please submit a copy of this letter to the state or federal agency from which you obtain any permit, license, grant, or other assistance.

Sincerely,

Rachel Leibowitz, Ph.D.  
Deputy State Historic  
Preservation Officer



STATE OF MISSOURI  
DEPARTMENT OF NATURAL RESOURCES

Jeremiah W. (Jay) Nixon, Governor • Sara Parker Pauley, Director

www.dnr.mo.gov

August 17, 2015

Kenneth A. Barr, Chief  
Environmental Planning Branch RPEDN  
Corps of Engineers, Rock Island District  
Clock Tower Building – P.O. Box 2004  
Rock Island, Illinois 61204-2004

Re: Dredged Material Placement Sites (COE) Lewis County, Missouri

Dear Mr. Barr:

Thank you for submitting information on the above referenced project for our review pursuant to Section 106 of the National Historic Preservation Act (P.L. 89-665, as amended) and the Advisory Council on Historic Preservation's regulation 36 CFR Part 800, which require identification and evaluation of cultural resources.

We have reviewed the May 2015 report entitled *Intensive Phase I Cultural Resources Survey and Supporting Geomorphological Investigation, Upper Mississippi River Navigation Pool 20 Dredged Material Placement Site, Lewis County, Missouri* by Bear Creek Archeology, Inc. Based on this review, it is evident that a thorough and adequate cultural resources survey has been conducted. We concur with the investigator's recommendation that archaeological sites 2323LE1414 and 23LE1416 may be eligible for inclusion in the National Register of Historic Places.

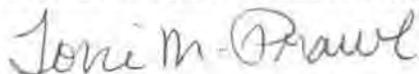
We have also reviewed the information documenting that the proposed placement site has been modified to avoid two archaeological sites. We concur that the proposed project will have **no adverse effect** with the understanding that measures will be in place to ensure ongoing protection during future dredge materials placement activities. We have no objection to the initiation of project activities.

Please be advised that, should project plans change, information documenting the revisions should be submitted to this office for further review. In the event that cultural materials are encountered during project activities, all construction should be halted, and this office notified as soon as possible in order to determine the appropriate course of action.

We also concur that sites 23LE1415, 23LE1417 and 23LE1418 are not eligible for the National Register. If you have any questions, please write Judith Deel at State Historic Preservation Office, P.O. Box 176, Jefferson City, Missouri 65102 or call 573/751-7862. Please be sure to include the SHPO Log Number (**012-LE-15**) on all future correspondence or inquiries relating to this project.

Sincerely,

STATE HISTORIC PRESERVATION OFFICE



Toni M. Prawl, Ph.D.  
Director and Deputy State  
Historic Preservation Officer

TMP:jd





United States Department of Agriculture

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August 28, 2015

Charlene Carmack  
U.S. Army Corps of Engineers - Clock Tower Building  
P.O. Box 2004  
Rock Island, Illinois 61204-2004

Dear Ms. Carmack

Attached is a Farmland Conversion Impact Rating (form AD-1006) for the proposed Dredged Material Management Plan (DMMP) in Lewis County, Missouri. After you complete the form, please return one copy for our records.

Please note that if the Total Points (Parts V & VI) in Part VII exceeds 160, alternative sites should be considered. Two alternatives are required if the score is between 160-220, and three alternatives are required if the score is over 220.

If you have any questions, please call me at (573) 769-2235 Ext. # 133.

Sincerely,

A handwritten signature in black ink, appearing to read "Scott Larsen", with a long, sweeping horizontal line extending to the right.

Scott Larsen  
Area Resource Soil Scientist

Attachment

cc: Ashley Johnson, DC, NRCS, Edina, MO

U.S. Department of Agriculture

# FARMLAND CONVERSION IMPACT RATING

<b>PART I (To be completed by Federal Agency)</b>		Date Of Land Evaluation Request <b>8/20/15</b>	
Name Of Project <b>Lock 20 Upper Dredged Material Management Plan</b>		Federal Agency Involved <b>U.S. Army Corps of Engineers, Rock Island</b>	
Proposed Land Use <b>Dredged Material Placement</b>		County And State <b>Lewis County, MO</b>	

<b>PART II (To be completed by NRCS)</b>		Date Request Received By NRCS <b>8/21/15</b>	
Does the site contain prime, unique, statewide or local important farmland? <i>(If no, the FPPA does not apply -- do not complete additional parts of this form).</i>		Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Major Crop(s) <b>Corn and Soybean</b>		Acres Irrigated	Average Farm Size <b>348</b>
Farmable Land In Govt. Jurisdiction Acres: <b>320,297</b> % <b>98.0</b>		Amount Of Farmland As Defined in FPPA Acres: <b>258,013</b> % <b>78.9</b>	
Name Of Land Evaluation System Used <b>LESA</b>		Date Land Evaluation Returned By NRCS <b>8/28/15</b>	

<b>PART III (To be completed by Federal Agency)</b>	Alternative Site Rating			
	Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly	31.5			
B. Total Acres To Be Converted Indirectly	42.8			
C. Total Acres In Site	74.3	0.0	0.0	0.0

<b>PART IV (To be completed by NRCS) Land Evaluation Information</b>				
A. Total Acres Prime And Unique Farmland	<b>74.3</b>			
B. Total Acres Statewide And Local Important Farmland	<b>0</b>			
C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted	<b>0.023</b>			
D. Percentage Of Farmland In Govt. Jurisdiction With Same Or Higher Relative Value	<b>10.4</b>			

<b>PART V (To be completed by NRCS) Land Evaluation Criterion</b>				
Relative Value Of Farmland To Be Converted (Scale of 0 to 100 Points)	<b>0</b>	<b>100</b>	<b>0</b>	<b>0</b>

<b>PART VI (To be completed by Federal Agency)</b>				
Site Assessment Criteria (These criteria are explained in 7 CFR 658.5(b))	Maximum Points			
1. Area In Nonurban Use	15	10		
2. Perimeter In Nonurban Use	10	9		
3. Percent Of Site Being Farmed	20	16		
4. Protection Provided By State And Local Government	20	0		
5. Distance From Urban Builtup Area	15	5		
6. Distance To Urban Support Services	15	10		
7. Size Of Present Farm Unit Compared To Average	10	0		
8. Creation Of Nonfarmable Farmland	10	9		
9. Availability Of Farm Support Services	5	5		
10. On-Farm Investments	20	5		
11. Effects Of Conversion On Farm Support Services	10	2		
12. Compatibility With Existing Agricultural Use	10	2		
<b>TOTAL SITE ASSESSMENT POINTS</b>	<b>160</b>	<b>73</b>	<b>0</b>	<b>0</b>

<b>PART VII (To be completed by Federal Agency)</b>				
Relative Value Of Farmland (From Part V)	100	<b>100</b>	0	0
Total Site Assessment (From Part VI above or a local site assessment)	160	<b>173</b>	0	0
<b>TOTAL POINTS (Total of above 2 lines)</b>	<b>260</b>	<b>173</b>	<b>0</b>	<b>0</b>

Site Selected:	Date Of Selection	Was A Local Site Assessment Used? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
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Reason For Selection: Proximity to dredge cut; overall capacity; outside of floodway; some protection from flooding; minimal long-term impacts to aquatic ecosystem; potential to avoid impacts to cultural resources; potential for beneficial use of dredged (sand) material.



**DREDGED MATERIAL MANAGEMENT PLAN**

**UPPER MISSISSIPPI RIVER**

**POOL 20**

**RIVER MILES 343.2-344.3**

**LOCK 20 UPPER DREDGE CUT**

**APPENDIX A**

**ENVIRONMENTAL ASSESSMENT  
FINDING OF NO SIGNIFICANT IMPACT**

**APPENDIX EA-3  
CLEAN WATER ACT 404(b)(1) EVALUATION**



**DREDGED MATERIAL MANAGEMENT PLAN**

**UPPER MISSISSIPPI RIVER  
POOL 20  
RIVER MILES 343.2-344.3**

**LOCK 20 UPPER DREDGE CUT**

**APPENDIX EA-3  
CLEAN WATER ACT  
SECTION 404(b)(1) EVALUATION**

**SECTION 1 – PROJECT DESCRIPTION ..... EA-3-1**

I. Location..... EA-3-1

II. General Description ..... EA-3-1

III. Authority and Purpose ..... EA-3-2

IV. General Description of the Dredged Material ..... EA-3-2

V. Description of the Proposed Placement Sites ..... EA-3-2

VI. Description of the Placement Method ..... EA-3-2

**SECTION 2 – FACTUAL DETERMINATION ..... EA-3-2**

I. Physical Substrate Determinations ..... EA-3-2

II. Water Circulation and Fluctuation ..... EA-3-3

III. Suspended Particulate/Turbidity Determinations ..... EA-3-3

IV. Contaminant Determinations ..... EA-3-4

V. Aquatic Ecosystem and Organismic Determinations..... EA-3-4

VI. Proposed Placement Site Determinations ..... EA-3-5

VII. Determination of Cumulative Effects on the Aquatic Ecosystem..... EA-3-5

VIII. Determination of Secondary Effects on the Aquatic Ecosystem ..... EA-3-6

**SECTION 3 – FINDINGS OF COMPLIANCE OR NONCOMPLIANCE WITH THE  
RESTRICTIONS ON PLACEMENT..... EA-3-**



# **DREDGED MATERIAL MANAGEMENT PLAN**

## **UPPER MISSISSIPPI RIVER POOL 20 RIVER MILES 343.2-344.3**

### **LOCK 20 UPPER DREDGE CUT**

#### **APPENDIX C CLEAN WATER ACT SECTION 404(b)(1) EVALUATION**

## **SECTION 1 – PROJECT DESCRIPTION**

### **I. LOCATION**

The *Lock 20 Upper Dredged Material Management Plan* (DMMP) project area is located on the Upper Mississippi River (UMR) between river miles (RM) 343.2 and 345.0 immediately upstream of Lock and Dam 20 and .5 miles upstream of Canton, Missouri, in Adams County, Illinois, and Lewis County, Missouri. Material dredged from the Lock 20 Upper dredge cut consists predominantly of medium to fine brown sand and historically has been placed along the right descending bank, just upstream of the lock guide wall.

The proposed dredged material placement is between 5 locations:

- Site 344.7R - White Island is located ~2 miles north of Canton, Missouri, in Adams County, Illinois, between RM 344.8 and 345.5R. The site is in Section 12 of Township 2 North, Range 10 West of the 4<sup>th</sup> Principal Meridian.
- Site 344.1L - Between Wing Dams site is located ~1 mile north of Canton, Missouri, in Adams County, Illinois, between RM 344.0 and 344.2L. The site is in Sections 13 and 24 of Township 2 North, Range 10 West of the 4<sup>th</sup> Principal Meridian.
- Site 343.8L - Below Wing Dams site is located ~.5 miles upstream of Lock and Dam 20 and immediately below Site 344.1L – Between Wing Dams in Adams County, Illinois, between RM 343.6 and 344.0L. The site is in Section 24 of Township 2 North, Range 10 West of the 4<sup>th</sup> Principal Meridian.
- Site 343.4R - Canton Ag Field site is located ~.5 miles north of Canton in Lewis County, Missouri, between RM 343.2 and 343.9R. The site is in Sections 23, 24, 25 and 26 of Township 62 North, Range 6 West of the 5<sup>th</sup> Principal Meridian.
- Site 343.4T - Thalweg is located immediately upstream of Lock and Dam 20 in Lewis County, Missouri, between RM 343.1 and 343.4 of the main channel. The site is in Section 25 of Township 62 North, Range 6 West of the 5<sup>th</sup> Principal Meridian.

### **II. GENERAL DESCRIPTION**

The availability of operationally feasible, environmentally acceptable, economically sound dredged material placement sites at locations requiring chronic dredging presents a continual challenge to those

Federal and State agencies charged with managing the Upper Mississippi River. Historic placement sites for this dredging area have become less environmentally acceptable at the quantities and frequencies that have occurred in the past.

### **III. AUTHORITY AND PURPOSE**

The authority and purpose of this evaluation is to comply with Section 404 of the Clean Water Act pertaining to guidelines for placement of dredged or fill material into waters of the United States. This evaluation, in conjunction with the EA, will assist in analysis of the alternatives for this project, resulting in the Base Plan (Federal Standard). Further, this evaluation will provide information and data to the State water quality certifying agency demonstrating compliance with State water quality standards. This will aid in the decision making process concerning State 401 water quality certification.

### **IV. GENERAL DESCRIPTION OF DREDGED MATERIAL**

Sampling of the dredged sediments for this chronic dredge cut was undertaken on April 22, 2015. Complete detailed results can be found in Appendix D, *Geotechnical Data*. The amount of fines in the sediment is very low. The percent of material passing through the No. 200 sieve range from 0.0 to 1.0 and average 0.4 percent.

Laboratory testing was performed in accordance with EM 1110-2-1906, dated November 30, 1970, revised May 1, 1980, and August 20, 1986. All samples were oven dried at 110 degrees centigrade and then shaken through a nest of sieves ranging in size from largest to smallest of 1.9 cm to #200.

Visual classification is in accordance with USCS (Unified Soils Classification System).

### **V. DESCRIPTION OF THE PROPOSED PLACEMENT SITES**

Complete and detailed information on the placement sites can be found in the EA (see Section 2, Project Location and Description, and Section 5, Environmental Impacts of the Preferred Alternative).

### **VI. DESCRIPTION OF PLACEMENT METHOD**

Historically, dredged material has been excavated by hydraulic dredge that utilizes a cutterhead in combination with a centrifugal pump to entrain dredged solid materials in high velocity water. Dredged material is then pumped in slurry via floating discharge lines and onto the placement areas through movable shore pipe. Shore pipe is positioned by use of a bulldozer and pipe handlers to the desired location (See Background Information in the EA).

## **SECTION 2 – FACTUAL DETERMINATIONS**

### **I. PHYSICAL SUBSTRATE DETERMINATIONS**

**A. Substrate Elevation and Slope.** Flat pool for the Mississippi River in the vicinity of the aquatic placement sites is 475.5

**B. Sediment Type.** Hydrographic surveys of the aquatic placement sites indicate the substrates primarily consist of unstable sands. Dredged sediments were described earlier in this evaluation under the heading, “General Description of Dredged Material.”

**C. Dredged/Fill Material Movement.** At the Canton agricultural field site, low berms would be constructed to contain the dredged material and direct the return water back to the river near the placement site. No movement of the dredged material is anticipated after placement activity is completed. Hydrologic modeling of proposed aquatic placement sites 344.1L and 344.7R indicated that placement of dredged material to maximum elevations of 470 (MSL, 1912) and 481 (MSL, 1912), respectively, at these sites does provide a stable location for the dredged material not to return to the channel.

**D. Physical Effect on Benthos.** During placement activity at the Canton agricultural field site, the return water would be routed overland back to the river. The impact to any benthic organism in adjacent drainages or water bodies is not anticipated to be significant. Benthic organisms existing in the footprint of the aquatic placement likely would be buried during placement activity and destroyed. However, similar organisms would be expected to recolonize these areas after placement.

**E. Actions Taken to Minimize Impacts.** Dredging quantities would be kept to the minimum required to maintain safe navigation. Near-term division of dredged material placement between more than one aquatic placement site would reduce the adverse effects to benthos at any one location. Long-term placement of dredged material on farmed wetlands would be avoided.

## II. WATER CIRCULATION AND FLUCTUATION

**A. Water.** The proposed action would have a temporary and insignificant effect on water quality in the Mississippi River. Water chemistry, water temperature, pH, clarity, color, odor, taste, dissolved gas levels, nutrient levels, or organic matter influxes would either be nonexistent or would cause insignificant and temporary impacts to aquatic organisms. Aquatic vegetation is severely limited in the project area and hence would not be significantly affected. Impacts to the human population concerning the suitability of this water body for human consumption, recreation, and aesthetics would be negligible or nonexistent.

**B. Current Patterns and Water Circulation.** Current patterns and water circulation may be altered in the immediate vicinity of the discharge pipe during dredged material placement activity at the aquatic placement sites. No major changes in main channel current patterns and circulations are anticipated.

**C. Normal Water Level Fluctuation.** Minor impacts would occur with regard to prolonged periods of inundation, exaggerated extremes of high or low water, or other water level modifications as a result of this action. Based on results of hydrological modeling of the 50% ACE (annual chance of exceedence) and the 1% ACE, placement of dredged material at the aquatic sites within the maximum height restrictions will have no impact on the water surface profile. As such, the preferred plan will comply with the State floodplain 'no rise' requirement.

**D. Actions Taken to Minimize Impacts.** Dredging quantities would be kept to the minimum to maintain safe navigation.

## III. SUSPENDED PARTICULATE/TURBIDITY DETERMINATIONS

**A. Effects on Physical and Chemical Properties of the Water Column.** Grain size analysis is included in Appendix D of the DMMP Report. Impacts on turbidity levels, suspended particulate levels, light penetration, dissolved oxygen, toxic metals, organic influxes, pathogens, and aesthetics would be minor and insignificant with only short-term duration.

**B. Effects on Biota.** Impacts to the aquatic plant community would be negligible and insignificant. Impacts to sight feeders and to suspension/filter feeders would be insignificant and temporary.

**C. Actions Taken to Minimize Impacts.** Dredging quantities would be kept to the minimum necessary to maintain a safe and unobstructed navigation channel, which is expected to minimize near-term impacts to biota at the aquatic placement sites. Inland placement of dredged sediments at the Canton agricultural field site would avoid or minimize most impacts to the aquatic environment in the long term.

#### **IV. CONTAMINANT DETERMINATIONS**

The sandy material to be dredged is of large enough particle size that contaminant binding is negligible. Historically, sediment sampling of sandy dredged material has shown an insignificant level of contamination, since contaminants have a greater affinity for smaller-sized particles. In general, prior to dredging a Mississippi River navigation channel site, bed material samples are collected and analyzed for grain size. If the material is predominately sand/gravel (at least 80 percent), it is considered uncontaminated and further testing is generally not required. If the material consists of greater than 20 percent silt/clay, then typically an elutriate test is performed to determine if contaminants are present. Bed sediments sampled in April 2015 in the vicinity of RM 343.8R consisted of greater than 95 percent sand. Unless this material changes considerably before dredging is begun, or unless there is some other reason to believe this material may be contaminated, it is unlikely that testing other than a grain size analysis would be performed.

#### **V. AQUATIC ECOSYSTEM AND ORGANISMIC DETERMINATIONS**

**A. Effects on Plankton and Nekton.** No significant impacts to plankton or nekton are anticipated to result from near-term dredged material placement at aquatic sites, and no significant effects to these resources are expected to result from long-term placement of dredged material at the Canton agricultural field site. The extended flushing action from return water may displace planktonic organisms by washing them downriver. Affected areas would recolonize quickly from drifting planktonic organisms from upstream locations after placement activities cease. Free-swimming organisms would avoid the area during dredging and placement activities.

**B. Effects on Benthos.** See Section 2, “Factual Determinations, Physical Substrate Determinations.”

**C. Effects on Aquatic Food Web.** The proposed action would not cause or establish the proliferation of any undesirable competitive species that may usurp resident plant or animal species. No significant reduction or elimination of any food chain organism would occur if either the near-term placement sites or the long-term placement sites is utilized.

**D. Effects on Special Aquatic Sites.** There are no refuges, mudflats, vegetated shallows, or riffle and pool complexes in the project area. The Corps would attempt to avoid direct placement on any soil types currently identified as farmed wetlands within the Canton agricultural field placement site. As part of detailed site design, the Corps and OSIT would identify and consider any opportunities for enhancement of farmed wetlands on the placement site as part of berm construction. The Corps and the OSIT would monitor these farmed wetland areas to determine if the proposed placement has a negative impact on the wetland character of these soils. If future monitoring reveals a loss in function of these areas as wetlands, compensatory action would commence at a rate of 1.5 acres to offset the loss of each acre of wetland. Compensatory wetlands would be designed to replicate as closely as possible the specific mix of types, functions and values provided by the project-impacted wetlands and located in an area as close as practicable to those impacted by the project.

**E. Threatened and Endangered Species.** (See EA V. Environmental Impacts of the Preferred Alternative, C. Natural Resources, Endangered Species.)

**F. Other Wildlife.** Other wildlife normally present in the dredging or placement areas would be expected to move from and avoid these areas temporarily during dredging operations. No significant impacts to wildlife populations and use would be expected over the long term following placement. This assessment is supported by several conclusions from a report entitled, *Final Report, Natural Resource Survey of Fauna Inhabiting Dredged Material Disposal Sites in Pool 18 of the Upper Mississippi River*. No significant difference was detected between the dredged material placement sites and floodplain forest areas with respect to small mammal capture rates. Evidence of opossum and cottontail rabbit usage was only observed in dredged material placement sites. Fox squirrel and woodchuck signs were observed in both habitat types. Turtles, snakes, and toads were more abundant on dredged material placement sites.

Apparent positive effects on wildlife communities of dredged material placement sites in the floodplain forest include the creation of additional edge habitat, turtle nesting areas, and toad habitat. The dredged material placement sites may also provide high ground for small mammals and reptiles when most of the floodplain forest area is inundated. Apparent negative impacts include loss of breeding areas for frogs and toads, and loss of habitat for frogs, beaver, and muskrat.

**G. Actions Taken to Minimize Impacts.** Dredging quantities would be kept to a minimum to maintain safe navigation. Placement at the Canton agricultural field site would avoid long-term adverse impacts to the aquatic ecosystem.

## **VI. PROPOSED PLACEMENT SITE DETERMINATIONS**

**A. Mixing Zone Determinations.** A mixing zone is an area in which the water quality is allowed to be degraded. The idea is to allow for a zone of dilution before compliance with relevant water quality standards is met. The large volumetric capacity of the main channel border would provide a more than adequate mixing zone for any contaminated sediments or return water that may be present. As noted earlier in this evaluation, most contaminants have affinities for finer sediments than are found at either the dredge cut or the placement locations.

**B. Determination of Compliance with Applicable Water Quality Statutes.** (See Tables EA-4 and EA-5, and EA VIII, Compliance with Environmental Quality Statutes)

**C. Clean Water Act (Sections 401 and 404.)** Section 401 Water Quality Certification from Illinois would be obtained before placement in the thalweg, below wing dam, or White Island aquatic sites. Long-term placement at the Canton agricultural field likewise would require State Section 401 Certification (from Missouri), but the site would first need to be acquired by the Corps and design plans finalized before certification could be obtained for use of this site.

## **VII. DETERMINATION OF CUMULATIVE EFFECTS ON THE AQUATIC ECOSYSTEM**

Utilization of the Canton agricultural field site for dredged material placement would cause only a minor and short-term impact to any component of the aquatic ecosystem. Near-term utilization of aquatic placement sites in the thalweg above Lock 20, the channel border between wing dams #25 through #27, and the channel border along the lower eastern shoreline of White Island would not be expected to have significant long-term effects to any component of the aquatic ecosystem.

Indirect and cumulative impacts from crop field placement of dredged material are not expected to be significant. Placement of dredged material in this area should not decrease overall terrestrial or aquatic productivity, either in the project vicinity or in surrounding areas.

Identifying practical methodologies for the quantitative assessment of the cumulative impacts of all past operation and maintenance dredging activities on the environment has been problematic. The establishment of a clear and unequivocal relationship concerning causes of ecological harm resulting from the cumulative impacts of channel maintenance dredging activities is difficult. Efforts to improve in this area are ongoing.

#### **VIII. DETERMINATION OF SECONDARY EFFECTS ON THE AQUATIC ECOSYSTEM**

Placing the dredged sand on an inland site in the long term will avoid most impacts to more environmentally productive areas, such as main channel borders and backwaters. No other secondary effects to the aquatic ecosystem are anticipated. This determination is subject to reevaluation if warranted by Federal, State, or local agency comment, as well as from the interested public.

**SECTION 3 – FINDINGS OF COMPLIANCE OR NONCOMPLIANCE WITH THE RESTRICTIONS ON PLACEMENT**

1. No significant adaptations of the 404(b)(1) Guidelines were made relative to this valuation.
2. Alternatives that were considered in addition to the proposed action were as follows:
  - A. No Project/No Change
  - B. Other Combinations Consisting of Four or Fewer Feasible Placement Sites
3. Certification under Section 401 of the Clean Water Act would be obtained from the State of Illinois prior to aquatic placement. Section 401 Certification would be obtained from the State of Missouri prior to land placement.
4. The project would not introduce hazardous or toxic substances into the waters of the United States or result in appreciable increases in existing levels of toxic materials.
5. No adverse effect to Federally listed endangered or threatened species is anticipated from this project, and no significant effect to State listed threatened or endangered is expected to result from the proposed placement.
6. No municipal or private water supplies would be affected. There would be no adverse impacts to recreational or commercial fishing. No significant adverse changes to the ecology of the river system would result from this action.
7. No contamination of the river is anticipated. The proposed actions would cause only minimal adverse environmental effects when performed separately, and would have only minimal cumulative adverse effects on the environment.
8. No other practicable alternatives have been identified that would have less adverse impacts on the aquatic ecosystem. The proposed actions, both near-term and long-term, are in compliance with Section 404(b)(1) of the Clean Water Act, as amended. The proposed actions would not significantly impact water quality and would improve the long-term integrity of the authorized navigation system.

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Craig S. Baumgartner  
Colonel, U.S. Army  
District Engineer



**DREDGED MATERIAL MANAGEMENT PLAN**

**UPPER MISSISSIPPI RIVER**

**POOL 20**

**RIVER MILES 343.2-344.3**

**LOCK 20 UPPER DREDGE CUT**

**APPENDIX A**

**ENVIRONMENTAL ASSESSMENT  
FINDING OF NO SIGNIFICANT IMPACT**

**APPENDIX EA-4  
PROGRAMMATIC AGREEMENT**



## PROGRAMMATIC AGREEMENT

AMONG THE ROCK ISLAND DISTRICT OF THE U.S. ARMY CORPS OF ENGINEERS,  
THE ADVISORY COUNCIL ON HISTORIC PRESERVATION, AND  
THE ILLINOIS STATE HISTORIC PRESERVATION OFFICER,  
THE IOWA STATE HISTORIC PRESERVATION OFFICER,  
THE MISSOURI STATE HISTORIC PRESERVATION OFFICER,  
AND THE WISCONSIN STATE HISTORIC PRESERVATION OFFICER  
REGARDING IMPLEMENTATION OF THE LONG-TERM MANAGEMENT STRATEGY  
FOR DREDGED MATERIAL PLACEMENT

WHEREAS, the Rock Island District of the U.S. Army Corps of Engineers (Corps) has determined that the Illinois Waterway and Mississippi River have historic and chronic shoaling areas and that dredging is generally required to provide adequate channels for commercial navigation and that dredged material placement undertakings are required for the Corps' long-term (greater than 10 years) needs, as documented in the Long-Term Management Strategy for Dredged Material Placement Upper Mississippi River Miles 300-614, dated August 1990, and the Long-Term Management Strategy for Dredged Material Placement Illinois Waterway River Miles 80-327, dated June 1995, all presently referred to as the Dredged Material Management Plan.

WHEREAS, the Corps has determined that the dredged material placement undertakings may have an effect upon properties listed on, or eligible for, inclusion in the National Register of Historic Places (National Register), and has consulted with the Advisory Council on Historic Preservation (Council) and the Illinois, Iowa, Missouri, and Wisconsin State Historic Preservation Officers [SHPO(s)] pursuant to Section 800.13 of the regulations (36 CFR Part 800) implementing Section 106 of the National Historic Preservation Act (16 U.S.C. 470f), [and Section 110(f) of the same Act (16 U.S.C. 470h-2(f)); and,

NOW, THEREFORE, the Corps, the Council, and the appropriate SHPO(s) agree that the undertakings shall be implemented in accordance with the following stipulations to satisfy the Corps' Section 106 responsibility for all individual actions.

### I. HISTORIC PROPERTY SURVEYS AND TESTING

A. The Corps will take all measures necessary to discover, preserve, and avoid significant historic properties, listed on, or eligible for, inclusion in the National Register of Historic Places, burials, cemeteries, or sites likely to contain human skeletal remains/artifacts and objects associated with interments or religious activities, and provide this information, studies, and/or reports to the appropriate SHPO(s) through the implementation of historic property surveys and testing, and the treatments of historic properties. The Corps will ensure that the following measures are implemented:

1. Unless recent and modern ground surface disturbances and/or historic use can be documented, the Corps will conduct a historic property visual (reconnaissance) survey with subsurface testing on all new and expanded dredged material placement sites and all other areas indirectly and directly affected by construction, use, maintenance, and operation of the new and expanded dredged material placement sites having the potential for historic properties. The Corps will evaluate historic properties identified through the

reconnaissance survey in accordance with 36 CFR Part 800.4(c) and reports of the findings shall be submitted to the appropriate SHPO(s) for review and comment. If the reconnaissance survey results in the identification of historic properties that are eligible for the National Register of Historic Places, the Corps, in consultation with the appropriate (SHPO(s), shall develop and implement plans for the appropriate treatment of historic properties. Treatment will include, but not be limited to, avoidance of the historic property, avoidance of a portion of the historic property, and data recovery of the portion of the historic property to be affected, or data recovery of the entire historic property.

2. The reconnaissance surveys and subsurface testing will be conducted in a manner consistent with the Secretary of the Interior's Standards and Guidelines for Identification and Evaluation (48 FR 44720-23) and take into account the National Park Service publication The Archaeological Survey: Methods and Uses (1978) and any extant or most recent version of appropriate SHPO(s) guidelines for historic properties reconnaissance surveys/reports, related guidance, and etc. The reconnaissance surveys and subsurface testing will be implemented by the Corps and monitored by the appropriate SHPO(s).

3. In consultation with the appropriate SHPO(s), the Corps shall evaluate for eligibility all significant historic properties by applying the National Register criteria (36 CFR Part 60.4).

a. For those properties that the Corps and the appropriate SHPO(s) agree are not eligible for nomination to or inclusion in the National Register, no further historic properties investigations will be required, and the project may proceed in those areas.

b. If the survey results in the identification of properties that the Corps and the appropriate SHPO(s) agree are eligible for nomination to, or inclusion on, the National Register, such properties shall be treated in accordance with Part II below.

c. If the Corps and the appropriate SHPO(s) do not agree on National Register eligibility, or if the Council or the National Park Service so request, the Corps will request a formal determination of eligibility from the Keeper of the National Register, National Park Service, whose determination shall be final.

## II. TREATMENT OF HISTORIC PROPERTIES

A. Those properties that the Corps and the appropriate SHPO(s) agree are eligible for nomination to, or that the Keeper has determined eligible for inclusion in, the National Register will be treated in the following manner:

1. If The Corps determines, and documents this determination, in consultation with the appropriate SHPO(s) that no other actions are feasible to avoid and minimize effects to properties and the Corps and SHPO(s) agree under consultation that properties cannot be avoided, then a treatment plan, which may include data recovery, documentation, avoidance, protection, or removal, will be coordinated with the appropriate SHPO(s). If data recovery is the agreed upon treatment, the data recovery plan will address substantive research questions developed in consultation with the appropriate SHPO(s). The treatment plan shall be consistent with the Secretary of the Interior's Standards and Guidelines for Archaeological Documentation (48 FR 44734-37) and take into account the Council's publication, Treatment of Archaeological Properties (Advisory Council on Historic Preservation, 1980) and appropriate SHPO(s) guidance. It shall specify, at a minimum, the following:

- a. The property, properties, or portions of properties where the treatment plan is to be carried out;
- b. The research questions to be addressed, with an explanation of research relevance and importance;
- c. The methods to be used, with an explanation of methodological relevance to the research questions;
- d. Proposed methods of disseminating results of the work to the interested public; and,
- e. A proposed schedule for the submission of progress reports to the appropriate SHPO(s).

2. The treatment plan shall be submitted by the Corps to the appropriate SHPO(s) for 30 days review. The Corps will take into account SHPO comment and shall ensure that the data recovery plan is implemented. The appropriate SHPO(s) shall monitor this implementation.

B. The Corps will ensure that the data recovery plan is carried out by or under the direct supervision of an archaeologist(s), architectural historian(s) and/or other appropriate cultural resource specialist that meets, at minimum, the Secretary of the Interior's Professional Qualifications Standards (48 FR 44738-9).

C. The Corps will ensure that adequate provisions, including personnel, time, and laboratory space, are available for the analysis of recovered materials from historic properties.

D. The Corps will develop and implement an adequate program in consultation with the appropriate SHPO(s) to secure and historic properties from vandalism during data recovery.

### III. CURATED ITEMS

In consultation with the appropriate SHPO(s), the Corps will ensure that all materials and records resulting from the historic properties studies conducted for the dredged material placement sites project are curated at a repositories within the States of Illinois, Iowa, Missouri, and Wisconsin in accordance with 36 CFR Part 79.

### IV. TREATMENT OF HUMAN REMAINS

If incidental finds of human remains are encountered either during the data recovery or during any project construction activities, the Corps will comply with all provisions outlined in the appropriate state acts, statutes, guidance, provisions, etc., and any decisions regarding the treatment of human remains will be made under consultation with the SHPO(s). If incidental finds of human remains are encountered or collected from Federal lands or Federally-Recognized Tribal lands, the Corps will coordinate with the appropriate Federally-recognized Native Americans, as promulgated by the Native American Graves Protection and Repatriation Act of 1990 (25 U.S.C. § 3001 *et seq.*), under consultation with the appropriate SHPO(s).

## V. REPORTS

The Corps will ensure that all final historic properties reports resulting from the actions pursuant to this Programmatic Agreement (Agreement) will be provided in a format acceptable to the appropriate SHPO(s) and the National Park Service for possible peer review and submission to the National Technical Information Service. The Corps will ensure that all such reports are responsive to contemporary standards, and to the Department of the Interior's Format Standards for Final Reports of Data Recovery (42 FR 5377-79). Precise locational data may be provided only in a separate appendix if it appears that the release of this locational data could jeopardize historic properties. The reports and reports data will be made available for publication and public dissemination.

## VI. PROVISION FOR UNDETECTED HISTORIC PROPERTIES DISCOVERED DURING IMPLEMENTATION

In accordance with 36 CFR Section 800.11(a), if previously undetected or undocumented historic properties are discovered during project activities, the Corps will cease, or cause to stop, any activity having an effect and consult with the appropriate SHPO(s) to determine if additional investigation is required. If further archaeological investigations are warranted or required, any treatment plan will be performed in accordance with Part II TREATMENT OF HISTORIC PROPERTIES and Part III CURATION AND DISSEMINATION OF INFORMATION of this Agreement. If both the Corps and the appropriate SHPO(s) determine that further investigation is not necessary, activities may resume with no further action required. Any disagreement between the Corps and the appropriate SHPO(s) concerning the need for further investigations will be handled pursuant to Part V DISPUTE RESOLUTION of this Agreement.

## VII. DISPUTE RESOLUTION

Should the appropriate SHPO(S) or the Council object within 30 days to any plans or actions provided for review pursuant to this agreement, the Corps will consult with the objecting party to resolve the objection. If the Corps determines that the disagreement cannot be resolved, the Corps will request further comment from the Council in accordance with 36 CFR Part 800.6(b). Any Council comment provided in response will be taken into account by the Corps in accordance with 36 CFR Part 800.6(c)(2), with reference only to the subject of the dispute. The Corps' responsibility to carry out all actions under this Agreement that are not the subjects of the dispute will remain unchanged.

## VIII. TERMINATION

Any of the signatories to this Agreement may request a reconsideration of its terms or revoke the agreement upon written notification to the other signatories, by providing thirty (30) days notice to the other parties, provided that the parties will consult during the period prior to termination to seek agreement on amendments or other actions that would avoid termination. In the advent of termination, the Corps will comply with 36 CFR Parts 800.4 through 800.6 with regard to individual undertakings covered by this Agreement.

## IX. AMENDMENTS

Any party to this Agreement may request that it be amended, whereupon the parties will consult in accordance with 36 CFR Part 800.13, to consider such amendment.

## X. PERIODIC REVIEW

The Corps will provide the SHPO(s) with evidence of compliance with this Agreement by letter on January 30, 1997, and once every two years thereafter said date. This letter shall contain the name of the project, title of the documents which contained the Agreement, historic properties identified, determinations of effect, avoidance procedures, level of investigation(s) and/or mitigation(s) conducted with titles of all project reports related to such investigation(s) and/or mitigation(s) which have been completed.

## XI. EXECUTION AND IMPLEMENTATION

A. Nothing in this Agreement is intended to prevent the Corps from consulting more frequently with the appropriate SHPO(s) or the Council concerning any questions that may arise or on the progress of any actions falling under or executed by this Agreement. Any resulting modifications to this Agreement will be coordinated in accordance with Section 800.5(e)(5).

B. The undersign concur that the Corps has satisfied its Section 106 responsibilities for all individual undertakings through this Agreement regarding the implementation of the Long-Term Management Strategy for Dredged Material Placement.

## XII. SIGNATORIES

### A. ROCK ISLAND DISTRICT, U.S. ARMY CORPS OF ENGINEERS:

BY: Charles S. Cox Date: 7 Dec 95  
Colonel Charles S. Cox  
District Engineer  
U. S. Army Corps of Engineers  
Rock Island District

### B. ILLINOIS STATE HISTORIC PRESERVATION OFFICER:

BY: William L. Wheeler Date: 1-3-96  
William L. Wheeler  
Illinois State Historic Preservation Officer  
Illinois Historic Preservation Agency

XII. SIGNATORIES (Continued)

C. IOWA STATE HISTORIC PRESERVATION OFFICER:

BY: Patricia Ohlerking Date: 1-22-96  
Patricia Ohlerking  
Iowa State Historic Preservation Officer  
State Historical Society of Iowa

D. MISSOURI STATE HISTORIC PRESERVATION OFFICER:

BY: David A. Shorr Date: 15 FEB. 96  
David A. Shorr  
Missouri State Historic Preservation Officer  
Department of Natural Resources

E. WISCONSIN STATE HISTORIC PRESERVATION OFFICER:

BY: Jeff M. Dean Date: 2/26/96  
Jeff M. Dean  
Wisconsin State Historic Preservation Officer  
State Historical Society

F. ADVISORY COUNCIL ON HISTORIC PRESERVATION:

BY: Robert D. Bush Date: 4/29/96  
Robert D. Bush  
Executive Director  
Advisory Council on Historic Preservation

**DREDGED MATERIAL  
MANAGEMENT PLAN**

**UPPER MISSISSIPPI RIVER  
POOL 20  
RIVER MILES 343.2-344.3**

**LOCK 20 UPPER DREDGE CUT**

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**PUBLIC REVIEW DRAFT**

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**APPENDIX B  
HYDRAULIC DATA**



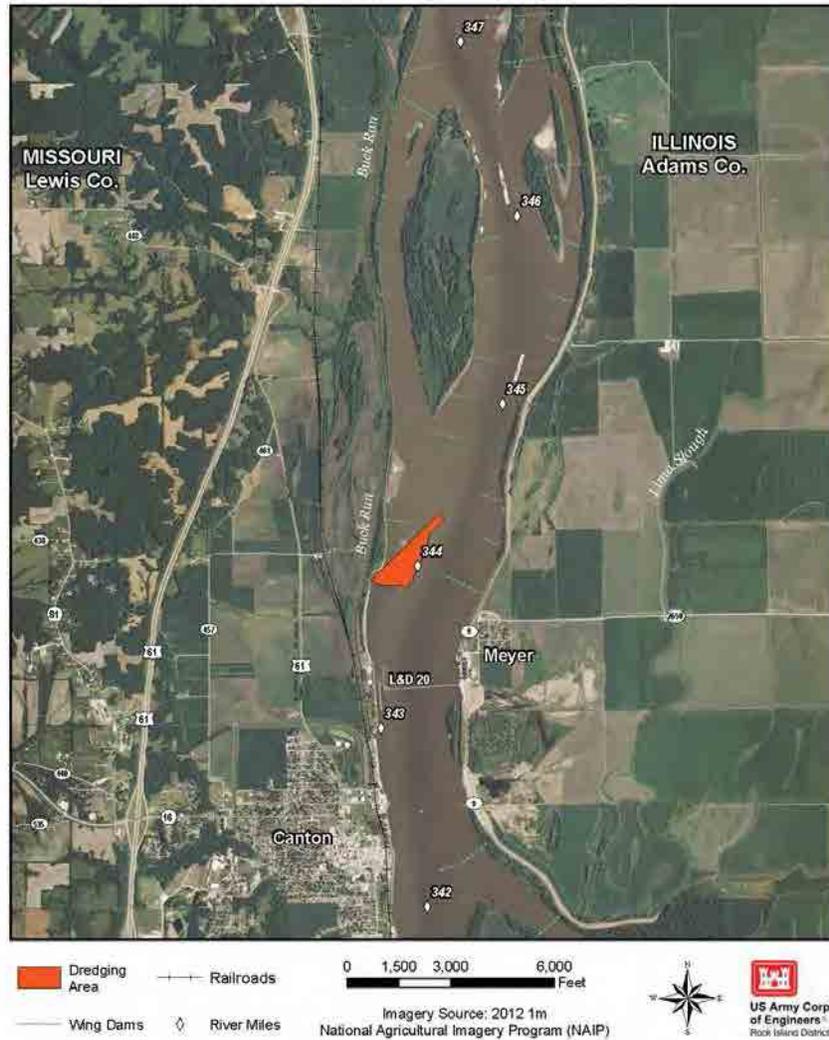
# POOL 20, MISSISSIPPI RIVER

## LOCK AND DAM 20 UPPER, RIVER MILE 343.2 TO 351.5

### Hydraulic Modeling Analysis

June 2015

Lock 20 Upper Maintenance Dredging & Placement of Dredged Material  
Public Meeting Vicinity Map





**Pool 20, Mississippi River  
Lock and Dam 20 Upper,  
River Mile 343.2 to 351.5**

**Hydraulic Modeling Analysis**

<b>Description .....</b>	<b>1</b>
<b>2D Numerical Model Construction .....</b>	<b>3</b>
<b>ADCP Survey .....</b>	<b>5</b>
<b>2D Model Calibration .....</b>	<b>8</b>
<b>Wing Dams Restored Condition Investigated .....</b>	<b>9</b>
<b>Alternative One Investigated .....</b>	<b>14</b>
<b>Alternative Two Investigated.....</b>	<b>19</b>
<b>Comparison between Wing Dams Restored Condition and Alternative One .....</b>	<b>22</b>
<b>Comparison between Wing Dams Restored Condition and Alternative Two .....</b>	<b>24</b>
<b>Comparison of Water Surface Profiles .....</b>	<b>26</b>
<b>Conclusions .....</b>	<b>30</b>

**Appendix A  
ADCP Survey**

**Appendix B  
ADCP vs. ADH**

**Appendix C  
HEC-RAS vs. ADH**



# LOCK AND DAM 20 UPPER, RIVER MILE 343.2 TO 351.5 POOL 20, MISSISSIPPI RIVER

June 2015

## DESCRIPTION

Lock and Dam 20 is 343.2 miles above the confluence of the Mississippi and Ohio rivers. The navigation channel from RM 343.8 to 344.5 has shifted away from the right descending bank in response to extreme shoaling. Commercial vessels, especially downbound vessels, approach to the lock is more difficult due to the shoaling and must get extremely close to the upper end of the lock guidewall and the dam in order to get around the shoal. Minor maintenance dredging from RM 343.8 to 344.5, necessary to maintain navigation, has been performed for many years. Figure 1 shows the Lock and Dam 20 location and vicinity. Figure 2 shows water depths near the Lock and Dam 20 from RM 343 to 345.

