

**REGULATING STRUCTURE REPAIR**

**RIVER MILES 595.4 - 599.0  
POOL 11, MISSISSIPPI RIVER**

**GRANT COUNTY, WISCONSIN**

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**ENVIRONMENTAL ASSESSMENT**

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**January 2021**



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

# REGULATING STRUCTURE REPAIR

RIVER MILES 595.4-599.0  
POOL 11, MISSISSIPPI RIVER

GRANT COUNTY, WISCONSIN

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## ENVIRONMENTAL ASSESSMENT

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**Editor will finalize Table of Contents following Public Review.**

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**DRAFT FINDING OF NO SIGNIFICANT IMPACT**



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### 1.0. PURPOSE OF AND NEED FOR ACTION

The purpose of this Environmental Assessment (EA) is to address the effects of construction proposed as part of operation and maintenance of the Upper Mississippi River (UMR) 9-Foot Channel Navigation Project. Navigation channel maintenance includes periodic repair and maintenance of existing regulating structures, e.g., wing dams and closing dams, as well as construction of new structures. These actions generally involve large-grade limestone rock placement.

The U.S. Army Corps of Engineers (Corps), Rock Island District (District) proposes to reduce Mississippi River navigation channel dredging in Pool 11 by making structural improvements to two closing dams in the Hurricane Island and Finley's Landing reaches and construction of rock vanes to stabilize the Hurricane Island bank line placement site (Project). The study area is between River Miles (RM) 595.4-599.0 in Pool 11 of the Mississippi River, near North Buena Vista, Dubuque County, Iowa, and Potosi, Grant County, Wisconsin (Figure EA-1). The Project resides completely in Grant County, Wisconsin, but due to its proximity to Dubuque County, Iowa, the District considered Dubuque County during planning and some environmental assessments.

Sediment deposition, or shoaling, is occurring in the navigation channel near Finley's Landing, resulting in more frequent dredging, increased channel closures, and vessel groundings in recent years. The District has received eight industry-issued reports for this area since 2015. Finley's Landing dredge cut was first dredged in 1974 and has since had a dredging frequency of approximately every 0.42 years, or 42 percent over the 43 years (18 events/43 years = 42 percent). The frequency has been increasing, but the average quantity has been decreasing since approximately the year 2000. Between 1974 and 1999, the frequency was 28 percent with an average quantity of 37,588 cy. Between 2000 and 2016, the frequency was 69 percent with an average quantity of 17,081 cy (Corps, 2017). The District has not been able to dredge to authorized channel dimensions within the Finley's Landing dredge cut due to lack of an approved placement site. Continued placement at the Hurricane Island bank line is contingent on bank stabilization. Repair of the regulating structures in the Project area is necessary to reduce sediment deposition in this area, by increasing shear stress and velocities in the navigation channel.

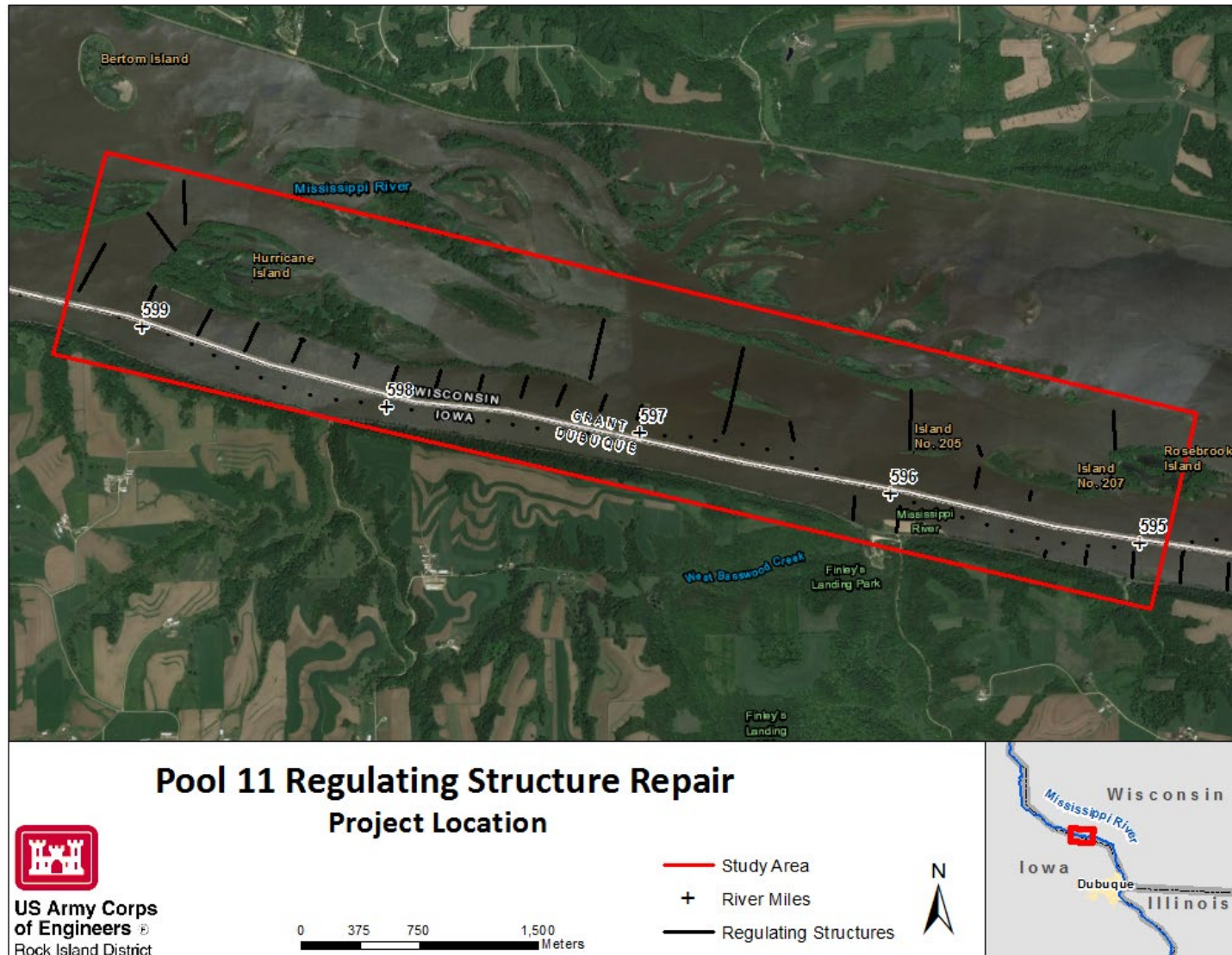
**1.1. Project Objectives.** The Corps' goal for navigation is "To provide an unrestricted state of the art, environmentally sustainable and cost-effective navigation system." To meet this goal, the Project objectives are:

- Improve commercial navigation in the Project area to allow for maintenance of the 9-foot navigation channel in a cost-efficient manner, while minimizing impacts to environmental resources.

- Repair or enhance regulating structures determined to need modification to divert energy and flow into the navigation channel.
- Reduce the sediment deposition and frequency of dredging events by repairing regulating structures, resulting in the reduction of channel maintenance and operating (O&M) costs.
- Take advantage of opportunities to restore existing island footprints through the indirect benefit of modifying regulating structures and protect bank line areas from erosion by adding rock vanes to existing placement areas.

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**Figure EA-1. Project Location**

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**1.2. Related National Environmental Policy Act (NEPA) Documents.** The environmental impact statement (EIS) entitled *Continued Operations and Maintenance, Upper Mississippi River, 9-Foot Navigation Channel, Final Environmental Impact Statement Pools 11 thru 22*, (USACE, 1974) describes contributions of regulating structures to channel maintenance and repairs of such structures. The District has prepared this NEPA documentation to address any impacts potentially resulting from the proposed Project. This EA is a standalone document and does not rely on any other NEPA document for cross reference or programmatic impact assessment.

**1.3. Other Related Documents.** The *Hurricane Island Reach Dredge Material Management Plan* (Corps, 2017) describes the most current dredge material alternatives within Hurricane Island Reach. The Preferred Alternative consists of temporary placement on an 11-acre “bathtub” site on the left descending bank (L) at RM 594.0L, with later relocation to a farm field quarry as the permanent placement site at RM 592.0L. Other related actions in the Project area are documented in the following reports:

- Dredged Material Management Plan for Dredged Material Placement Site Plan for Hurricane Island Dredge Cut, UMR River Miles (RM) 598.7-599.1. Sept. 1999.
- Dredged Material Management Plan for Dredged Material Placement Site Plan for Finley’s Landing Dredge Cut, UMR River Miles (RM) 595.5-596.5, Pool 11. July 1999.

**1.4. Scoping and Significant Issues.** The primary function of the multidisciplinary and interagency Committee to Assess Regulatory Structures (CARS) group is to advise and coordinate with the District’s Operations Division (OD) in the maintenance or construction of navigation regulating structures. Chaired by OD, the CARS was formalized by *GREAT II Channel Maintenance Handbook, December 1980* to assist in the reduction of dredging requirements through the evaluation of river hydraulics and regulating structures and optimize the benefits to both navigation and fish and wildlife resources in the design of any repair, alteration, or construction of a regulating structure. The U.S. Fish and Wildlife Service (USFWS), as part of CARS, ensures the input of appropriate state natural resource staff to the planning process. CARS activities are discussed in forums, such as the Fish and Wildlife Interagency Committee (FWIC) and River Resources Coordinating Team (RRCT).

Additionally, the On-Site Inspection Team (OSIT) is a multi-agency group that assists the District with dredged material management decisions, including placement at the Hurricane Island permanent placement site (Figure EA-1). An updated Memorandum of Understanding (MOU) between the District and the State of Wisconsin in 2018 requires OSIT approval prior to any dredged material placement at Hurricane Island to ensure placement site requirements are met. Following a site visit to Pool 11 in July 2018, the OSIT recommended the CARS group also examine the use of rock armoring to protect or expand existing island footprints and reduce sediment migration and erosion, in addition to the evaluation of regulating structures in this area. The District has used their experience and expertise, input from state and Federal agencies to compile data and decide on a preferred alternative. Several issues considered for this Project include:

- Benefits of regulating structures, channel maintenance dredging, and other channel maintenance activities on the maintenance of a reliable infrastructure for the navigation industry.
- Reduction of shoaling in the navigation channel through the repair of regulating structures, while also minimizing floodplain impacts.
- Impacts (both positive and negative) of channel maintenance activities to natural resources.

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The District recognizes that restoration of regulating structures can provide some habitat diversity. However, the primary goal of regulating structure construction is to reduce future demand for maintenance dredging in the 9-foot navigation channel along this stretch of the river, thus decreasing the impacts of dredging and dredge material placement and the cost of operation and maintenance of the navigation channel.

The District discussed the possibility of constructing chevrons or wing dam variations with the resource agencies via the CARS and OSIT groups, especially the Wisconsin Department of Natural Resources (WDNR), Iowa Department of Natural Resources (IADNR), and the USFWS. The District also coordinated with several state and Federal agencies during the decision-making process. Section 5, *Coordination and Public Involvement*, and Appendix A, *Pertinent Correspondence*, contain public and agency scoping comments. Agencies had concerns with possible impacts of construction on air quality, water resources, sediment deposition, bald eagles, potential mussel resources, and channel and flood surface profile impacts. The District conducted a mussel survey in the area to assess possible impacts in 2019. No federally-listed species were recovered during this survey. Section 4.0, *Environmental Consequences*, contains further discussion of natural resources impacts.

**1.5. Authority and Environmental Compliance.** The formal authorization for the Corps to perform operation and maintenance activities on the UMR was given in the Rivers and Harbors Act of 1927, as modified by the Rivers and Harbors Acts of 1930, 1932, 1935, and 1950; and a Resolution of the House Committee on Flood Control of September 19, 1944. These Acts and Resolution authorize the construction, operation, and maintenance of the 9-foot navigation channel on the Mississippi River between the mouth of the Missouri River and St. Paul, Minnesota.

If the District determines their channel maintenance would become more efficient with wing dam modification, wing dam construction, or chevron construction, the District would have to comply with several Federal environmental statutes and obtain any necessary permits required. For the following legal requirements, the District is the responsible party who must comply with all legal compliance and meet the requirements to obtain any permits or certifications from other governing bodies. Prior to initiating any aspect of the project, the District will comply or obtain all the necessary requirements which include:

- NEPA documentation in the form of this EA, ultimately concluding with a signed Finding of No Significant Impact (FONSI) or the initiation of an EIS. This EA also serves to fulfill environmental compliance coordination for several statutes, such as the Endangered Species Act and National Historic Preservation Act (see Section 4.0, *Environmental Consequences*).
- Clean Water Act (CWA) Sections 401 and 404 Compliance
- State of Wisconsin Floodplain Construction Permit (or waiver)

## **2.0. ALTERNATIVE FORMULATION AND ANALYSIS**

This section describes the alternative formulation and analysis, including potential measures and the initial array of alternatives, alternatives considered, but eliminated from further analysis, and the final array of alternatives (potential actions) considered to be environmentally acceptable and operationally feasible. Section 3.0, *Affected Environment*, and Section 4.0, *Environmental Consequences*, summarize the existing conditions and environmental impacts of each potential action. Two potential actions were alternatives evaluated in detail. This section also defines the differences between each alternative, especially how their environmental impacts may differ. The District evaluated only those alternatives considered to be feasible and reasonable.



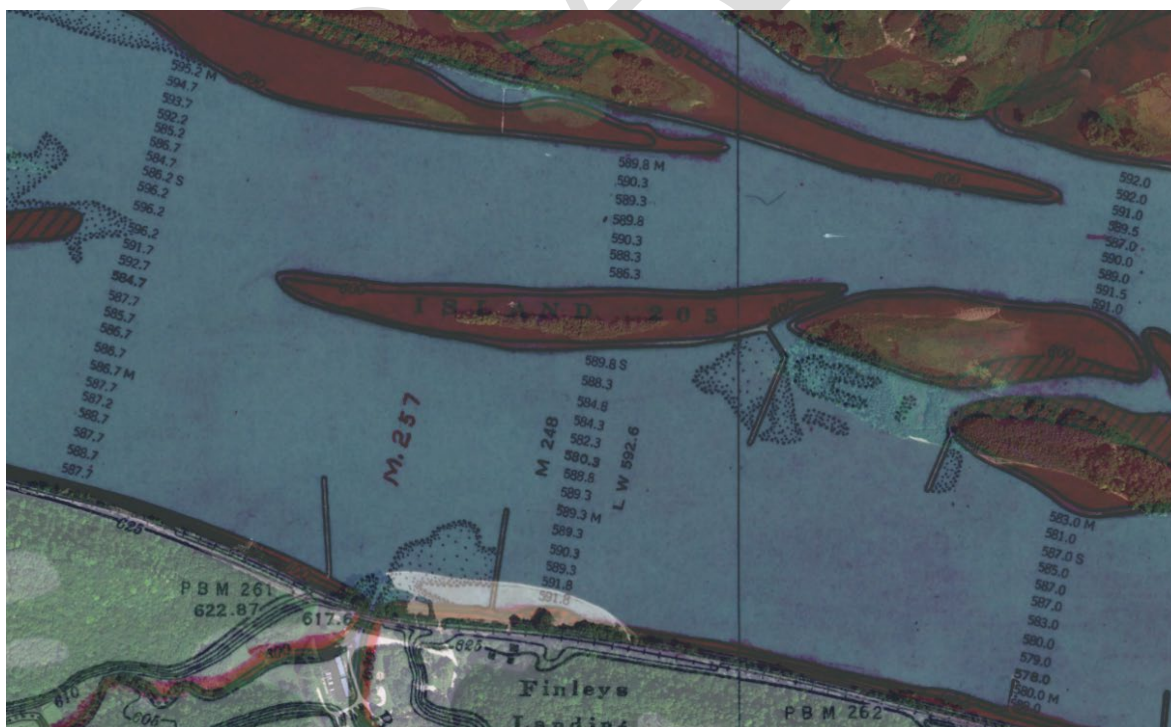
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**2.1. Potential Measures.** Potential measures, listed below, were evaluated for their effectiveness in reducing sediment deposition in the navigation channel.

**Restoring/Enhancing Regulating Structures:** Many wing dams and closing dams in the Hurricane Island and Finley's Landing reaches have experienced degradation over time. A Geographic Information Systems (GIS) analysis comparing the original design to the current condition computed the fill required to restore the structure. Certain structures that showed significant degradation were included in the initial array of alternatives to see if restoring or enhancing the structure would help reduce sediment deposition.

**Notching:** This measure was not originally considered for this study, as notching structures can decrease the velocity and shear stress in the main channel needed to meet the project objectives. However, a notch in one of the closure structures was later considered to accommodate for recreational boat traffic based on a request by the IADNR (see Section 2.3, *Final Array of Alternatives*). Notching a closure structure has the ability to create a scour hole which may produce a diversity of habitat in the side channel.

**Island Restoration:** Another potential measure included restoring Island 205 to an elevation of 605.0 feet (MSL 1912) and shaping it to match the profile shown in the Mississippi River Brown's Map of 1931. Figure EA-2 depicts the historic footprint of Island 205 overlaying the most current aerial imagery. The island would be constructed with dredged material from the adjacent navigation channel where dredging is needed. The upstream end of Island 205 has been severely eroded and, to the point where the island has lost over 90% of its land mass. The reduced size of this island may be causing increased flow diversion from the main channel, resulting in sediment deposition downstream of Finley's Landing. After placing dredged material at the restored portion of Island 205, it would be protected with riprap revetment to prevent further erosion.



**Chevron:** The District also investigated the addition of a chevron attached to Island 205 to help capture material and restore the island's footprint. A chevron is a V- or U-shaped rock structure, pointing upstream, which diverts river flows toward the main channel and creates several different types of river habitat with variable depth and flow velocities, much like a wing dam. River flows overtopping the structures during high water periods create a large scour hole just downstream of the structure's apex, with material settling out in a shallow bar downstream.

**Rock Vanes:** Rock vanes are a potential measure to stabilize the bank line placement at Hurricane Island and protect it from erosion. The rock vanes would act as a weir and direct flow away from the bank lines as they are overtopped.

## **2.2. Initial Array of Alternatives and Alternatives Considered but Eliminated from Further**

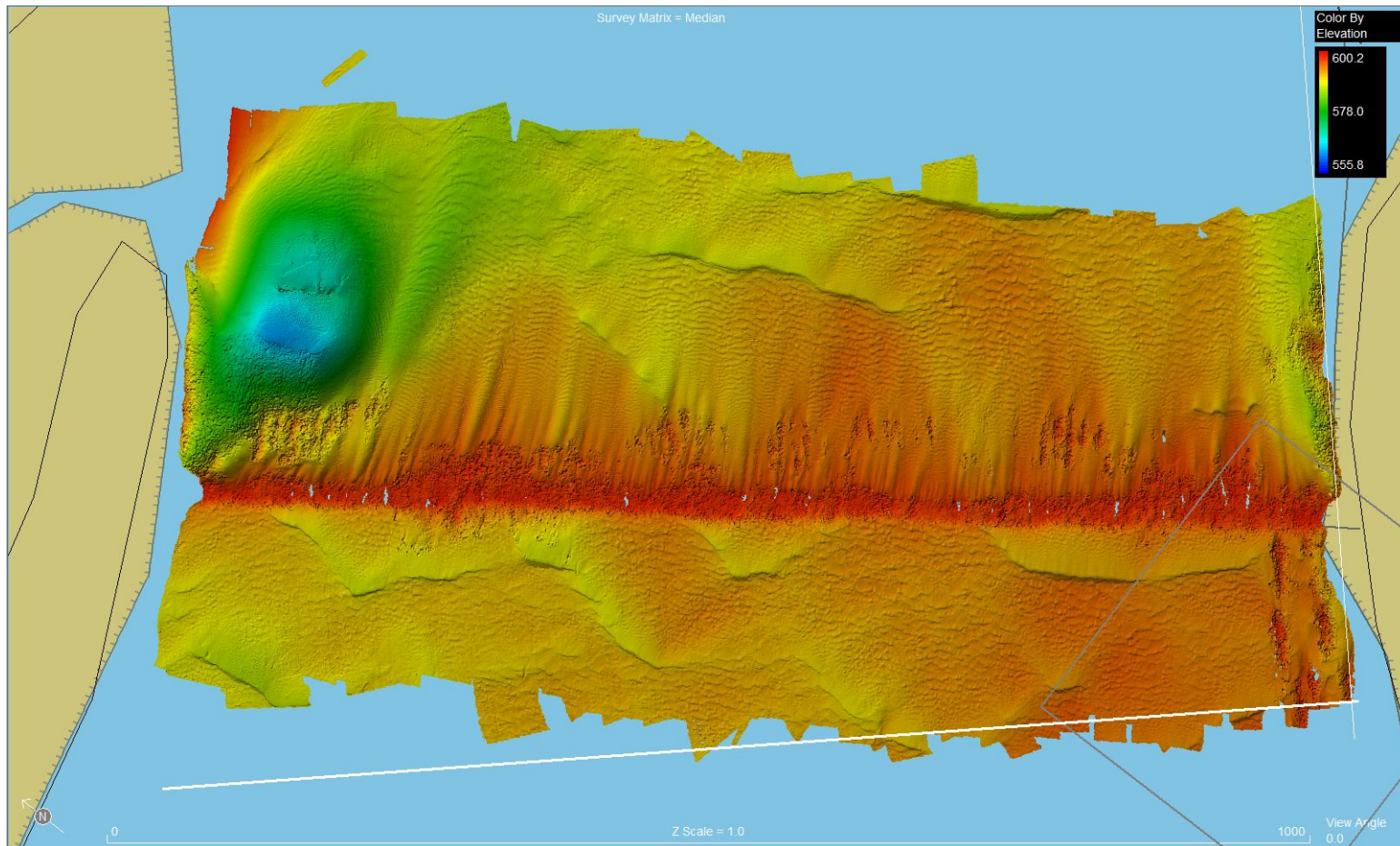
**Analysis.** This study initially began with the need to repair closing dam (CL) 599\_2 adjacent to the head of Hurricane Island, as evidenced by a multi-beam survey conducted in 2018. The degradation of this closing dam breach has diverted flow from the navigation channel and caused severe scouring (depths up to 40-feet) on the backside of the dam (Figure EA-3). This scour hole will likely be filled with material from maintenance dredging in the Finley's Landing and Hurricane Island reaches and the closing dam will be tied into the shoreline to prevent erosion into the adjacent bank lines, thereby reducing likelihood of a scour hole reoccurring.

The multi-disciplinary Project Delivery Team (PDT) examined 17 alternatives, comprised of the potential measures listed in Section 2.1, in the initial array to meet the goal of reducing dredging in the Hurricane Island and Finley's Landing Reaches of Pool 11. Alternatives were selected to examine possibilities in reducing the sediment deposition in the main channel from RM 595.0 to RM 603.0, or in shifting the sediment in this river reach downstream. Alternatives 1 and 2 are focused on Hurricane Island and Alternatives 3-17 are focused on Finley's Landing. Table EA-1 outlines the initial alternatives considered in this study. Conversations with OD personnel emphasized the need to repair CL\_599\_2 and focus efforts toward reducing dredging in the Finley's Landing reach as most of the recent dredging has occurred there. See Table EA-2.

Of the 17 alternatives analyzed, several were not carried forward because they either did not provide benefits to reduce sediment deposition in the channel or had impacts to flood surface profiles. The alternatives were first analyzed by incorporating the potential measures into a 2D Adaptive Hydraulics (AdH) model and then comparing the results to the results from the existing conditions model. Alternatives were evaluated on the increase in discharge, velocity and shear stress in the main channel near dredging locations to determine if there would be an impact to sediment deposition. Alternatives 15, 16, and 17 had the largest effect on velocity and shear stress so a floodplain analysis was completed for those alternatives to see if they met the State of Wisconsin's "no-rise" criteria. Alternative 15, which included Island 205 restoration, and Alternative 16, which included a chevron around Island 205, created an increase in the 0.01 annual exceedance probability water surface profile greater than 0.00 feet and were not carried forward. Alternative 17, which included raising the closing dam 595\_8\_CL to elevation 601.0 MSL 1912, did meet the floodplain requirements. To maximize benefit to the navigation channel and avoid impacts to flood surface profiles, Alternative 17 was revised to Alternative 17a, which was carried forward to the final array (Section 2.3). Refer to Appendix C, *Hydrology and Hydraulics*, for further discussion on screening the initial array of alternatives.



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**Figure EA-3.** Multibeam Survey (2018) of CL\_599\_2 Adjacent to the Head of Hurricane Island

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**Table EA-1. Summary Matrix of Initial Alternatives Considered**

	FEATURE												
	Restore 599_2_CL to EL 600	Restore 599_3_TL to EL 596.6	Restore 595_8_CL to EL 599	Island 205 to EL 605 (size and shape may vary)	Restore 595_7_CL to EL 595.7	Restore 595_5_TL to EL 595.6	Restore 597_3_CL to EL 596.3	Restore 595_1_CL to EL 595.6	Restore 596_7_TL to EL 596.2	Chevron Upstream of Island 205 (size and shape may vary) to EL 605	Restore Iowa Wingdams Near Finley's Landing	Lateral Structure Adjacent to Island 205 to EL 600	Rock Vanes at Hurricane Island Placement Site
Alternative 1	X												
Alternative 2	X	X											
Alternative 3	X	X	X										
Alternative 4	X	X	X	X									
Alternative 5	X	X	X	X									
Alternative 6	X	X	X	X		X							
Alternative 7	X	X	X				X	X	X				
Alternative 8										X			
Alternative 9											X		
Alternative 10										X			
Alternative 11												X	
Alternative 12												X	
Alternative 13				X									
Alternative 14	X	X	X			X	X	X	X		X		
Alternative 15	X		X	X	X								
Alternative 16	X		X		X					X			
Alternative 17	X	X	X (To EL 601)		X								
Alternative 17a	X		X (To EL 601)										X

<sup>1</sup> CL – closing dam, on the left descending bank

<sup>2</sup> EL – elevation

<sup>3</sup> TL - training dam, on the left descending bank

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**2.3. Final Array of Alternatives (Potential Actions).** The following alternatives were carried forward for further analysis, as they are considered feasible and reasonable.

- Alternative 0. No Federal Action
- Alternative 17a. Closing Dam Restoration and Enhancement with Rock Vanes

**Alternative 0. No Federal Action.** Under the No Federal Action alternative, the District would continue its present channel maintenance activities in Pool 11. The District must abide by congressional mandate to maintain a commercial navigation channel on the Mississippi River. The Hurricane Island and Finley's Landing Reaches will continue to be a chronic dredging area and offer challenging decision making concerning the dredged material placement location(s) and mitigation options. Current placement of dredged material would continue at various bank line locations and a bathtub site, which is currently under construction. Continued long-term placement at the historically used placement sites at the historic rate would result in unacceptable terrestrial and aquatic habitat loss.

As water volumes diminish in the main channel, river bed load material (mostly shifting sand) is settling out in the navigation channel. The District anticipates average to above-average dredging in this area in the future. Recent dredging actions are limited to amounts required to maintain an open channel, due to reduced capacity and availability of placement locations, which results in more frequent dredging. Table EA-2 summarizes historical dredging events in this reach of Pool 11.

Under the present conditions, the threat of closing the navigation channel and/or vessel groundings exists. An immediate closing requires costly emergency dredging. If approved dredged material placement sites are full, the District would have to select an emergency placement site with little environmental analysis. This process is outlined in the *GREAT II Channel Maintenance Handbook* and emergency dredging actions are coordinated through the OSIT. The District and river resource agencies prefer placement sites outside of the floodplain, as upland sites typically have less natural resource impact, although they may have other impacts, such as loss of farmland and/or impacts to wetlands.

See Section 3.0, *Affected Environment*, for a more detailed profile of the current environmental situation in the Hurricane Island and Finley's Landing Reaches of the Mississippi River. If the District selects the No Federal Action alternative, environmental consequences would still occur because the existing environment is not static. Dredging and dredging impacts would continue to occur. The District considers the No Federal Action alternative as the baseline for the rest of the analysis herein.

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**Table EA-2.** Historic Dredging Events at Hurricane and Finley's Landing Reaches

<b>Hurricane Island</b>		<b>Year</b>	<b>CYs</b>	<b>Dredge Site</b>	<b>Placement Site</b>	<b>Placement Type</b>
Total CYs	233,509	1968	43,600	598.7-598.9	598.8-599.0L	Bank line
# of Events	11	1971	43,966	598.7-599.0	598.9-599.0L	Bank line
Avg per Event	21,228	1973	47,122	598.7-599.1	598.6-598.8L	Bank line
		1974	10,926	598.8-599.0	598.7-598.8L	Bank line
		1981	15,392	598.7-598.9	Cassville, WI	Inland
		1989	29,963	598.6-598.9	598.6-599.0L	Bank line
		1995	23,982	598.5-598.8	598.7-599.0L	Bank line
		1998	2,526	598.6-598.8	606.1L (Dairyland DMMP site)	Upland
		2001	6,275	598.6-598.7	606.1L (Dairyland DMMP site)	Upland
		2006	7,601	598.6-598.8	598.8-599.0L	Bank line
		2007	2,156	598.3-598.5	610.3-610.4L	Bank line

<b>Finley's Landing</b>		<b>Year</b>	<b>CYs</b>	<b>Dredge Site</b>	<b>Placement Site</b>	<b>Placement Type</b>
Total CYs	564,832 <sup>1</sup>	1974	124,332	595.5-596.5	595.7-596.0R	Bank line
# of Events	22	1983	12,578	596.0-596.2	595.8-596.0R	Bank line
Avg per Event	25,674	1985	27,326	596.0-596.4	595.8-596.0R	Bank line
		1988	26,451	596.0-596.3	596.1-596.3R	Bank line
		1993	21,167	595.7-596.0	595.5R	Bank line
		1994	29,243	595.5-595.6	595.9L (Sand Pad for Closing Dam)	Open Water
		1999	22,022	595.4-595.5	RM 608.0L (WI Light & Power DMMP site)	Upland
		2003	15,471	594.5-595.6	606.1L (Dairyland DMMP site)	Upland
		2004	20,274	594.9-595.6	606.1L (Dairyland DMMP site)	Upland
		2006	33,481	594.8-595.7	595.7-596.0R	Bank line
		2007	9,642	596.5-596.7	599.0L 4,061, 610.3-610.4L	Bank line
		2007	5,775	596.0-596.2	610.3-610.4L	Bank line
		2008	5,611	595.5-595.7	596.0R	Bank line
		2008	15,908	594.8-595.1	596.0R	Bank line
		2009	9,617	595.4-595.7	598.8L	Bank line
		2010	17,834	595.4-595.7	598.8L	Bank line
		2012	35,577	594.7-595.6	596.0R, 598.8-599.0L	Bank line
		2016	18,702	594.8-595.5	595.7-596.0R	Bank line
		2018	44,046	595.5-596.5	595.7-596.0R & Bathtub Construction 594.2L	Bank line/Inland
		2018	16,775	594.2-594.2	595.7 - 596.0R	Bank line
		2019	25,000	596.0-596.5	594.1L (Bathtub Construction)	Bank line, Re- handled to Bathtub
		2019	28,000	594.5-595.3	594.1L (Bathtub Construction)	Bathtub

<sup>1</sup> Does not include 2020 totals

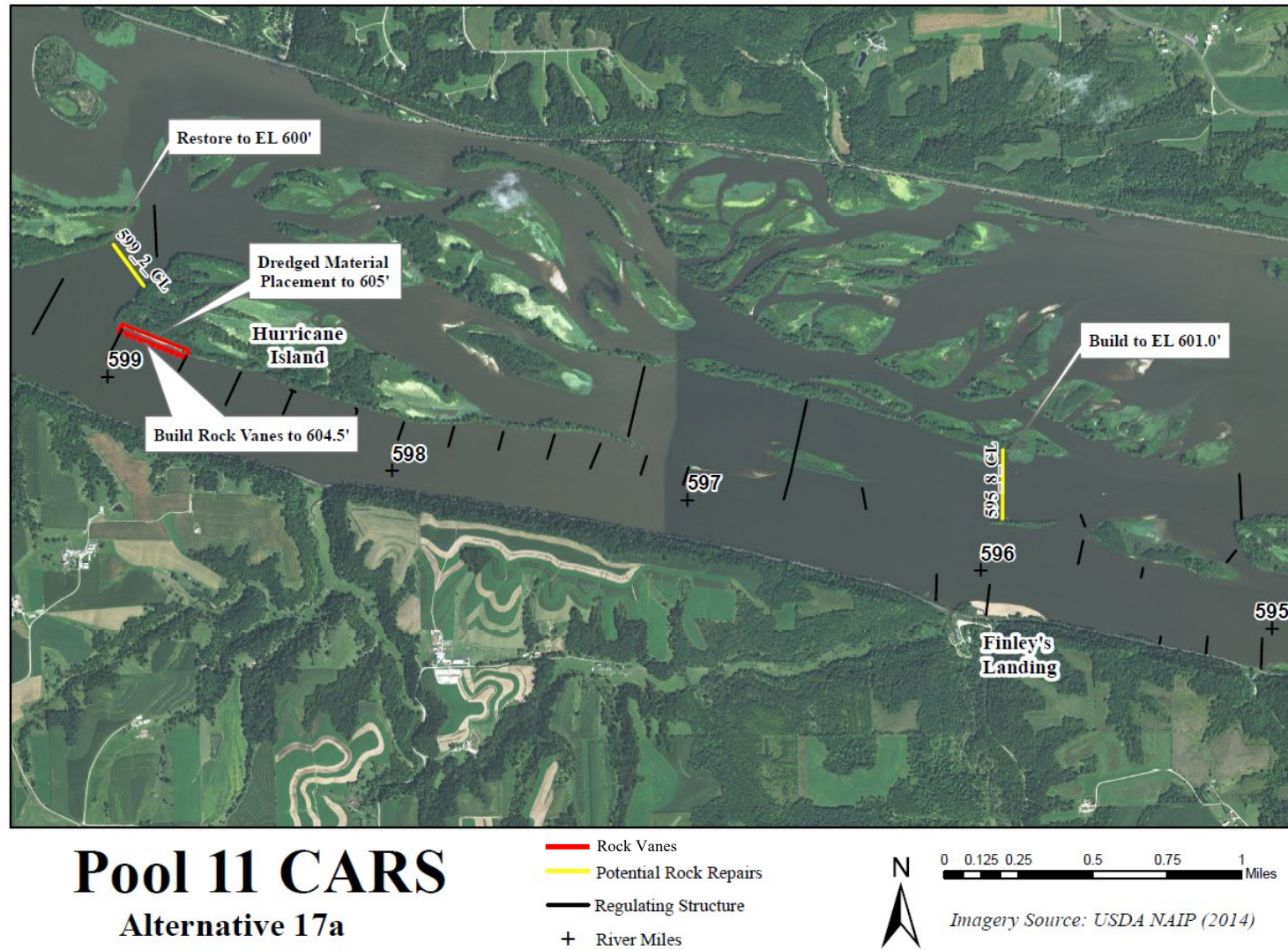
**Alternative 17A. Closing Dam Restoration and Enhancement with Rock Vanes.** Repair includes rebuilding 599\_2\_CL at the head of Hurricane Island near RM 599.2 to original design grade elevation (600 feet) and raising 595\_8\_CL to elevation 601 feet along the left descending bank at RM 595.8 (Figure EA-4). After reevaluating the hydraulic modeling for Alternative 17, it was determined that closing dams 599\_3\_TL and 595\_7\_CL may not provide added benefit and these structures were not included in Alternative 17A. Closure structure 595\_8\_CL would have a notch with a length of 250 feet to an elevation of 599.5 feet to ensure access for recreational boaters, as requested by the IADNR. An analysis using the 2D AdH model was completed to determine if a notch in the closure structure would reduce the effectiveness. While the effectiveness of the raised closure structure was slightly decreased with the notch, there was still an overall increase in discharge and velocity in the main channel. Once Alternative 17A went through the floodplain analysis again and met the floodplain requirements, the effectiveness of including the Hurricane Island bank line placement and rock vanes was considered. As vanes are overtopped, they function as weirs and redirect flow away from the shore (USACE, 2012). Vanes are effective on shorelines adjacent to moving current. In many situations, vanes also function as groins by reducing littoral drift due to wind-driven wave action. Because of this dual function, the angle of the vane with the upstream shoreline is fairly large.

The placement and rock vanes were evaluated in the 2017 Hurricane Island DMMP project, but were removed from the design due to floodplain impacts. However, several updates were made to the hydraulic model in this Project, enabling the inclusion of Hurricane Island bank line placement and rock vanes to meet floodplain requirements: 1) cross sections were updated using terrain instead of interpolated values and 2) decreasing the width of the dredge material placement to 125 feet from the mature treeline. The placement would be 1,000 ft in length and placed to an elevation of 605' MSL 1912. A total of nine rock vanes would be constructed, each 30 feet long and at an angle of 45 degrees. The height of each the rock vane would be 604.5' MSL 1912. At the most upstream end of the placement site, an existing wing dam would be partially restored to act as a larger rock vane to protect the dredged material from erosion. The upstream rock vane would have similar properties as the other rock vanes but would be perpendicular to the main channel and with a longer length of 150 feet. Figure EA-4 shows the design features of Alternative 17a.

Table EA-3 collectively displays the proposed lengths, elevations, and rock quantity estimates. If constructed, the closing dams would be approximately 2-3 feet below the water surface at normal river stage. Like the typical closing dams, proposed repairs would reconnect the structure to the Wisconsin shoreline. The closing dams would tie in at each bank line location, approximately 200 feet above and 200 feet below each dam. Figures EA-5 and EA-6 depict preliminary closing dam design dimensions for 599\_2\_CL (North) and 595\_8\_CL (South), respectively. Figure EA-7 depicts preliminary design dimensions for the proposed rock vanes and Figure EA-8 shows an aerial overlay of the design.

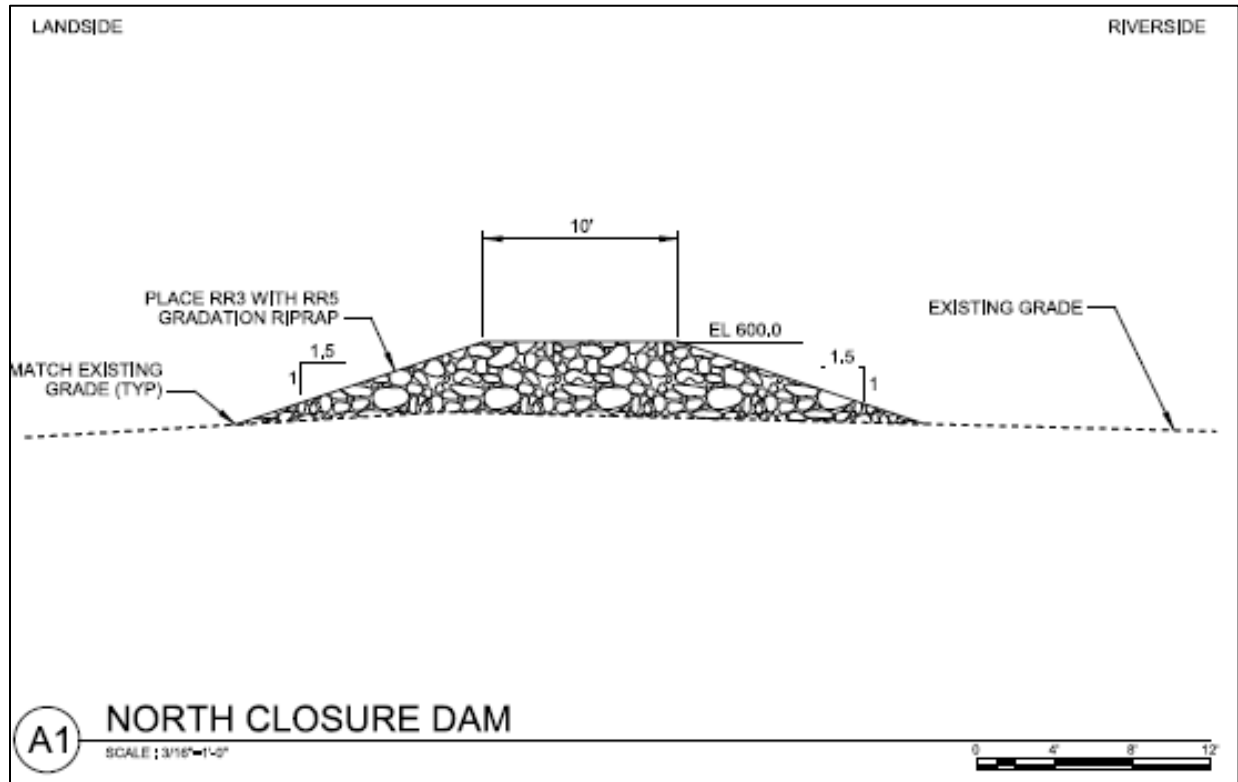


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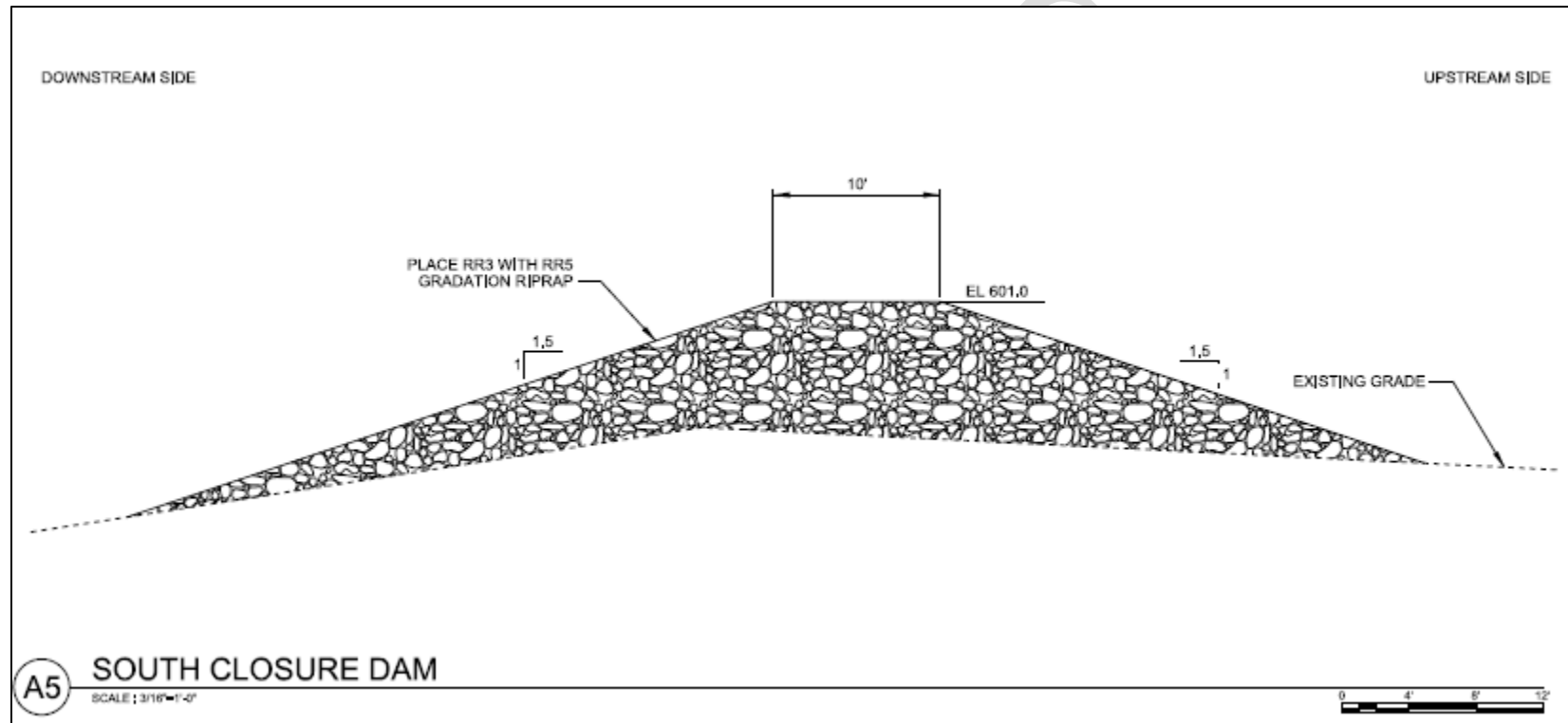
**Figure EA-4.** Alternative 17a Preliminary Design Features

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**Figure EA-5.** Design Dimensions for 599\_2\_CL

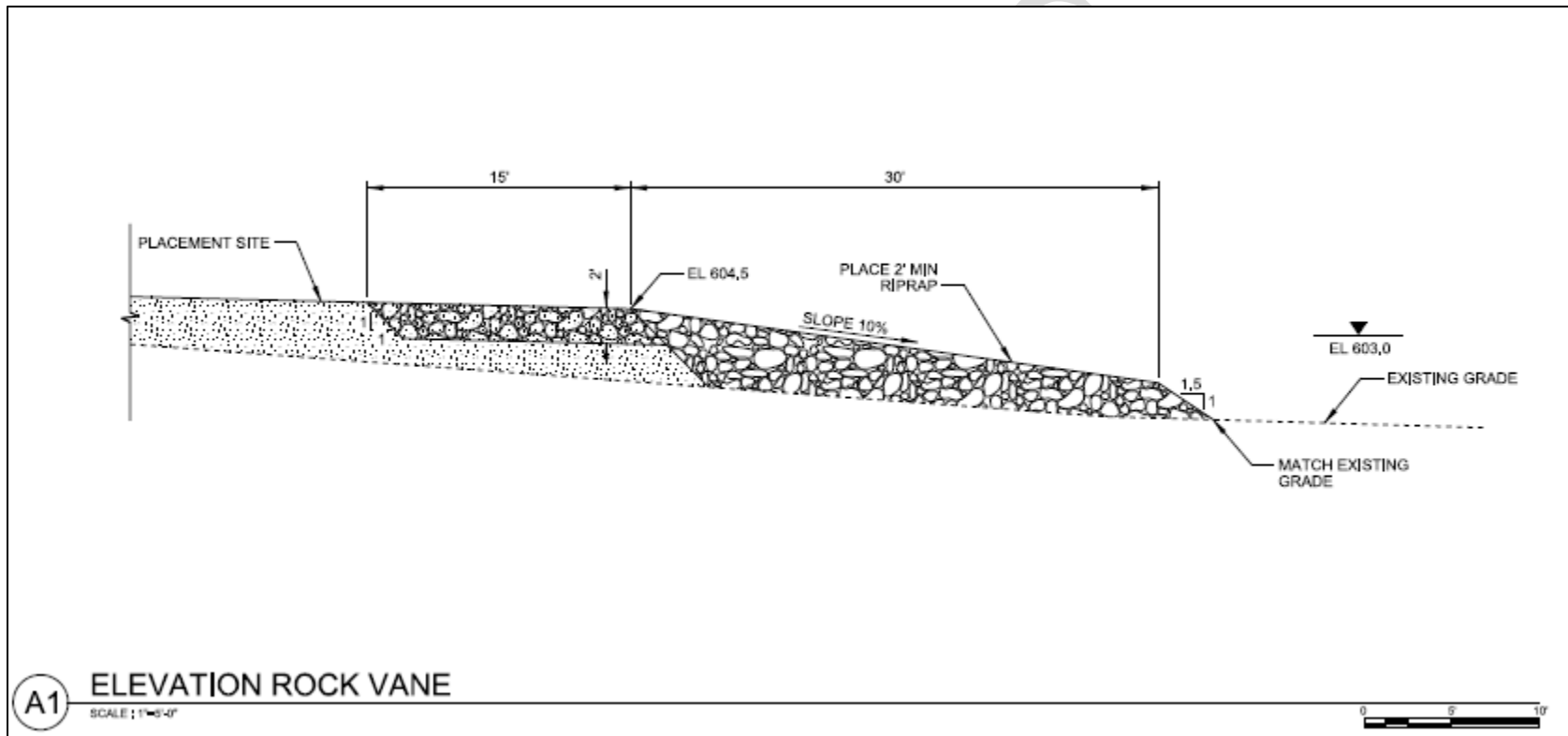
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**Figure EA-6.** Design Dimensions for 595\_8\_CL

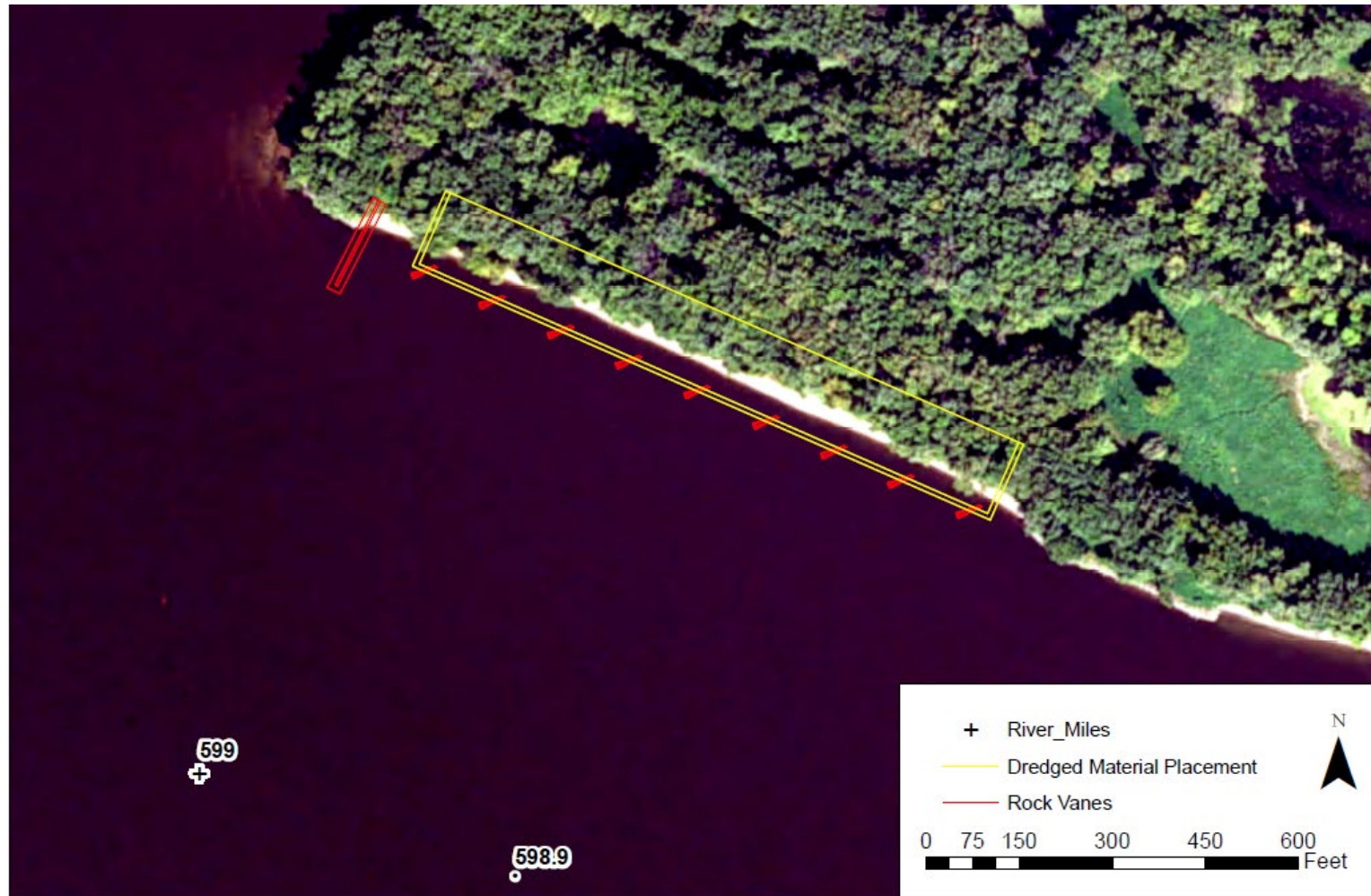


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**Figure EA-7.** Design Dimensions for Rock Vanes

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**Figure EA-8.** Aerial Overlay of Hurricane Island Bank Line Placement Site and Rock Vanes

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**Table EA-3.** Summary of Alternative 17a Structure Repair or Enhancement

<b>Structure</b>	<b>River Mile</b>	<b>Year Built</b>	<b>Design Elevation (ft) (MSL 1912)</b>	<b>Restore/Enhance Elevation (ft) (MSL 1912)</b>	<b>Depth Below Flat Pool (603 ft)</b>	<b>Surveyed Length (ft)</b>	<b>Fill Volume (CY)</b>	<b>Fill Qty (TN)</b>
599.2 CL	599.2	1996	600.0	600.0	3	1000	2,716	4,481
595.8 CL	595.8	1994	599.0	601.0	2-3.5 <sup>1</sup>	899	2,259	3,757
Rock Vanes	599.1-598.8	N/A	604.5	N/A	-1.5	30 <sup>2</sup>	160	264

<sup>1</sup> Per IADNR request, a 250-foot wide by 1.5-foot depth notch will be added to this structure to allow for recreation access.

<sup>2</sup> The most upstream vane would be constructed in the existing wing dam footprint to reduce erosion (Figure EA-8). It would have the same top elevation and slopes but will be longer (150 feet) than the proposed downstream rock vanes (9 total).

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A hydraulic solution in the Project area is necessary to capture and maintain a flow in the Mississippi River main channel capable of maintaining the 9-foot navigation channel. Additional modeling indicated that closing dam structures listed in Table EA-3 would provide the greatest increase of shear stress and velocity to the navigation channel. The goal of restoring or enhancing regulating structures is to divert energy and flow into the navigation channel. Raising 595\_8\_CL and restoring 599\_2\_CL would direct more flow and increase the velocities, shear stress, and discharges into the main channel, therefore decreasing sediment deposition and likely the frequency of dredging. Dredging will not be entirely eradicated in the Project area, but the District anticipates the frequency, duration, and quantity of dredging will be reduced as a result of implementing the proposed alternative.

**2.4. Comparison of Alternatives.** Implementing either alternative would have specific environmental implications on the ability of the Project to meet the objectives outlined in Section 1.1. Table EA-4 depicts a summary comparison of the alternatives and provides a key part of the information needed by the District and the public to make an informed, reasoned decision regarding the implementation of a preferred alternative.

**2.5. Selection of the Preferred Alternative.** Minimization and avoidance of federally-listed endangered species and floodplain impacts were heavily considered in the evaluation of alternatives (see Section 4.0, *Environmental Consequences*). These considerations were balanced with the need to maintain navigation infrastructure and reduce shoaling in the main channel. After several iterations of hydraulic and environmental analysis, in cooperation with OSIT and other key stakeholders in the area, Alternative 17a was determined to be the Preferred Alternative to achieve Project objectives while minimizing impacts to the natural environment.

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**Table EA-4.** Comparison of Achievement of Project Objectives of the Project Alternatives

Objective	Indicators	Alternative 0 No Action	Alternative 17A CL 599 2, 595 8 and Rock Vanes
<b>Objective #1.</b> Improve commercial navigation in the Project area to allow for maintenance of the 9-foot navigation channel in a cost-efficient manner, while minimizing impacts to environmental resources.	Maintain the 9-foot navigation channel	Current channel maintenance practices would continue. Based on the past 20-year history, average annual dredging in the Finley's Landing reach would be about 20,233 yds <sup>3</sup> of dredge material placed at historic placement sites	Channel maintenance would likely continue but with less dredging and therefore at a reduced O&M cost. Repair of regulating structures and installation of rock vanes will increase habitat diversity in off-channel areas.
<b>Objective #2.</b> Repair or enhance regulating structures determined to need modification to divert energy and flow into the navigation channel.	Increased velocities and shear stress in the main channel.	The main channel border would remain rather consistent with shifting sand near the main channel. This existing condition is unsuitable habitat for many aquatic species.	Reduced dredging would extend the life of placement sites and new placement sites may not be needed as quickly.
<b>Objective #3.</b> Reduce the sediment deposition and frequency of dredging events by repairing regulating structures, resulting in the reduction of channel maintenance and operating (O&M) costs.	Reduced channel maintenance actions and reduced O&M costs.	The frequency of dredging events is likely to increase as sediment deposition remains unabated, therefore increasing channel O&M costs.	Closing dam repair forces flow into the main channel and would cause a change in river bottom conditions, specifically in the main channel. Threats of vessel groundings and channel closures likewise will be reduced.
<b>Objective #4.</b> Take advantage of opportunities to restore existing island footprints through the indirect benefit of modifying regulating structures and protect bank line areas from erosion by adding rock vanes to existing placement areas.	Reduced bank line erosion and increased island land mass area	The bank line of the historic placement site will continue to erode, causing more migration of sand into the navigation channel.	Addition of rock vanes tied into the shoreline adjacent to the historic placement site will protect it from bank line erosion.

**2.6. Construction, Staging and Safety.** The District's maintenance crew is based at the Mississippi River Project Office in LeClaire, Iowa. The crew would load barges with necessary equipment for transit to Pool 11. Maintenance crew employees typically work four 10-hour days. Approximately 4 to 6 vehicles would report to the Project area via Finley's Landing, a public boat launch managed by Dubuque County. The District's use would not disrupt typical recreational use at the area as most of the public use occurs on weekends.

Construction of the Project is dependent on available funding and could begin as early as spring 2021. The timing and duration of construction may continue for several construction seasons (generally late spring to early fall) if river conditions delay Project completion. Construction of rock vanes would occur concurrently or shortly after placement at the dredge material bank line site on Hurricane Island.

Regulating structure repair typically involves the use of deck-mounted cranes and/or derricks, deck barges, endloaders, quarter boats, and tender craft. Using this equipment, the District would place the rock material on the specified alignments and shape them to the design cross section. Large-grade stone is placed by crane or derrick. Quarried rock would be sourced from a Corps approved quarry and transported to the Project location via barge. The specific quarry is unknown at this time, as the contracting process would not be initiated until completion of the EA and funding is allocated.