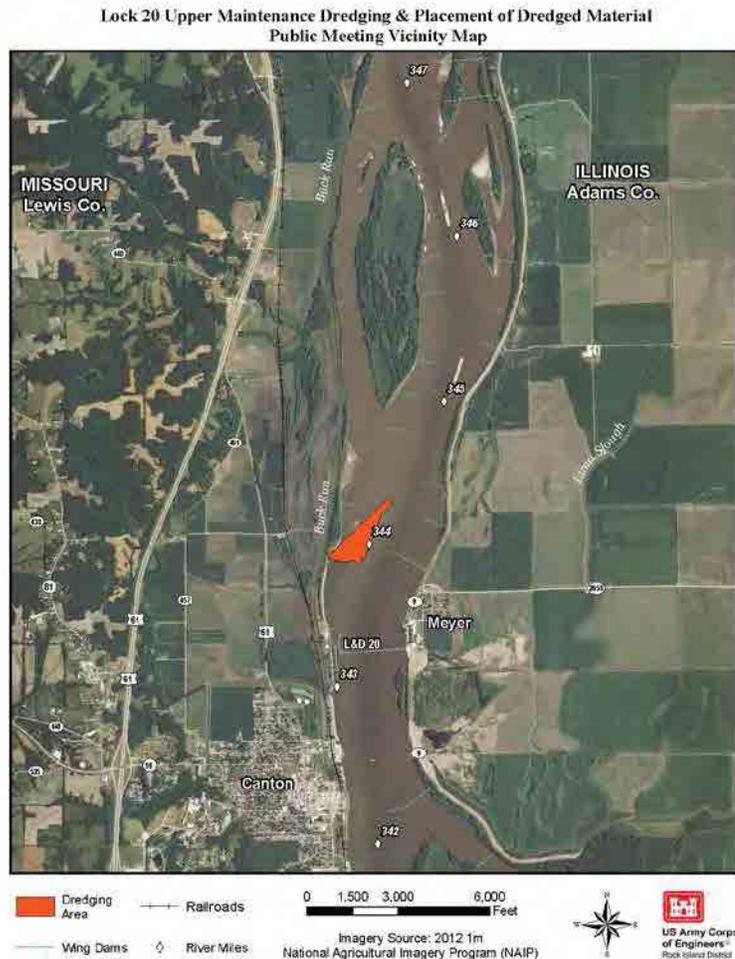
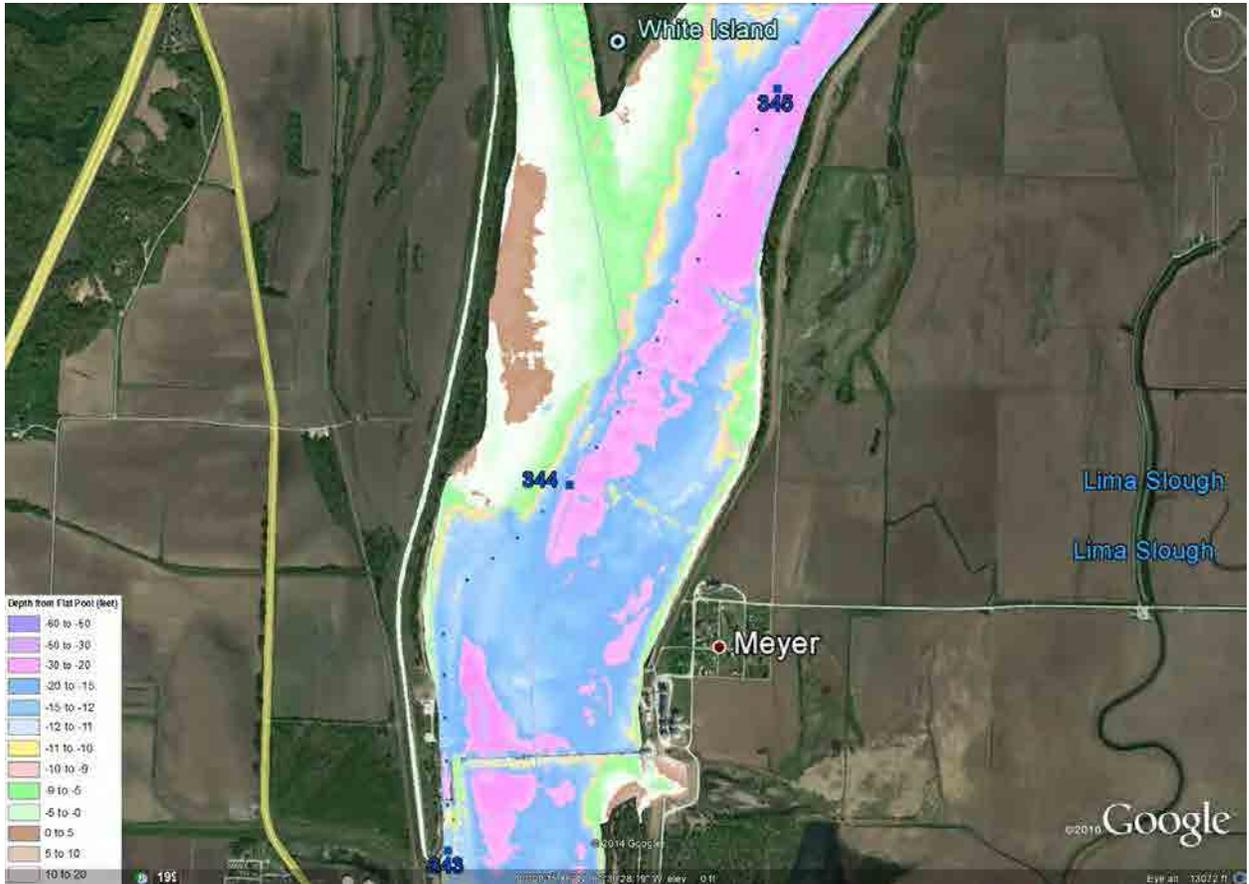


Figure 1 Lock & Dam 20 Vicinity Map

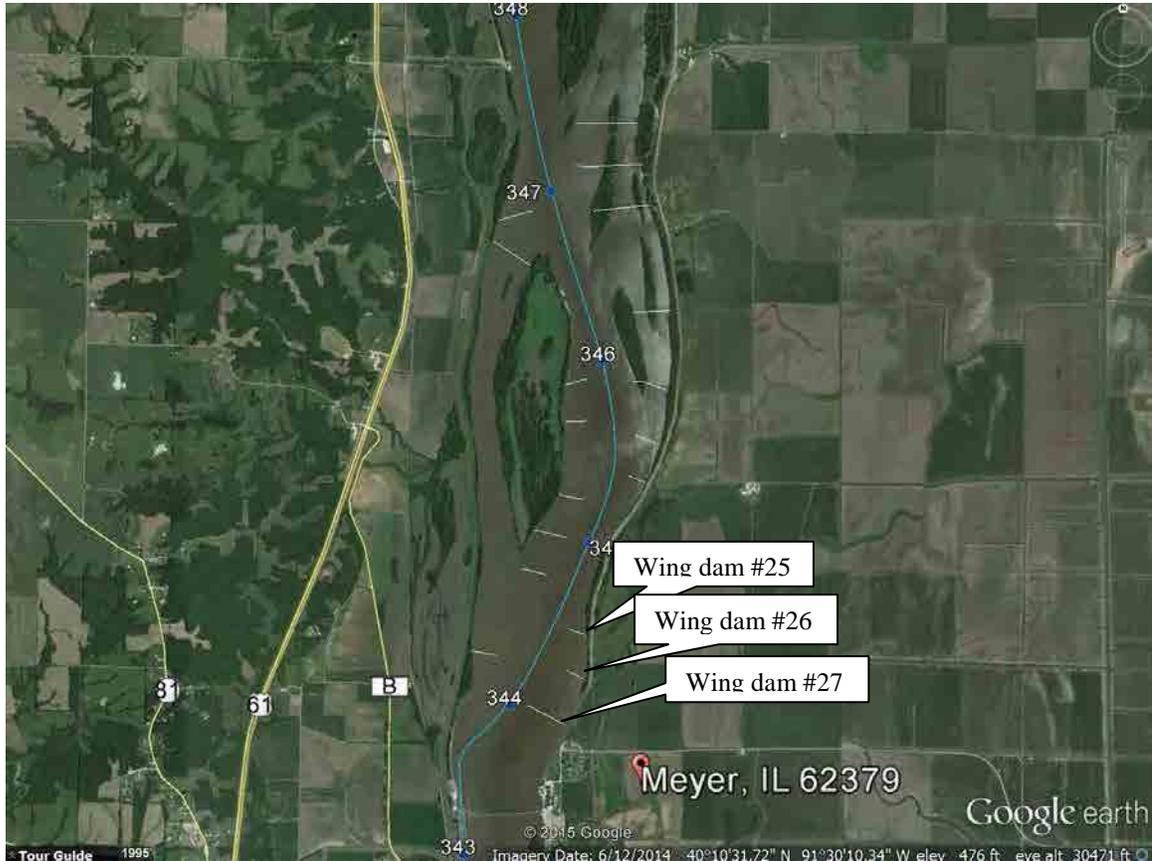


**Figure 2 Water Depths near Lock & Dam 20 from RM 343 to RM 345**

Because of the extensive sedimentation in the navigation channel from RM 343.8 to 344.5, Rock Island District has restored three wing dams (#25, #26, and #27) shown in Figure 3 upstream of Lock and Dam 20 on the left descending bank of the Mississippi River to increase the flow velocity and initiate a scouring action of the deposited sediment. The purposes of this project are: (1) to verify the attempt moving these sediments and restoring a navigation channel at this location, (2) to evaluate placement options for dredged material and look for safe placement sites where the dredged material will not be scoured and return to the navigation channel, and (3) to confirm no impacts of three restored wing dams and dredged material placement sites on the water surface profile. The restored wing dam design specifications are displayed in Table 1.

**Table 1 Design Specifications for Restored Wing Dams**

Wing Dam #	River Mile	Design Length (ft)	Design Elevation (ft, MSL 1912)
25	344.5	620	473.3
26	344.3	1,220	473.2
27	344.0	1,350	473.0



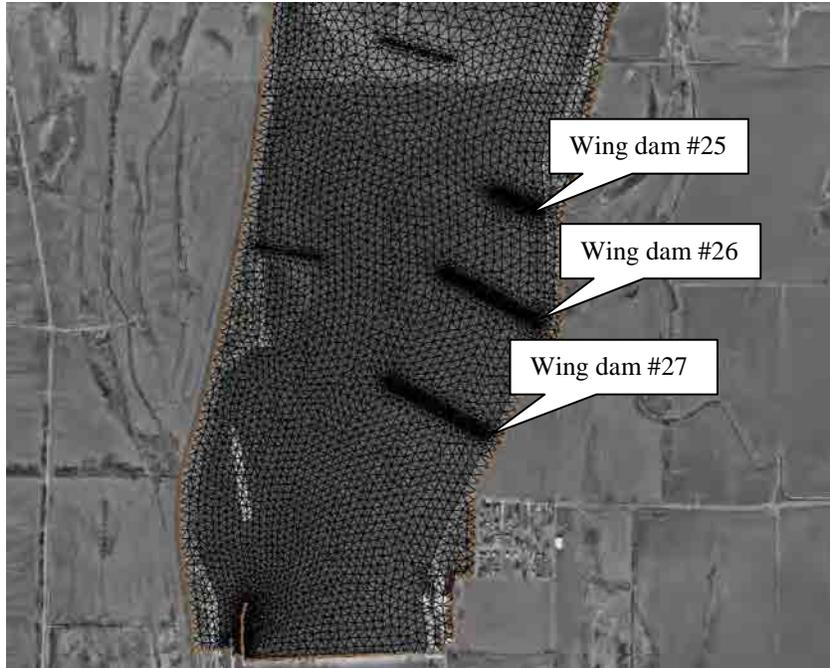
**Figure 3 Location of Three Restored Wing Dams**

## **2D NUMERICAL MODEL CONSTRUCTION**

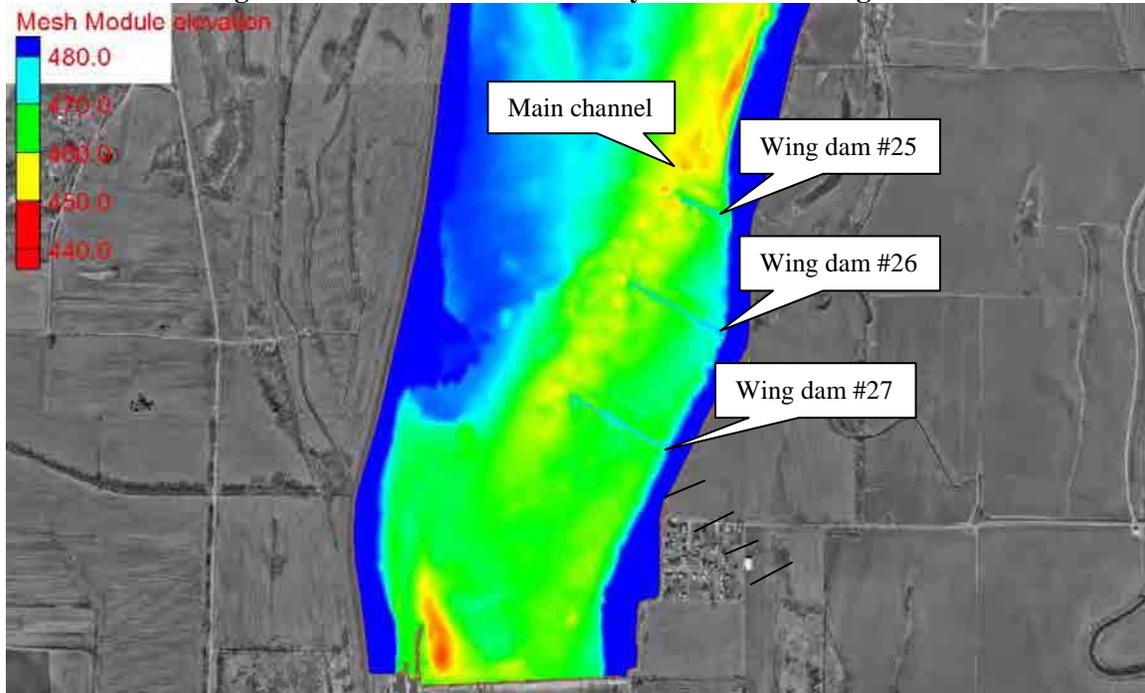
The ADaptive Hydraulics (ADH) Modeling System (Executable Version ADH\_v4.2), a two-dimensional unsteady flow model, was used in this study. The determination of the upstream and downstream boundaries of the ADH mesh was based on the following considerations: (1) the river reach interested for this project (RM 343.2 ~ 345), (2) Lock and Dam 20 (RM 343.2) as the downstream boundary, and (3) a stable ADH model simulation requiring that the mesh has a proper length and boundaries should be located in the main channel. Therefore, the ADH mesh was extended from RM 343.2 to RM 351.5.

The map module within SMS (Surfacewater Modeling Systems) Version 10.1 was initially used to create a .map file. Based on this map file, a .2dm zero elevation mesh was developed. The bathymetric data with a vertical datum of MSL 1912 had been collected from field surveys (2000 ~ 2014). The LIDAR data with a vertical datum of NAVD88 had been collected from aircraft topographic survey (2008), and was converted to the MSL 1912. Both bathymetric data and LIDAR data were interpolated to this .2dm mesh to obtain the actual elevations of individual nodes. The horizontal datum is NAD 1983 with a projection of State Plane, IL West 1202, and the vertical datum is MSL 1912 U.S. Survey Feet. Elements were changed from quadratic to

linear, and material types were assigned to elements. This final mesh has 23,145 nodes and 45,292 elements. Figure 4 shows a portion of the entire mesh to display the detail elements around the three upstream wing dams. Figure 5 shows a bathymetric contour map generated from bathymetric data and LIDAR data.



**Figure 4 ADH Mesh in the Vicinity of Restored Wing Dams**



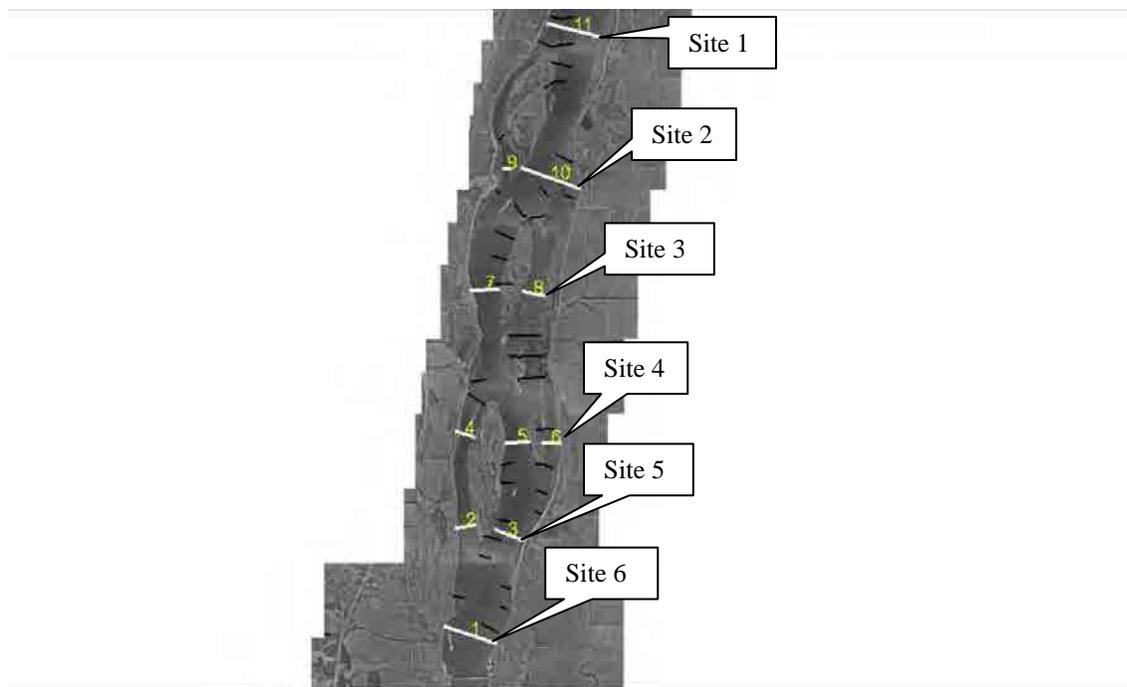
**Figure 5 Bathymetric Contour Map in the Vicinity of Restored Wing Dams**

Five different material categories were created. A manning's n value was assigned to each category. The selected manning's n values for all the material categories are shown below.

<b>Material Category</b>	<b>Selected Manning's n-value</b>
Main Channel	0.020
Deep Main Channel	0.019
Near Bank	0.040
Island	0.050
Wing dam	0.045

### **ADCP SURVEY**

The ADCP survey was performed by the Rock Island District Water Quality & Sediment Section, Hydrology & Hydraulics Branch on April 7, 2015 before the three upstream wing dams were restored. Figure 6 shows the sites of the ADCP survey on April 7, 2015. ADCP survey transects for the ADCP survey on April 7, 2015 are shown in Appendix A. The observed discharge data collected from ADCP survey is summarized in Table 2.

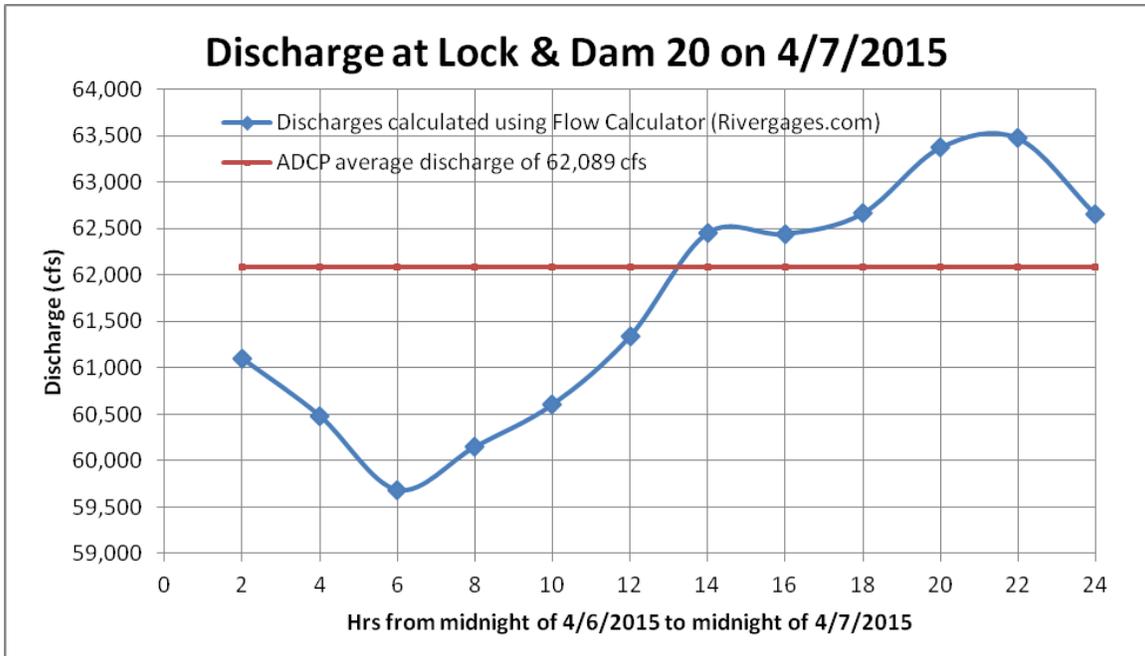


**Figure 6 ADCP Survey Sites**

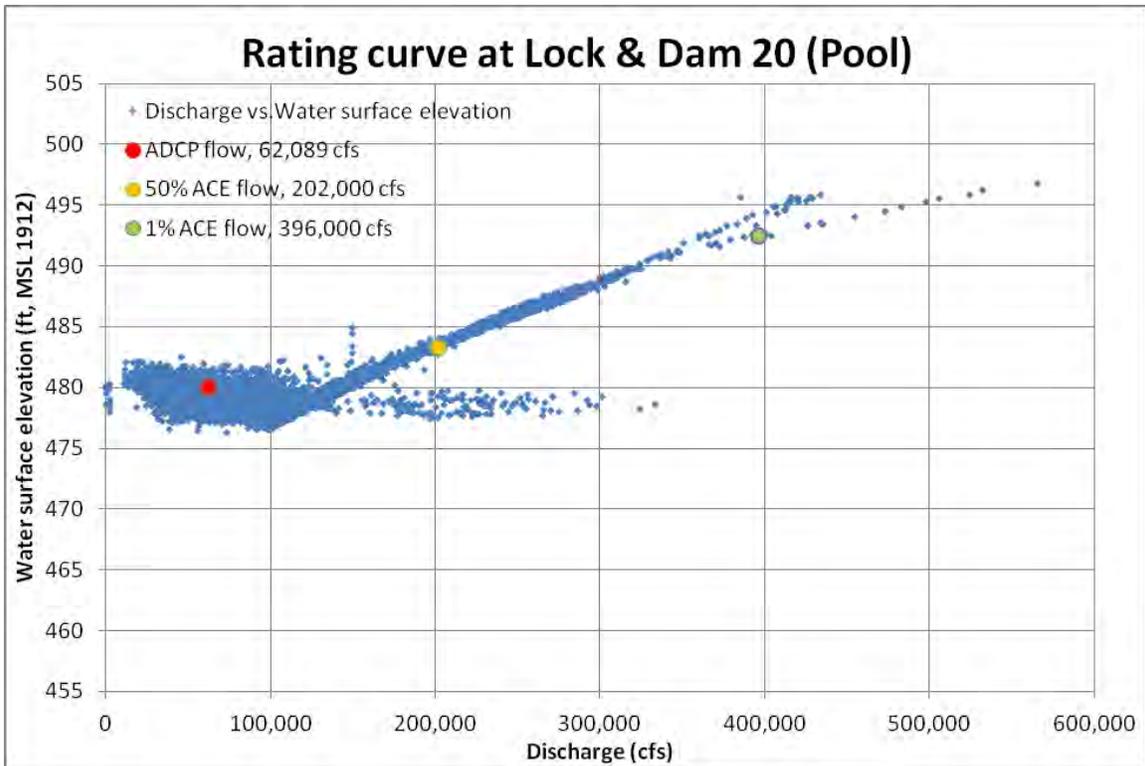
**Table 2 ADCP Discharges Collected on April 7, 2015**

<b>ADCP Survey Date</b>	<b>ADCP Survey Site</b>	<b>ADCP Transect #</b>	<b>Start Bank</b>	<b>Q for transect (cfs)</b>	<b>Q averaged for transects (cfs)</b>	<b>Total Q At different sites (cfs)</b>
4/7/2015	1	07APR000	Left	62,045	63,414	63,414
		07APR001	Right	64,783		
	2	07APR002	Left	59,371	60,024	62,135
		07APR003	Right	60,677		
		07APR004	Left	1,982	2,111	
		07APR005	Right	2,240		
	3	07APR006	Right	46,978	46,193	62,742
		07APR007	Left	45,407		
		07APR008	Right	17,370	16,549	
		07APR009	Left	15,729		
	4	07APR010	Right	54,993	54,773	61,592
		07APR011	Left	54,553		
		07APR012	Right	503	503	
		07APR020	Right	6,266	6,316	
		07APR021	Left	6,367		
	5	07APR014	Right	57,151	55,925	61,681
		07APR015	Left	54,700		
		07APR018	Left	5,648	5,756	
		07APR019	Right	5,864		
	6	07APR016	Left	59,744	60,969	60,969
07APR017		Right	62,194			
<b>Total Q averaged for the day of 4/7/2015 (cfs)</b>						<b>62,089</b>

The average flow discharge through the study reach on April 7, 2015 was estimated as 62,089 cfs. Figure 7 is discharges calculated based on the pool stage, tail stage, and gate operation at Lock and Dam 20 from the midnight on April 6, 2015 to the midnight on April 7, 2015. Figure 8 is the rating curve (discharge vs. water surface elevation) at Lock and Dam 20 for the pool. Based on this rating curve, the water surface elevation corresponding to the discharge of 62,089 cfs was determined as 480 ft (MSL 1912) (red point). Figure 8 also shows points for the 50% ACE flow (2-year) of 202,000 cfs with the corresponding water surface elevation of 483.3 ft and the 1% ACE (100-year) flow of 396,000 cfs with the corresponding water surface elevation of 492.5 ft. Both points fall around the rating curve very well.



**Figure 7 Discharges Measured at Lock & Dam 20 on April 7, 2015**



**Figure 8 Rating Curve at Lock & Dam 20 for the Pool**

## 2D MODEL CALIBRATION

The 2D ADH model was calibrated by using ADCP data (velocity and discharge). Simulating the ADH model with a discharge of 62,089 cfs at the upstream boundary and a water surface elevation of 480 ft (MSL 1912) at the downstream boundary, flow velocities, water depths, and discharges were computed. The flow velocity comparisons between ADH simulated and ADCP measured for the twenty one ADCP transects are shown in Appendix B. The average flow velocity and discharge comparisons between ADH simulated and ADCP measured for the twenty one ADCP transects are displayed in Table 3. Table 3 shows the average flow velocity, velocity difference, discharge, and discharge difference between ADCP measured and ADH simulated for each of the twenty one transects.

**Table 3**  
**Velocity & Discharge Comparisons between ADCP Measured and ADH Simulated**

ADCP Survey date	ADCP Transect #	Measured averaged V (ft/s)	Simulated averaged V (ft/s)	V difference (ft/s)	Measured Q (cfs)	Simulated Q (cfs)	Q difference (%)
4/7/15	07APR000	1.58	1.43	0.15	62,045	61,574	0.8
	07APR001	1.56	1.46	0.10	64,783	61,726	4.7
	07APR002	1.51	1.63	-0.12	59,371	59,017	0.6
	07APR003	1.52	1.53	-0.01	60,677	58,525	3.5
	07APR004	0.72	0.71	0.01	1,982	1,871	5.6
	07APR005	0.82	0.71	0.11	2,240	2,124	5.2
	07APR006	1.67	1.44	0.23	46,978	43,994	6.4
	07APR007	1.65	1.65	0.00	45,407	42,202	7.1
	07APR008	1.01	0.98	0.03	17,370	18,311	-5.4
	07APR009	0.89	0.93	-0.04	15,729	16,535	-5.1
	07APR010	1.38	1.41	-0.03	54,993	54,334	1.2
	07APR011	1.43	1.48	-0.05	54,553	53,889	1.2
	07APR012				503		
	07APR020	1.00	1.02	-0.02	6,266	6,525	-4.1
	07APR021	1.03	1.03	0.00	6,367	6,388	-0.3
	07APR014	1.50	1.44	0.06	57,151	55,345	3.2
	07APR015	1.46	1.45	0.01	54,700	54,614	0.2
	07APR018	0.86	0.85	0.01	5,648	5,970	-5.7
	07APR019	0.89	0.87	0.02	5,864	5,802	1.1
	07APR016	1.18	1.22	-0.04	59,744	62,369	-4.4
	07APR017	1.25	1.22	0.03	62,194	61,505	1.1

## WING DAMS RESTORED CONDITION INVESTIGATED

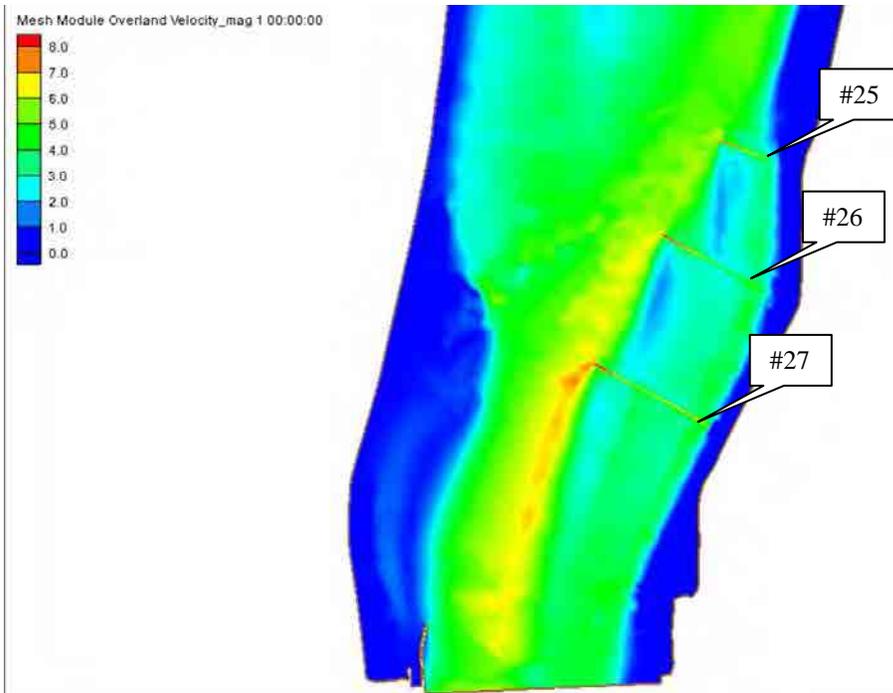
The wing dams restored condition is that wing dams #25, #26, and #27 near Lock and Dam 20 on the left descending bank of the Mississippi River were restored to the design elevations of 473.3 ft, 473.2 ft, and 473.0 ft (MSL 1912), respectively.

Two flows were simulated by the 2D ADH model showing in Table 4.

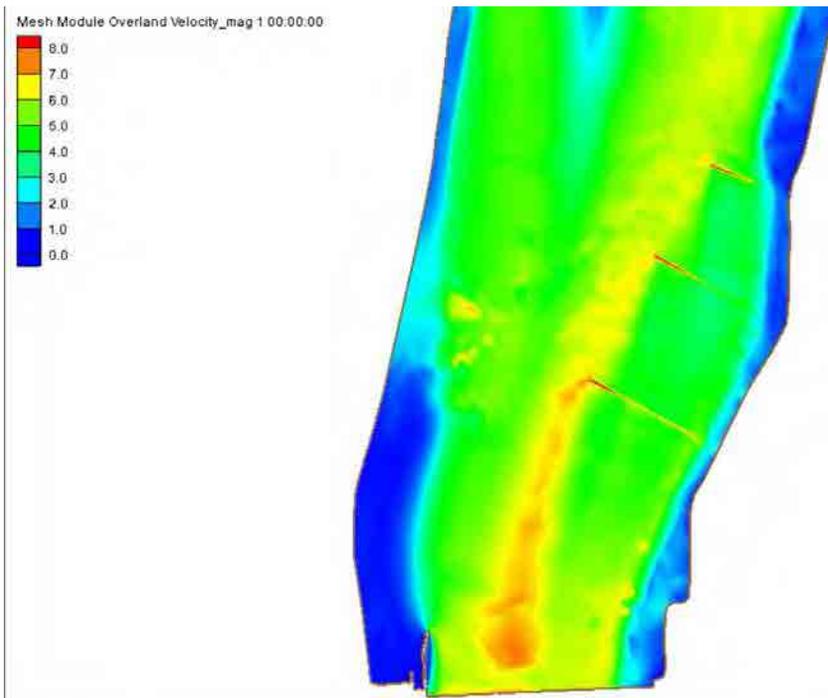
**Table 4 Flows Simulated by ADH Model**

<b>Flow Frequency</b>	<b>Discharge at the upstream boundary (cfs)</b>	<b>Water Surface Elevation at the downstream boundary (ft, MSL 1912)</b>
50% ACE flow	202,000	483.3
1% ACE flow	396,000	492.5

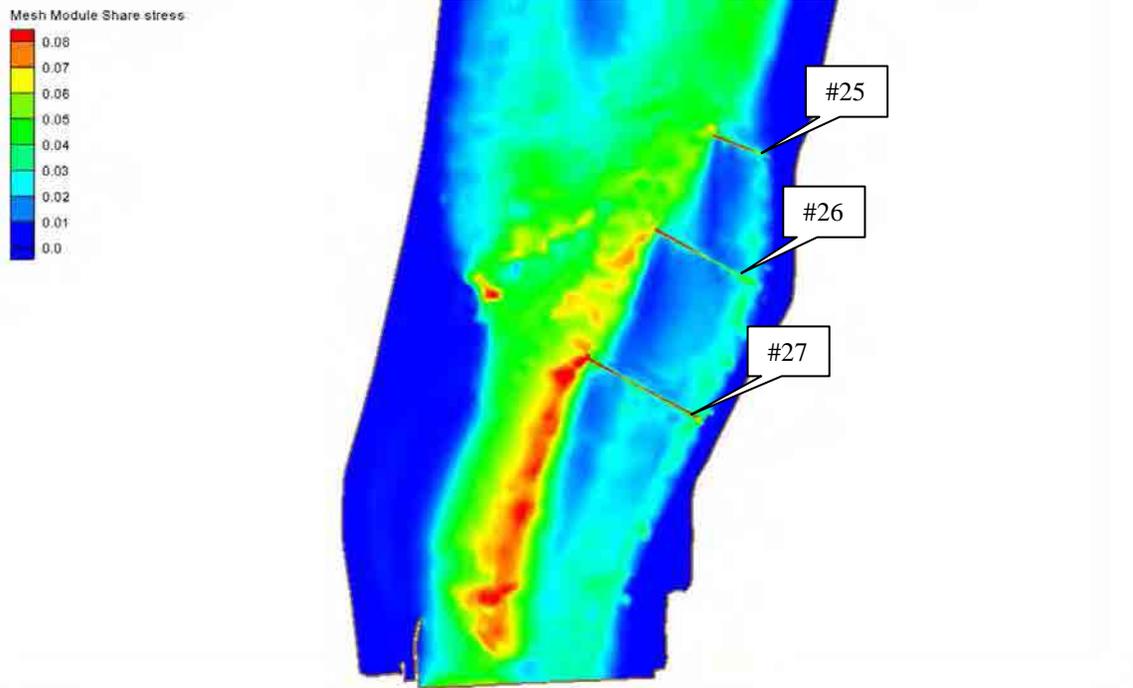
The flow velocities simulated near the wing dams #25, #26, and #27 are displayed in Figure 9(1) for the 50% ACE (2-year) flow and Figure 9(2) for the 1% ACE (100-year) flow. The bed shear stresses simulated near the wing dams #25, #26, and #27 are displayed in Figures 10(1) for the 50% ACE (2-year) flow and Figure 10(2) for the 1% ACE (100-year) flow.



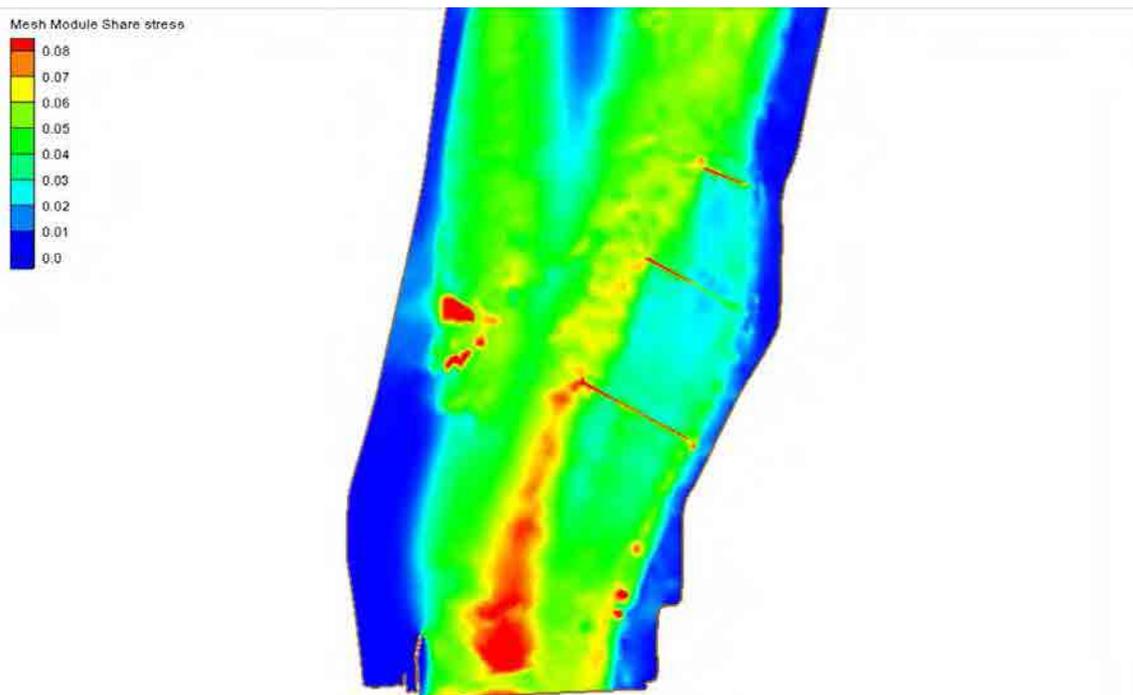
**Figure 9(1) Velocity Simulated near Wing Dams #25, #26, and #27  
Wing Dams Restored Condition for 50% ACE Flow (2-year)**



**Figure 9(2) Velocity Simulated near Wing Dams #25, #26, and #27  
Wing Dams Restored Condition for 1% ACE Flow (100-year)**



**Figure 10(1) Bed Shear Stress Simulated near Wing Dams #25, #26, and #27  
Wing Dams Restored Condition for 50% ACE Flow (2-year)**



**Figure 10(2) Bed Shear Stress Simulated near Wing Dams #25, #26, and #27  
Wing Dams Restored Condition for 1% ACE Flow (100-year)**

The bed shear stress is determined using the following equations

$$\tau_b = \gamma * \frac{n_{grain}^2}{(1.486)^2} * \frac{V^2}{h^{\frac{1}{3}}}$$

Where  $\tau_b$  = the bed shear stress,  $\gamma$  = the specific weight of water,  $n_{grain}$  = the Manning's coefficient representing the grain roughness,  $V$  = the flow velocity, and  $h$  = the water depth.

$$n_{grain} = \frac{(d_{50})^{\frac{1}{6}}}{20}$$

Where  $d_{50}$  = the median sediment size in meters.

The critical shear stress ( $\tau_c$ ) is defined as the stress at which soil detachment begins. If the critical stress is higher than the effective stress, the erosion rate is considered zero. Smerdon and Beasley (1961) developed an empirical relation between the soil property and  $\tau_c$  as

$$\tau_c = 3.54 * 10^{-28.1 * d_{50}}$$

Where  $\tau_c$  = the critical shear stress (Pa), and  $d_{50}$  = the median sediment size in meters.

Based on the sediment grain size distribution curve (Figure 11) obtained from field data collected at RM 343.91 on April 22, 2015, the average  $d_{50}$  around the wing dams #25, #26, and #27 is 0.5 mm. The critical shear stress  $\tau_c$  is calculated equal to 3.43 Pa or 0.072 lb/ft<sup>2</sup>.



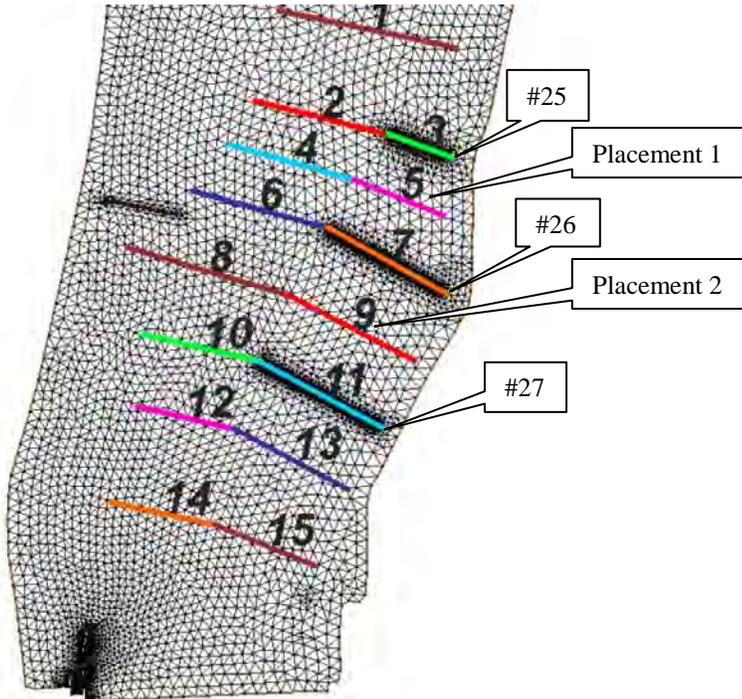
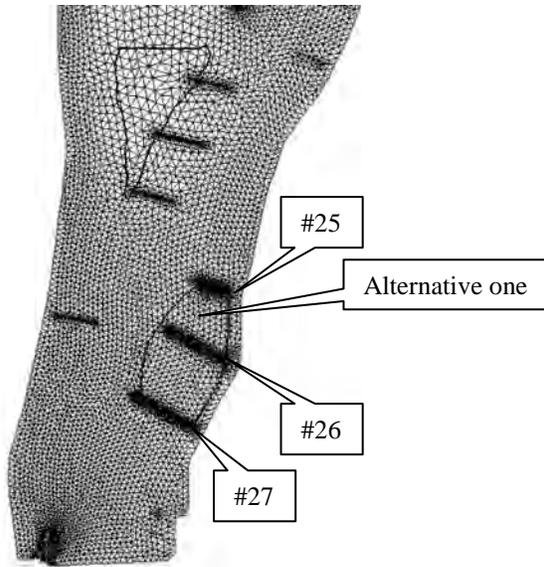
## **ALTERNATIVE ONE INVESTIGATED**

Alternative One places dredged material in the area between wing dams #25 and #26 and the area between wing dams #26 and #27 to an elevation of 470 ft (MSL 1912), i.e., raising the river bed between the wing dams by 10 ft. Figure 12 shows the location of Alternative One and placement site 1 and placement site 2. In this reach there are fifteen arcs from 1 to 15. The Arcs 3, 7, and 11 represent the wing dams #25, #26, and #27, respectively. The Arcs 5 and 9 are located almost the middle of the placement site 1 and the placement site 2, respectively.

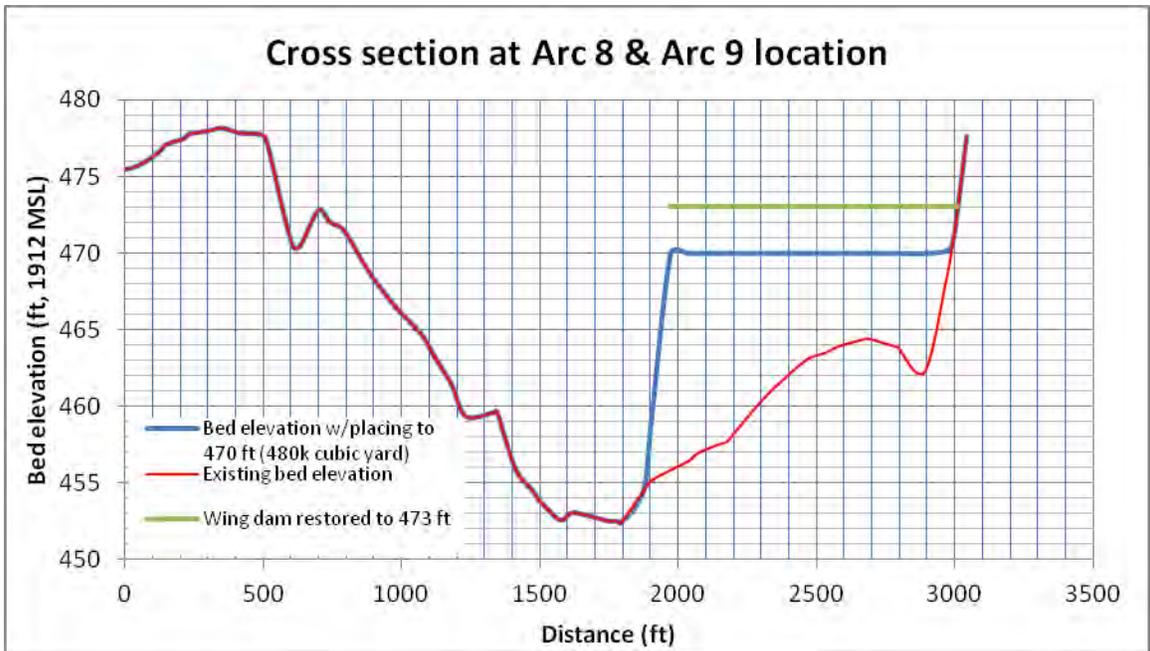
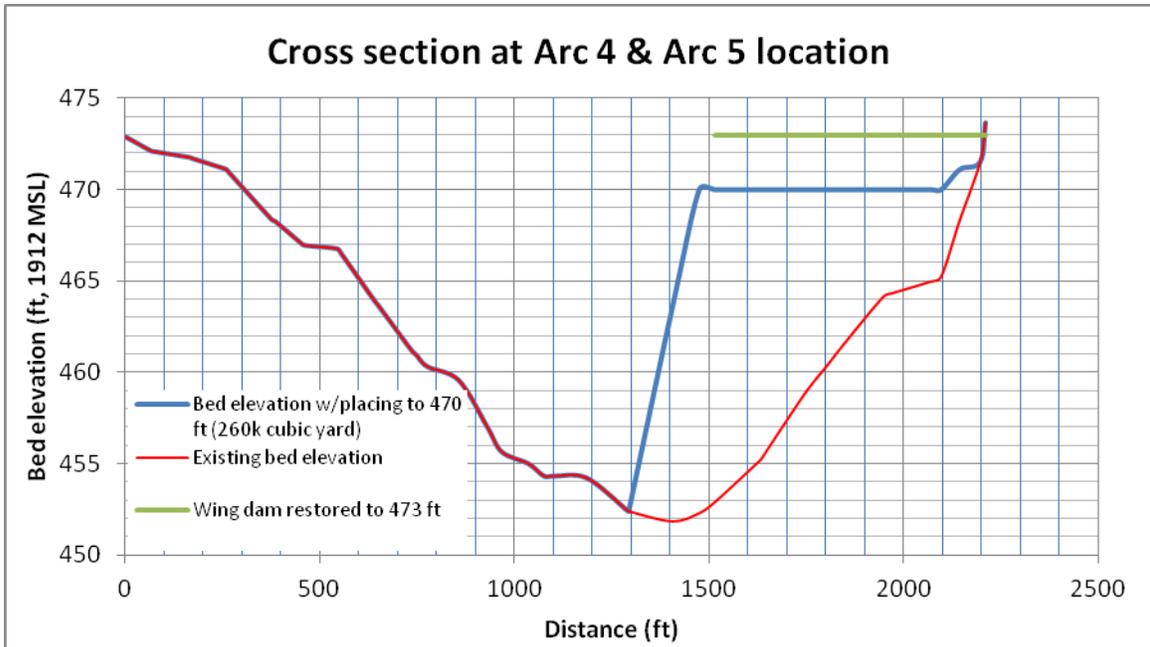
The cross sectional bed elevation changes along Arcs 4 & 5 and Arcs 8 & 9 are shown in Figure 13. The placement volumes were estimated as a total of 260,000 cubic yards for the placement site 1, and a total of 480,000 cubic yards for the placement site 2.

Two flows, 50% ACE (2-year) flow and 1% ACE (100-year) flow, were simulated by the 2D ADH model. The flow velocities simulated near the wing dams #25, #26, and #27 are displayed in Figure 14(1) for the 50% ACE (2-year) flow and Figure 14(2) for the 1% ACE (100-year) flow. The bed shear stresses simulated near the wing dams #25, #26, and #27 are displayed in Figure 15(1) for the 50% ACE (2-year) flow and Figure 15(2) for the 1% ACE (100-year) flow.

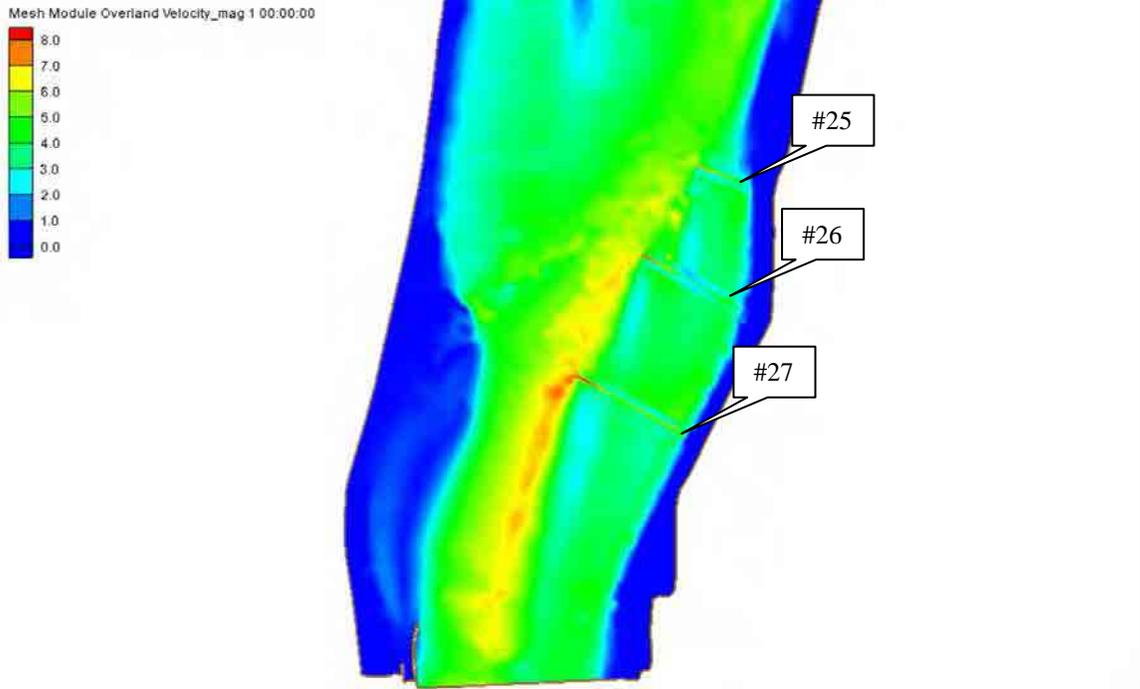
From Figures 15(1) and 15(2), it is found that within the areas of placement site 1 and placement site 2, there are very few locations where bed shear stresses are greater than the critical shear stress ( $0.072 \text{ lb/ft}^2$ ) for either the 50% ACE (2-year) flow or the 1% ACE (100-year) flow. Therefore, the method placing dredged material to the areas between wing dams #25 and #26 and between wing dams #26 and #27 does provide a stable location for the dredged material not to return to the channel.



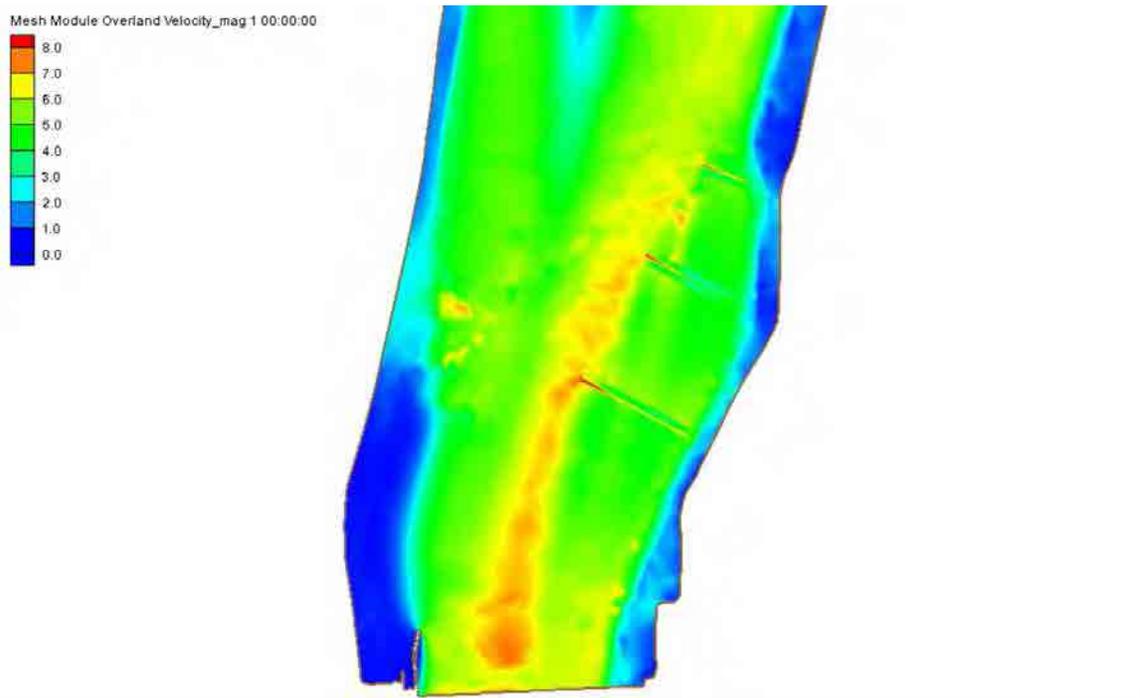
**Figure 12 Alternative One & Placement Sites 1 and 2**



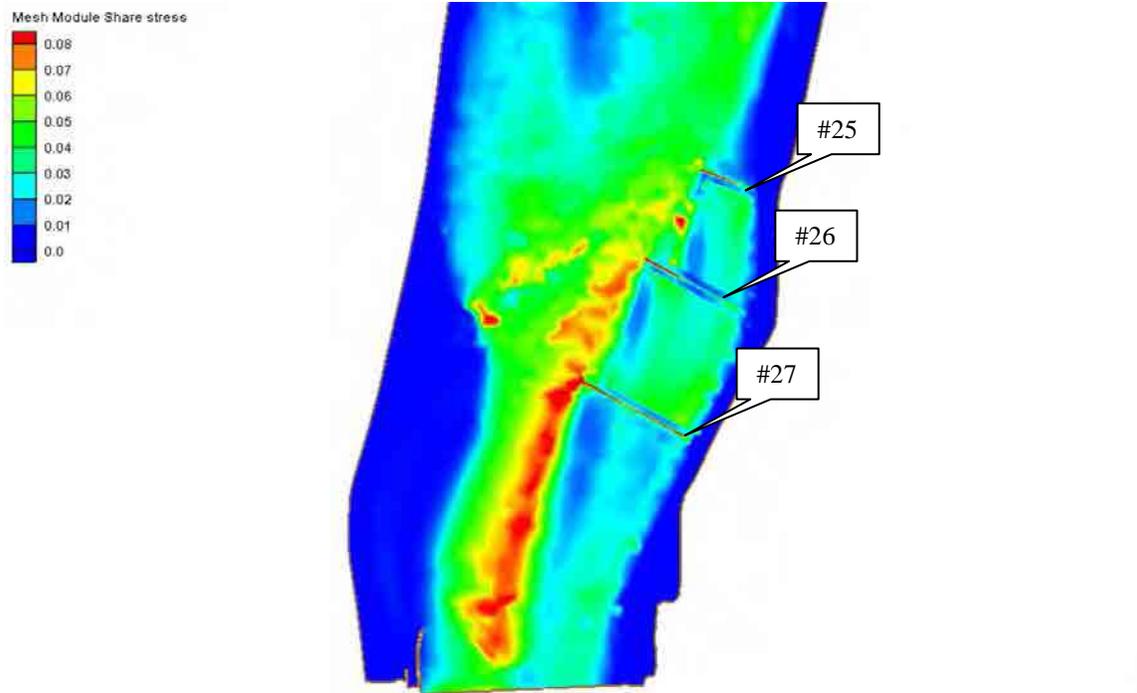
**Figure 13 Cross Sectional Bed Elevation Changes  
Dredged Material Placement Sites 1 and 2**



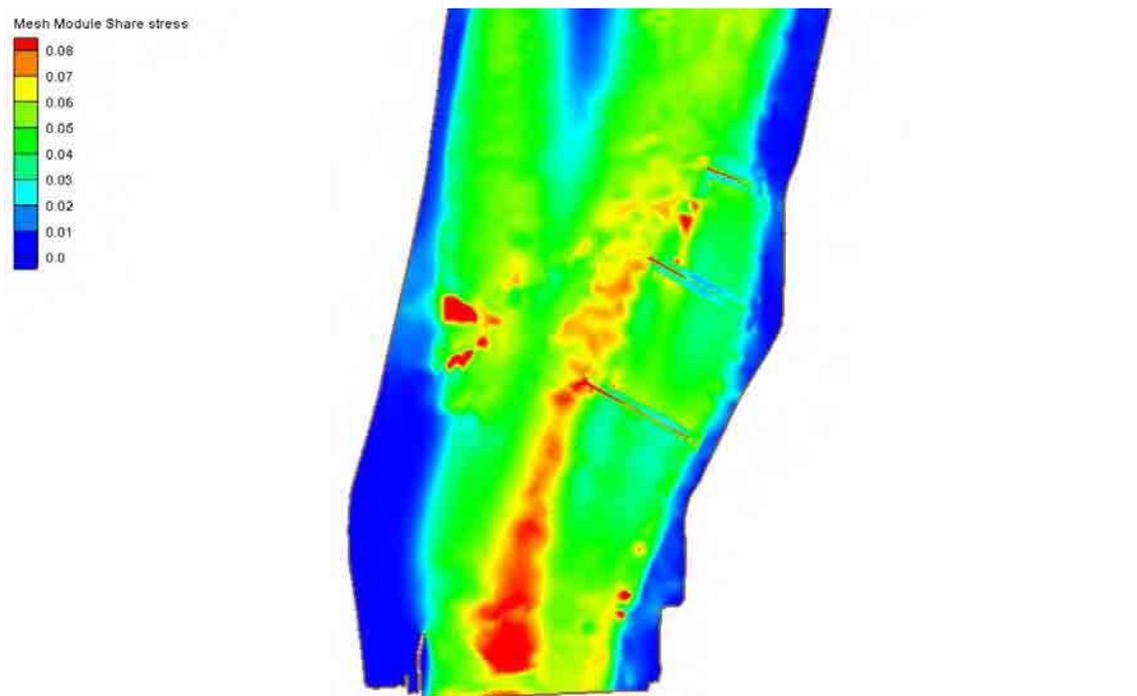
**Figure 14(1) Velocity Simulated near Wing Dams #25, #26, and #27  
Alternative One for 50% ACE Flow (2-year)**



**Figure 14(2) Velocity Simulated near Wing Dams #25, #26, and #27  
Alternative One for 1% ACE Flow (100-year)**



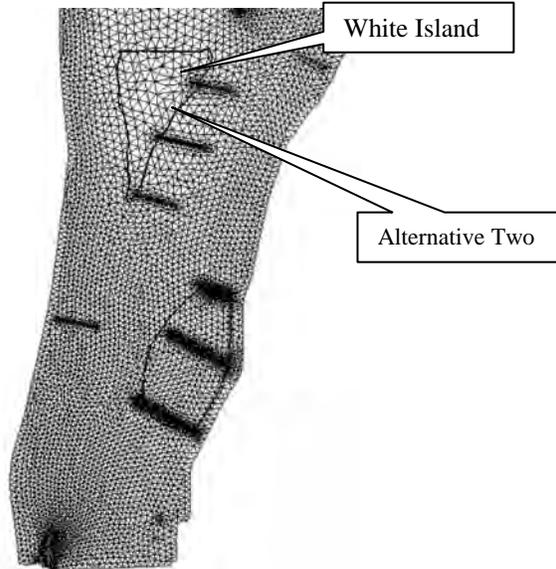
**Figure 15(1) Bed Shear Stress Simulated near Wing Dams #25, #26, and #27 Alternative One for 50% ACE Flow (2-year)**



**Figure 15(2) Bed Shear Stress Simulated near Wing Dams #25, #26, and #27 Alternative One for 1% ACE Flow (100-year)**

## ALTERNATIVE TWO INVESTIGATED

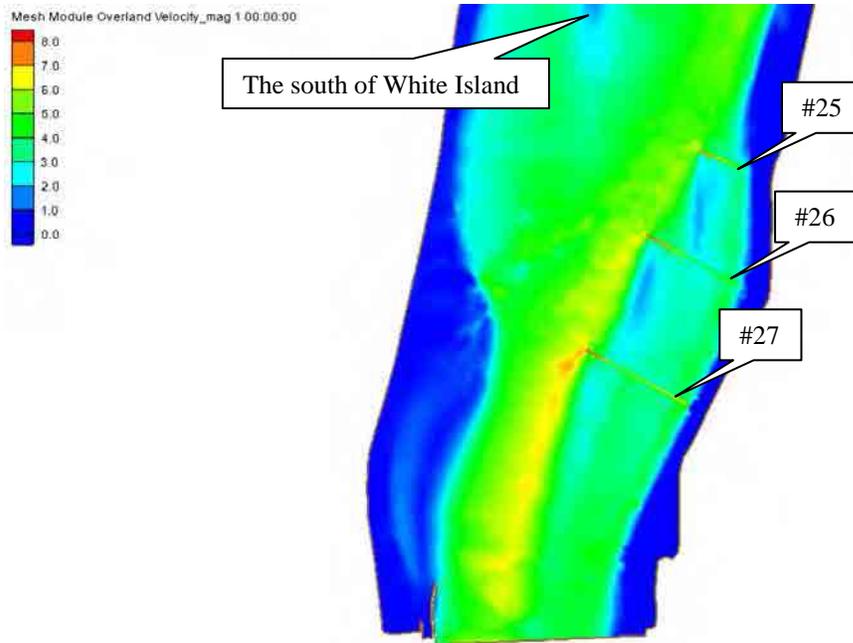
Alternative Two places dredged material on the south end of White Island to an elevation of 481 ft (MSL 1912). The location of Alternative Two is shown in Figure 16.



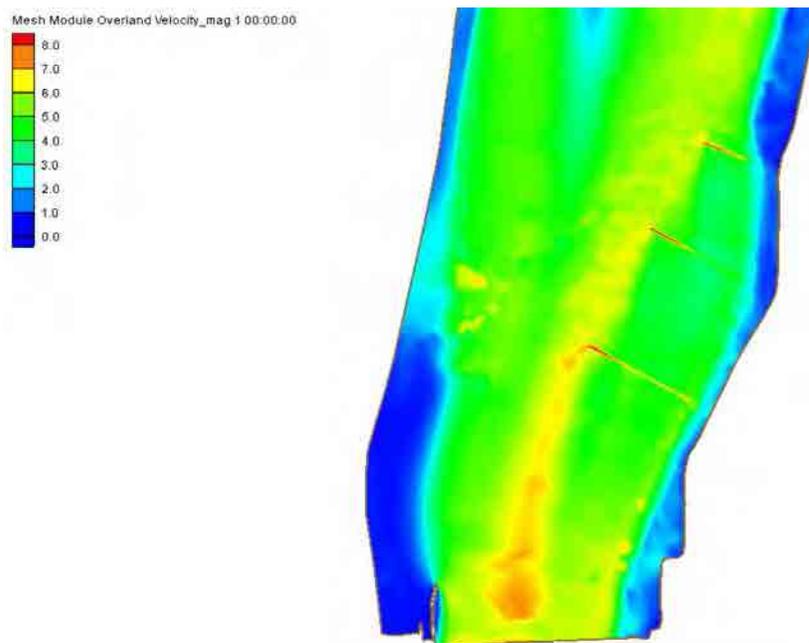
**Figure 16 Alternative Two**

Two flows, 50% ACE (2-year) flow and 1% ACE (100-year) flow, were simulated by the 2D ADH model. The flow velocities simulated near the wing dams #25, #26, and #27 and near the south of White Island are displayed in Figure 17(1) for the 50% ACE (2-year) flow and Figure 17(2) for the 1% ACE (100-year) flow. The bed shear stresses simulated near the wing dams #25, #26, and #27 and near the south of White Island are displayed in Figure 18(1) for the 50% ACE (2-year) flow and Figure 18(2) for the 1% ACE (100-year) flow.

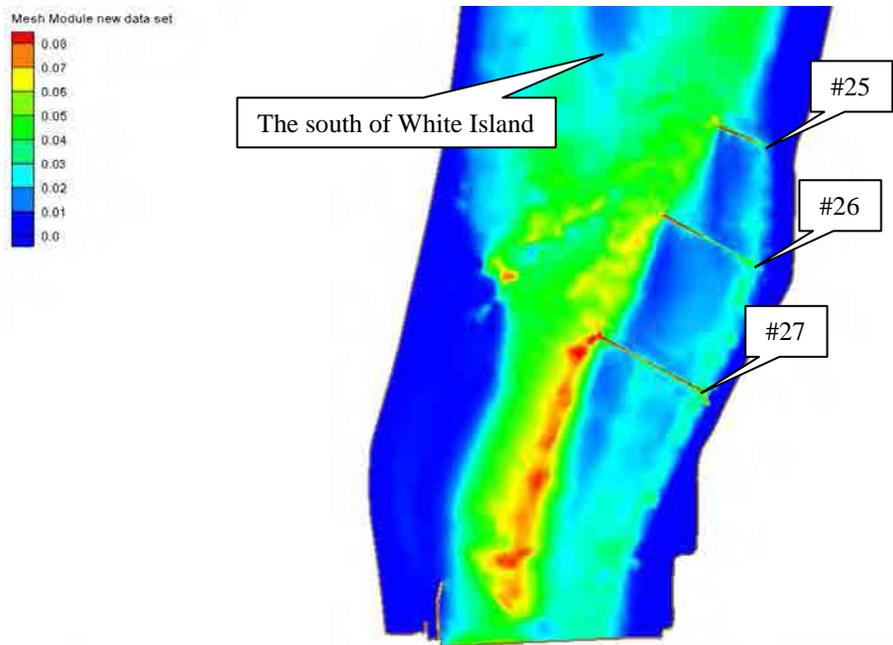
From Figures 18(1) and 18(2), it is found that around the south end of White Island, there are no locations where bed shear stresses are greater than the critical shear stress ( $0.072 \text{ lb/ft}^2$ ) for either the 50% ACE (2-year) flow or the 1% ACE (100-year) flow. Therefore, the south end of White Island placement site does provide a stable location for the dredged material not to return to the channel.



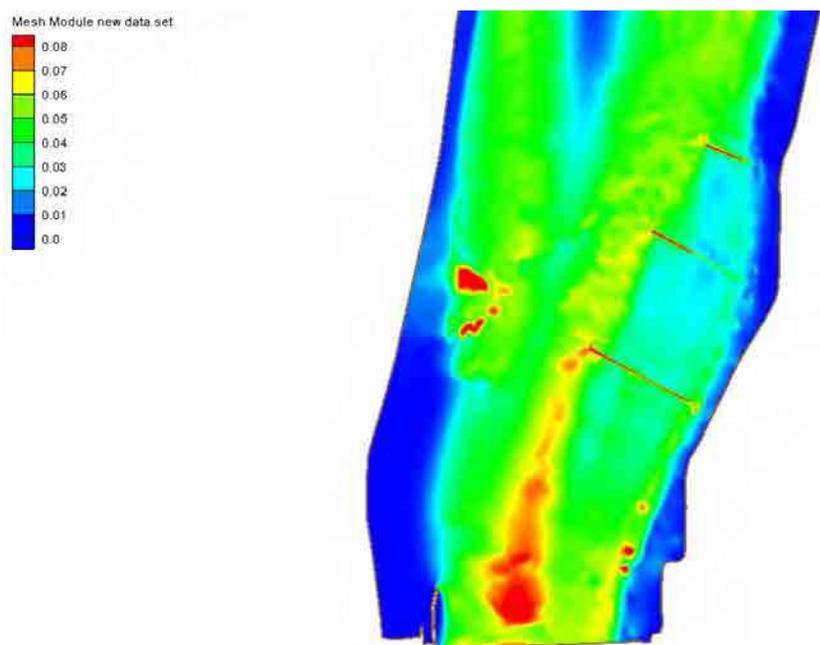
**Figure 17(1) Velocity Simulated near Wing Dams #25, #26, and #27  
Alternative Two for 50% ACE Flow (2-year)**



**Figure 17(2) Velocity Simulated near Wing Dams #25, #26, and #27  
Alternative Two for 1% ACE Flow (100-year)**

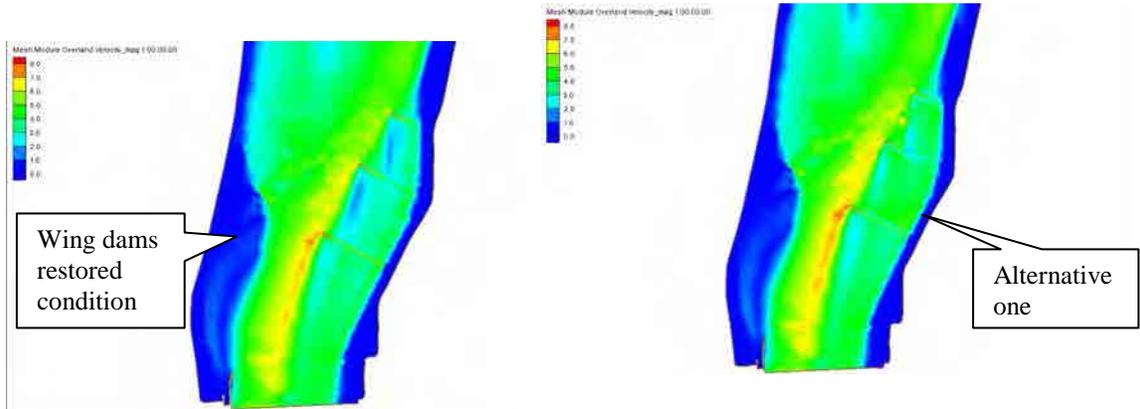


**Figure 18(1) Bed Shear Stress Simulated near Wing Dams #25, #26, and #27 Alternative Two for 50% ACE Flow (2-year)**

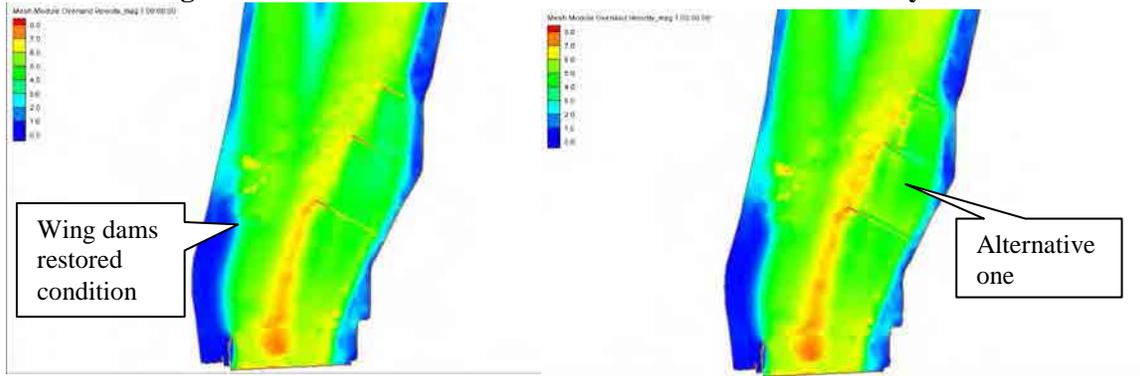


**Figure 18(2) Bed Shear Stress Simulated near Wing Dams #25, #26, and #27 Alternative Two for 1% ACE Flow (100-year)**

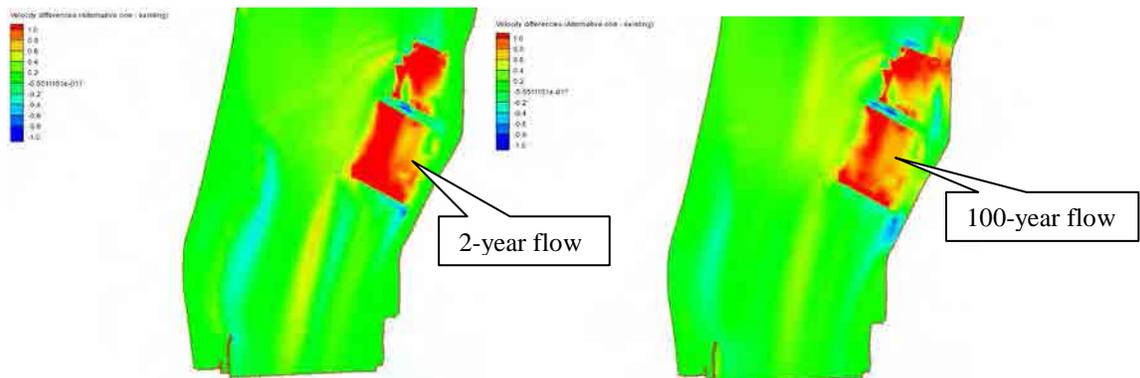
**COMPARISON BETWEEN WING DAMS RESTORED CONDITION AND ALTERNATIVE ONE**



**Figure 19(1) Velocity Comparison  
Wing Dams Restored Condition and Alternative One for the 2-year Flow**

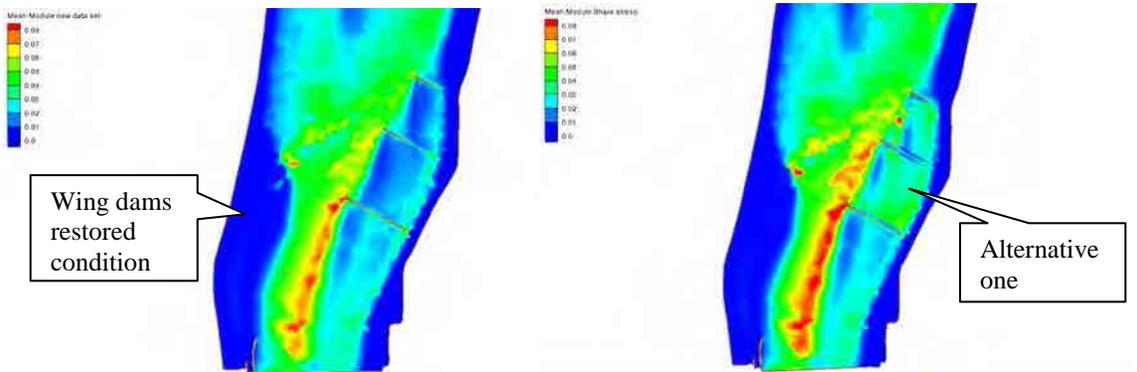


**Figure 19(2) Velocity Comparison  
Wing Dams Restored Condition and Alternative One for the 100-year Flow**

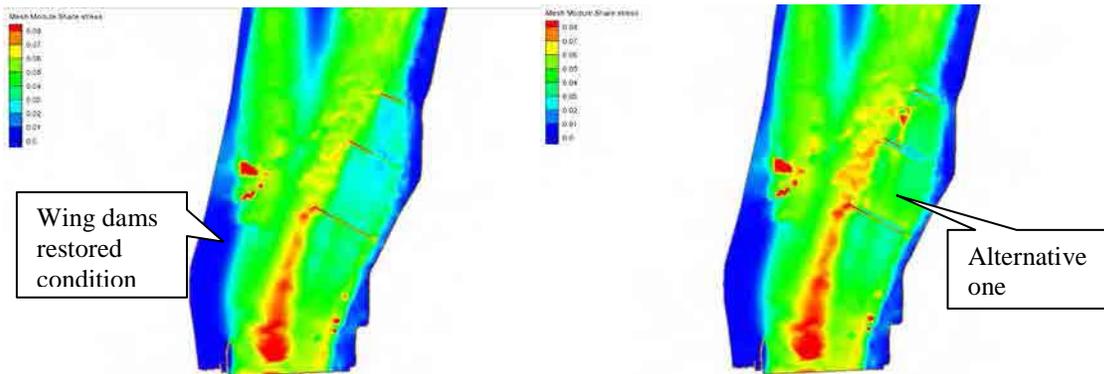


**Figure 20 Velocity Differences (Alternative One  
minus Wing Dams Restored Condition) for the 2-year Flow and 100-year Flow**

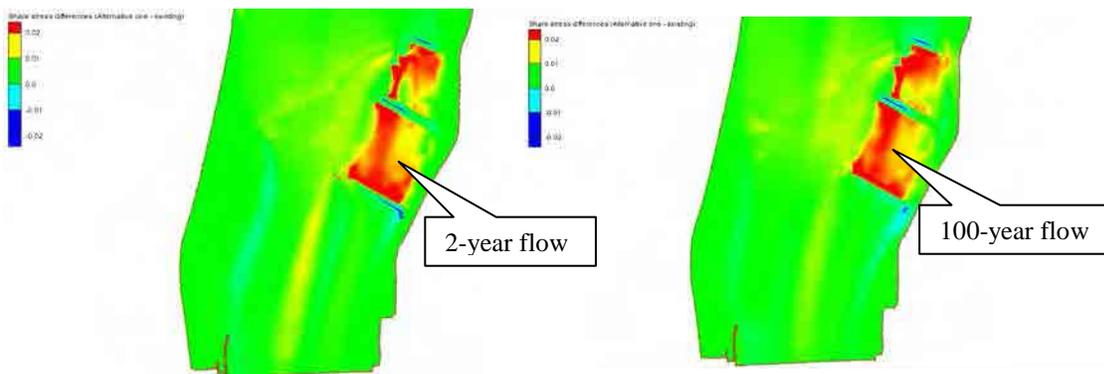
Figures 19(1), 19(2), and 20 show that Alternative One does increase flow velocities within both placement areas for either the 50% ACE (2-year) flow or the 1% ACE (100-year) flow. However, the increase amount is not very large.



**Figure 21(1) Bed Shear Stress Comparison  
Wing Dams Restored Condition and Alternative One for the 2-year Flow**



**Figure 21(2) Bed Shear Stress Comparison  
Wing Dams Restored Condition and Alternative One for the 100-year Flow**



**Figure 22 Bed Shear Stress Differences (Alternative One minus Wing Dams Restored Condition) for the 2-year Flow and 100-year Flow**

Figures 21(1), 21(2), and 22 show that Alternative One does increase the bed shear stresses within both placement areas for either the 50% ACE (2-year) flow or the 1% ACE (100-year) flow. However, the increase amount is not significant.