Corps-approved quarries provide rock commercially for many purposes, therefore sourcing the riprap would not cause a significant increase in typical workload of the quarry. The Mississippi River is a transportation system and experiences frequent barge and recreation traffic. Transportation of riprap to the Project area would not significantly increase traffic on the UMR. No access dredging will be required for the Project and barges would likely be moored along the navigation channel at the Hurricane Island historic placement site.

The District Engineering Branch requires Iowa Department of Transportation Class A (or equivalent) for regulating structure construction; inclusion of fine material is not permitted. The Riprap Scope of Work (SOW) states:

1. Riprap stone shall be of a suitable quality to ensure permanence in the structure and in the climate to be used. It shall be free from cracks, seams, and other defects that would tend to increase deterioration from natural causes. The inclusion of objectionable quantities of dirt, sand, clay, and rock fines, as determined by the Corps POC, will not be permitted. Stone shall be reasonably well graded over the entire range of sizes conforming to the limitations specified to follow and further delineated on the chart included as Attachment B titled (Coarse Alternative Riprap Gradation Curve & Tally Chart).

2. Neither the breadth nor the thickness of any piece shall be less than one-third of its length. All stone shall be processed to remove fine particles by loading over a vibrating screen, with not less than 6 inch bar spacing, or by other approved methods and equipment that will result in satisfactory removal of fine particles. No individual piece shall exceed the maximum gradation size by more than 10 percent, i.e., 440 pounds, and the total combined weight of all over-sized pieces for each gradation shall not exceed 10 percent of the total sample size. The above SOW would be included during the contracting process.

Occupational health is a District priority. The District adheres to EM 385-1-1, *Safety and Health Requirements Manual*, along with Occupational Safety and Health Administration (OSHA) policies, to ensure personnel safely perform our work and minimize potential exposures.

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### **Riprap**

<u>Percent Finer By Weight (SSD)</u>	<u>Limits of Stone Weight in Pounds</u>
100	400-250
50	175-90
15	50-15

### **3.0. AFFECTED ENVIRONMENT**

Chapter 3 describes the baseline environmental conditions potentially affected by the Project. The District considered all possible environmental factors potentially influenced by the proposed Project prior to writing this EA. From this analysis, the District was able to focus their environmental review on specific resources and eliminate others from further evaluation.

**3.1. Resources Not Evaluated in Detail.** The EA does not contain detailed discussions on resources not found in the planning area, not be impacted at all by any of the alternatives, or not impacted more than during typical activities. These include:

- Prime and Unique Farmlands
- Soils
- Coastal and Estuaries Areas
- Wild and Scenic Rivers
- Noise
- Mineral and Energy Resources
- State and Federally-listed endangered and threatened species inhabiting terrestrial habitats

**3.2. Relevant Resources Found in the Planning Area.** The District focused their evaluation on resources potentially affected by any of the alternatives. These include:

- Fisheries
- Mussels
- Threatened and Endangered Species
- State-listed Species
- Water Quality and Wetlands
- Migratory Birds
- Substrate and Benthic Communities
- Socioeconomic Resources
- Minority and Low-income Populations (Environmental Justice)
- Cultural Resources
- Constructed Resources
- Climate
- Air Quality
- Invasive species
- Navigation
- Land Use

**3.2.1. Fisheries.** The aquatic habitat in Pool 11 supports a productive sport and commercial fishery. The WIDNR and IADNR, among others, have conducted fish surveys in Pool 11. The expected fish

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community reflects those species typical of large rivers and associated habitats (chutes and backwaters). Fish species expected to occur near the Project area include channel catfish (*Ictalurus punctatus*), blue catfish (*I. furcatus*), flathead catfish (*Pylodictis olivaris*), freshwater drum (*Aplodinotus grunniens*), river carpsucker (*Carpoides carpio*), quillback (*C. cyprinus*), gizzard shad (*Dorosoma cepedianum*), silver carp (*Hypophthalmichthys molitrix*), bighead carp (*H. nobilis*), smallmouth buffalo (*Ictiobus bubalus*), bigmouth buffalo (*I. cyprinellus*), longnose gar (*Lepisosteus osseus*), shortnose gar (*L. platostomus*), and emerald shiner (*Notropis atherinoides*). Fishes will inhabit all areas of the river and its spectrum of river velocities, water clarity, substrate, etc. In the Project area, which is comprised of main channel border habitat, the USFWS Natural Resource Inventory (2015) identifies a potential commercial fishery area along the left descending bank.

**3.2.2. Mussels.** Pool 11 has historically contained a rich abundance of mussel resources and there have been several surveys recorded within the Project area. In 1996, the District contracted for a mussel survey to assess a closing dam post-construction at RM 595.8. This is the same closing dam (595\_8\_CL) currently proposed for repair as part of Alternative 17a. This survey produced similar pre-construction mussel survey results: both surveys characterized substrate as unstable silty sand and were similar to pre-construction survey completed in 1992. The post-construction survey yielded 211 individuals of 15 live species, but no federally-listed endangered species were recovered. Mussel abundance, richness, and composition did not appear to be affected by the closing dam construction and habitat changes were limited to the area of dam placement.

In 2012, the District partnered with the Corps' Memphis District dive team, which surveyed for mussels just downstream of the current Project area. Since 2012, the District has changed some of the dredge placement sites prompting the current survey/relocation need. The survey yielded five Higgin's Eye pearlymussel (*Lampsilis higginsii*) and four sheepsnose (*Plethobasus cyphus*) adults.

In 2016, the District contracted for a mussel survey to assess potential placement sites for the Hurricane Island DMMP. No mussels or suitable habitat was found at the Hurricane Island bank line placement site (RM 599.0), which is the site of the proposed rock vanes for this Project. Downstream of the proposed CARS repairs, the survey yielded 11 *L. higginsii* and zero *P. cyphus* adults near the Rosebrook Island area/bathtub site (RM 593.4-595.0); however, it is likely that *P. cyphus* may inhabit the Rosebrook Island area given previous survey records and diverse mussel beds located in the Pool 11 reach.

District staff and the USFWS conducted a site visit on August 1, 2018, to look at several regulating structures in the Project area. Side-scan sonar of these structures indicated that many are either completely or partially filled in with shifting sand. The increased flows and velocities near the breach of 599\_2\_CL does not currently support suitable mussel habitat. The group also searched the shoreline at the head of Hurricane Island and downstream of Finley's Landing placement site. Hurricane Island had very few mussel shells on the shoreline and the substrate consisted of mostly fine sands, whereas the site downstream from Finley's Landing placement site had the most promising habitat consisting of gravelly substrate and several species of dead shell mussels were recovered on the shoreline (Photograph EA-1).



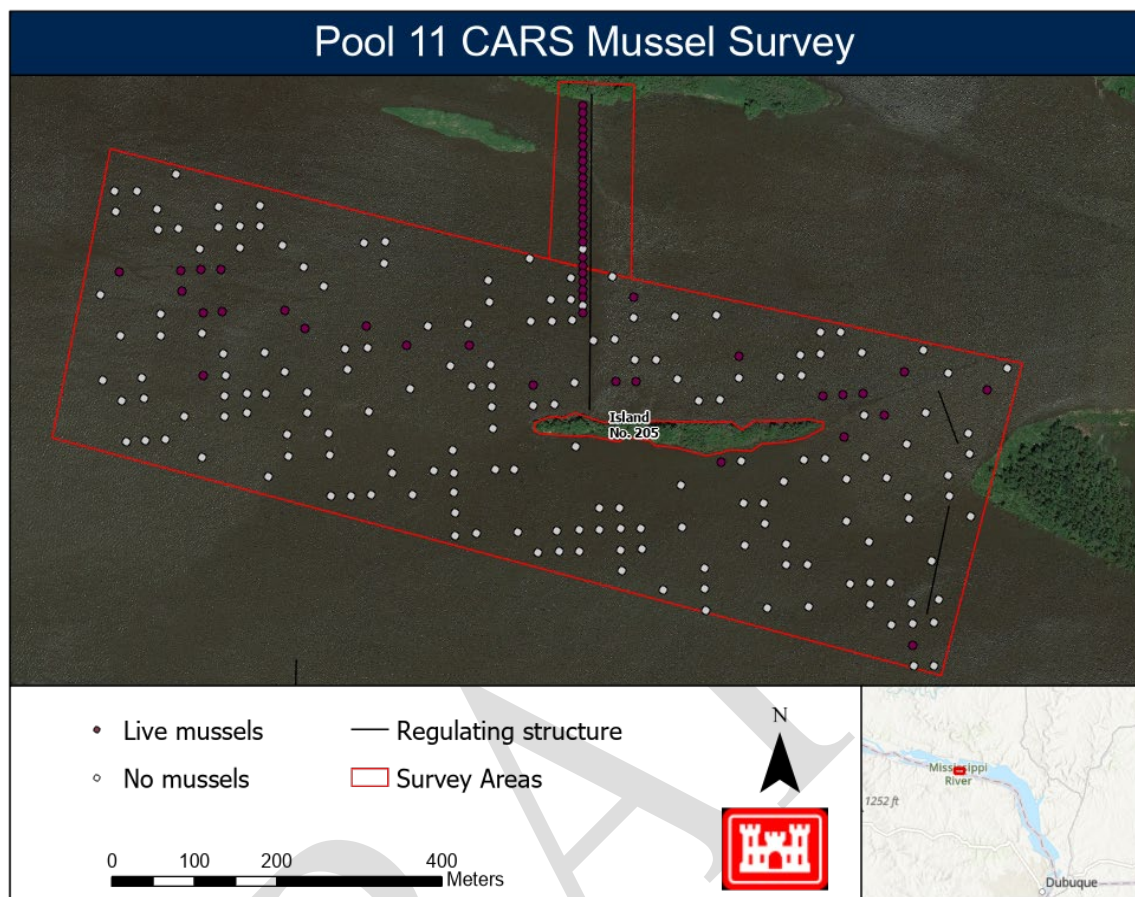
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**Photograph EA-1.** Shoreline Search of Mussels Downstream of  
Finley's Landing Placement Site on August 1, 2018

Due to a lack of survey data in waters surrounding Island 205 and the proposed 595\_8\_CL enhancement, the District retained Environmental Solutions & Innovations, Inc. (ESII) in November 2018 to conduct a mussel survey in this area. However, due to high waters and unsafe diving conditions in November, field investigations were halted and completed in August 2019 (Figure EA-9). The survey included a combination of quantitative and semi-quantitative sampling procedures per the USFWS' UMR Mussel Sampling Guidelines. The survey resulted in the collection of 299 live mussels representing 18 species, a majority of which (n = 227) were recovered during timed searches on the upstream edge of 595\_8\_CL. No federally-listed mussel species were recovered as part of this survey and there was no evidence of the spectaclecase mussel (*Cumberlandia monodonta*) along suitable microhabitats of 595\_8\_CL (Ecological Solutions & Innovations, Inc., 2019).

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**Figure EA-9.** 2019 Mussel Survey Locations Near Island 205 and 595\_8\_CL

**3.2.3. Threatened and Endangered Species.** The District used the USFWS Information for Planning and Consultation (IPaC) website to identify potentially occurring federally-listed species for the Project location (Table EA-5). The Project resides completely in Grant County, Wisconsin, but due to its proximity to Dubuque County, Iowa, the District considered Dubuque County species in their analysis. No designated critical habitat is present within the Project area and no federally-listed mussels were recovered in the 2019 mussel survey.

**3.2.4. State-Listed Species.** The Project resides completely in Grant County, Wisconsin; therefore, the District considered only Grant County species in their analysis. A list of Wisconsin Threatened (T) and Endangered (E) species can be found at <https://dnr.wi.gov/>. The 2019 mussel survey did recover four live state-endangered yellow sandshell mussels (*Lampsilis teres*), one live state-threatened monkeyface mussel (*Thelidderma metanevra*), and 12 live state-threatened wartyback mussels (*Quadrula nodulata*). Only 12 of these 17 state listed individuals occurred along the upstream edge of 595\_8\_CL, which is one of the proposed repairs included in the Preferred Alternative.

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**Table EA–5.** Federally-Listed Species with the Potential to Occur within Grant County, WI

Species	Scientific Name	Status	Habitat Types
Northern Long-Eared Bat	<i>Myotis septentrionalis</i>	Threatened	During the winter, caves and mines and during the summer, underneath flaky bark, in cavities or in crevices of both live trees and snags (dead trees).
Higgins Eye Pearlymussel	<i>Lampsilis higginsii</i>	Endangered	Larger rivers with deep water and moderate currents
Spectaclecase Mussel	<i>Cumberlandia monodonta</i>	Endangered	Large rivers where they live in areas sheltered from the main force of the river current, such as beneath rock slabs, between boulders and even under tree roots.
Mead's Milkweed	<i>Asclepias meadii</i>	Threatened	Moderately wet (mesic) to moderately dry (dry mesic) upland tallgrass prairie or glade/barren habitat characterized by vegetation adapted for drought and fire.
Northern Wild Monkshood	<i>Aconitum noveboracense</i>	Threatened	Shaded to partially shaded cliffs, algific talus slopes, or on cool, streamside sites.
Prairie Bush Clover	<i>Lespedeza leptostachya</i>	Threatened	Found only in the tallgrass prairie region
Western Prairie Fringed Orchid	<i>Platanthera praeclara</i>	Threatened	Occur most often in mesic to wet unplowed tallgrass prairies and meadows but have been found in old fields and roadside ditches.
Iowa Pleistocene Snail	<i>Discus macclintocki</i>	Endangered	Leaf litter of special cool and moist hillsides or algific talus slopes.
Hine's Emerald Dragonfly	<i>Somatochlora hineana</i>	Endangered	Spring-fed marshes and sedge meadows overlaying dolomite bedrock.
Whooping Crane	<i>Grus Americana</i>	Experimental Population, Non-essential	Wetlands, marshes, mudflats, wet prairies and fields.
Monarch Butterfly	<i>Danaus plexippus</i>	Candidate	Typically grasslands, but also any areas where milkweed and flowering plants are found.

Source: US Fish and Wildlife Service's Information for Planning and Consultation (IPaC) website, 2020



**3.2.5. Water Quality and Wetlands.** The Mississippi experiences heavy boat and barge traffic, as well as inputs from adjacent industrial companies and agricultural facilities, that influence water quality. The USEPA listed Pool 11 as impaired under the CWA, Section 303(d) (<https://www.epa.gov/tmdl>). According to draft data from 2016, the State of Iowa listed this reach as impaired due to aluminum levels. In a final report with additional data from 2018, Wisconsin listed total phosphorus, PCBs, and mercury as other pollutants increasing the impairment of Pool 11 (Table EA-6). This degraded water quality has led to fish consumption and other use restrictions. Total Maximum Daily Loads (TMDLs) have not yet been established for this reach of the river. TMDLs are pollution reduction plans that assign the maximum amount of a pollutant a water body can receive and still meet water quality standards.

**Table EA-6.** Potential Causes for Impaired Water Quality, Mississippi River, Grant County, WI

Potential Cause	Impaired Designated Use
Polychlorinated biphenyls	Fish Consumption
Phosphorus	Plant, Macroinvertebrate, and Fish Consumption
Mercury	Fish Consumption

Source: WIDNR, 2018

The Project area is completely in the waters of the Mississippi River. The Cowardin et al (1979) classification for this type of habitat is riverine. General characteristics of this habitat type include flowing water with upland islands usually, but not always, present. The entire UMR has undergone dramatic changes in the extent, composition, and structure of its wetland forests over the last two centuries. Lack of mast-tree regeneration, reduction of species diversity, and increased tree mortality can be directly attributed to the increase in flood frequency and duration over time. Islands in this reach consist of a mix of herbaceous wetlands and wetland forests. Wetland forest composition consisting of cottonwood, silver maple, honey locust, black cherry, red and white mulberry, American elm, green ash, boxelder, sycamore, gray dogwood, amur bush honeysuckle, common hackberry, and black willow is common. While the bathtub site (RM 594.0) consists of a mix of shallow/deep marsh and sedge meadow wetlands, there are no regulated wetlands within the Project area.

**3.2.6. Migratory Birds.** Bald eagle (*Haliaeetus leucocephalus*), heron rookeries, waterfowl, and neotropical migratory birds are the typical avian community found within Pool 11. The USFWS National Wildlife and Fish Refuge (NWFR) indicated there are no active bald eagle nests or heron rookeries within 660 feet of the proposed closing dam repairs or rock vane installation.

**3.2.7. Substrate and Benthic Communities.** The Project area is located in the main channel border with a river bottom composed primarily of shifting medium to fine sand. Increased river flows influence the substrate from the navigation channel toward the Wisconsin shoreline. Between the navigation channel and shoreline, the river becomes shallow shifting sand then transitions to a deep side channel. The benthic community consists largely of organisms considered part of the tolerant taxa, which are large portion of the invertebrate community. In addition to native mussels, some of the organisms inhabiting the main channel border are Chironimidae (midges), Diptera (true flies), Oligochaeta (aquatic worms), Ephemeroptera (mayflies), Sphaeriidae (fingernail clams), *Corbicula fluminea* (asian clams), *Dreissena polymorpha* (zebra mussels), Odonata (Dragonflies and damselflies), and Gastropoda (snails).

**3.2.8. Socioeconomic Resources.** The Project area is dominated by an undeveloped forested area and has little residential populations. The Project is located in Pool 11 on the Mississippi River, which flows through Dubuque County, Iowa, and Grant County, Wisconsin. The land in these two counties is used primarily for agriculture, but there is also significant industrial development, especially near City of

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Dubuque, Iowa (approximately 15 river miles downstream), as shown on Table EA-7. Table EA-8 shows cumulative acreage totals for Dubuque and Grant Counties classified by land and water resource descriptions. This information was retrieved from the 2019 USDA National Agricultural Statistics Service Cropland Data Layer. Water-based activities dominate recreation use, with boating, boat fishing, and sightseeing being the most popular activities. Finley's Landing is a popular recreational area and is at full capacity, allowing limited space for residents to enjoy. Agriculture is the largest single land use in this reach of the river. There are no low income or minority populations in the planning area, as the Project area is entirely within the river.

**Table EA-7.** Mississippi River Pool 11 Business and Industry Distribution by County

Major Industry	Number of Establishments		Total	% of Total
	Dubuque Co., IA	Grant Co., WI		
Agriculture, forestry, fishing and hunting	17	8	25	0.6
Utilities	4	6	10	0.2
Construction	299	146	445	11.1
Manufacturing	148	67	215	5.4
Wholesale trade	165	54	219	5.5
Retail trade	424	185	609	15.2
Transportation and warehousing	120	60	180	4.5
Information	55	42	97	2.4
Finance and insurance	206	88	294	7.3
Real estate and rental and leasing	121	51	172	4.3
Professional, scientific, and technical services	183	56	239	5.9
Management of companies and enterprises	28	0	28	0.7
Administrative and support and waste management and remediation services	125	42	167	4.2
Educational services	39	10	49	1.2
Health care and social assistance	282	111	393	9.8
Arts, entertainment, and recreation	58	19	77	1.9
Accommodation and food services	250	129	379	9.4
Other services (except public administration)	271	149	420	10.5
<b>Total</b>	<b>2795</b>	<b>1223</b>	<b>4018</b>	
<b>% of Total</b>	69.6	30.4		

Source: U.S. Census – 2016 County Business Patterns and 2016 North American Industry Classification System Codes

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**Table EA-8:** Land and Water Resource Acreages for Pool 11 Counties

Class Name	Acres	% Total
Corn	294,880	26.98
Soybeans	93,448	8.55
Alfalfa	65,980	6.04
Open Water	27,039	2.47
Developed/Open Space	39,187	3.59
Developed/Low Intensity	25,683	2.35
Developed/Medium Intensity	7,145	0.65
Developed/High Intensity	2,093	0.19
Deciduous Forest	281,750	25.78
Grass/Pasture	231,641	21.20
Woody Wetlands	17,162	1.57
Herbaceous Wetlands	6,796	0.62
<b>Total</b>	<b>1,092,804</b>	<b>100</b>

Source: USDA – National Agricultural Statistics Service, 2019

Existing socio-economic information for Iowa and Wisconsin counties near the Project area is as follows (U.S. Census, 2010):

**Dubuque County, Iowa.** With an average population density of 154 people per each of its 608 square miles (2010), Dubuque County, Iowa, experienced a 3.9% increase in total population from 93,653 to 97,311 people during the years 2010 to 2019 (2019 estimated). The median household income is estimated at \$61,321, with 11.3% of persons living below the poverty level (2014-2018). Income per capita is \$31,096 (2018). Of persons over 25 years of age, 92.4% have a high school education or higher and 30.5% have a Bachelor's degree or higher (2014-2018).

**Grant County, Wisconsin.** With an average population density of 45 people per each of its 1,147 square miles (2010), Grant County experienced a 0.5% increase in total population from 51,208 to 51,439 people during the years 2010 to 2019 (2019 estimated). The median household income is estimated at \$52,958, with 14.0% of persons living below the poverty level (2014-2018). Income per capita is \$24,974 (2018). Of persons over 25 years of age, 92.3% have a high school education or higher and 23.0% have a Bachelor's degree or higher (2014-2018).

**3.2.9. Minority and Low-Income Populations (Environmental Justice).** According to the Environmental Protection Agency's Environmental Justice Screening and Mapping Tool (Version 2019), the region surrounding the Hurricane Island/Finley's Landing Reaches is comprised of 14% percent minority population and of 10% low income population.

**3.2.10. Cultural Resources.** The Corps is required to search for, identify, and determine effects upon historic properties eligible for, or listed on, the National Register of Historic Places and to seek comments from the appropriate State Historic Preservation Officer (SHPO) and relevant federally-recognized tribes. These requirements are promulgated under Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, and its implementing regulations, 36 CFR Part 800: Protection of Historic Properties.

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The District conducted an archival search for historic properties following the Policy and Procedures for the Conduct of Underwater Historic Resource Surveys for Maintenance Dredging and Corps Activities (Dredging Guidance Letter-89-01, March 1989). The District queried the Iowa GIS site file database and the Wisconsin Historic Preservation Database and reviewed the report entitled An Investigation of the Submerged Historic Properties in the Upper Mississippi River and Illinois Waterway, dated October 1997, for historic properties potentially affected by the Project. The Area of Potential Effect (APE) contains no recorded archeological sites or architectural properties. One prior archeological survey overlaps a portion of the APE.

The Project's Landform Sediment Assemblages are limited to "channel" at the closing structures and "island" at the terminus of each closing structure and at the rock vane construction location. These landforms have low potential for intact cultural resources as they are newly formed and subject to frequent erosion and inundation. Landform Sediment Assemblages designations are based on the report entitled Landform Sediment Assemblage Units in the Upper Mississippi River Valley, United States Army Corps of Engineers, Rock Island District, Vol. 1 and 2, dated 1996.

An archeological survey was conducted in 1992 by a District archeologist over a portion of the 595.8 closure structure (92-0369). The review consisted of surface survey supported by shovel testing and failed to document any evidence of archeological remains. No further work was recommended.

**3.2.11. Constructed Resources.** There is a total of 184 Corps'-built wing dams, closing structures, and bank line protection structures in Pool 11. A majority of rock structures were constructed between 1880 and 1933. While these regulating structures are still functional to some degree, they need maintenance and, at times, the District upgrades them to increase their efficiency for maintaining the 9-foot navigation channel. The most recent rock construction in Pool 11 occurred in 2006 with the construction of the Pool 11 Islands Habitat Rehabilitation and Enhancement Project (HREP) near Mud Lake. The most recent rock construction within the Project area occurred in 1994 and 1996, with the construction of 595\_8\_CL and 599\_2\_CL, respectively.

Since the Corps has modified the Mississippi River main channel beginning in the 1800s to the present day, the District considers the navigation channel a manmade resource. Other manmade resources in the vicinity of the wing dams include Finley's Landing campground, the railroad adjacent to the river in both Iowa and Wisconsin, the bathtub site at RM 594.1, the USFWS-managed UMR NWFR, and a few local parks.

**3.2.12. Climate.** According to the National Oceanic and Atmospheric Administration's National Centers for Environmental Information (NOAA, 2020), since 1895, annual temperature in Project area has risen approximately 0.1°F per decade to present day. Temperatures in the 2000s were higher than any other historical period, excepting the early 1930's "Dust Bowl" era. Warming has been concentrated in winter and spring while summers have not warmed substantially in the region, a feature characteristic of much of the Midwest.

Average annual precipitation for the period of record is 33.39 inches and has ranged from a low of 20.41 inches in 1988 to a high of 51.06 inches in 2018. The driest multi-year periods occurred in the majority of years in the first half of the 1900s, and the wettest periods have been observed since the 1990s and into the 2000s. The driest 5-year period was 1900–1905 and the wettest was 2007–2011. Frost-free period is 120 to less than 32 inches in the north 180 days. Elevation is 177 to 466 meters (580 to 1,530 feet) above mean sea level.

**3.2.13. Air Quality.** The USEPA *Green Book Nonattainment Areas for Criteria Pollutants* (Green Book, 2020) maintains a list of all areas within the United States that are currently designated nonattainment areas with respect to one or more air pollutants. Nonattainment areas are listed by county or metropolitan statistical area and are areas considered to have air quality worse than the National Ambient Air Quality Standards as defined in the Clean Air Act Amendments of 1970 (P.L. 91-604, Sec. 109). Grant County is classified as an attainment area for each of the six criteria pollutants and is therefore not considered an area of impaired ambient air quality (USEPA 2020).

**3.2.14. Invasive Species.** Human activities, intentional or unintentional, have introduced exotic and nuisance species to the UMR, and some have caused significant changes. Common carp were introduced in the late 1880s and have become one of the most abundant fish species in the river. Zebra mussels were introduced from Europe into the Great Lakes and the Illinois River in the early 1990s and have become widespread, in some locations even colonizing native mussel species. Other species, whose overall impact to the river is still unknown, include several Asian carp species and the round goby.

**3.2.15. Navigation.** One of the Corps' primary missions is to ensure that this traffic can move safely, reliably, and efficiently and with minimal impact on the environment. The five-year average (2013-2017) for the Mississippi River System, Minneapolis MN to the Mouth of the Missouri River, is 11.7 billion ton-miles. The 10-year average (2010–2019) for Lock and Dam 10 and Lock and Dam 11 are 14,362.92 and 14,649.77, respectively. Commercial barge navigation provides a cost-effective means for moving major bulk commodities, such as grain, coal and petroleum. Channel closures and width and depth restrictions affect not only the local area but a large regional area.

**3.2.16. Land Use.** Land within the Project area is within the historic floodplain of the UMR and dominated by undeveloped forests, cultivated crops, and open water. Agriculture is the largest single land use in this reach of the river. The Project area occurs within the USFWS Upper Mississippi River UMR NWFR, which encompasses Federal lands spanning a length over 250 river miles from Wabasha, Minnesota, to near Rock Island, Illinois. The two main land use plans that guide administration and management within the Project area are the Corps' Mississippi River Master Plan for Resource Management of Pools 11-22 (1972; 1989) and the UMR NWFR Master Plan (1987).

#### **4.0. ENVIRONMENTAL CONSEQUENCES**

This section analyzes how the Preferred Alternative (17A) may affect the Project's environmental resources identified in Section 3.0, *Affected Environment*. The impacts associated with the No Action Alternative (0) include the current baseline environment and the without Project future impacts, as described by Section 3.0. This section primarily assesses environmental consequences in Grant County, WI, as the Project occurs entirely in Wisconsin waters.

**4.1. Resources Not Evaluated in Detail.** The EA does not contain detailed discussions on resources not found in the planning area, not be impacted at all by any of the alternatives, or not impacted more than during typical activities. These include:

- Prime and Unique Farmlands
- Soils
- Coastal and Estuaries Areas
- Wild and Scenic Rivers
- Noise
- Mineral and Energy Resources



- State- and federally listed-endangered and threatened species inhabiting terrestrial habitats

**4.2. Relevant Resources Found in the Planning Area.** The District focused their evaluation on resources potentially affected by any of the alternatives. These include:

- Fisheries
- Mussels
- Threatened and Endangered Species
- State-listed Species
- Water Quality and Wetlands
- Migratory Birds
- Substrate and Benthic Communities
- Socioeconomic Resources
- Minority and Low-income Populations (Environmental Justice)
- Cultural Resources
- Constructed Resources
- Climate
- Air Quality
- Invasive Species
- Navigation
- Land Use

**4.2.1. Effects on Fisheries.** Studies indicate wing dam structures provide aquatic habitat diversity and shelter, produce fish food organisms, flow refugia, and may provide spawning substrate for a variety of fish species (Bingham, 1982). The rock substrate of various regulating structures also provides habitat for epilithic (rock dwelling or attached to rock) macroinvertebrates capable of colonizing in very high densities and providing an important food source for fish. Thus, the Project has the potential to increase recreational and commercial fishing opportunities over time. Temporary disturbances to fish during construction are anticipated, but these are expected to be minor, as fish will usually avoid the Project area until construction activities are completed. The District will also avoid fish spawning periods or times when nursery areas would be adversely impacted (March 1–June 15).

**4.2.2. Effects on Mussels.** The District expects some loss of individual mussels during construction, but not a loss of a mussel bed or large assemblage of mussels. Except for 595\_8\_CL, the proposed work areas do not currently provide suitable habitat for mussels (high velocities and unstable substrates). The 2019 mussel survey indicated no to very low population of mussels in the Project footprint and did not recover any federally-listed mussel species.

The structures would attract mussel host fish species, and therefore the areas around each closing dam and rock vane may become populated with a diverse mussel population post construction. A study by Miller and Whiting (1988) found wing dams enabled development of a dense and rich mussel assemblage compared to unprotected offshore area. Wing dams and other regulating structures may encourage mussel colonization because they attract fish that are necessary hosts for most species. Reduction in future dredging requirements is expected to reduce the disruption to benthic animal communities found at the dredge cut and at placement sites, reducing the impacts to mussels in the main channel.

**4.2.3. Effects on Threatened and Endangered Species.** Federally threatened and endangered species that may occur within or near the Project vicinity include, Higgins' eye pearly mussel (*Lampsilis*

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*higginsii*) and the spectaclecase mussel (*Cumberlandia monodonta*). While *L. higginsii* individuals have been recorded in previous surveys of Pool 11, no federally-listed mussel species were recovered in 2019 within the proposed Project footprint. ESII searched preferred microhabitats of the 595\_8\_CL and did not yield any spectaclecase individuals. Current velocities and unstable substrates at the Hurricane Island bank line placement site and the 599\_2\_CL appears to be precluding establishment of native mussels. Implementation of the Preferred Alternative may have the potential to enhance establishment of native mussels.

Due to potential impacts from in-water rock placement, the District will coordinate its Not Likely Adversely Affect determination for the Higgins eye pearlymussel with the USFWS. The District anticipates the USFWS will concur with its determination. Section 7 compliance would conclude before the District Engineer signs the Finding of No Significant Impact. No other federally-listed species are expected to be adversely affected by the proposed action, and consequently no impacts to other federally-listed species are anticipated. The Project is entirely aquatic in nature and will therefore have no effect on terrestrial species listed in Table EA-9.

**Table EA-9.** Determination of Effects for Federally-listed Species

Species	Scientific Name	Status	Determination of Impacts
Northern Long-Eared Bat	<i>Myotis septentrionalis</i>	Threatened	No Effect
Higgins Eye Pearlymussel	<i>Lampsilis higginsii</i>	Endangered	Not Likely to Adversely
Spectaclecase Mussel	<i>Cumberlandia monodonta</i>	Endangered	No Effect
Mead's Milkweed	<i>Asclepias meadii</i>	Threatened	No Effect
Northern Wild Monkshood	<i>Aconitum noveboracense</i>	Threatened	No Effect
Prairie Bush Clover	<i>Lespedeza leptostachya</i>	Threatened	No Effect
Western Prairie Fringed Orchid	<i>Platanthera praeclara</i>	Threatened	No Effect
Iowa Pleistocene Snail	<i>Discus macclintocki</i>	Endangered	No Effect
Hine's Emerald Dragonfly	<i>Somatochlora hineana</i>	Endangered	No Effect
Whooping Crane	<i>Grus Americana</i>	Experimental Population, Non-essential	No Effect
Monarch Butterfly	<i>Danaus plexippus</i>	Candidate	No Effect

**4.2.4. Effects to State Listed Species.** The Wisconsin Natural Heritage Inventory (NHI) database contains Wisconsin Natural Area Inventory sites, dedicated Wisconsin Nature Preserves, or registered Land and Water Reserves in the vicinity of the Project location. There are several records of state-listed threatened and endangered species that occur within the wider Project area based on the Wisconsin NHI. Additionally, 17 individual Wisconsin state-threatened and endangered mussels were recovered during the 2019 survey. While temporary disturbances to aquatic listed species are anticipated to occur, none of the State-listed endangered or threatened species and no rare natural communities available on the WIDNR website are expected to be adversely affected based on the narrow proposed construction footprint of 595\_8\_CL.

**4.2.5. Effects on Water Quality and Wetlands.** Minor and temporary increases in turbidity and levels of suspended sediments would occur during construction activity. These impacts would be minimal compared to the normal turbidity of the Mississippi River and the substrate composition at the construction sites. Disturbed material would quickly resettle near each site. The construction materials

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would be clean quarry stone and would not introduce additional suspended material, toxic material, or biological material in the water column contributing to significant increases in turbidity or water quality degradation. The District anticipates no long-term adverse effects to water quality resulting from this action. Appendix B, *Clean Water Act Evaluation*, demonstrates compliance with the CWA. This evaluation details the possible impacts to waters of the US and water quality. The Project provisionally meets conditions of Nationwide Permits 3 and 13, pending a waiver for construction length deviation. Prior to any construction, the District will obtain Section 404 and Section 401 Water Quality Compliance (WQC) compliance.

The closing dam would redirect some, but not all, downstream flows into the main channel. In general, the closing dams would increase velocities in the main channel preventing a buildup of material in the main channel. The flow distribution would remain relatively unchanged further downstream of study area, as changes in velocity from the closing structures dissipate relatively quickly. Since the proposed action is located entirely within the navigation channel and side channels, no loss of wetlands is expected to result from Project implementation.

**4.2.6. Effects on Migratory Birds.** Currently, there are no known active bald eagle nests or heron rookeries within 660 feet of the Preferred Alternative. Following coordination with the USFWS, the closest eagle nest to the Project area occurs in the interior of Hurricane Island, approximately 2,500 feet from the Hurricane Island bank line placement site. The status of this nest is currently unknown. Birds may avoid the immediate area during construction. The District will coordinate with the USFWS if an active eagle nest is located near the construction footprint.

**4.2.7. Effects on Substrate and Benthic Communities.** Wing dam repair would have direct impacts at the footprint of each structure, which would likely harm benthic organisms during initial placement of rock. The structures' rocky composition would contribute to altering the local substrate and benthic community from a relatively monotypic shifting sand substrate to an increased diverse habitat, further supporting recolonization post construction. Pockets and crevasses between the rocks would also offer foraging and escape cover to invertebrates and small fish currently not present in the main channel border.

If the District constructs the proposed structures, the aquatic community found near each structure would become relatively diverse, owing to the range of available habitat types within a comparatively small area. This is particularly true for the closing dam at the head of Hurricane Island (RM 599.2), where degradation of the structure has created a deep scour hole on the back side, causing velocities too high to be considered suitable habitat or refugia for species.

**4.2.8. Effects on Socioeconomic Resources.** Construction of the proposed structures is expected to have little effect on existing aesthetic values. No displacement of people or farms or changes in community cohesion would occur and no public opposition is anticipated. No significant impacts to community and regional growth, property values and tax revenues, or employment and labor force are expected to result from this action. Changes in business and industrial activity during Project construction would be minimal. Public facilities and services would benefit from the proposed action as maintenance of the 9-foot navigation channel is essential for commercial navigation of the Mississippi River. No significant impacts to life, health, and safety are likely; however, the Preferred Alternative would help reduce maintenance dredging on the river, which would aid navigation and reduce chances for channel closures and subsequent groundings. Minor and temporary increases in noise levels and air quality may occur as a result of construction activity and transportation of materials. This may have

temporary adverse effects on users of nearby recreational sites and wildlife, but these areas are typically avoided during construction. No long-term significant impacts are anticipated.

**4.2.9. Effects on Minority and Low-income Populations (Environmental Justice).** The region surrounding the Hurricane Island/Finley's Landing Reaches is comprised of 14% percent minority population and of 10% low income population. The District determined there would be no impact on low income or minority populations that surround the Project area, as the entire Project area lies within the river. The proposed action will not result in any change in land use or other impacts that would disproportionately affect minority or low-income populations.

**4.2.10. Effects on Cultural Resources.** Pursuant to the NHPA of 1966, as amended, and its implementing regulations, 36 CFR Part 800, the District has determined that this Undertaking has potential to cause effects to archeological 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).

The District proposes no archeological investigations at the proposed Project locales: there are no known submerged resources nearby and these areas have been subjected to historic dredging and dredged material placement. The closure structures were originally built in 1994 and 1996 and are too recent to be potentially eligible for inclusion on the National Register of Historic Places.

The APE contains no recorded historic properties and the District has evaluated the APE as having low potential for intact cultural resources. It is the District's opinion that the present undertaking will have No Effect on historic properties within the APE due to low archeological potential in accordance with 36 CFR 800.4(d)(1). The District provided this determination to the Wisconsin SHPO and to federally-recognized tribes by letter dated October 1, 2020. The Wisconsin SHPO concurred with the District's determination on October 7, 2020. See Appendix A, *Pertinent Correspondence*, for documentation of additional tribal concurrence.

**4.2.11. Effects on Constructed Resources.** The habitat adjacent to the proposed action would experience localized disturbance for a short period of time during and after construction. The proposed action would not impact land-based activities or near-shore activities near North Buena Vista, Iowa, and Potosi, Wisconsin. Repair of the closing dams would reduce shoaling in the 9-foot navigation channel and therefore, help reduce dredging and dredged material placement issues in the Project area. The Preferred Alternative would not result in any significant change in floodplain storage.

**4.2.12. Effects on Climate.** Climate change impacts within the Project area would likely revolve around increased temperatures and increased precipitation leading to further altered (flashier) hydrologic conditions (NOAA <https://statesummaries.ncics.org/>, 2017). Any changes in hydrologic conditions occurring within the Project area would likely result from less frequent but more intense warm-weather precipitation events, moderately to severely reduced summer flow conditions and degraded water quality, less winter ice cover and more cold-weather erosion events. Extreme rainfall events and flooding have increased during the last century and these trends are expected to continue, causing erosion, declining water quality, and negative impacts on transportation, agriculture, human health, and infrastructure. The range and distribution of fish and other aquatic species will likely change, and an increase in invasive species would also likely occur (Pryor et al., 2014). This Project would not impact future climate conditions and would be resilient to future hydraulic conditions.

**4.2.13. Effects on Air Quality.** Heavy machinery would temporarily increase air pollutants in the immediate Project area during construction activity. In 2002, EPA classified diesel emissions as a likely

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human carcinogen and in 2012 the International Agency for Research on Cancer concluded that diesel exhaust is carcinogenic to humans. Diesel exhaust can also lead to other serious health conditions and can worsen heart and lung disease, especially in vulnerable populations such as children and elderly people. The EPA provided the PDT with a Construction Emission Control Checklist, which will be utilized in developing diesel emissions specifications during the Project design phase. No permanent changes in air quality are anticipated from rock work and sand placement. The immediate area is comprised of isolated farms and riverine habitat.

The U.S. Army and the Corps are committed to reducing emissions. The District will continue to take advantage of opportunities to improve government-owned equipment and emissions reduction procedures. In accordance with Corps Acquisition Instruction, the District shall advance sustainable acquisition and the Army Green Procurement Guide by ensuring that all applicable new contract actions include relevant, federally-mandated, sustainability requirements. If sustainable opportunities exist for supplies, product, equipment, technologies, etc., the applicable language must be included in the contract scopes of work. Additionally, dust control measures are standard in District contracts, and we anticipate this to continue.

The temporary impacts during construction would be similar to those produced throughout the area in routine farm and cement production. Riprap would be acquired from a Corps approved quarry and barged to the Project location. Impacts to air quality from obtaining and transporting would be similar to other commercial traffic and would not be significantly greater than current navigation or quarry operations.

**4.2.14. Effects on Invasive Species.** On February 3, 1999, President Clinton issued Executive Order (EO) 13112, with amendment EO 13751 on December 5, 2016, 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 District anticipates that increased invasive species entering the UMR in the future is likely. The use of relevant programs and authorities to prevent the introduction of invasive species would remain throughout the Project life of the proposed regulating structures repairs. The proposed action would not increase the likelihood of invasive species colonization in the Project area.

**4.2.15. Effects on Navigation.** The proposed action would benefit commercial navigation activities. The closing dams would reduce shoaling in the 9-foot navigation channel and therefore, reduce potential channel closures. Currently, commercial industry is occasionally forced to light loading barges due to the potential for channel closures and width and depth to restrictions. This reduces efficiency and cost of commercial barge navigation. Additionally, economic losses would burden the communities and business that depend on the Mississippi River System.

**4.2.16. Land Use.** Agriculture is the largest single land use in this reach of the river. Since the proposed Project is entirely aquatic in nature, is unlikely to induce significant alterations in the pattern and type of land use. The proposed Project would not change the use of any floodplain or aquatic resources and would not alter or conflict with other land use plans in the vicinity.

**4.3. Probable Adverse Effects Which Cannot Be Avoided.** The loss of some benthic organisms currently inhabiting the Project area is an unavoidable adverse effect of the proposed action. Following construction, benthic organisms would rapidly recolonize the wing dams.

**4.4. Relationship Between Short-Term Use and Long-Term Productivity.** Construction activities would temporarily disrupt wildlife and human use of the Project area. Long-term impacts are expected to

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be minimal on all ecosystems associated with this project. Benefits from the Project would be derived by bank stability, aquatic habitat diversity and reduced need for channel maintenance dredging.

**4.5. Irreversible or Irretrievable Commitment of Resources if the Project Is Implemented.** The purchase of materials and the commitment of man-hours, fuel, and machinery to perform the Project are irretrievable. Other than the aforementioned, none of the proposed actions are considered irreversible.

**4.6. Compliance With Environmental Quality Statutes.** Table EA-10 summarizes compliance with environmental quality statutes.

**Table EA-10.** Relationship of Plans to Environmental Protection Statutes and Other Environmental Requirements

<b><u>Federal Policies</u></b>	<b><u>Compliance</u><sup>1</sup></b>
Archaeological and Historic Preservation Act, 16 U.S.C. 469, et seq.	Full compliance
Clean Air Act, as amended, 42 U.S.C. 1857h-7, et seq.	Full compliance
Clean Water Act, 33 U.S.C. 1857h-7, et seq.	Pending
Consultation with Indian Tribal Governments (Executive Order 13175)	Full compliance
Endangered Species Act, 16 U.S.C. 1531, et seq.	Pending
Environmental Justice, Executive Order 12898	Full compliance
Federal Water Project Recreation Act, 16 U.S.C. 460-1(12), et seq.	Full compliance
Fish and Wildlife Coordination Act, 16 U.S.C. 601, et seq.	Full compliance
Land and Water Conservation Fund Act, 16 U.S.C. 460/-460/-11, et seq.	Not applicable
National Environmental Policy Act, 42 U.S.C. 4321, et seq.	Full compliance
National Historic Preservation Act, 16 U.S.C. 470a, et seq.	Full compliance
River and Harbors Act, 33 U.S.C. 403, et seq.	Full compliance
Watershed Protection and Flood Prevention Act, 16 U.S.C. 1001, et seq.	Not applicable
Wild and Scenic Rivers Act, 16 U.S.C. 1271, et seq.	Not applicable
Flood Plain Management (Executive Order 11988)	Full compliance
Protection of Wetlands (Executive Order 11990)	Full compliance
Farmland Protection Act	Not applicable
Analysis of Impacts on Prime and Unique Farmland (CEQ Memorandum, 11 Aug 80)	Not applicable
Corps of Engineers Planning Guidance Handbook (ER 1105-2-100)	Full compliance
Invasive Species (Executive Order 13112)	Full Compliance

<sup>1</sup> Full compliance. Having met all requirements of the statute for the current stage of planning.  
Not applicable. No requirements for the statute required.

## **5.0. COORDINATION AND PUBLIC INVOLVEMENT**

The District has coordinated the proposed regulating structure repairs and construction of rock vanes in Pool 11 throughout the planning and design process with the following local, State and Federal agencies, and tribal nations:

Iowa Department of Natural Resources  
Wisconsin Historic Preservation Agency  
Wisconsin Department of Natural Resources  
U.S. Environmental Protection Agency  
U.S. Fish and Wildlife Service  
Citizen Potawatomi Nation  
Delaware Nation  
Delaware Tribe of Indians of Oklahoma

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Forest County Potawatomi Community  
Ho-Chunk Nation  
Iowa Tribe of Kansas and Nebraska  
Iowa Tribe of Oklahoma  
Kickapoo Tribe in Kansas  
Kickapoo Tribe of Oklahoma  
Menominee Indian Tribe of Wisconsin  
Miami Nation of Indians in Indiana  
Miami Tribe of Oklahoma  
Omaha Tribe of Nebraska  
Oneida Tribe of Indians of Wisconsin  
Osage Nation  
Otoe-Missouri Tribe  
Pokagon Band of Potawatomi Indians  
Ponca Tribe of Nebraska  
Ponca Tribe of Oklahoma  
Prairie Band Potawatomi Nation  
Sac and Fox Nation of Missouri in Kansas and Nebraska  
Sac and Fox Nation of Oklahoma  
Sac and Fox Tribe of the Mississippi in Iowa  
Stockbridge-Munsee Band Community Band of Mohican Indians  
Winnebago Tribe of Nebraska

Letters of scoping comments are contained in Appendix A, *Pertinent Correspondence*. The District received comments from the various agencies, subsequently incorporated into this EA. Additionally, the District and the USFWS met onsite August 1, 2018, to survey several regulating structures and to discuss Project features and alternatives.

The WIDNR responded by a January 28, 2019, email to the District's proposal of regulating structure repair requesting further clarification relating to alternative and hydraulic analyses. Appendix A details the District's responses to this information request. The District will obtain a WIDNR Floodplain Permit prior to construction, as required by Federal law designated to State/County enforcement.

The EPA responded by a February 4, 2019, letter to the District's proposal of regulating structure repair. The EPA recommended the District clearly describe the purpose and need for repairs and outline best management construction practices. This information was integrated into Section 2, *Alternative Formulation and Analysis*. The EPA further recommended the District identify potential impacts, particularly to air and water quality. These potential impacts were incorporated into Section 4.0, *Environmental Consequences*.

The USFWS responded by a February 12, 2019, letter to the District's proposal of regulating structure repair. The USFWS recommended the District document potential impacts to freshwater mussels and bald eagles, which were incorporated into Section 4.0, *Environmental Consequences*.

In a letter dated October 1, 2020, the District provided the Wisconsin Historic Preservation Agency with its determination that this undertaking will have No Effect on historic properties. The Wisconsin SHPO provided concurrence on October 7, 2020.



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The District presented mussel survey and hydraulic modeling results during a December 12, 2019, conference call with State and Federal agencies. The District also discussed recommended alternatives and the potential to integrate rock vanes to provide bank stabilization at Hurricane Island.

Construction of navigation regulating structures are coordinated through the CARS team, consisting interdisciplinary personnel from the Corps and the USFWS.

The public has the opportunity to comment during the 30-day review period beginning on the date posted on the EA's cover letter. This District is not holding a public meeting for this action.

Appendix E, *Distribution List*, lists the agencies, groups, libraries, media outlets, and individuals receiving copies of this EA. They may write or email any substantive comments concerning the addition or deletion of alternatives, or the analysis of new resource issues to the District within the 45-day comment period. The District will evaluate all the comments received and dutifully integrate them in the decision-making process. If additional analysis is warranted, the District will conduct sufficient study to determine the significance of any action they propose.

## 6.0. LIST OF PREPARERS

Name	Area of Expertise
Matt Afflerbaugh, USACE, Rock Island District	Navigation Channel Maintenance
Bre Popkin, USACE, Rock Island District	Project Manager
Wendy Frohlich, USACE, Rock Island District	CWA Compliance
Davi Michl, USACE, Rock Island District	NEPA Documentation, Natural Resources
Anton Stork, USACE, Rock Island District	Hydraulics, Hydraulic Modeling
Indigo Rockmore, USACE, Rock Island District	Engineering, Design
Mary Rodkey, USACE, Rock Island District	Report Editing
Jim Ross, USACE, Rock Island District	Cultural Resources

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## **DRAFT FINDING OF NO SIGNIFICANT IMPACT**

### **REGULATING STRUCTURE REPAIR**

#### **RIVER MILES 595.4-599.0, POOL 11, UPPER MISSISSIPPI**

### **ENVIRONMENTAL ASSESSMENT**

The U.S. Army Corps of Engineers, **ROCK ISLAND** District (Corps) has conducted an environmental analysis in accordance with the National Environmental Policy Act of 1969, as amended. This IFR/EA dated **1 October 2020**, for the **REGULATING STRUCTURE REPAIR PROJECT** addresses **CHANNEL MAINTENANCE** opportunities in the **POOL 11, UPPER MISSISSIPPI RIVER (UMR) RIVER MILES (RM) 595.4-599.0**. The final recommendation is **PENDING**.

The Final IFR/EA, incorporated herein by reference, evaluated various alternatives that would **1) IMPROVE COMMERCIAL NAVIGATION OF THE 9-FOOT NAVIGATION CHANNEL AND 2) PROTECT BANKLINE AREAS FROM EROSION** in the study area. The District determined the Preferred Alternative meets the objectives of providing navigation channel operation and local channel maintenance needs. The other alternatives did not meet the channel maintenance requirements. The Preferred Alternative includes:

- **REPAIR CLOSING DAM 599\_2 TO ORIGINAL DESIGN GRADE ELEVATION (600 FEET MSL)**
- **RAISE CLOSING DAM 595\_8 TO ONE FOOT ABOVE ORIGINAL DESIGN GRADE ELEVATION (601 FEET MSL)**
- **CONSTRUCT A SERIES OF 30-FOOT LONG ROCK VANES AT ELEVATION 604.5 FEET MSL TO STABILIZE THE HURRICANE ISLAND HISTORIC PLACEMENT SITE**

In addition to a “no action” plan, **1** alternative was evaluated. The alternative included **REPAIR OR ENHANCEMENT REGULATING AND CONSTRUCTION OF BANK LINE STABILIZATION STRUCTURES. NON-STRUCTURAL MEASURES WERE NOT CONSIDERED FOR ALTERNATIVE FORMULATION BECAUSE THEY WERE FOUND TO BE INCOMPLETE, INEFFECTIVE, OR NOT WITHIN THE SCOPE OF THE AUTHORIZED PROJECT.**

#### ***SUMMARY OF POTENTIAL EFFECTS:***

For all alternatives, the potential effects were evaluated, as appropriate. A summary assessment of the potential effects of the Preferred Alternative are listed in Table 1:

**Table 1: Summary of Potential Effects of the Preferred Alternative**

	Insignificant Effects	Insignificant Effects As A Result of Mitigation	Resource Unaffected By Action	Positive Effects
Aesthetics	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Air Quality	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aquatic Resources/Wetlands	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Invasive Species	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Fish and Wildlife Habitat	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Threatened/Endangered Species/Critical Habitat	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Historic Properties	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Other Cultural Resources	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Floodplains	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hazardous, Toxic & Radioactive Waste	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Hydrology	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Land Use	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Navigation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Noise Levels	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Public Infrastructure	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Socio-Economics	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Environmental Justice	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Soils	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Tribal Trust Resources	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Water Quality	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Climate Change	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

All practicable and appropriate means to avoid or minimize adverse environmental effects were analyzed and incorporated into the Preferred Alternative. Best management practices (BMPs) as detailed in Section 4.0 of the EA will be implemented, if appropriate, to minimize impacts.

No compensatory mitigation is required as part of the Preferred Alternative.

Public review of the draft IFR/EA and FONSI will be completed **IN JANUARY 2021**. All comments submitted during the public review period were responded to or incorporated in the Final EA and FONSI.

#### **ENDANGERED SPECIES ACT: PENDING**

Pursuant to Endangered Species Act of 1973, Section 7, as amended, the District determined the Preferred Alternative May Affect but Is Not Likely to Adversely Affect the Higgins Eye pearlymussel. Implementation of the Preferred Alternative is entirely aquatic and will have No Effect on any other federally-listed species or their designated critical habitat that occur in the Project area.

#### **NATIONAL HISTORIC PRESERVATION ACT:**

Pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended, the District determined the Preferred Alternative will have no effect on historic properties.

#### **CLEAN WATER ACT SECTION 404(B)(1): PENDING**

Pursuant to the Clean Water Act of 1972, as amended, the discharge of dredged or fill material associated with the Preferred Alternative has been found to be compliant with section 404(b)(1) Guidelines (40 CFR 230). The Clean Water Act Section 404(b)(1) Guidelines evaluation for the use of Nationwide Permit No. 3 and No. 13 is found in **APPENDIX EA-B, CLEAN WATER ACT COMPLIANCE** of the EA. A waiver for NWP 13 will be required prior to construction, as proposed rock vanes currently exceed the specific threshold by 500 linear feet. The District anticipates authorizing this project under the NWP #13 for bank stabilization while waiving the 500 linear foot threshold, as stated in the Federal Register

#### **401 WQC: PENDING**

Water quality certification pursuant to section 401 of the Clean Water Act has been issued by the State of Wisconsin for **NATIONWIDE PERMIT NO. 3 AND NO. 13**. A waiver for NWP 13 will be required prior to construction, as proposed rock vanes currently exceed the specific threshold by 500 linear feet. The District anticipates authorizing this project under the NWP #13 for bank stabilization while waiving the 500 linear foot threshold, as stated in the Federal Register. The District will obtain 401 WQC prior to signing the FONSI to ensure all conditions are implemented in order to minimize adverse impacts to water quality.

#### **OTHER SIGNIFICANT ENVIRONMENTAL COMPLIANCE:**

All applicable environmental laws have been considered and coordination with appropriate agencies and officials has been completed.

#### **FINDING**

Technical, environmental, and cost effectiveness criteria used in the formulation of alternative plans were those specified in the Water Resources Council's 1983 *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies*. All applicable laws, executive orders, regulations, and local government plans were considered in evaluation of alternatives.

The District determined the Preferred Alternative meets the objectives of reducing future demand for dredging and improving the efficiency of navigation channel maintenance in the Project area. The other alternatives do not meet the District's objectives or would have unacceptable floodplain or environmental impacts.

Based on this report, the reviews by other Federal, State and local agencies, Tribes, input of the public, and the review by my staff, it is my determination that the Preferred Alternative would not cause significant adverse effects on the quality of the human environment; therefore, preparation of an Environmental Impact Statement is not required. The District would re-evaluate this determination if warranted by later developments.

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Date

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**STEVEN M. SATTINGER, P.E.**  
**COLONEL, US ARMY**  
Commander & District Commander

**REGULATING STRUCTURE REPAIR**

**RIVER MILES 595.4 – 599.0  
POOL 11, MISSISSIPPI RIVER**

**GRANT COUNTY, WISCONSIN**

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**ENVIRONMENTAL ASSESSMENT**

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**APPENDIX A**

**PERTINENT CORRESPONDENCE**

DRAFT

**JANUARY 2021**





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

REPLY TO  
ATTENTION OF

December 18, 2018

Regional Planning and Environmental  
Division North (RPEDN)

SEE DISTRIBUTION LIST

The U.S. Army Corps of Engineers, Rock Island District (District), is planning to repair rock channel regulating structures (wing dams), stabilize portions of historic Wisconsin Island #205, and restore the closing dam at the head of Hurricane Island, in the Mississippi River, Pool 11 between river miles (RM) 595.4 and 599.0, just upstream of Dubuque, Iowa (Enclosure 1). The District proposes repairing several channel regulating structures to original design elevations and restoring Island #205 to historic bankline elevations.

Shoaling is occurring in the navigation channel near Finley's Landing resulting in more frequent dredging events (Enclosure 2) and several emergency closures. The District is completing a hydraulic study to determine the most effective way to reduce dredging at this location.

Proposed work includes adding rock to raise wing dams back to their original construction elevation and original design profile, typically 3 feet below the flat pool elevation of 603.0 feet (MSL 1912) (Enclosure 3). The Hurricane Island closing dam (RM 599) is degraded adjacent to the Wisconsin shoreline, as evidenced by 40-foot scour hole on the backside of the dam (Enclosure 4). Island #205 also experienced erosion by approximately 90% compared to the 1931 Brown's survey maps (Enclosure 5).

In accordance with the National Environmental Policy Act (NEPA), the District is preparing an Environmental Assessment (EA) to address impacts associated with potential wing dam repairs and island restoration (Enclosure 6). The District looks forward to working with other agencies to ensure stakeholder interests are considered and integrated into the final document.

The U.S. Fish. and Wildlife Service's (USFWS) Information for Planning and Conservation (IPaC) endangered species website indicates there are nine species listed as either threatened or endangered, for the project area (Enclosure 7). The two mussel species—spectaclecase, and Higgins' eye pearly mussel—occupy riverine habitats. Although the federally-listed sheepnose mussel was not included in the IPaC species list, it was found in the vicinity in a 2012 District survey. The District also documented Higgins' eye mussels within the project area as recently as 2016 and contracted another mussel survey in the project area to occur in the spring 2019. This project would not impact any terrestrial habitat commonly used by the northern long-eared bat, Iowa Pleistocene snail, Hine's emerald dragonfly, Mead's milkweed, northern wild monkshood, prairie bush-clover, or western prairie-fringed orchid. According to the USFWS's Natural Resource Inventory, several bald eagle nests are located within the project area; however, none of these nests are within 660 feet of any proposed construction areas.