### COMPARISON BETWEEN WING DAMS RESTORED CONDITION AND ALTERNATIVE TWO

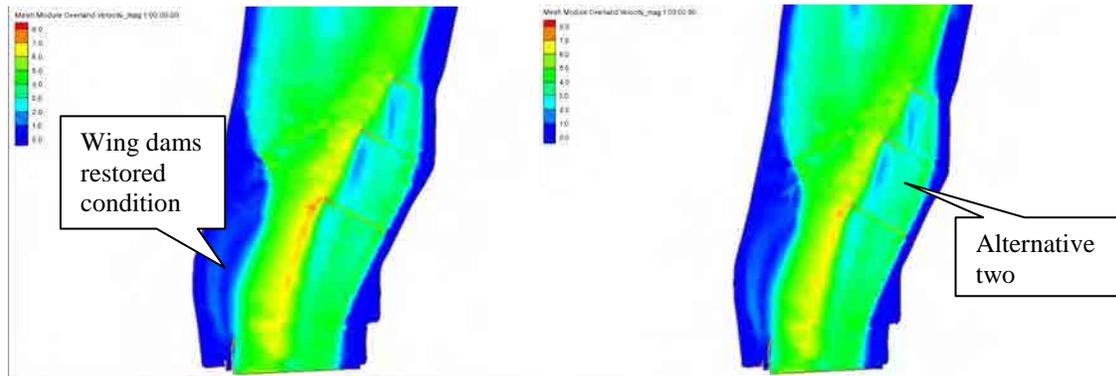


Figure 23(1) Velocity Comparison  
Wing Dams Restored Condition and Alternative Two for the 2-year Flow

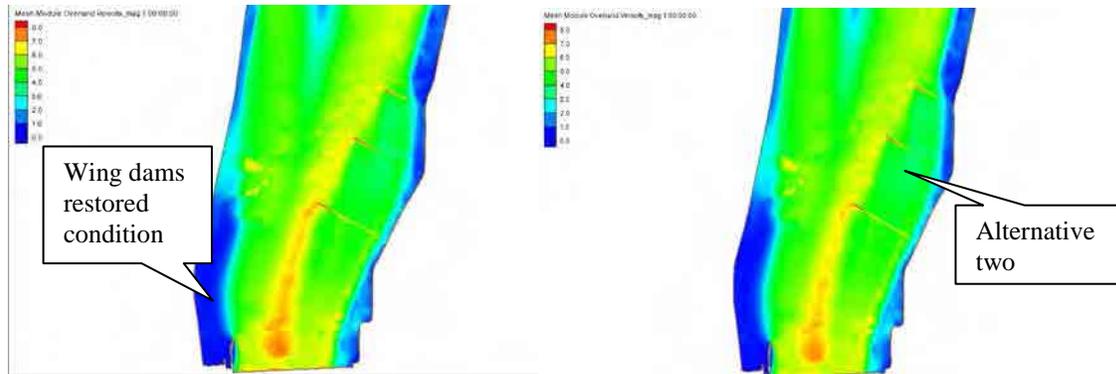
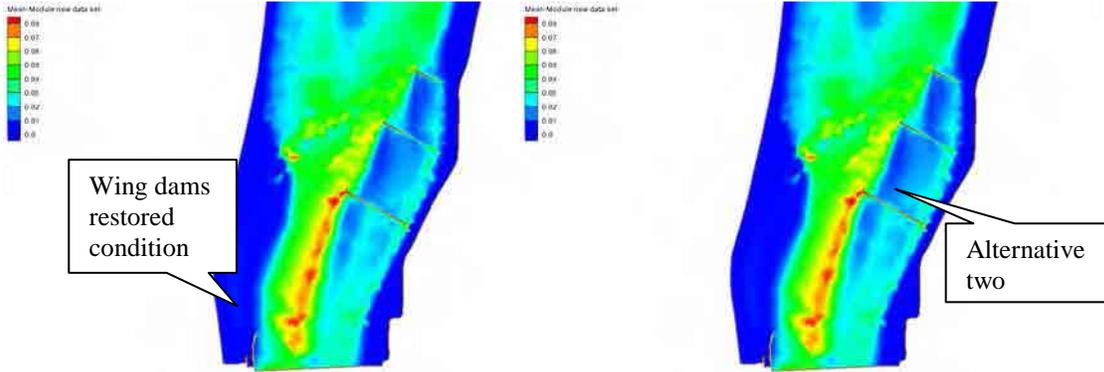
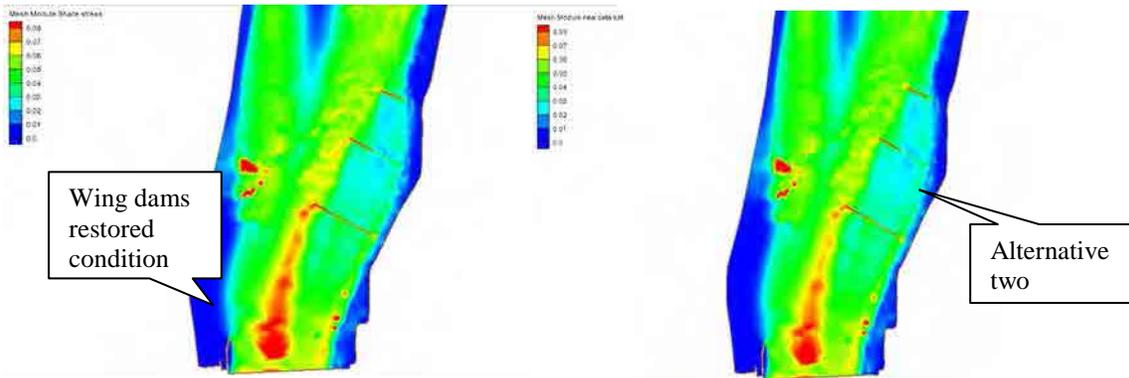


Figure 23(2) Velocity Comparison  
Wing Dams Restored Condition and Alternative Two for the 100-year Flow



**Figure 24(1) Bed Shear Stress Comparison  
Wing Dams Restored Condition and Alternative Two for the 2-year Flow**



**Figure 24(2) Bed Shear Stress Comparison  
Wing Dams Restored Condition and Alternative Two for the 100-year Flow**

Figures 23(1), 23(2), 24(1), and 24(2) show that velocities and bed shear stresses simulated from Alternative Two are same as these simulated from the wing dams restored condition. Alternative Two does not increase the flow velocity and bed shear stress.

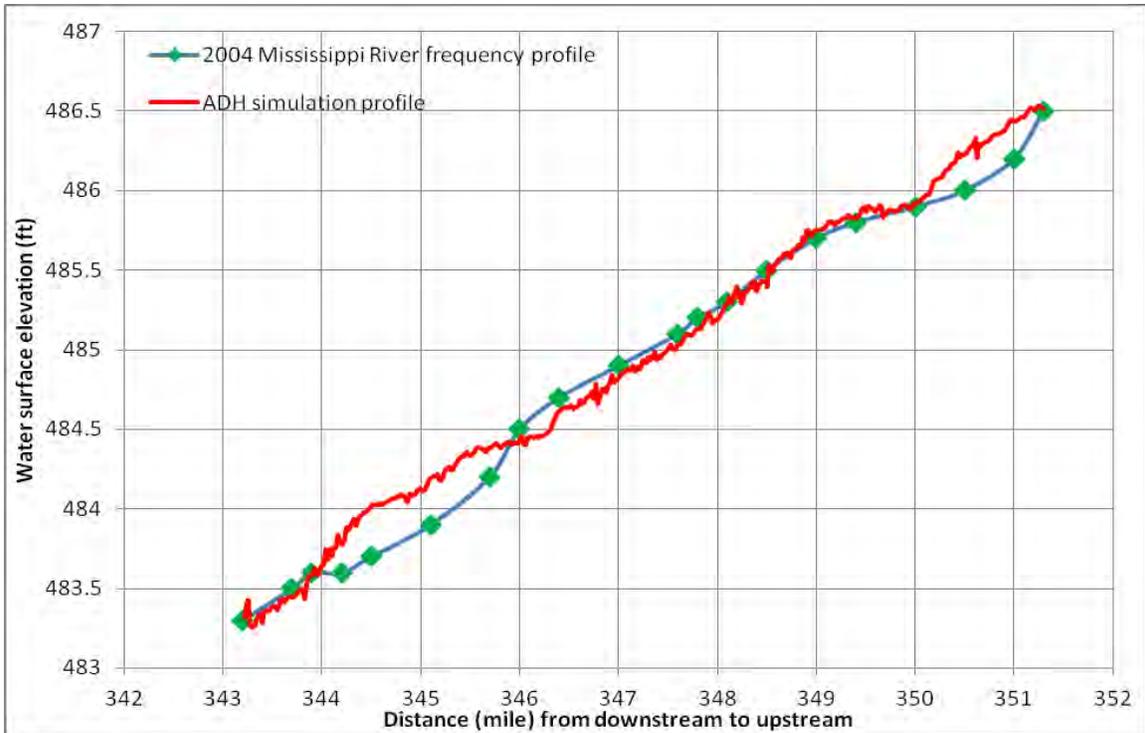
## COMPARISON OF WATER SURFACE PROFILES

The 50% Annual Chance Exceedance (ACE) (2-year) and the 1% ACE (100-year) water surface profiles (Upper Mississippi River System Flow Frequency Study (UMRSFFS), USACE, Rock Island District, 2004) were compared with the ADH simulation profiles along the sailing line (Figure 25) from RM 343.2 to RM 351.3. Figure 26 shows the comparison between the UMRSFFS profile and the ADH wing dams restored simulation profile for the 50% ACE flow ( $Q = 202,000$  cfs). Figure 27 shows the comparison between the UMRSFFS profile and the ADH wing dams restored simulation profile for the 1% ACE flow ( $Q = 396,000$  cfs).

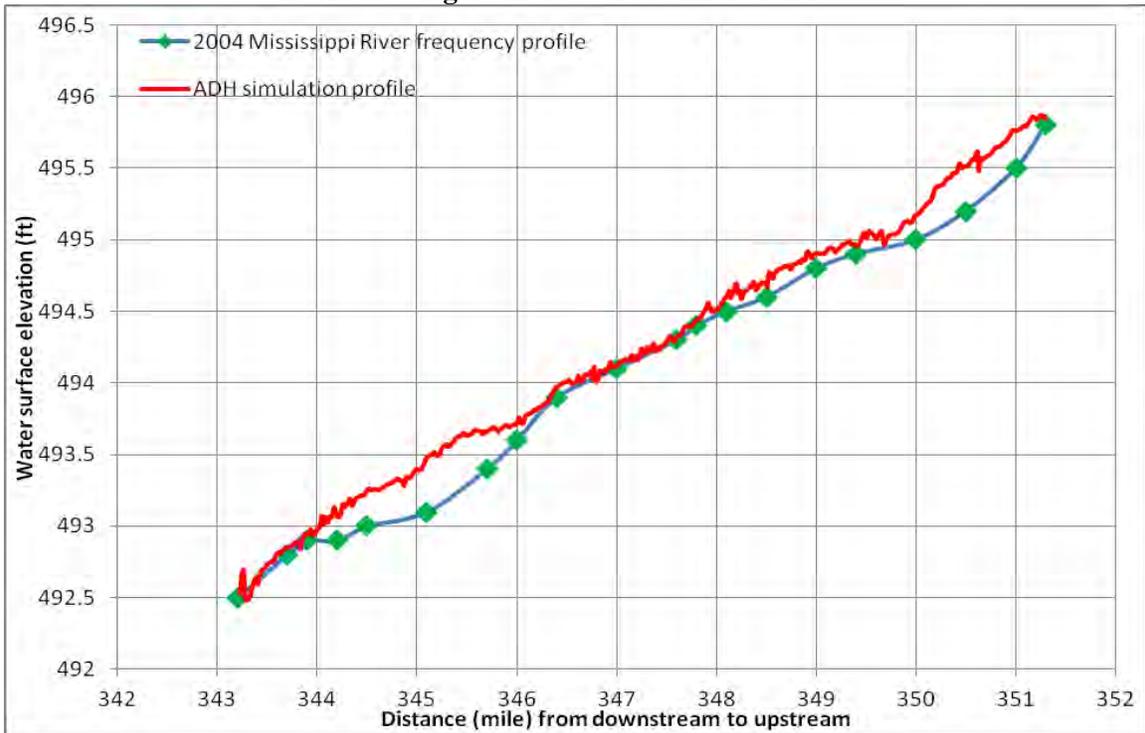
Figures 28 and 29 show the comparison of water surface profiles among profiles before and after the wing dams restored, and Alternative One and Alternative Two profiles along the sailing line from RM 343.2 to RM 345 around the study area for the 50% ACE flow and the 1% ACE flow, respectively. Figures 28 and 29 show the water surface profile before the wing dams restored is very close to those after the wing dams restored, Alternative One, or Alternative Two.



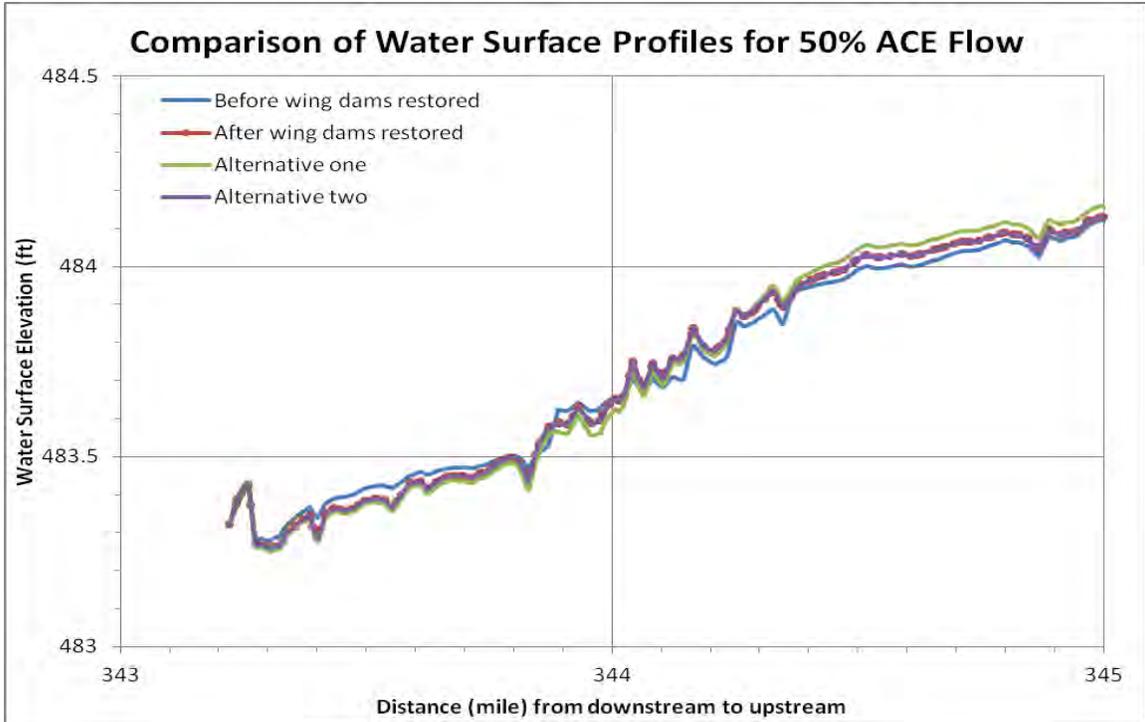
**Figure 25 Sailing Line in Lock & Dam 20 Upper Study Area**



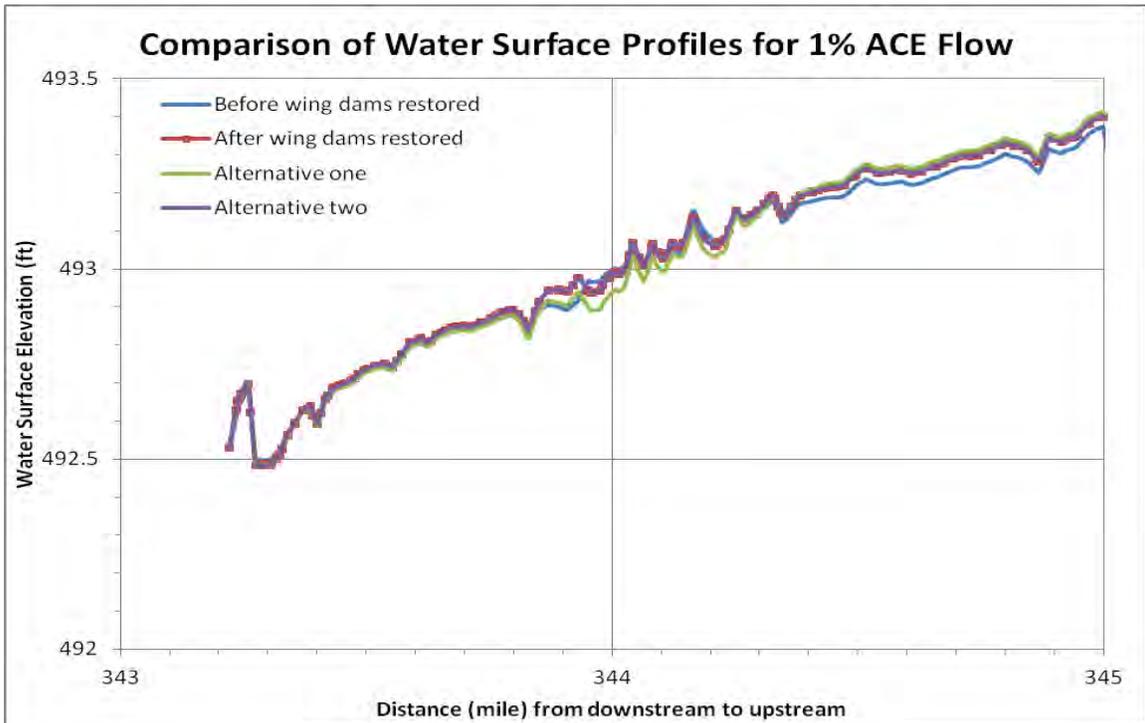
**Figure 26 Comparison UMRSFFS 50% ACE Flow Profile and ADH Wing Dams Restored Simulation Profile**



**Figure 27 Comparison UMRSFFS 1% ACE Flow Profile and ADH Wing Dams Restored Simulation Profile**



**Figure 28 Comparison Various Profiles for 50% ACE Flow**



**Figure 29 Comparison Various Profiles for 1% ACE Flow**

Table 5 shows the comparison of the water surface profiles among Upper Mississippi River System Flow Frequency Study (UMRSFFS) profiles, ADH wing dams restored condition profiles, Alternative One and Alternative Two profiles at RM 351.3 (the upstream boundary), RM 345 (around the study location interested), and RM 343.2 (the downstream boundary). As shown in Table 5, the wing dams restored condition, Alternative One, and Alternative Two do not have impact on water surface profiles.

**Table 5**  
**Water Surface Elevation Comparison**  
**Wing Dams Restored Condition and Placement Conditions**

River Mile	UMRSFFS*		ADH simulated with Wing Dams Restored Condition		ADH simulated with Alternative One		ADH simulated with Alternative Two	
	Water Surface Elevation (ft MSL 1912)							
	2-year	<b>100-year</b>	2-year	<b>100-year</b>	2-year	<b>100-year</b>	2-year	<b>100-year</b>
<b>351.3</b>	486.4	<b>495.7</b>	486.5	<b>495.8</b>	486.5	<b>495.8</b>	486.5	<b>495.8</b>
<b>345</b>	484.5	<b>493.6</b>	484.4	<b>493.7</b>	484.4	<b>493.7</b>	484.4	<b>493.7</b>
<b>343.2</b>	483.3	<b>492.5</b>	483.3	<b>492.5</b>	483.3	<b>492.5</b>	483.3	<b>492.5</b>

*\*Upper Mississippi River System Flow Frequency Study, USACE, Rock Island District, 2004*

## CONCLUSIONS

Restoring three wing dams #25, #26, and #27 to an elevation of 473 ft (MSL 1912) does increase the flow velocity and the bed shear stress in the navigation channel, but the increase amount on the flow velocity or the bed shear stress is not large enough to scour sediments with  $d_{50}$  grain size equal to 0.5 mm.

Alternative One, placing dredged material to areas between wing dams #25 and #26 and between wing dams #26 and #27 to an elevation of 470 ft (MSL 1912), does increase the flow velocity and the bed shear stress within both placement sites, but the increase amount on the flow velocity and the bed shear stress is not large enough to move the sediments. Therefore, the method placing dredged material to the areas between wing dams #25 and #26 and between wing dams #26 and #27 does provide a stable location for the dredged material not to return to the channel.

Alternative Two, placing dredged material on the south end of White Island to an elevation of 481 ft (MSL 1912), has no impact on increasing the flow velocity and the bed shear stress. The south end of White Island placement site does provide a stable location for the dredged material. Therefore, the south end of White Island placement site does provide a stable location for the dredged material not to return to the channel.

Based on the comparison of water surface profiles among profiles before and after the wing dams restored, and Alternative One and Alternative Two profiles along the sailing line from RM 343.2 to RM 345 around the study area for the 50% ACE flow and the 1% ACE flow, it is concluded that the wing dams restored condition, Alternative One, and Alternative Two do not have impact on the water surface profile. The placement of dredge material as described in alternatives one and two indicate there is no-rise in the water surface elevations at the project site or upstream of the project site. This project complies with the state floodplain 'no-rise' requirement.

**APPENDIX A**  
**ADCP SURVEY**

LD 20 Upper Transects from April 7, 2015  
 Transect\_07APR000 (Location 11)  
 62,045 CFS



— Flow Control Structures



1,000 Feet



63,414  
 62,135  
 62,742  
 61,502  
 61,683  
 60,969

Figure 1 ADCP Transect 07APR000 on April 7, 2015

LD 20 Upper Transects from April 7, 2015  
 \_07APR001 (Location 11)  
 64,783 CFS



— Flow Control Structures



1,000 Feet



Figure 2 ADCP Transect 07APR001 on April 7, 2015

LD 20 Upper Transects from April 7, 2015  
 \_07APR002 (Location 10) AND  
 59,371 CFS (002) AND 1,982 CFS (004)

\_07APR004 (Location 09)



— Flow Control Structures



1,000 Feet



Figure 3 ADCP Transects 07APR002 & 07APR004 on April 7, 2015

LD 20 Upper Transects from April 7, 2015  
 07APR003 (Location 10) AND  
 60,677 CFS (003) AND 2,240 CFS (005)

\_07APR005 (Location 09)



— Flow Control Structures



1,000 Feet



Figure 4 ADCP Transects 07APR003 & 07APR005 on April 7, 2015

LD 20 Upper Transects from April 7, 2015  
 \_07APR006 (Location 07) AND  
 46,978 CFS (006) AND 17,370 CFS (008)

\_07APR008 (Location 08)



— Flow Control Structures



1,000 Feet



Figure 5 ADCP Transects 07APR006 & 07APR008 on April 7, 2015

LD 20 Upper Transects from April 7, 2015  
 \_07APR007 (Location 07) AND  
 45,407 CFS (007) AND 15,729 CFS (009)

\_07APR009 (Location 08)



— Flow Control Structures



1,000 Feet

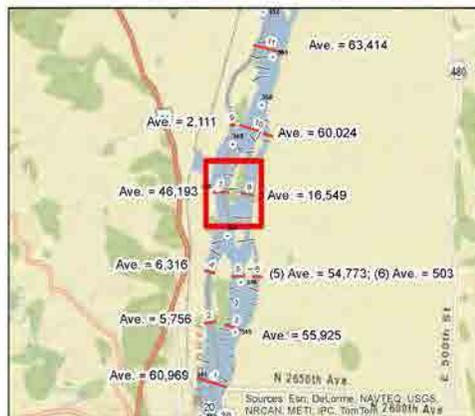


Figure 6 ADCP Transects 07APR007 & 07APR009 on April 7, 2015

LD 20 Upper Transects from April 7, 2015  
 Transect \_07APR020 (Location 04) AND \_07APR010 (Location 05) AND \_07APR012 (Location 06)  
 6,266 CFS (020) AND 54,993 CFS (010) AND 503 CFS (012)



— Flow Control Structures



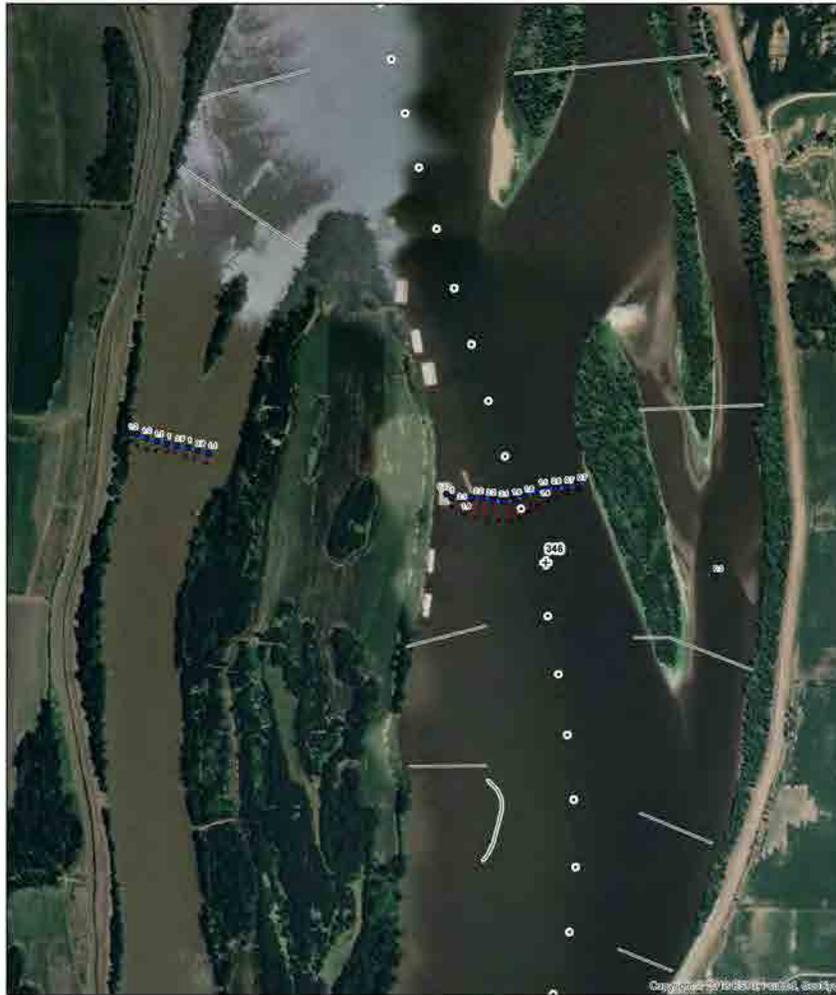
1,000 Feet



63,414  
 63,135  
 62,742  
 61,592  
 61,681  
 60,969

Figure 7 ADCP Transects 07APR020, 07APR010 & 07APR012 on April 7, 2015

LD 20 Upper Transects from April 7, 2015  
 Transect \_07APR021 (Location 04) AND \_07APR011 (Location 05) AND \_07APR012 (Location 06)  
 6,367 CFS (021) AND 54,553 CFS (011) AND 503 CFS (012)



— Flow Control Structures

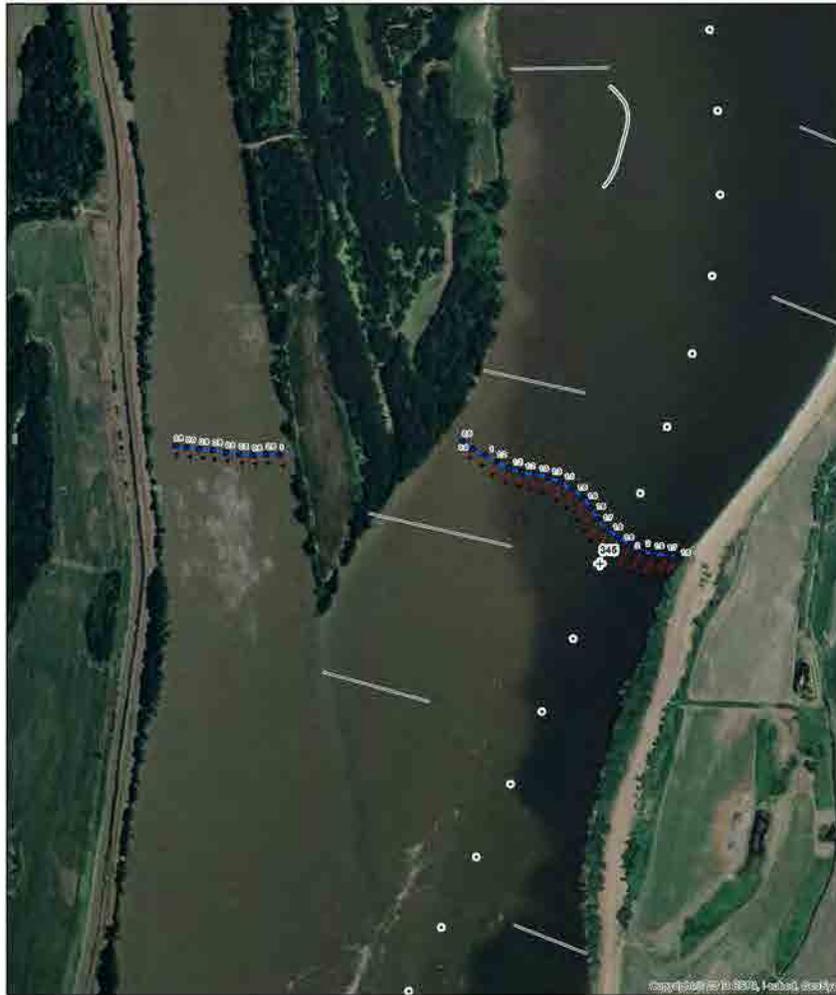


1,000 Feet



Figure 8 ADCP Transects 07APR021, 07APR011 & 07APR013 on April 7, 2015

LD 20 Upper Transects from April 7, 2015  
 Transect \_07APR018 (Location 02) AND \_07APR014 (Location 03)  
 5,648 CFS (018) AND 57,151 CFS (014)



— Flow Control Structures



1,000 Feet



Figure 9 ADCP Transects 07APR018 & 07APR014 on April 7, 2015

LD 20 Upper Transects from April 7, 2015  
 Transect \_07APR019 (Location 02) AND \_07APR015 (Location 03)  
 5,864 CFS (019) AND 54,700 CFS (015)



— Flow Control Structures



1,000 Feet



63,414  
 63,135  
 62,742  
 61,592  
 61,681  
 60,969

Figure 10 ADCP Transects 07APR019 & 07APR015 on April 7, 2015

LD 20 Upper Transects from April 7, 2015  
 Transect\_07APR016 (Location 01)  
 59,744 CFS (016)



— Flow Control Structures



1,000 Feet



63,414  
 63,135  
 62,742  
 61,932  
 61,681  
 60,969

Figure 11 ADCP Transect 07APR016 on April 7, 2015

LD 20 Upper Transects from April 7, 2015  
 Transect\_07APR017 (Location 01)  
 62,194 CFS (017)



— Flow Control Structures



1,000 Feet



63,414  
 63,135  
 62,742  
 61,932  
 61,681  
 60,969

Figure 12 ADCP Transect 07APR017 on April 7, 2015



**APPENDIX B**  
**ADCP vs. ADH**

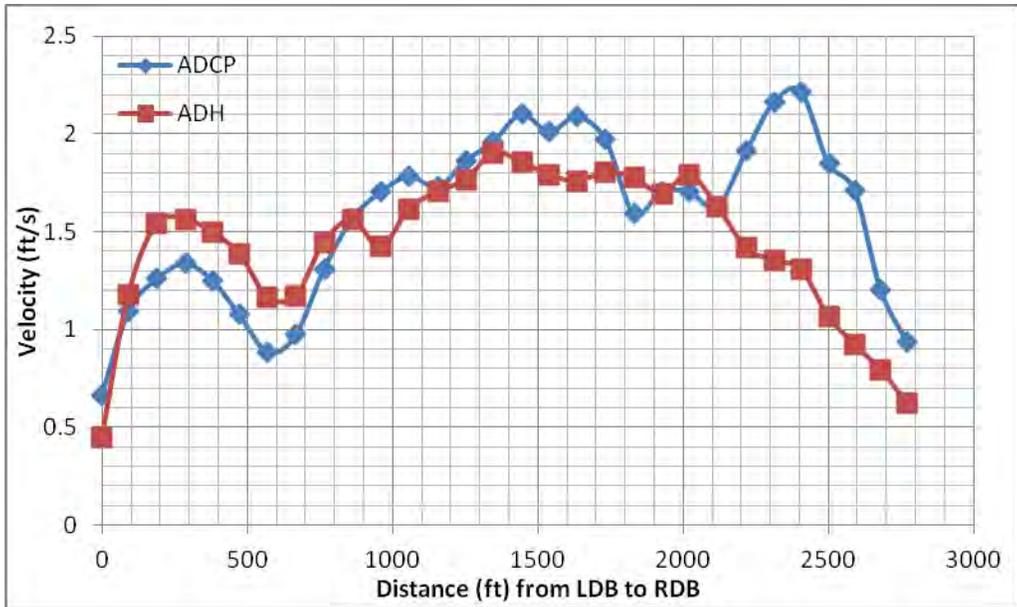


Figure 1 Velocity comparison between ADCP measured and ADH simulated on Transect 07APR000

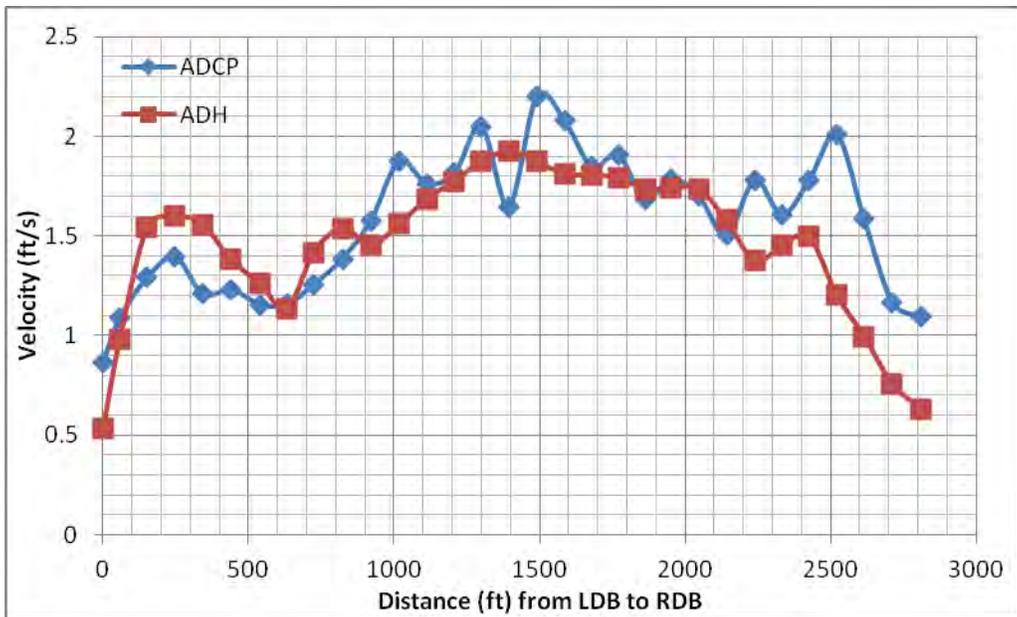
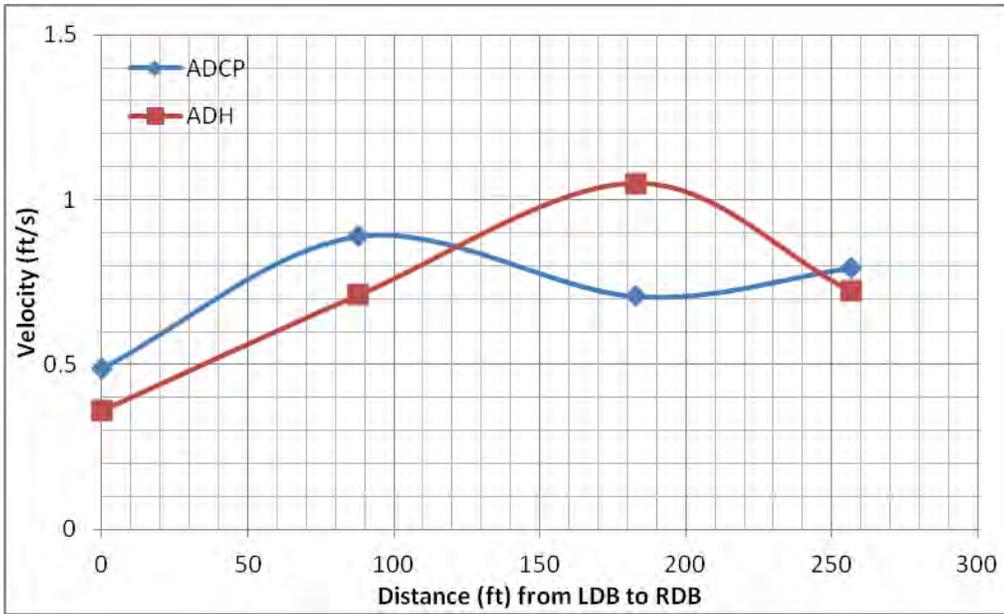
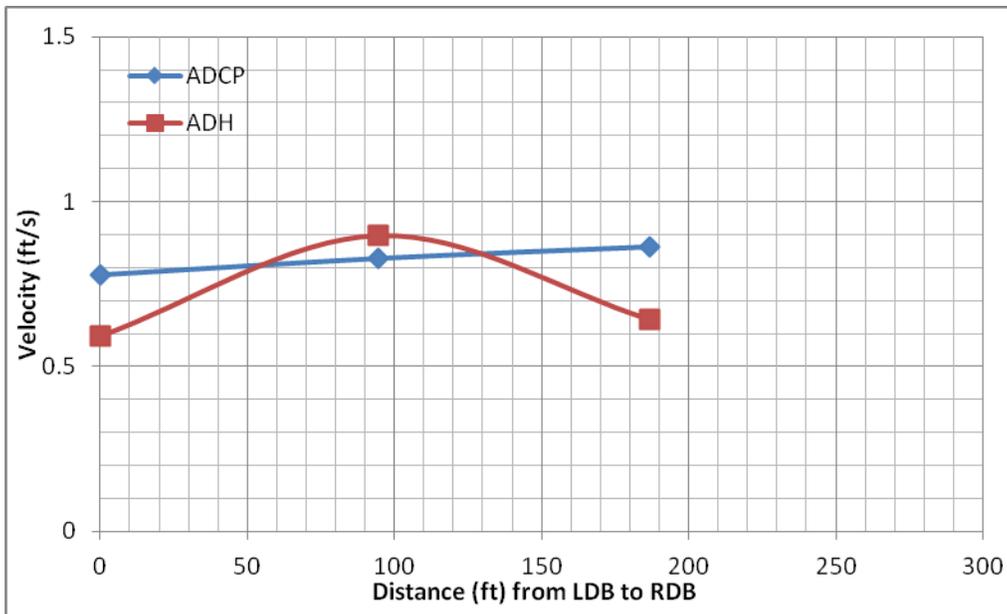


Figure 2 Velocity comparison between ADCP measured and ADH simulated on Transect 07APR001



**Figure 3 Velocity comparison between ADCP measured and ADH simulated on Transect 07APR004**



**Figure 4 Velocity comparison between ADCP measured and ADH simulated on Transect 07APR005**

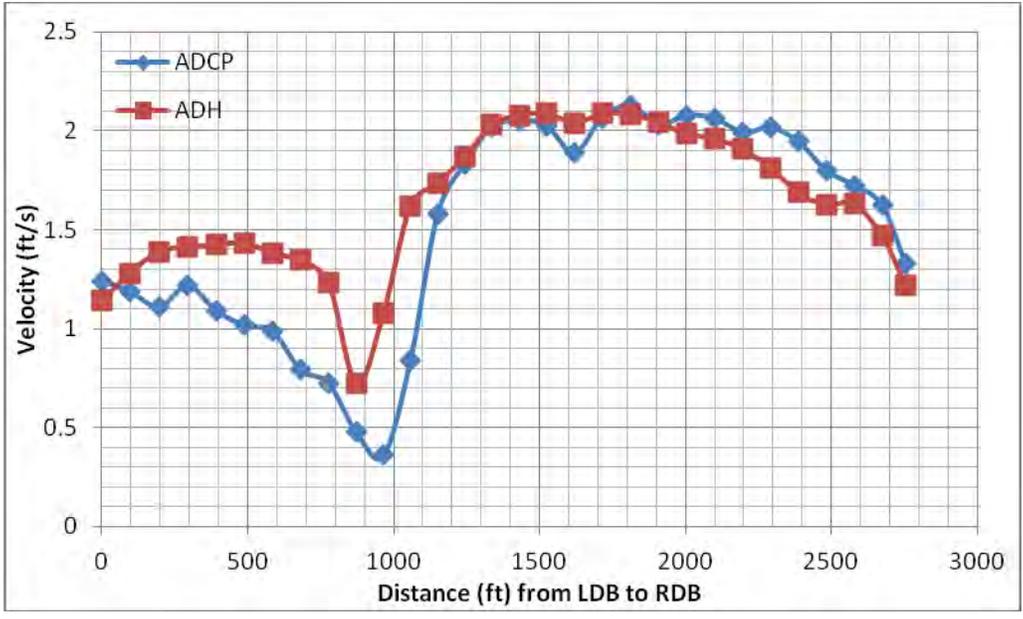


Figure 5 Velocity comparison between ADCP measured and ADH simulated on Transect 07APR002

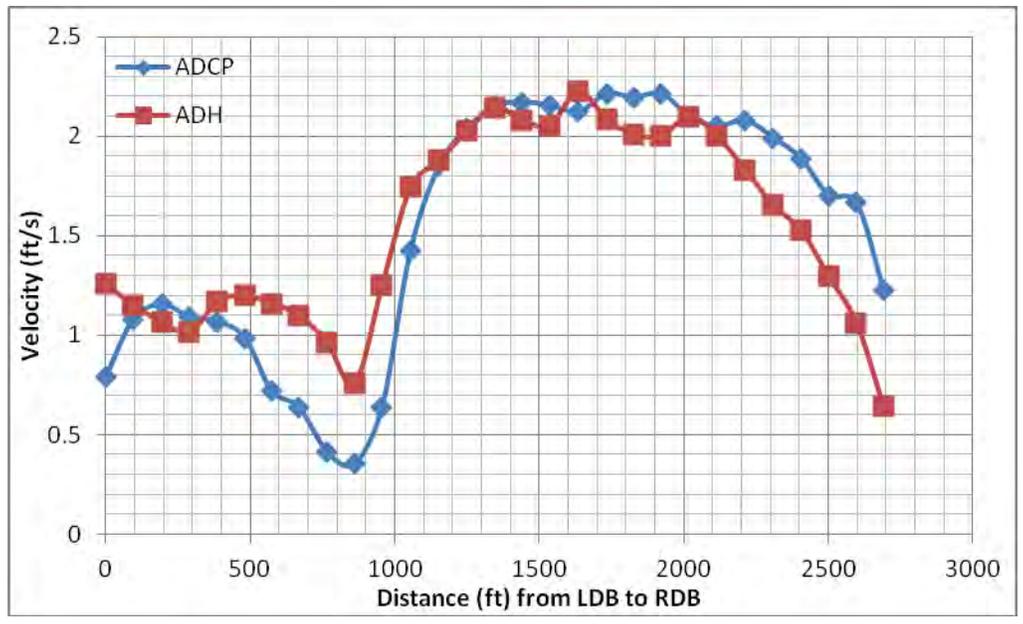


Figure 6 Velocity comparison between ADCP measured and ADH simulated on Transect 07APR003

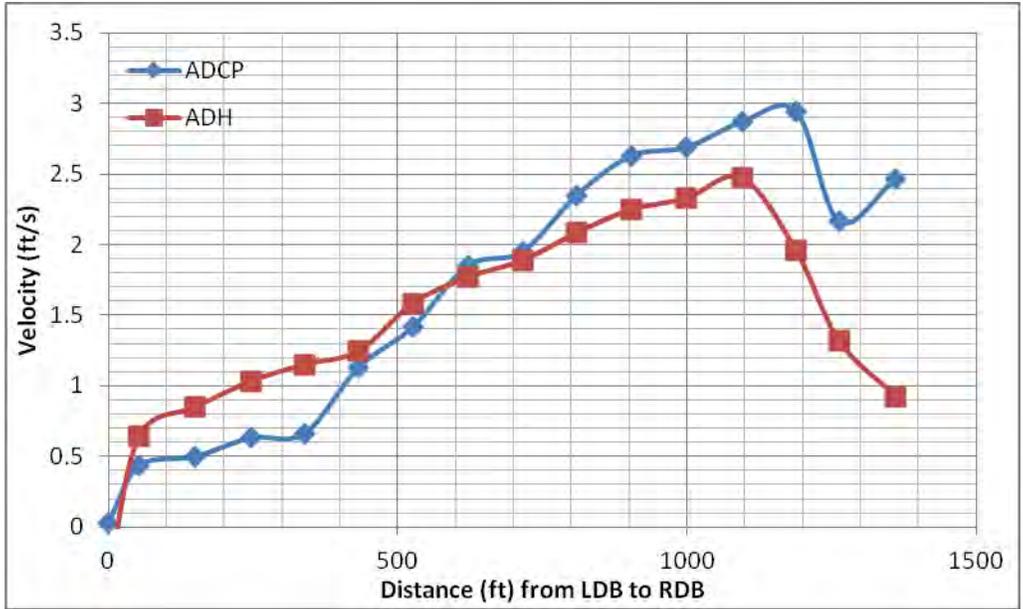


Figure 7 Velocity comparison between ADCP measured and ADH simulated on Transect 07APR006

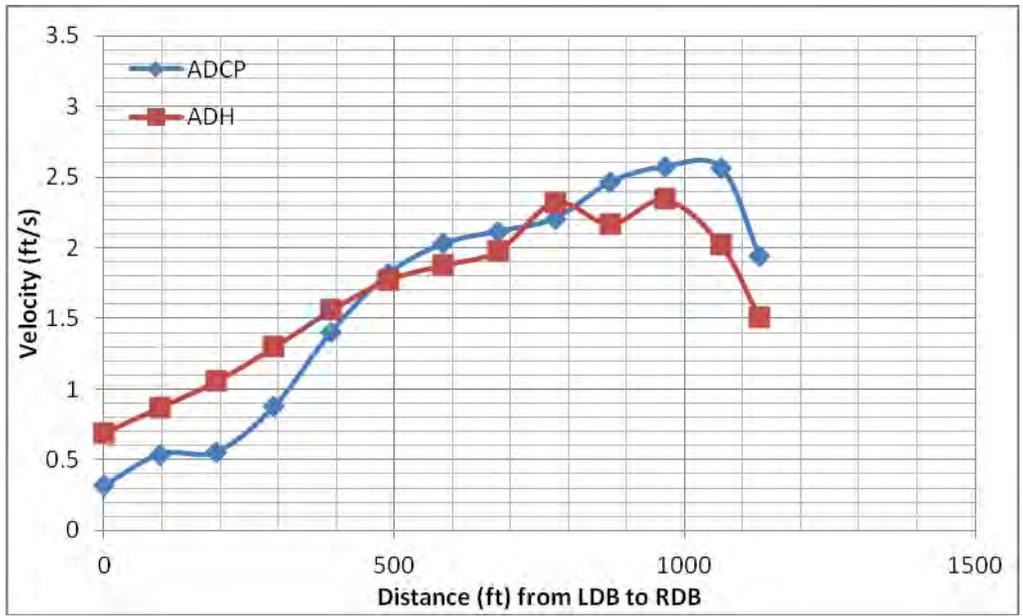


Figure 8 Velocity comparison between ADCP measured and ADH simulated on Transect 07APR007

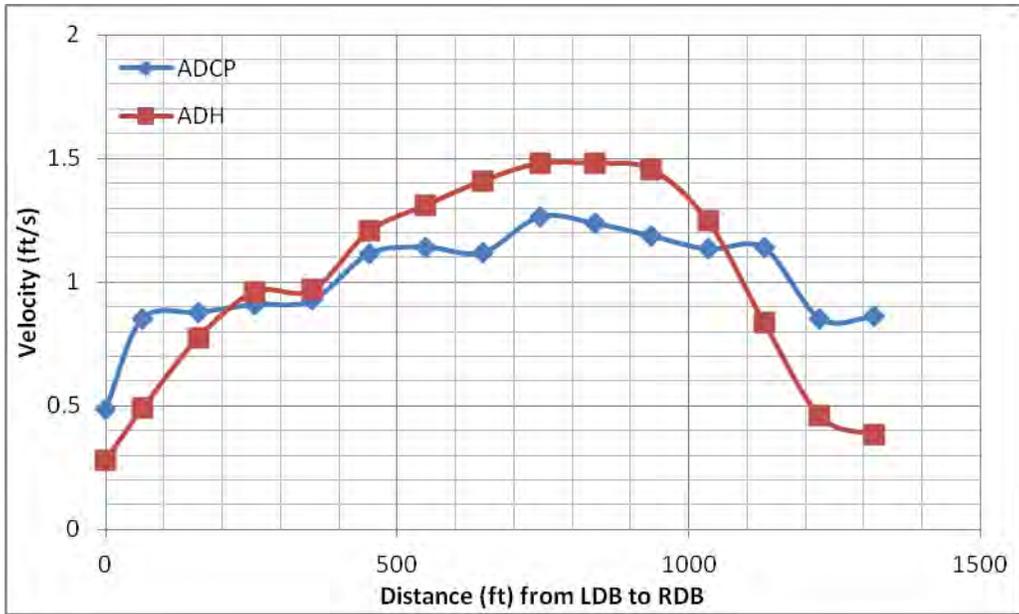


Figure 9 Velocity comparison between ADCP measured and ADH simulated on Transect 07APR008

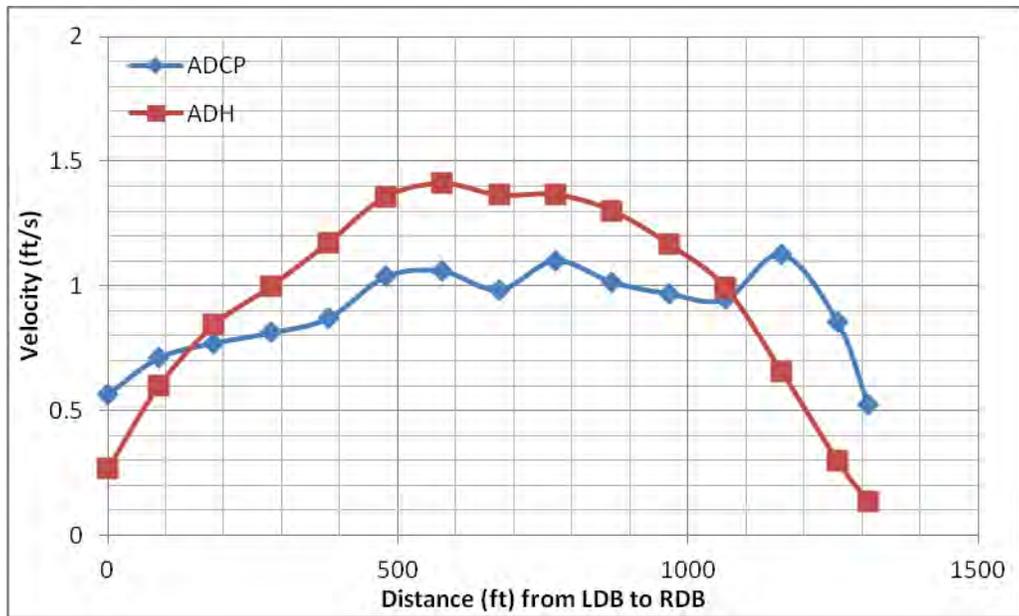


Figure 10 Velocity comparison between ADCP measured and ADH simulated on Transect 07APR009

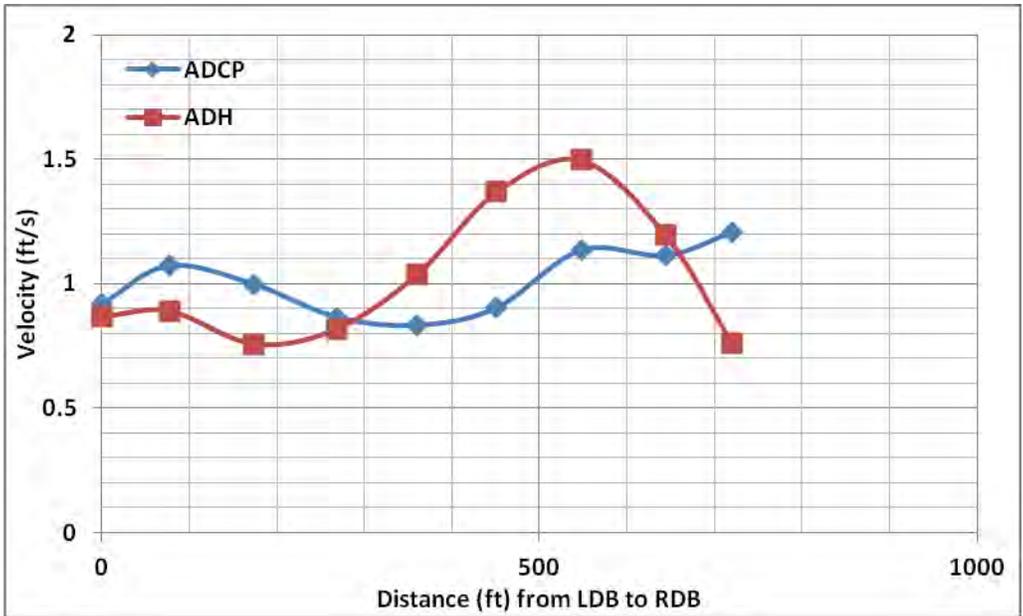


Figure 11 Velocity comparison between ADCP measured and ADH simulated on Transect 07APR020

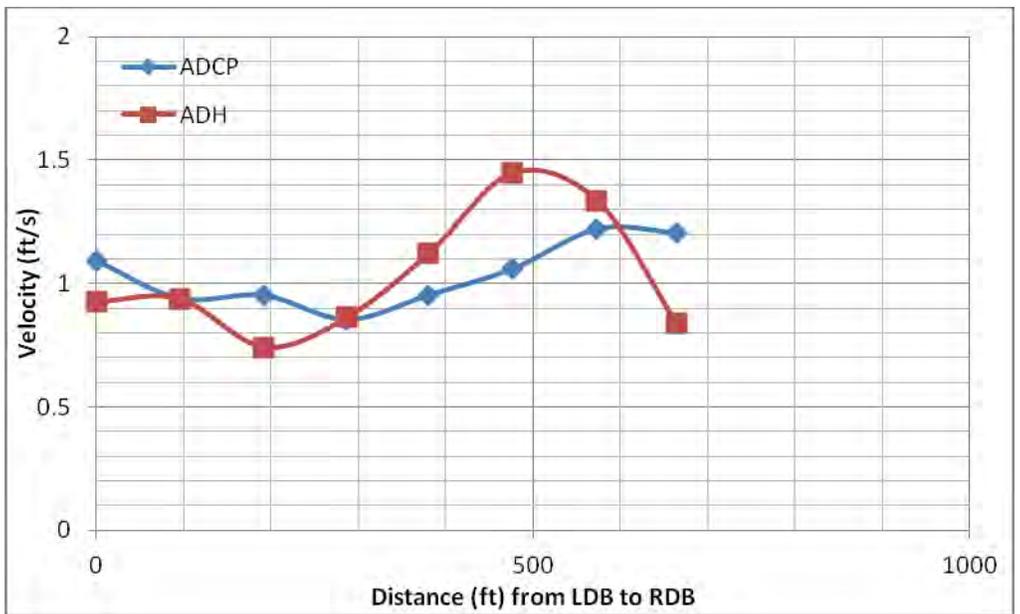


Figure 12 Velocity comparison between ADCP measured and ADH simulated on Transect 07APR021

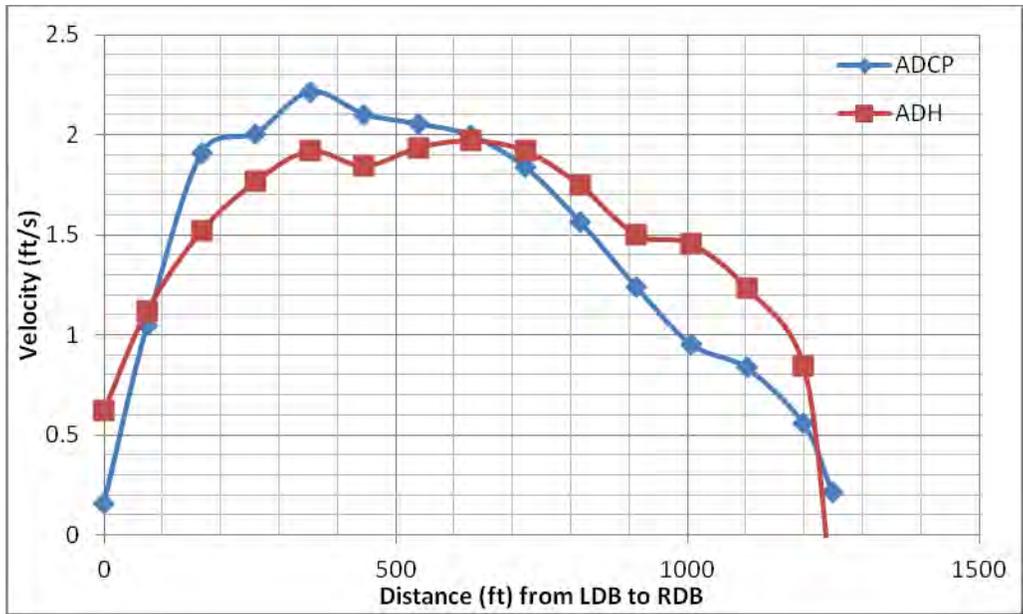


Figure 13 Velocity comparison between ADCP measured and ADH simulated on Transect 07APR010

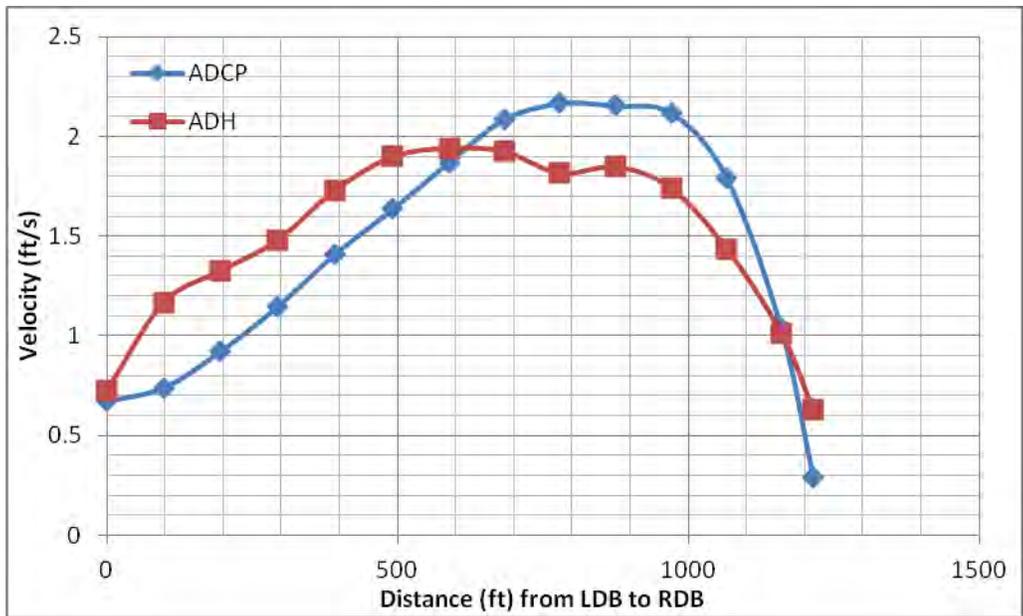


Figure 14 Velocity comparison between ADCP measured and ADH simulated on Transect 07APR011

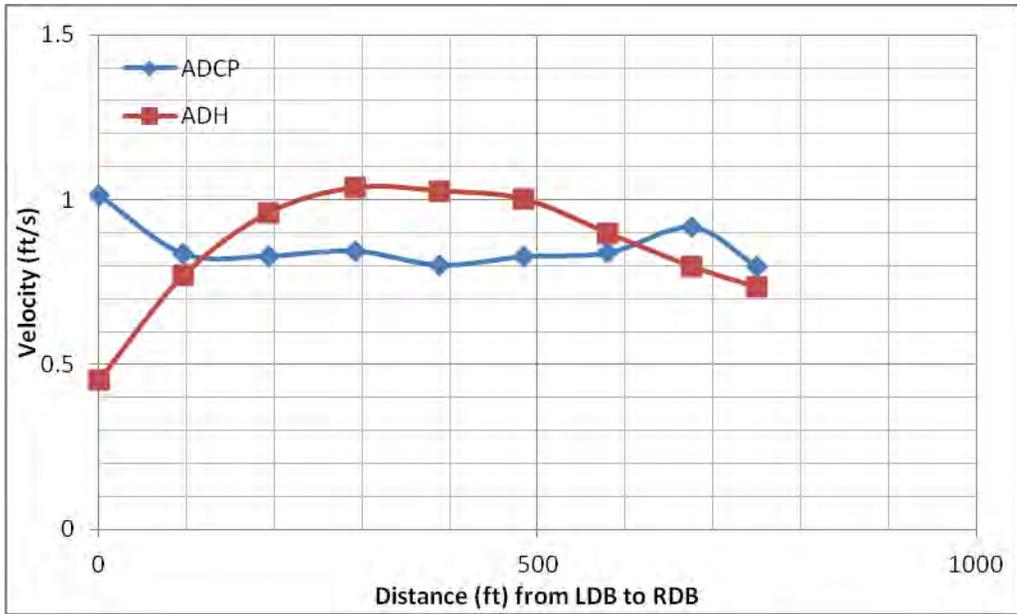


Figure 15 Velocity comparison between ADCP measured and ADH simulated on Transect 07APR018

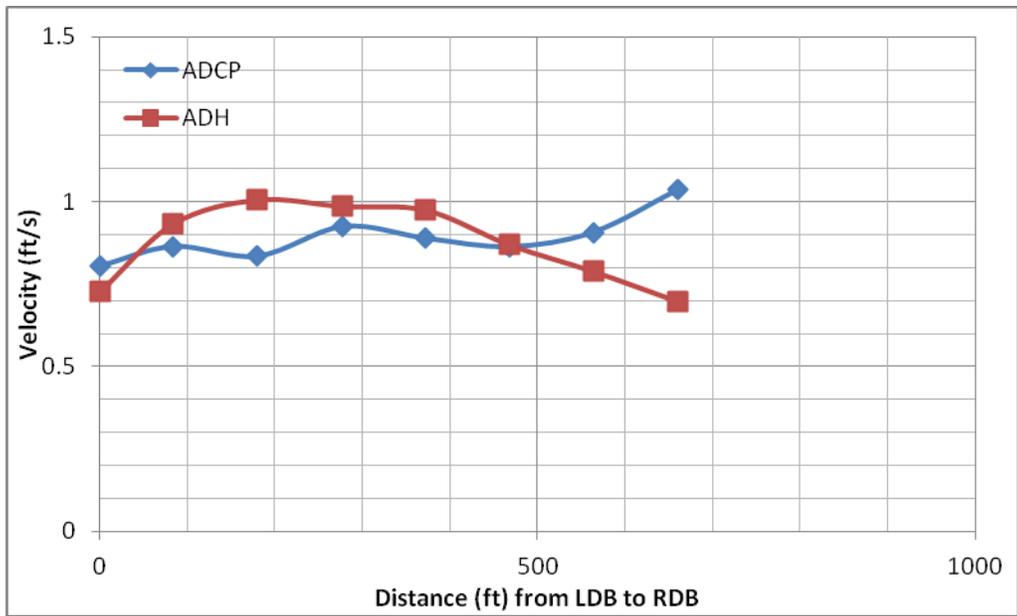


Figure 16 Velocity comparison between ADCP measured and ADH simulated on Transect 07APR019

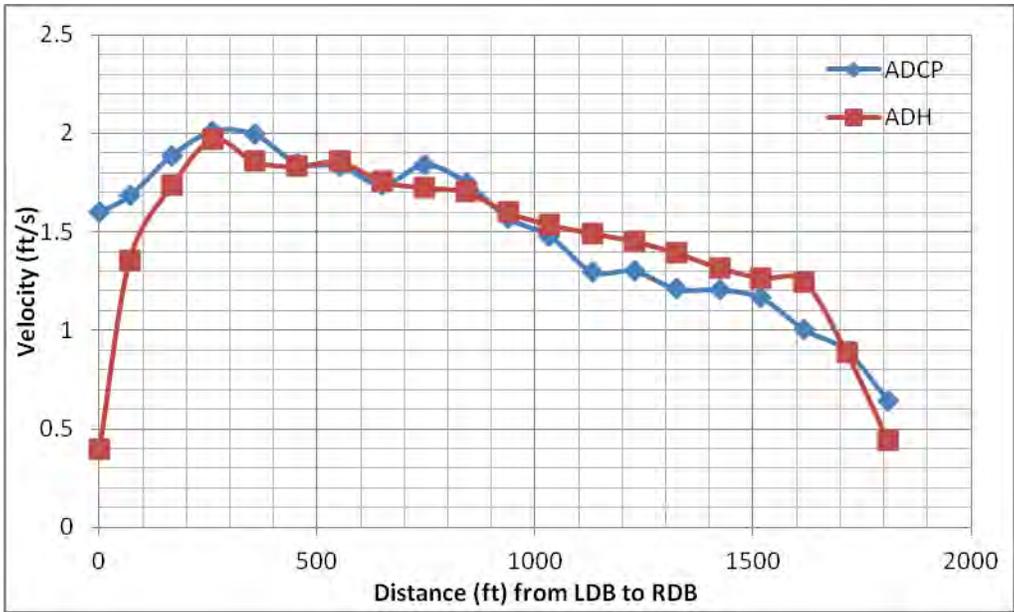


Figure 17 Velocity comparison between ADCP measured and ADH simulated on Transect 07APR014

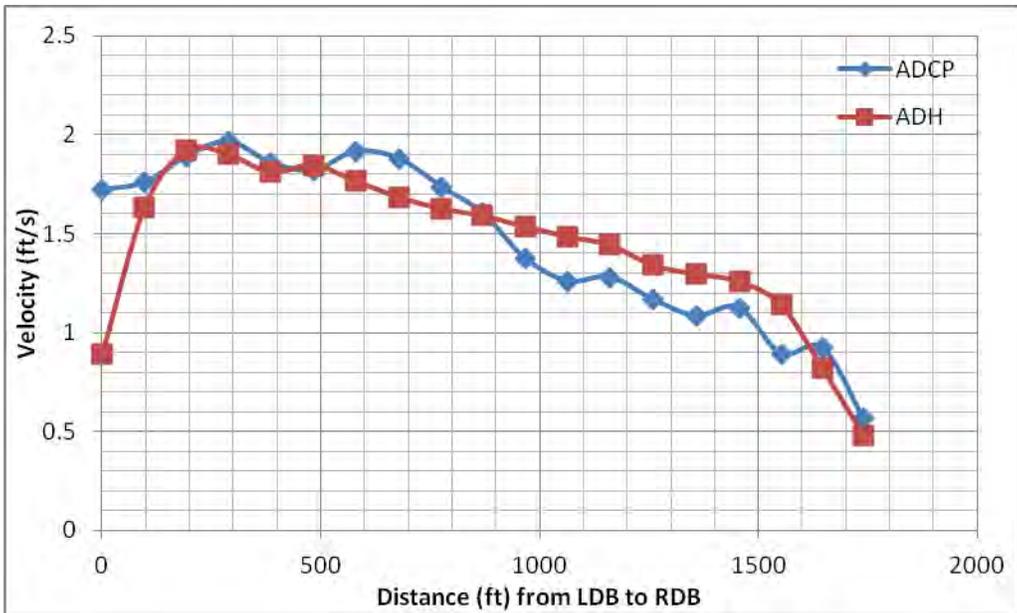


Figure 18 Velocity comparison between ADCP measured and ADH simulated on Transect 07APR015

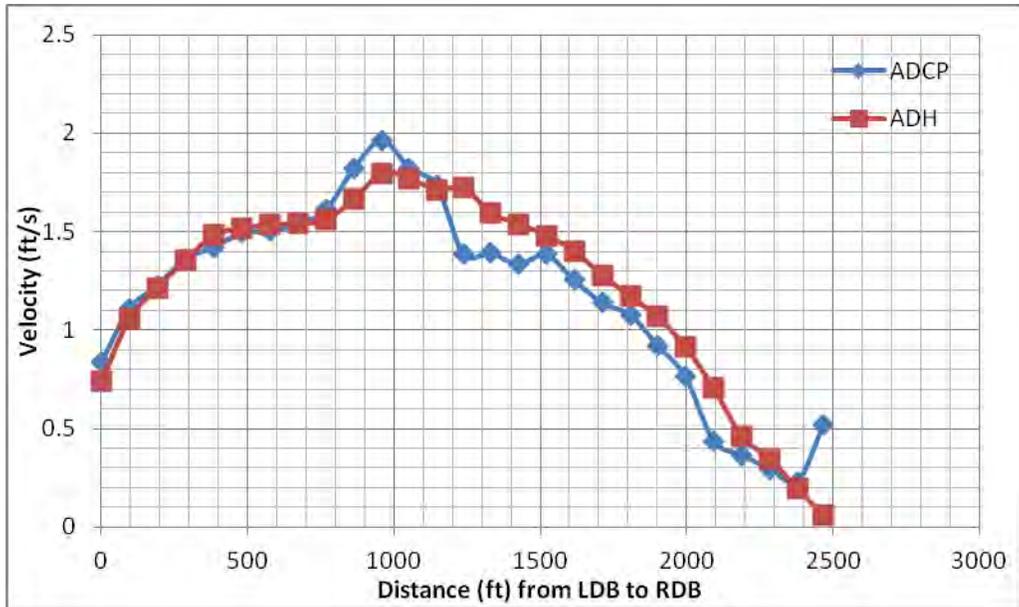


Figure 19 Velocity comparison between ADCP measured and ADH simulated on Transect 07APR016

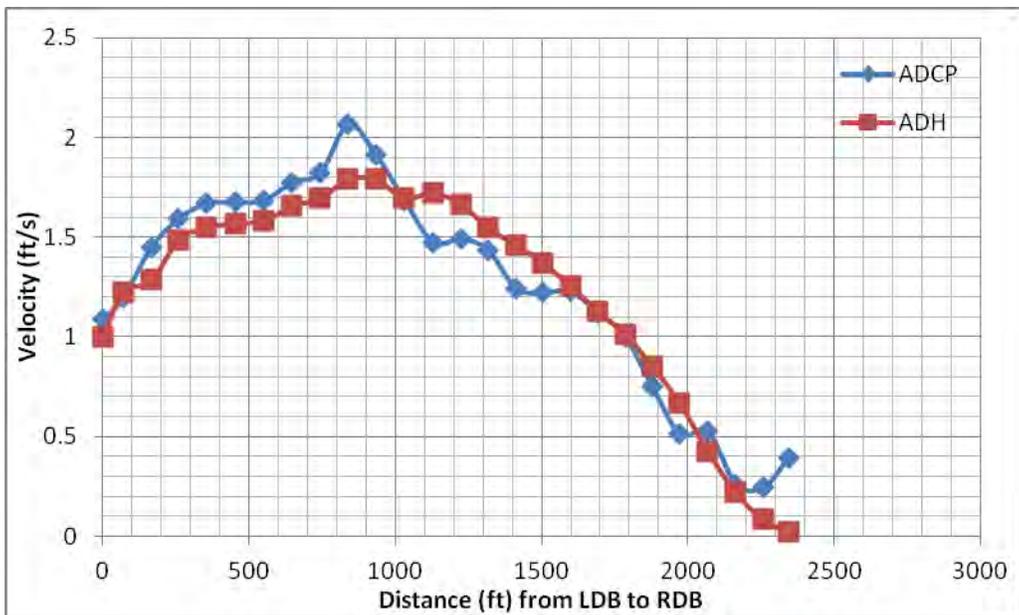


Figure 20 Velocity comparison between ADCP measured and ADH simulated on Transect 07APR017



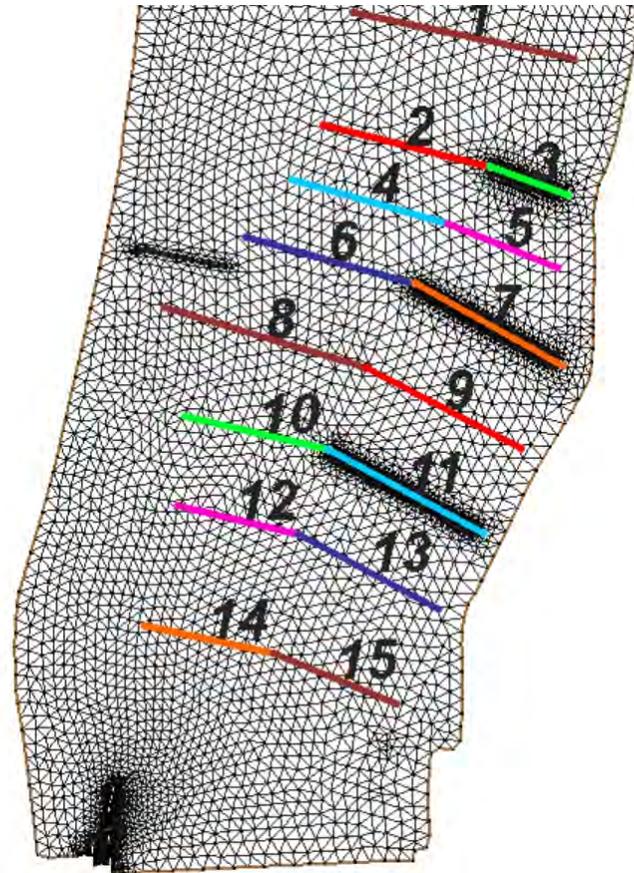
**APPENDIX C**  
**HEC-RAS vs. ADH**



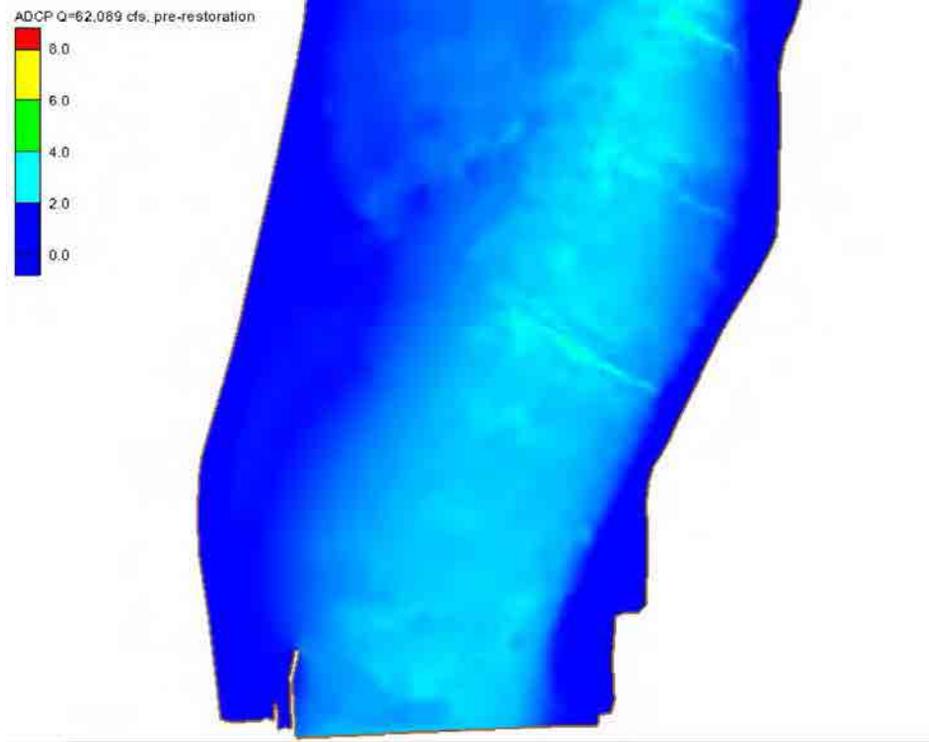
### HEC-RAS 2D vs. ADH Velocity Results

Average Velocity along Arc (estimated from contour plots)

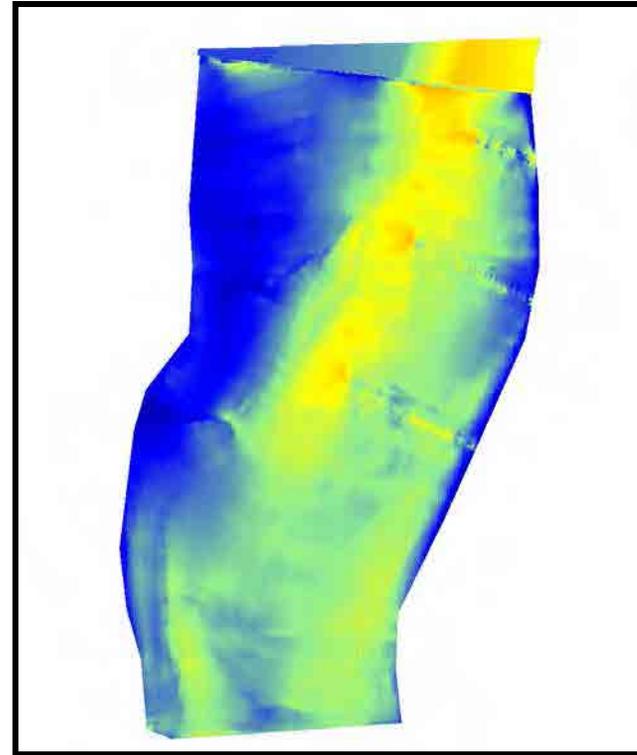
Arc	Pre-restored Condition				Wing-dams Restored to 473 feet Condition			
	RAS 2D	ADH	RAS 2D	ADH	RAS 2D	ADH	RAS 2D	ADH
	ADCP (62,000 cfs)	ADCP (62,000 cfs)	2-yr flow (202,000 cfs)	2-yr flow (202,000 cfs)	2-yr flow (202,000 cfs)	2-yr flow (202,000 cfs)	100-yr flow (358,000 cfs)	100-yr flow (358,000 cfs)
2	1.5	1.4	3.8	3.7	4.5	4.0	5.2	4.8
4	1.3	1.2	3.7	3.4	3.6	4.0	4.8	4.5
6	1.2	1.2	3.2	3.3	3.3	4.3	4.5	4.8
8	0.9	0.9	3.0	2.7	2.8	3.9	4.4	4.7
10	1.2	1.0	3.6	3.0	4.4	4.5	5.4	5.2
12	1.3	1.1	3.7	3.0	3.8	4.4	5.2	5.0
14	1.2	1.3	3.2	3.6	3.2	4.9	4.6	5.3



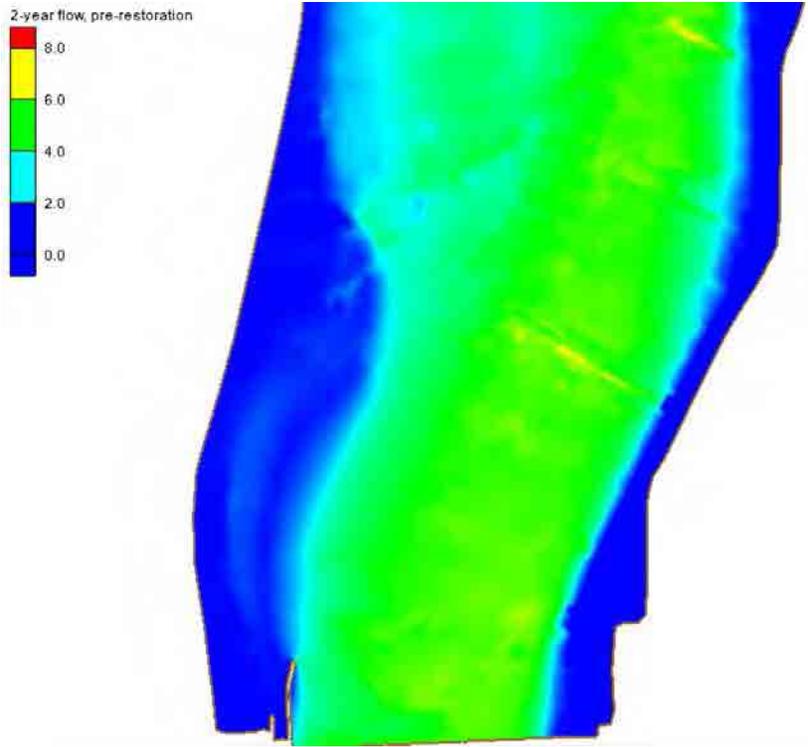
Location of the arcs



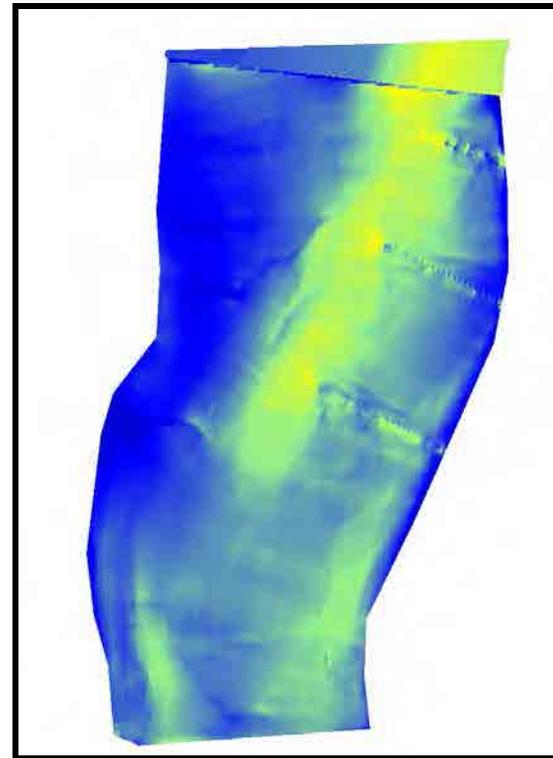
ADH – ADCP flow for Pre-restoration



HEC-RAS – ADCP flow for Pre-restoration

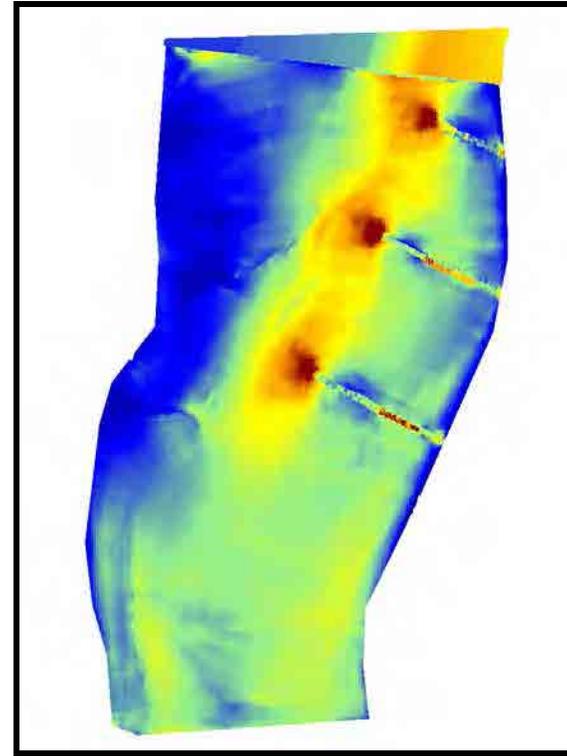
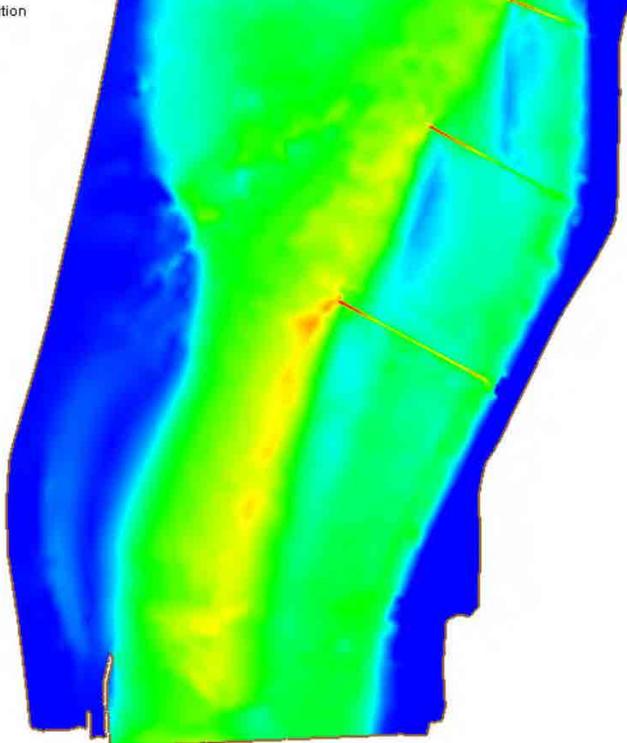
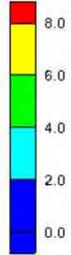


ADH – 2-year flow for Pre-restoration



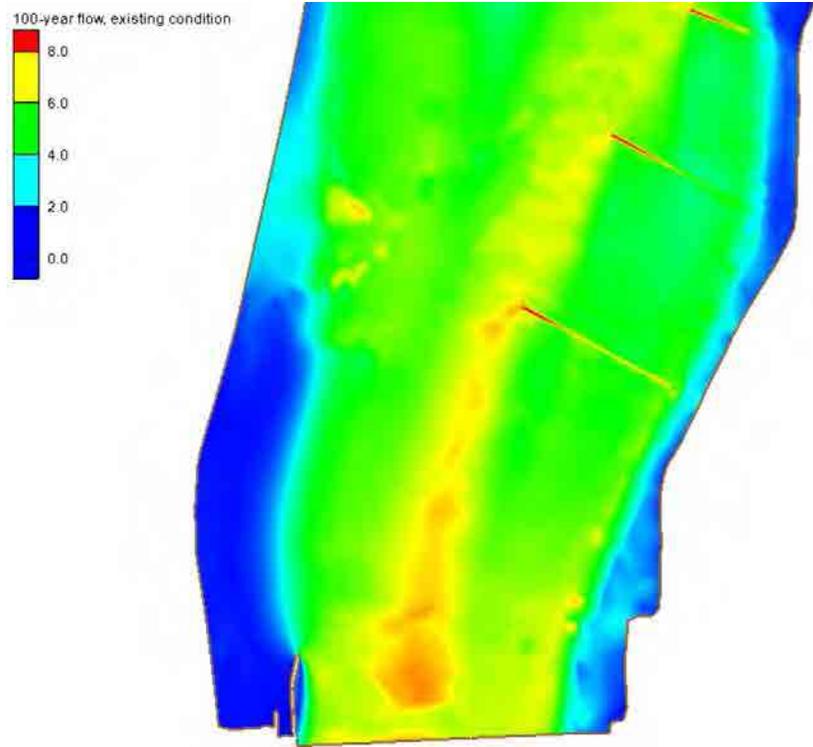
HEC-RAS – 2-year flow for Pre-restoration

2-year flow, existing condition

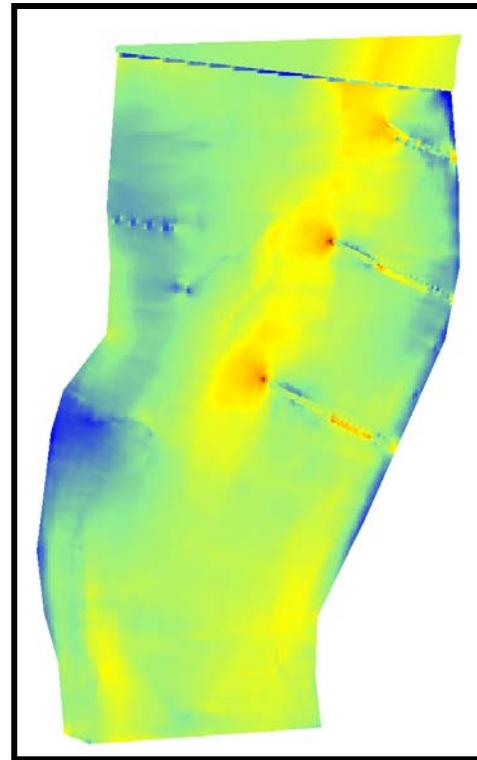


ADH – 2-year flow for Existing

HEC-RAS – 2-year flow for Existing



ADH – 100-year flow for Existing



HEC-RAS – 100-year flow for Existing

**DREDGED MATERIAL  
MANAGEMENT PLAN**

**UPPER MISSISSIPPI RIVER  
POOL 20  
RIVER MILES 343.2-344.3**

**LOCK 20 UPPER DREDGE CUT**

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**PUBLIC REVIEW DRAFT**

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**APPENDIX C  
HAZARDOUS, TOXIC AND RADIOACTIVE WASTE  
ASSESSMENT**



**HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE  
PHASE I ESA DOCUMENTATION REPORT**

**POOL 20 DREDGED MATERIAL PLACEMENT SITES  
MISSISSIPPI RIVER  
RIVER MILES 343.4 TO 344.7  
LEWIS COUNTY, MISSOURI  
ADAMS COUNTY, ILLINOIS**

**MARCH 2015**

**Prepared By:**

**Steve Gustafson, PG  
USACE  
CEMVR-EC-DN  
Rock Island District**



## **Executive Summary**

**1. Background.** This report documents the Phase I Hazardous, Toxic, and Radioactive Waste (HTRW) Environmental Site Assessment (ESA) for the proposed disposal of United States Government (Government) land located in Polk County, Iowa (Study Area), in accordance with Engineering Regulation (ER) 1165-2-132, HTRW Guidance for Civil Works Projects, and ER 405-1-12, Real Estate Handbook. The Phase I ESA was performed in conformance with the scope and limitations of the American Society for Testing and Materials Standard (ASTM) E 1527-13.