The District requests your comments to assist in the preparation of the EA. Please provide any comments on this project with respect to concerns or anticipated effects on any resources within your agency's jurisdictional oversight. Your comments will be a vital contribution to the planning process and environmental evaluation of the proposed actions. Please provide your written recommendations, comments and concerns within 30 days of the date of letter.

If you have any questions or would like to request additional information, please call Ms. Davi Michl of our Environmental Planning Branch, telephone [REDACTED], email: [REDACTED] or write to our address above, ATTN: Regional Planning and Environmental Division North (D. Michl).

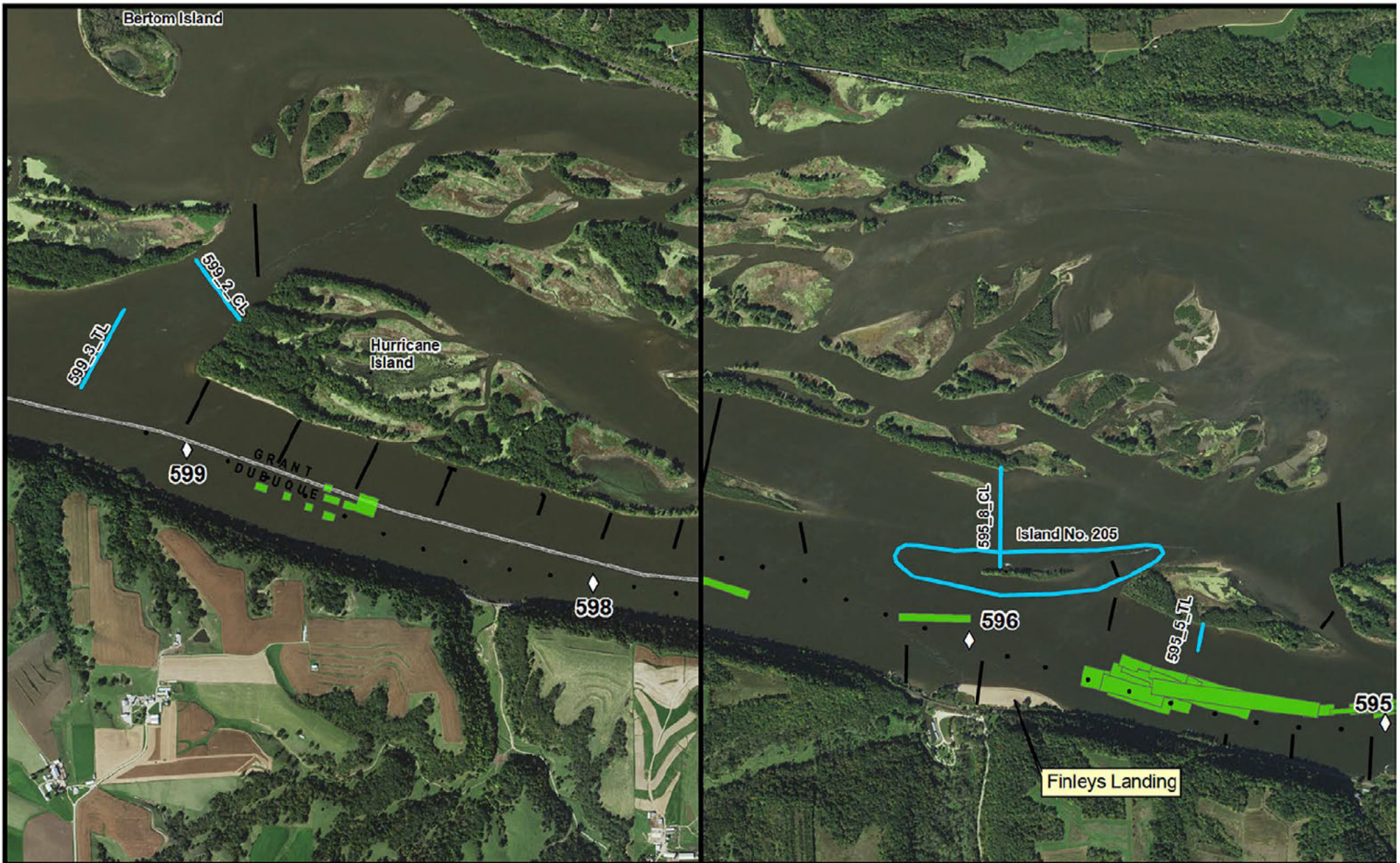
Sincerely,



Jodi K. Creswell  
Chief, Environmental Planning Branch (RPEDN)

Enclosures

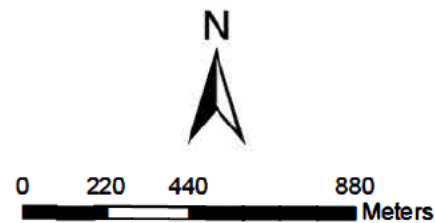




# Pool 11 CARS Project Location

- USACE Current Dredge Cuts
- River Miles
- Potential Rock Repairs
- Wing Dams

A-3  
EA A 4



### Dredging Events at Hurricane and Finleys Landing Reaches

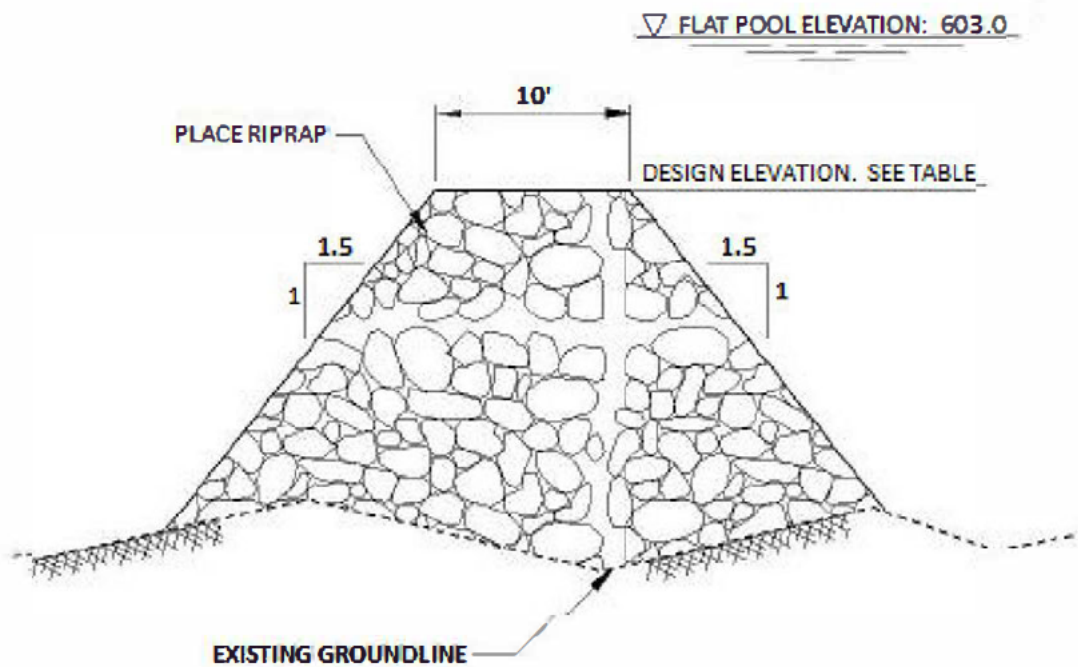
Hurricane Island		Year	CYs	Dredge Site	Placement Site	Placement Type
Total CYs	233,509	1968	43,600	598.7-598.9	598.8-599.0L	Bankline
# of Events	11	1971	43,966	598.7-599.0	598.9-599.0L	Bankline
Avg per Event	21,228	1973	47,122	598.7-599.1	598.6-598.8L	Bankline
		1974	10,926	598.8-599.0	598.7-598.8L	Bankline
		1981	15,392	598.7-598.9	Cassville, WI	Inland
		1989	29,963	598.6-598.9	598.6-599.0L	Bankline
		1995	23,982	598.5-598.8	598.7-599.0L	Bankline
		1998	2,526	598.6-598.8	606.1L (Dairyland DMMP site)	Upland
		2001	6,275	598.6-598.7	606.1L (Dairyland DMMP site)	Upland
		2006	7,601	598.6-598.8	598.8-599.0L	Bankline
		2007	2,156	598.3-598.5	610.3-610.4L	Bankline

Finley's Landing		Year	CYs	Dredge Site	Placement Site	Placement Type
Total CYs	451,011*	1974	124,332	595.5-596.5	595.7-596.0R	Bankline
# of Events	21	1983	12,578	596.0-596.2	595.8-596.0R	Bankline
Avg per Event	21,477	1985	27,326	596.0-596.4	595.8-596.0R	Bankline
*Does not include 2018 totals		1988	26,451	596.0-596.3	596.1-596.3R	Bankline
		1993	21,167	595.7-596.0	595.5R	Bankline
		1994	29,243	595.5-595.6	595.9L (Sand Pad for Closing Dam)	Open Water
		1999	22,022	595.4-595.5	RM 608.0L (WI Light & Power DMMP site)	Upland
		2003	15,471	594.5-595.6	606.1L (Dairyland DMMP site)	Upland
		2004	20,274	594.9-595.6	606.1L (Dairyland DMMP site)	Upland
		2006	33,481	594.8-595.7	595.7-596.0R	Bankline
		2007	9,642	596.5-596.7	599.0L 4,061, 610.3-610.4L	Bankline
		2007	5,775	596.0-596.2	610.3-610.4L	Bankline
		2008	5,611	595.5-595.7	596.0R	Bankline
		2008	15,908	594.8-595.1	596.0R	Bankline
		2009	9,617	595.4-595.7	598.8L	Bankline
		2010	17,834	595.4-595.7	598.8L	Bankline
		2012	35,577	594.7-595.6	596.0R, 598.8-599.0L	Bankline
		2016	18,702	594.8-595.5	595.7-596.0R	Bankline
		2018	TBD	594.2L	594.1L (Bathtub Access Channel	Bankline/Inland
		2018	TBD	594.9-595.2	594.1L (Bathtub Access Construction)	
		2018	TBD	594.6-595.2	594.1L (Bathtub Access Construction)	

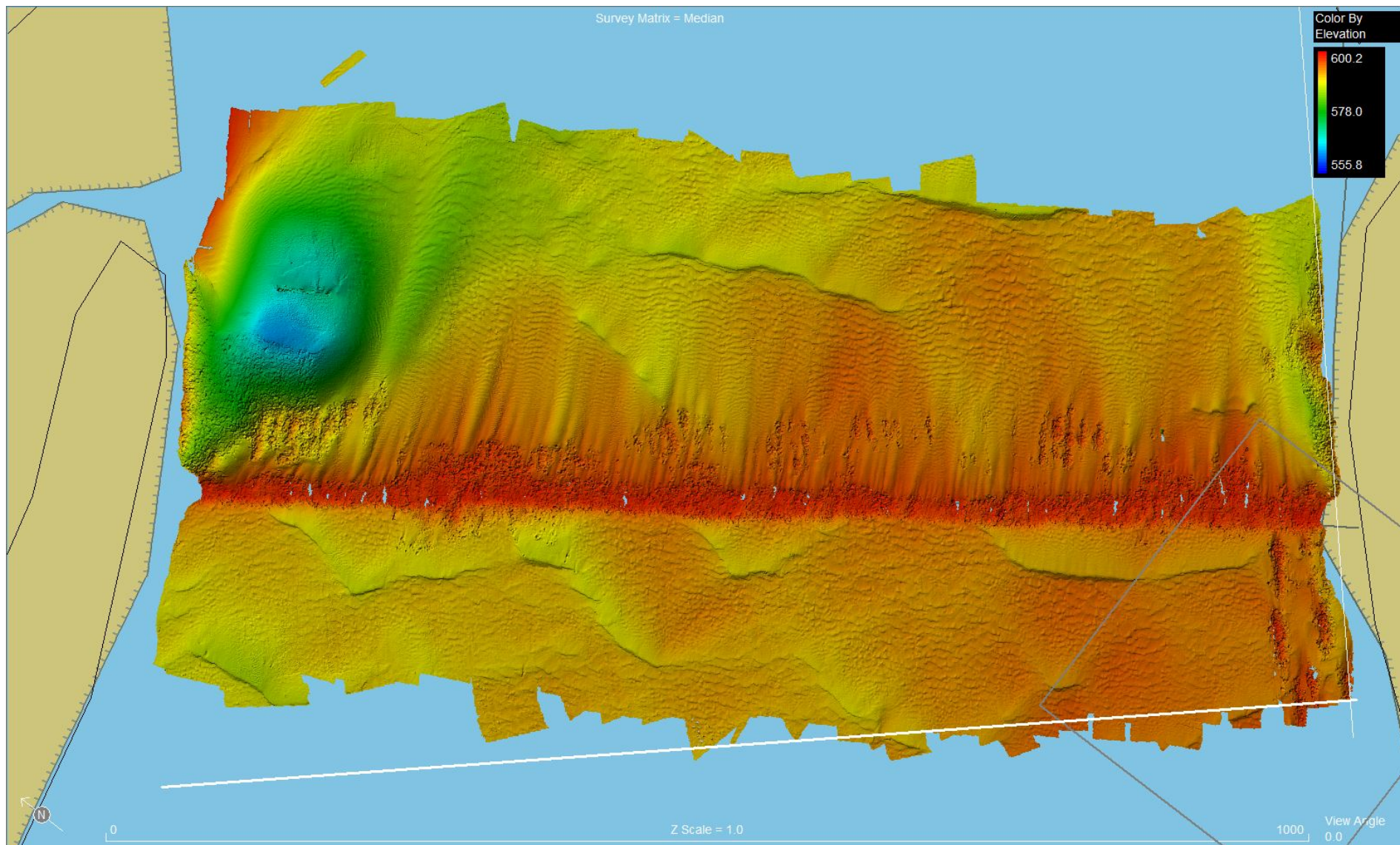


### Potential Wing Dam Repairs

Wing Dam No.	River Mile	Year Built	Design Elev (ft) (MSL 1912)	Flat Pool (ft) (MSL 1912)	Depth below FP (ft)	Surveyed Length (ft)
599.3_TL	599.3	1912	596.6	603.0	6.4	1740
599.2_CL	599.2	1996	600.0	603.0	3	1000
595.8_CL	595.8	1994	599.0	603.0	4	899
595.5_TL	595.5	1928	595.6	603.0	7.4	512

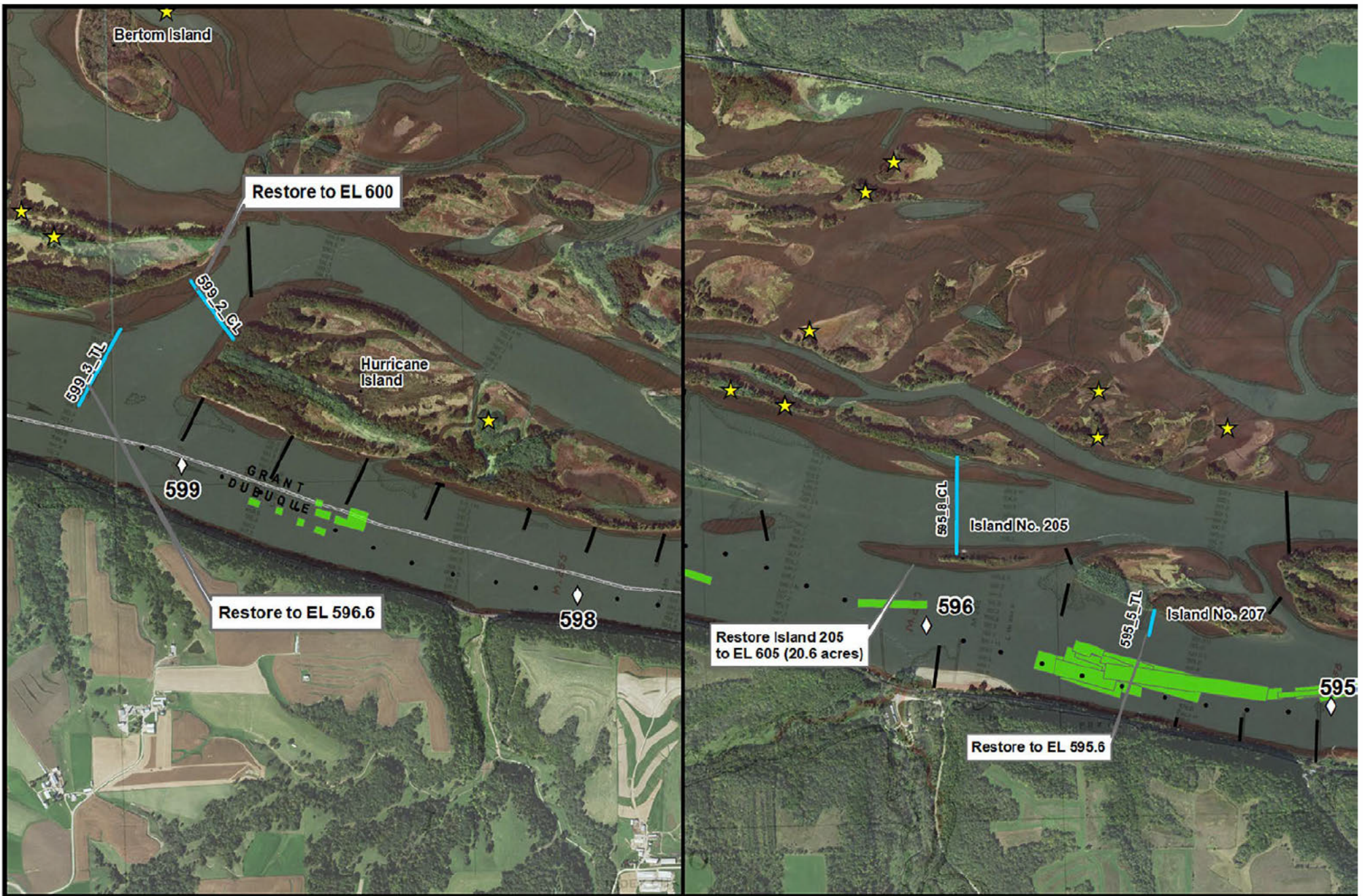


**Wing Dam Design Dimensions**



**Hurricane Island Closing Dam (599\_2\_CL) Multibeam Survey**





# Pool 11 CARS Potential Measures

- ★ Eagle Nests
- Potential Rock Repairs
- Wing Dams

- USACE Current Dredge Cuts
- ◇ River Miles

A-7



0 220 440 880 Meters

Historic overlay source data: Brown, W.D., USACE, and William & Heintz Co. (1931). Upper Mississippi River, Hastings, MN, to Grafton, IL, Survey 1929-1930 [map].

### Potential Measures to Reduce Maintenance Dredging

Alternative	Description
Alternative 1	Restoring closing dam 599_2_CL to EL 600.
Alternative 2	Restoring the closing structure 599_2_CL to EL 600 and restoring WD 599_3_TL to EL 596.6
Alternative 3	Includes repairs in Alternative 2 with restoring closing dam 595_8_CL to EL 599.
Alternative 4	Includes repairs in Alternative 3 and restoring Island 205 to EL 605.
Alternative 5	This is the same plan as Alternative 4 with a slightly larger footprint of the island.
Alternative 6	Includes Alternative 5 plus restoring WD 595_5_TL to EL 595.6

### Summary of Quantities by Structure

Structure Name	River Mile	Design Elevation	Fill Volume (CY)	Area
599_2_CL	599.2	600.0	2,057	-
599_3_TL	599.3	596.6	1,885	-
595_8_CL	595.8	599.0	1,350	-
595_5_TL	595.5	595.6	418	-
Island 205	595.6-596.1	605.0	387,600*	20.6
Island 205	595.6-596.1	453.3'	478,700*	25.5

\*Fill volume for Island 205 may be a combination of sand and rock, dependent upon design



**List of Federally-Endangered and Threatened Species with Preferred Habitat Types  
With the Potential to Occur Within Dubuque County, IA, and Grant County, WI**

Species	Scientific Name	Status	Habitat Types
Northern Long-Eared Bat	<i>Myotis septentrionalis</i>	Threatened	During the winter, caves and mines and during the summer, underneath flaky bark, in cavities or in crevices of both live trees and snags (dead trees).
Higgins Eye Pearlmussel	<i>Lampsilis higginsii</i>	Endangered	Larger rivers with deep water and moderate currents
Spectaclecase	<i>Cumberlandia monodonta</i>	Endangered	Large rivers where they live in areas sheltered from the main force of the river current, such as beneath rock slabs, between boulders and even under tree roots.
Mead's Milkweed	<i>Asclepias meadii</i>	Threatened	Moderately wet (mesic) to moderately dry (dry mesic) upland tallgrass prairie or glade/barren habitat characterized by vegetation adapted for drought and fire.
Northern Wild Monkshood	<i>Aconitum noveboracense</i>	Threatened	Shaded to partially shaded cliffs, algific talus slopes, or on cool, streamside sites.
Prairie Bush Clover	<i>Lespedeza leptostachya</i>	Threatened	Found only in the tallgrass prairie region
Western Prairie Fringed Orchid	<i>Platanthera praeclara</i>	Threatened	Occur most often in mesic to wet unplowed tallgrass prairies and meadows but have been found in old fields and roadside ditches.
Iowa Pleistocene Snail	<i>Discus macclintocki</i>	Endangered	Leaf litter of special cool and moist hillsides or algific talus slopes.
Hine's Emerald Dragonfly	<i>Somatochlora hineana</i>	Endangered	Spring-fed marshes and sedge meadows overlaying dolomite bedrock.

Source: US Fish and Wildlife Service, August, 2018, <http://www.fws.gov/midwest/endangered>

**From:** [Rasmussen, Kurt A - DNR](#)  
**To:** [Michl, Davi E CIV USARMY CEMVP \(US\)](#)  
**Subject:** [Non-DoD Source] Pool 11 Channel Maintenance Structures  
**Date:** Monday, January 28, 2019 2:40:45 PM

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Davi,

Thanks for taking my call earlier. The purpose of my call was to ask some preliminary questions regarding the channel maintenance structure options proposed in the December 18, 2018 letter sent to the WDNR. Please feel free to give me a call if you need any clarification or would like to discuss these questions.

#### Timing

One concern we have is the timing of this proposal. Why are we looking at these channel training modifications after the Corps just finalized the 40 year Dredge Material Management Plan (DMMP) for this reach of the river. Why didn't they modification of these structures get included into the DMMP?

#### Table of Summary of Quantities by Structure

Enclosure 6 has a table that lists quantity of material required for each structure. The bottom entry for Island 205 lists a design elevation of 453.3'. Possibly a typo?

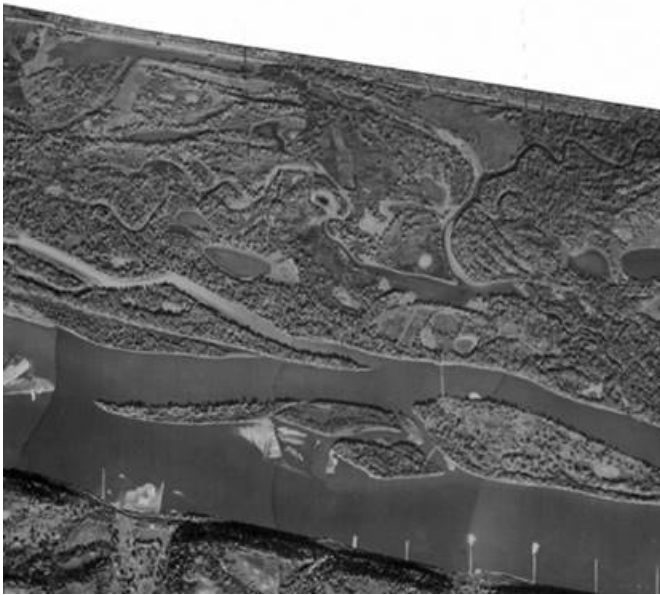
#### Alternatives

Would it be possible to get a breakdown of the channel impacts for each of the alternatives outlined in Enclosure 6?

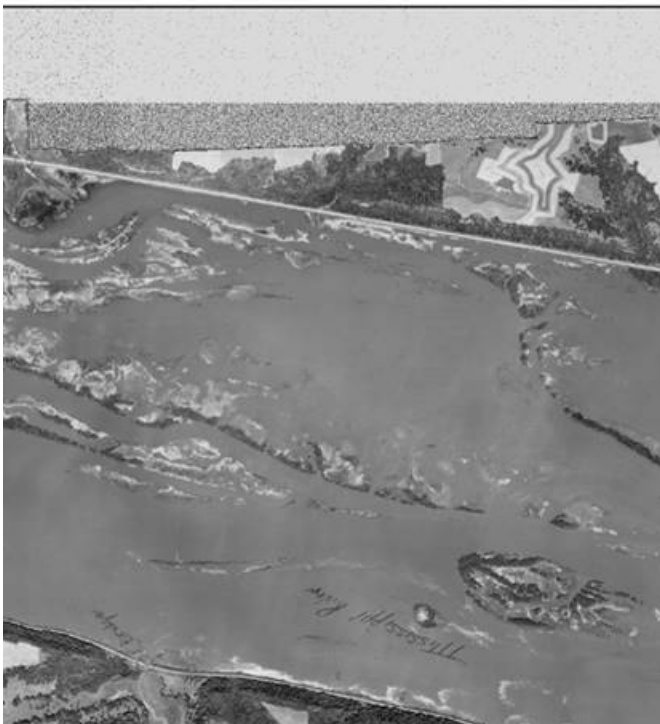
#### Island 205

Alternatives 4, 5 and 6 all include restoring Island 205 to what appears to be a pre-lock and dam footprint. The material quantities needed to construct Island 205 are on track to take all of the material estimated in the 2017 DMMP for the next 40 years (400,000 CY). Is the intention that this island becomes the new dredge material placement site? Does the island footprint need to be as large as proposed (either 20.6 or 25.5 acres)? During the DMMP planning we ran into issues with flood rise for the bathtub placement site. Has any preliminary flood rise modeling been completed for this island?

**1930 Air Photo**



**1950 Air Photo**



Thank you for opportunity to look at the alternatives prior to the release of the EA. Please feel free to contact me with any questions.

Sincerely,

**We are committed to service excellence.**

Visit our survey at [Blockedhttp://dnr.wi.gov/customersurvey](http://dnr.wi.gov/customersurvey) to evaluate how I did.

Kurt A. Rasmussen

Mississippi River Planner

Office of Great Waters – *Mississippi River, Lake Superior & Lake Michigan*

Environmental Management Division

Wisconsin Department of Natural Resources

3550 Mormon Coulee Road

La Crosse, WI 54601





## Timing

**One concern we have is the timing of this proposal. Why are we looking at these channel training modifications after the Corps just finalized the 40 year Dredge Material Management Plan (DMMP) for this reach of the river. Why didn't they modification of these structures get included into the DMMP?**

One reason that we're relooking at channel modifications in this reach is because more refined data has become available since potential modifications were originally simulated with a 2D model. Another limiting factor at the time of the DMMP report was the lack of a placement site impeding channel maintenance activities to keep the navigation channel open. Operations also received funding late in FY18 to investigate channel maintenance structures as an opportunity to reduce shoaling in this area, potentially extending the life of the DMMP site being built.

## Table of Summary of Quantities by Structure

**Enclosure 6 has a table that lists quantity of material required for each structure. The bottom entry for Island 205 lists a design elevation of 453.3'. Possibly a typo?**

Correct; this is a typo. The design elevation for Island 205 should be listed as 605.0'.

## Alternatives

**Would it be possible to get a breakdown of the channel impacts for each of the alternatives outlined in Enclosure 6? I am primarily interested in the hydraulic impacts. It would be nice to see an itemized list of features and the hydraulic impacts they have on the channel to get a better understanding of where the channel is gaining its sediment transport efficiency.**

See attached files depicting alternatives analyzed, including an itemized list of features and their hydraulic impacts to the channel.

## Island 205

**Alternatives 4, 5 and 6 all include restoring Island 205 to what appears to be a pre-lock and dam footprint. The material quantities needed to construct Island 205 are on track to take all of the material estimated in the 2017 DMMP for the next 40 years (400,000 CY). Is the intention that this island becomes the new dredge material placement site? Does the island footprint need to be as large as proposed (either 20.6 or 25.5 acres)? During the DMMP planning we ran into issues with flood rise for the bathtub placement site. Has any preliminary flood rise modeling been completed for this island?**

The team has primarily focus on the H&H analysis of potential alternatives, rather than design, but it is my understanding that the island would be partially built with rock.

The intention for placing material on Island 205 was always seen as an opportunity to use material for island restoration based on partner input. The larger island footprint will provide a greater impact in the channel, but impacts to flood rise will need to be analyzed further in floodplain analysis. Preliminary floodplain modeling has not yet been completed, but is anticipated within the next month.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 5  
77 WEST JACKSON BOULEVARD  
CHICAGO, IL 60604-3590  
FEB 04 2019

REPLY TO THE ATTENTION OF:

Davi Michl  
U.S. Army Corps of Engineers, Rock Island District  
ATTN: Environmental Planning Branch  
Clock Tower Building  
P.O. Box 2004  
Rock Island, Illinois 61204-2004

RE: Scoping Request – Repair of Rock Channel Regulating Structures, Stabilize Portions of Historic Wisconsin Island #205, and Restore of Closing Dam at Head of Hurricane Island, Mississippi River, Pool 11, Upstream of Dubuque, Iowa (RM 595.4 – 599.0)

Dear Ms. Michl:

The U.S. Environmental Protection Agency has reviewed the U.S. Army Corps of Engineers' (USACE) scoping request dated December 18, 2018 concerning the above-mentioned project. Our comments in this letter are provided in accordance with our responsibilities under the National Environmental Policy Act (NEPA), the Council on Environmental Quality's NEPA Implementing Regulations (40 CFR 1500-1508), and Section 309 of the Clean Air Act.

According to the scoping request, data indicates shoaling is occurring in the navigation channel near Finley's Landing, resulting in more frequent dredging events and emergency closures. As a result, USACE is completing a hydraulic study to determine the most effective way to reduce shoaling at this location. Additionally, the Hurricane Island closing dam is degraded adjacent to the Wisconsin shoreline, as evidenced by a 40-foot scour hole. Island #205 has experienced erosion by approximately 90 percent when compared to the 1931 Brown's survey maps.

Proposed work includes adding rock to raise wing dams to original construction elevation and the original design profile, typically three feet below flat pool elevation of 603.0 feet mean sea level (MSL). To address erosion at Island #205, USACE proposed repairing several channel regulating structures to original design elevations and restoring Island #205 to historic bankline elevations.

Pursuant to our review of the limited scoping information, EPA offers the following comments to aid in the preparation of an Environmental Assessment (EA).

**Purpose and Need / Project Alternatives**

1. EPA recommends the forthcoming EA address the reason(s) shoaling is occurring at this location. Is this problem caused or precipitated by regulating structures upstream of this location in need of repair or construction? EPA has learned USACE has had some success

with notching wing dams to change how sediment accumulates and to keep sediment out of the main channel. Is this approach viable to address accumulating sedimentation in the navigation channel in the project area?

2. The EA should identify the reason(s) the rock channel regulating structures need repair and whether the underlying cause(s) for repair will be alleviated by the proposed repair project. If not, what additional activities, if any, can be undertaken to protect the rock channel regulating structures?
3. EPA recommends the forthcoming EA explain the link between wing dam height and erosion. Additionally, we recommend the EA address what impact, if any, raising the wing dams will have on hydrology (e.g., downstream flows or velocities)?
4. The EA should discuss the rationale behind the proposal to return Island #205 to the 1931 Brown's survey map criteria. What benefit(s) would a restored Island #205 provide to the natural environment and/or navigation?
5. After the underlying purpose and need and alternatives designed to solve the stated problems have been identified, we recommend the forthcoming draft EA identify any alternatives considered but dismissed from further consideration (if applicable) and provide elimination criteria and an explanation for early elimination.

### **Project Features**

1. EPA recommends the forthcoming EA discuss the origin of materials to be used to fill in the scour hole and restore Island #205. Additionally, what measures beyond those suggested in the scoping document, if any, are necessary to ensure the conditions which resulted in the scour hole and eroded island will not re-occur?
2. Similarly, what are the impacts of obtaining and transporting the riprap proposed for use to raise wing dams back to their original construction elevation?

### **Water Quality**

EPA recommends the forthcoming EA provide information pertaining to current impairments listed on the Clean Water Act Section 303(d) list of impaired water bodies for this stretch of the Mississippi River<sup>1</sup> and describe how the proposed project could affect the River with regard to specific listed impairments, if any.

### **Air Quality**

EPA recommends existing air quality within the project and potential air quality impacts of the proposed project be discussed in the forthcoming EA. In addition to an analysis of project impacts to air quality, diesel emissions from project construction may pose environmental and human health risks and should be minimized. In 2002, EPA classified diesel emissions as a likely human carcinogen, and in 2012 the International Agency for Research on Cancer concluded that diesel exhaust is carcinogenic to humans. Acute exposures can lead to other health problems, such as eye and nose irritation, headaches, nausea, asthma, and other respiratory

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<sup>1</sup> See enclosed NEPAAssist report.

system issues. Longer-term exposure may worsen heart and lung disease.<sup>2</sup> EPA recommends that USACE consider the protective measures outlined in the attachment “*Construction Emission Control Checklist*” and commit to specific, applicable measures in any decision documents pertaining to the proposed project.

### **Construction and Staging**

- 1) In addition to identifying resources that could potentially be affected by the proposed project, the draft EA should discuss the following:
  - a. staging area locations;
  - b. access points to the worksite(s), including transport of necessary materials;
  - c. anticipated number of transport vehicles traveling to the placement site(s) each day, if applicable;
  - d. whether work will take place during weekdays only or 7 days/week; and
  - e. anticipated months of the year when work will occur.
- 2) EPA also recommends the draft NEPA document include specific measures and best management practices (BMPs) that will be undertaken to minimize construction impacts to air quality, water resources, soil (e.g., sediment and erosion control methods), and other regulated resources.

### **Noxious and Invasive Species (NNIS)**

The draft EA should discuss aquatic and terrestrial NNIS, with a focus on existing infestations and the potential for proposed activities to increase NNIS in the project area. EPA recommends the draft EA include applicable aquatic and/or terrestrial invasive management plans to address the identification and control of noxious weed/invasive species in and near the project area.

### **Interagency Coordination**

The draft EA should include a list of all Federal, state, and local permits that will be required to undertake each alternative. For all environmental impact categories requiring coordination with other Federal or state agencies, EPA recommends that the draft EA include copies of both your letters to those agencies, as well as the responses from those agencies.

### **Cumulative Impacts**

The draft EA should address whether the proposed project dovetails with current or reasonably-foreseeable projects within the general vicinity of the project area (e.g., US Army Corps of Engineers’ projects, state projects, etc.) as well as applicable Upper Mississippi River plans (e.g., 2018 strategic plan, regulating works projects, Upper Mississippi River Restoration projects, etc.).

### **EPA’S Environmental Databases**

The following databases can be accessed to obtain environmental information pertaining to the project area.

- EnviroMapper<sup>3</sup>: <https://www.epa.gov/waterdata/waters-watershed-assessment-tracking-environmental-results-system>

<sup>2</sup> [https://www3.epa.gov/region1/eco/diesel/health\\_effects.html](https://www3.epa.gov/region1/eco/diesel/health_effects.html)

<sup>3</sup> The Watershed Assessment, Tracking & Environmental Results System (WATERS) unites water quality information previously available only from several independent and unconnected databases.

- Envirofacts<sup>4</sup>: <https://www3.epa.gov/enviro/facts/multisystem.html>
- EJSCREEN: <https://www.epa.gov/ejscreen>
- NEPAassist: <https://www.epa.gov/nepa/nepassist>
- Clean Water Act Section 303(3) Listed Impaired Waters: <https://www.epa.gov/exposure-assessment-models/303d-listed-impaired-waters>
- National Ambient Air Quality Standards:  
<http://www.epa.state.oh.us/dapc/general/naaqs.aspx>

Enclosed is a NEPAassist report for the study area.

Thank you for the opportunity to review and provide comments at the earliest stages of project development. Please send future NEPA documents pertaining to this project as they become available. Should you have any questions about this letter, please contact me or Kathy Kowal of my staff at [REDACTED]

Sincerely,



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

Enclosures: EPA's Construction Emission Control Checklist  
NEPAassist Report

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<sup>4</sup> Includes enforcement and compliance information.

**U.S. Environmental Protection Agency**  
**Construction Emission Control Checklist**

**Mobile and Stationary Source Diesel Controls**

Purchase or solicit bids that require the use of vehicles that are equipped with zero-emission technologies or the most advanced emission control systems available. Commit to the best available emissions control technologies for project equipment in order to meet the following standards.

- On-Highway Vehicles: On-highway vehicles should meet, or exceed, the EPA exhaust emissions standards for model year 2010 and newer heavy-duty, on-highway compression-ignition engines (e.g., long-haul trucks, refuse haulers, shuttle buses, etc.).<sup>1</sup>
- Non-road Vehicles and Equipment: Non-road vehicles and equipment should meet, or exceed, the EPA Tier 4 exhaust emissions standards for heavy-duty, non-road compression-ignition engines (e.g., construction equipment, non-road trucks, etc.).<sup>2</sup>
- Marine Vessels: Marine vessels servicing infrastructure sites should meet, or exceed, the latest EPA exhaust emissions standards for marine compression-ignition engines (e.g., Tier 4 for Category 1 & 2 vessels, and Tier 3 for Category 3 vessels).<sup>3</sup>
- Low Emission Equipment Exemptions: The equipment specifications outlined above should be met unless: 1) a piece of specialized equipment is not available for purchase or lease within the United States; or 2) the relevant project contractor has been awarded funds to retrofit existing equipment, or purchase/lease new equipment, but the funds are not yet available.

Consider requiring the following best practices through the construction contracting or oversight process:

- Establish and enforce a clear anti-idling policy for the construction site.
- Use onsite renewable electricity generation and/or grid-based electricity rather than diesel-powered generators or other equipment.
- Use electric starting aids such as block heaters with older vehicles to warm the engine.
- Regularly maintain diesel engines to keep exhaust emissions low. Follow the manufacturer's recommended maintenance schedule and procedures. Smoke color can signal the need for maintenance (e.g., blue/black smoke indicates that an engine requires servicing or tuning).
- Retrofit engines with an exhaust filtration device to capture diesel particulate matter before it enters the construction site.
- Repower older vehicles and/or equipment with diesel- or alternatively-fueled engines certified to meet newer, more stringent emissions standards (e.g., plug-in hybrid-electric vehicles, battery-electric vehicles, fuel cell electric vehicles, etc.).
- Retire older vehicles, given the significant contribution of vehicle emissions to the poor air quality conditions. Implement programs to encourage the voluntary removal from use and the marketplace of pre-2010 model year on-highway vehicles (e.g., scrappage

<sup>1</sup> <http://www.epa.gov/otaq/standards/heavy-duty/hdci-exhaust.htm>

<sup>2</sup> <http://www.epa.gov/otaq/standards/nonroad/nonroadci.htm>

<sup>3</sup> <http://www.epa.gov/otaq/standards/nonroad/marineci.htm>

rebates) and replace them with newer vehicles that meet or exceed the latest EPA exhaust emissions standards.

### **Fugitive Dust Source Controls**

- Stabilize open storage piles and disturbed areas by covering and/or applying water or chemical/organic dust palliative, where appropriate. This applies to both inactive and active sites, during workdays, weekends, holidays, and windy conditions.
- Install wind fencing and phase grading operations where appropriate, and operate water trucks for stabilization of surfaces under windy conditions.

### **Occupational Health**

- 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.
- 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 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.
- Use respirators, which are only an interim measure to control exposure to diesel emissions. In most cases, an N95 respirator is adequate. Workers must be trained and fit-tested before they wear respirators. Depending on the type of work being conducted, and if oil is present, concentrations of particulates present will determine the efficiency and type of mask and respirator. Personnel familiar with the selection, care, and use of respirators must perform the fit testing. Respirators must bear a NIOSH approval number.



WI Island Wing Dams

Map



Geographic coordinates:

POLYGON  
(42.685154,-90.867290,42.684902,-90.867118,42.683640,-90.781459,42.648423,-90.777339,42.659786,-90.865916,42.685154,-90.867290)  
with buffer 0 miles

Note: The information in the following reports is based on publicly available databases and web services. The National Report uses nationally available datasets and the State Reports use datasets available through the EPA Regions. Click on the hyperlinked question to view the data source and associated metadata.

National Report

Questions

Answers

Within an Ozone 8-hr (1997 standard) Non-Attainment/Maintenance Area?	no
Within an Ozone 8-hr (2008 standard) Non-Attainment/Maintenance Area?	no
Within a Lead (2008 standard) Non-Attainment/Maintenance Area?	no
Within a SO <sub>2</sub> 1-hr (2010 standard) Non-Attainment/Maintenance Area?	no
Within a PM <sub>2.5</sub> 24hr (2006 standard) Non-Attainment/Maintenance Area?	no
Within a PM <sub>2.5</sub> Annual (1997 standard) Non-Attainment/Maintenance Area?	no
Within a PM <sub>2.5</sub> Annual (2012 standard) Non-Attainment/Maintenance Area?	no
Within a PM <sub>10</sub> (1997 standard) Non-Attainment/Maintenance Area?	no
Within a Federal Land?	yes
Within an impaired stream?	yes
Within an impaired waterbody?	no
Within a waterbody?	yes
Within a stream?	yes
Within an NWI wetland?	<a href="#">click here</a> <b>May take several minutes</b>
Within a Brownfields site?	no
Within a Superfund site?	no
Within a Toxic Release Inventory (TRI) site?	no
Within a water discharger (NPDES)?	no
Within a hazardous waste (RCRA) facility?	no
Within an air emission facility?	no
Within a school?	no
Within an airport?	no
Within a hospital?	no
Within a designated sole source aquifer?	no
Within a historic property on the National Register of Historic Places?	no
Within a Toxic Substances Control Act (TSCA) site?	no
Within a RADInfo site?	no

Save to Excel Save as PDF

Wisconsin Report

Iowa Report

Demographic Reports

USFWS IPaC Report

# NEPAssist Report

## WI Island Wing Dams



Input Coordinates: 42.685154,-90.867290,42.684902,-90.867118,42.683640,-90.781459,42.648423,-90.777339,42.659786,-90.865916,42.685154,-90.867290	
Project Area	9.19 sq. mi.
Within an Ozone 8-hr (1997 standard) Non-Attainment/Maintenance Area?	no
Within an Ozone 8-hr (2008 standard) Non-Attainment/Maintenance Area?	no
Within a Lead (2008 standard) Non-Attainment/Maintenance Area?	no
Within a SO2 1-hr (2010 standard) Non-Attainment/Maintenance Area?	no
Within a PM2.5 24hr (2006 standard) Non-Attainment/Maintenance Area?	no
Within a PM2.5 Annual (1997 standard) Non-Attainment/Maintenance Area?	no
Within a PM2.5 Annual (2012 standard) Non-Attainment/Maintenance Area?	no
Within a PM10 (1987 standard) Non-Attainment/Maintenance Area?	no
Within a Federal Land?	yes
Within an impaired stream?	yes
Within an impaired waterbody?	no
Within a waterbody?	yes
Within a stream?	yes
Within an NWI wetland?	Available Online
Within a Brownfields site?	no
Within a Superfund site?	no
Within a Toxic Release Inventory (TRI) site?	no
Within a water discharger (NPDES)?	no
Within a hazardous waste (RCRA) facility?	no

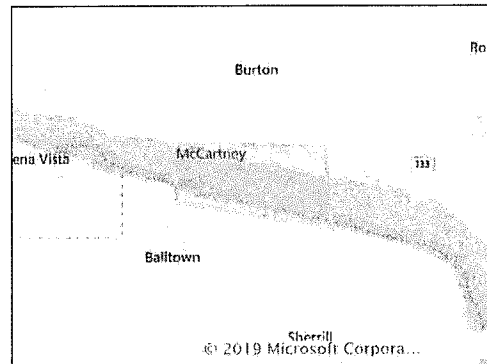
Within an air emission facility?	no
Within a school?	no
Within an airport?	no
Within a hospital?	no
Within a designated sole source aquifer?	no
Within a historic property on the National Register of Historic Places?	no
Within a Toxic Substances Control Act (TSCA) site?	no
Within a RADInfo site?	no

Created on: 1/28/2019 1:42:45 PM

## NEPAassist

Home | Help

U.S. Environmental Protection Agency

Report question: *Within an Impaired stream?* **yes**

Modify question by entering a new buffer distance and unit for the selected study area:

0 miles 

Features within Study Area

Features found: 9

Name	Distance	Units
WI_000038_593	0	miles
WI_000038_593	0	miles
IA 01-NEM-0030_1	0	miles
WI_000038_593	0	miles
WI_000038_593	0	miles
IA 01-NEM-0030_1	0	miles
IA 01-NEM-0030_1	0	miles
WI_000038_593	0	miles
IA 01-NEM-0030_1	0	miles



## Waterbody Quality Assessment Report

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### On This Page

- [Causes of Impairment](#)
- [TMDLs That Apply to This Waterbody](#)
- [Previous Causes of Impairment Now Attaining All Uses](#)

## 2004 Waterbody Report for Mississippi River -- Wisconsin River To Lock And Dam

11

**State:** Wisconsin

**Waterbody ID:**

**Other ID:** WI\_000038\_593

**State List ID:** WIWI\_000038\_593

**Location:** Multiple

**State Waterbody Type:** Stream/Creek/River

**EPA Waterbody Type:** Rivers and Streams

**Water Size:**

**Units:** miles

**Watershed Name:** Grant-Little Maquoketa

[Waterbody History Report](#)

**Data are also available for these years:** 2010 2008

2006

### Causes of Impairment for Reporting Year 2004

Description of this table		
Cause of Impairment	Cause of Impairment Group	State TMDL Development Status
Fish Consumption Advisory - Mercury	Mercury	TMDL needed
Fish Consumption Advisory - PCBs	Polychlorinated Biphenyls (PCBs)	TMDL needed
Mercury	Mercury	TMDL needed
Polychlorinated Biphenyls (PCBs)	Polychlorinated Biphenyls (PCBs)	TMDL needed

### TMDLs That Apply to this waterbody

*No TMDL data have been recorded by EPA for this waterbody.*

### Previous Causes of Impairments Now Attaining All Uses

*No causes of impairment are recorded as attaining all uses for this waterbody.*

January 28, 2019



## Waterbody Quality Assessment Report

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### On This Page

- [Causes of Impairment](#)
- [TMDLs That Apply to This Waterbody](#)
- [Previous Causes of Impairment Now Attaining All Uses](#)

**State:** Iowa

**Waterbody ID:**

**Other ID:** IA 01-NEM-0030\_1

**Location:** From Lock & Dam 11 At North Side Of Dubuque (Dubuque Co.) To Lock & Dam 10 At Guttenberg (Clayton Co.)

**State Waterbody Type:** River

**EPA Waterbody Type:** Rivers and Streams

**Water Size:** 30.9

**Units:** miles

**Watershed Name:** Grant-Little Maquoketa

[Waterbody History Report](#)

**Data are also available for these years:** 2014 2010

2006

### Causes of Impairment for Reporting Year 2012

Description of this table			
Cause of Impairment	Cause of Impairment Group	State TMDL	Development Status
Aluminum	Metals (other than Mercury)	TMDL needed	
Cadmium	Metals (other than Mercury)	TMDL needed	

### TMDLs That Apply to this waterbody

*No TMDL data have been recorded by EPA for this waterbody.*

### Previous Causes of Impairments Now Attaining All Uses

Description of this table			
Cause of Impairment	Cycles Listed	WQS Attainment Date	WQS Attainment Reason
Aluminum	2006, 2010, 2012, 2014	Aug-04-2010	Applicable WQS attained, according to new assessment method.
Cadmium	2012	Sep-11-2015	Data and/or information lacking to determine WQ status; original basis for listing was incorrect
Assessment error: impairment was identified with estimated data for cadmium.			

January 28, 2019



# United States Department of the Interior

## FISH AND WILDLIFE SERVICE

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



IN REPLY REFER  
TO:

Jodi Creswell  
Chief, Environmental Planning Branch  
Attn: Davi Michl, Regional Planning and Environmental Division North  
U.S. Army Corps of Engineers  
Rock Island District  
Clock Tower Building, P.O. Box 2004  
Rock Island, Illinois 61204-2004

Electronic Mail  
February 12, 2019

Ms. Creswell:

This responds to your letter dated December 18, 2018, requesting comments to assist in preparation of an Environmental Assessment (EA) for the proposed repair work of channel regulating structures within the Hurricane Island reach. The project area is located within Pool 11 of the Mississippi River, between river miles (RM) 595.4 and 599.0, upstream of Dubuque, Dubuque County, Iowa. Proposed work includes repair of rock channel regulating structures (wing dams) and the closing dam at the head of Hurricane Island to original design elevations and stabilization of portions of Wisconsin Island #205 to historic bankline elevations.

Ten federally listed species were identified as having the potential to occur within the project area: spectaclecase mussel (*Cumberlandia monodonta*), Higgins eye-pearlymussel (*Lampsilis higginsii*), whooping crane (*Grus americana*), northern long-eared bat (*Myotis septentrionalis*), Iowa Pleistocene snail (*Discus macclintocki*), Hine's emerald dragonfly (*Somatochlora hineana*), Mead's milkweed (*Asclepias meadii*), northern wild monkshood (*Aconitum noveboracense*), prairie bush-clover (*Lespedeza leptostachya*), and western prairie-fringed orchid (*Platanthera praeclara*). The project, as proposed, is not expected to impact terrestrial habitat. If no suitable habitat exists within your project area or its area of impact, and no species or critical habitat is present, it is appropriate to determine the project will have "no effect" on listed species. If you determine the action will have "no effect" on listed species or critical habitat, concurrence with that determination from the Service is not required and will not be provided by the Illinois-Iowa Ecological Services Field Office. We recommend you maintain a written record of why a "no effect" finding is warranted and include it in your administrative record. An example "no effect" memo can be found on our website at <http://www.fws.gov/midwest/endangered/section7/s7process/step1.html>.

### Freshwater Mussels

Two federally endangered freshwater mussel species are known to have ranges coincident to the project area, including the Higgins eye pearlymussel and the spectaclecase mussel. Additionally, the federally endangered sheepsnose mussel (*Plethobasus cyphyus*) has the potential to occur within Pool 11 of the Mississippi River. Ideal habitats for these species include:

Higgins eye pearlymussels are typically found in deep water habitats with moderate currents over sand or gravel substrate.

Spectaclecase mussels are typically found in sheltered areas of larger rivers, away from the main current. Individuals are typically found beneath rock slabs or between boulders or tree roots. Documented populations tend to be highly fragmented and restricted to short stream reaches.



Sheepnose mussels are typically found in shallow areas within large rivers and streams, with moderate to swift currents over coarse sand and gravel substrate. On occasion, sheepnose mussels have been found in areas of mud, cobble, and boulders.

Historic records document the presence of both state and federally listed freshwater mussel species within Pool 11 of the Mississippi River, including within immediate proximity to the project area. A mussel survey conducted between river miles 593.4 and 599.0 as part of the Hurricane Island Dredged Material Management Plan (DMMP) in 2016 identified 25 freshwater mussel species, including Higgins eye pearlymussel and several state listed species.

A mussel survey is scheduled to assess the project area for freshwater mussel resources during the 2019 survey season. We recommend that the survey protocol follow the *draft* Upper Mississippi River mussel Sampling Guidelines (Duyvejonck, 2013). Additionally, due to the spectaclecase mussel's unique habitat requirements, we recommend that the survey protocol be coordinated with the Service to design methodology specific to spectaclecase mussels to be implemented in locations of potentially suitable habitat for this species. Areas considered for potential mussel impacts should include the proposed footprints of the construction areas, buffer areas, and all equipment mooring and/or staging areas. If suitable habitat is identified within the project area, the appropriate determination is that the project "may affect" listed species. Additional information on how to make accurate effect determinations and how to document your determination can be found on our website at <http://www.fws.gov/midwest/endangered/section7/s7process/step1.html>.

#### Bald Eagles

The Service removed bald eagles from protection under the ESA on August 8, 2007. However, they remain protected today under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act (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." There are several active bald eagle nests within the vicinity of the project area. In accordance with the avoidance measures described within the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c), any activities resulting in potential disturbance should be restricted within 660 feet of any identified active eagle nest to dates outside of the nesting season, typically August through mid-January in the Midwest. As identified in your letter dated December 18, 2018, there are currently no identified active eagle nests within 660 feet of the proposed project. However, should a new nest be constructed or the project be modified resulting in potential disturbance of a new or existing nest, please notify our office.

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. Thank you for the opportunity to provide comments.

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

Sara Schmuecker  
Fish and Wildlife Biologist  
Ecological Services  
U.S. Fish and Wildlife Service  
1511 47<sup>th</sup> Avenue  
Moline, IL 61265

[REDACTED]  
[REDACTED]

Regional Planning and Environmental  
Division North (RPEDN)

SEE DISTRIBUTION LIST

The U.S. Army Corps of Engineers (USACE), Rock Island District (District) proposes to reduce Mississippi River navigation channel dredging by making structural improvements to two closing dams in the Hurricane Island and Finley's Landing reaches and construction of rock vanes to stabilize the Hurricane Island bank line placement site (Project). The study area is between River Miles (RM) 595.4 – 599.0 in Pool 11 of the Mississippi River, near North Buena Vista, Dubuque County, Iowa, and Potosi, Grant County, Wisconsin (Enclosures 1 and 2). The Project resides completely in Grant County, Wisconsin

**Federal Undertaking**

Pursuant to the NHPA of 1966, as amended, and its implementing regulations, 36 CFR Part 800, the District has determined that this Undertaking has potential to cause effects to archeological 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 APE (Enclosures 1 and 2) for this Undertaking includes two closure structure repair areas and a rock vane construction area with associated dredged material placement. Detailed plan view and typical profile drawings of the closure structures are provided in Enclosures 3-6. Repair includes rebuilding 599\_2\_CL at the head of Hurricane Island near RM 599.2 to original design grade elevation (600 feet) and raising 595\_8\_CL to elevation 601 feet along the left descending bank at RM 595.8. Closure structure 595\_8\_CL would include a notch with a length of 250 feet to an elevation of 599.5 feet to ensure access for recreational boaters. Both closure structures were originally built in 1994 and 1996 respectively.

Rock vane construction will require dredge material placement along the existing placement site to within 125 feet from the mature tree line. The placement would be 1,000 ft in length and placed to an elevation of 605' MSL 1912. The rock vanes will be 30 feet long and at an angle of 45 degrees to the navigation channel. The elevation of the rock vanes would be 604.5' MSL 1912. At the most upstream end of the placement site, an existing wing dam would be partially restored to act as a larger rock vane to protect the dredged material from erosion. The upstream rock vane would have similar properties as the other rock vanes but would be perpendicular to the main channel with a longer length of 150 feet.

Structure	River Mile	Year Built	Design Elevation (ft) (MSL 1912)	Restore/Enhance Elevation (ft) (MSL 1912)	Impact Area Linear (ft)	Section	Twp-Rge
599.2_CL	599.2	1996	600.0	600.0	1000	5	T2N-R4W
595.8_CL	595.8	1994	599.0	601.0	899	11	T2N-R4W
Rock Vanes	599.1 - 598.8	N/A	604.5	N/A	30	5, 9	T2N-R4W

### Consulting Parties

The District finds the organizations identified on the Distribution List (Enclosure 7) 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. Inclusion on the Distribution List allows agencies, tribes, individuals, organizations, and other interested parties an opportunity to provide views on any effects of this undertaking on historic properties resulting from the Project and to participate in the review of the EA. The District complies with any requests to be removed from, or provide additions to, the Distribution List.

### State Historic Preservation Officer (SHPO) and Tribal Historic Preservation Officer (THPO) Invitations

The District invites the SHPOs/THPOs 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 District's normal procedures for public involvement under the National Environmental Policy Act; 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:** The District conducted an archival search for historic properties following the Policy and Procedures for the Conduct of Underwater Historic Resource Surveys for Maintenance Dredging and Corps Activities (DGL-89-01, March 1989). The District queried the Iowa Geographic Information Systems site file database and the Wisconsin Historic Preservation Database and reviewed the report entitled *An Investigation of the Submerged Historic Properties in the Upper Mississippi River and Illinois Waterway*, dated October 1997, for historic properties potentially affected by the Project. The APE contains no recorded archeological sites or architectural properties. One prior archeological survey overlaps a portion of the APE.

The Project's Landform Sediment Assemblages are limited to "channel" at the closing structures and "island" at the terminus of each closing structure and at the rock vane construction location. These landforms have low potential for intact cultural resources as they are newly formed and subject to frequent erosion and inundation. Landform Sediment Assemblages designations are based on the report entitled *Landform Sediment Assemblage (LSA) Units in the Upper Mississippi River Valley, United States Army Corps of Engineers, Rock Island District, Vol. 1 and 2*, dated 1996.

An archeological survey was conducted in 1992 by a District archeologist over a portion of the 595.8 closure structure (92-0369). The review consisted of surface survey supported by shovel testing and failed to document any evidence of archeological remains. No further work was recommended (Enclosure 8).

***Level of Future Identification Efforts:*** The District proposes no archeological investigations at the proposed Project locales: there are no known submerged resources nearby and, these areas have been subjected to historic dredging and dredged material placement. The closure structures were originally built in 1994 and 1996 and are too recent to be potentially eligible for inclusion on the National Register of Historic Places.

### **Determination of Effect**

The APE contains no recorded historic properties and the District has evaluated the APE as having low potential for intact cultural resources. It is the District's opinion that the present undertaking will have No Effect on historic properties within the APE due to low archeological potential in accordance with 36 CFR 800.4(d)(1).

### **Request for Information from Consulting Parties**

The District is seeking information from all consulting parties regarding their concerns with issues relating to the potential effects of this undertaking 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 requests your written comments on this project within 30 days, pursuant to 36 CFR 800.3(c)(4). Results of all consultation and determination shall be included in the EA for additional public review this year.