The Study Area is comprised of three potential dredged material placement sites located immediately upstream of Lock and Dam 20, near Canton, Missouri.

This Phase I ESA is being conducted to determine if there is any risk of HTRW concerns with the Study Area, prior to real estate acquisition activities by the Government.

**2. Conclusions.** This report has revealed no evidence of a Recognized Environmental Condition (REC) that could potentially affect the Study Area. The assessment was performed in conformance with scope and limitations of the ASTM Standard E 1527-13.

**3. Recommendations.** No additional assessment or further investigation is recommended.

**4. Limitations.** No ESA can wholly eliminate uncertainty regarding the existence for recognized environmental conditions concerning a property. This assessment is intended to reduce, but not eliminate, uncertainty regarding the existence of recognized environmental conditions in connection with a property with reasonable limits of time and cost. Continuing the Environmental Due Diligence Audit process beyond this Phase I ESA to a Phase II ESA may reduce uncertainty, or reveal unidentified environmental liabilities. If any previously unaddressed recognized environmental condition should arise, this Phase I ESA will be revisited.

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**3. Study Area Description ..... 3**  
**4. User Provided Information ..... 4**  
**5. Records Review ..... 4**  
**6. Site Reconnaissance ..... 6**  
**7. Interviews..... 7**  
**8. Evaluations ..... 8**  
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**10. Signatures and Qualifications..... 10**

**Appendices**

- Appendix A: Acronyms Used**
- Appendix B: Site Map**
- Appendix C: Environmental Database Searches**
- Appendix D: Topographic Maps**
- Appendix E: Aerial Photos**
- Appendix F: Site Photographs**
- Appendix G: Questionnaire Forms**

## **1.0 General**

**1.1. Guidance and Policy.** The United States Army Corps of Engineers (USACE) Engineering Regulation (ER) providing guidance for the conduct of Civil Works Planning Studies is contained in ER 1105-2-100. The policies and authorities outlined in ER 1165-2-132, Hazardous, Toxic, and Radioactive Waste (HTRW) Guidance for Civil Works Projects, and ER 405-1-12, Real Estate Handbook, were developed to facilitate the early identification and appropriate consideration of HTRW issues in all of the various phases of a water resources study or project. American Society for Testing and Materials (ASTM) Standard E1527-13 provides a comprehensive guide for conducting Phase I Environmental Site Assessments (ESA). These references provide information on what considerations are to be factored into project planning and implementation. The policy of the U.S. Army Corps of Engineers is to avoid construction of Civil Works projects when HTRW is located within project boundaries or may affect or be affected by such projects.

## **2.0 Introduction**

**2.1. Purpose and Scope.** This HTRW inquiry is required in order to minimize and prevent Federal liability under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and to reduce any threats to project workers and avoid costly delays associated with environmental abatement activities. Appendix A contains a list of acronyms used in this report.

Phase I ESA's use only practically reviewable information. This investigation and assessment of the property is guided by the level appropriate for the type of property, information developed in the course of the assessment, project requirements, regulatory agency requirements, and potential risks. The screening methods used to prepare the Phase I ESA have been selected based on the location, physical setting, surrounding land uses, and particular nature of the Study Area. Intrusive field sampling and lab analyses are not used for the Phase I ESA, but are reserved for the Phase II ESA when required.

**2.2. Limiting Conditions and Methodologies Used.** The techniques used to assess HTRW contamination within and adjacent to the Study Area consisted of review of aerial photographs and topographic maps, conducting interviews and site visits. Also, a search of federal and state environmental databases was conducted. The scope of inquiry was limited to investigating onsite HTRW potential within the project boundaries as well as offsite HTRW potential within a reasonable distance (according to ASTM standards) from the Study Area. This Phase I ESA was completed by the Corps Environmental Engineering Section (CEMVR-EC-DN).

## **3.0 Study Area Description**

The Study Area consists of three potential dredged materials placements sites near Lock and Dam 20, Lewis County, Missouri and Adams County, Illinois. One placement site, named 343.4R, is located on privately owned land north of Canton, Missouri. The other two placement sites, named 344.7I and 344.1WDL, are located within the normal pool boundaries of Pool 20 of

the Mississippi River, and therefore are continuously submerged. Site 344.7I is located immediately south and east of White Island within the Mississippi River, Township 2 North, Range 10 West, Section 12 in Adams County, Illinois. Site 344.1WDL is located along the left descending bank of the Mississippi River, north of Meyer, Adams County Illinois, in Township 2 North, Range 10 East, Section 24.

The 343.4R placement site is an active row crop agricultural field, bounded to the east by a railroad and sand levee and the Mississippi River, to the south by woodlands and the City of Canton, to the west by Business Highway 61 and row crop agricultural fields, and to the north by woodlands and row crop agricultural fields. 343.4R is located within a portion of Section 25, in Township 62 North, Range 6 West in Lewis County, Missouri.

See Appendix B, Site Vicinity Map, for the Study Area location.

#### **4.0. User Provided Information**

**4.1 Environmental Liens.** Ron Silver (CEMVR-RE), did not indicate any knowledge of environmental liens associated with the Study Area.

**4.2 Activity and Use Limitations.** Ron Silver (CEMVR-RE), did not indicate any knowledge of Activity and Use limitations associated with the Study Area.

**4.3 Specialized Knowledge.** Ron Silver (CEMVR-RE), did not indicate any specialized knowledge indicative of potential or actual recognized environmental conditions (REC's), controlled recognized environmental conditions (CREC's) or historic REC's (HREC's).

**4.4 Commonly Known or Reasonably Ascertainable Information.** Ron Silver (CEMVR-RE). did not provide any commonly known or reasonable ascertainable information that would be indicative of potential or actual REC's, CREC's, or HREC's.

**4.5 Valuation Reduction for Environmental Issues.** Ron Silver (CEMVR-RE) indicated there is no information that indicates any valuation reduction on the Study Area.

**4.6 Obvious Indicators of Contamination at the Site.** Ron Silver (CEMVR-RE) did not provide any information that would be indicative of contamination at the Study Area.

#### **5.0. Records Review**

The purpose of a records review is to obtain and review records that will help identify recognized environmental conditions concerning the property. Some of the records reviewed pertain not just to the property, but also to properties within an approximate minimum search distance, in order to help assess the likelihood of problems from migrating hazardous substance or petroleum products. Factors considered in determining the approximate minimum search distance include the density of the setting, the distance that the hazardous substances or petroleum products are likely to migrate based on local geologic or hydrogeologic conditions, and other reasonable

factors. This records review included the site assessment report from various state and federal environmental databases, maps, and air photos. Appendix C contains a printout of results of the database search.

**5.1 EnviroMapper.** EnviroMapper, created by the Environmental Protection Agency (EPA), is a database warehouse implemented in the Oracle Relational Database Management System and is available through the Internet for public access. It has the ability to retrieve information from several environmental databases, such as TRI (Toxic Release Inventory), Hazardous Waste (RCRAinfo), Brownfields (ACRES), Air Emissions (AIRS/AFS) and Water Discharges (PCA).

An EnviroMapper database query was conducted on 27 January 2015. No areas of concern were identified within a 1/2 mile radius. Appendix C contains a printout of results of the database search.

**5.2 Cleanups in My Community.** Cleanups in My Community, created by the EPA, is a database warehouse implemented in the Oracle Relational Database Management System and is available through the Internet for public access. It is a mapping and listing tool that shows sites where pollution is being or has been cleaned up throughout the United States. It maps, lists and provides cleanup progress profiles for sites, facilities and properties that have been contaminated by hazardous materials and are being, or have been, cleaned up under EPA's Superfund, RCRA and/or Brownfields cleanup programs and Federal facilities that have been contaminated by hazardous materials and are being, or have been, cleaned up under EPA's Superfund and/or RCRA cleanup programs.

A 'Cleanups in My Community' database query was conducted on 27 January 2015. No areas of concern or cleanups were identified within a 1 mile radius of the Study Area. Appendix C contains a printout of results of the database search.

**5.3 Missouri Department of Natural Resources Hazardous Substance Locator.** The Missouri Department of Natural Resources Hazardous Waste program provides oversight on the investigation and remediation of hazardous substance sites in Missouri. The locator map allows users to conduct web-based searches for hazardous substance investigations and cleanups. The locator map database contains Superfund, Federal Facilities, RCRA Corrective Action, and Brownfields/Voluntary Cleanup Programs sites.

A web-based query conducted 27 January 2016 indicated no hazardous substance sites within 1 mile of the Study Area. Appendix C summarizes the details and results of the database search.

**5.6 Physical Setting Sources.** The 1903 Kahoka Quadrangle 1:125000 topographic map and the 1951 and 2015 Canton Quadrangle 7.5 minute series topographical maps were used for records review. Surface elevation for the Study Area is approximately 480 feet above mean sea level (North American Datum 1983) with higher elevations westward. The 343.4R placement area is part of the floodplain of the Mississippi River, and therefore has a fairly level topographically. The 344.7I and 344.1WDL placement areas are located within the normal pool boundaries of the Mississippi River and are therefore continuously submerged. Floodplains are

located to the east and west of the placement areas, with uplands surrounding. See Appendix D for topographic maps of the Study Area. There were no indications of additional REC's in the topographic maps.

**5.7 Historical Use Information.** Based on aerial photos (1930's through present day), topographic maps (1903, 1951 and 2015) and interviews, the 343.4R placement area has been utilized for agricultural purposes, particularly row crop production. A the town of Tully was located along the 343.4R placement areas southern boundary in the 1800's, but was destroyed by flooding in the late 1800's, and never redeveloped. The City of Canton ended up overtaking portions of the former location of Tully. Placement areas 344.7I and 344.1WDL are within normal Mississippi River pool boundaries and have been continuously submerged. Lock and Dam 20 was developed in the late 1930's to the southeast of placement site 343.4R.

See Appendix D for topographic maps. See Appendix E for aerial photos. Obvious indications of REC's were not observed in the aerial photographs or topographic maps.

No Sanborn Fire Insurance Maps were found for the Study Area and immediate surrounding properties.

The presence of a former town (Tully) is considered a potential REC.

## **6.0 Site Reconnaissance**

**6.1 Methodology and Limiting Conditions.** A site visit to placement site 343.4R was conducted by USACE representative Steve Gustafson (EC-DN) on Friday, 13 March, 2015. A reconnaissance was performed with visual inspection of surrounding properties.

**6.2 General Site Setting.** Leveed agricultural land on the right descending bank of the Mississippi River. Bare row crop agricultural land, numerous areas of standing water in the center of the southern farm field. Woodlands to the south and north. Row crop agricultural land to the north and west. Railroad tracks and sand levee to the east. Surface consisted of bare soil, brown to black, with crop residue and some weeds. Old highway located to the east. Field access comes from old highway.

**6.3 Interior Observations.** No structures in placement area 343.4R.

**6.4 Exterior Observations.** The following is a list of exterior items or features that were looked for during the site visit:

*Landfills, emergency generators, evidences of above ground or underground storage tanks/equipment, drums, barrels, sumps, cisterns, catch basins, dry wells, septic tanks and/or leach fields, pipeline markers, transformers, capacitors, generators, stressed vegetation, stained soil, stained pavement, leachate or waste seeps, trash, debris or waste materials, dumping or disposal areas, construction/demolition debris, fill dirt, surface*

*water discoloration, odor sheen or free floating product, exterior pipe discharges and /or effluent discharges, discharged from roof drains, quarries or pits, wells, hazardous materials and petroleum products.*

All accessible areas of the placement area 343.4R were observed during the site visit.

See Appendix F for site visit photos. The following observations were made:

- No indications of spills or staining were observed on the surface.
- No indications of hazardous materials storage areas.

No REC's were identified during site reconnaissance activities.

## **7.0 Interviews**

Interviews were completed by Kim Ferguson (member of CEMVR-EC-DN) in order to complete the Phase I assessment.

- Date: 2/4/15  
Name: Ron Silver, US Army Corps of Engineers, Real Estate Division, Rock Island, Illinois (knowledgeable member of user).  
Topic: Discussed knowledge of Study Area site history, environmental issues, spills, cleanups, environmental liens and AUL's. No REC's identified. Mr. Silver did identify that the southeast corner of the 343.4R placement site was former location of the town of Tully, MO.
- Date: 2/3/15  
Name: David Keith, Lewis County Emergency Management Director, Lewis County , MO (government official).  
Topic: Discussed knowledge of environmental issues, spills, and cleanups in and around the Study Area. No REC's identified.
- Date: 2/3/15  
Name: Cindy Kell, City Clerk, City of Canton, MO (government official).  
Topic: Discussed knowledge of Study Area history, environmental issues, spills, cleanups in the Study Area. No knowledge of spills, cleanups or environmental issues.
- Date: 3/13/15  
Name: Ron Levingood, Canton, MO (343.4R landowner).  
Topic: Discussed knowledge of 343.4R placement area history, environmental issues, spills, cleanups, environmental liens and activity and use limitations (AUL's). No knowledge of spills, environmental issues, liens or AUL's. Confirmed presence of former town of Tully in southeast corner of 343.4R placement area.

See Appendix G for interview questionnaire forms.

## **8.0 Evaluation**

### **8.1 Documentation**

No documentation was excluded from the Phase I ESA.

### **8.2 Findings**

This assessment did not identify any CREC's, HREC's or REC's in the Study Area or in the vicinity of the Study Area. One potential REC is the location of the former town of Tully near in the southern border of placement site 343.4R.

### **8.3 Opinion**

No CREC's, HREC's or REC's are present in the Study Area. While the former town of Tully existed near and in the southern border of placement site 343.4R, the town was destroyed by flooding in the late 1800's. Due to the large amount of time that has passed since town occupation, and the fact that associated REC's such as underground storage tanks or hazardous materials are highly unlikely to have been stored in an 1800's residential area, any environmental concerns with the presence of the town are not warranted.

### **8.4 Additional Investigation**

No additional investigation is warranted.

### **8.5 Data Gaps**

No historical documentation in such forms as topographic maps, aerial photos or agricultural surveys from the 1960's, 1970's or 1980's could be found during the Records Review. Given the continued submerged condition of 344.7I and 344.1WDL, and the consistent use of 343.4R as an agricultural field through the data gap time period, there is little risk in not having the missing data.

### **8.6 Conclusion**

CEMVR-EC-DN has performed a Phase I Environmental Site Assessment in conformance with the scope and limitations of ASTM Practice E 1527-13 for the Study Area [proposed DMMP sites 343.4R, 344.7I, 344.1WDL, Mississippi River, Lewis County, MO and Adams County, IL]. Any exceptions to, or deletions from, this practice are described in Section 9 of this report. This

assessment has revealed no evidence of recognized environmental conditions in connection with the Study Area.

### **8.7 Additional Services**

No additional services beyond the scope of the ASTM E1527-13 standard were provided during the preparation of this Phase I ESA.

### **8.8 Deviations and Limitations**

No material deviations from the standard were made. No limitations to execution of the Phase I were encountered.

No ESA can wholly eliminate uncertainty regarding the existence for recognized environmental conditions concerning a property. This assessment is intended to reduce, but not eliminate, uncertainty regarding the existence of recognized environmental conditions in connection with a property with reasonable limits of time and cost. Continuing the Environmental Due Diligence Audit process beyond this Phase I ESA to a Phase II ESA may reduce uncertainty, or reveal unidentified environmental liabilities. If any previously unaddressed recognized environmental condition should arise, this Phase I ESA will be revisited. The findings of this report are valid as of the date of the report.

### **9.0 References**

U. S. Army Corps of Engineers, Lower Mississippi Valley Division, ER 1165-2-9, Hazardous, Toxic, and Radioactive Waste Policy for Civil Works Projects, 14 June 1996.

U. S. Army Corps of Engineers, Rock Island District, ER 1165-2-132, Hazardous, Toxic, and Radioactive Waste Guidance for Civil Works Projects, 26 June 1992.

U. S. Army Corps of Engineers, Policy Guidance Letter ER 1105-2-100 No. 34, CECW-PA, Non-CERCLA Regulated Contaminated Materials at Civil Works Projects, 5 May 1992.

U. S. Army Corps of Engineers, ER 385-1-92, Safety and Occupational Health Document Requirements for Hazardous, Toxic, and Radioactive Waste (HTRW) and Ordnance and Explosive Waste (OEW) Activities, 18 March 1994.

U. S. Army Corps of Engineers, ER 405-1-12, Real Estate Handbook, Chapter 8.

U. S. Army Corps of Engineers, ER 500-1-1, Natural Disaster Procedures.

ASTM E 1527-13, Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process.

**10.0 Signatures and Qualifications**

We declare that to the best of our professional knowledge and belief, we meet the definition of Environmental Professional as defined in 312.10 of 40 CFR 312 and we have the specific qualifications based on education, training, and experience to assess a property of the nature, history and setting of the subject property. We have developed and performed the all appropriate inquires in conformance with the standards and practices set forth in 40 CFR Part 312.

CEMVR-EC-DN representative Steve Gustafson, P.G., was responsible for the preparation of this Phase I Environmental Site Assessment.

Prepared by \_\_\_\_\_

Date \_\_\_\_\_

CEMVR-EC-DN representative Julie Millhollin, P.E., conducted review activities for this Phase I Environmental Site Assessment.

Reviewed by \_\_\_\_\_

Date \_\_\_\_\_

## **APPENDIX A**

### **Acronyms**



**APPENDIX A**  
**ACRONYMS**

ACRES	Assessment, Cleanup and Redevelopment Exchange System
AIRS/AFS	Aerometric Information Retrieval System/AIRS Facility Subsystem
ASTM	American Society for Testing and Materials
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CEMVR	Corps of Engineers, Mississippi Valley Division, Rock Island District
CREC	Controlled Recognized Environmental Condition
DOD	Department of Defense
ED-DN	Engineering Division - Environmental Engineering Section
EM	Engineering Manual
EMCI	EnviroFacts Master Chemical Integrator
EPA	Environmental Protection Agency
ER	Engineering Regulation
ESA	Environmental Site Assessment
GIS	Geographic Information System
HREC	Historical Recognized Environmental Condition
HTRWDR	HTRW Documentation Report
HTRW	Hazardous, Toxic, and Radioactive Waste
I	Island
IDNR	Iowa Department of Natural Resources
L	Left Descending Bank
LUST	Leaking Underground Storage Tanks
NAD	North American Datum
NCOD	National Contaminant Occurrence Database
NPL	National Priorities List
PCS	Permit Compliance System
R	Right Descending Bank
RE	Real Estate
REC	Recognized Environmental Condition
RCRA	Resource Conservation and Recovery Act
RCRIS	Resource Conservation and Recovery Information System
RM	River Mile
SDWIS	Safe Drinking Water Information System
SEIDS	Site Environmental Information Data System
SSHP	Site Specific Safety and Health Plan
TRIS	Toxic Release Inventory System
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USGS	United States Geological Survey
UST	Underground Storage Tank
WDL	Wingdam Left Descending Bank



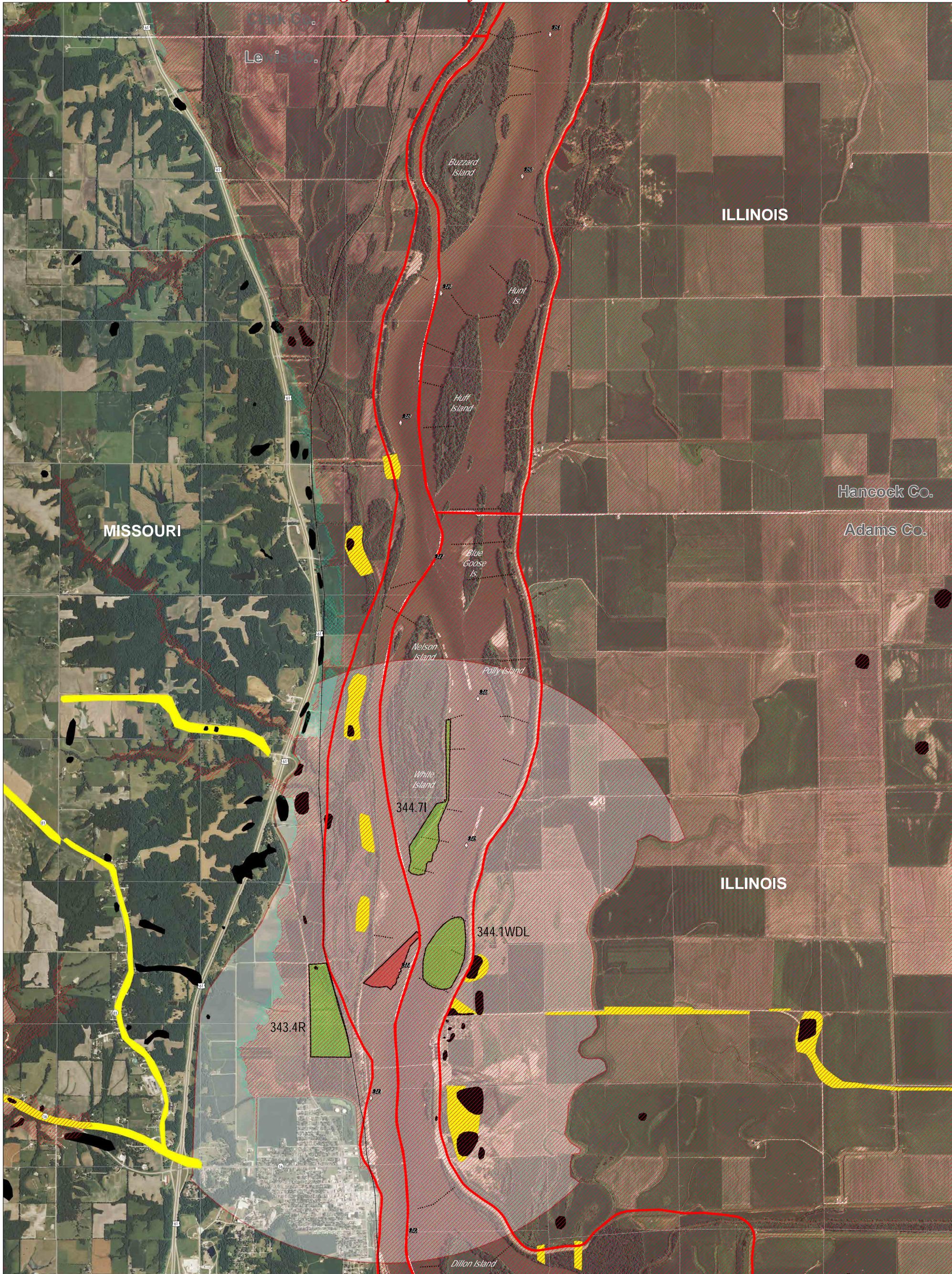
## **APPENDIX B**

### **Site Map**

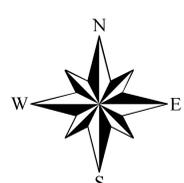


# Lock 20 Upper Maintenance Dredging & Placement of Dredged Material

*For Planning Purposes Only - Not For Public Release*



- Dredging Area
- Placement Sites
- 10,000' Pump Limits
- Cultural Sites
- Floodway
- 1% Annual Chance of Flooding
- 0.2% Annual Chance of Flooding
- River Miles
- Wing Dams
- Railroads
- Section Lines



2012 IL NAIP Imagery  
Map revised January 16, 2015.





## **APPENDIX C**

### **Environmental Database Searches**



Search Place: Canton, MO

Basemap Tools Add Data Search Envirofacts

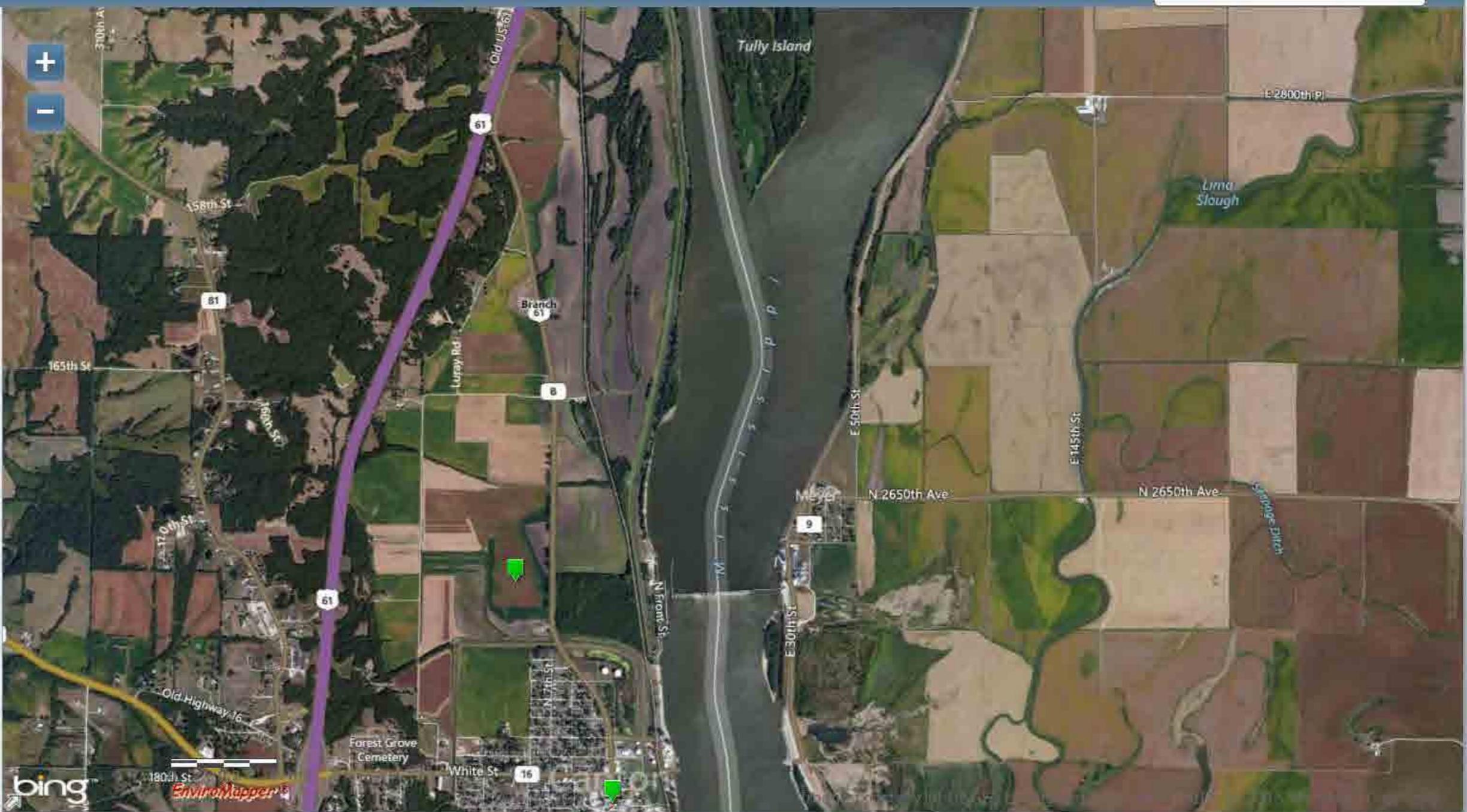
Select EPA program system(s) to map:

- Air Emissions (AIRS/AFS)(2)
- Superfund Sites (CERCLIS)(0)
- Toxic Releases (TRI)(0)
- Hazardous Waste (RCRAInfo)(4)
- Water Dischargers (PCS/ICIS)(6)
- Brownfields (ACRES)(2)
- Biennial Reporting (BR)(0)
- RADInfo(0)
- Toxic Substances Control Act (TSCA)(0)

View:  
 All  20 per page

- Single facility
- Clustered facilities

Download



Search Place: Canton, MO

[Basemap](#) ▾ [Tools](#) ▾ [Add Data](#) ▾ [Search Envirofacts](#) ▾

Clear ✕

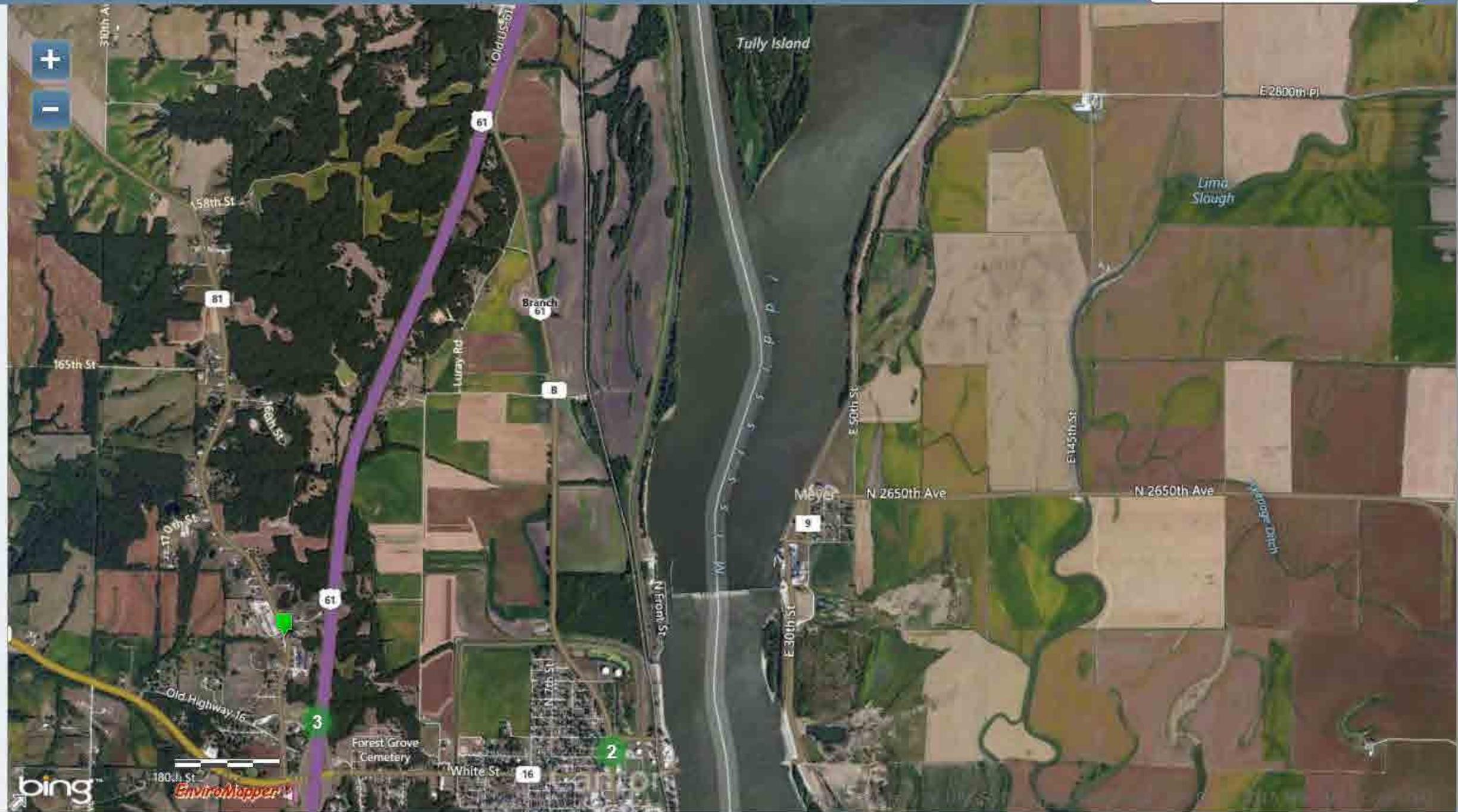
**Select EPA program system(s) to map:**

- Air Emissions (AIRS/AFS)(2)
- Superfund Sites (CERCLIS)(0)
- Toxic Releases (TRI)(0)
- Hazardous Waste (RCRAInfo)(4)
- Water Dischargers (PCS/ICIS)(6)
- Brownfields (ACRES)(2)
- Biennial Reporting (BR)(0)
- RADInfo(0)
- Toxic Substances Control Act (TSCA)(0)

**View:**

All  20 per page

Single facility  
 Clustered facilities



Search Place: Canton, MO

Basemap Tools Add Data Search Envirofacts

Clear: X

Select EPA program system(s) to map:

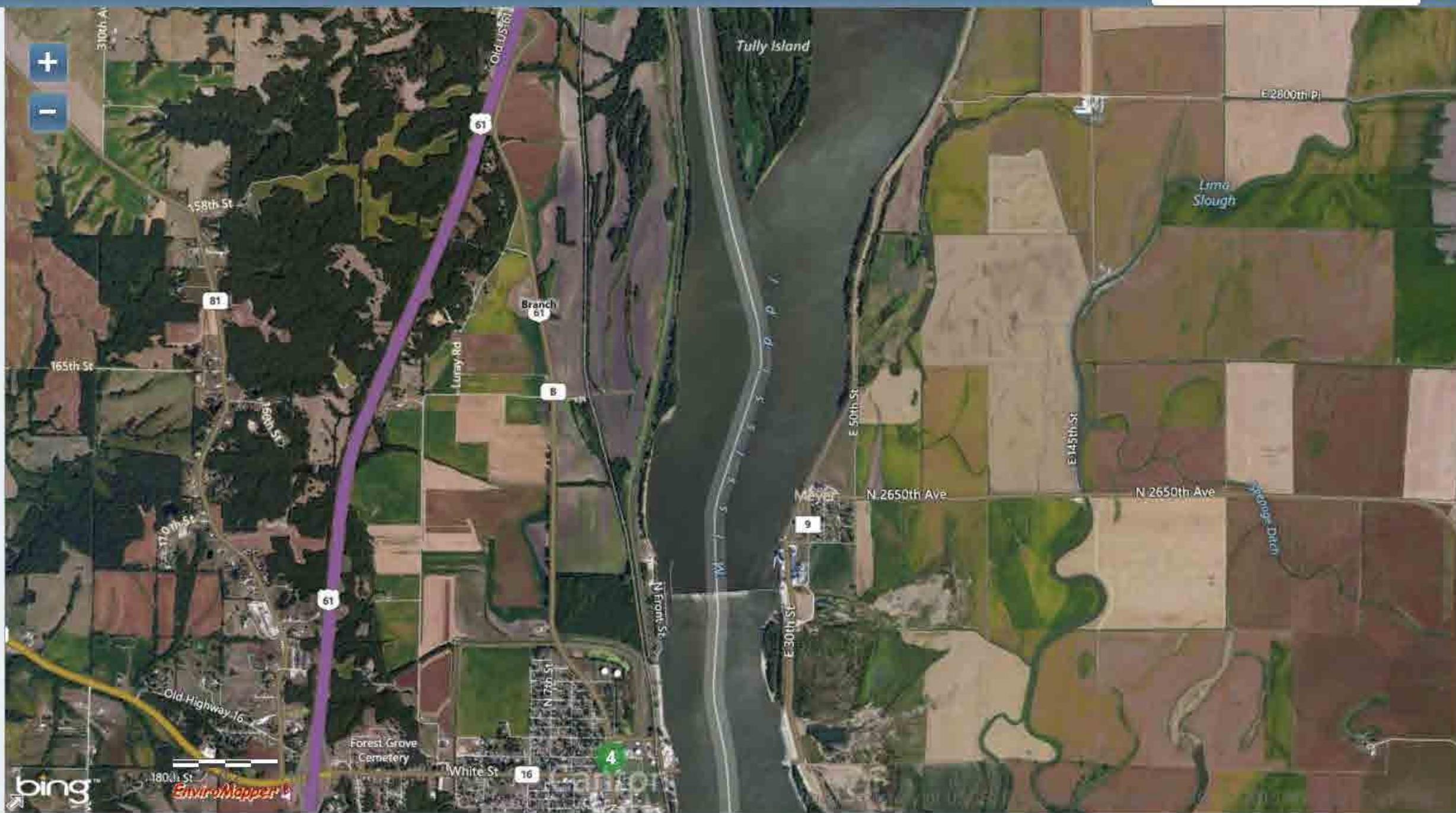
- Air Emissions (AIRS/AFS)(2)
- Superfund Sites (CERCLIS)(0)
- Toxic Releases (TRI)(0)
- Hazardous Waste (RCRAInfo)(4)
- Water Dischargers (PCS/ICIS)(6)
- Brownfields (ACRES)(2)
- Biennial Reporting (BR)(0)
- RADInfo(0)
- Toxic Substances Control Act (TSCA)(0)

View:

All  20 per page

Single facility  
 Clustered facilities

Download



Search Place: Canton, MO

Basemap ▾

Tools ▾

Add Data ▾

Search Envirofacts ▾

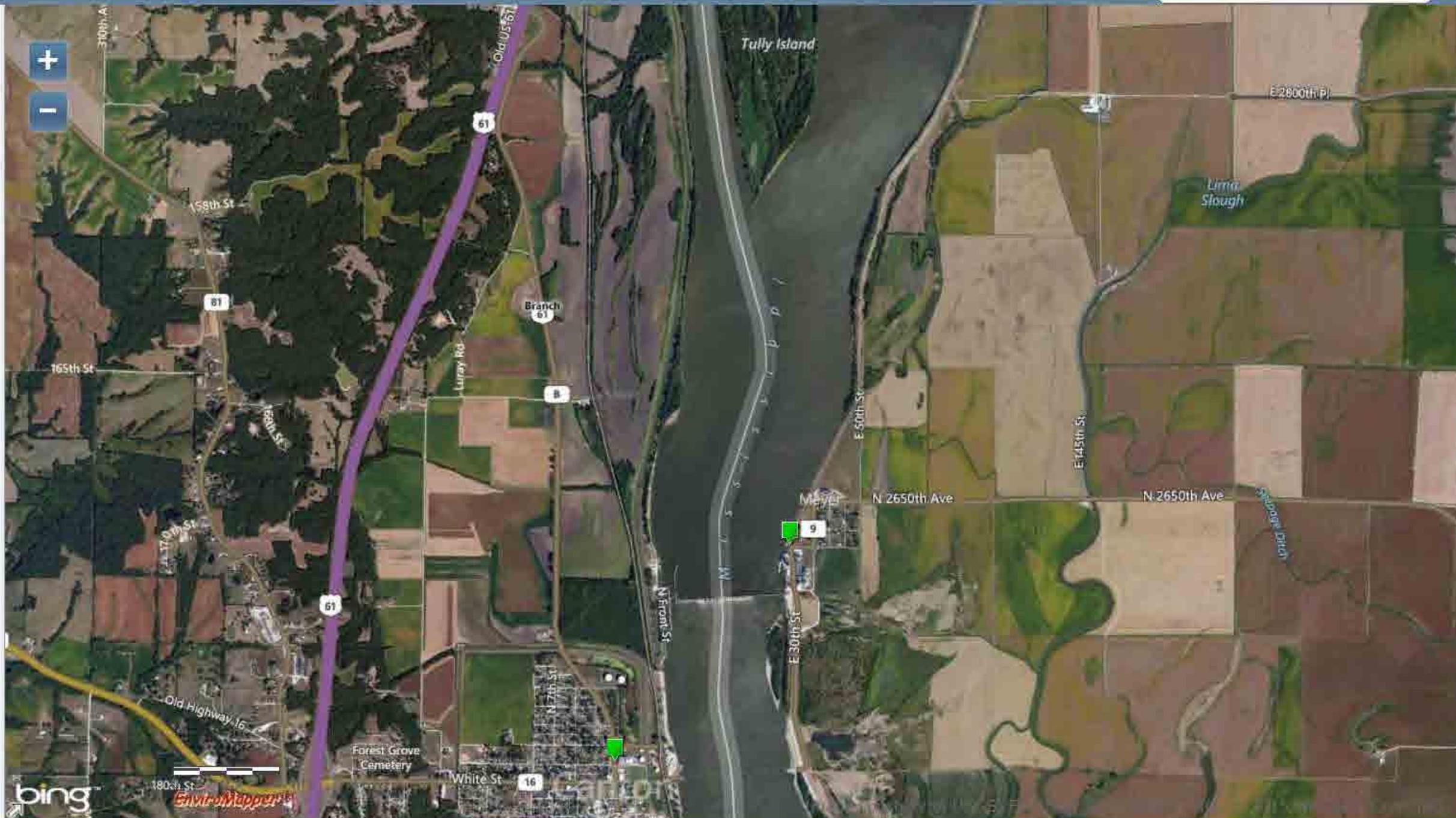


Clear

Select EPA program system(s) to map:

- Air Emissions (AIRS/AFS)(2)
- Superfund Sites (CERCLIS)(0)
- Toxic Releases (TRI)(0)
- Hazardous Waste (RCRAInfo)(4)
- Water Dischargers (PCS/ICIS)(6)
- Brownfields (ACRES)(2)
- Biennial Reporting (BR)(0)
- RADInfo(0)
- Toxic Substances Control Act (TSCA)(0)

View:

 All  20 per page Single facility Clustered facilities Download

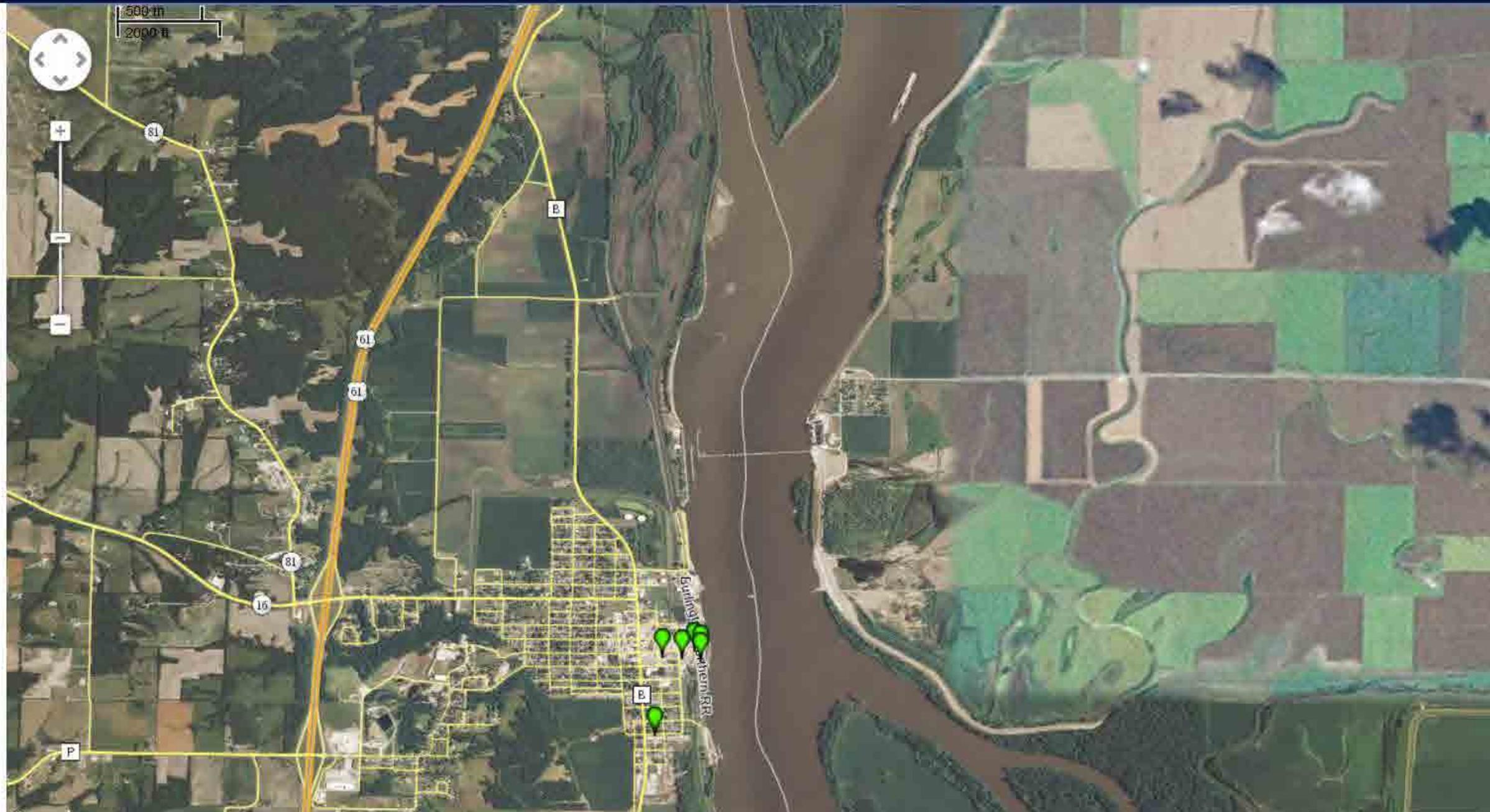
# Missouri Department of Natural Resources

[Application Home](#) [Select County](#) [Select City](#) [Select Zip Code](#) [Zoom to Address](#) [Full Extent](#)

Latitude: 40.13365116119385 Longitude: -91.46466298937992

## LAYERS

- Hazardous Waste Program Cleanup Sites**
  - Active** - Sites undergoing investigation or remediation
  - Long-Term Stewardship** - Sites with activity and use limitations
  - Environmental Notice** - Sites where an environmental advisory may be warranted
  - Completed** - Sites suitable for unrestricted use
- Activity & Use Limitation Area** - Area subject to activity and use limitations
- Site Area** - Approximate area that comprises the site or permitted facility

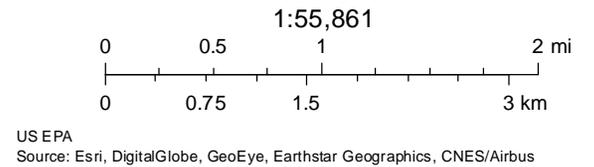


# Cleanups in My Community



January 27, 2015

- |  |   |
|--|---|
|  Search Area                         |  RCRA Hazardous Waste - Corrective Actions |
|  Incidents of National Significance |  Superfund NPL sites                       |
|  Brownfields Properties             |  Responses                                 |

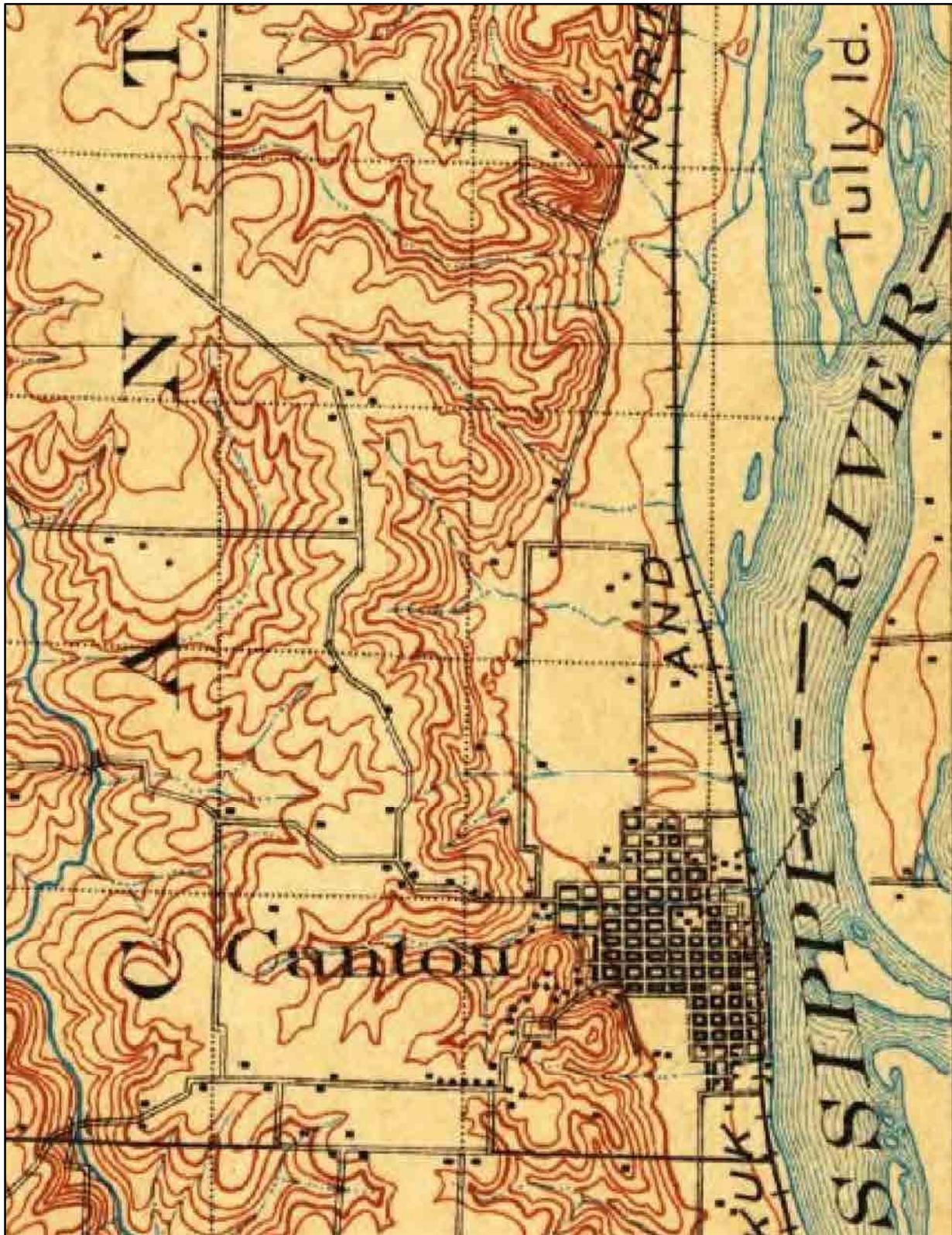


## **APPENDIX D**

### **Topographic Maps**



# Pool 20 Potential DMMP Sites

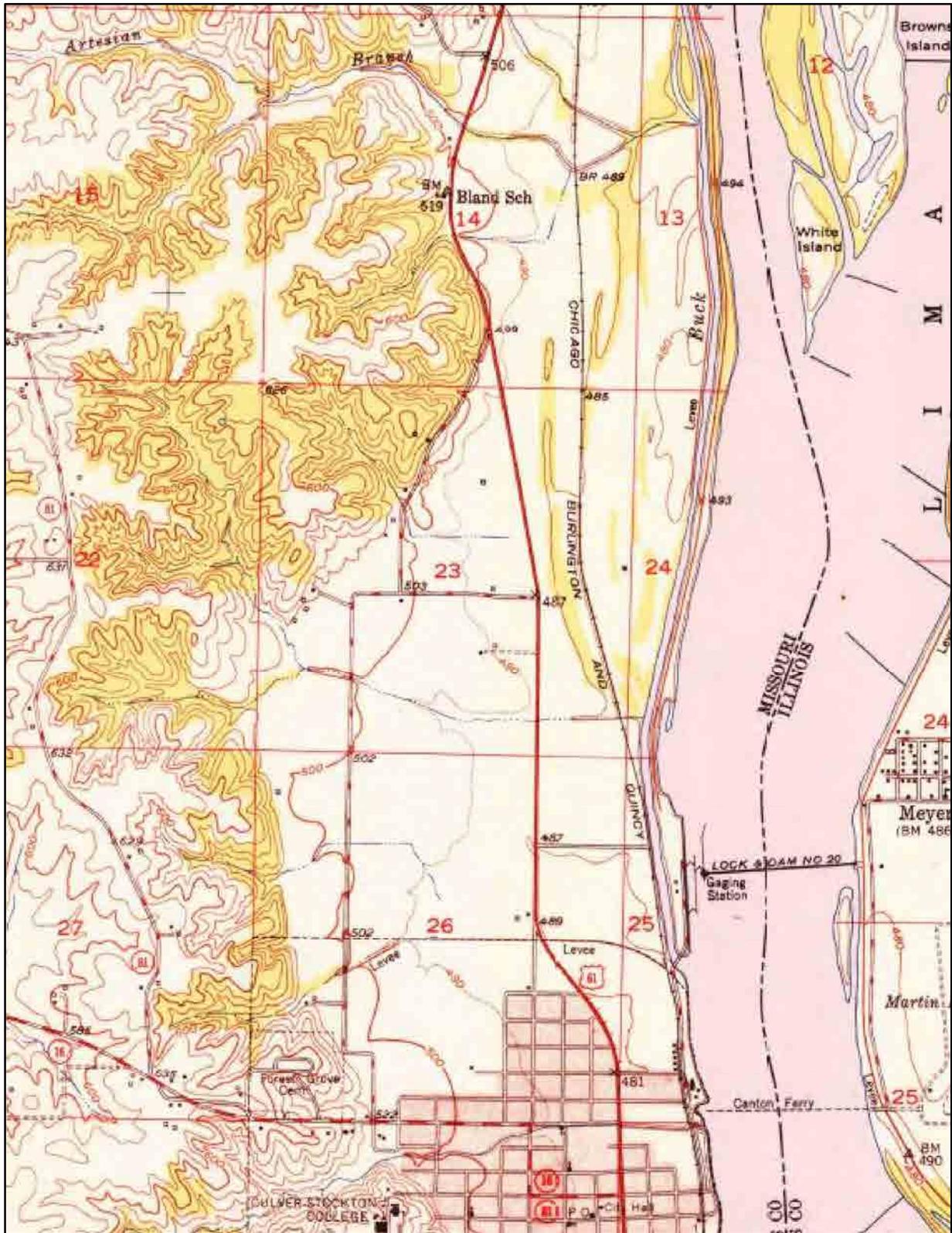


1903 1:125000 Topographic Map  
Kahoak Quadrangle  
Contour Interval 20 Feet

Image Courtesy of US Geological Survey



# Pool 20 Potential DMMP Sites

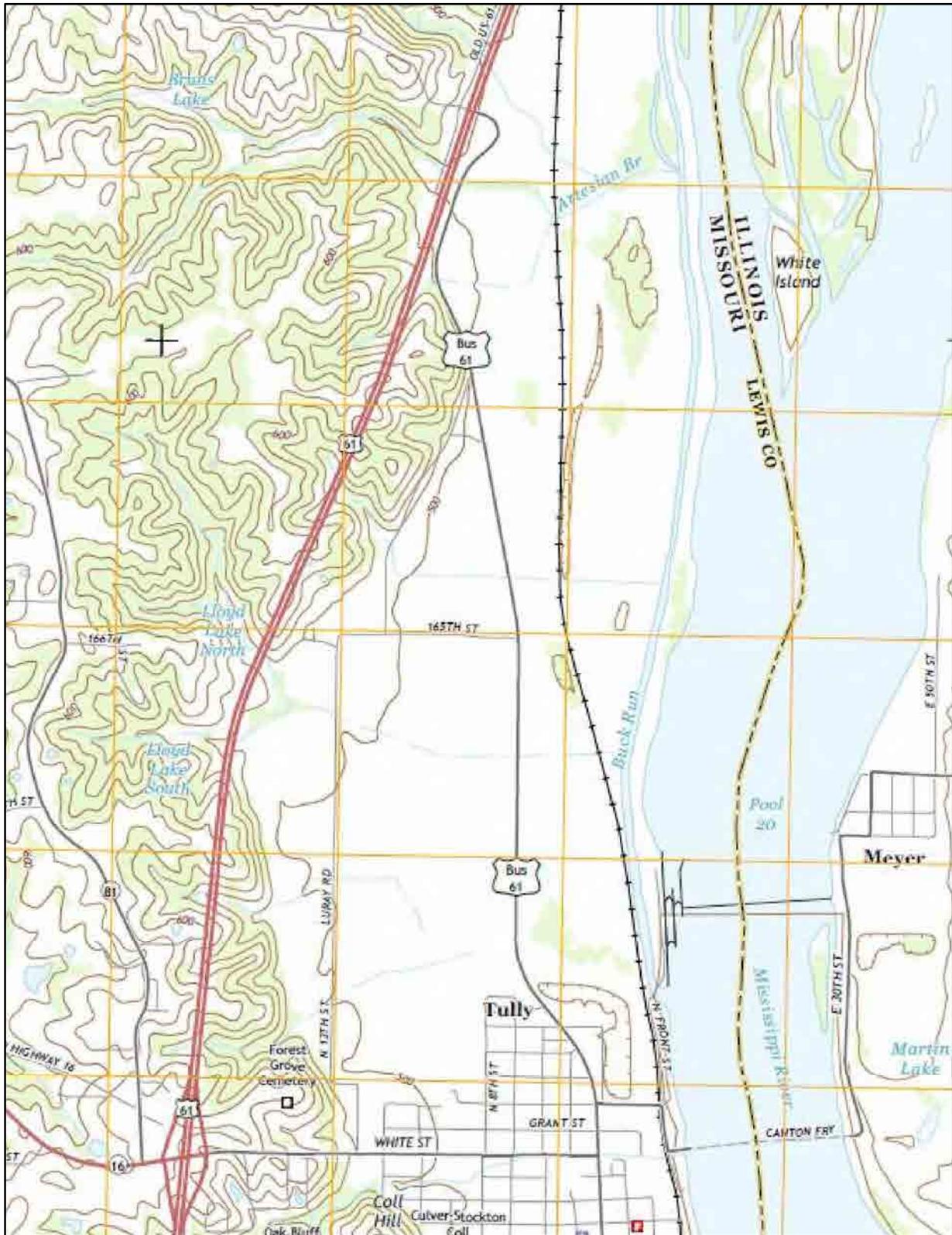


1951 1:24000 Topographic Map  
Canton Quadrangle  
Contour Interval 20 Feet

Image Courtesy of US Geological Survey



# Pool 20 Potential DMMP Sites



2015 1:24000 Topographic Map  
Canton Quadrangle  
Contour Interval 20 Feet

Image Courtesy of US Geological Survey





## **APPENDIX E**

### **Aerial Photos**



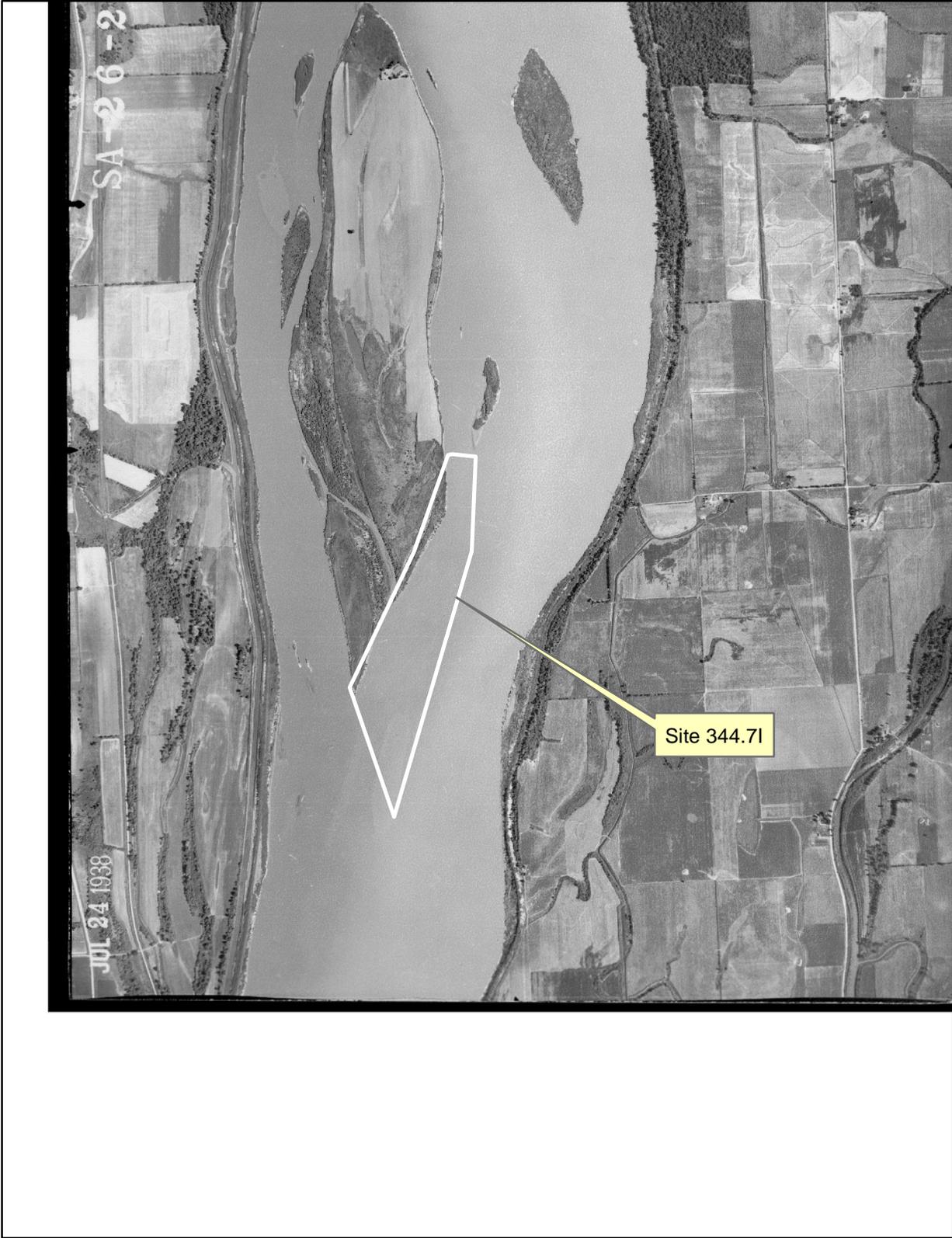
# Pool 20 Potential DMMP Sites 343.4R & 344.1WD



1938 Aerial Photo



# Pool 20 Potential DMMP Site 344.71

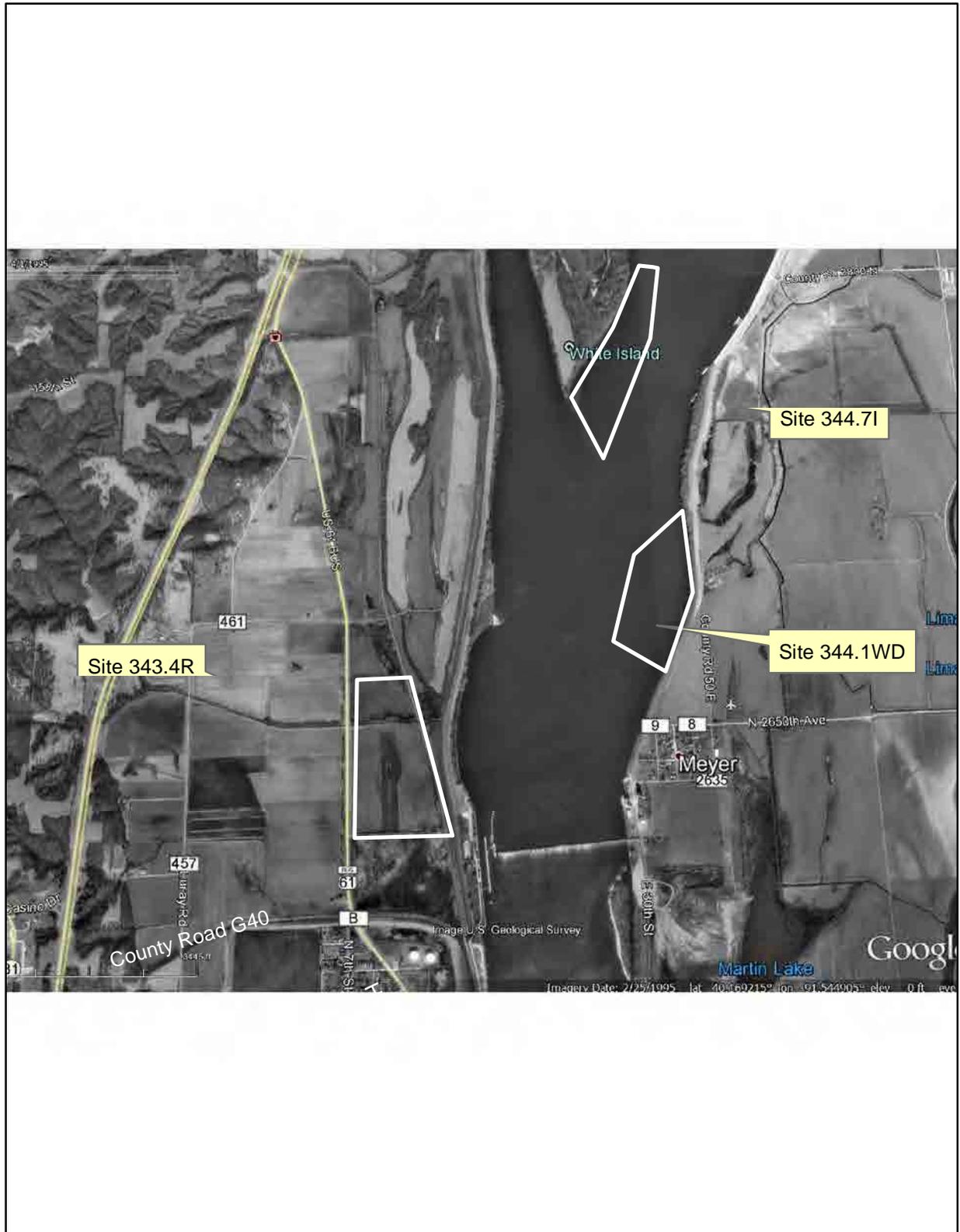


1938 Aerial Photo

Image Courtesy of Illinois Geospatial Data Clearinghouse



# Pool 20 Potential DMMP Sites

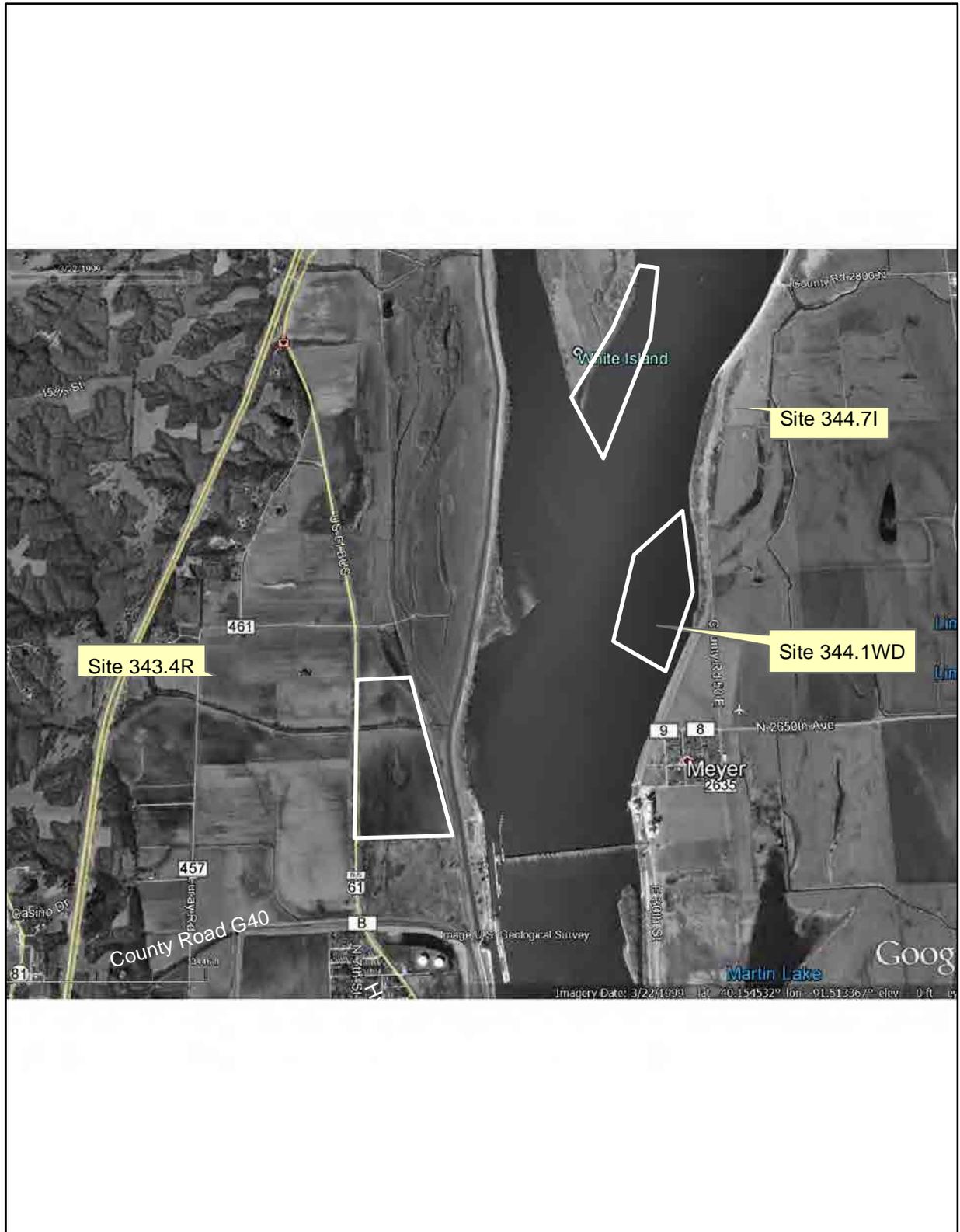


1995 Aerial Photo

Image Courtesy of Google Earth



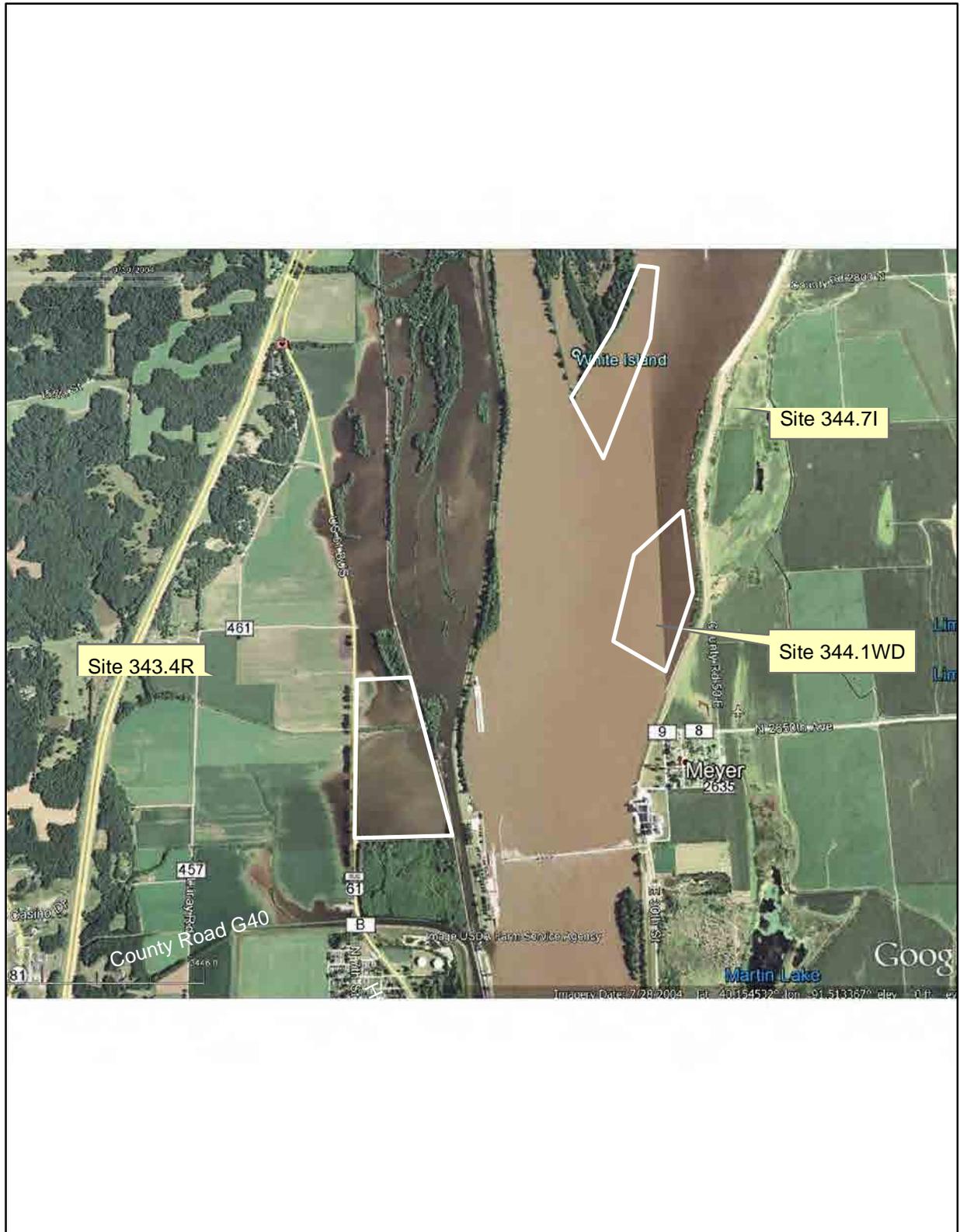
# Pool 20 Potential DMMP Sites



1999 Aerial Photo



# Pool 20 Potential DMMP Sites

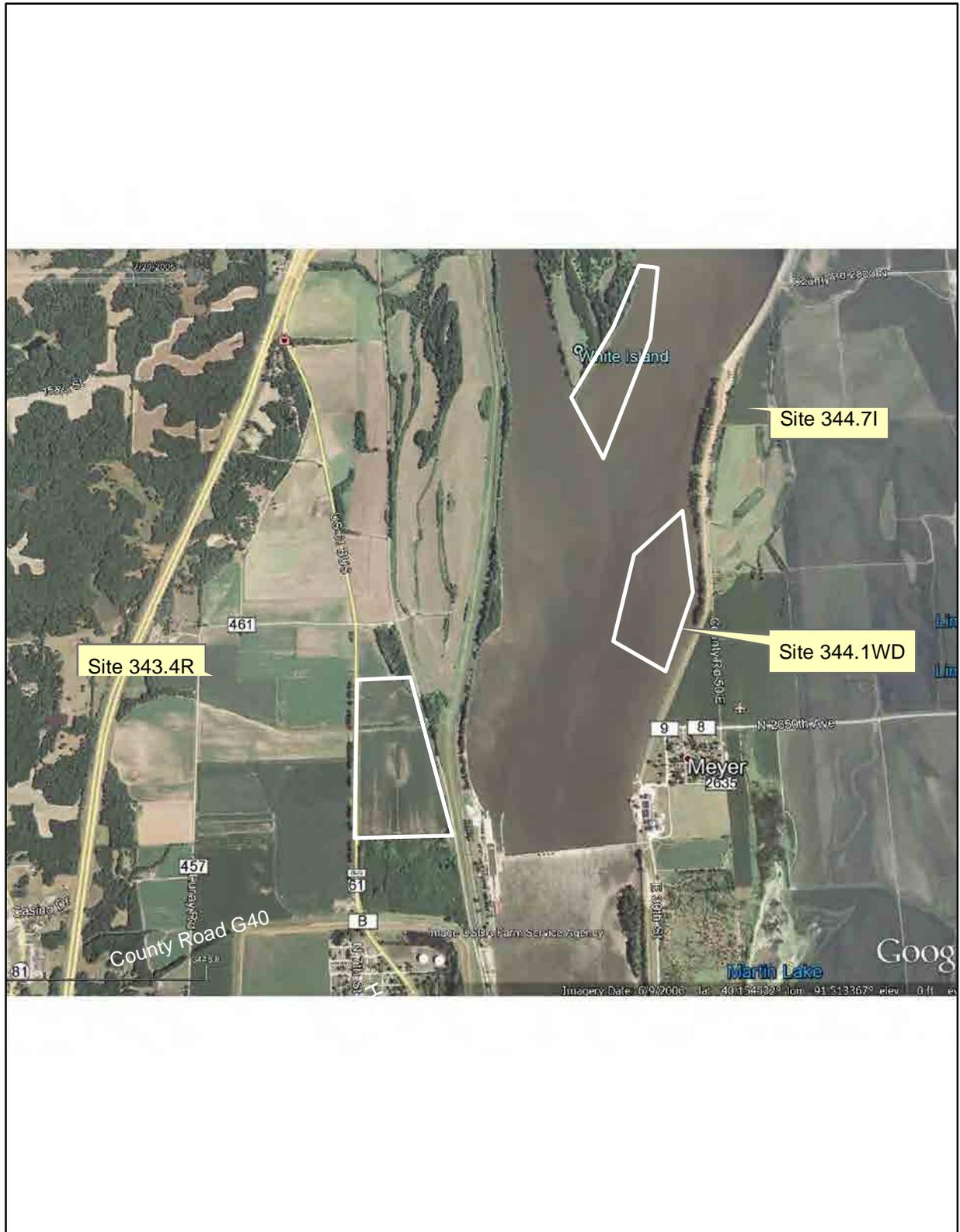


2004 Aerial Photo

Image Courtesy of Google Earth



# Pool 20 Potential DMMP Sites

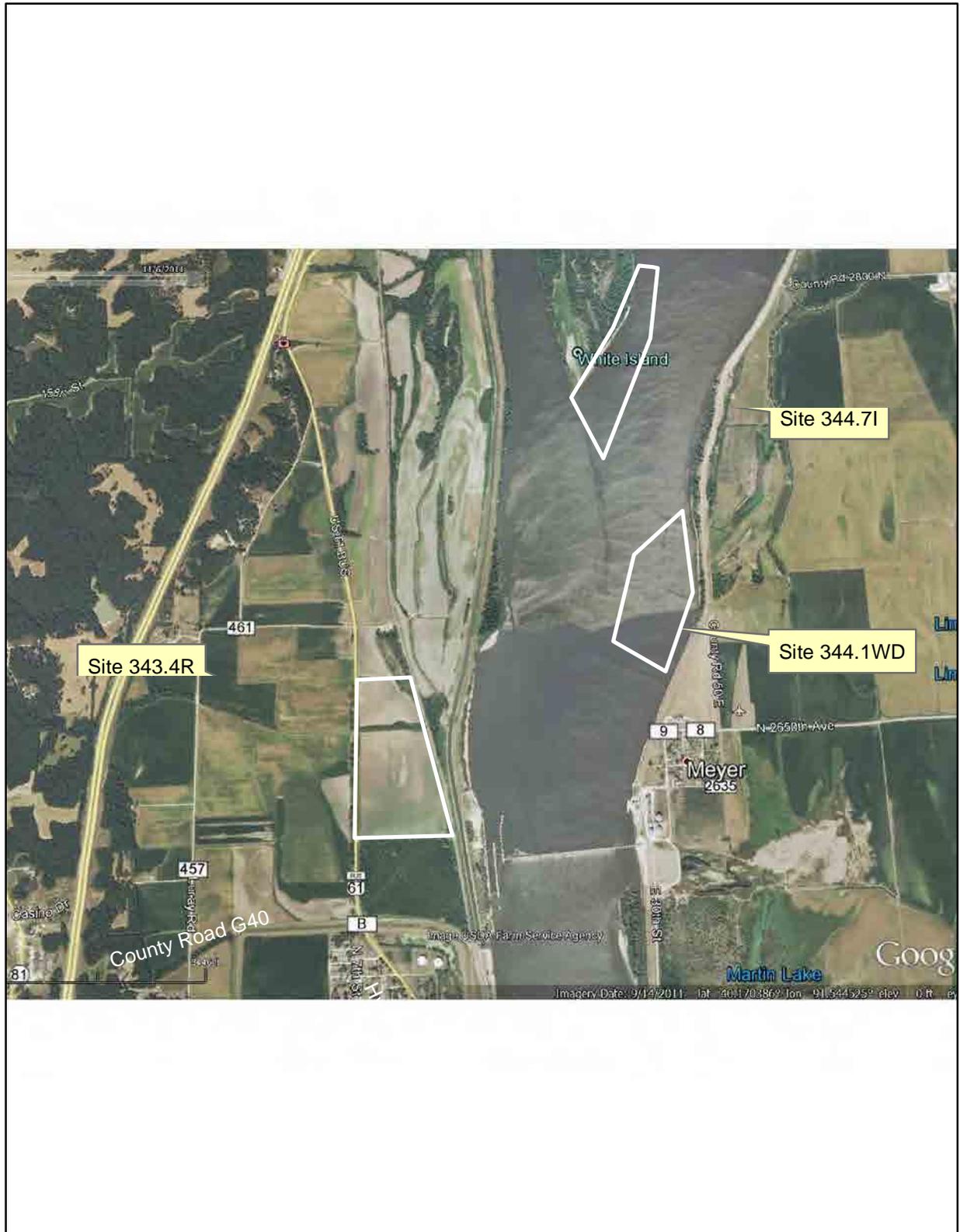


2006 Aerial Photo

Image Courtesy of Google Earth



# Pool 20 Potential DMMP Sites



2011 Aerial Photo

Image Courtesy of Google Earth





## **APPENDIX F**

### **Site Photographs**



Photo 1: NW corner of 343.4R south field, looking southeast.



Photo 2: Northern border of 343.4R south field, looking east.



Photo 3: Stream running W-E between 343.4R fields, looking west.