If you have any questions regarding this matter, please call Mr. Jim Ross of our Environmental Compliance Branch, [REDACTED] or write to our address above, ATTN: Environmental Compliance Branch (Jim Ross).

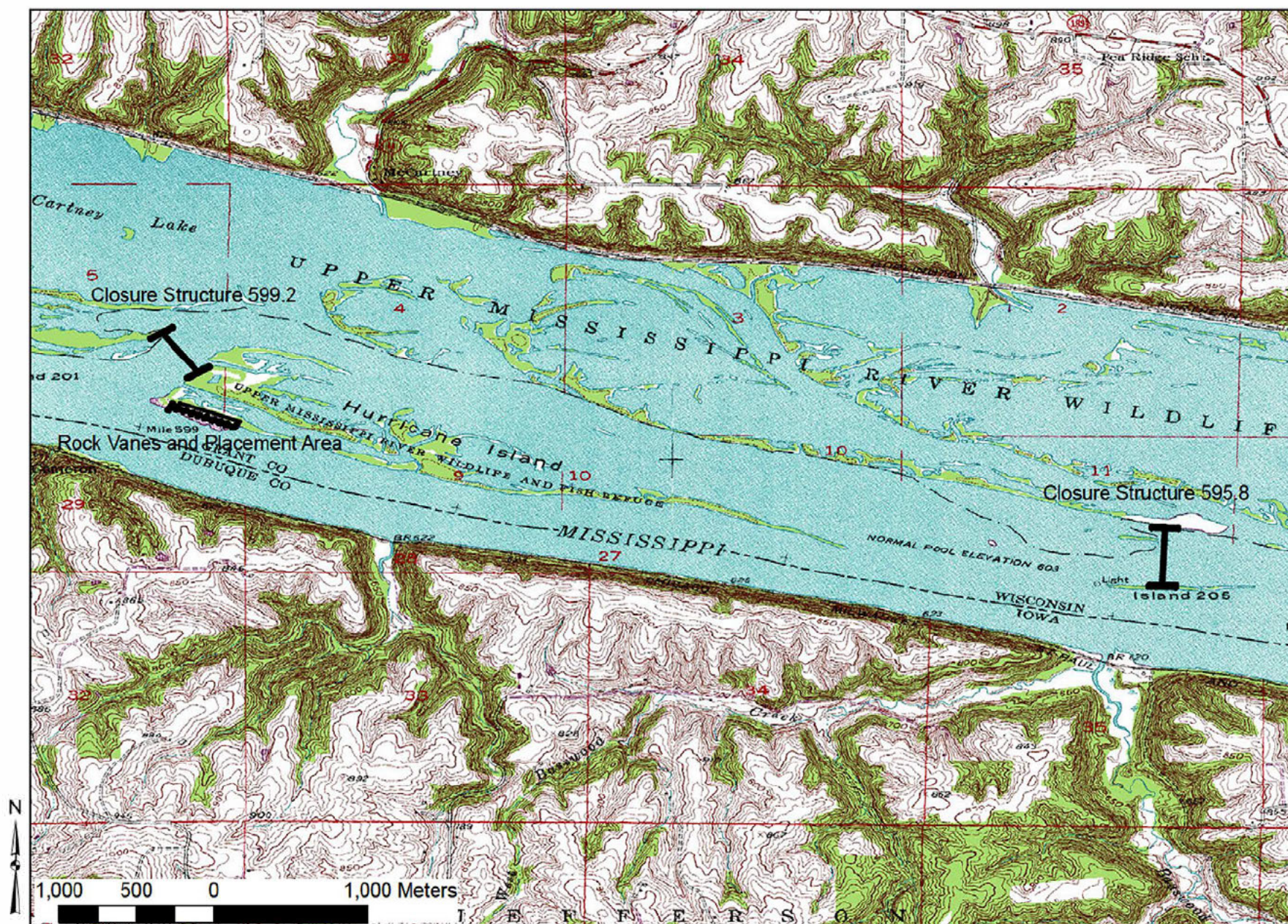
Sincerely,

For

Jodi K. Creswell  
Chief,  
Environmental Planning Branch, RPEDN

Enclosures (8)





ENCLOSURE 1. Area of Potential Effect for Closure Structures and Rock Vanes with Placement Area (1:36000).

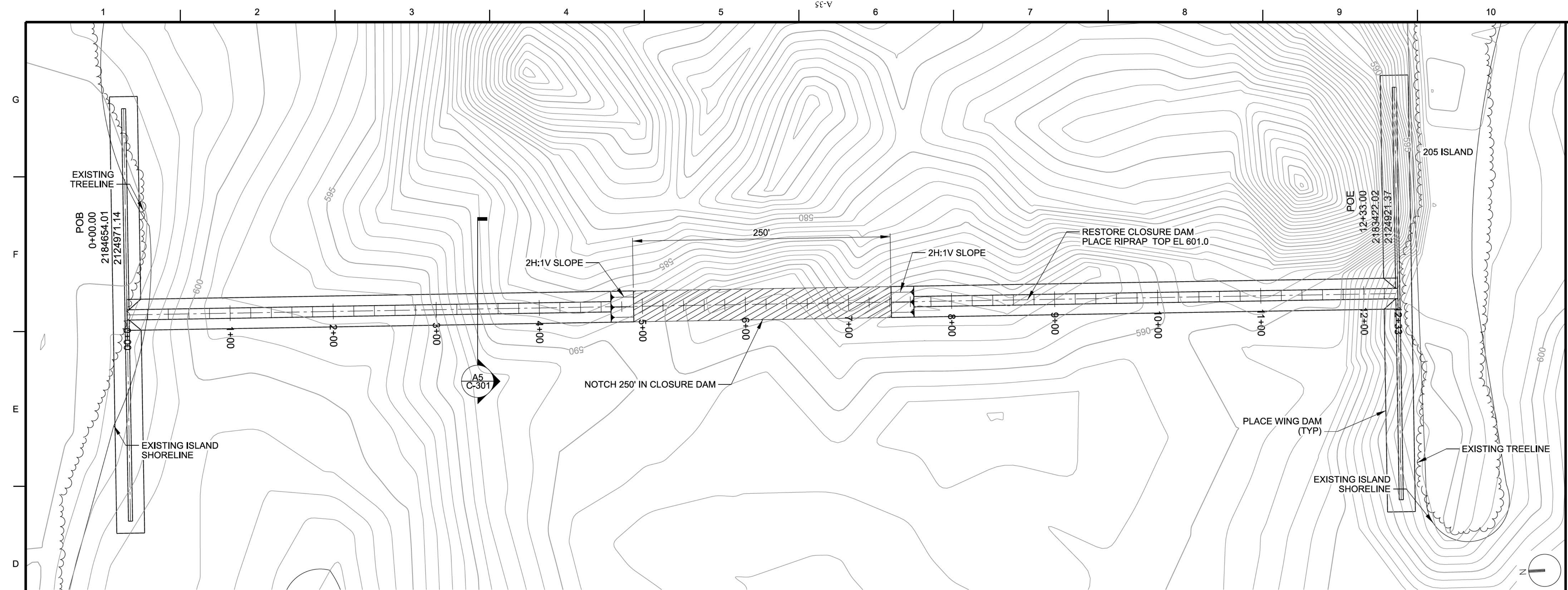




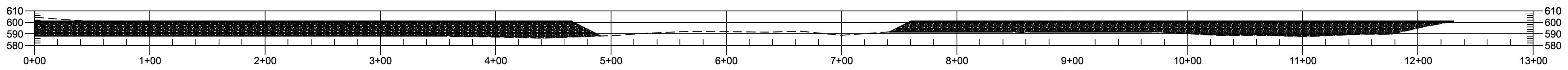








D1 PLAN SOUTH CLOSURE DAM  
SCALE : 1"=50'-0"



A1 PROFILE SOUTH CLOSURE DAM  
SCALE : 1"=50'-0"

US Army Corps of Engineers®

MARK	DATE	DESCRIPTION

DESIGNED BY:	CHK BY:	DATE:	SOLICITATION NO.:
L. ROCKMORE	K. NEAD		

SUBMITTED BY:	APPROVED BY:	DATE:	PROJECT NO.:
J. PATRICK			

FILE NAME:	FILE SIZE:	FILE DATE:	PROJECT CODE:
B5-HURRIC1901	ANSI D		B5HURRIC1901

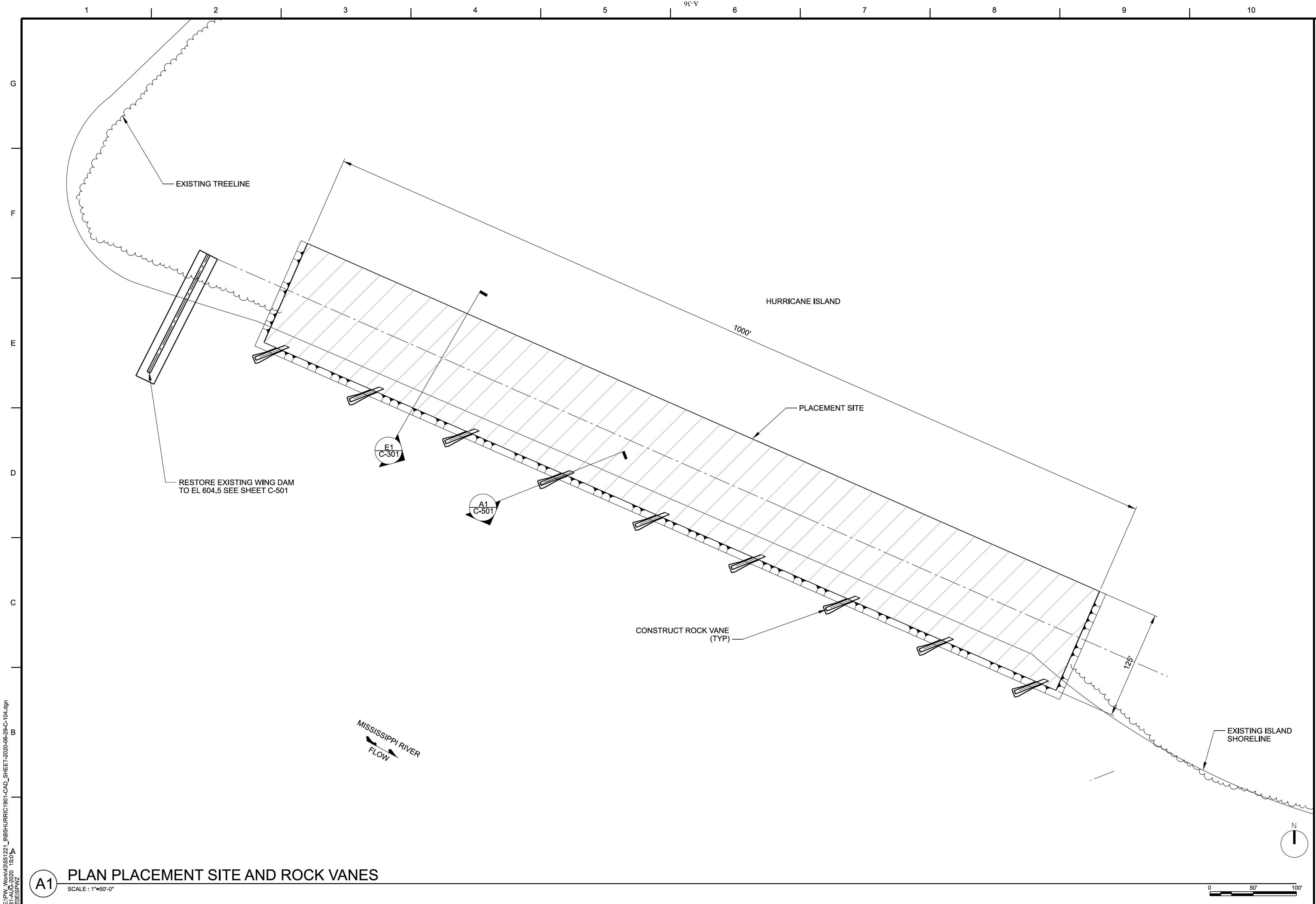
MISSISSIPPI RIVER BASIN  
POOL 11 MISSISSIPPI RIVER  
ROCK ISLAND DISTRICT  
ROCK ISLAND, ILLINOIS 61201

PLAN  
SOUTH CLOSURE DAM

SHEET ID  
C-103

E:\P\W\Work\4351221\_9\B5HURRIC1901-CAD\_SHEET-2020-06-29-C-103.dgn  
27-AUG-2020 16:53  
ZHEBPNZ






E:\P\W\Work\4351221\_9\B6HURRIC1901-CAD\_SHEET-2020-06-29-C-104.dgn  
31-AUG-2020 15:01  
ZHEBPNZ

**A1** PLAN PLACEMENT SITE AND ROCK VANES

SCALE : 1"=50'-0"



US Army Corps  
of Engineers®

MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY:	DATE:	CHD BY:	SOLICITATION NO.:
L. ROCKMORE		K. NEAD	

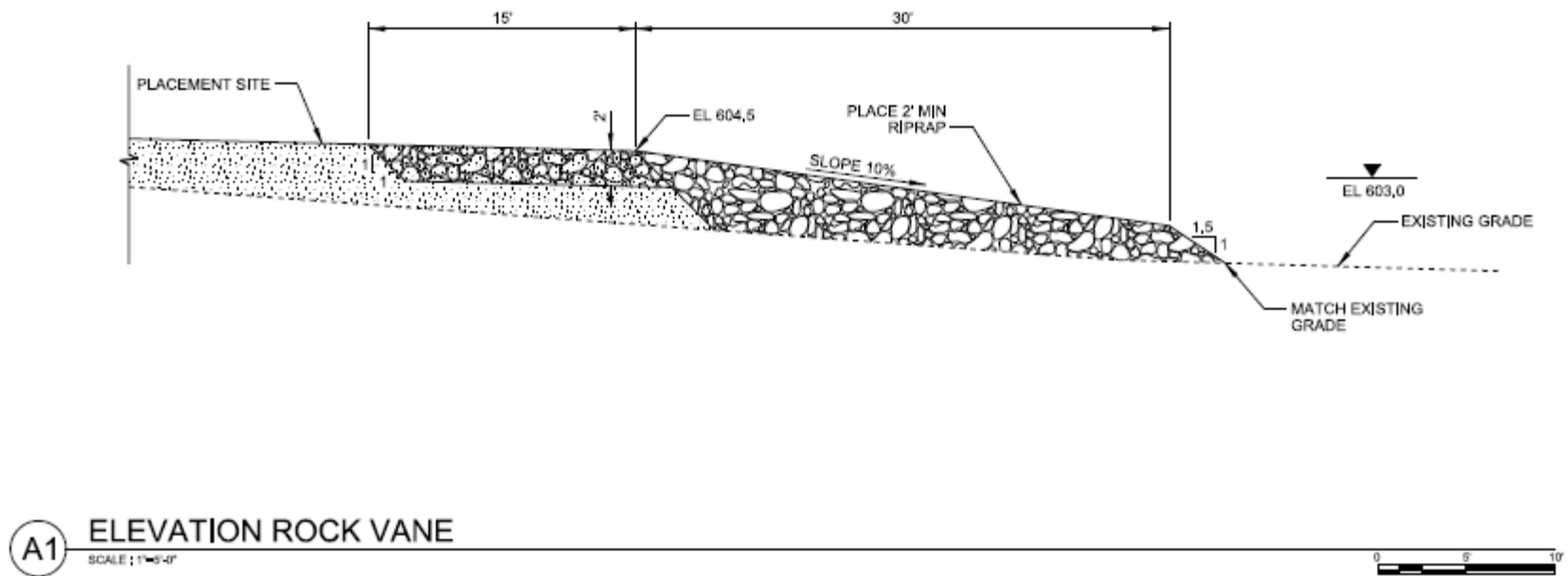
SUBMITTED BY:	FILE NAME:	PROJECT CODE:
J. PARAMESWARAN	B6HURRIC1901	B6HURRIC1901

PLAT SCALE:	FILE NAME:	PROJECT CODE:
AS SHOWN	B6HURRIC1901	B6HURRIC1901

MISSISSIPPI RIVER BASIN  
POOL 11 MISSISSIPPI RIVER  
RIVER MILES 59.1 TO 60.0  
REGULATING STRUCTURE REPAIR  
PLAN  
PLACEMENT SITE AND ROCK VANES

SHEET ID  
**C-104**

REVIEW



ENCLOSURE 6. General Profile of Rock Vane and Placement Site.

## DISTRIBUTION LIST

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Cultural Preservation Dept.  
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Forest County Potawatomi Community  
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Mr. Shannon Wright, Jr., THPO  
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Tribal Chairperson Troy Wanatee  
Sac and Fox Tribe of the Mississippi in Iowa  
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Tama, IA 52339

Mr. Johnathan Buffalo, Director  
Historic Preservation Department  
Sac and Fox Tribe of the Mississippi in Iowa  
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Tama, IA 52339

Tribal President Shannon Holsey  
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Bowler, WI 54416

Ms. Bonney Hartley, THPO  
Stockbridge-Munsee Band Community Band  
of Mohican Indians  
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Winnebago, NE 68071

Mr. Henry Payer, THPO  
Winnebago Tribe of Nebraska  
PO Box 687  
Winnebago, NE 68071

Ms. Daina Penkiunas, Deputy SHPO  
Wisconsin Historical Society  
816 State St.  
Madison, WI 53706

**Primary Info**

<b>WHS Project #</b>	92-0369
<b>ARI #</b>	4206
<b>Report Title</b>	Letter Report of Survey: Dam Sites in the Mississippi River.
<b>Author</b>	Hanson, Dudley M.
<b>Report Location</b>	Archives - Box #28

**Location Info**

County	Grant				
USGS 7.5' Quad Info	BALLTOWN				
PLSS	Township	Range	Direction	Section	French Lot
	2	4	W	10	
	2	4	W	11	

**Investigation Info**

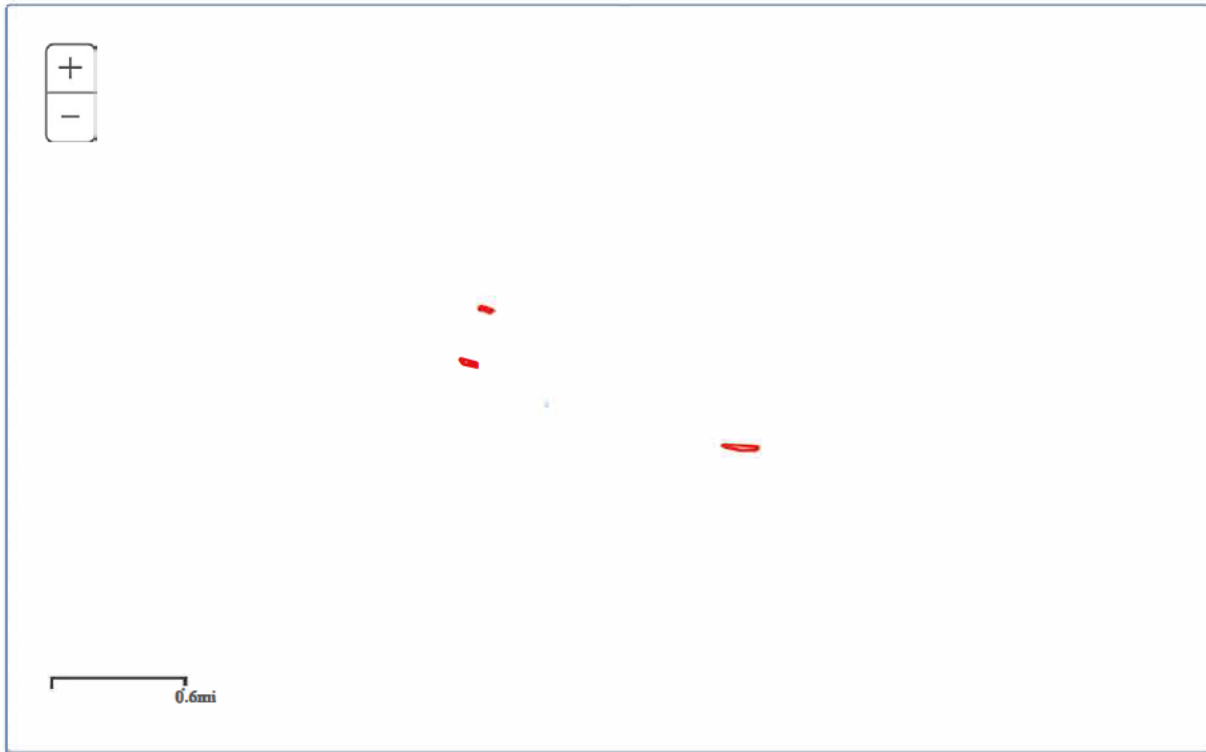
<b>Investigation Type</b>	Surface Survey, Records/Background, Shovel Testing/Probing
---------------------------	--

**Reports**

<b>Report Type</b>	
--------------------	--

**Other Info**

<b>Abstract</b>	In March 1992 an archeologist from the Rock Island District Corps of Engineers undertook a Phase I survey for proposed dam modifications on the Mississippi River in Grant County. Pedestrian survey and shovel tests did not reveal any sites in the project area. No further work is recommended.
<b>Series Type</b>	
<b>Series Number</b>	
<b>Series Investigator</b>	United States Army Corps of Engineers
<b>Sites Investigated</b>	None
<b>Map Description</b>	
<b>Acreage Covered</b>	0.00
<b>Place Published</b>	Rock Island, IL
<b>Month Published</b>	April
<b>Year Published</b>	1992
<b>Is Report On File</b>	No
<b>Date Filed</b>	
<b>Date Entered</b>	01/29/2014
<b>Date Modified</b>	02/26/2003



Enclosure 8. Survey Reference (WHS Project # 92-0369).

**REQUEST FOR SHPO COMMENT AND CONSULTATION ON A FEDERAL UNDERTAKING**

Submit one copy with each undertaking for which our comment is requested. Please print or type. Return to:  
Wisconsin Historical Society, State Historic Preservation Office, 816 State Street, Madison, WI 53706

Please Check All Boxes and Include All of the Following Information, as Applicable.

**I. GENERAL INFORMATION**

- ☒ This is a new submittal.  
☐ This is supplemental information relating to Case #: \_\_\_\_\_, and title: \_\_\_\_\_  
☐ This project is being undertaken pursuant to the terms and conditions of a programmatic or other interagency agreement. The title of the agreement is \_\_\_\_\_
- a. Federal Agency Jurisdiction (Agency providing funds, assistance, license, permit): USACE-MVR (ROCK ISLAND)
- b. Federal Agency Contact Person: JAMES ROSS Phone: [REDACTED]
- c. Project Contact Person: JAMES ROSS Phone: [REDACTED]
- d. Return Address: PO BOX 2004 City: ROCK ISLAND, IL Zip Code: 61204-2004
- e. Email Address: [REDACTED]
- f. Project Name: REGULATING STRUCTURE REPAIR, RIVER MILES 595.4 – 599.0, POOL 11, MISSISSIPPI RIVER
- g. Project Street Address: N/A
- h. County: GRANT City: POTOSI (~5 miles SW) Zip Code: \_\_\_\_\_
- i. Project Location: Township 2N, Range 4W, East ☐ or West ☐, Section 5, 9, 11, Quarter Sections \_\_\_\_\_
- j. Project Narrative Description—Attach Information as Necessary.
- k. Area of Potential Effect (APE). Attach Copy of U.S.G.S. 7.5 Minute Topographic Quadrangle showing APE.

**II. IDENTIFICATION OF HISTORIC PROPERTIES**

- ☐ Historic Properties are located within the project APE per 36 CFR 800.4. Attach supporting materials, per 36 CFR 800.11.  
☒ Historic Properties are not located within the project APE per 36 CFR 800.4. Attach supporting materials, per CFR 800.11.

**III. FINDINGS**

- ☒ No historic properties will be affected (i.e., none is present or there are historic properties present but the project will have no effect upon them). Attach necessary documentation, as described at 36 CFR 800.11.  
☐ The proposed undertaking will have no adverse effect on one or more historic properties located within the project APE under 36 CFR 800.5. Attach necessary documentation, as described at 36 CFR 800.11.  
☐ The proposed undertaking will result in an adverse effect to one or more historic properties and the applicant, or other federally authorized representative, will consult with the SHPO and other consulting parties to resolve the adverse effect per 36 CFR 800.6. Attach supporting documentation as described at 36 CFR 800.11.

Authorized Signature: ROSS.JAMES.S.1231088128 Digitally signed by ROSS.JAMES.S.1231088128 Date: 2020.10.01 11:13:32 -05'00' Date: October 1, 2020

Type or print name: James S. Ross

**IV. STATE HISTORIC PRESERVATION OFFICE COMMENTS**

- ☒ Agree with the finding in section III above.  
☐ Object to the finding for reasons indicated in attached letter.  
☐ Cannot review until information is sent as follows: \_\_\_\_\_

Authorized Signature: [Signature] Date: 7 Oct 2020



## Miami Tribe of Oklahoma

3410 P St. NW, Miami, OK 74354 • P.O. Box 1326, Miami, OK 74355  
Ph: (918) 541-1300 • Fax: (918) 542-7260  
www.miamination.com



October 30, 2020

Department of the Army  
Corps of Engineers - Rock Island District  
Attn: Environmental Compliance Branch (Jim Ross)  
Clock Tower Building - P.O. Box 2004  
Rock Island, IL 61204-2004

Re: Hurricane Island and Finley's Landing Structure Repair, Grant County, Wisconsin –  
Comments of the Miami Tribe of Oklahoma

Dear Mr. Ross:

Aya, kikwehsitoole – I show you respect. The Miami Tribe of Oklahoma, a federally recognized Indian tribe with a Constitution ratified in 1939 under the Oklahoma Indian Welfare Act of 1936, respectfully submits the following comments regarding the Hurricane Island and Finley's Landing Structure Repair in Grant County, Wisconsin.

The Miami Tribe offers no objection to the above-referenced project at this time, as we are not currently aware of existing documentation directly linking a specific Miami cultural or historic site to the project site. However, given the Miami Tribe's deep and enduring relationship to its historic lands and cultural property within present-day Wisconsin, if any human remains or Native American cultural items falling under the Native American Graves Protection and Repatriation Act (NAGPRA) or archaeological evidence is discovered during any phase of this project, the Miami Tribe requests immediate consultation with the entity of jurisdiction for the location of discovery. In such a case, please contact me at 918-541-8966 or by email at [dhunter@miamination.com](mailto:dhunter@miamination.com) to initiate consultation.

The Miami Tribe accepts the invitation to serve as a consulting party to the proposed project. In my capacity as Tribal Historic Preservation Officer I am the point of contact for consultation.

Respectfully,

Diane Hunter  
Tribal Historic Preservation Officer

**From:** [Michael LaRonge](#)  
**To:** [Ross, James S CIV \(USA\)](#)  
**Subject:** [Non-DoD Source] RE: Review Request REGULATING STRUCTURE REPAIR, MISSISSIPPI RIVER MILES 595.4 – 599.0, GRANT COUNTY, WI  
**Date:** Sunday, November 1, 2020 1:58:49 PM

---

Re: USACE Rock-Island District - Regulating Structure Repair, Mississippi River Miles 595.4 – 599.0, Grant County, Wisconsin.

Dear Mr. Ross,

Pursuant to consultation under Section 106 of the National Historic Preservation Act (1966 as amended) the Forest County Potawatomi Community, a Federally Recognized Native American Tribe, reserves the right to comment on Federal undertakings, as defined under the act.

This response is regarding the project mention above. Based on the information provided it does not appear that this project will impact any historic properties of concern for the Tribe. FCPC THPO is pleased to offer a finding of no historic properties affected, with two conditions. First, should the SHPO comments differ the Tribe reserves the right to reconsider based on the new information provided. Second, in the event that human remains or archaeological materials are exposed as a result of project activities in the alluvium work must halt and the Tribe must be included in any consultation regarding treatment and disposition of the find prior to further disturbance.

Your interest in protecting cultural and historic properties is appreciated. If you have any questions or concerns, please contact me at the email or number listed below.

Respectfully,

Michael LaRonge  
Tribal Historic Preservation Officer  
Cultural Preservation Division  
Forest County Potawatomi Community  
8130 Mish ko Swen Drive  
P.O. Box 340  
Crandon, Wisconsin 54520

-----Original Message-----

From: Ross, James S CIV (USA) [REDACTED]  
Sent: Thursday, October 1, 2020 11:34 AM  
Subject: Review Request REGULATING STRUCTURE REPAIR, MISSISSIPPI RIVER MILES 595.4 – 599.0, GRANT COUNTY, WI

Greetings,

The U.S. Army Corps of Engineers, Rock Island District is initiating consultation and providing a determination of effect for the subject undertaking in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended, and it's implementing regulations 36CFR800. Please see attached and contact me by e-mail or telephone if you have any questions.

Sincerely,

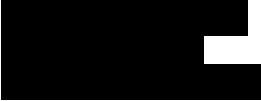
Jim Ross  
Chief, MVR Environmental Compliance Section USACE-RPEDN-Rock Island



**From:** [Joseph Reed](#)  
**To:** [Ross, James S CIV \(USA\)](#)  
**Subject:** [Non-DoD Source] RE: Review Request REGULATING STRUCTURE REPAIR, MISSISSIPPI RIVER MILES 595.4 – 599.0, GRANT COUNTY, WI  
**Date:** Tuesday, November 3, 2020 10:45:20 AM

---

Kêkarus,  
This project lies outside of the cultural landscape for the Pawnee Nation.  
Nawa iri,

Matt Reed  
Historic Preservation Officer  
Pawnee Nation  
PO Box 470  
657 Harrison Street  
Pawnee, Oklahoma 74058  


-----Original Message-----

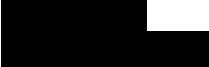
From: Ross, James S CIV (USA)   
Sent: Thursday, October 1, 2020 11:34 AM  
Subject: Review Request REGULATING STRUCTURE REPAIR, MISSISSIPPI RIVER MILES 595.4 – 599.0, GRANT COUNTY, WI

CAUTION: This email originated from outside your organization. Exercise caution when opening attachments or clicking links, especially from unknown senders.

Greetings,

The U.S. Army Corps of Engineers, Rock Island District is initiating consultation and providing a determination of effect for the subject undertaking in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended, and it's implementing regulations 36CFR800. Please see attached and contact me by e-mail or telephone if you have any questions.

Sincerely,

Jim Ross  
Chief, MVR Environmental Compliance Section USACE-RPEDN-Rock Island  


**REGULATING STRUCTURE REPAIR**

**RIVER MILES 595.4 – 599.0  
POOL 11, MISSISSIPPI RIVER**

**GRANT COUNTY, WISCONSIN**

---

---

**ENVIRONMENTAL ASSESSMENT**

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---

**APPENDIX B**

**CLEAN WATER ACT EVALUATION**

DRAFT

**JANUARY 2021**

# REGULATING STRUCTURE REPAIR

## RIVER MILES 595.4-599.0 POOL 11, MISSISSIPPI RIVER

### GRANT COUNTY, WISCONSIN

---

---

#### ENVIRONMENTAL ASSESSMENT

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#### APPENDIX B

#### CLEAN WATER ACT EVALUATION

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III. PROJECT DESCRIPTION .....	B-1
IV. AUTHORITY .....	B-7
V. NATIONWIDE PERMIT COMPLIANCE DOCUMENTATION .....	B-8
VI. CONCLUSION .....	B-14

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*Regulating Structure Repair  
River Miles 595.4 - 599.0, Pool 11, Mississippi River  
Grant County, Wisconsin  
Environmental Assessment*

*Appendix B  
Clean Water Act Evaluation*

## **PREFACE**

The Administrator of the Environmental Protection Agency, in conjunction with the Secretary of Army acting through the Chief of Engineers under Section 404(b)(1) of the Clean Water Act (CWA) (33 U.S.C. 1344), developed the guidelines applicable to the specification of disposal sites for discharges of dredged or fill material into waters of the United States. The guideline's purpose is to restore and maintain the chemical, physical, and biological integrity of waters of the United States through control of discharges or fill material.

When the U.S. Army Corps of Engineers (Corps), Rock Island District (District), plans and proposes to perform any specific civil works action involving discharges of dredged or fill material, they first evaluate the action using specific criteria specified in CWA, 40 CFR Part 230, Subpart B Section 404(b)(1). This appendix presents the District's CWA Evaluation (Evaluation) for placing clean rock (fill material) in the Mississippi River (waters of the United States) for the purpose of maintaining the 9-foot navigation channel.

## **I. CLEAN WATER ACT COMPLIANCE INTRODUCTION**

The District is required to comply with CWA Sections 401 and 404 for the *Regulating Structure Repair*. This appendix details the District justification why this Project meets the conditions and requirements of CWA Nationwide Permit (NWP) 3, Maintenance and NWP 13, Bank Stabilization Activities pending a waiver for construction length deviation.

**II. PROJECT OBJECTIVES.** The Corps' goal for navigation is, "To provide an unrestricted state of art, environmentally sustainable and cost effective navigation system." To meet this goal, the District's objectives for this project are to:

- Improve commercial navigation in the Project area to allow for maintenance of the 9-foot navigation channel in a cost efficient manner, while minimizing impacts to environmental resources.
- Repair or enhance regulating structures determined to need modification to divert energy and flow into the navigation channel.
- Reduce the sediment deposition and frequency of dredging events by repairing regulating structures, resulting in the reduction of channel maintenance and operating (O&M) costs.
- Take advantage of opportunities to restore existing island footprints through the indirect benefit of modifying regulating structures and protect bank line areas from erosion by adding rock vanes to existing placement areas.

## **III. PROJECT DESCRIPTION**

**A. Authority and Purpose.** The formal authorization for the Corps to perform operation and maintenance activities on the Upper Mississippi River (UMR) was given in the Rivers and Harbors Act of 1927; as modified by the Rivers and Harbors Acts of 1930, 1932, and 1935; 1950, and a Resolution of the

*Regulating Structure Repair  
River Miles 595.4 - 599.0, Pool 11, Mississippi River  
Grant County, Wisconsin  
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House Committee on Flood Control of September 19, 1944. These Acts and Resolution authorize the construction, operation, and maintenance of the 9-foot navigation channel on the UMR between the mouth of the Missouri River near St. Louis, Missouri, and St. Paul, Minnesota.

**B. Location.** This document specifically addresses proposed rock placement in the Hurricane Island and Finley's Landing reaches in Pool 11 of the Mississippi River. The District proposes to repair wing dams 599\_2\_CL and 595\_8\_CL along the left descending bank at river miles 595.4 to 599.0. The District also proposes to construct rock vanes at the historic Hurricane Island placement site to provide bank line stabilization. All proposed repairs and bank stabilization measures are located entirely within Grant County, Wisconsin (Figure B-1).

**C. General Description.** Construction includes repair of closing dam 599\_2\_CL at the head of Hurricane Island to original design elevation, raising closing dam 595\_8\_CL, and installing several rock vanes adjacent to stabilize the bank line adjacent to the Hurricane Island placement site (Table B-1). The 599\_2\_CL dam will be at approximately 3 feet below water surface at normal river stage. The 595\_8\_CL dam will only be at approximately 2 feet below water surface at normal river stage; therefore, this structure will be notched to allow for recreational boat access. The rock vanes will be placed approximately 1.5 feet above water surface at normal river stage (604.5 feet MSL 1912). Each structure would be an average linear length of approximately 30 feet.

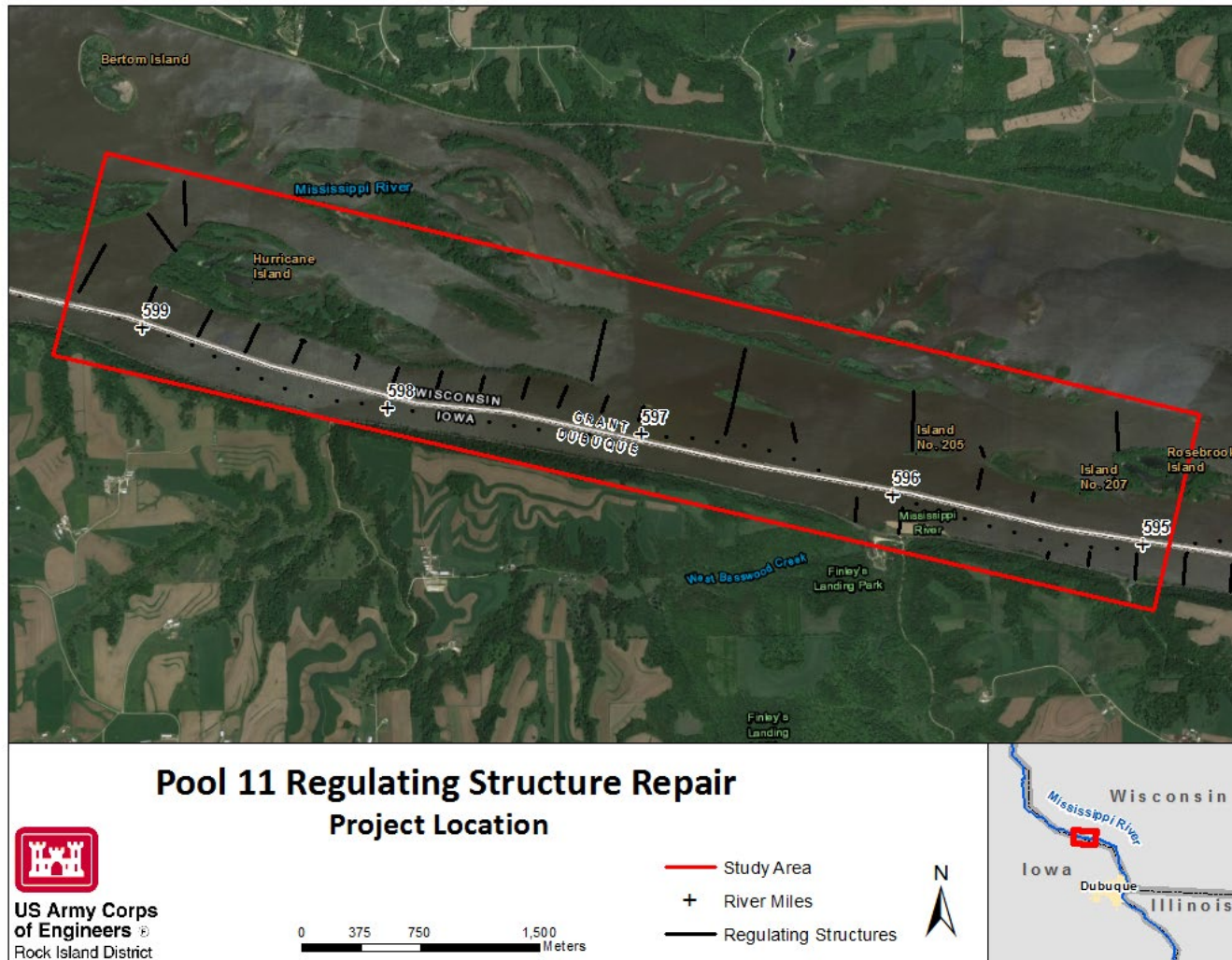
Like the typical closing dams, proposed repairs would reconnect the structure to the Wisconsin shoreline. The closing dams would tie-in at each bank line location approximately 200 feet above and 200 below each dam. Figures EA-5 and EA-6 depict preliminary closing dam design dimensions for 599\_2\_CL (North) and 595\_8\_CL (South), respectively. Figure EA-7 depicts preliminary design dimensions for the proposed rock vanes. While regulating structures divert river flow toward the main channel, they also diversify river habitat, with variable depth and flow velocities. River flows overtopping the structures during high water periods create a large scour hole just downstream of the structure's apex.

The primary goal of regulating structure construction is to reduce future demand for maintenance dredging in the 9-foot navigation channel along this stretch of the river, thus decreasing the impacts of dredging and dredge material placement, and the cost of operation and maintenance of the navigation channel.

If the District repairs regulating structures at this location, the need for dredging would probably not stop, yet the frequency, duration, and quantity of dredging would likely drop in this reach of the river.

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**Figure B-1. Project Location**

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**D. General Description of Fill Material.** Quarried rock would be sourced from a Corps approved quarry, in accordance with Engineering Manual (EM) 1110-2-2301, and transported via barge to the project area. Corps approved quarries provide rock commercially for many purposes, therefore sourcing the riprap would not cause a significant increase in typical workload of the quarry. A 250-foot wide by 1.5-foot deep notch in 595\_8\_CL was accounted for in the quantities in Table B-1. Like the typical closing dams, proposed repairs would reconnect the structure to the Wisconsin shoreline. An assumption of shoreline protection 200 feet upstream and 200 feet downstream of the closing dams was used in the quantity analysis. Riprap for closure dam restoration and shoreline protection would be Iowa Department of Transportation Class A Revetment Iowa Department of Transportation (IADOT) Class A, or equivalent. IA DOT Class A, riprap has a nominal size of 400 pounds and at least 75 percent of the stones must weigh more than 75 pounds. The District Geotechnical Branch would complete a gradation test on the quarried rock prior to placement. Table B-1 displays the proposed amounts of Class A inert and uncontaminated limestone/dolomite rock.

**E. Description of the Proposed Placement Sites.** The Mississippi River main channel border in this reach of Pool 11 has a fairly consistent river bottom comprised of shifting sand in a dune-like pattern. The river depths are approximately 10-18 feet deep. Figure B-2 depicts proposed project features.

**F. Description of Placement Method.** Wing dam repair typically involves the use of deck-mounted cranes and/or derricks, deck barges, endloaders, quarter boats, and tender craft. Using this equipment, the District would place the rock material on the specified alignments and shaped them to the design cross section. Large-grade stone is placed by crane or derrick.

Construction of the Project is dependent on available funding and could begin as early as spring 2021. The timing and duration of construction may continue for several construction seasons (generally late spring to early fall) if river conditions delay Project completion. Construction of rock vanes would occur concurrently or shortly after placement at the dredge material bank line site on Hurricane Island.



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**Table B-1.** Summary of Alternative 17a Structure Repair or Enhancement

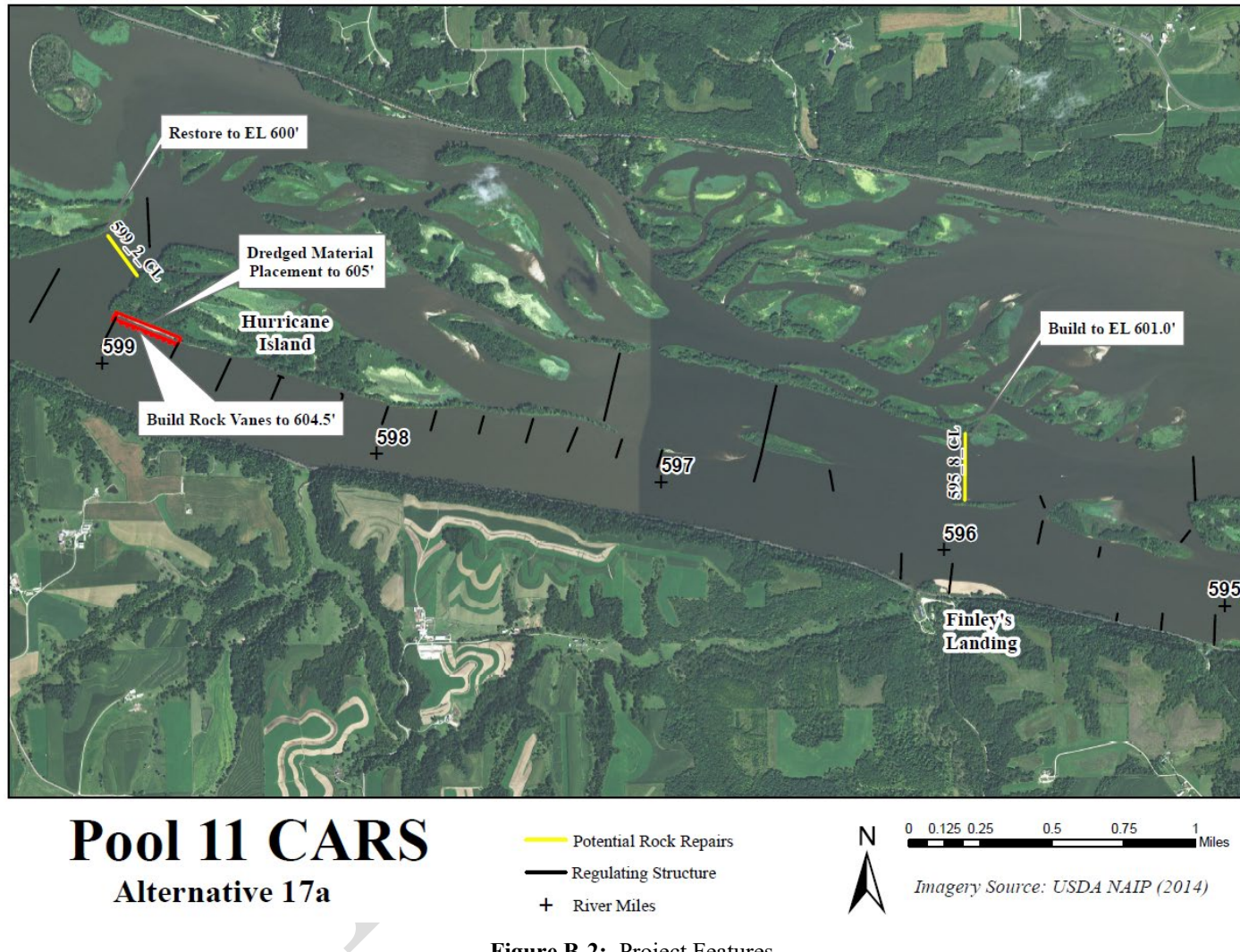
<b>Structure</b>	<b>River Mile</b>	<b>Year Built</b>	<b>Design Elevation (ft) (MSL 1912)</b>	<b>Restore/Enhance Elevation (ft) (MSL 1912)</b>	<b>Depth Below Flat Pool (603 ft)</b>	<b>Surveyed Length (ft)</b>	<b>Fill Volume (CY)</b>	<b>Fill Qty (TN)</b>
599.2 CL	599.2	1996	600.0	600.0	3	1000	2,716	4,481
595.8 CL	595.8	1994	599.0	601.0	2-3.5 <sup>1</sup>	899	2,259	3,757
Rock Vanes	599.1-598.8	N/A	604.5	N/A	-1.5	30 <sup>2</sup>	160	264

<sup>1</sup> Per IADNR request, a 250-foot wide by 1.5-foot depth notch will be added to this structure to allow for recreation access.

<sup>2</sup> The most upstream vane would be constructed in the existing wing dam footprint to reduce erosion (Figure EA-8). It would have the same top elevation and slopes, but will be longer (150 feet) than the proposed downstream rock vanes (9 total).

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**Figure B-2: Project Features**

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#### **IV. AUTHORITY**

In the 1880s, Congress directed the Corps to prevent dumping and filling in the nation's harbors, a program that was vigorously enforced by the engineers. In the Rivers and Harbors Act of 1899, Congress gave the Corps the authority to regulate most kinds of obstructions to navigation, including hazards resulting from effluents (under the so-called Refuse Act of 1899, Section 13). The formal authorization for the Corps to perform operation and maintenance activities on the UMR was given in the Rivers and Harbors Act of 1927; as modified by the Rivers and Harbors Acts of 1930, 1932, and 1935; 1950, and a Resolution of the House Committee on Flood Control of September 19, 1944. These Acts and Resolution authorize the construction, operation, and maintenance of the 9-foot navigation channel on the Mississippi River between the mouth of the Missouri River and St. Paul, Minnesota.

Within its current regulatory program, the Corps has authority over work on structures in navigable waterways under Section 10 of the Rivers and Harbors Act of 1899 and over the discharge of dredged or fill material under Section 404 of the Federal Water Pollution Control Act Amendments of 1972 (P.L. 92-500). This latter requirement applies to wetlands and other valuable aquatic areas throughout the United States. The Corps' current regulatory mission is a natural product of historical evolution, for the Corps has been exercising regulatory responsibilities for over a hundred years.

The Wisconsin Department of Natural Resources (WDNR) has promulgated authority to issue CWA Section 401 Water Quality Certification (WQC) certifying that the Project's discharge would comply with the Wisconsin water quality standards on a case by case basis. However, for certain nationwide permits, the WDNR has issued 401 Water Quality Certification for all projects meeting the conditions and limits of the NWP. Each project must also comply with WDNR conditions specific to each NWP and Memorandum of Understanding.

On January 6, 2017, the Corps published in the Federal Register (82 FR 1860), the Final Rule for the Nationwide Permits Program under the Rivers and Harbors Act of 1899; the CWA; and the Marine Protection, Research and Sanctuaries Act. These rules became effective on March 19, 2017. The planning team used this approved version of the NWP language, terms, and conditions.

In the case of this Project, the planning team's CWA evaluation procedures include:

- consulting with the local Corps regulatory office, which is located at the District headquarters office in Rock Island, Illinois. This consultation concluded the Project preliminarily complies with NWPs 3 and 13 and does not require an individual 404 permit.
- demonstrating why NWPs 3 and 13 would be the appropriate level of compliance. A waiver for NWP 13 will be required, as proposed rock vanes currently exceed the specific threshold by 500 linear feet. The District anticipates authorizing this project under the NWP #13 for bank stabilization while waiving the 500 linear foot threshold as stated in the federal register. This appendix outlines the information the District's regulatory office reviewed to make their final concurrence/nonoccurrence determination.
- ensuring the District will obtain Section 401 WQC and be in full compliance with the CWA prior to signing the FONSI.

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## **V. NATIONWIDE PERMIT COMPLIANCE DOCUMENTATION**

In order to use an NWP, the Project must comply with four sets of conditions:

- General NWP conditions for NWPs (Section C),
- NWPs 3 and 13 conditions,
- Wisconsin Regional Conditions for NWPs, and
- WIDNR 401 Water Quality Certification conditions

For the full language of NWP permit conditions and NWPs 3 and 13 conditions, refer to the St. Paul District's Regulatory Branch website for *Nationwide Permits – Minnesota and Wisconsin* link on the (<https://www.mvp.usace.army.mil/missions/regulatory/nwp/>).

Table B-2 shows the 32 general NWP conditions and the District's compliance responses.<sup>1</sup>

Table B-3 shows the NWP 3 conditions and the District's compliance responses.<sup>1</sup>

Table B-4 shows the NWP 13 conditions and the District's compliance responses.<sup>1</sup>

There are 23 Wisconsin Regional Conditions for nationwide Permit use. Table B-5 documents the District's response to each Condition.

The WIDNR has conditioned Section 401 water quality certification applicable to NWPs 3 and 13. Department of the Army authorization pursuant to Section 404 of the CWA (33U.S.C.1344) under NWPs 3 and 13 would be subject to the WIDNR conditions. All activities conducted under NWPs 3 and 13 shall be in accordance with the provisions of Chapter NR 299 Wis. Adm. Code, s. 299.04.

Table B-6 shows the WIDNR Section 401 Water Quality Certification (WQC) conditions for NWP 3 and NWP 13, along with the District's compliance responses.<sup>1</sup> The WIDNR has granted WQC for both NWP 3 and NWP 13 (Attachment A). The District will obtain WQC and be in full compliance with the CWA prior to signing the FONSI.

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<sup>1</sup> The Environmental Assessment contains detailed discussions on most of these topics. If the EA does not address the condition, a detailed response is presented in these tables.

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**Table B-2:** General Nationwide Permit Conditions and Compliance Responses

#	General NWP Condition	Compliance Response
1	Navigation	No navigation impacts expected. Project will reduce dredging frequency in the Hurricane Island and Finley's Landing Reaches. Temporary impacts to barge operation, safety, or tow handling may occur during construction, but will be minimal. Temporary impacts to recreational boating may occur during construction, but will be minimal.
2	Aquatic Life Movements	Positive impacts are expected with restored river connectivity as a main Project feature.
3	Spawning Areas	Reduced flows and velocities in off-channel areas expected to benefit spawning areas.
4	Migratory Bird Breeding Areas	Bank stabilization of the Hurricane Island Placement site may provide nesting habitat for migratory birds.
5	Shellfish Beds	No shellfish beds present in the Project area.
6	Suitable Material	Local material (rock) will be used for rock structure rehabilitation.
7	Water Supply Intakes	No public water supply intakes present in planning/impact area.
8	Adverse Effects From Impoundments	No impoundments will be constructed.
9	Management of Water Flows	Project features would handle fluctuating water levels including fluctuating river levels.
10	Fills Within 100-Year Floodplains	This Project would comply with applicable FEMA approved floodplain management requirements.
11	Equipment	Heavy equipment will be on barges. Temporary impacts the water column clarity or water quality standards may occur during construction, but will not significantly change existing conditions.
12	Soil Erosion and Sediment Controls	The Project would require standard construction guidelines to avoid erosion and sediment resuspension.
13	Removal of Temporary Fills	No temporary fill required for the Project.
14	Proper Maintenance	The District would properly maintain authorized structures.
15	Single and Complete Project	The Project would be a single Project.
16	Wild and Scenic Rivers	Not Applicable
17	Tribal Rights	Not Applicable
18	Endangered Species	Full Compliance. See EA Section 4.0, <i>Environmental Consequences</i>
19	Migratory Birds and Bald and Golden Eagles	No currently known active eagle nests occur within the Project footprint. The District will continue to coordinate with the USFWS should an active nest be located in the construction footprint.
20	Historic Properties	Full Compliance. See EA Section 4.0, <i>Environmental Consequences</i>
21	Discovery of Previously Unknown Remains and Artifacts	The District Engineer would be notified immediately and coordination initiated, if previously unknown remains and artifacts are discovered.
22	Designated Critical Resource Waters	This Project is not located in or does not contain any Wisconsin Designated Critical Resource Waters

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**Table B-2:** General Nationwide Permit Conditions and Compliance Responses

#	General NWP Condition	Compliance Response
23	Mitigation	This Project would not require wetland mitigation.
24	Safety of Impounded Structures	Not Applicable
25	Water Quality	This Project would comply with the Wisconsin water quality standards (See Table B-6)
26	Coastal Zone Management	Not Applicable
27	Regional and Case-By-Case Conditions	Not Applicable
28	Use of Multiple Nationwide Permits	The Project PDT requests use of NWPs 3 and 13.
29	Transfer of NWP Verifications	No transfer of NWP Verifications.
30	Compliance Certification	The District would submit the compliance certification upon receipt of the NWP.
31	Activities Affecting Structures or Works Built by the United States	This Project does not require Section 408 permission.
32	Pre-Construction Notification (PCN)	Full compliance expected.



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**Table B-3:** Nationwide Permit 3 Conditions and Compliance Responses

#	NWP 3 Condition	Compliance Response
1	Repair, rehabilitation, or replacement of previously authorized currently serviceable structure or fill	These Project features were previously constructed as part of the 4.5, 6, and 9 Channel Project authorized by the Rivers and Harbors Act, which directed the Corps to maintain a navigable water way.
2	Accumulated Sediments	Full compliance expected.
3	Temporary Structures and Fill	Full compliance expected. No temporary work pads, cofferdams, access roads, or other temporary fill required.
4	Dredging	Full compliance expected.
6	Notifications	Full compliance expected.

**Table B-4:** Nationwide Permit 13 Conditions and Compliance Responses

#	NWP 13 Condition	Compliance Response
1	No Excess Material	No material will be placed in excess of the minimum needed for erosion protection.
2	Length Restriction of 500 feet	The rock vanes bank stabilization will be 1,000 feet in length along the bank. The District Engineer will waive this criterion with written determination that discharge will result in minimal adverse environmental effects.
3	Fill Volume restriction of one cubic yard per running foot	The Project will place less than one cubic yard of rock per running foot.
4	Discharge	The proposed Project would not involve discharges of fill material into special aquatic sites.
5	Surface water flow	The Project will not impair surface water flow into or out of any waters of the United States
6	Material Erosion	Rock vanes are not expected to erode by normal or expected high flows.
7	Native Plants	Not Applicable
8	Stream Channelization	The rock vanes are not a stream channelization activity.
9	Maintenance	Full compliance expected.

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**Table B-5:** Wisconsin Regional Conditions and Compliance Responses

#	Wisconsin Regional Condition	Compliance Response
1	Discretionary Authority	Not Applicable
2	Limit on Tributary Impacts	The Project is covered under NWP 13 and will comply with permit conditions.
3	Linear Projects	Not Applicable - The Project is not a utility or linear transportation project.
4	Great Lakes Compact	Not Applicable - The Project is not within the Great Lakes Basin.
5	Tribal Rights	Not Applicable
6	Areas under a Special Area Management Plan	Not Applicable
7	Designated Critical Resource Water	Not Applicable - The Project does not impact any designated critical resource water.
8	Calcareous fens	Not Applicable. There are no calcareous fens in the Project area.
9	PCNs for Special Aquatic Resources: State-designated wild rice waters, coastal plain marshes, bog wetland plant communities, interdunal wetlands, Great Lakes ridge and swale complexes, fens, wetland sites designated of international importance	Not Applicable - The Project does not occur in any of the aquatic resources listed.
10	PCNs for Bridges, Structures, and Vessels more than 50 years old	Not Applicable
11	PCNs for Suspected Sediment or Soil Contamination	Not Applicable
12	PCNs for the Apostle Islands National Lakeshore and Madeline Island	Not Applicable
13	PCNs for Temporary Impacts	Not Applicable - The Project does not involve any temporary fills or structures.
14	Compensatory Mitigation	Not Applicable - The Project does not require compensatory
15	Site Inspection	Full compliance expected.
16	Restoration for Temporary Impacts	Not Applicable (see Condition 13 above).
17	Duration of Temporary Impacts	Not Applicable (see Condition 13 above).
18	Culverts and Crossings	Not Applicable
19	Best Management Practices	Full compliance expected
20	Riprap	Full compliance expected - The Project will use only rock of sufficient size to prevent movement from natural forces under normal
21	Pollutant or Hazardous Waste Spills	Full compliance expected
22	Clean Construction Equipment	Full compliance expected to prevent the spread of invasive species
23	Compliance	The District will ensure all the terms and conditions of NWPs 3 and NWP 13 in compliance.