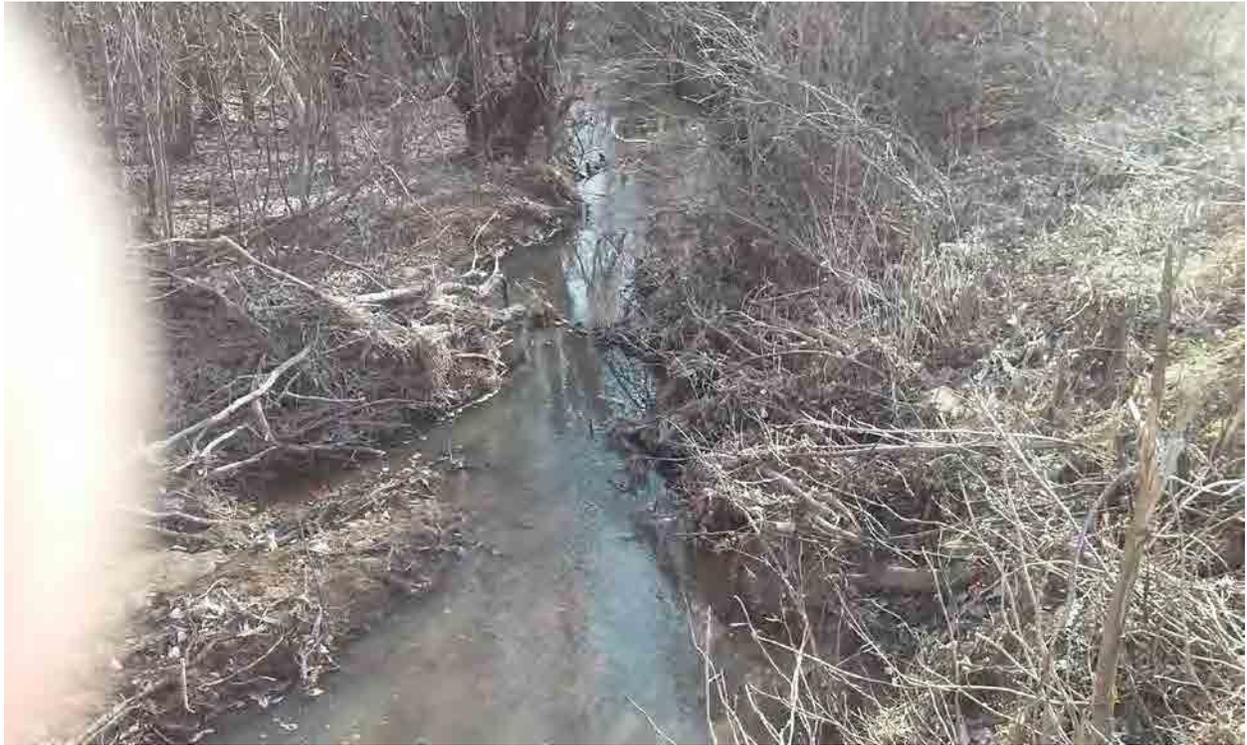


Photo 4: SW corner of 343.4R north field, looking northeast.



Photo 5: Middle of 343.4R north field, looking west.



Photo 6: Middle of 343.4R south field looking west.



Photo 7: Middle of 343.4R south field, looking south to former location of Tully MO.



Photo 8: Southern border of 343.4R south field, looking north.



Photo 9: Southern border of 343.4R south field, looking east at former location of Tully, MO.



Photo 10: Southern border of 343.4R south field, looking west.



Photo 11: Southern border of 343.4R south field, looking north at drainage ditch (center of field).

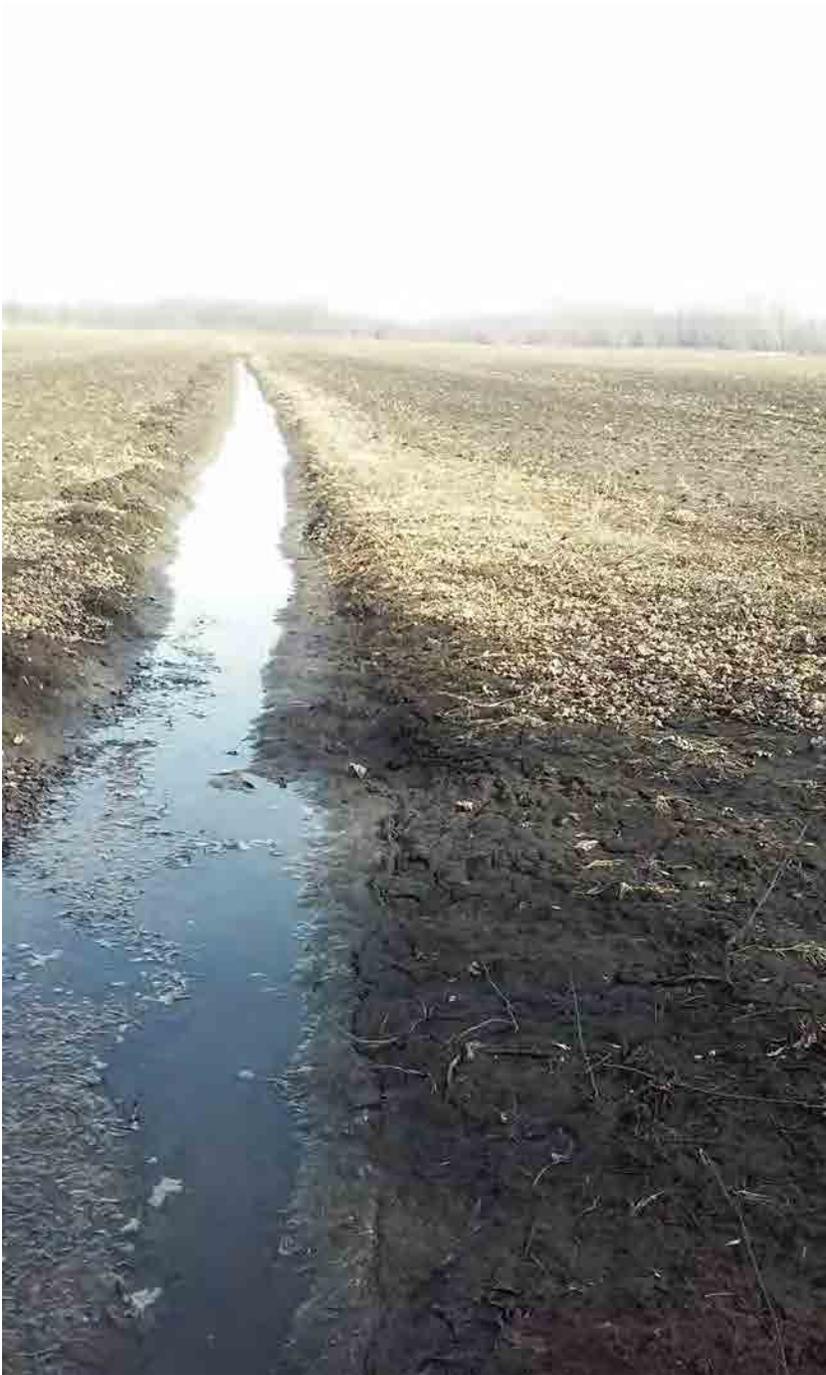


Photo 12: Western border of 343.4R south field, looking northeast.



Photo 13: SW corner of 343.4R south field, looking south at adjacent property.





## **APPENDIX G**

### **Questionnaire Forms**



**Interview Date: 4 Feb 15**  
**Name: Ronald E. Silver**  
**Title: Realty Specialist**  
**Company/Organization: MVD-RREND-P&A**  
**Status: above ground and breathing**  
Client/Owner  
Site Manager  
Occupant  
Government Official  
Other NGO Partner

**During what time period were you the site manager of the property?**

I have viewed site 343.4R on 4 occasions and talked to the owner 1 time while obtaining a ROE. The other two sites are either in the Mississippi River or on an island in the river, and I have not visited or viewed them. The answers following are for site 343.4R only

---

**What is the current use of the property?**

**Site 343.4R is currently used for farming**

---

**Who are the occupants of the property?**

**The real estate is owned by Ronald and Marcia Levensgood, 16160 State Highway 81, Canton, MO 63435-3478 Phone: 660-341-8889 or 573-288-3441**

---

**Do you have any other knowledge or experience with the property that may be pertinent to the environmental professional?**

Yes X

No

If yes describe:

Landowner gave me a copy of his RE Contract which states that a portion of the site (southeast corner) was the former location of the Town of Tully, MO which was platted into lots.

---

**Are you aware of any environmental cleanup liens against the property that are filed or recorded under federal, tribal, state or local law?**

Yes

No X

If yes describe:

---

**Are you aware of any Activity and Use Limitations, such as engineering controls, land use restrictions or institutional controls that are in place at the site and/or have been filed or recorded in a registry?**

Yes

No X

If yes describe:

---

**Do you know the past uses and general history of the property?**

Yes X

No

If yes describe:

Present owners have farmed the land since they have owned it. See above for information on the Town of Tully.

---

**Do you know of specific chemicals that are present or once were present at the property?**

Yes

No

If yes describe:

---

**Do you know of spills or other chemical releases that have taken place at the property?**

Yes

No

If yes describe:

---

**Do you know of any environmental cleanups that have taken place at the property?**

Yes

No

If yes describe:

---

**Based on your knowledge and experience related to the property are there any indicators that point to the presence or likely presence of contamination at the property?**

Yes

No

If yes describe:

Other than the usual chemicals applied for the purpose of growing crops

---

**Interview Date: 2/3/15**  
**Name: Cindy Kell**  
**Title: City Clerk**  
**Company/Organization: City of Canton, MO**  
**Status:**

**During what time period were you the site manager of the property?**

NA

---

**What is the current use of the property?**

Farmfield

---

**Who are the occupants of the property?**

Ron Levingood

---

**Do you have any other knowledge or experience with the property that may be pertinent to the environmental professional?**

No

---

**Are you aware of any environmental cleanup liens against the property that are filed or recorded under federal, tribal, state or local law?**

No

---

**Are you aware of any Activity and Use Limitations, such as engineering controls, land use restrictions or institutional controls that are in place at the site and/or have been filed or recorded in a registry?**

No

---

**Do you know the past uses and general history of the property?**

No

---

**Do you know of specific chemicals that are present or once were present at the property?**

No

---

**Do you know of spills or other chemical releases that have taken place at the property?**

No

---

**Do you know of any environmental cleanups that have taken place at the property?**

No

---

**Based on your knowledge and experience related to the property  
are there any indicators that point to the presence or likely presence of contamination at  
the property?**

No

---

**Interview Date: 2/3/15**  
**Name: David Keith**  
**Title: Emergency Management Director**  
**Company/Organization: Lewis County MO**  
**Status:**

**During what time period were you the site manager of the property?**

NA

---

**What is the current use of the property?**

Farm

---

**Who are the occupants of the property?**

Private landowner

---

**Do you have any other knowledge or experience with the property that may be pertinent to the environmental professional?**

No

---

**Are you aware of any environmental cleanup liens against the property that are filed or recorded under federal, tribal, state or local law?**

No

---

**Are you aware of any Activity and Use Limitations, such as engineering controls, land use restrictions or institutional controls that are in place at the site and/or have been filed or recorded in a registry?**

No

---

**Do you know the past uses and general history of the property?**

No

---

**Do you know of specific chemicals that are present or once were present at the property?**

No

---

**Do you know of spills or other chemical releases that have taken place at the property?**

No

---

**Do you know of any environmental cleanups that have taken place at the property?**

No

---

**Based on your knowledge and experience related to the property  
are there any indicators that point to the presence or likely presence of contamination at  
the property?**

No

---

**Interview Date: 3/13/15**  
**Name: Ron Levingood**  
**Title: Landowner of placement area 343.4R**  
**Company/Organization:**  
**Status:**

**During what time period were you the site manager of the property?**

NA

---

**What is the current use of the property?**

Farmfields

---

**Who are the occupants of the property?**

Ron and Marcia Levingood

---

**Do you have any other knowledge or experience with the property that may be pertinent to the environmental professional?**

Former town of Tully located in SE corner of 343.4R

---

**Are you aware of any environmental cleanup liens against the property that are filed or recorded under federal, tribal, state or local law?**

No

---

**Are you aware of any Activity and Use Limitations, such as engineering controls, land use restrictions or institutional controls that are in place at the site and/or have been filed or recorded in a registry?**

No

---

**Do you know the past uses and general history of the property?**

No

---

**Do you know of specific chemicals that are present or once were present at the property?**

No

---

**Do you know of spills or other chemical releases that have taken place at the property?**

No

---

**Do you know of any environmental cleanups that have taken place at the property?**

No

---

**Based on your knowledge and experience related to the property  
are there any indicators that point to the presence or likely presence of contamination at  
the property?**

No

---

**DREDGED MATERIAL  
MANAGEMENT PLAN**

**UPPER MISSISSIPPI RIVER  
POOL 20  
RIVER MILES 343.2-344.3**

**LOCK 20 UPPER DREDGE CUT**

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**PUBLIC REVIEW DRAFT**

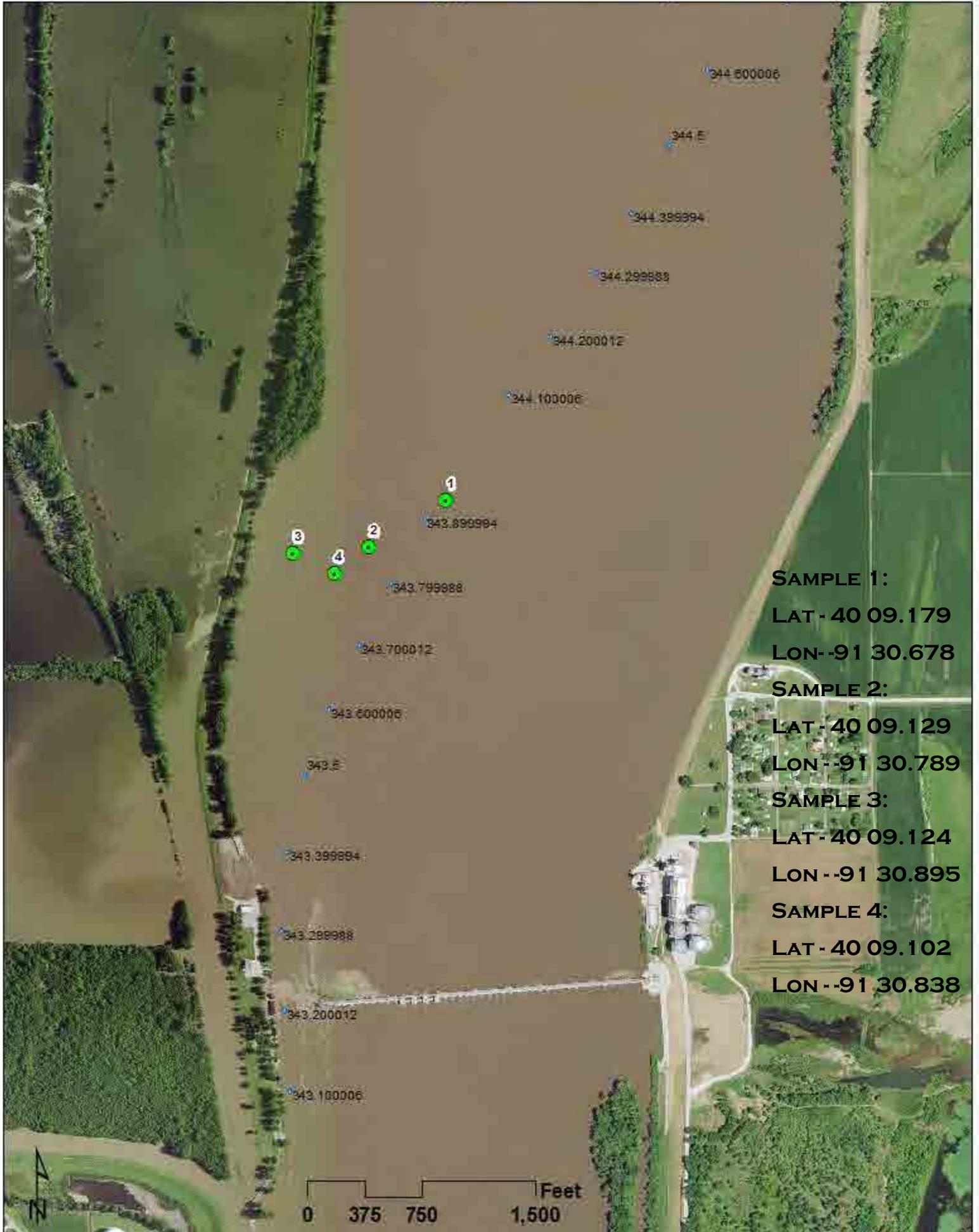
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**APPENDIX D  
GEOTECHNICAL DATA**



# Lock and Dam 20 Upper Pre-Dredge Sampling



**MISSISSIPPI RIVER DREGING  
LOCK AND DAM 20 UPPER CUT  
GRAIN SIZE ANALYSIS OF SEDIMENT SAMPLES**

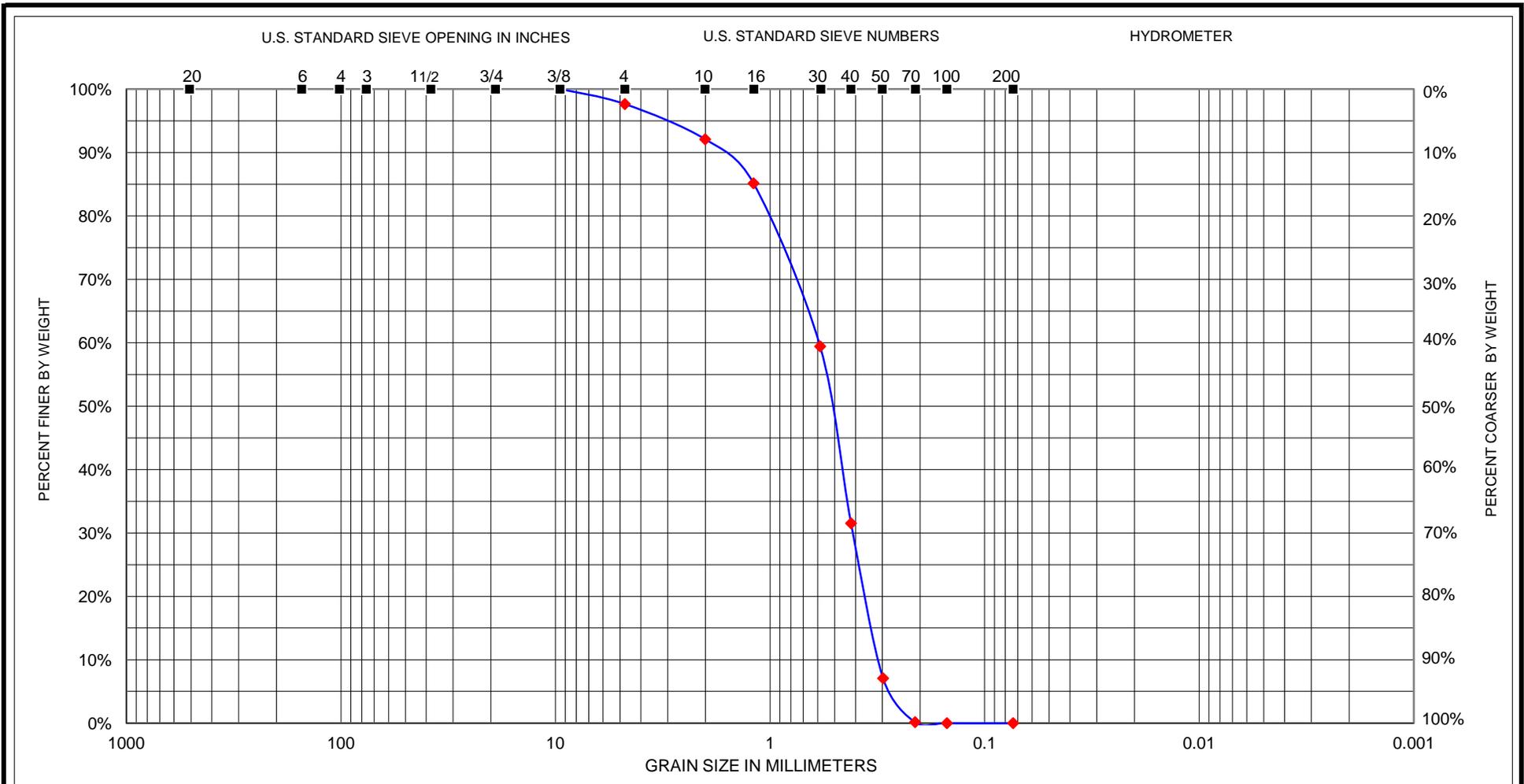
**SAMPLES COLLECTED:** 22-Apr-15

**Percent Finer by Weight**

<b>SAMPLE NUMBERS:</b>		<b>343.91R (1)</b>	<b>343.85R (2)</b>	<b>343.82R (3)</b>	<b>343.80R (4)</b>			
	<b>1 1/2"</b>							
<b>S</b>	<b>3/4"</b>							
<b>I</b>	<b>3/8"</b>	100.0%		100.0%				
<b>E</b>	<b>#4</b>	97.6%	100.0%	99.3%	100.0%			
<b>V</b>	<b>#10</b>	92.1%	98.9%	96.1%	97.9%			
<b>E</b>	<b>#16</b>	85.1%	96.1%	88.8%	92.5%			
	<b>#30</b>	59.4%	77.9%	62.7%	67.5%			
<b>S</b>	<b>#40</b>	31.5%	51.4%	36.0%	38.6%			
<b>I</b>	<b>#50</b>	7.1%	20.2%	10.3%	10.8%			
<b>Z</b>	<b>#70</b>	0.2%	6.8%	1.6%	2.6%			
<b>E</b>	<b>#100</b>	0.0%	2.8%	0.6%	0.8%			
<b>S</b>	<b>#200</b>	0.0%	1.0%	0.3%	0.3%			
	<b>CLASSIFICATION:</b>	SP, MEDIUM TO FINE SAND						

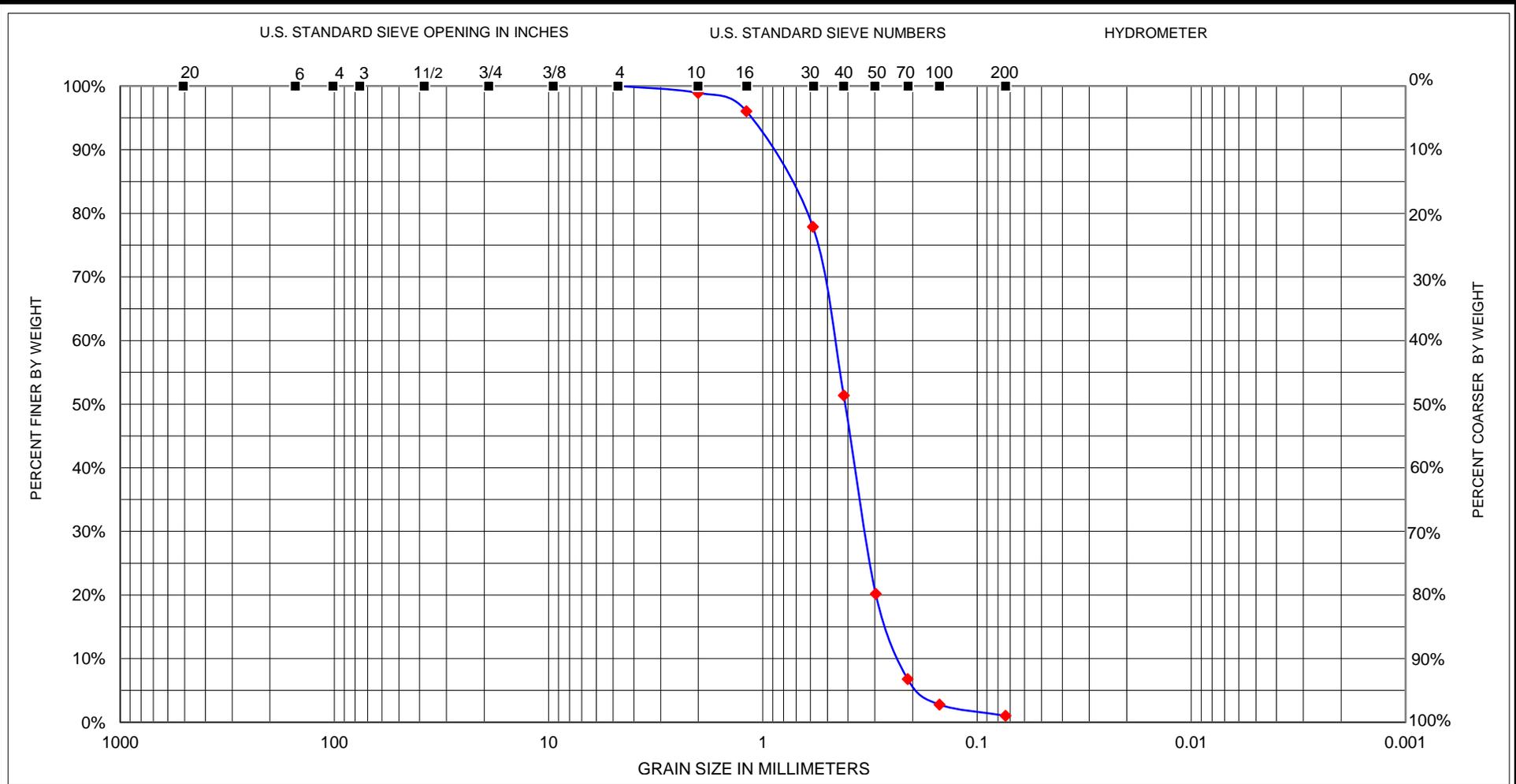
**Notes:**

1. Visual classification of soil is in accordance with "The Unified Soils Classification System (USCS)".
2. Laboratory testing was performed in accordance with EM 1110-2-1906, dated 30 Nov 70, revised 1 May 80 and 20 Aug 86. All samples were oven dried at 110 degrees centigrade. Sample designated (dup) is a duplicate sample.

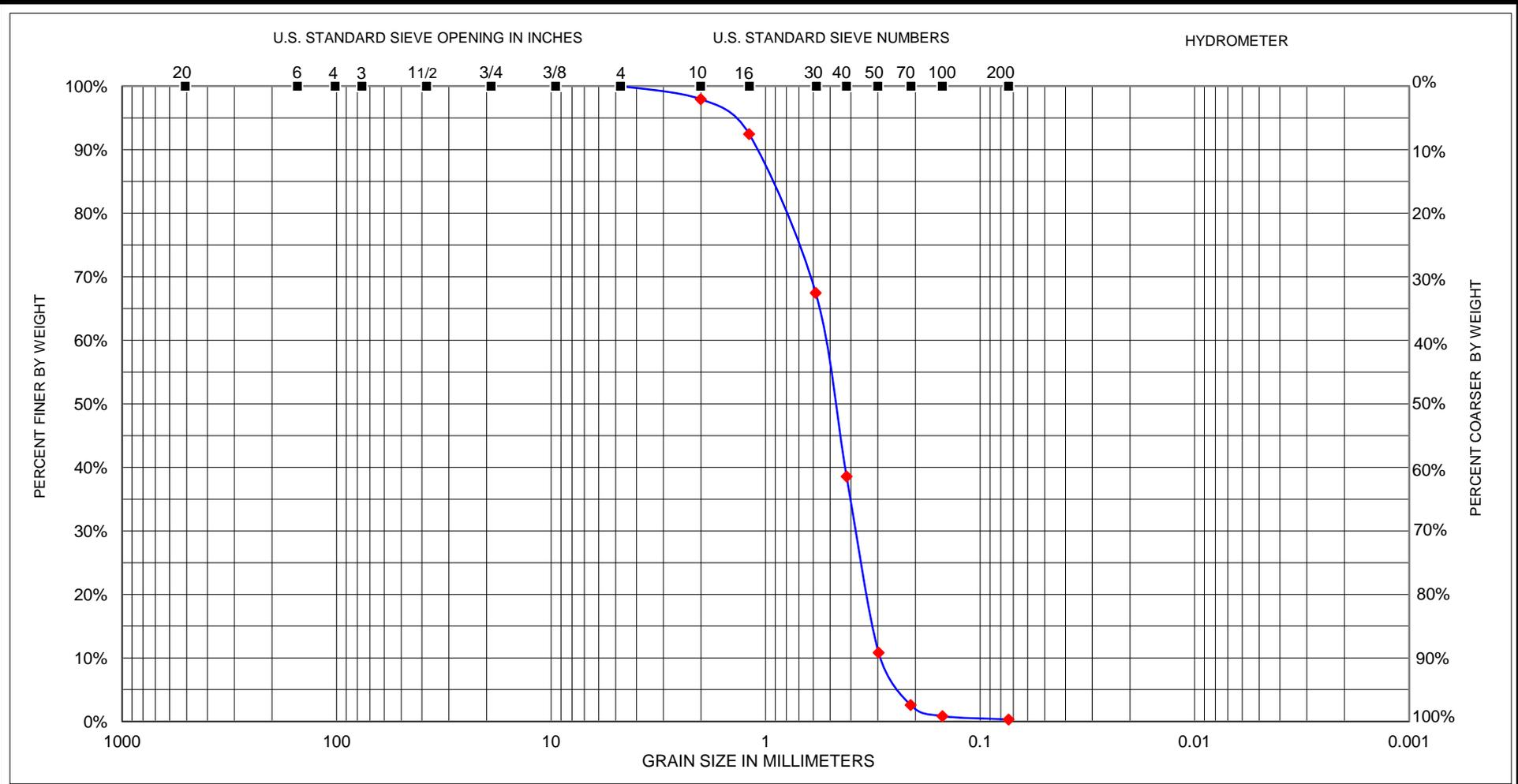


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Sample No.	Elev or Depth	Classification	Color	D <sub>10</sub>	-#200	Project:
343.91R		SP, MEDIUM TO FINE SAND	BR	0.43	0.0%	MISSISSIPPI RIVER DREGING
						Area: LOCK AND DAM 20 UPPER CUT
						Boring No.:
						Date: 22-Apr-15







COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Sample No.	Elev or Depth	Classification	Color	D <sub>10</sub>	-#200	Project:
343.80R		SP, MEDIUM TO FINE SAND	BR	0.29	0.3%	MISSISSIPPI RIVER DREGING
						Area: LOCK AND DAM 20 UPPER CUT
						Boring No.:
						Date: 22-Apr-15

**DREDGED MATERIAL  
MANAGEMENT PLAN**

**UPPER MISSISSIPPI RIVER  
POOL 20  
RIVER MILES 343.2-344.3**

**LOCK 20 UPPER DREDGE CUT**

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**PUBLIC REVIEW DRAFT**

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**APPENDIX E  
DESIGN PLATES**































**DREDGED MATERIAL  
MANAGEMENT PLAN**

**UPPER MISSISSIPPI RIVER  
POOL 20  
RIVER MILES 343.2-344.3**

**LOCK 20 UPPER DREDGE CUT**

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**PUBLIC REVIEW DRAFT**

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**APPENDIX F  
DISTRIBUTION LIST**



*Lock 20 Upper  
Dredged Material Management Plan*

*Public Review Draft*

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HONORABLE ROY BLUNT  
UNITED STATES SENATOR  
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WASHINGTON, DC 20510

HONORABLE ROY BLUNT  
UNITED STATES SENATOR  
555 IND2502 TANNER DR STE 208  
CAPE GIRARDEAU, MO 63703

HONORABLE RICHARD DURBIN  
UNITED STATES SENATOR  
711 HART SENATE BLDG  
WASHINGTON, DC 20510

HONORABLE RICHARD DURBIN  
UNITED STATES SENATOR  
525 S 8TH ST  
SPRINGFIELD, IL 62703

HONORABLE SAMUEL GRAVES  
REPRESENTATIVE IN CONGRESS-6<sup>TH</sup> DIST  
1415 LONGWORTH HOUSE OFC BLDG  
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HONORABLE SAMUEL GRAVES  
REPRESENTATIVE IN CONGRESS-6<sup>TH</sup> DIST  
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HANNIBAL, MO 63401

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UNITED STATES SENATOR  
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WASHINGTON, DC 20510

HONORABLE MARK KIRK  
UNITED STATES SENATOR  
607 E ADAMS STE 1520  
SPRINGFIELD, IL 62701

HONORABLE CLAIRE MCCASKILL  
UNITED STATES SENATOR  
HART SENATE OFC BLDG STE 506  
WASHINGTON, DC 20510

HONORABLE CLAIRE MCCASKILL  
UNITED STATES SENATOR  
4141 PENNSYLVANIA AVE STE 101  
KANSAS CITY, MO 64111

HONORABLE DARIN LAHOOD  
REPRESENTATIVE IN CONGRESS-18<sup>TH</sup> DIST  
209 W STATE ST  
JACKSONVILLE, IL 62650

HONORABLE DARIN LAHOOD  
REPRESENTATIVE IN CONGRESS-18<sup>TH</sup> DIST  
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SPRINGFIELD, IL 62701

DAN STEPHENSON  
IL DEPARTMENT OF NATURAL RESOURCES  
700 SOUTH 10TH STREET  
HAVANA, IL 62644

DOUG CARNEY  
IL DEPARTMENT OF NATURAL RESOURCES  
1 CONFLUENCE WAY  
EAST ALTON, IL 62024-2401

DEBBIE BRUCE  
IL DEPARTMENT OF NATURAL RESOURCES  
ONE NATURAL RESOURCES WAY  
SPRINGFIELD, IL 62702-1271

NATHAN GRIDER  
IL DEPARTMENT OF NATURAL RESOURCES  
ONE NATURAL RESOURCES WAY  
SPRINGFIELD, IL 62702-1271

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ARLAN JUHL  
IL DEPARTMENT OF NATURAL RESOURCES  
ONE NATURAL RESOURCES WAY  
SPRINGFIELD, IL 62702-1271

MIKE DIEDRICHSEN  
IL DEPARTMENT OF NATURAL RESOURCES  
ONE NATURAL RESOURCES WAY  
SPRINGFIELD, IL 62702-1271

JIM MICK  
IL DEPARTMENT OF NATURAL RESOURCES  
700 SOUTH 10TH STREET  
HAVANA, IL 62644

CHARLES INGERSOLL  
IL DEPARTMENT OF TRANSPORTATION  
2300 S DIRKSEN PKWY  
SPRINGFIELD, IL 62764

LISA BONNETT  
IL ENVIRONMENTAL PROTECTION AGENCY  
1021 N GRAND AVE E  
SPRINGFIELD, IL 62794-9276

DAN HEACOCK  
IL ENVIRONMENTAL PROTECTION AGENCY  
1021 N GRAND AVE E  
SPRINGFIELD, IL 62794-9276

THADDEUS FAUGHT  
IL ENVIRONMENTAL PROTECTION AGENCY  
1021 N GRAND AVE E  
SPRINGFIELD, IL 62794-9276

CHARLES SPENCER  
IL FARM BUREAU  
1701 TOWANDA AVE  
BLOOMINGTON, IL 61704

RACHEL LEIBOWITZ PH.D.  
IL HISTORIC PRESERVATION AGENCY  
1 OLD STATE CAPITOL PLAZA  
SPRINGFIELD, IL 62701

BILL GRANT  
IZAACK WALTON LEAGUE  
1619 DAYTON AVE #202  
ST PAUL, MN 55104

BRAD WALKER  
MO COALITION FOR THE ENVIRONMENT  
2149 LLEWELLYN RD  
SWANSEA, IL 62223

TRAVIS MOORE  
MO DEPARTMENT OF CONSERVATION  
8965 HWY 36 STE 1  
HANNIBAL, MO 63401-6739

JANET STERNBURG  
MO DEPARTMENT OF CONSERVATION  
2901 W TRUMAN BLVD PO BOX 180  
JEFFERSON CITY, MO 65109

KRISTA NOEL  
MO DEPARTMENT OF CONSERVATION  
3500 SOUTH BALTIMORE  
KIRKSVILLE, MO 63501

DARLENE BRYANT  
MO DEPARTMENT OF CONSERVATION  
3500 SOUTH BALTIMORE  
KIRKSVILLE, MO 63501

JOHN A. PINKOWSKI  
MO DEPARTMENT OF CONSERVATION  
R. R. 3, BOX 56  
EDINA, MO 63537

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DEPUTY DEPT DIR FOR WATER RES  
MO DEPARTMENT OF NATURAL RESOURCES  
PO BOX 176  
JEFFERSON CITY, MO 65102-0176

JUDITH DEEL  
MO DEPARTMENT OF NATURAL RESOURCES  
PO BOX 176  
JEFFERSON CITY, MO 65102

SARA PARKER PAULEY  
MO DEPARTMENT OF NATURAL RESOURCES  
PO BOX 176  
JEFFERSON CITY, MO 65102

ACTING DIRECTOR  
NATIONAL AUDUBON SOCIETY  
1 WATER ST W STE 200  
ST PAUL, MN 55107-2039

DARREN MELVIN  
IL RIVER CARRIERS ASSOCIATION  
PO BOX 7038  
ROMEDEVILLE, IL 60446

STAFF WRITER  
QUINCY HERALD-WHIG  
130 S 5TH ST PO BOX 909  
QUINCY, IL 62306-0909

DEPUTY SECTOR COMMANDER  
U.S. COAST GUARD  
1222 SPRUCE ST STE 7.103  
ST LOUIS, MO 63103-2818

JENNIFER FEYERHERM  
SIERRA CLUB  
122 W WASHINGTON AVE STE 830  
MADISON, WI 53703

SAM ZUMWALT  
HUNT DRAINAGE DISTRICT  
695 NORTH COUNTY ROAD 600  
WARSAW, IL 62379

DIANNE BARNETT  
LIMA LAKE DRAINAGE DISTRICT  
102 NORTH WESTGATE AVENUE  
JACKSONVILLE, IL 62650

HOWARD HIGBEE  
GREGORY LEVEE & DRAINAGE DISTRICT  
R.R. 1 BOX 19  
CANTON, MO 63435

JAMES GARVEY  
SOUTHERN ILLINOIS UNIVERSITY  
MAIL CODE 6511  
CARBONDALE, IL 62901

GREAT LAKES REGION MID CONTINENT OFC  
U.S. DEPARTMENT OF TRANSPORTATION  
1222 SPRUCE ST STE 2.202F  
ST LOUIS, MO 63103-2818

KATHLEEN KOWAL  
U.S. ENVIRONMENTAL PROTECTION AGENCY  
E-19J 77 W JACKSON BLVD  
CHICAGO, IL 60604

LARRY SHEPARD  
U.S. ENVIRONMENTAL PROTECTION AGENCY  
11201 RENNER BLVD  
LENEXA, KS 66219

SARA SCHMUECKER  
U.S. FISH AND WILDLIFE SERVICE  
8588 RTE 148  
MARION, IL 62959

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KRAIG MCPEEK  
U.S. FISH AND WILDLIFE SERVICE  
1511 47TH AVE  
MOLINE, IL 61265

JASON WILSON  
U.S. FISH AND WILDLIFE SERVICE  
BOX 88  
ANNADA, MO 63330

SCOTT LARSEN  
NATURAL RESOURCE CONSERVATION SERVICE  
6465 HIGHWAY 168, SUITE C  
PALMYRA, MO 63461-3203

TIM COY  
NATURAL RESOURCE CONSERVATION SERVICE  
502 SOUTH WASHINGTON  
MONTICELLO, MO 63457

RONALD LEVENGOOD  
RR #2  
CANTON, MO 63435

CMT FARMS, LLC  
1504 MONTICELLO ROAD  
CANTON, MO 63435

MCDONALD FAMILY IRREVOCABLE TRUST  
#7 SUMMERS CREEK  
QUINCY, IL 62301

FRANK BERHORST  
27486 215TH STREET  
CANTON, MO 63435

FERTILE ACRES, INC.  
RT. 1, BOX 19  
ALTONA, IL 61414

PAUL A. LOGSDON  
18916 STATE HIGHWAY P  
CANTON, MO 63435

DAVID SHIREY  
21801 STATE HIGHWAY P  
CANTON, MO 63435

JAMES RALPH BARKLEY  
32361 130TH  
CANTON, MO 63435

RONALD G. MCCULLOUGH  
13405 U.S. HIGHWAY 61  
CANTON, MO 63435

SCOTT T. ROBERTSON  
13421 U.S. HIGHWAY 61  
CANTON, MO 63435

BETTY LLOYD  
R. R. 1  
CANTON, MO 63435

SCOTT M. HOEWING  
R.R. 1 BOX 7-A  
CANTON, MO 63435

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BETTY L. HENDRICKSON  
RFD 1  
CANTON, MO 63435

RALPH JAMES  
R.R. 1 BOX 241  
CANTON, MO 63435

ADWELL CORP.  
102 NORTH WESTGATE AVENUE  
JACKSONVILLE, IL 62650-2294

JOHN J. CALDWELL  
43 NORTH 2635TH AVENUE  
WARSAW, IL 62379-2006

RALPH W. MILLER  
915 NORTH 2400TH AVENUE  
MENDON, IL 62351-2726

RICHARD G. LITTICH  
6709 FOX RIDGE CIRCLE  
DAVIDSON, NC 28036-8092

NORMAN D. DICKS  
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QUINCY, IL 62301-6633

JOHN H. JR. CLARK  
1275 NORTH 2053RD ROAD,  
GRAND RIDGE, IL 61325-9407

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PRINCETON, MO 64673-1316

HOWARD F. HUMPHREY  
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HISTORIC PRESERVATION COORDINATOR  
SAC & FOX TRIBE OF THE MISSISSIPPI IN IOWA  
349 MESKWAKI ROAD  
TAMA, IA 52339-9629

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MIAMI, OK 74355

DR. ROBERT FIELDS  
THE IOWA TRIBE OF OKLAHOMA  
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PERKINS, OK 74059

CRYSTAL DOUGLAS  
THE KAW NATION  
DRAWER 50  
KAW CITY, OK 74641

DR. ANDREA HUNTER  
THE OSAGE NATION  
627 GRANDVIEW  
PAWHUSKA, OK 74056

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THE HO-CHUNK NATION  
P.O. BOX 667  
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202 SOUTH EIGHT TRIBES TRAIL  
MIAMI, OK 74354

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HANNIBAL, MO 63401-1574

LEWIS COUNTY HISTORICAL SOCIETY  
102 NORTH 45TH STREET  
CANTON, MO 63435

HISTORICAL SOCIETY OF QUINCY AND ADAMS CO.  
425 SOUTH 12TH STREET  
QUINCY, IL 62301

GREAT RIVER GENEALOGICAL SOCIETY  
526 JERSEY STREET  
QUINCY, IL 62301-3927

JAMES R. FRANKENHOFF  
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LEWIS COUNTY ENGINEER  
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JARROD PHILLIPS  
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