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**Table B-6:** WIDNR Section 401 Water Quality Certification for NWP 3 and NWP 13 General Conditions and Compliance Responses  
(per Ch NR 299 Wis. Adm. Code, s. 299.04)

#	WIDNR Section 401 Water Quality Certification for NWP 3 and NWP 13	Compliance Response
1	The permittee shall allow the WIDNR reasonable entry and access to the discharge site to inspect the discharge for compliance with the certification and applicable laws.	Full compliance expected
2	If any of these Section 401 water quality conditions are found invalid or unenforceable, the water quality certification is denied for all activities to which that condition applies.	Full compliance expected
3	Water quality certification is denied without prejudice for activities involving the temporary stockpiling of dredged or fill material in waters of the state, including wetlands	Not Applicable
4	No discharges of dredged or fill material below the ordinary high water mark of a navigable stream as defined by s. 310.03(5), Wis. Adm. Code, may take place during fish spawning periods or times when nursery areas would be adversely impacted (March 1 – June 15)	Full compliance expected
5	Unless specifically exempt from state statute and Federal PCN requirements, applicants seeking authorization under these NWPs shall complete the Joint State/Federal Permit Application on the department e-permitting site at <a href="http://dnr.wi.gov/permits/water/">http://dnr.wi.gov/permits/water/</a>	Full compliance expected.

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## **VI. CONCLUSION**

The District concludes this Project would meet the conditions of CWA, Section 404 by an existing Department of Army NWP 3, Maintenance and NWP 13, Bank Stabilization (pending waiver), as described in the January 6, 2017, Federal Register, Reissuance of Nationwide Permits; Notice (82 FR 1860).

The District realizes NWPs 3 and 13 may be modified, reissued, or revoked prior to March 19, 2022. The planning team would remain informed of changes to the NWPs. If construction activities are not completed prior to 12 months from the date of the modifications or revocation of the NWP, the team would reevaluate the Project's 404 compliance status and would coordinate the Project with the District's Regulatory Branch. The Project would be in full compliance with the current CWA regulations prior to any construction and activities.



**REGULATING STRUCTURE REPAIR**

**RIVER MILES 595.4-599.0  
POOL 11, MISSISSIPPI RIVER**

**GRANT COUNTY, WISCONSIN**

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**ENVIRONMENTAL ASSESSMENT**

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**ATTACHMENT A**

**WISCONSIN DEPARTMENT OF NATURAL RESOURCES  
SECTION 401 WATER QUALITY CERTIFICATION CONDITIONS**

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**BEFORE THE WISCONSIN DEPARTMENT OF NATURAL RESOURCES**

Application of the United States Department of the Army,)   
Corps of Engineers, for Water Quality Certification for the)   
Final Regulations Pertaining to the Issuance, Reissuance, )   
and Modification of Nationwide Permits )

On January 6, 2017, the United States Department of the Army, Corps of Engineers (COE), published its final notice regarding the Issuance of Nationwide Permits (NWP) in the Federal Register (agency docket number COE-2015-0017). The publication includes new, existing, and modified NWPs. Publication of these NWPs serves as the Corps' application to the State for water quality certification (WQC) under Section 401 of the Federal Clean Water Act (CWA).

The Wisconsin Department of Natural Resources (WDNR) has examined the final regulations pursuant to Section 401, CWA, and Chapter NR 299, Wisconsin Administrative Code (Wis. Adm. Code).

The WDNR has determined the following conditions for the NWPs are required to ensure compliance with state water quality standards enumerated in s. 299.04, Wis. Adm. Code. The certification contained herein shall expire on March 19, 2022.

Section 401 Certification does not release the permittee from obtaining all other necessary federal, state, and local permits, licenses, certificates, approvals, registrations, charters, or similar forms of permission required by law. It does not limit any other state permit, license, certificate, approval, registration, charter, or similar form of permission required by law that imposes more restrictive requirements. It does not eliminate, waive, or vary the permittee's obligation to comply with all other laws and state statutes and rules throughout the construction, installation, and operation of the project. This Certification does not release the permittee from any liability, penalty, or duty imposed by Wisconsin or federal statutes, regulations, rules, or local ordinances, and it does not convey a property right or an exclusive privilege.

This Certification does not replace or satisfy any environmental review requirements, including those under the Wisconsin Environmental Policy Act (WEPA) or the National Environmental Policy Act (NEPA).

**Note:** The specific language in the NWPs is not included in this document. Copies of complete nationwide permits published in the Federal Register on January 6, 2017, may be obtained from your local COE field office.

**STATE CONDITIONS AND LIMITATIONS OF CERTIFICATION**

**GENERAL CONDITIONS:**

1. The permittee shall allow the WDNR reasonable entry and access to the discharge site to inspect the discharge for compliance with the certification and applicable laws.

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2. If any of these §401 water quality certification conditions are found invalid or unenforceable, the water quality certification is denied for all activities to which that condition applies.
3. Water quality certification is denied without prejudice for activities involving the temporary stockpiling of dredged or fill material in waters of the state, including wetlands.
4. No discharges of dredged or fill material below the ordinary high water mark of a navigable stream as defined by s. 310.03(5), Wis. Adm. Code, may take place during fish spawning periods or times when nursery areas would be adversely impacted. These periods are:
  - September 15<sup>th</sup> through May 15<sup>th</sup> for all trout streams and upstream to the first dam or barrier on the Root River (Racine County), the Kewaunee River (Kewaunee County), and Strawberry Creek (Door County). To determine if a waterway is a trout stream, you may use the WDNR website trout maps at <http://dnr.wi.gov/topic/fishing/trout/streammaps.html>.
  - March 1<sup>st</sup> through June 15<sup>th</sup> for ALL OTHER waters.
5. Unless specifically exempt from state statute and federal Pre-Construction Notification (PCN) requirements, Applicants seeking authorization under these NWP's shall complete the Joint State/Federal Permit Application on the department e-permitting site at <http://dnr.wi.gov/Permits/Water/>.

Nationwide Permits Granted Water Quality Certification:

- NWP 3 – Maintenance
- NWP 4 – Fish and Wildlife Harvesting, Enhancement, and Attraction Devices and Activities
- NWP 5 – Scientific Measurement Devices
- NWP 6 – Survey Activities
- NWP 13 – Bank Stabilization
- NWP 15 – U.S. Coast Guard Approved Bridges
- NWP 16 – Return Water From Upland Contained Disposal Areas
- NWP 18 – Minor Discharges
- NWP 20 – Response Operations for Oil or Hazardous Substances
- NWP 22 – Removal of Vessels
- NWP 25 – Structural Discharges
- NWP 27 – Aquatic Habitat Restoration, Enhancement, and Establishment Activities
- NWP 28 – Modifications of Existing Marinas
- NWP 30 – Moist Soil Management for Wildlife
- NWP 31 – Maintenance of Existing Flood Control Facilities
- NWP 35 – Maintenance Dredging of Existing Basins
- NWP 36 – Boat Ramps
- NWP 37 – Emergency Watershed Protection and Rehabilitation
- NWP 38 – Cleanup of Hazardous and Toxic Waste
- NWP 45 – Repair of Uplands Damaged by Discrete Events
- NWP 53 – Removal of Low-Head Dams
- NWP 54 – Living Shorelines

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Nationwide Permits for which Water Quality Certification is Partially Denied

WQC is certified or denied without prejudice as indicated below for the activities authorized by the following NWP. Certified activities are subject to WQC conditions 1-5 above. If activities are denied without prejudice, the applicant must apply to the WDNR for an individual 401 WQC.

- NWP 7 - Outfall Structures and Associated Intake Structures
  - WQC denied: Where the effluent from the outfall is not regulated under the WPDES permit program. WPDES permit information is available at:  
<http://dnr.wi.gov/topic/wastewater/PermitApplications.html>
  - WQC certified: All other NWP 7 activities.
- NWP 32 - Completed Enforcement Actions
  - WQC denied: If WDNR is not a party to the agreement or if WDNR has not concurred in writing with the settlement agreement.
  - WQC certified: All other NWP 32 activities.
- NWP 39 - Commercial and Institutional Developments
  - WQC denied: Discharges of dredged or fill material for the construction of the following attendant features: yards, recreation facilities, stormwater management facilities or wastewater management facilities.
  - WQC certified: All other NWP 39 activities.
- NWP 41 - Reshaping Existing Drainage Ditches
  - WQC denied: If any portion of the project will occur in or adjacent to a trout stream or any perennial tributaries to a trout stream. To determine if a waterway is a trout stream, you may use the WDNR website trout maps at  
<http://dnr.wi.gov/topic/fishing/trout/streammaps.html>.
  - WQC certified: All other NWP 41 activities.
- NWP 42 - Recreational Activities
  - WQC denied: If the project involves the placement of any dredged or fill material into Wisconsin navigable waters as defined in s. NR 310.03(5), Wis. Adm. Code.
  - WQC certified: All other NWP 42 activities.
- NWP 44 - Mining Activities
  - WQC denied: If the project involves the placement of any dredged or fill material into Wisconsin navigable waters as defined in s. NR 310.03(5), Wis. Adm. Code.
- NWP 46 - Discharges in Ditches
  - WQC denied: If the project involves the placement of any dredged or fill material into Wisconsin navigable waters as defined in s. NR 310.03(5), Wis. Adm. Code.
  - WQC certified: All other NWP 46 activities.
- NWP 51 - Land-Based Renewable Energy Generation Facilities
  - WQC denied: Discharges of dredged or fill material for the construction of the following attendant features: yards, recreation facilities, stormwater management facilities or wastewater management facilities.
  - WQC certified: All other NWP 51 activities.

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Water Quality Certification Is Also Denied for the Nationwide Permits Revoked by the Corps of Engineers in Wisconsin and Listed Below:

- NWP 8 – Oils and Gas Structures on the Outer Continental Shelf
- NWP 12 – Utility Line Activities
- NWP 14 – Linear Transportation Projects
- NWP 15 – U.S. Coast Guard Approved Bridges
- NWP 21 – Surface Coal Mining Activities
- NWP 23 – Approved Categorical Exclusions
- NWP 24 – Indian Tribe or State Administered Section 404 Programs
- NWP 34 – Cranberry Production Activities
- NWP 49 – Coal Re-mining Activities
- NWP 50 – Underground Coal Mining Activities

Nationwide Permits Denied Water Quality Certification Without Prejudice At This Time:

The following NWP categories are denied Water Quality Certification (WQC) in their entirety and require an individual Section 401 WQC for all activities under these NWPs. In instances where a state has denied the 401 WQC for discharges under a particular NWP, permittees must furnish the District Engineer for the COE with an individual 401 WQC.

Each category was reviewed and it was determined that: potential water quality and beneficial use impacts would be beyond that considered minimal; the activity was not likely to occur in Wisconsin; the NWP doesn't align with state general permit standards required by statute (NWP 29, 40, 43); inadequate data was available for WDNR to fully evaluate potential water quality and beneficial use impacts; or the category was empty (Reserved).

- NWP 17 – Hydropower Projects
- NWP 19 – Minor Dredging
- NWP 26 – Reserved
- NWP 29 – Residential Developments
- NWP 33 – Temporary Construction, Access and Dewatering
- NWP 40 – Agricultural Activities
- NWP 43 – Stormwater Management Facilities
- NWP 47 – Reserved
- NWP 48 – Existing Commercial Shellfish Aquaculture Activities
- NWP 52 – Water-Based Renewable Energy Generation Pilot Projects

**Note:** State water quality certification is not required for the following Section 10 only NWPs: 1 – Aids to Navigation, 2 – Structures in Artificial Canals, 9 – Structures in Fleeting and Anchorage Areas, 10 – Mooring Buoys, 11 – Temporary Recreational Structures, 28 – Modifications of Existing Marinas, 35 – Maintenance Dredging of Existing Basins.



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Clean Water Act Evaluation*

**NOTICE OF APPEAL RIGHTS**

If you believe that you have a right to challenge this decision, you should know that Wisconsin Statutes and administrative rules establish time periods within which requests to review Department decisions must be filed.

To request a contested case hearing pursuant to section 227.42, Wisconsin Statutes, you have 30 days after the decision is mailed, or otherwise served by the Department, to serve a petition for hearing on the Secretary of the Department of Natural Resources.

This determination becomes final in accordance with the provisions of s. NR 299.05(7), Wisconsin Administrative Code, and is judicially reviewable when final. For judicial review of a decision pursuant to Sections 227.52 and 227.53, Wisconsin Statutes, you have 30 days after the decision becomes final to file your petition with the appropriate circuit court and to serve the petition on the Secretary of the Department of Natural Resources. The petition must name the Department of Natural Resources as the respondent.

Reasonable accommodation, including the provision of informational material in an alternative format, will be provided for qualified individuals with disabilities upon request.

This notice is provided pursuant to section 227.48(2), Wisconsin Statutes.

Dated at Madison, Wisconsin

June 1, 2017

STATE OF WISCONSIN  
DEPARTMENT OF NATURAL RESOURCES

By



Cathy Stepp, Secretary

**REGULATING STRUCTURE REPAIR**

**RIVER MILES 595.4 – 599.0  
POOL 11, MISSISSIPPI RIVER**

**GRANT COUNTY, WISCONSIN**

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**ENVIRONMENTAL ASSESSMENT**

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**APPENDIX C**

**HYDROLOGY AND HYDRAULICS**

DRAFT

**JANUARY 2021**

# REGULATING STRUCTURE REPAIR

RIVER MILES 595.4 - 599.0  
POOL 11, MISSISSIPPI RIVER

GRANT COUNTY, WISCONSIN

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## ENVIRONMENTAL ASSESSMENT

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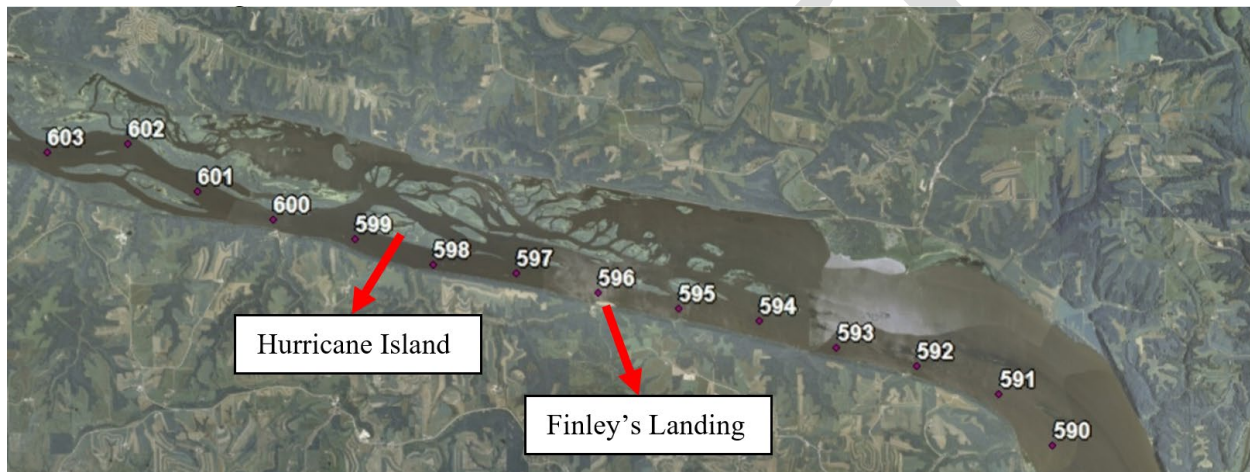
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## I. LOCATION

The Hurricane Island and Finley's Landing lies between the river mile RM 595 and RM 599 in Pool 11 of the Mississippi River (Figure C-1). Sediment deposition occurs in the main channel from RM 595 to RM 603, and the periodic dredging is frequently needed. In the last 15 years, dredging has occurred at Finley's Landing 11 times. There have been dredging issues upstream at Hurricane Island, but in the last 20 years Finley's Landing has been a more prevalent problem. Dredging materials are dumped along the beach of Hurricane Island and at Finley's Landing along the right side bank line near RM 596 and may contribute to the sedimentation issue. The Committee to Assess Regulating Structures (CARS) has proposed this project, and its objective is sediment deposition reduction in the river reach around the Hurricane Island and Finley's Landing. This report will outline different alternatives to reduce deposition at the chronic dredge site and measure their effectiveness.



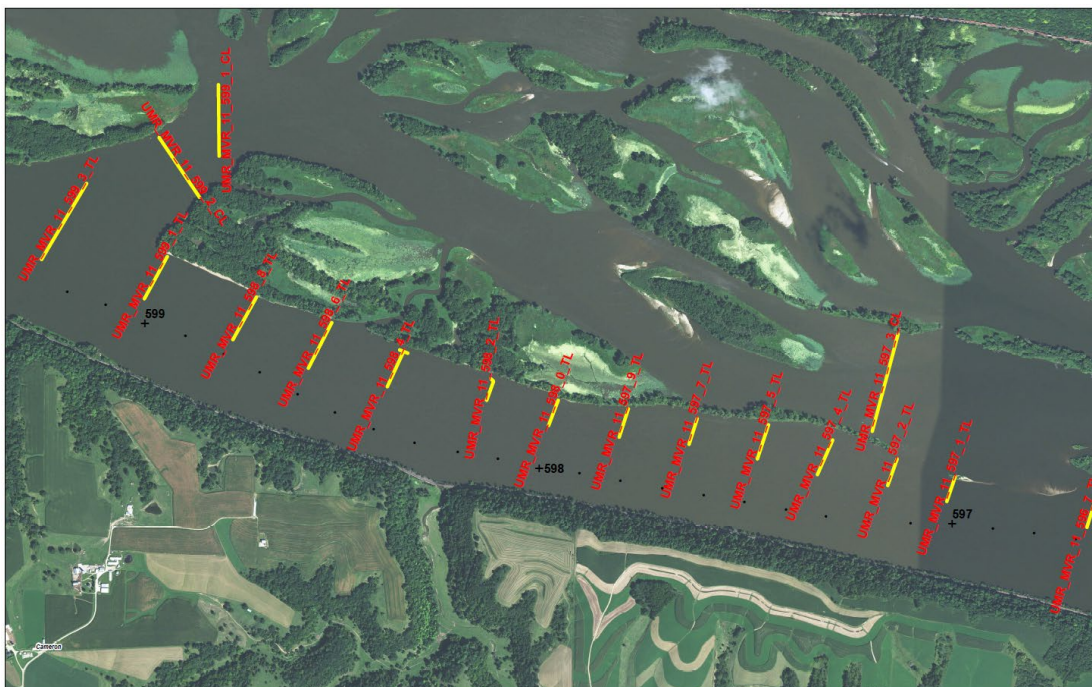
**Figure C-1.** Hurricane Island and Finley's Landing

## II. CONDITIONS OF STRUCTURES

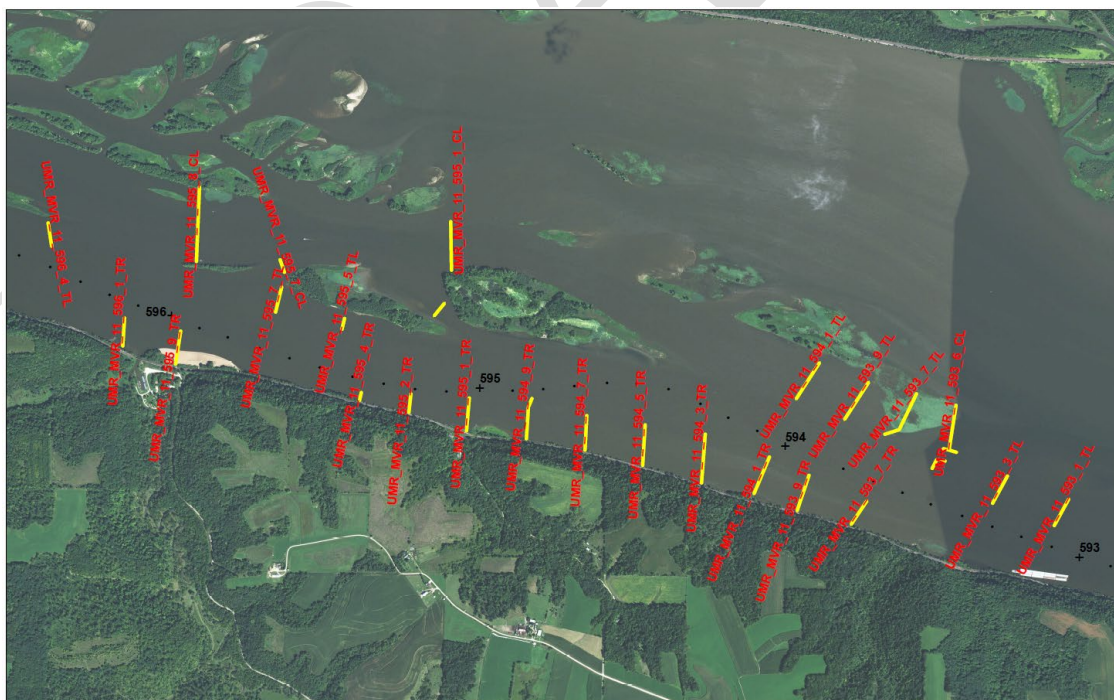
A GIS analysis was completed for all the regulating structures within the study area to determine their condition. The quantity of fill material needed to restore the structures to the original design was found by creating a 3D raster of the wingdam or closing dam and then subtracting the current Pool 11 raster surface to obtain the fill needed. The crown was built to the original design elevation and ten feet wide, and the side slopes were made at 1.5H: 1V. In certain cases, the wingdams were extended to current shoreline. The structures that were analyzed are shown and labeled in Figures C-2 and C-3. Table C-1 shows the fill needed to restore the structures to the original design.

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**Figure C-2.** Structures Near Hurricane Island



**Figure C-3.** Structures Near Finley's Landing

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**Table C-1. Pool 11 Structure Inventory**

<b>Dam Name</b>	<b>Wingdam No.</b>	<b>River Mile</b>	<b>Design Elev (ft)</b>	<b>Fill (CY)</b>	<b>Notes</b>
UMR_MVR_11_599_8_TL	23	599.8	597.3	1	
UMR_MVR_11_599_3_TL	12	599.3	596.6	1,885	
UMR_MVR_11_599_2_CL	-	599.2	600.0	2,057	Not using 2018 multibeam survey
UMR_MVR_11_599_1_TL	6	599.1	596.9	232	Original 1904 design height
UMR_MVR_11_599_1_TL	6	599.1	600.0	1,531	Brought up to 3' below Flat Pool
UMR_MVR_11_599_1_CL	2	599.1	597.4	3,253	
UMR_MVR_11_598_8_TL	7	598.8	596.9	273	
UMR_MVR_11_598_6_TL	8	598.6	596.8	63	
UMR_MVR_11_598_4_TL	9	598.4	596.7	680	
UMR_MVR_11_598_2_TL	10	598.2	596.6	227	
UMR_MVR_11_598_0_TL	32	598.0	596.5	615	
UMR_MVR_11_597_9_TL	33	597.9	596.5	397	
UMR_MVR_11_597_7_TL	34	597.7	596.5	282	
UMR_MVR_11_597_5_TL	35	597.5	596.5	310	
UMR_MVR_11_597_4_TL	36	597.4	596.3	445	
UMR_MVR_11_597_3_CL	3	593.3	596.3	1,473	
UMR_MVR_11_597_2_TL	37	597.2	596.2	526	
UMR_MVR_11_597_1_TL	38	597.1	596.2	3,099	
UMR_MVR_11_596_7_TL	5	596.7	596.0	1,003	
UMR_MVR_11_596_4_TL	39	596.4	595.9	751	
UMR_MVR_11_596_1_TR	19	596.1	595.8	513	
UMR_MVR_11_595_9_TR	18	595.9	595.8	1,169	
UMR_MVR_11_595_8_CL	-	595.8	599.0	1,350	
UMR_MVR_11_595_7_TL	17	595.7	595.7	1	
UMR_MVR_11_595_7_CL	-	595.7	595.7	919	Design Elev not given. Assumed to be 595.7 based on adjacent structures.
UMR_MVR_11_595_7_TL & UMR_MVR_11_595_7_CL	17 & -	595.7	595.7	651	Calculated as the two wingdams above together, intersecting at head of island.



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**Table C-1. Pool 11 Structure Inventory**

UMR_MVR_11_595_5_TL	44	595.5	595.6	418	
UMR_MVR_11_595_4_TR	43	595.4	595.6	67	
UMR_MVR_11_595_2_TR	10	595.2	595.5	369	
UMR_MVR_11_595_2_CL	9	595.2	595.4	434	
UMR_MVR_11_595_1_CL	8	595.1	595.6	491	
UMR_MVR_11_595_1_TR	11	595.1	595.4	199	
UMR_MVR_11_594_9_TR	16	594.9	592.3	13	
UMR_MVR_11_594_7_TR	12	594.7	595.2	26	
UMR_MVR_11_594_5_TR	13	594.5	595.2	44	
UMR_MVR_11_594_3_TR	14	594.3	595.1	98	
UMR_MVR_11_594_1_TR	35	594.1	595.0	522	
UMR_MVR_11_594_1_TL	41	594.1	595.0	0	
UMR_MVR_11_593_9_TR	36	593.9	594.9	790	
UMR_MVR_11_593_9_TL	42	593.9	594.9	0	Historic connection land significantly eroded
UMR_MVR_11_593_7_TR	30	593.7	594.9	304	
UMR_MVR_11_593_7_TL	29	593.7	594.9	0	Historic connection land significantly eroded
UMR_MVR_11_593_6_CL	15	593.6	594.8	82	Historic connection land significantly eroded
UMR_MVR_11_593_6_TL	32	593.6	594.8	222	Historic connection land significantly eroded
UMR_MVR_11_593_3_TL	33	593.3	594.7	194	Historic connection land significantly eroded
UMR_MVR_11_593_1_TL	34	593.1	594.6	289	Historic connection land significantly eroded

### **III. 2D ADH MODEL CONSTRUCTION**

The 2D Adaptive Hydraulics (ADH) modeling system utilized for this study was previously created in 2013 and then refined with updated bathymetric data in 2017 for a Regional Sediment Management study to use the Particle Tracking Model (PTM). The updated bathymetric data included additional hydrosurveys and SEAS multibeam surveys of wingdams.

A 2D mesh had been created for prior work within the Pool 11 river reach of interest, however additional resolution of numerous structures was necessary to meet mesh convergence criteria for PTM simulation. A new mesh was developed to incorporate resolution of hydraulically significant structures such as wingdams, closing dams and proposed features. The upstream and downstream boundaries of the 2D mesh extended from RM 587.5 to RM 603.3 (Figure C-5). The mesh was developed using SMS (Surfacewater Modeling Systems) v. 12.1.1, using the horizontal datum of NAD 1983 with a projection of State Plane, IL West 1202, and a vertical datum of NGVD 1912 U.S. Survey Feet.

Incorporating resolution for features associated with alternative bathymetries into the mesh was considered a priority due to anticipated future use of the model to further investigate chronic dredging issues within the reach. However, only one bathymetry (existing placement site conditions/existing dredging operations) was utilized in the study discussed herein.

Within the map module of SMS, the mesh outer boundary was created using aerial imagery to define the bankline of the river. Initial node spacing along the outer boundary of the mesh was approximately 200 feet and approximately 100 feet at the wingdams and within the main channel. Arcs were used to create resolution for influential features where supporting bathymetric data exists, further reducing node spacing in specific areas. Arcs were created to develop resolution around wingdams and closure structures. The spacing between each node was decreased to 10 feet at the crown and 30 feet at the base, for both the wingdams and closing dams. The availability of multibeam survey for wingdams supported this increased resolution.

Additional arcs were added to provide resolution for two interior channels within Hurricane Island. Concern voiced over potential sediment transport occurring within the small northeast-flowing channel that bisects Hurricane Island resulted in additional resolution to capture that interior channel even though assumptions regarding channel bottom elevations were necessary. Added resolution within the interior channel at the northwestern end of Hurricane Island was supported by existing LTRM (Long Term Resource Monitoring element of the Upper Mississippi River Restoration Program) bathymetric survey data. Without arcs within the channel to force mesh triangulation, the channel bottom bathymetry would have been omitted.

Mesh resolution necessary to capture the features of interest near Hurricane Island are shown in Figure C-4. The overall increased resolution is a result of additional features included in the current mesh as well as the need to exercise caution when relying on adaption to resolve the hydrodynamic solution when utilizing PTM.

After the features of hydraulic interest were resolved within the mesh, mesh convergence was established by means of manually refining the mesh using the Refine tool within the mesh module of SMS. The mesh convergence test resulted in only a 1 percent difference in discharge between the constructed mesh



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and the refined mesh throughout the main channel and within backwater areas, therefore no refinement was needed. Final node spacing near the upstream and downstream boundaries of the mesh was 100-200 feet and 50 feet within the main channel.

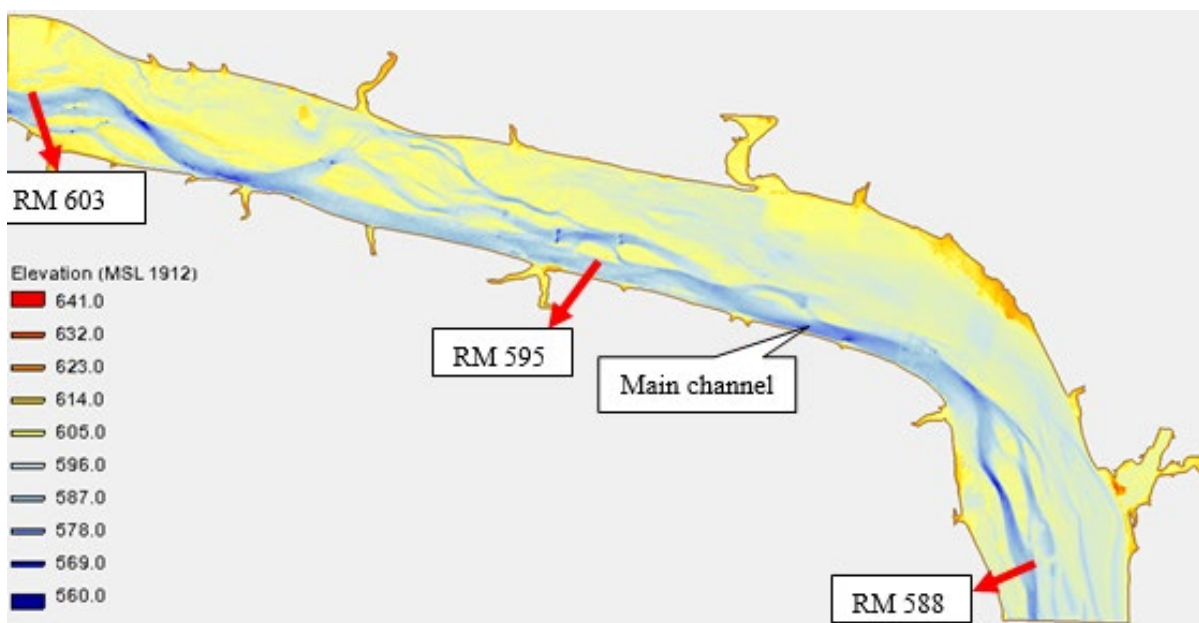
Bathymetric survey data is frequently collected within Pool 11 in support of the navigation mission. The most recent multibeam and single beam datasets that provide the greatest coverage for the model reach were used to develop the existing condition bathymetry. These datasets were collected between 1999 and 2016. Additional single beam bathymetry was collected in May of 2017 in areas where bathymetric data was missing, such as at the head of Hurricane Island and within secondary channels upstream of Hurricane Island. 2014 multibeam bathymetric data provided detailed surveys of wingdams. LTRM single beam surveys collected in 2010 provided bathymetric data for select backwater areas, and LTRM bluff-to-bluff LiDAR data collected in 2007 for Pool 11 was also used in developing the existing condition bathymetry for the model.

The different bathymetric datasets, as described above, were loaded into the scatter module of SMS. Recent bathymetric data were given precedence over older survey data in areas where overlapping hydrographic surveys occurred. Specific bathymetric datasets were identified for each of the dredge material placement sites in order to best represent existing operations (typical placement extents) at each site: a bathymetric survey from 28 June 2007 at the Hurricane Island placement site; and an 8 July 2008 survey at Finley's Landing. Data sets were chosen based upon completeness of coverage and timeliness of post-placement survey. The 2007 LTRM LiDAR at the location of the proposed Bathtub site was utilized to represent conditions at the time of initial construction. Site specific bathymetric datasets were given highest preference when the individual bathymetric scatter sets were merged and triangulated.



**Figure C-4.** A Portion of the Entire ADH Mesh Around Hurricane Island

Figure C-5 shows a bathymetric contour map generated from bathymetric data. This Figure displays that the bed elevations in the main channel and within the backwater areas.



**Figure C-5. Bathymetric Contour Map**

#### **IV. 2D ADH MODEL CALIBRATION**

The 2D ADH model was previously calibrated in 2017 for the Regional Sediment Management Study.

ADCP data collected on May 15, 2014 under discharge conditions of 156,750 cfs (at Lock and Dam 11) provided velocity transects at Hurricane Chute and other side channel flow split locations for model calibration. The locations of the ADCP transects are shown in Figure C-2-4. At the time of ADCP collection, the discharge at Lock and Dam 10 (RM 615.1) was 146,531 cfs and the discharge at Lock and Dam 11 (RM 583) was 156,750 cfs. The Turkey River (RM 608.2), Grant River (RM 593.5) and the Platte River (RM 588.5) are tributaries to Pool 11, each contributing 4,210 cfs, 212 cfs, and 93 cfs, respectively at the time of the ADCP collection. Differences in observed flows between Lock and Dam 10 and 11 exist even without tributary inflow due to rating curve errors. When the dams are out of operation, as was the case during the ADCP data collection, differences can be as much as 10,000 cfs. The discrepancy in observed discharge between the two locks during the time of ADCP collection was 5,704 cfs.

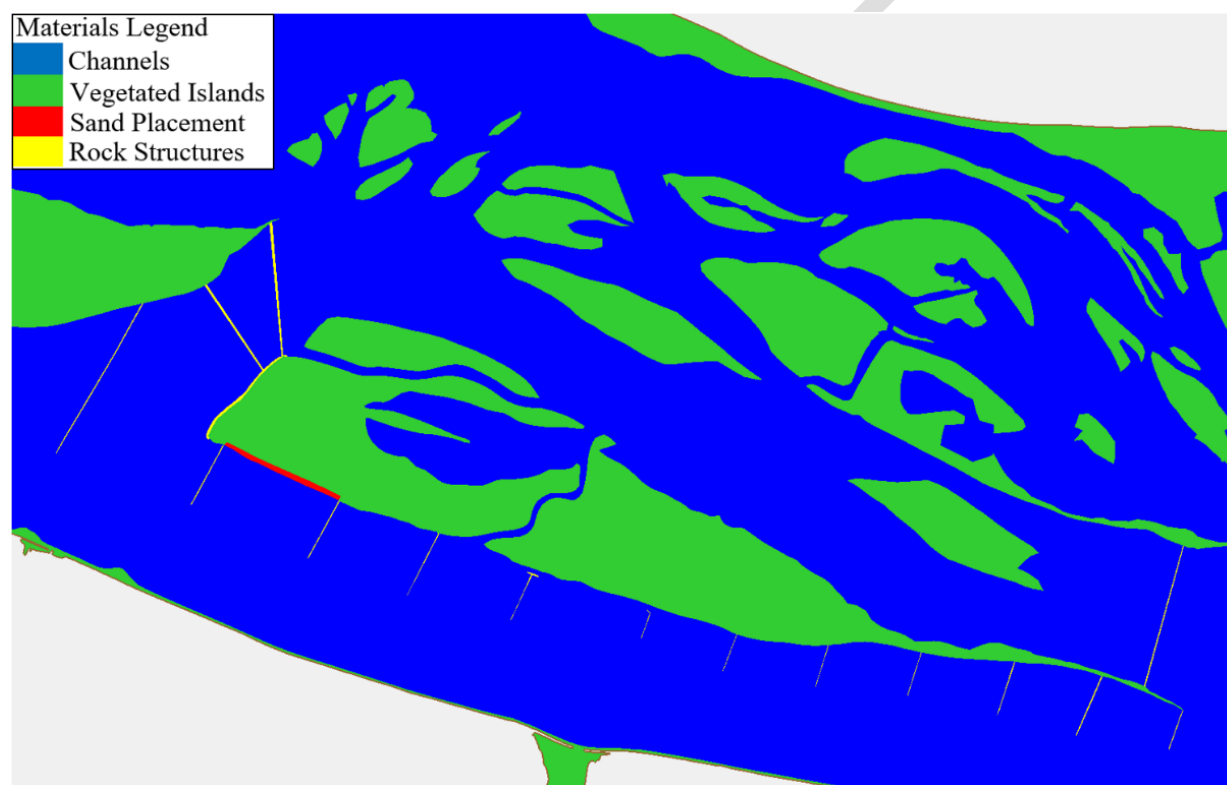
The upstream mesh boundary (RM 603.3) is located downstream of the Turkey River (RM 608.2), the most significant tributary within the pool. Therefore, the steady state calibration simulation used the observed discharge at Lock and Dam 11 (156,750 cfs) as the upstream model boundary condition rather than Lock and Dam 10. A discharge of 156,750 cfs at Lock and Dam 11 is in between the 50% annual chance exceedance (ACE) discharge (127,000 cfs) and 20% ACE discharge (169,000 cfs) and represents out of bank flow conditions. A stage of 605.6' was used for the downstream boundary condition at RM

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587.5 and was determined based on an interpolation from the 50% ACE and 20% ACE water surface profiles from the Upper Mississippi River System Flow Frequency Study (UMRSFFS) (USACE, 2004).

Material types were differentiated for channels, vegetated island, rock river-training structures, and sand placement sites (Figure C-6). Manning's n values were assigned to each material type accordingly. Initial calibration simulations indicated the modeled flow down Hurricane Chute was lower than observed flows. With very recent bathymetric survey of the area completed, opportunities for improvements to the bathymetry were limited.



**Figure C-6. Model Material Types**

Frictional losses over vegetated terrain can be represented using the Unsubmerged Rigid Vegetation (URV) card as an alternative to Manning's roughness. The URV card parameters of bed roughness height, average stem diameter and average stem density were varied as part of the calibration, however varying these parameters continually resulted in decreased flow down Hurricane Chute relative to use of Manning's roughness parameters. For example, changing Manning's n value of 0.04 for vegetated islands to a URV card with roughness height of 15 feet, stem diameter of 2 feet, and stem density of 0.002 stems/ft<sup>2</sup> produced a decrease in flow of 1.8%. Consequently, Manning's roughness was used for the final parameterization.

In order to increase simulated discharge down Hurricane Chute to better match observed discharge, further sensitivity analysis was pursued. Results revealed that the flow distribution down Hurricane Chute was most sensitive to Manning's n values for the vegetated island. Increasing Manning's n value



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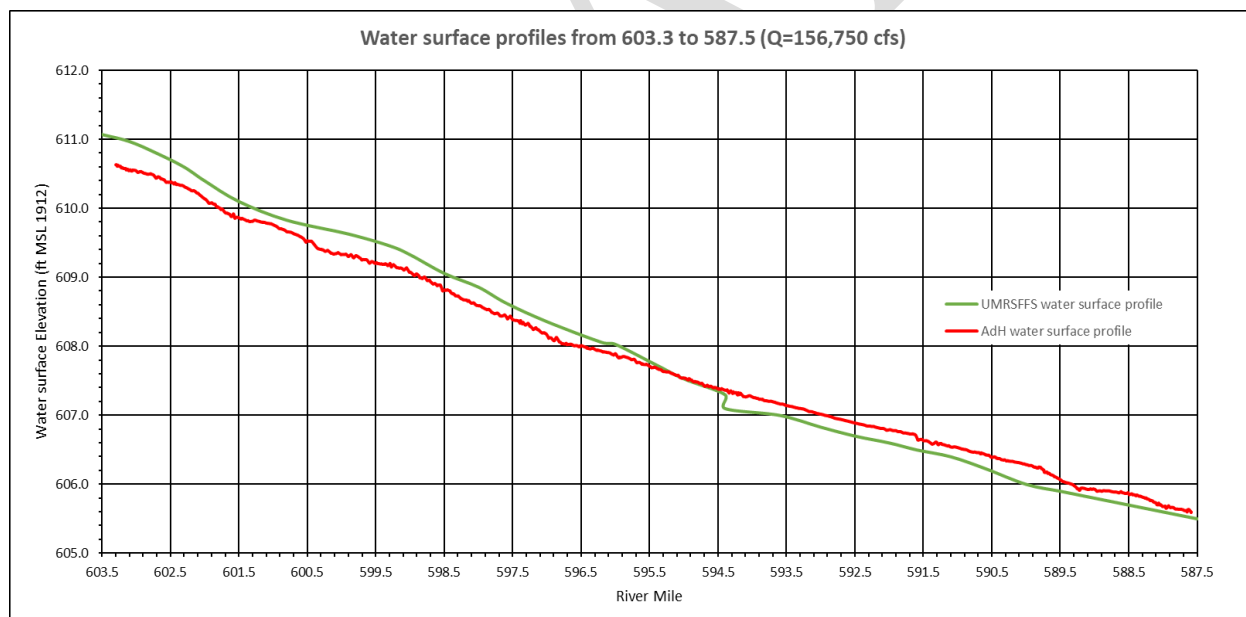
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for vegetated islands from 0.05 to 0.06 provided a 9.5% increase in flow into Hurricane Chute. Increasing Manning's n value for the channel's material type from 0.021 to 0.0225 further increased Hurricane Chute flows by 1.9%. The estimated eddy viscosity (EEV) card parameters were varied during the sensitivity analysis and revealed little impact to the flow distribution at Hurricane Chute. The final EEV card parameters included the Type 1 method and coefficients of 0.5. Model results were also insensitive to including transport of vorticity (VOR), which corrects 2-D models for the 3-D effects of vorticity at bends (USACE, 2015). The calibrated model included the default parameters for vorticity transport and a wetting and drying "depth" of 1.0 ft for the DTL card. The final Manning's n values for the calibrated model are shown in Table C-2.

**Table C-2.** Final Manning's n Roughness Values for the Calibrated Model

Material	Final Manning's n Value (calibration range)
Channels	0.0225 (0.02-0.0235)
Vegetated Islands	0.06 (0.04-0.08)
Rock Structures	0.05 (0.04-0.05)
Sand Placement	0.03 (0.025-0.03)

The AdH-simulated water surface profile was compared to the interpolated profile from the UMRSFSS within the AdH model reach from RM 603.3 to 587.5 and the results show the water surface profiles to match relatively well (Figure C-7).



**Figure C-7.** AdH-Simulated Water Surface Profile Compared to the Interpolated Frequency Profile From the UMRSFSS

The final calibration parameters (Table C-2) provided a significant improvement in the flow split distribution at Hurricane Island. A discharge comparison between the ADCP measurements and the AdH simulated results is shown in Table C-3.

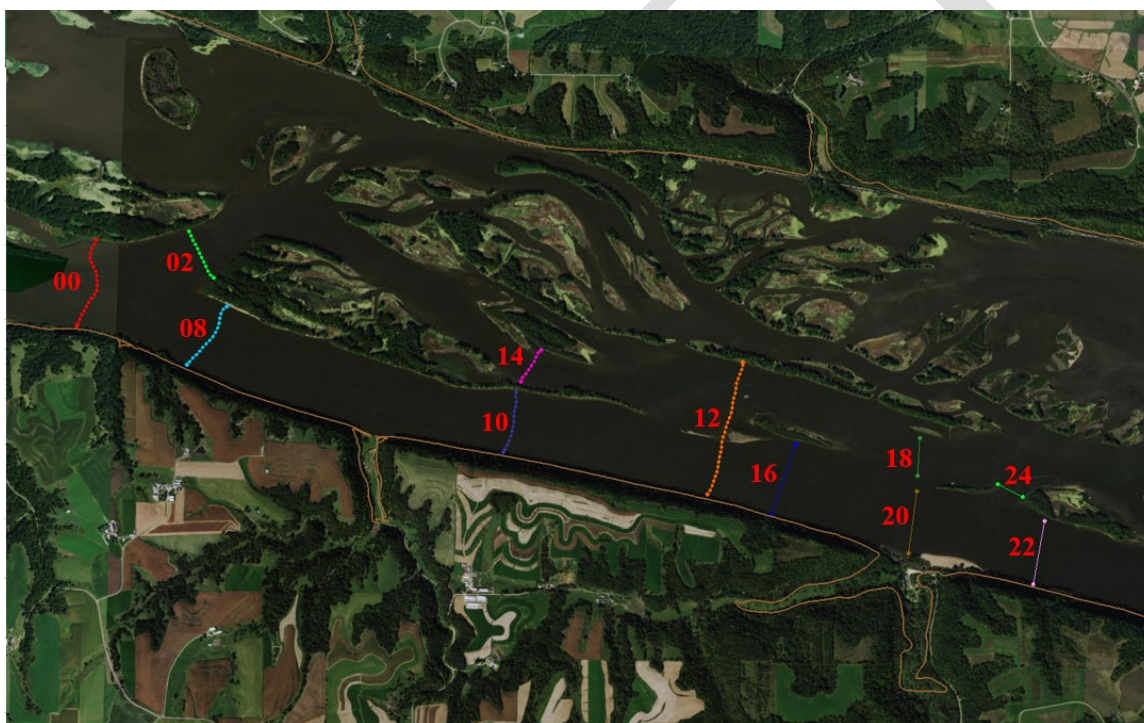
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**Table C-3.** Discharge Comparison of ADCP Measurement and AdH Simulation Results

<b>Transect</b>	<b>Measured Discharge (cfs)</b>	<b>Simulated Discharge (cfs)</b>	<b>Difference (%)</b>
<b>00</b>	126,822	135,103	6.5
<b>02</b>	47,411	42,874	-9.5
<b>08</b>	81,337	88,466	8.8
<b>10</b>	77,560	85,684	10.5
<b>12</b>	111,780	118,504	6.0
<b>14</b>	25,720	25,498	-0.9

Figure C-8 displays the locations of the ADCP transects as well as transects used to analyze the alternatives.



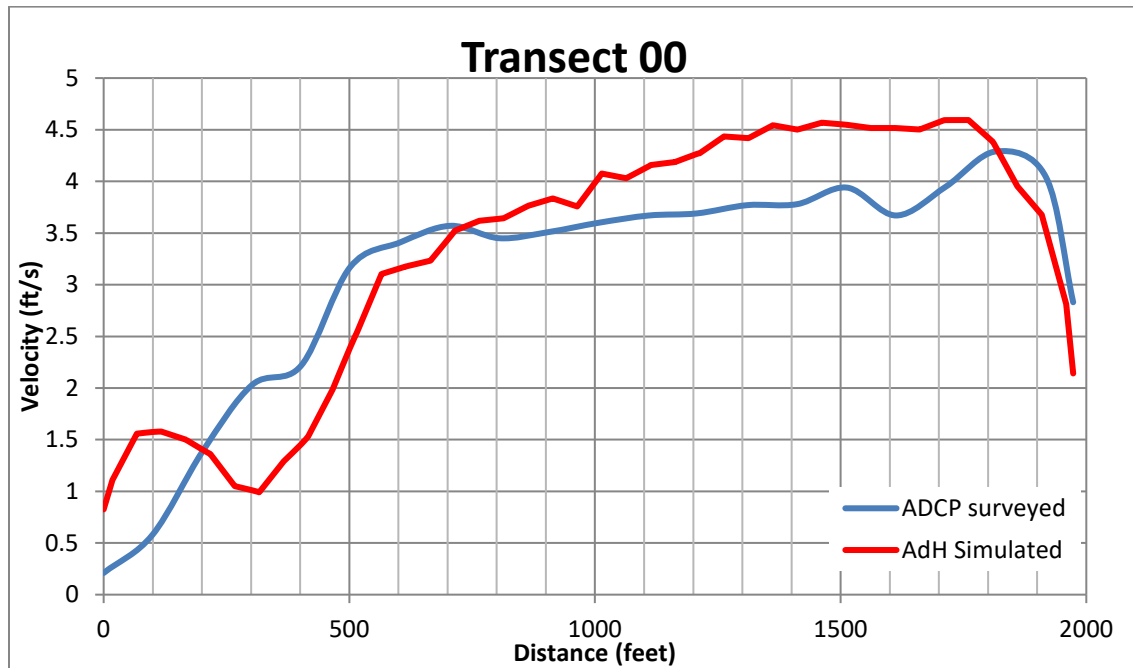
**Figure C-8.** Transect Locations for ADCP Measurement and Alternative Analysis

Figures 9(a)-9(f) illustrate the velocity comparison charts at the ADCP transects for 156,750 cfs.

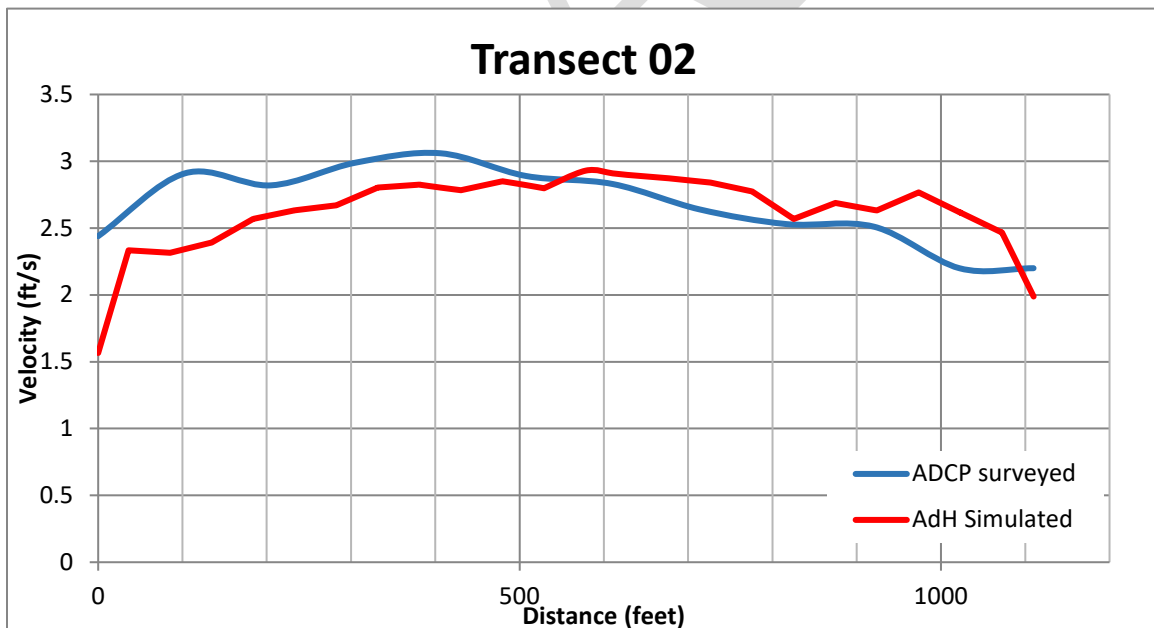


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**Figure C-9(a).** Velocity Calibration at Transect 00



**Figure C-9(b).** Velocity Calibration at Transect 02

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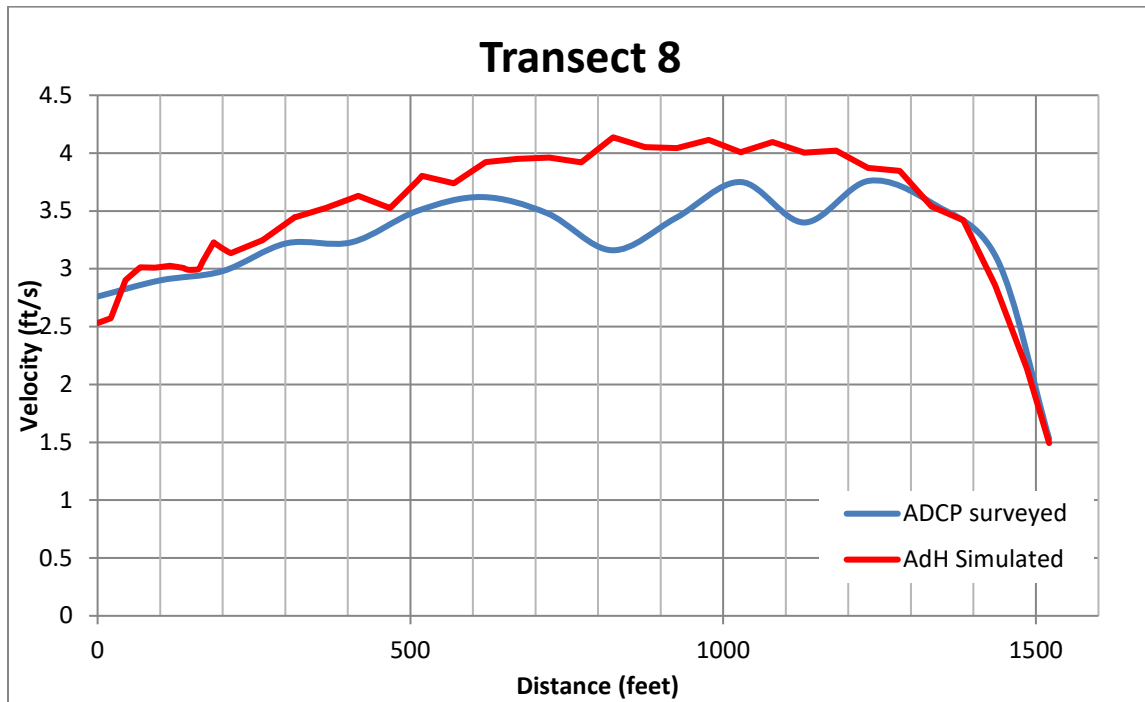


Figure C-9(c). Velocity Calibration at Transect 08

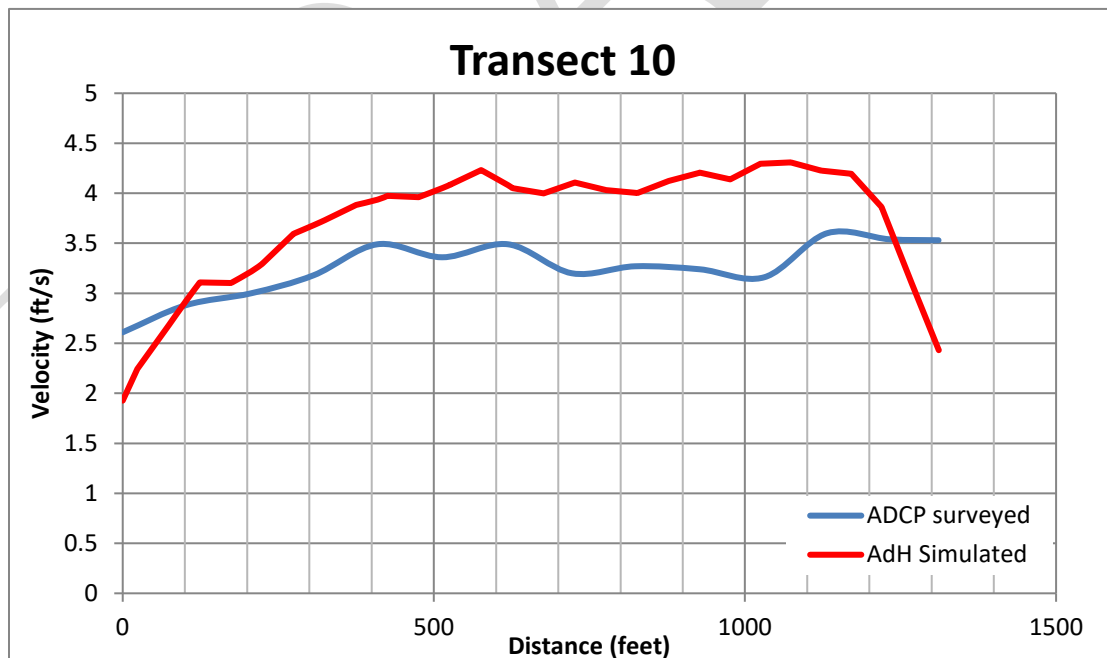
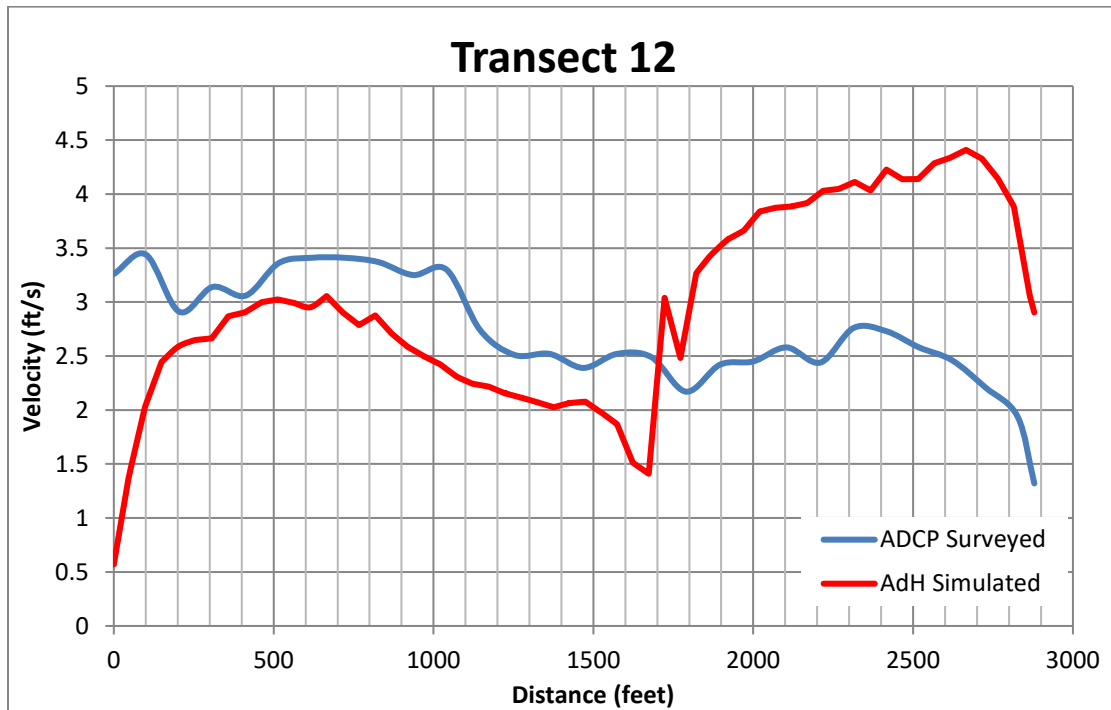


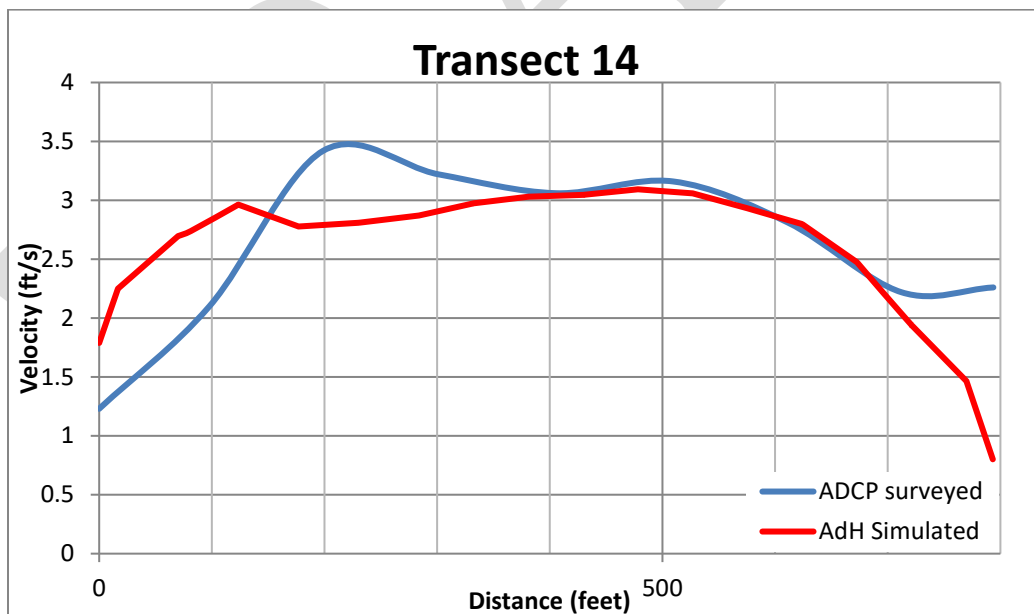
Figure C-9(d). Velocity Calibration at Transect 10

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**Figure C-9(e).** Velocity Calibration at Transect 12

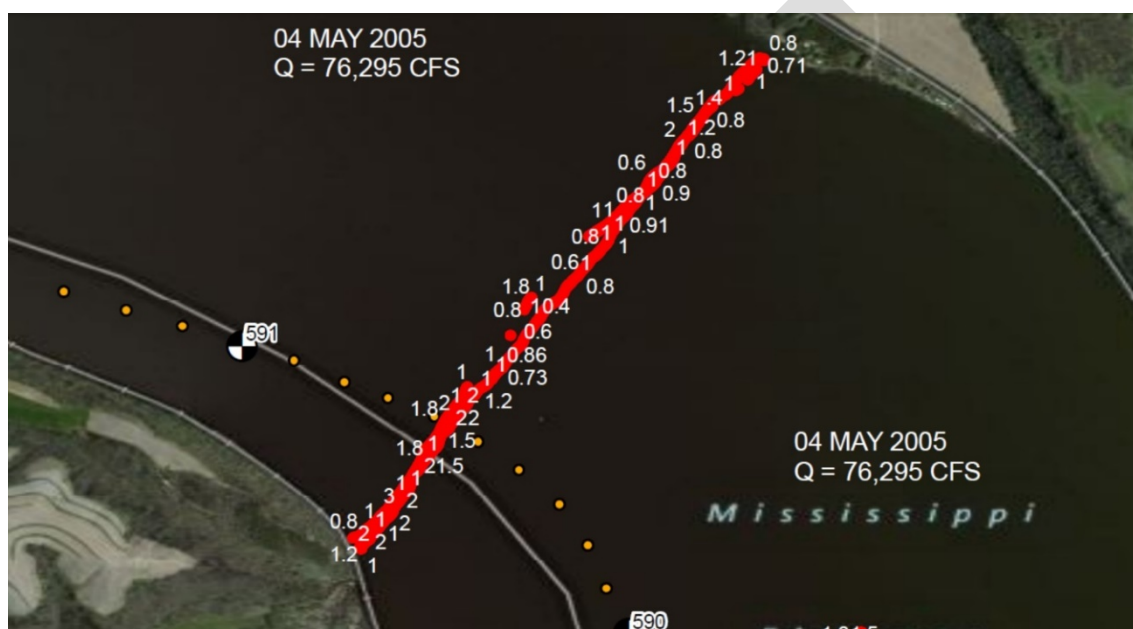


**Figure C-9(f).** Velocity Calibration at Transect 14

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For the 2D ADH model created in 2014, a different ADCP measurement was used in the calibration process than the one used in 2017. The ADCP measurement was not used in the calibration of the current model but was later used as a simulation flow. The previous measurement was performed by Water Quality & Sediment Section, Hydrology & Hydraulics Branch on May 4, 2005. Only one ADCP transect was located within the study mesh and available for the calibration purpose. Figure C-10 shows the location of ADCP transect 292 (RM 590.6). The detail observed discharge data collected by ADCP is summarized in Table C-4. Table C-5 shows that the averaged flow discharge on May 4, 2005 was 76,295 cfs. This flow was used for the calibration with the corresponding water surface elevation of 602.91 ft on the ADH' downstream boundary obtained from a HEC-RAS model.



**Figure C-10.** ADCP Transect 292 on May 4, 2005

**Table C-4.** ADCP Discharge Collected on May 4, 2005

ADCP Survey Date	ADCP Transect #	Start Time	Q for transect (cfs)	Start Bank
5/4/2005	292	11:34	76,295	Left

**Table C-5.** Water Surface Elevations at ADH Boundaries at 76,295 cfs

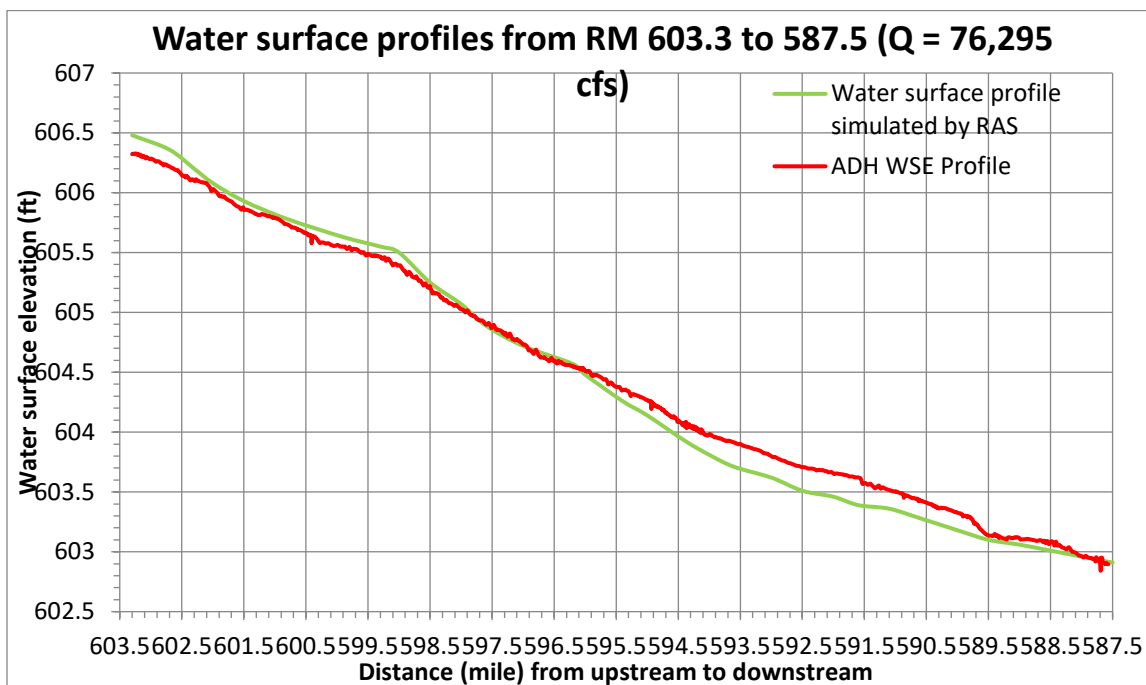
	L & D 10 RM 615.1	Upstream RM 603.3	Downstream RM 587.5	L & D 11 RM 583
WSE <sup>1</sup> Observed	608.36 ft (tail)			602.64 ft (pool)
WSE from RAS		606.48 ft	602.91 ft	

<sup>1</sup> WSE = water surface elevation

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The water surface profile simulated by HEC-RAS was compared with that simulated by ADH within the river reach from RM 603.3 to RM 587.5 (Figure C-11). Figure C-11 shows a good match for the two profiles.



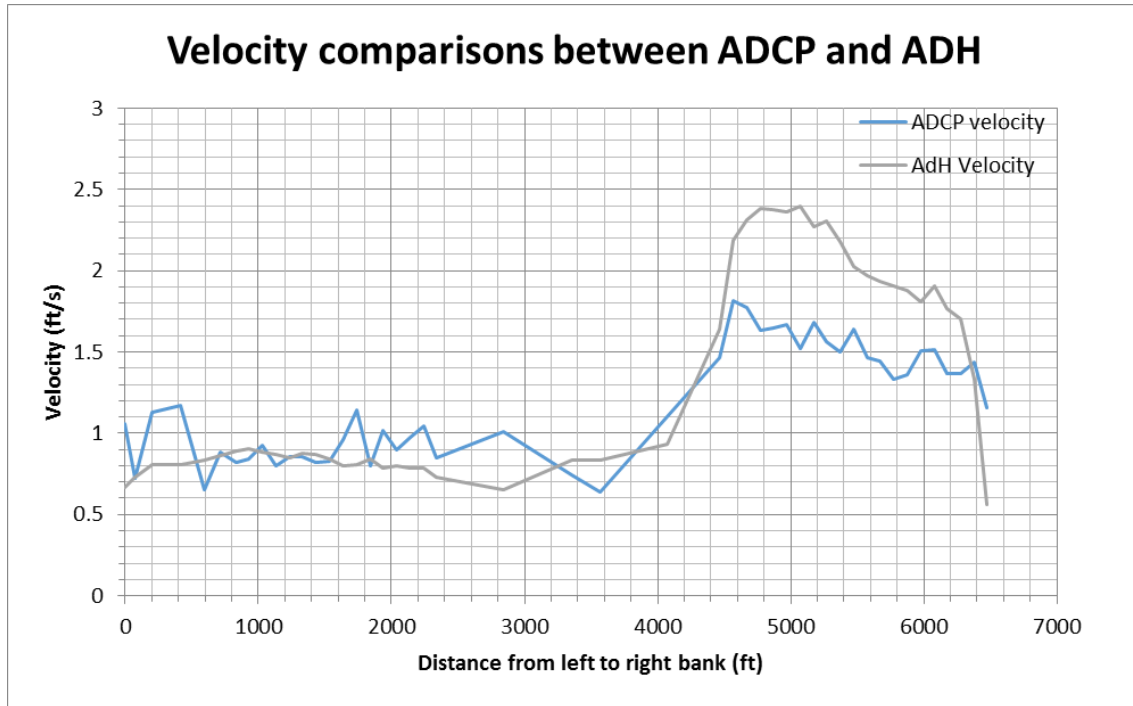
**Figure C-11.** Comparison of Water Surface Profiles Between ADH and HEC-RAS

Table C-6 shows that the flow discharge measured by ADCP is closed to those simulated by ADH. However, Figure C-12 shows that the flow velocities measured by ADCP within the main channel are much smaller than those simulated by ADH. The reason is that the bed elevations measured by ADCP on May 4, 2005 may be different with those used by ADH.

**Table C-6.** Discharge Comparison Between ADCP Measured and ADH Simulated

ADCP Survey date	ADCP Transect #	Measured Q (cfs)	Simulated Q (cfs)	Q difference (%)
5/4/2005	292	76,295	75,672	0.7





**Figure C-12.** Measured Velocities vs. Simulated Velocities for Transect 292 on 5/4/2005

## V. ADH RESULTS FOR THE EXISTING CONDITION

ADH modeling results are presented in Figures C-13(a), C-13(b), C-14(a), and C-14(b) and throughout the rest of the report. Velocities are a direct output from the model. Bed shear stresses are computed from model outputs of depth and velocity, along with the model input of n-value.

ADH results on the flow velocity within the area from RM 595 to RM 603 for the existing condition under flows of 76,295 cfs (ADCP flow) and 156,750 cfs (ADCP flow). The following flows are for reference of the magnitude of the ADCP flows, 50,080 cfs (50% duration), 127,000 cfs (2-year return period), and 169,000 cfs (5-year return period) are shown in Figures 12(a) to 13(b).

Figures 13(a) and 14(a) display the flow velocity distributions on the entire mesh for the existing condition under flows of 76,295 cfs and 156,750 cfs. Figures 13(b) and 14(b) display the shear stress distributions on the entire mesh for the existing condition at the same flow rates.

The bed shear stress is determined using the following equation

$$\tau_b = \rho u_*^2 = \rho g R S = \gamma R S \quad (1)$$

where  $\tau_b$  = the bed shear stress,  $u_*$  = the shear velocity,  $\rho$  = the water density,  $\gamma$  = the specific weight of water,  $g$  = the acceleration of gravity,  $R$  = the hydraulic mean radius, and  $S$  = the bed slope.

The Manning's equation for uniform flow is expressed as

$$V = 1.486 * \frac{R^{\frac{2}{3}} * S^{\frac{1}{2}}}{n} \quad (2)$$

where  $V$  = the flow velocity and  $n$  = the Manning's coefficient.

Thus, Equation (1) becomes

$$\tau_b = \gamma * \frac{n^2}{(1.486)^2} * \frac{V^2}{R^{\frac{1}{3}}} \quad (3)$$

For a wide natural river,

$$R \approx h \quad (4)$$

where  $h$  = the water depth, and Equation (3) is further written as

$$\tau_b = \gamma * \frac{n^2}{(1.486)^2} * \frac{V^2}{h^{\frac{1}{3}}} \quad (5)$$

Based on the flow velocity, the water depth, and the value of  $n$ , the bed shear stress is calculated using Equation (5).

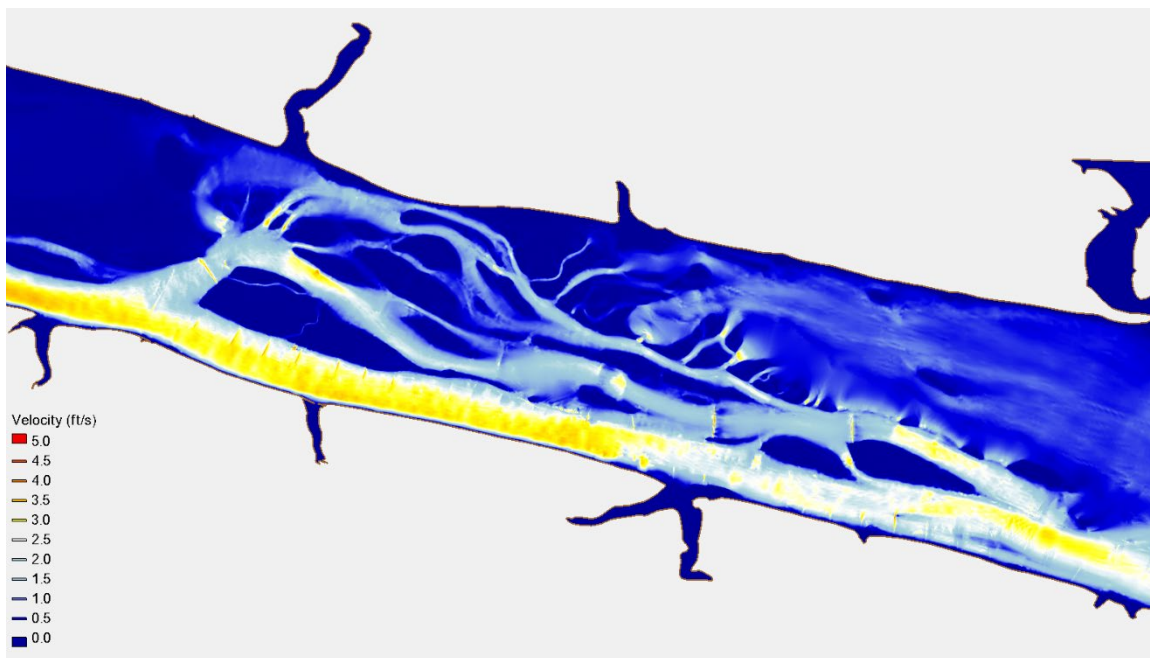
In general, the roughness in the channel has two components, i.e., the form roughness and the grain roughness. The form roughness is based on vegetation, sinuosity, and bend etc. The grain roughness is based on the bed sediment size. When assigning a Manning's  $n$  in the SMS model, it is represented as the total roughness, i.e., the sum of both the form roughness and grain roughness. With this roughness, the normal depth equation is solved to compute the water surface elevation and velocities. However, when running the sediment model in the SMS, the bed shear stress responsible for the bed sediment to move is only a function of the grain roughness. Thus, when computing the bed shear stress, a reduced roughness is considered. The sediment transport manual for the SMS model recommends that the  $n$  expressed in Equation (5) should use  $n_{\text{grain}}$  representing the grain roughness, and can be computed as

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

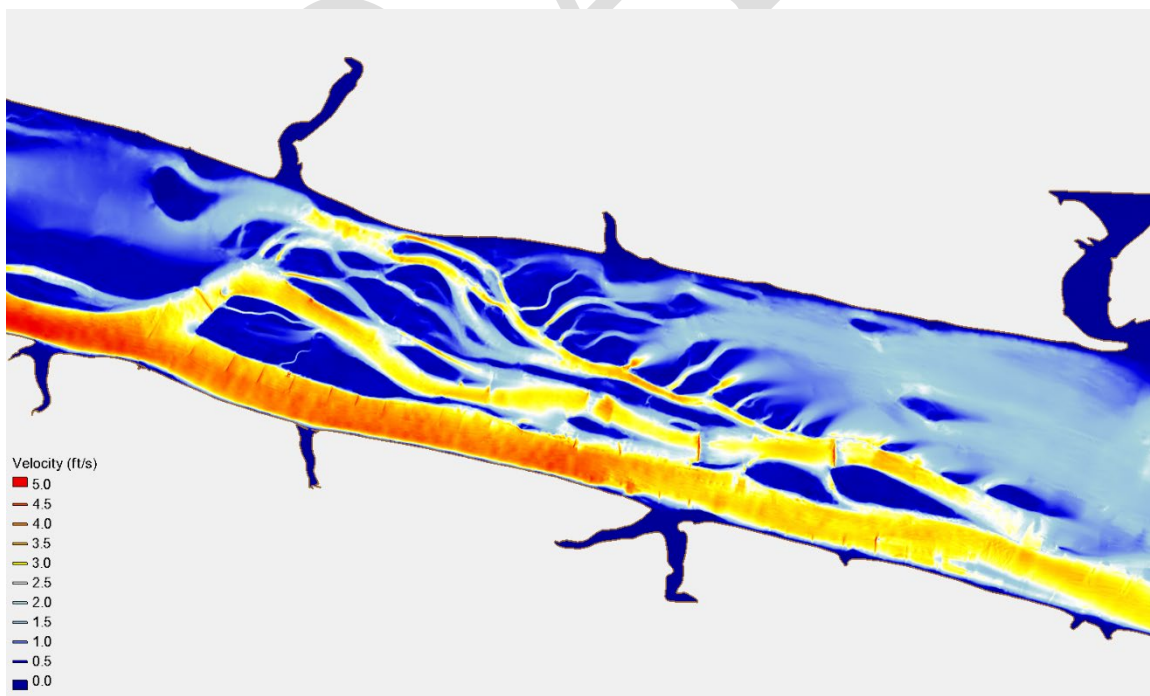
where  $n_{\text{grain}}$  = the Manning's coefficient representing the grain roughness and  $d_{50}$  = the median sediment size in meters.

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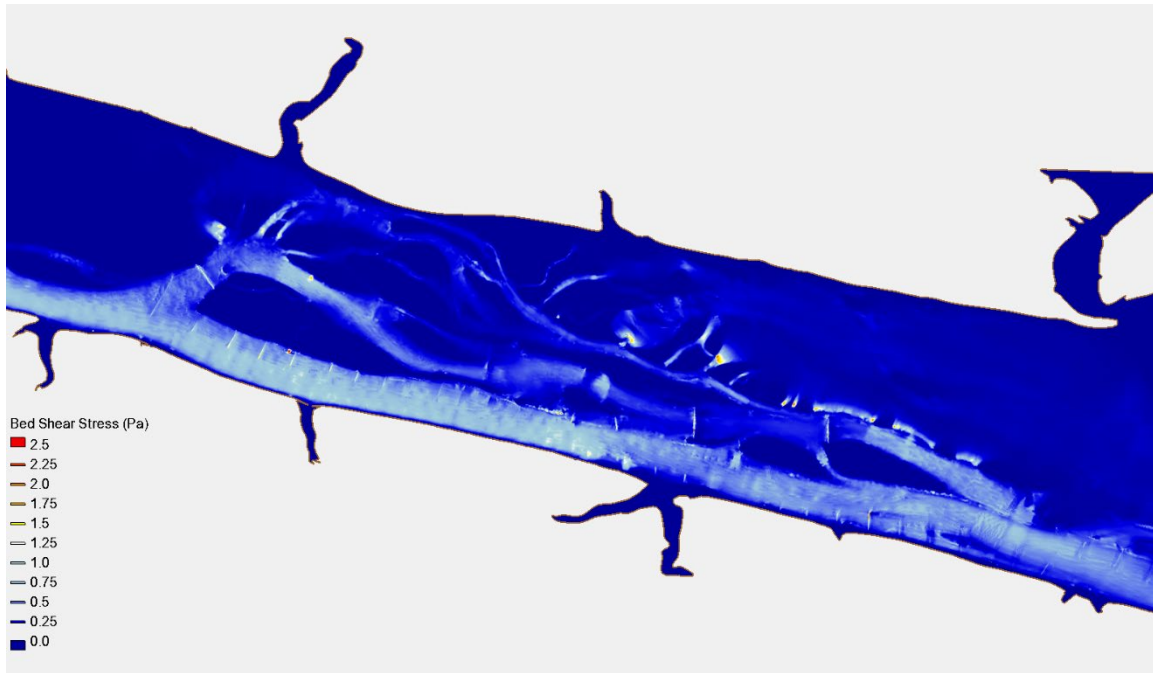
**Figure C-13(a).** Flow Velocity Map of the Existing Condition For  $Q = 76,295$  cfs



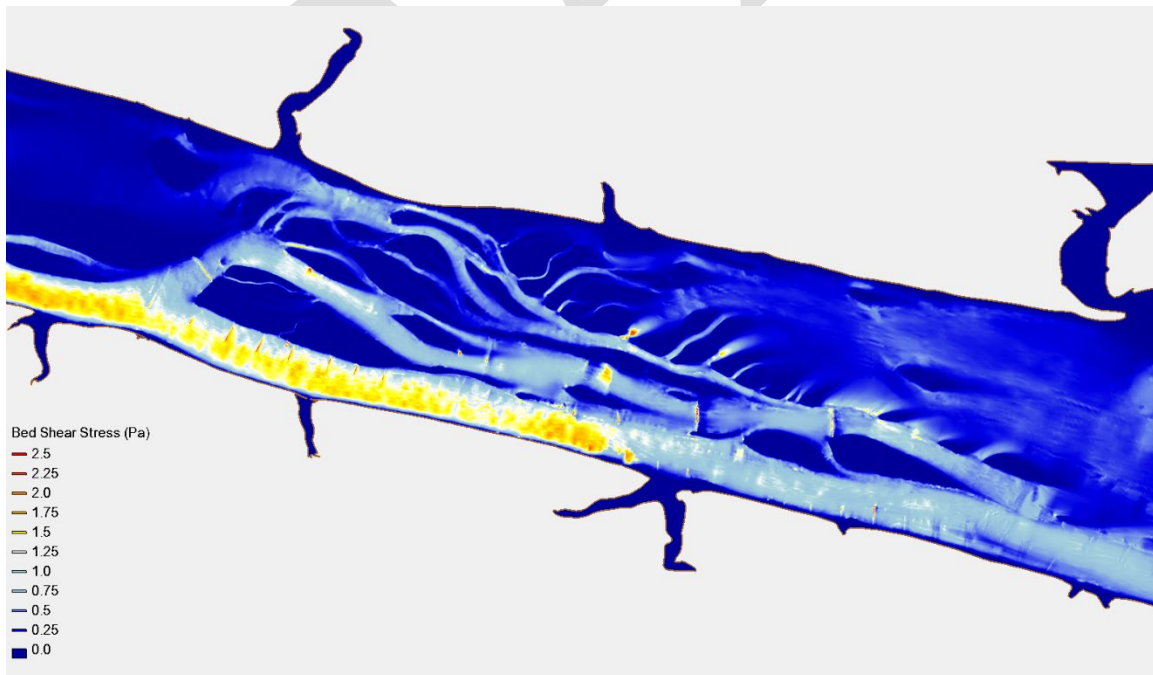
**Figure C-13(b).** Flow Velocity Map of the Existing Condition For  $Q = 156,750$  cfs

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**Figure C-14(a).** Shear Stress Map of the Existing Condition For  $Q = 76,295$  cfs

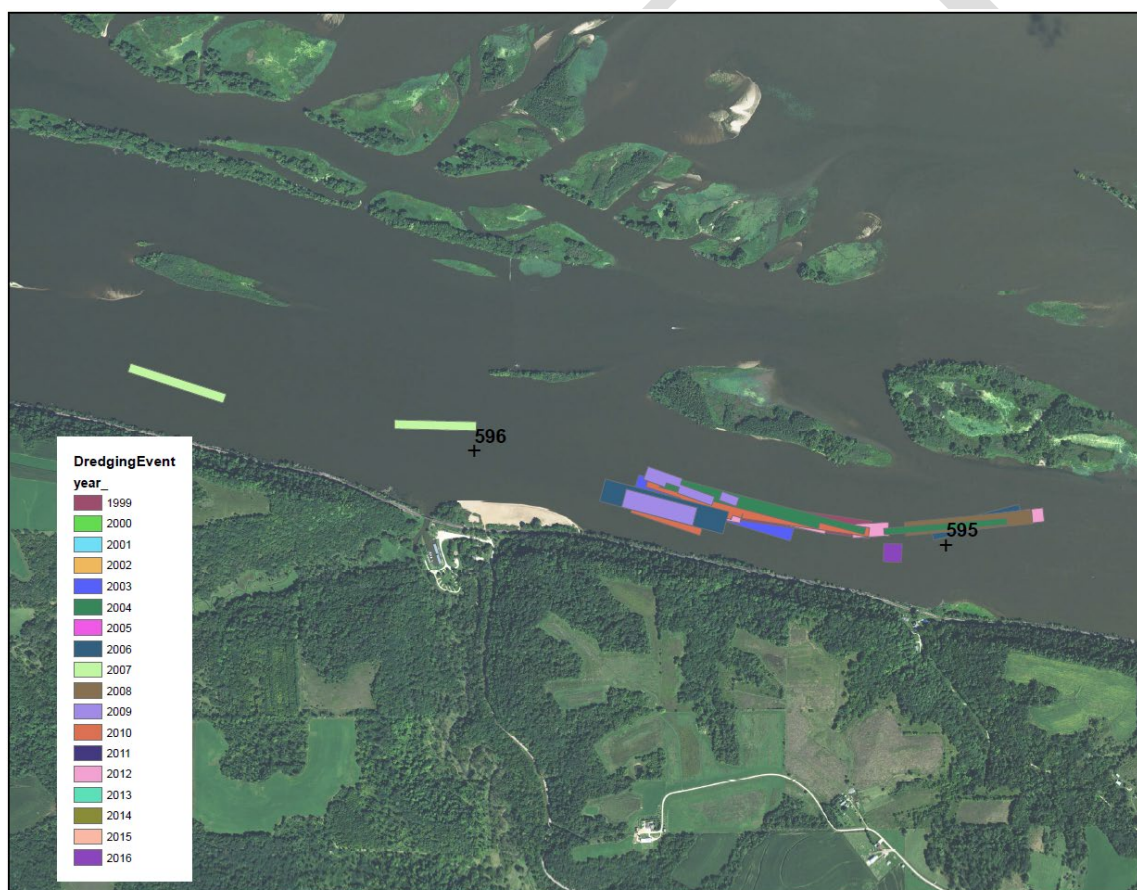


**Figure C-14(b).** Shear Stress Map of the Existing Condition for  $Q = 156,750$  cfs



## **VI. ALTERNATIVES FOR REDUCING SEDIMENT DEPOSITION AND EVALUATION OF THESE ALTERNATIVES**

Alternatives were selected to examine possibilities in improving the periodic dredging problem, reducing the sediment deposition in the main channel from RM 595 to RM 603, or eroding the sediment in this river reach and moving them to somewhere downstream. Alternative 1 and 2 are focused more at Hurricane Island and Alternatives 3-17 are focused at Finley's Landing. From conversations with personnel from the Operations Division, a heavier emphasis was placed at reducing dredging in the Finley's Landing reach since most of the recent dredging has occurred there. Figure C-15 shows the years and locations of dredging events within the Finley's Landing reach. Since a similar study was conducted in 2013 in the Hurricane Island reach and produced no effective alternatives to reduce sediment, a wide range of alternatives were looked at in a timely manner to see what had the most impact to velocities and bed shear stress in the main channel.



**Figure C-15.** Dredging Locations Near Finley's Landing

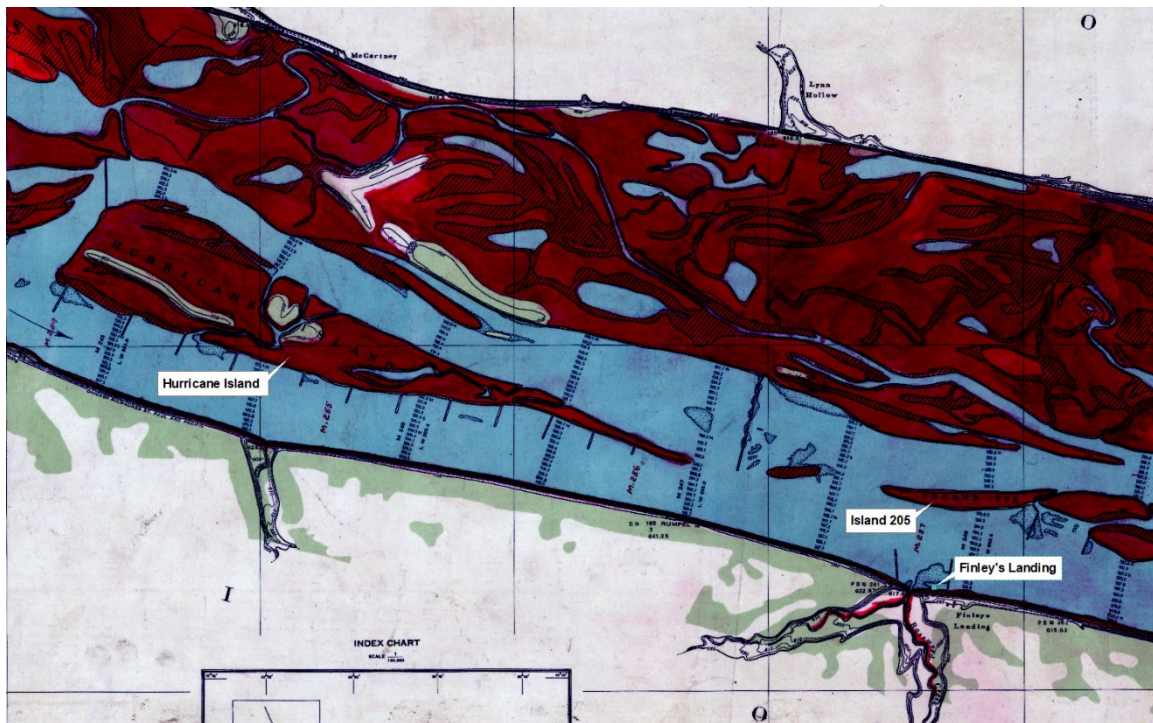
After looking at the Historic Brown's Survey Map of 1931, the Island 205 has significantly been reduced in size. Many of the alternatives near Finley's Landing incorporate Island 205 in some form as the reduced size of the island may be allowing more flow out of the main channel and causing sediment to



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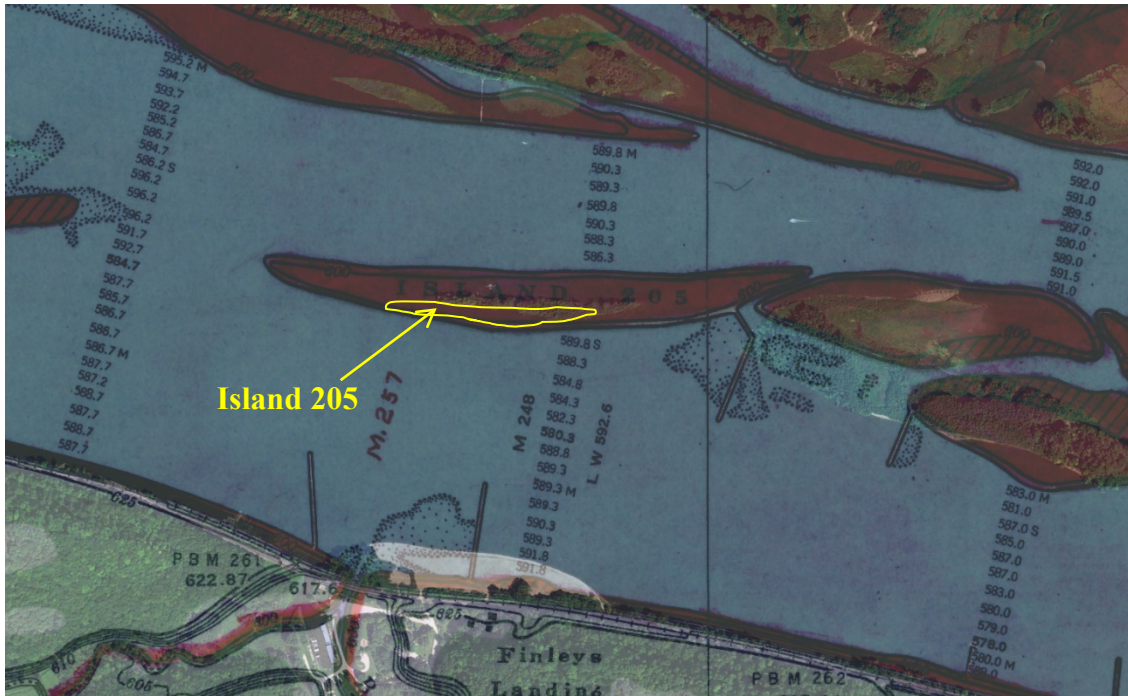
drop out downstream of Finley's Landing. The location of Island 205 is shown in Figure C-16 and the size comparison with aerial imagery is shown in Figure C-17. Aerial imagery of Island 205 and Finley's Landing from 1927 is shown in Figure C-18, and Figure C-19 is the acquisition map of the area. The shape of Island 205 for Alternatives 4-6 is slightly larger and less detailed than what is shown in Brown's Map. This is due to not having a clear depiction of Brown's Map at the time of modeling the specific alternatives and also attempting to create the most impact to velocity and shear stress in the main channel.



**Figure C-16.** Location of Island 205

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**Figure C-17.** Comparison of Island 205 Between Aerial Imagery and Brown's Map

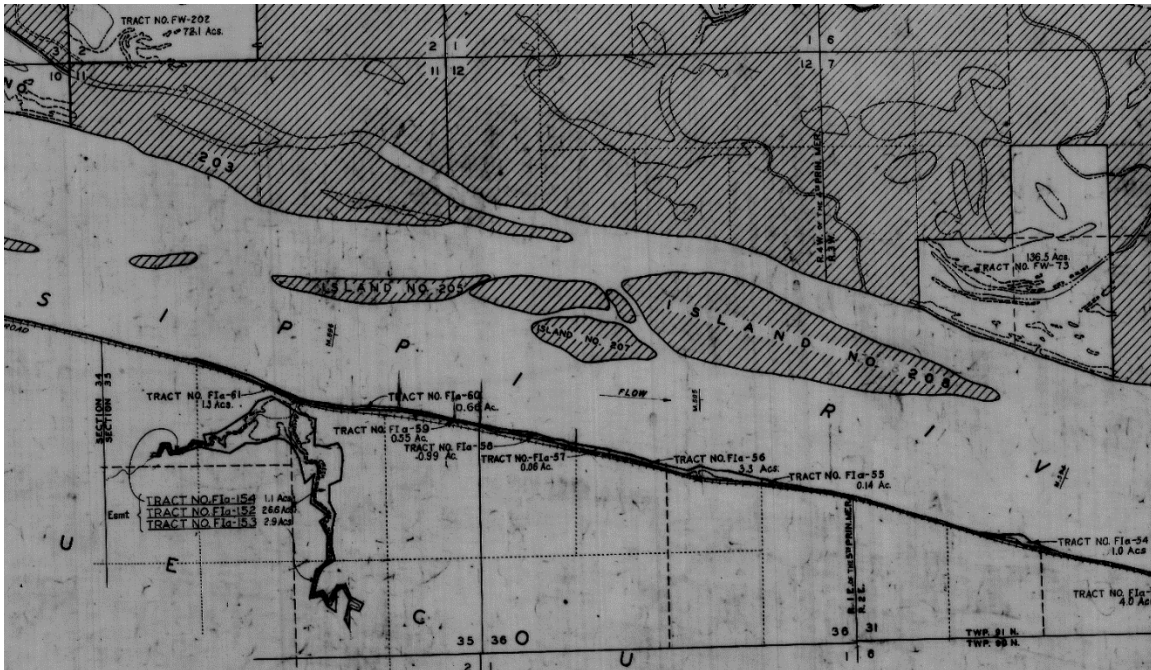


**Figure C-18.** 1927 Aerial Imagery



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**Figure C-19.** Acquisition Map

Tables C-7 and C-8 describe the alternatives that were analyzed during this study.

Figures 20(a)-20(r) display the alternatives in more detail and highlight differences.

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**Table C-7.** Summary of Initial Array of Alternatives

<b>Alternative</b>	<b>Description</b>
Alternative 1	Restore closing dam 599_2_CL <sup>1</sup> to EL <sup>2</sup> 600'
Alternative 2	Restore closing dam 599_2_CL to EL 600' and restoring WD 599_3_TL <sup>3</sup> to EL 596.6'
Alternative 3	Includes repairs in Alternative 2 with restoring closing dam 595_8_CL to EL 599'
Alternative 4	Includes repairs in Alternative 3 and restoring Island 205 to EL 605'.
Alternative 5	Includes Alternative 4 with a slightly larger footprint of Island 205.
Alternative 6	Includes Alternative 5 plus restoring WD 595_5_TL to EL 595.6'
Alternative 7	Includes Alternative 3 repairs plus restoring 597_3_CL, 595_1_CL, and 596_7_TL.
Alternative 8	Add chevron upstream of Island 205 to EL 605'
Alternative 9	Restore Iowa wingdams near Finley's from RM 595-596
Alternative 10	Different chevron design upstream of Island 205 to EL 605'
Alternative 11	Restore and lengthened lateral structure adjacent to Island 205 to EL 600'
Alternative 12	Extend the lateral structure adjacent to Island 205 further upstream than in Alternative 12 and to EL 600'.
Alternative 13	Restore Island 205 to EL 605' and to a more narrow design than in other alternatives
Alternative 14	Restore all regulating structures to original design elevations from RM 599.3-593.1
Alternative 15	Restore closing dam 599_2_CL to EL 600', restore closing dam 595_8_CL to EL 599', restore 595_7_CL to EL 595.7' and restore Island 205 to more refined shape based on Brown's Map to EL 605'
Alternative 16	Restore closing dam 599_2_CL to EL 600', restore closing dam 595_8_CL to EL 599', restore 595_7_CL to EL 595.7' and add a chevron at boundary of Island 205 based on Brown's Map to EL 605'
Alternative 17	Restore closing dam 599_2_CL to an elevation of 600', restore wing dam 599_3_TL to an elevation of 596.6, restore closing dam 595_8_CL to an elevation of 601' and restore closing dam to an elevation of 595.7'
Alternative 17a	Restore closing dam 599_2_CL to an elevation of 600', restoring closing dam 595_8_CL to an elevation of 601' and rock vanes at Hurricane Island (RM 599.0).

<sup>1</sup> CL – closing dam, on the left descending bank

<sup>2</sup> EL – elevation

<sup>3</sup> TL - training dam, on the left descending bank

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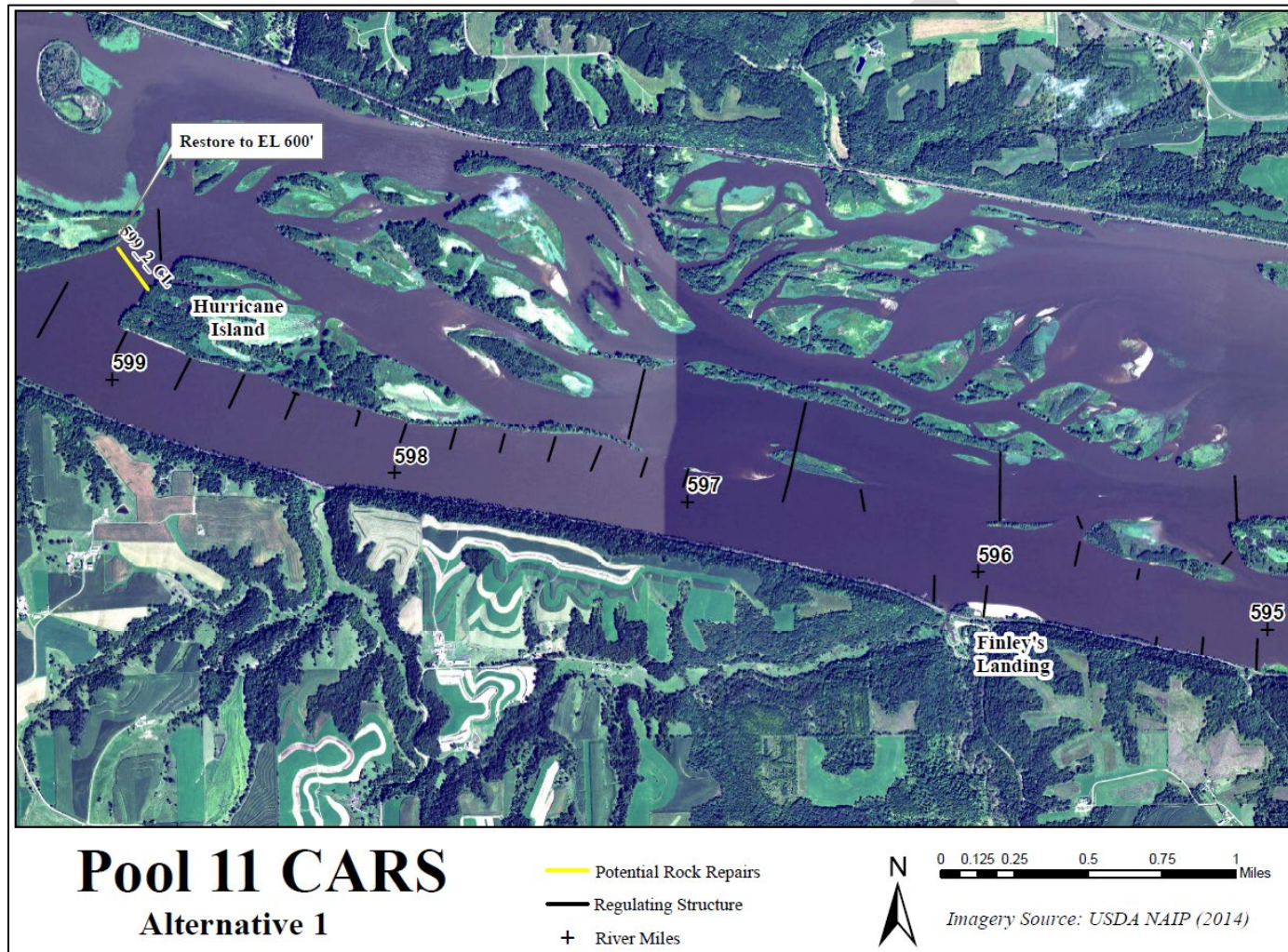
**Table C-8.** Summary Matrix of Initial Alternatives Considered

	FEATURE												
	Restore 599_2_CL to EL 600	Restore 599_3_TL to EL 596.6	Restore 595_8_CL to EL 599	Island 205 to EL 605 (size and shape may vary)	Restore 595_7_CL to EL 595.7	Restore 595_5_TL to EL 595.6	Restore 597_3_CL to EL 596.3	Restore 595_1_CL to EL 595.6	Restore 596_7_TL to EL 596.2	Chevron Upstream of Island 205 (size and shape may vary) to EL 605	Restore Iowa Wingdams Near Finley's Landing	Lateral Structure Adjacent to Island 205 to EL 600	Rock Vanes at Hurricane Island Placement Site
Alternative 1	X												
Alternative 2	X	X											
Alternative 3	X	X	X										
Alternative 4	X	X	X	X									
Alternative 5	X	X	X	X									
Alternative 6	X	X	X	X		X							
Alternative 7	X	X	X				X	X	X				
Alternative 8										X			
Alternative 9											X		
Alternative 10										X			
Alternative 11												X	
Alternative 12												X	
Alternative 13				X									
Alternative 14	X	X	X			X	X	X	X		X		
Alternative 15	X		X	X	X								
Alternative 16	X		X		X					X			
Alternative 17	X	X	X (To EL 601)		X								
Alternative 17a	X		X (To EL 601)										X



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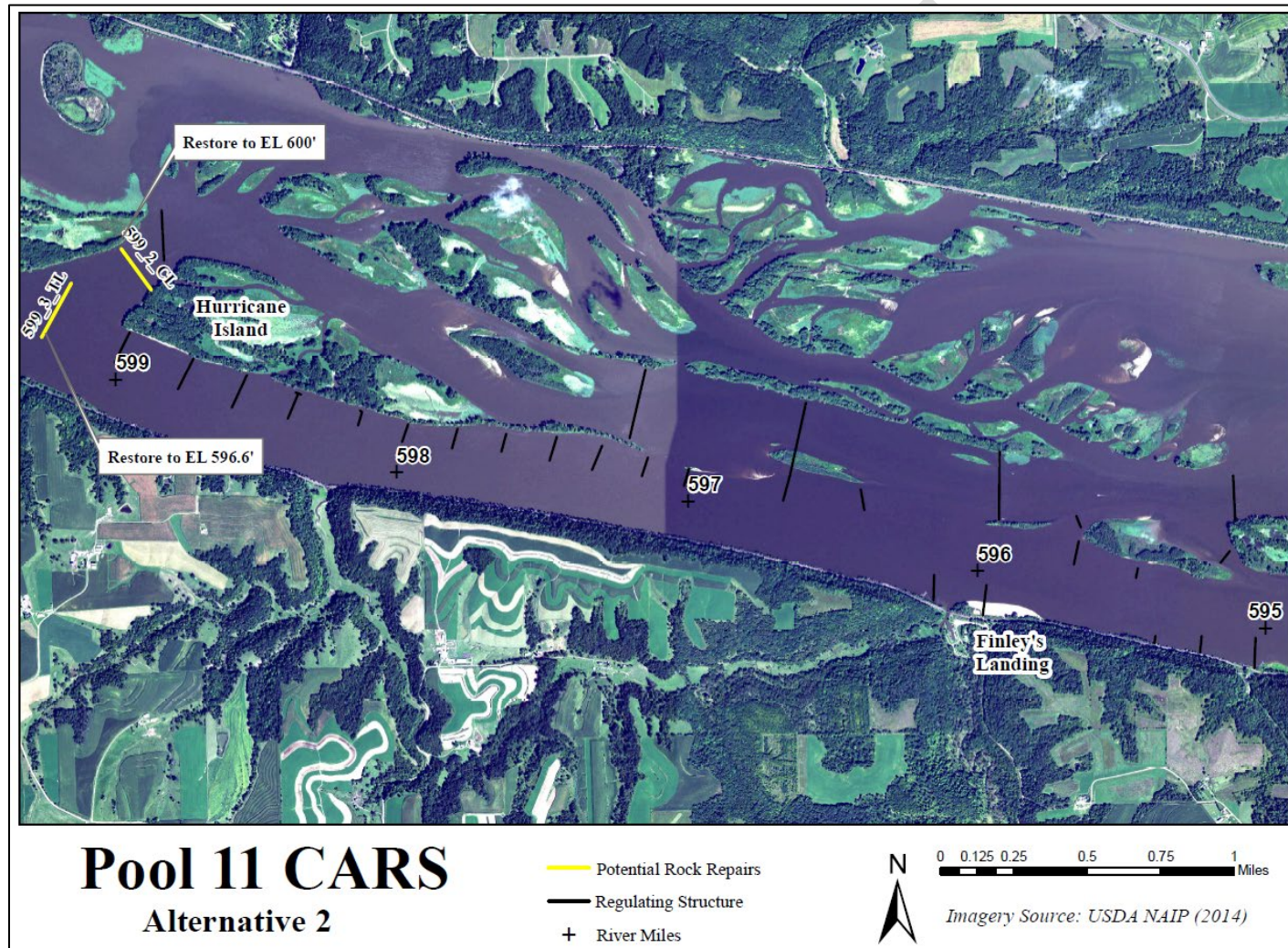


**Figure C-20(a).** Alternative 1 Design Features



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**Figure C-20(b).** Alternative 2 Design Features



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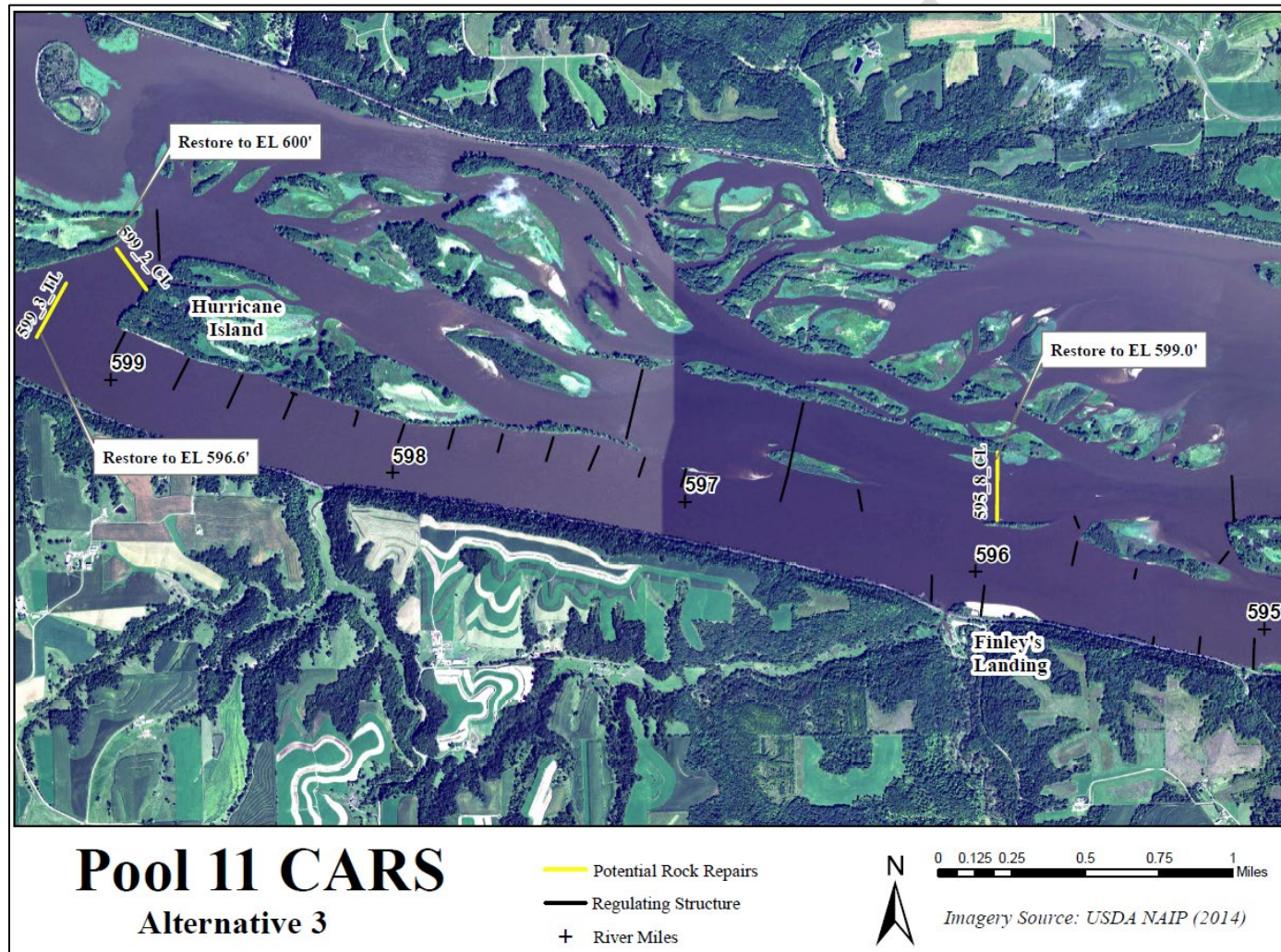


Figure C-20(c). Alternative 3 Design Features



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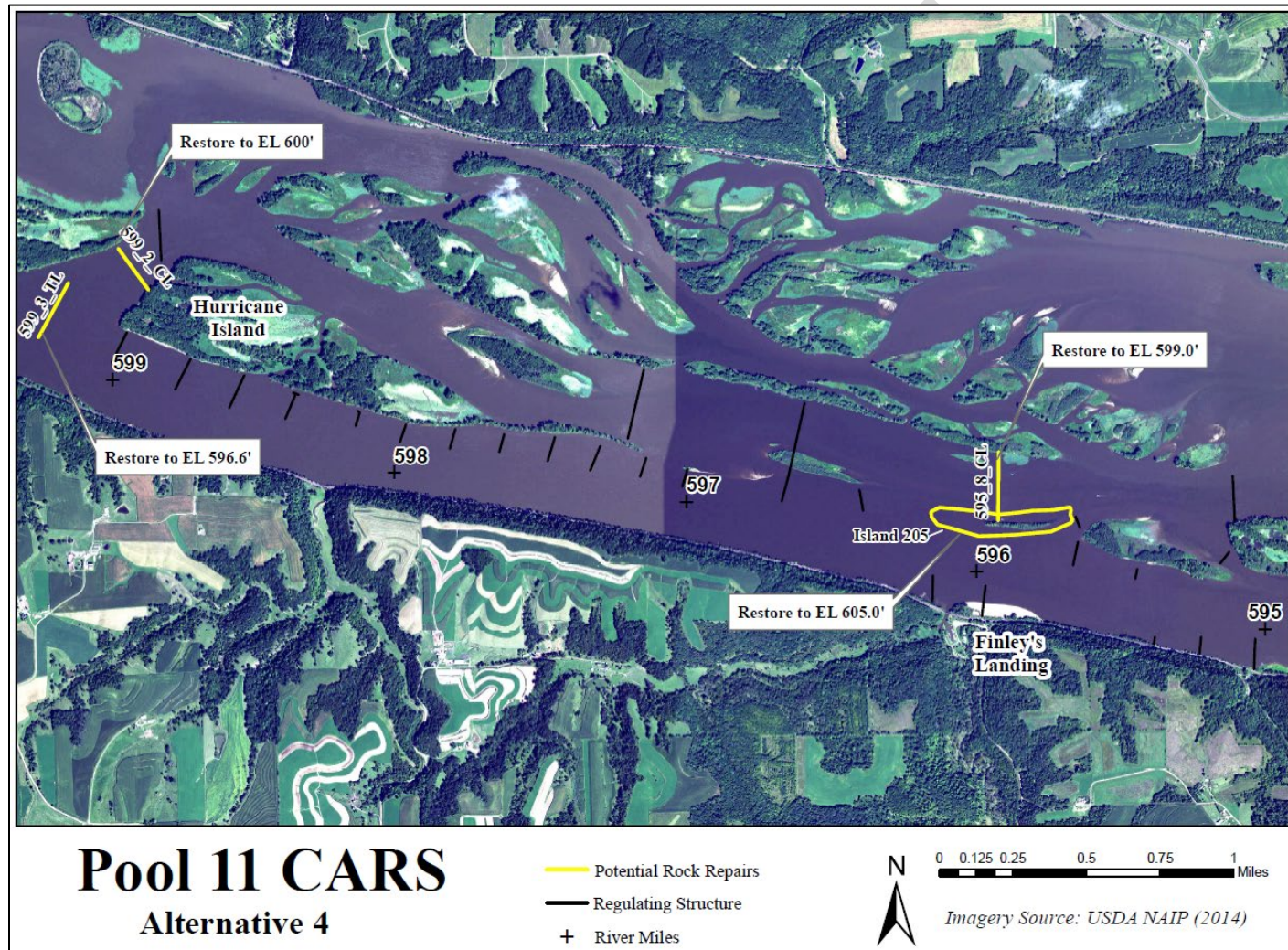


Figure C-20(d). Alternative 4 Design Features



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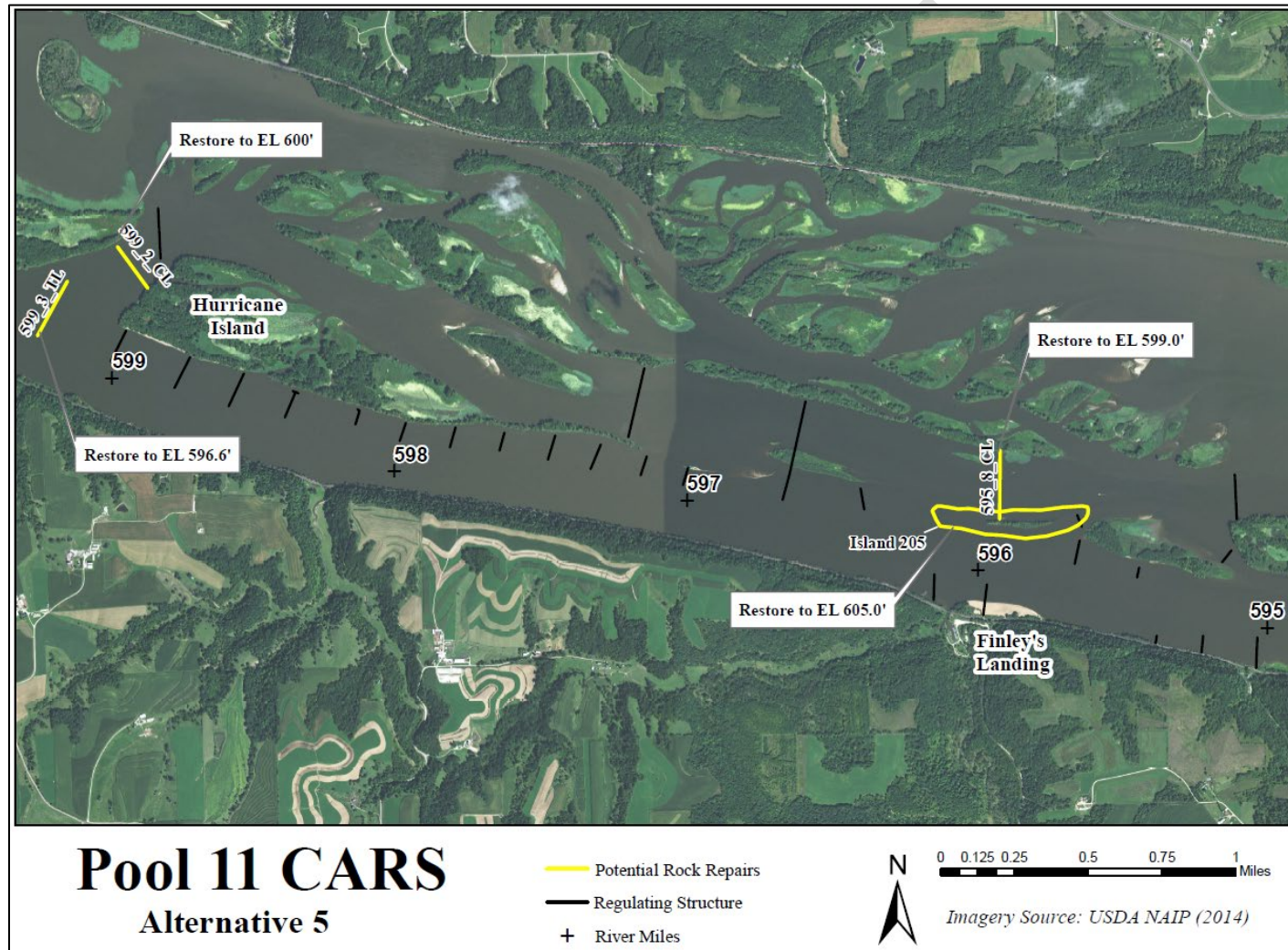
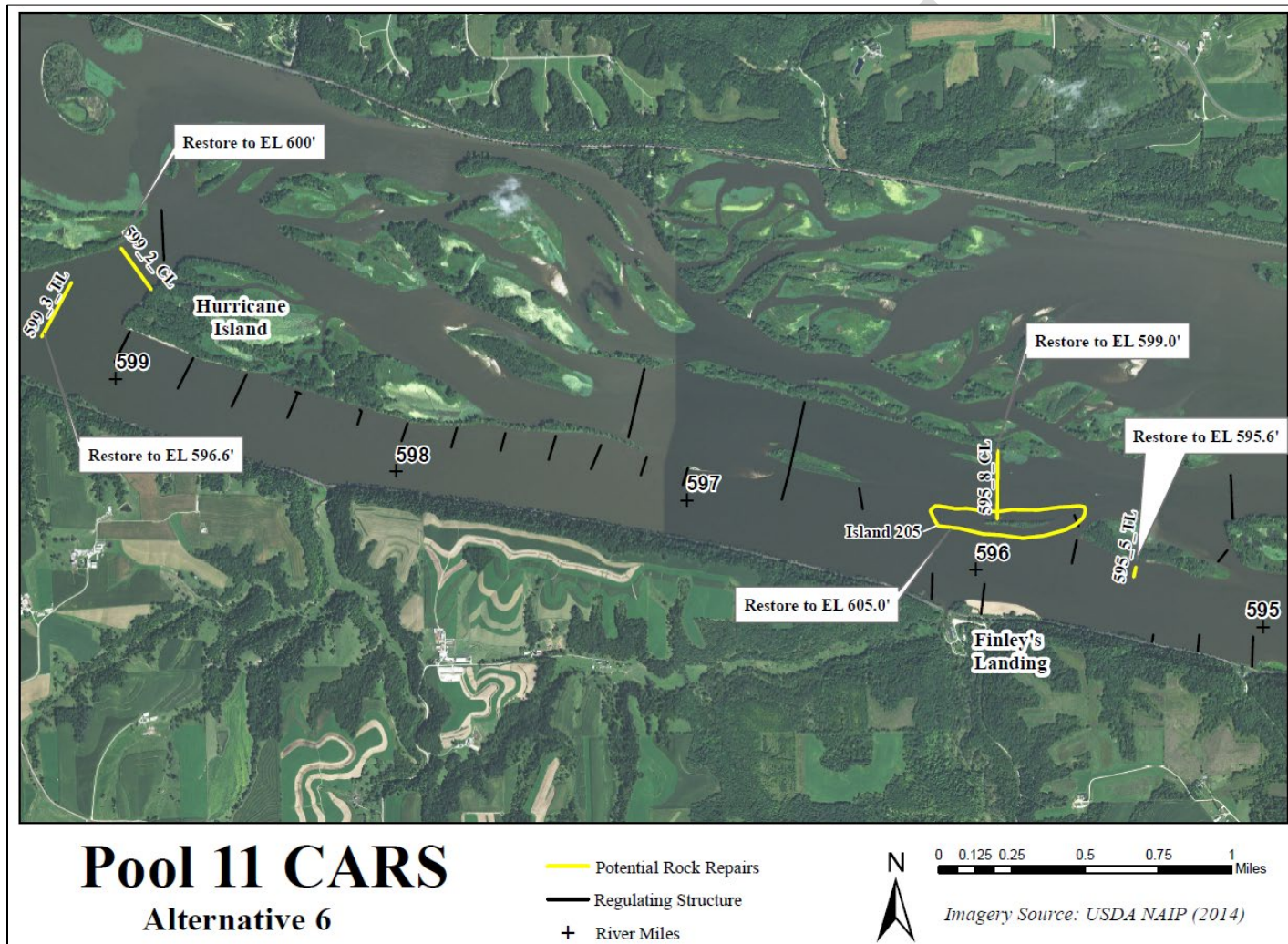


Figure C-20(e). Alternative 5 Design Features



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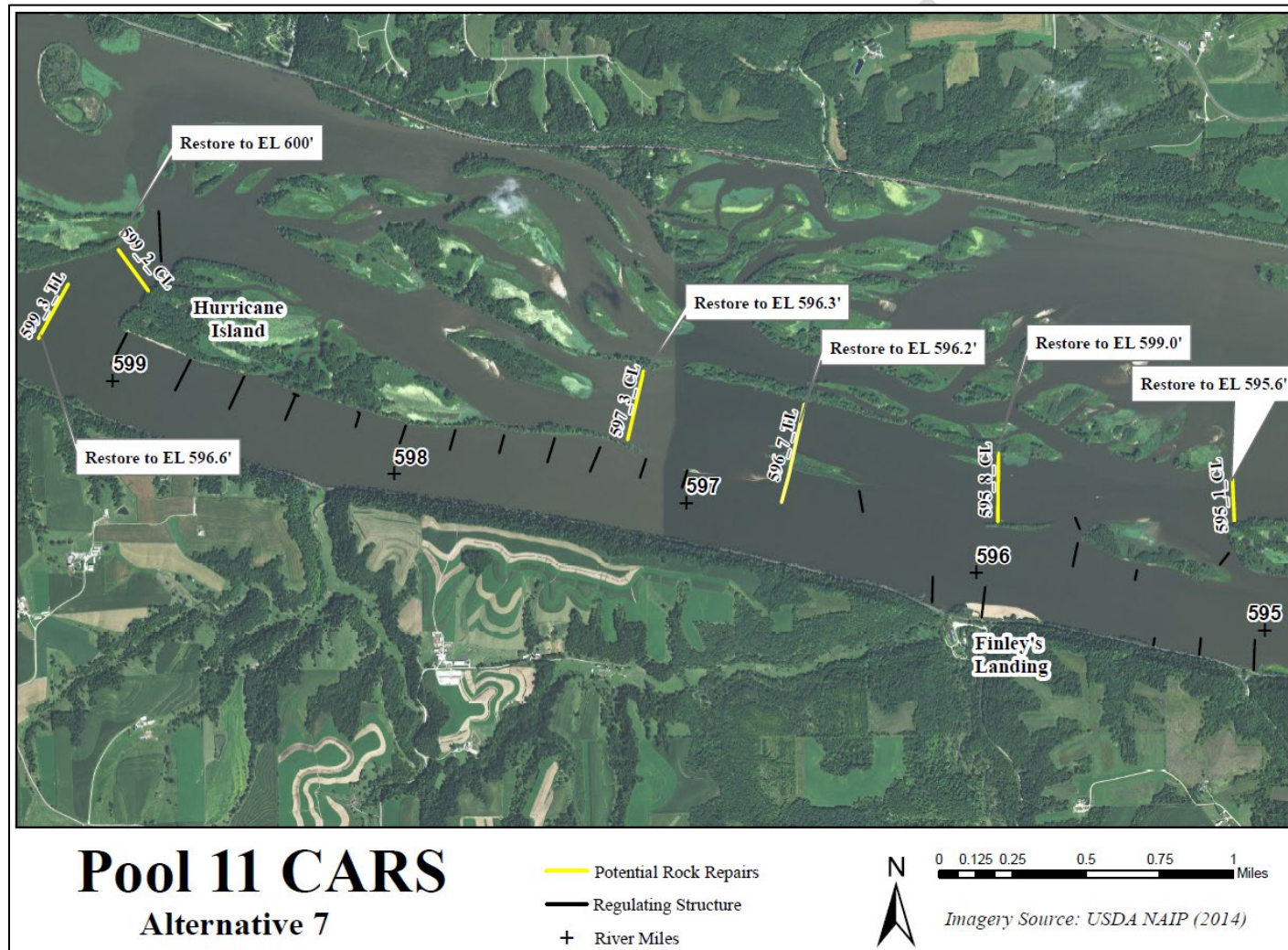
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**Figure C-20(f). Alternative 6 Design Features**

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**Figure C-20(g).** Alternative 7 Design Features



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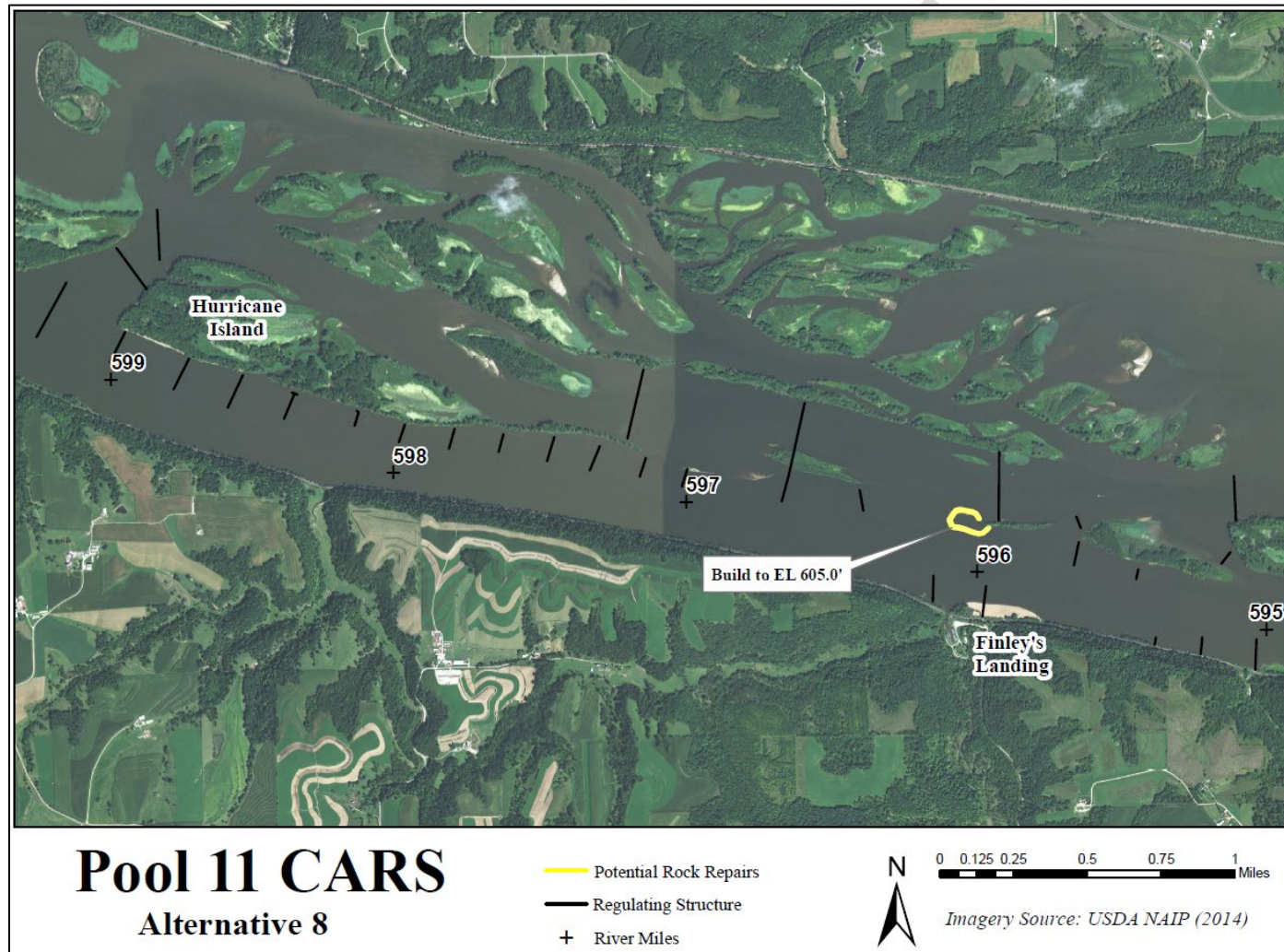


Figure C-20(h). Alternative 8 Design Features

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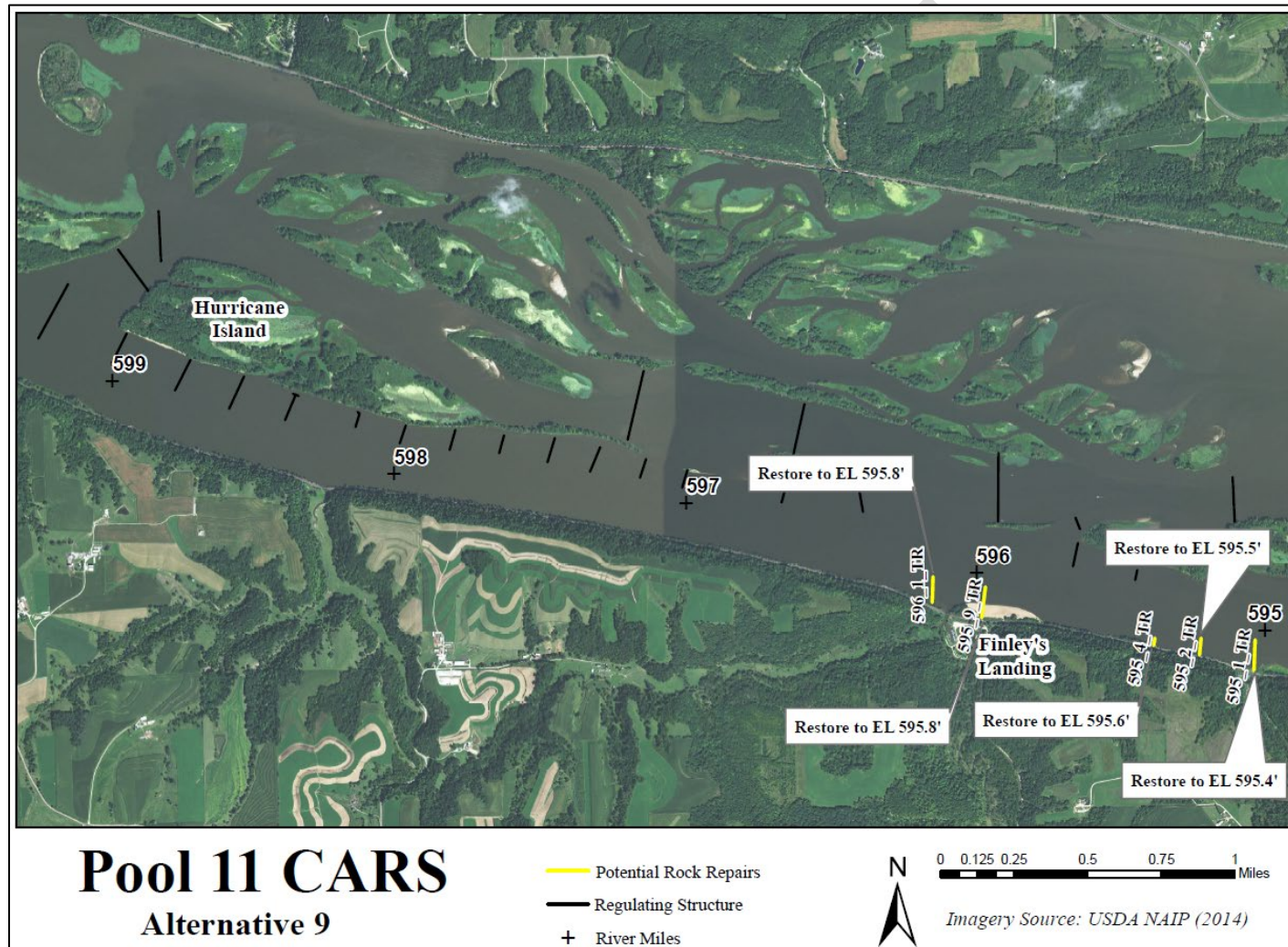
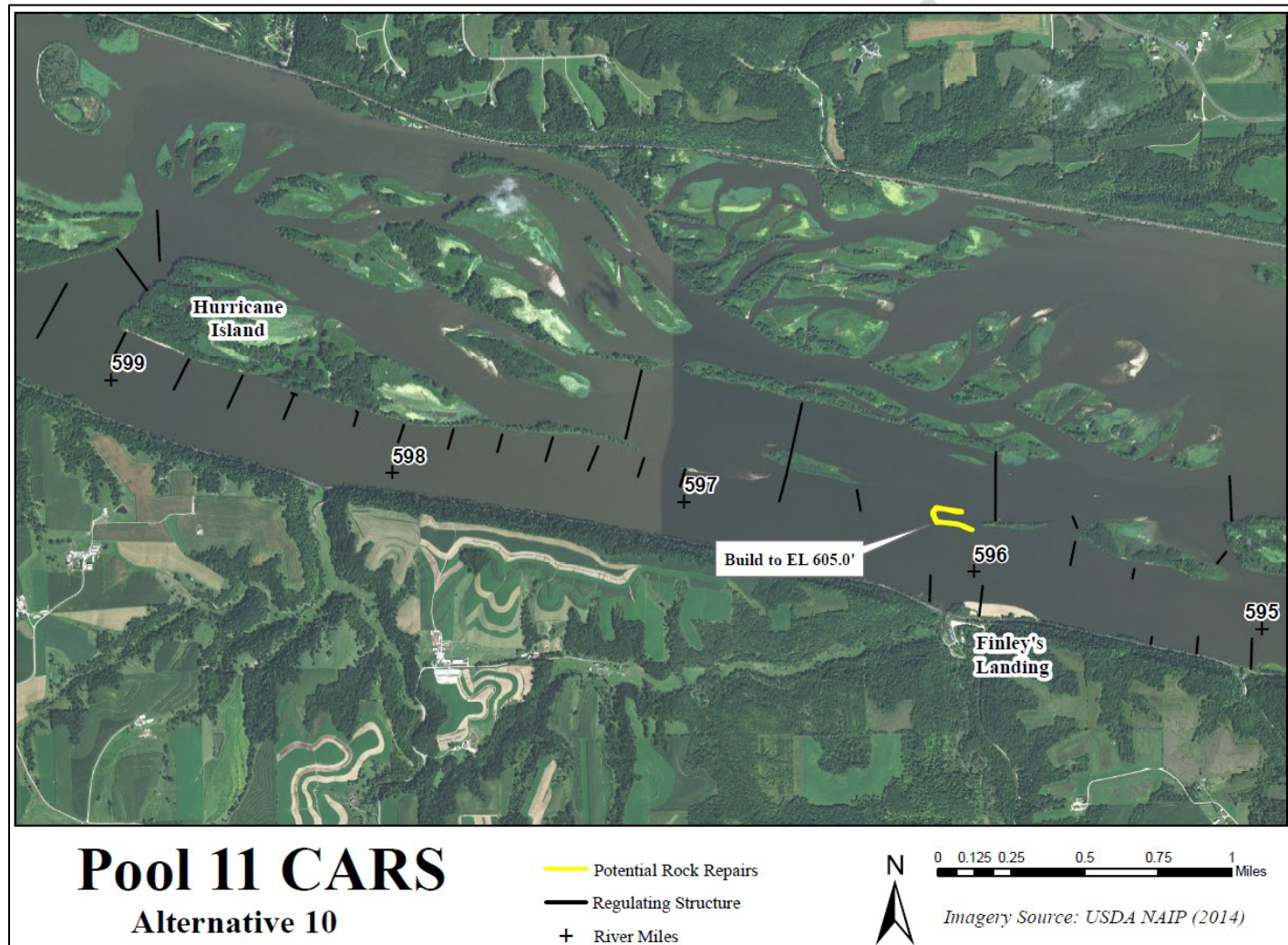


Figure C-20(i). Alternative 9 Design Features



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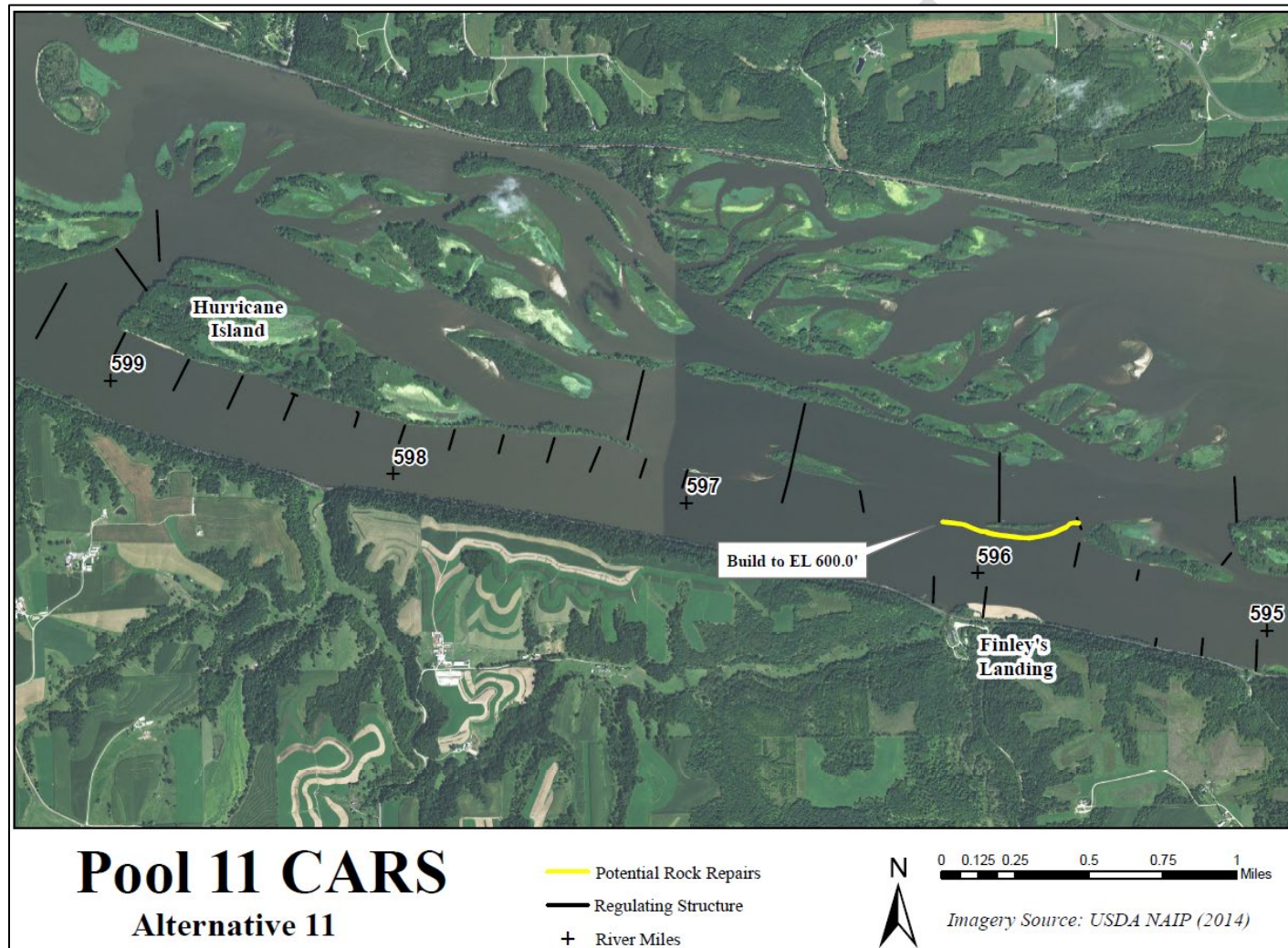
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**Figure C-20(j).** Alternative 10 Design Features

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**Figure C-20(k).** Alternative 11 Design Features



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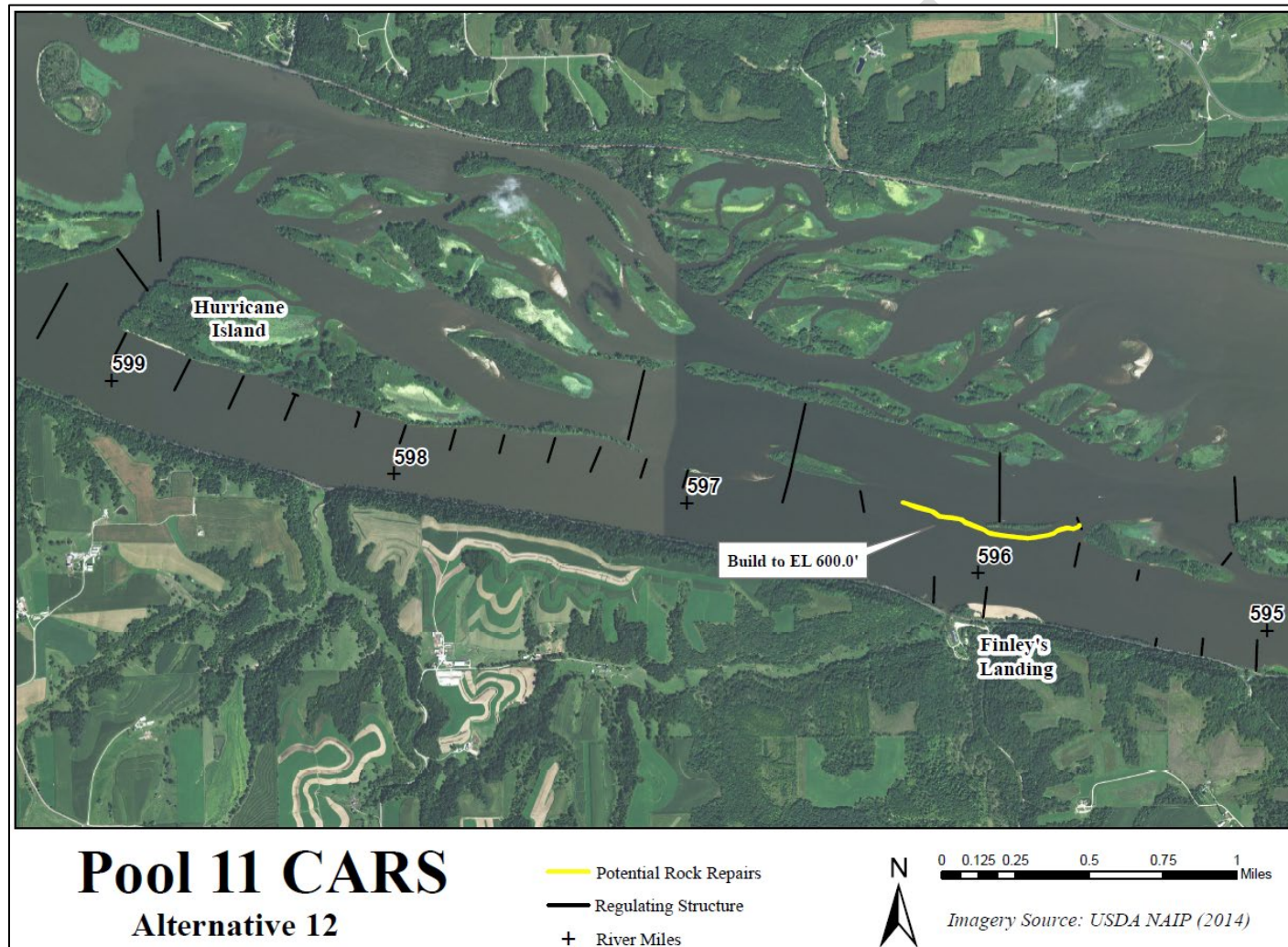
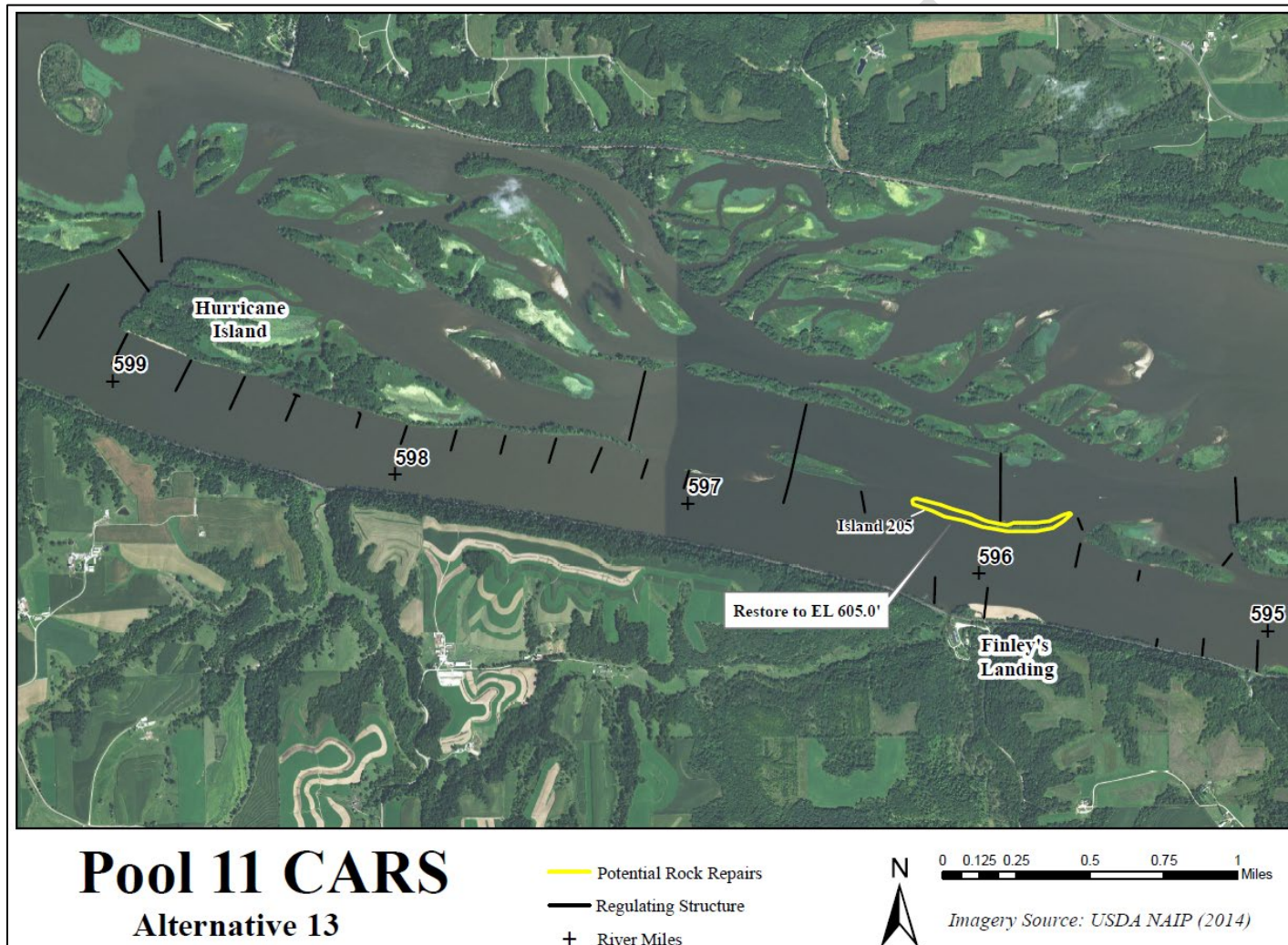


Figure C-20(l). Alternative 12 Design Features

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**Figure C-20(m).** Alternative 13 Design Features



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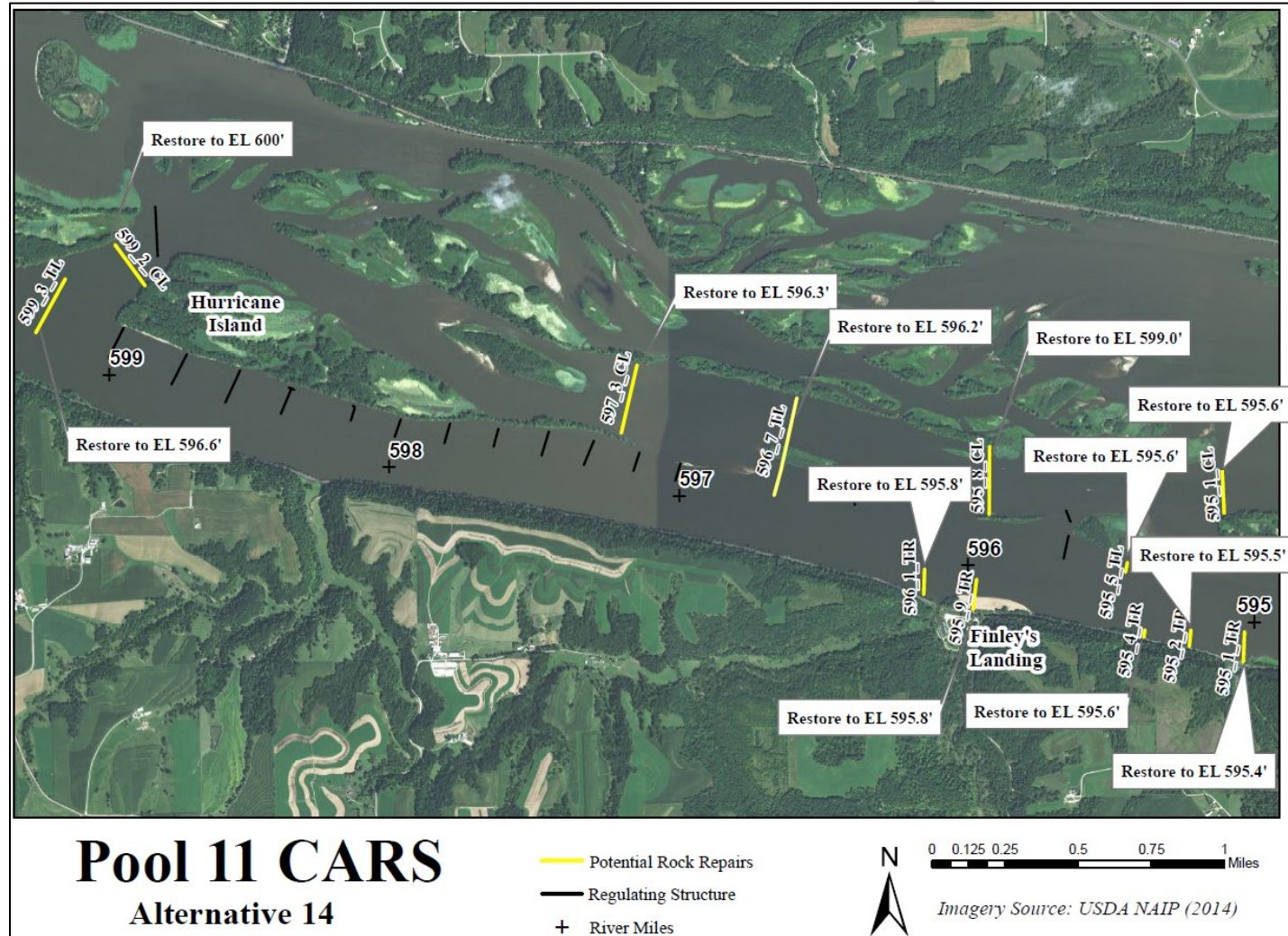
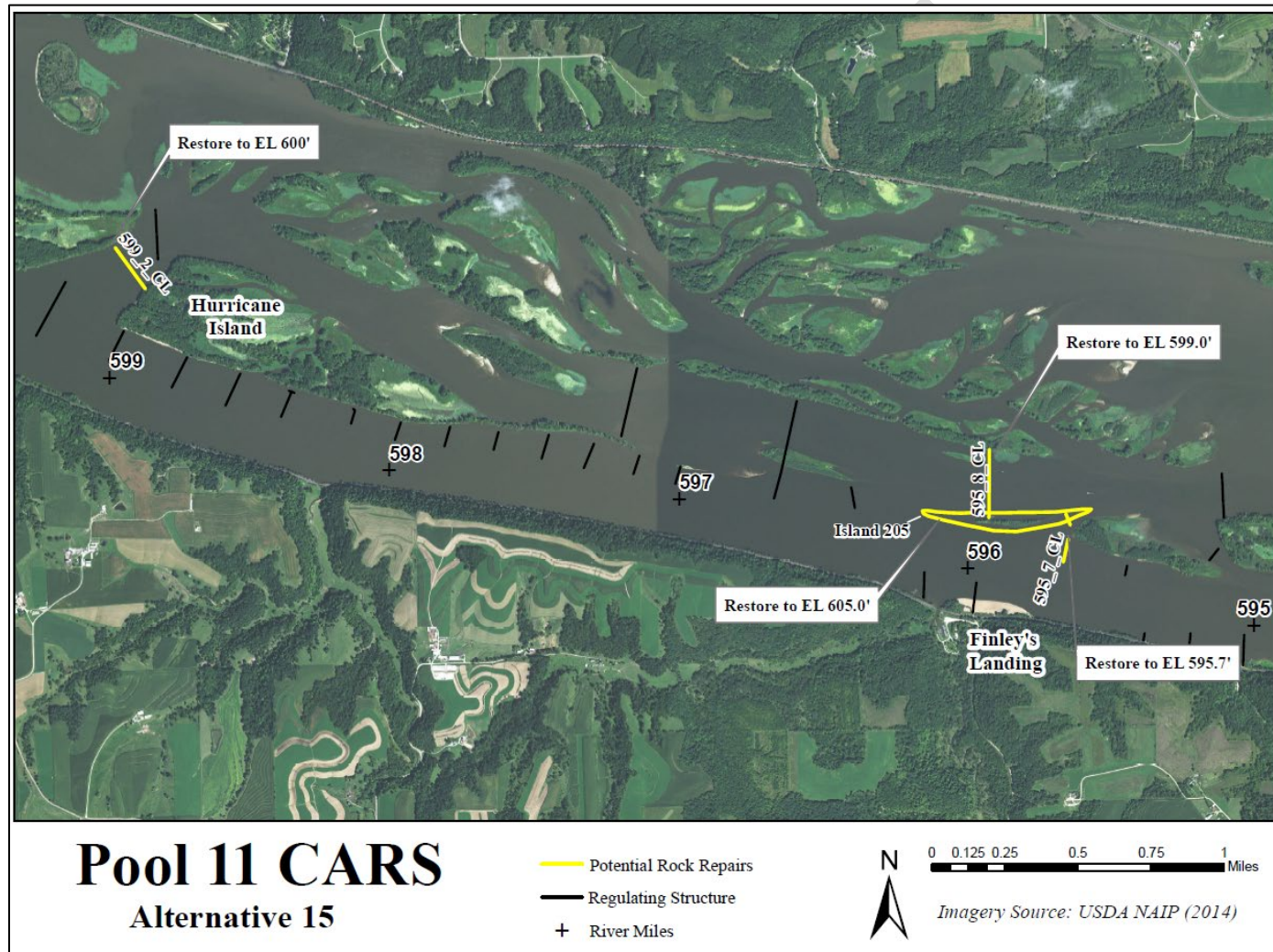


Figure C-20 (n). Alternative 14 Design Features

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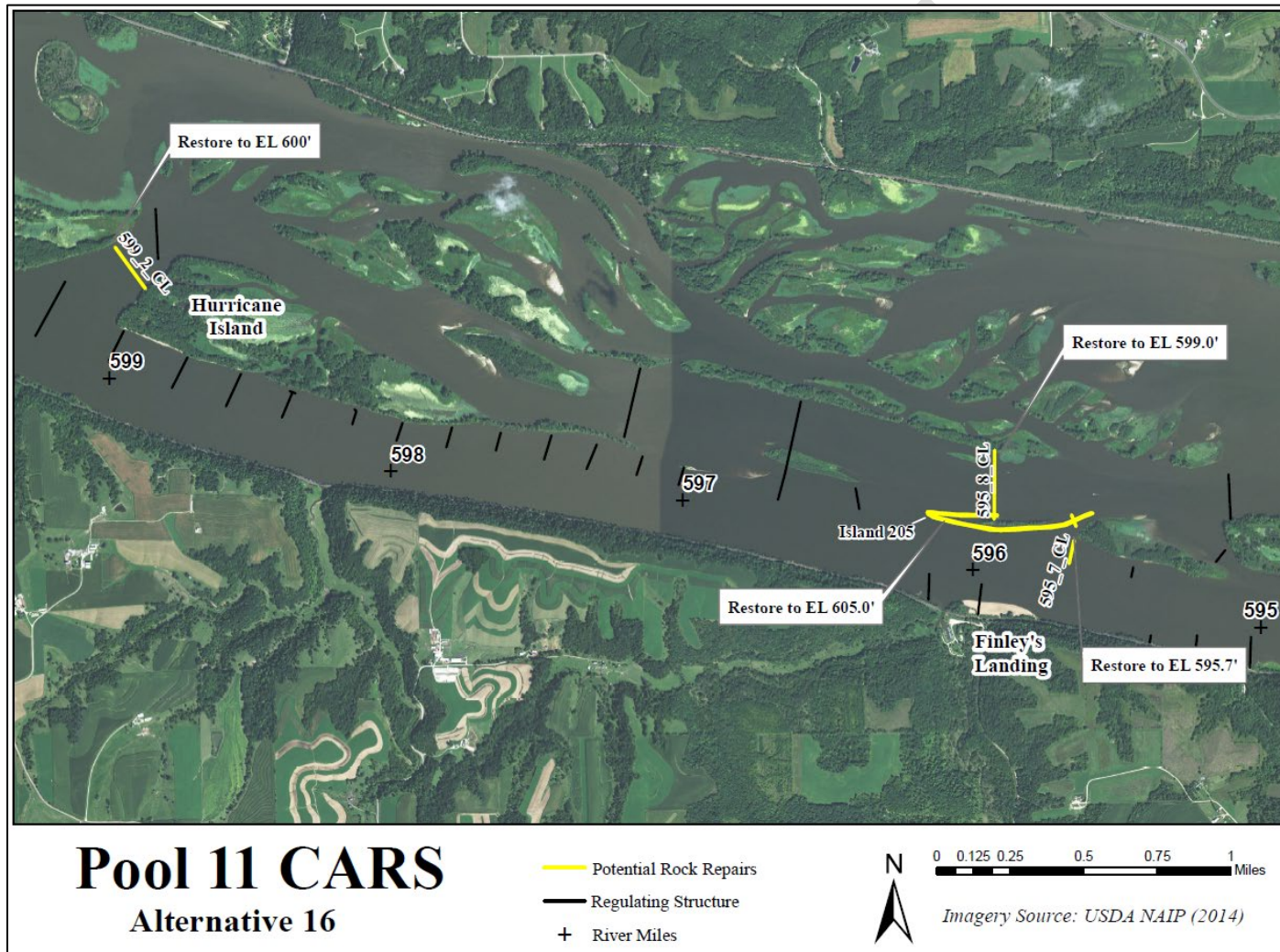


**Figure C-20(o).** Alternative 15 Design Features



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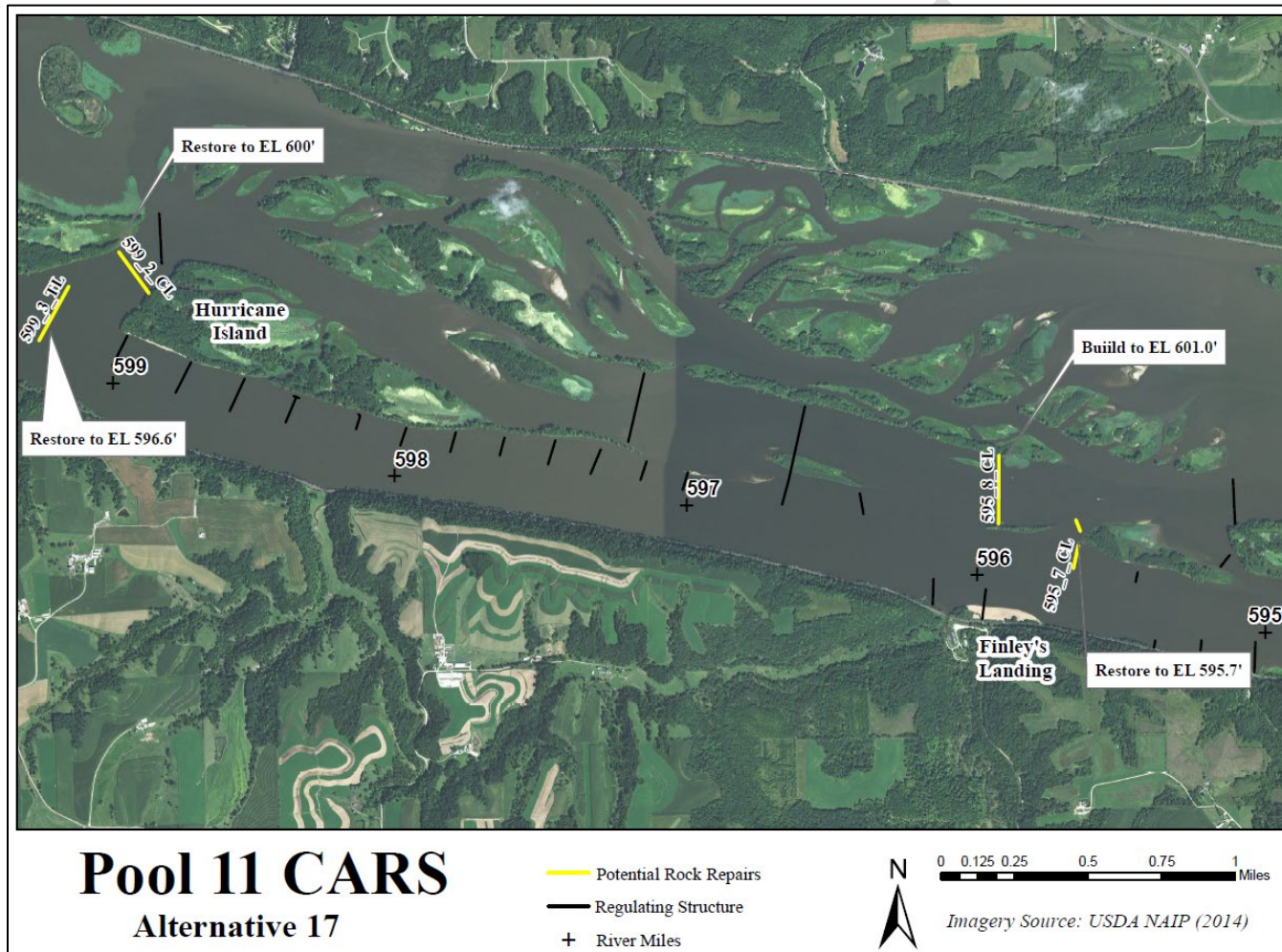
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**Figure C-20(p).** Alternative 16 Design Features

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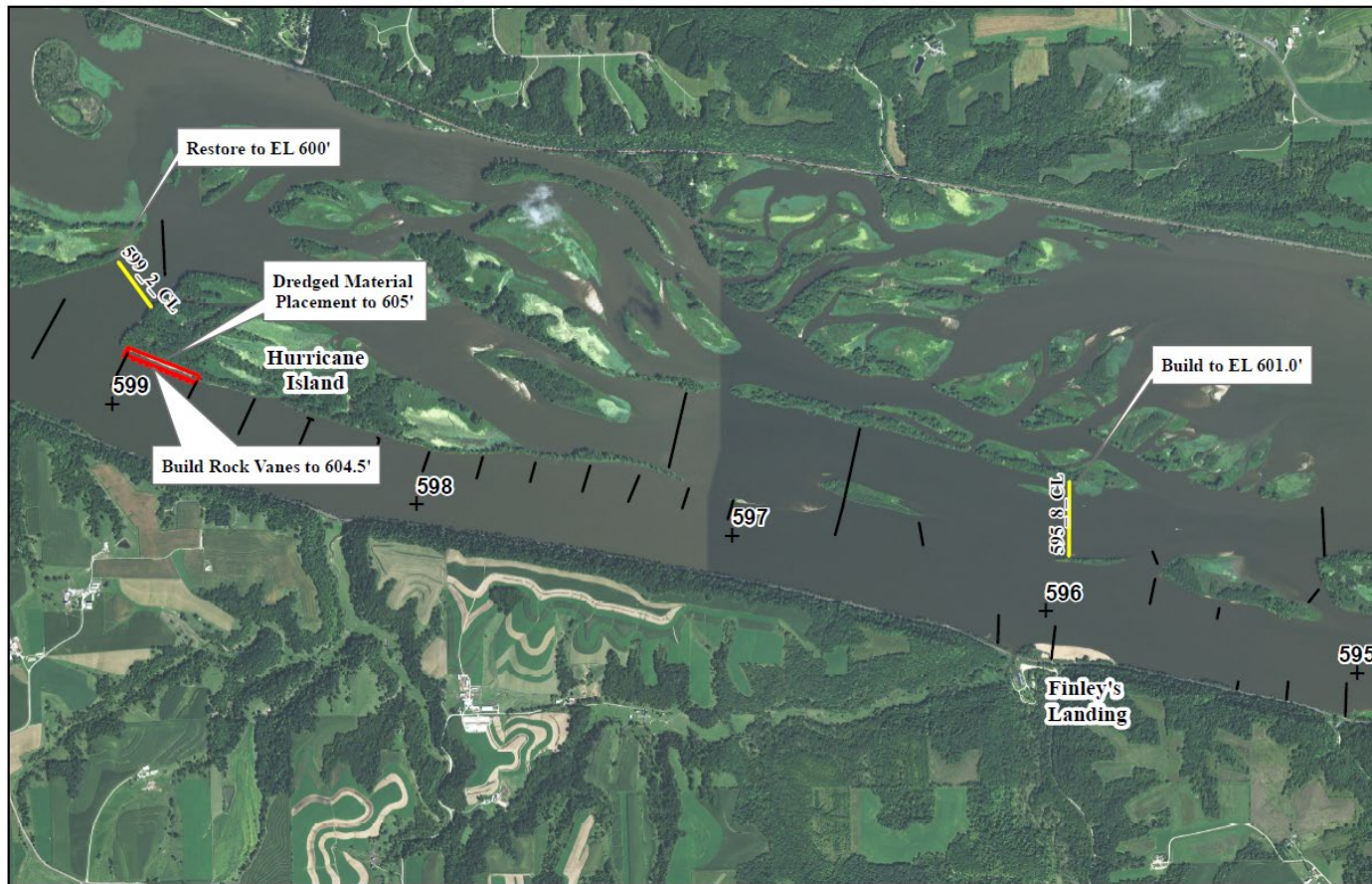


**Figure C-20(q). Alternative 17 Design Features**



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**Pool 11 CARS**  
**Alternative 17a**

- Potential Rock Repairs
- Regulating Structure
- +
 River Miles



0 0.125 0.25 0.5 0.75 1 Miles

Imagery Source: USDA NAIP (2014)

**Figure C-20(r). Alternative 17a Design Features**

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## Results

Tables C-9 and C-10 provide the discharge results of the AdH model at the different transects under the two conditions. The arcs used to compare the model results are shown in Figure C-8.

**Table C-9.** Discharge Distribution Comparison for the Flow of 156,750 cfs

Alternative	Arc 00	Arc 02	Arc 08	Arc 014	Arc 010	Arc 012
Existing Conditions	135,103	42,874	88,466	25,498	85,684	118,504
Alternative 1	134,178	39,709	90,178	24,921	86,813	118,721
Alternative 2	133,978	39,216	90,336	24,868	86,912	118,739

Only Alternatives 1 and 2 were run at the 156,750 cfs flow. Table C-9 shows an increase in flow in the main channel but the velocity plots in Figures C-21(a)-C-21(h) show a minimal increase in velocity. The flow of 76,295 cfs was then simulated in hopes that a greater change in velocity between the alternatives would be seen. At 76,295 cfs, there was still minimal increase in velocity between existing conditions and Alternative 2.

For the alternatives at Finley's Landing, Alternative 4 showed the greatest increase in flow directly across from the placement site, but Alternative 17 provided the greatest flow at the dredging site. This is likely due to restricting the flow in the side channel. Alternative 5 with the large size of Island 205 also showed an increase in discharge at the dredging site. The more defined shape of the island restoration and chevron in Alternatives 15 and 16 created less flow at Transect 20 compared to Alternatives 4 and 5 but showed higher discharges at Transect 22.

After reevaluating Alternative 17, it was determined that wing dams 599\_3\_TL and 595\_7\_CL may not provide added benefit and were not included in Alternative 17a, which was not simulated through the 2D model. Once Alternative 17a met the floodplain requirements, the team brought up the idea of including the Hurricane Island placement and rock structures with this work. The placement and rock structures had been evaluated in the 2017 Hurricane Island DMMP project but were removed from the design due to floodplain impacts. Through updating the hydraulic HEC-RAS model cross sections with updated terrain instead of interpolated values and decreasing the width of the dredge material placement to 125' from the mature treeline, the placement and rock vanes met the floodplain requirements. The placement will be 1,000 ft in length and placed to an elevation of 605' MSL 1912. The rock vanes will be 30' long and at angle of 45 degrees. The height of the rock vanes will be 604.5' MSL 1912.

The velocity shown in Figures C-21(a)-C-21(h) compare the different alternatives at the 156,750 cfs and 76,295 cfs flows.

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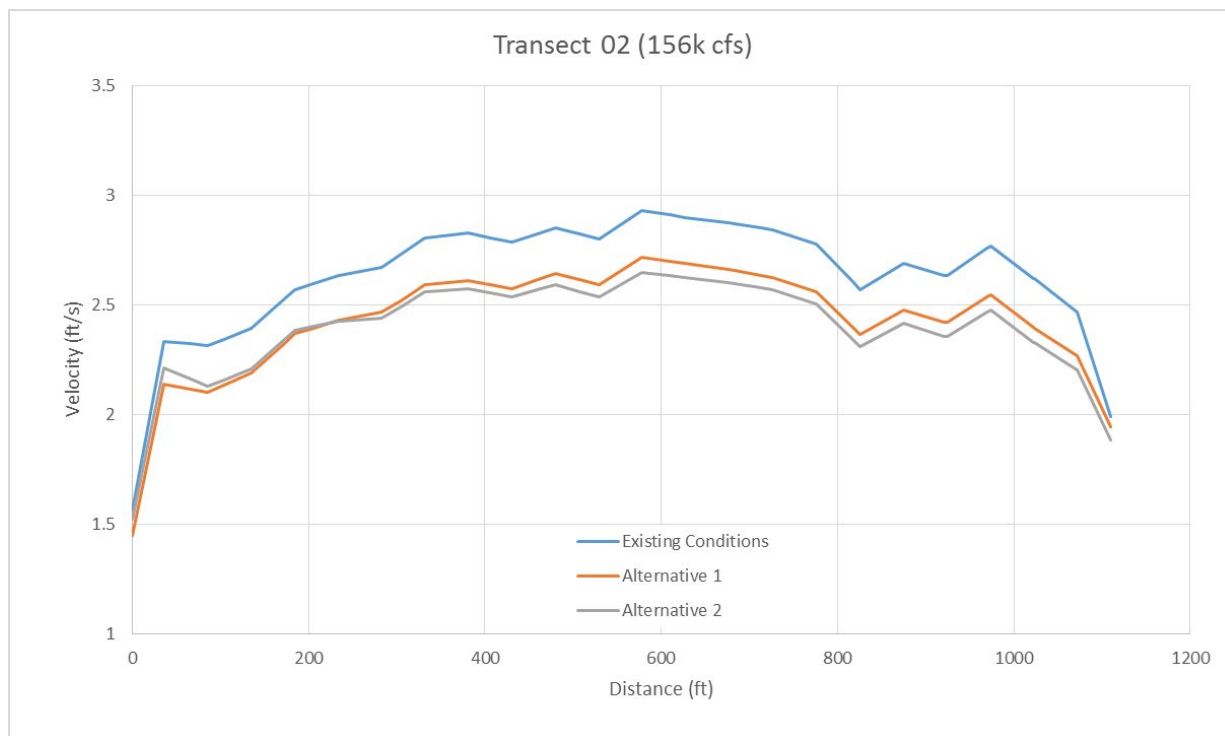
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**Table C-10.** Discharge Distribution Comparison for the Flow of 76,295 cfs

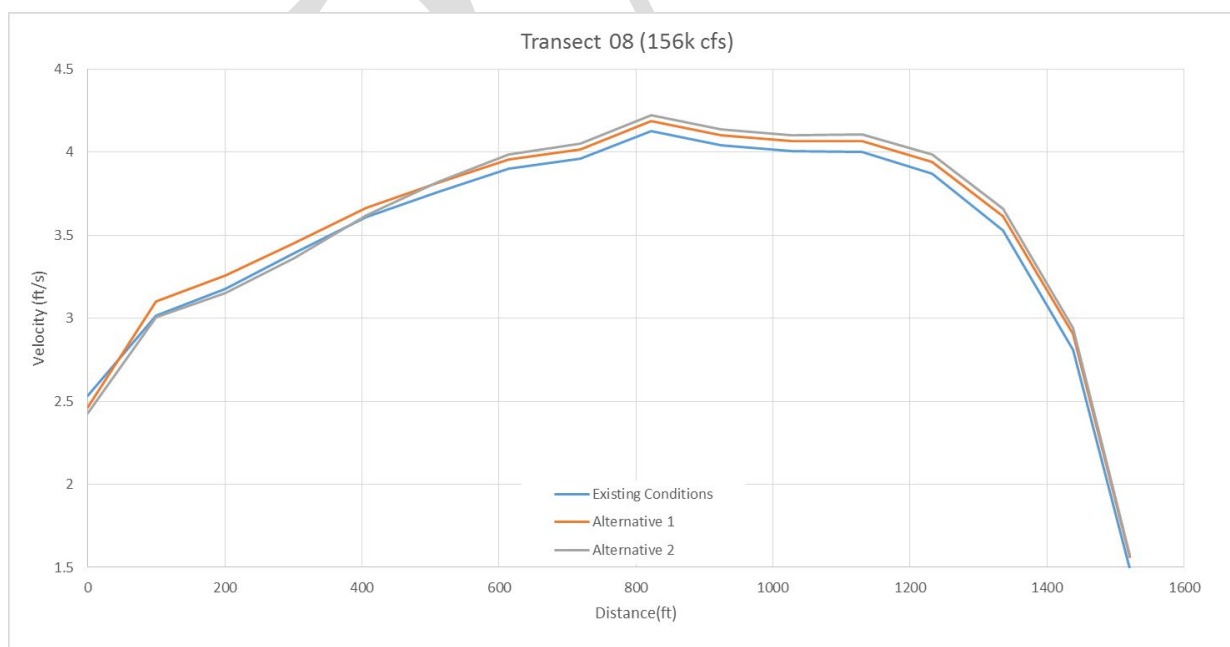
Alternative	Arc 00	Arc 02	Arc 08	Arc 14	Arc 010	Arc 12	Arc 16	Arc 18	Arc 20	Arc 22
Existing Conditions	75,335	24,741	49,658	11,856	49,223	61,995	48,968	18,661	36,885	36,218
Alternative 2	75,241	22,121	52,200	10,599	51,700	62,677	50,045	18,576	37,358	36,435
Alternative 3	75,222	22,224	52,076	10,535	51,569	62,335	49,818	17,150	38,946	37,879
Alternative 4	75,200	22,367	51,908	10,440	51,392	61,859	49,511	18,633	43,395	39,028
Alternative 5	75,193	22,423	51,845	10,404	51,325	61,681	49,320	19,575	42,170	40,143
Alternative 6	75,193	22,426	51,841	10,403	51,321	61,672	49,311	19,602	42,130	40,094
Alternative 7	75,217	22,173	52,123	10,418	51,622	62,226	49,924	16,951	39,002	37,984
Alternative 8	75,330	24,774	49,620	11,844	49,184	61,893	48,890	22,300	40,213	36,315
Alternative 9	75,334	24,748	49,650	11,855	49,215	61,980	48,952	18,701	36,784	36,072
Alternative 10	75,329	24,785	49,608	11,841	49,171	61,863	48,804	21,615	39,728	36,600
Alternative 11	75,333	24,754	49,643	11,851	49,208	61,954	48,923	19,380	36,890	36,390
Alternative 12	75,331	24,773	49,622	11,847	49,186	61,902	48,827	19,967	37,266	36,638
Alternative 13	75,329	24,807	49,584	11,845	49,146	61,839	48,497	20,181	39,569	36,937
Alternative 14	75,204	22,389	51,886	10,538	51,371	62,146	49,872	16,942	38,937	37,939
Alternative 15	75,211	22,666	51,665	10,563	51,156	61,773	49,295	19,426	40,619	40,411
Alternative 16	75,211	22,663	51,669	10,566	51,160	61,787	49,304	19,441	40,589	40,378
Alternative 17	75,185	22,472	51,787	10,373	51,264	61,511	49,280	14,465	41,996	41,018

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**Figure C-21(a).** Velocity Plot at Transect 02 for Q=156,750 cfs

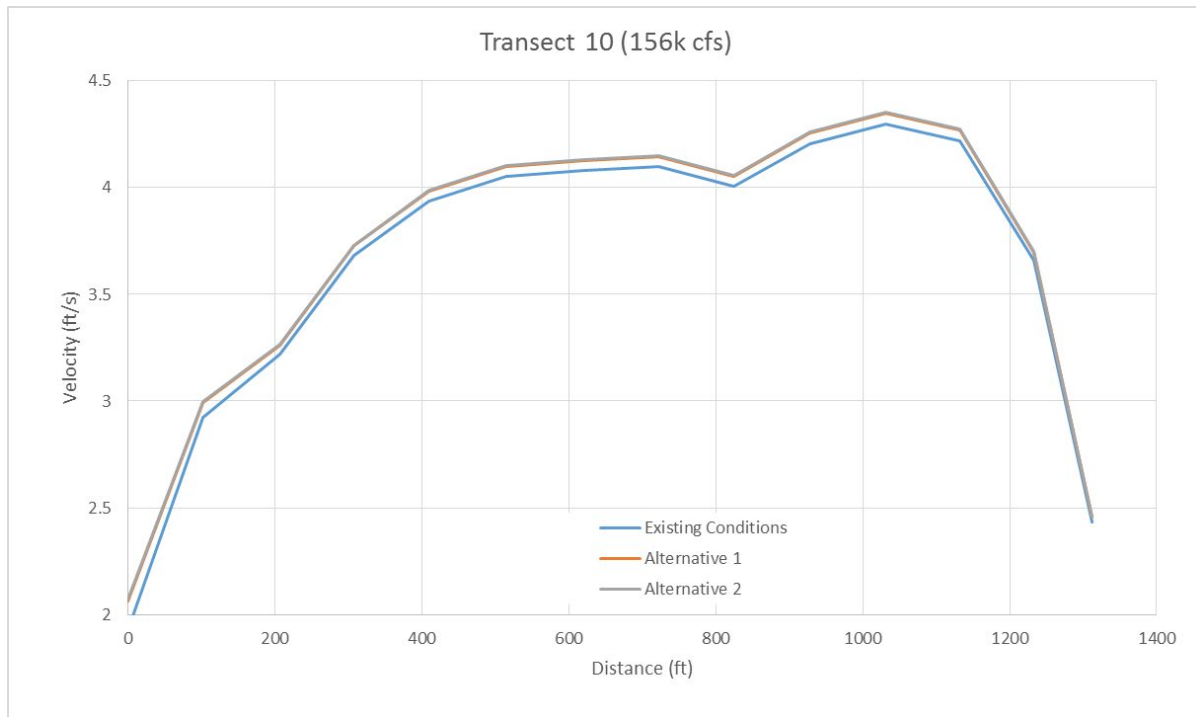


**Figure C-21(b).** Velocity Plot at Transect 08 for Q=156,750 cfs



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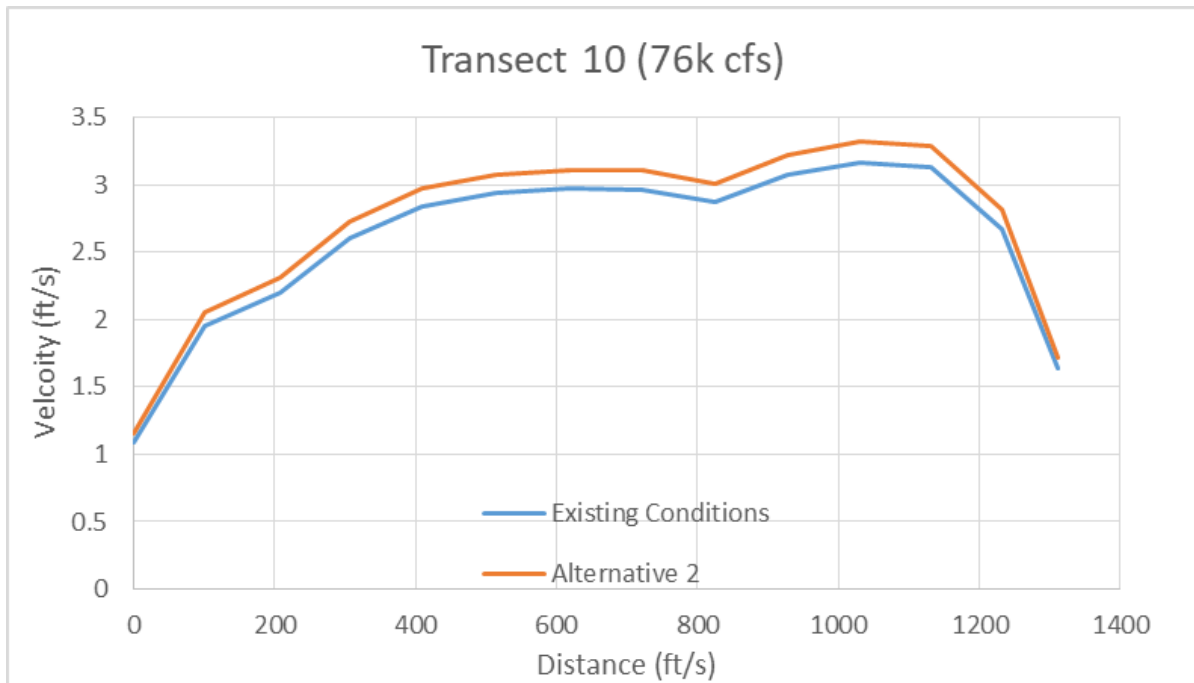
**Figure C-21(c).** Velocity Plot at Transect 10 for Q=156,750 cfs



**Figure C-21(d).** Velocity Plot at Transect 08 for Q=76,295 cfs

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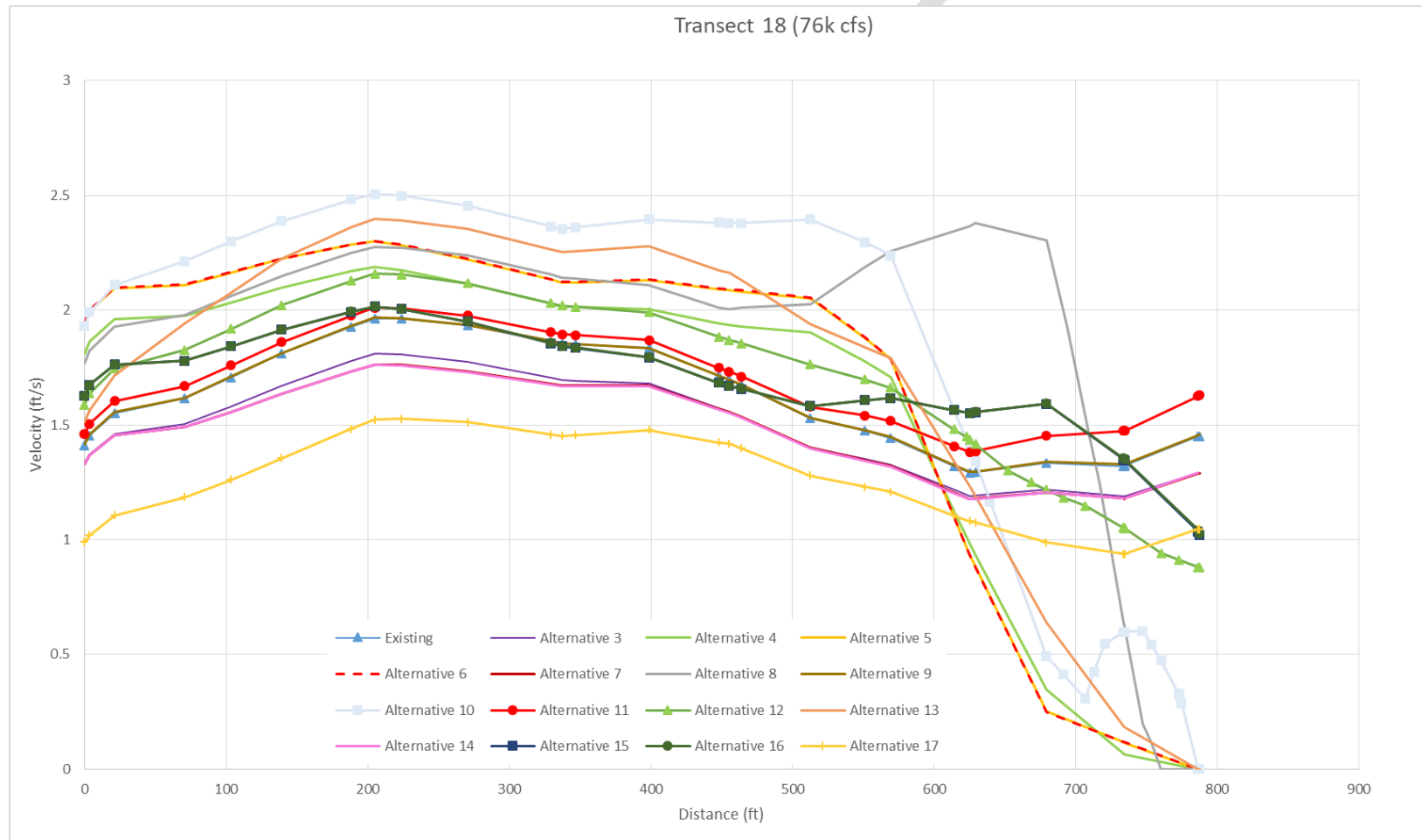
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**Figure C-21(e).** Velocity Plot at Transect 10 for Q=76,295 cfs

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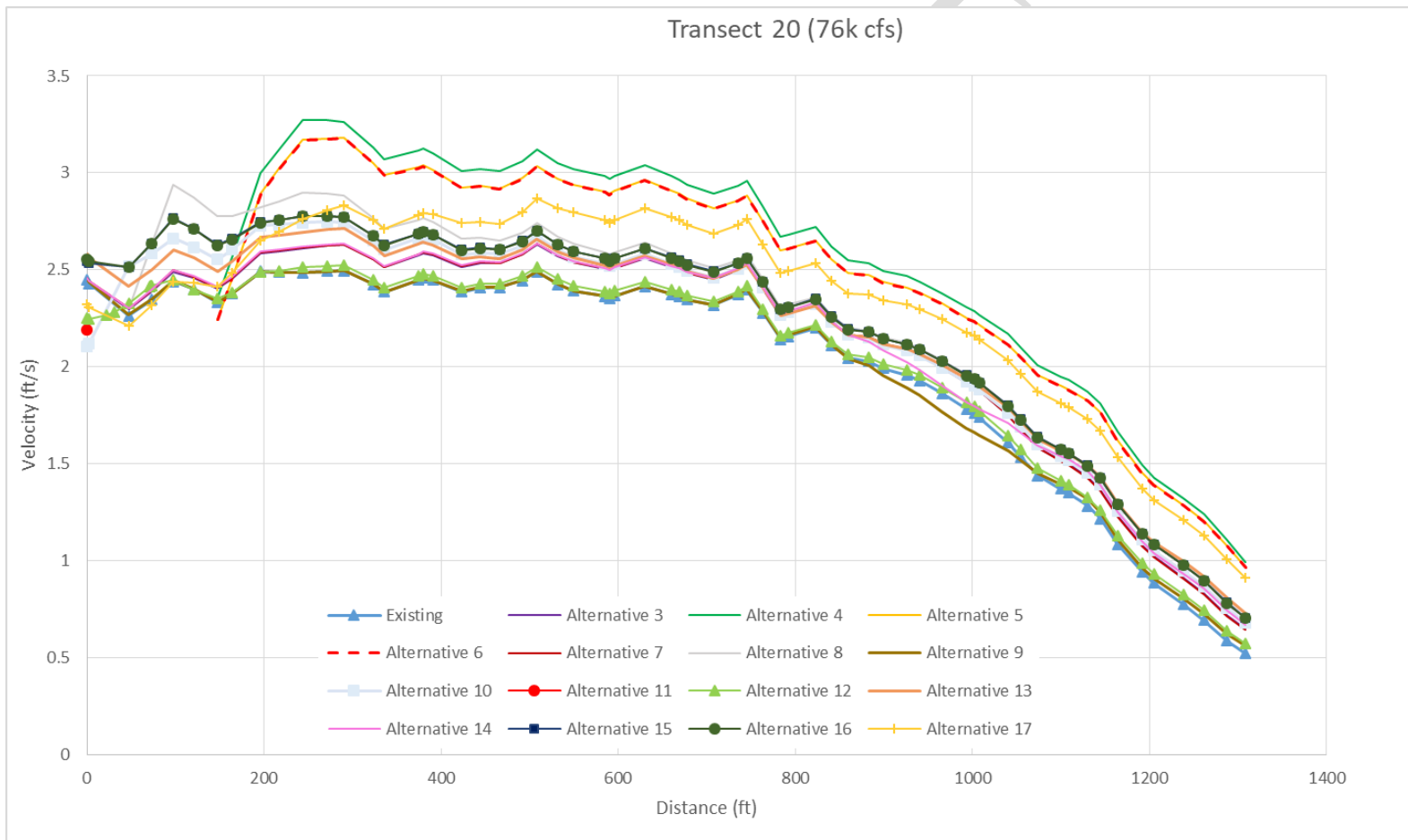
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**Figure C-21(f).** Velocity Plot at Transect 18 for Q=76,295 cfs

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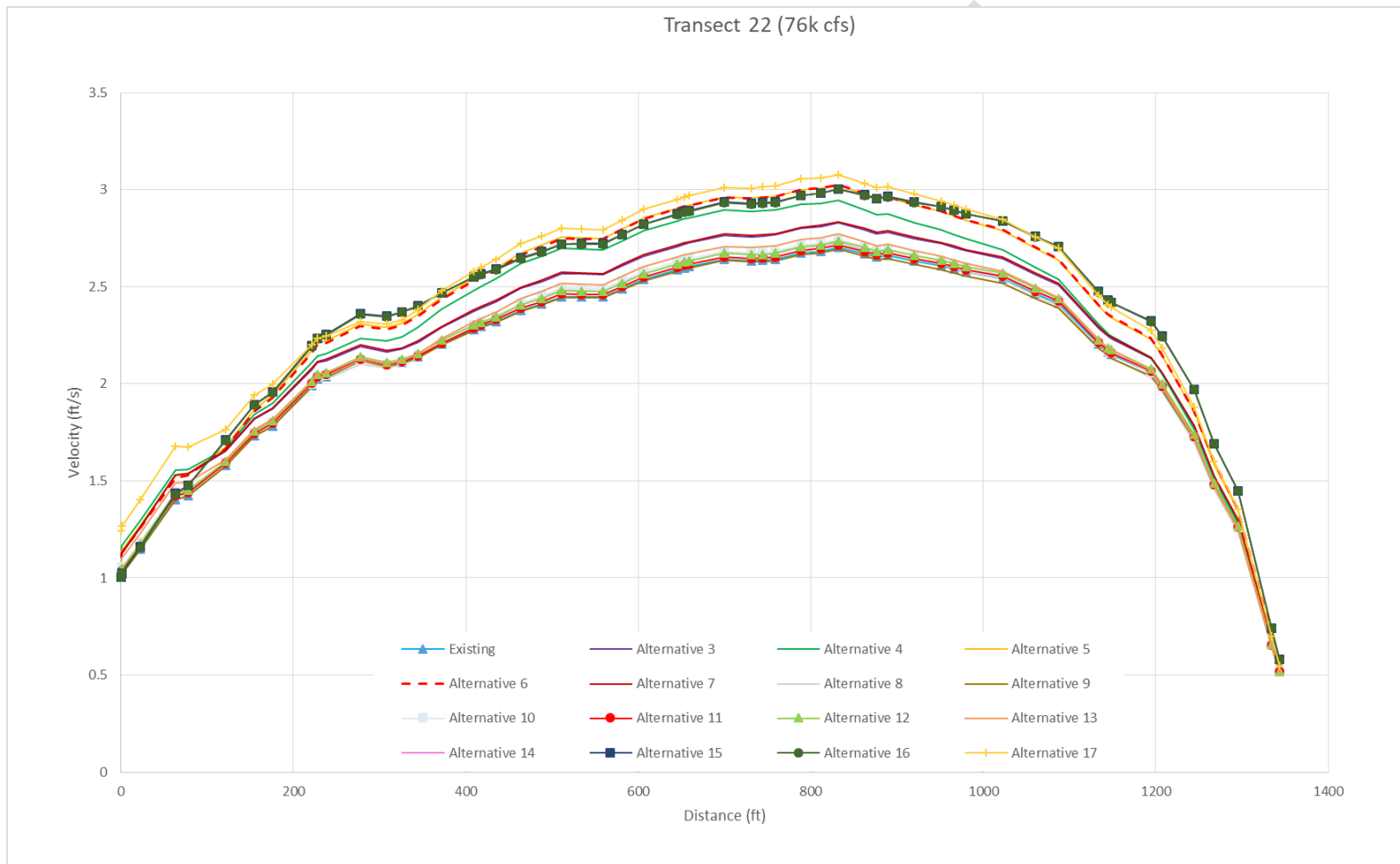


**Figure C-21(g).** Velocity Plot at Transect 20 for Q=76,295 cfs



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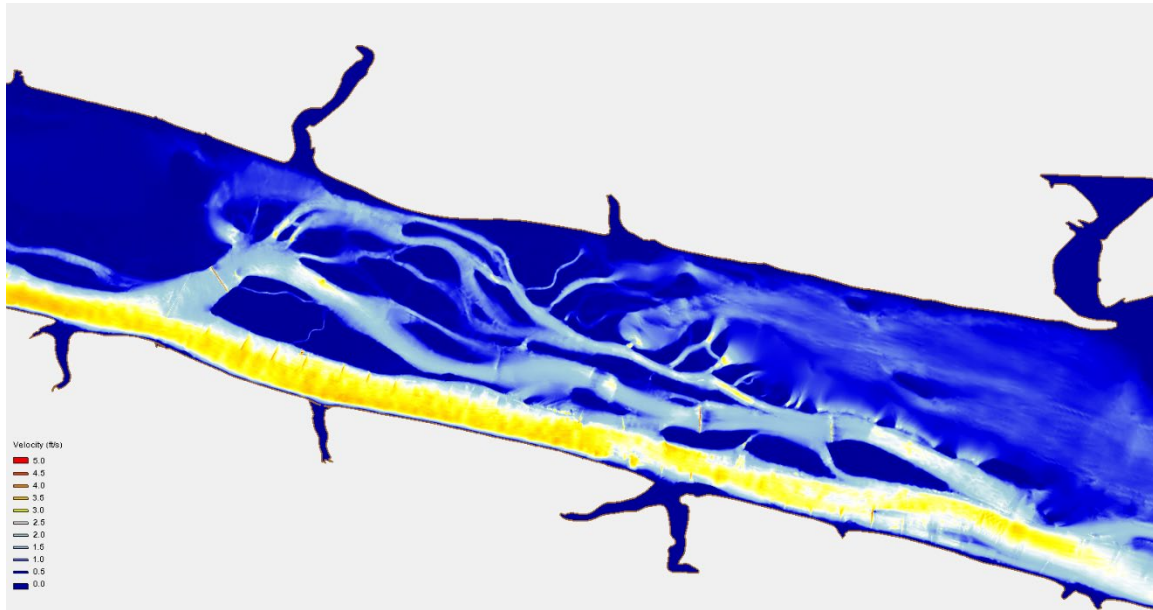


**Figure C-21(h).** Velocity Plot at Transect 22 for Q=76,295 cfs

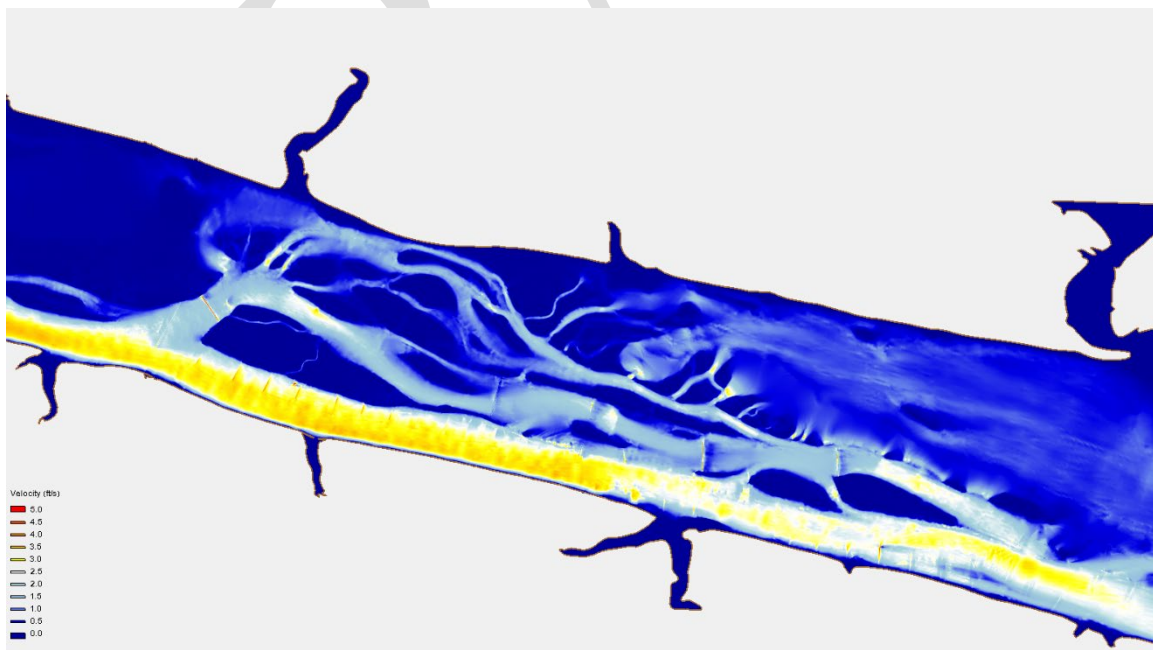
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Velocity contour maps were created for select alternatives with varying velocity impacts and are shown in Figures 22(a)-22(f). Alternatives 7 and 10 show a slight increase in velocity in the dredging area whereas Alternatives 5, 15, 16, and 17 show a larger increase in velocity.



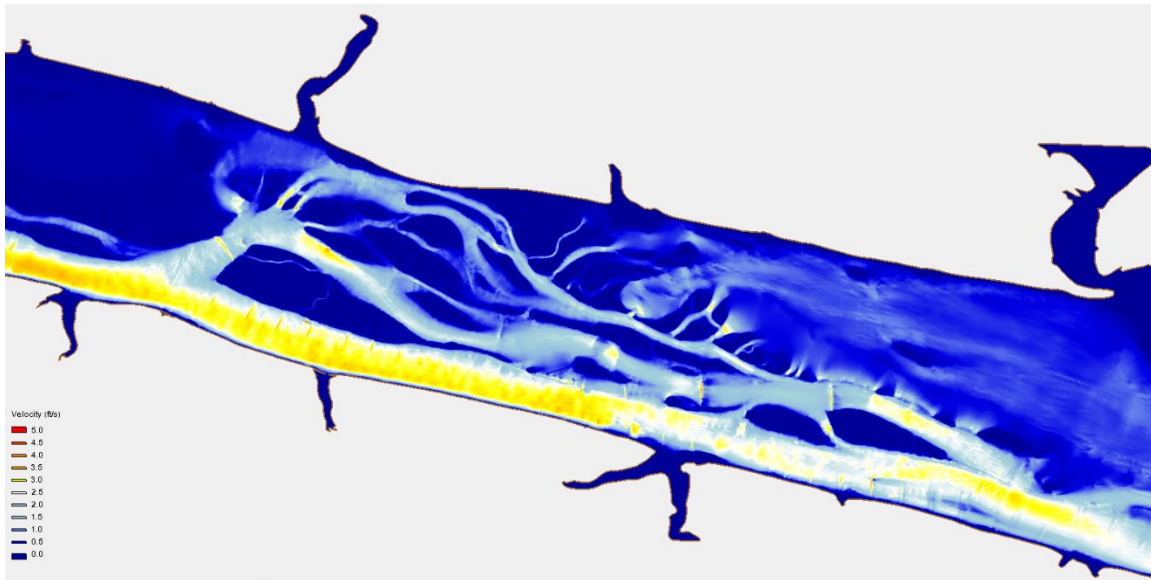
**Figure C-22(a).** Velocity Contour Map for Alternative 5 When  $Q=76,295$  cfs



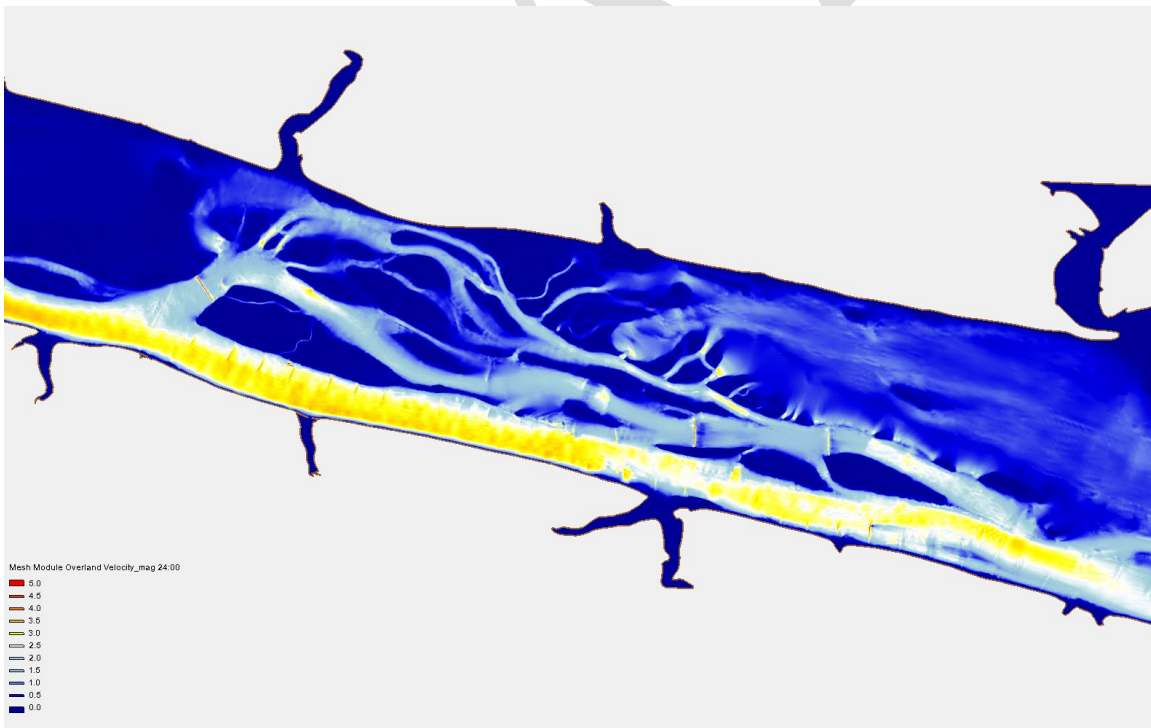
**Figure C-22(b).** Velocity Contour Map for Alternative 7 When  $Q=76,295$  cfs

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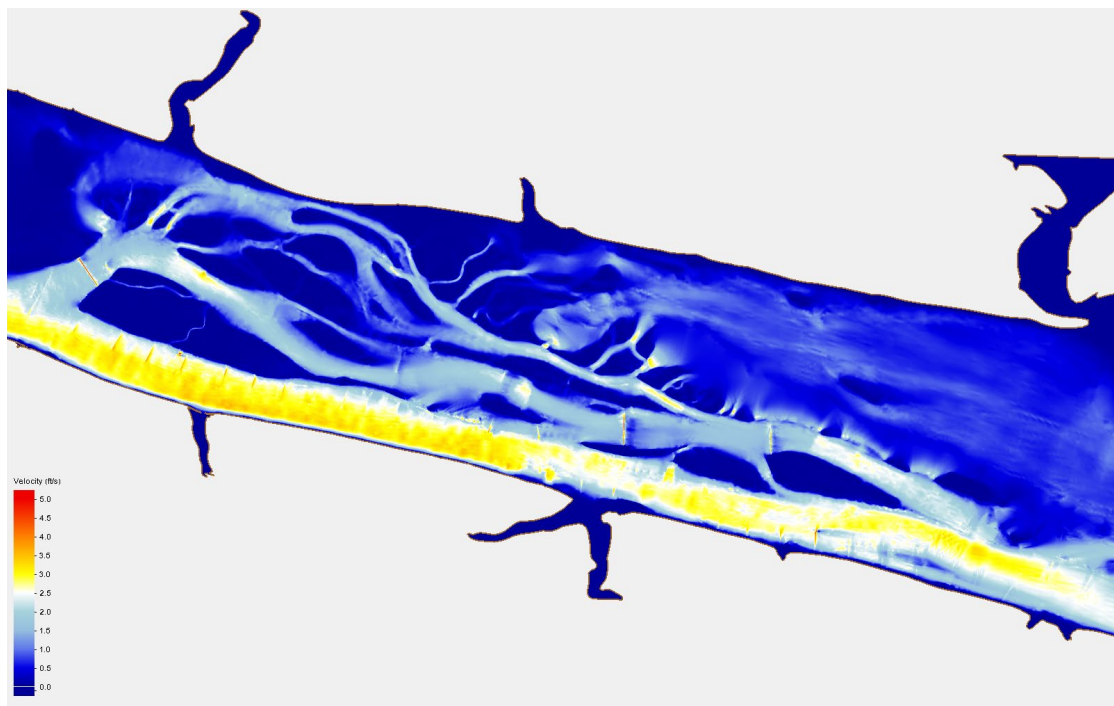
**Figure C-22(c).** Velocity Contour Map for Alternative 10 When  $Q=76,295$  cfs



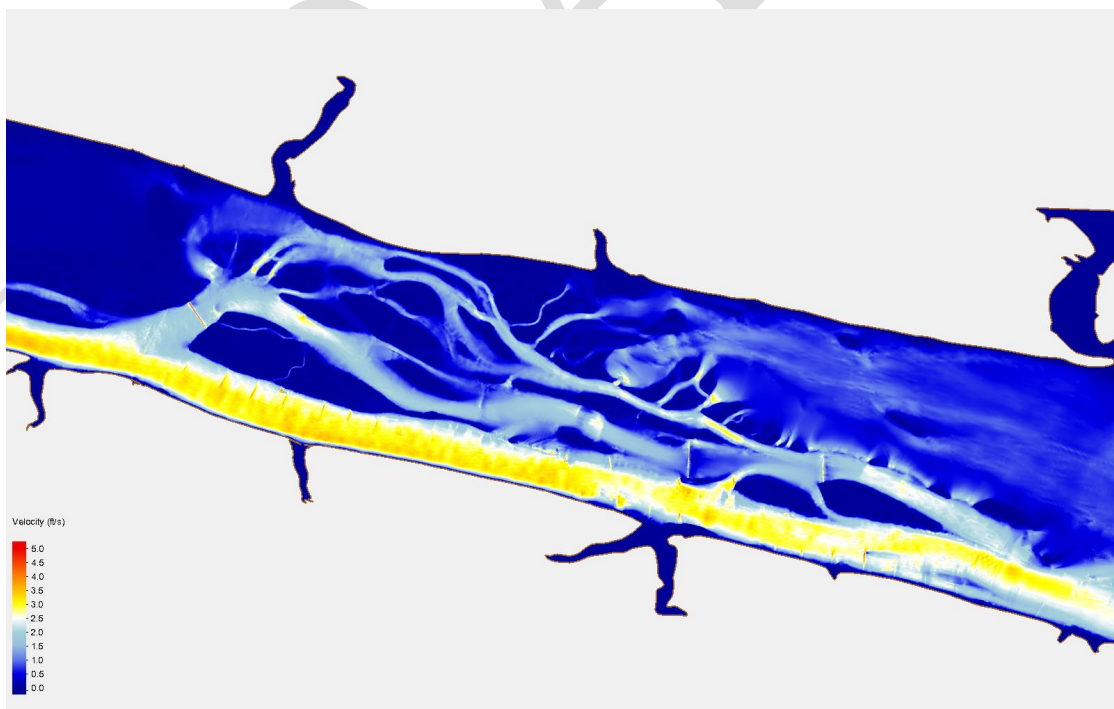
**Figure C-22(d).** Velocity Contour Map for Alternative 15 When  $Q=76,295$  cfs

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**Figure C-22(e).** Velocity Contour Cap for Alternative 16 When  $Q=76,295$  cfs



**Figure C-22(f).** Velocity Contour Map for Alternative 17 When  $Q=76,295$  cfs



## **VII. SHEAR STRESS ANALYSIS**

Based on the sediment grain size distribution curves (Figure C-23(a) to 23(d)) obtained from field data collected from RM 598.7 to RM 599.1, the average  $d_{50}$  around the Hurricane Island is 0.495 mm.

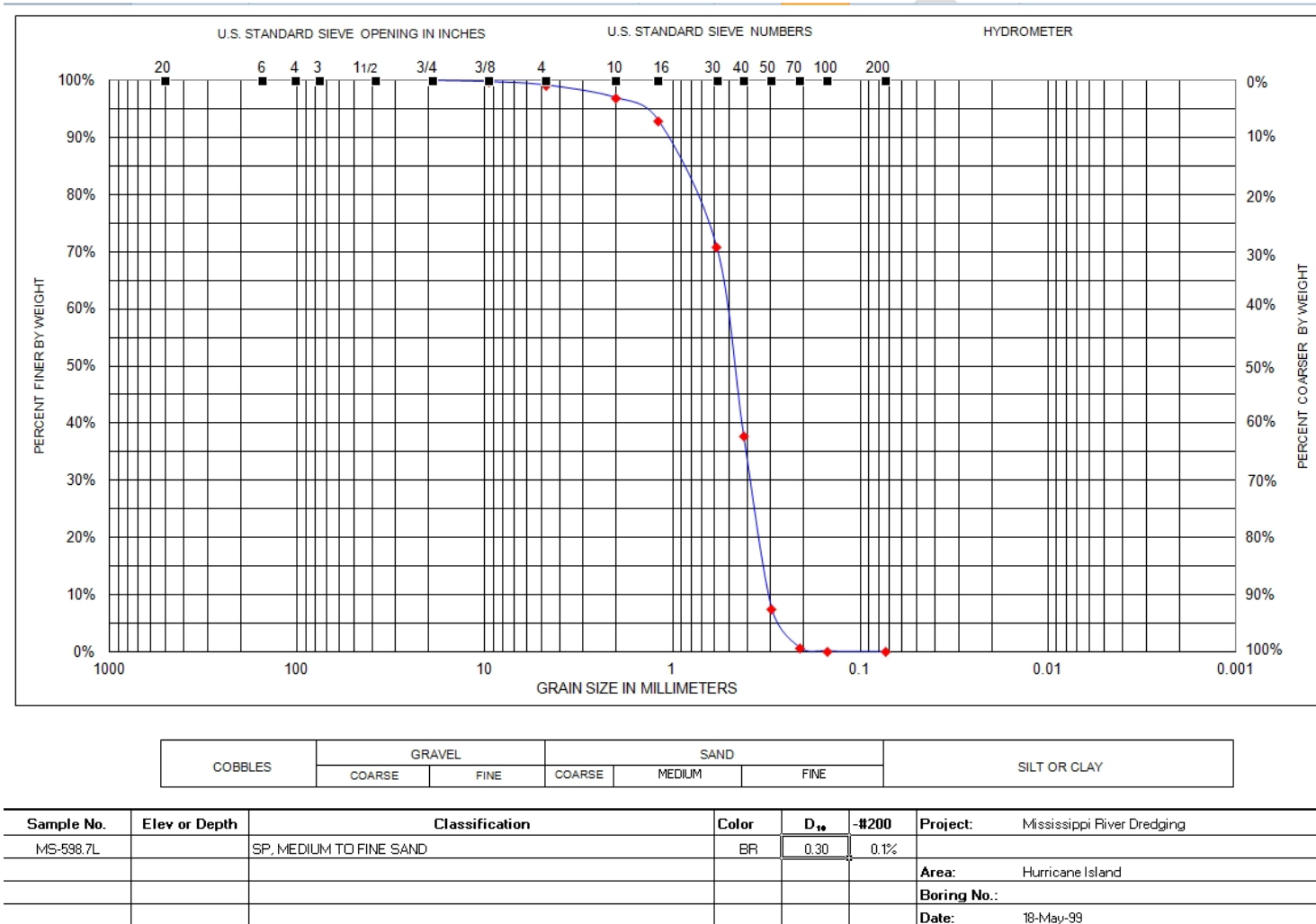
The critical shear stress ( $\tau_c$ ) is defined as the stress at which soil detachment begins. If the critical stress is higher than the effective stress, the erosion rate is considered zero. According to the *USGS Scientific Investigations Report 2008-5093*, a  $d_{50}$  of 0.495 mm is considered a medium sand and the critical bed shear stress is a range from 0.194 Pa to 0.27 Pa.

Similar to velocity comparisons, shear stress comparisons between the existing condition and the alternatives on selected arcs for the flow of 156,750 cfs are shown in Figures 24(a) to 24(c). Shear stress comparisons between the existing condition and the alternatives for the flow of 76,295 cfs are shown in Figures 25(a) to 25 (d). Figure C-25 (d) also shows the approximate width of previous dredging events within Transect 22.

The shear stress comparison figures show that a few of the alternatives have a slight increase in shear stress within the dredging area. There are shear stresses changed within the dredging area for each alternative but all the alternatives and existing conditions scenario show bed shear stress values larger than the critical shear stress of 0.194 Pa-0.27 Pa.

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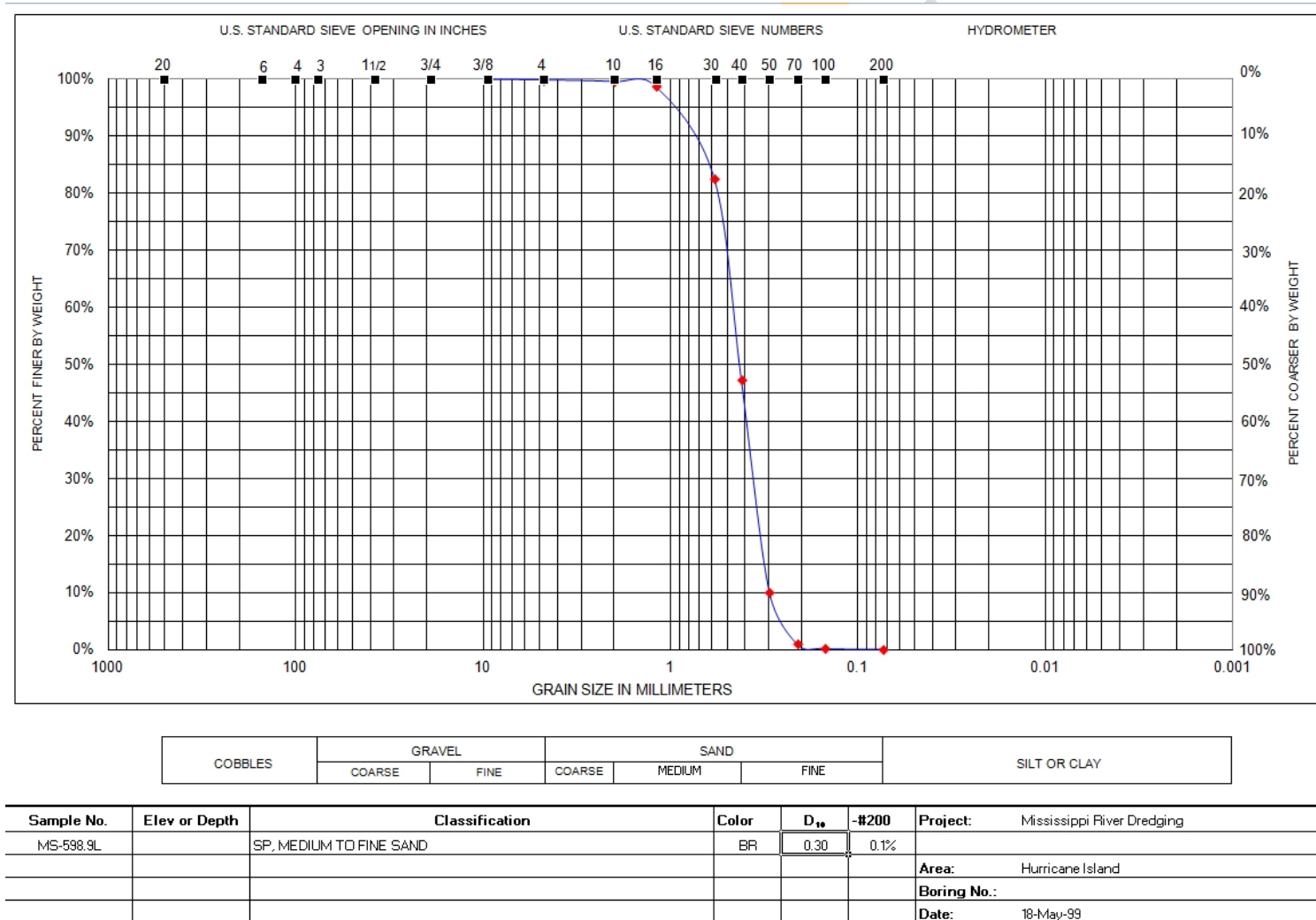
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**Figure C-23(a).** Sediment Grain Size Distribution Curve with  $d_{50} = 0.47$  mm Collected at RM 598.7

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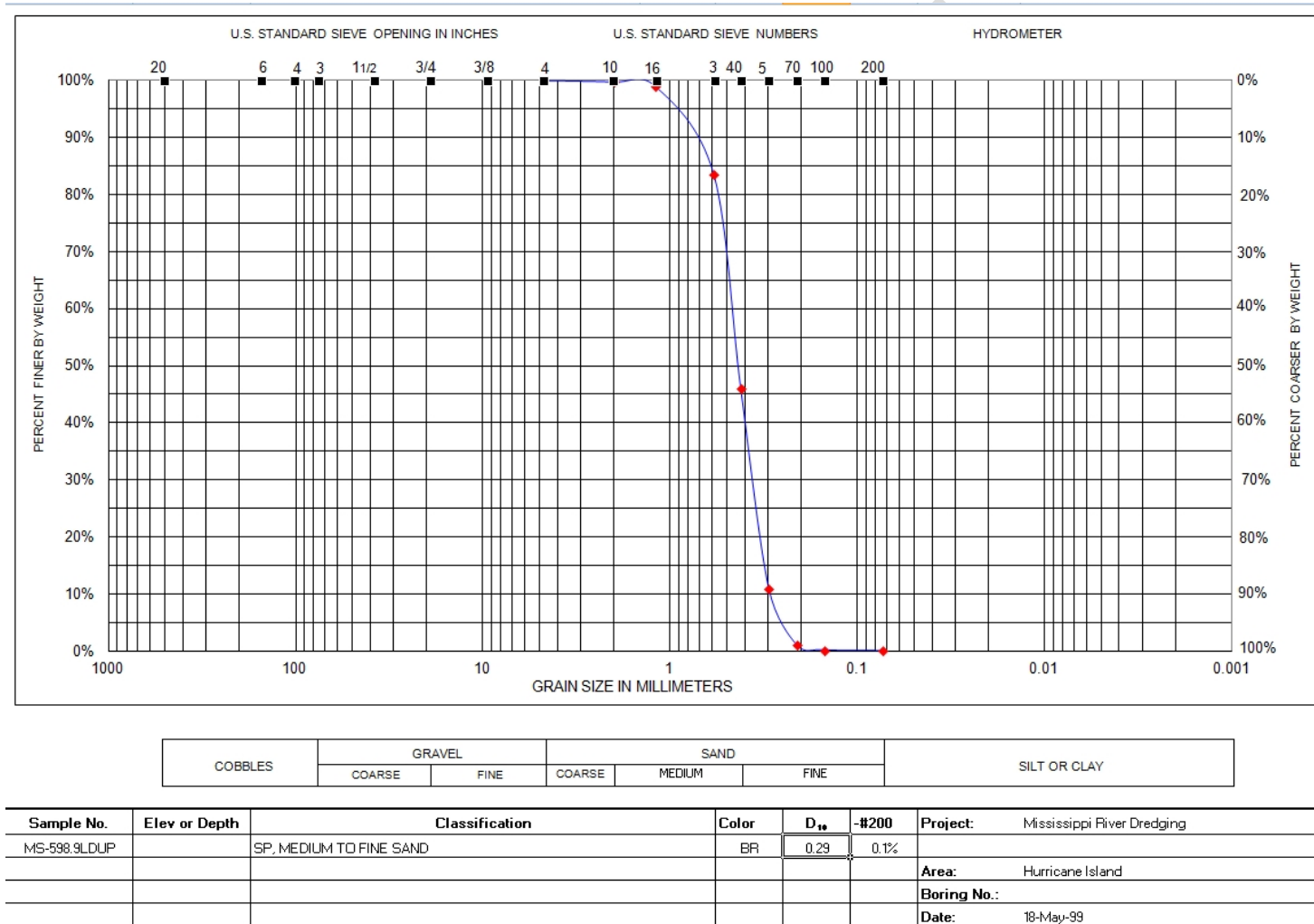
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**Figure C-23(b).** Sediment Grain Size Distribution Curve with  $d_{50} = 0.43$  mm Collected at RM 598.9

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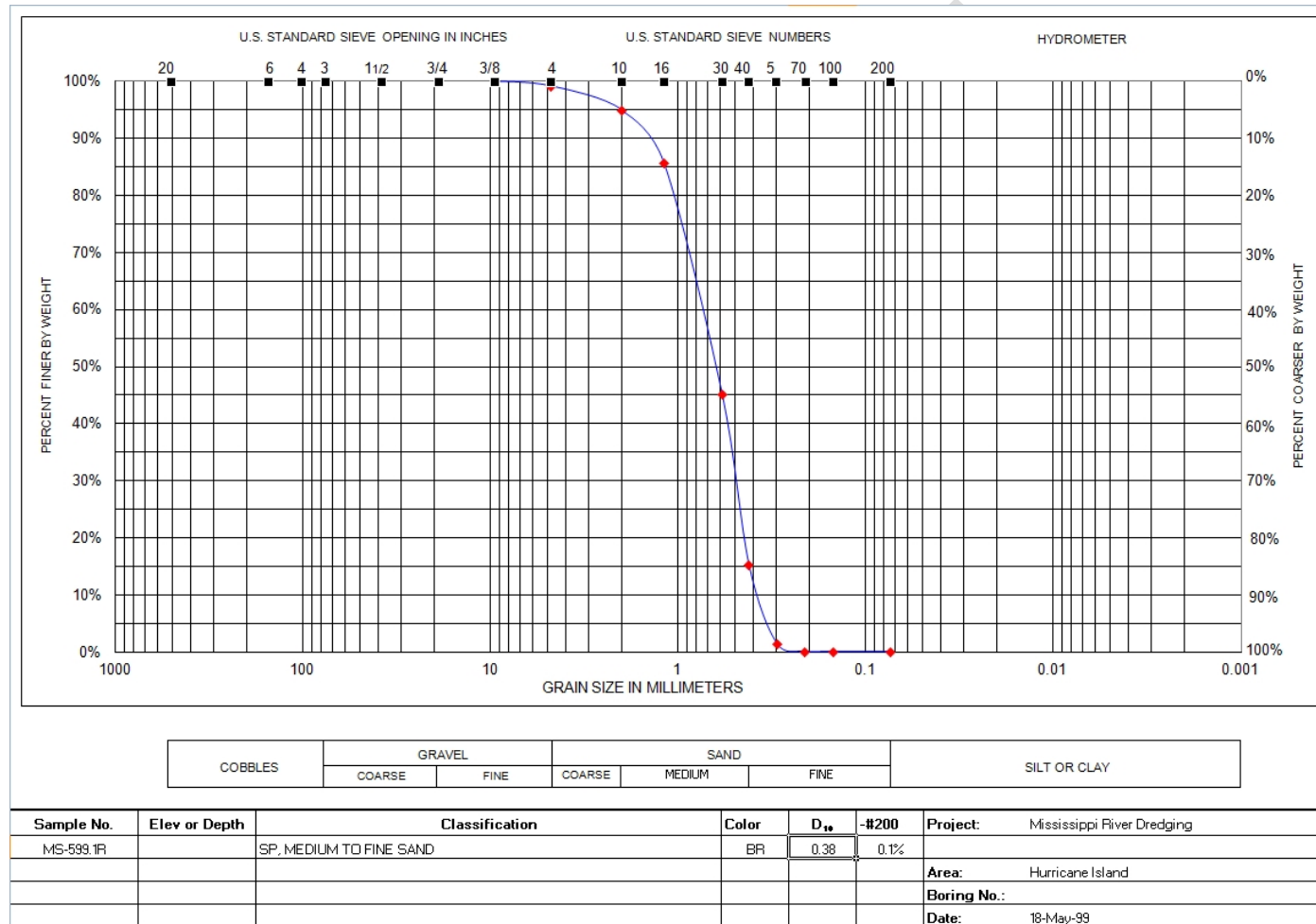


**Figure C-23(c).** Sediment Grain Size Distribution Curve with  $d_{50} = 0.44$  mm Collected at RM 598.9



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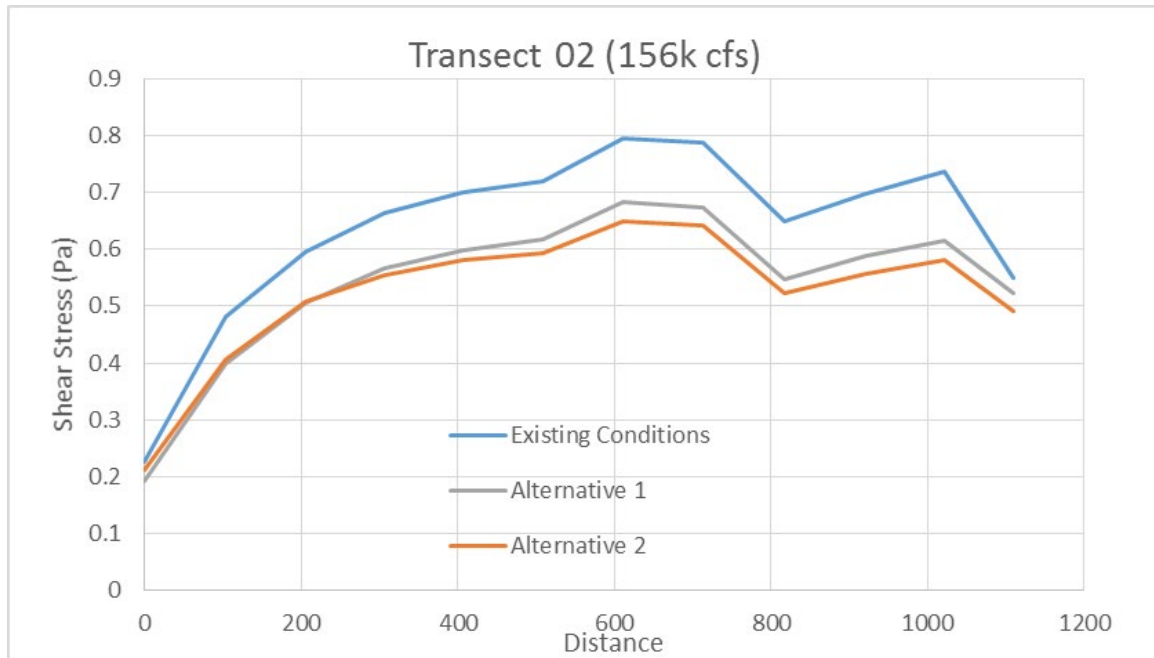
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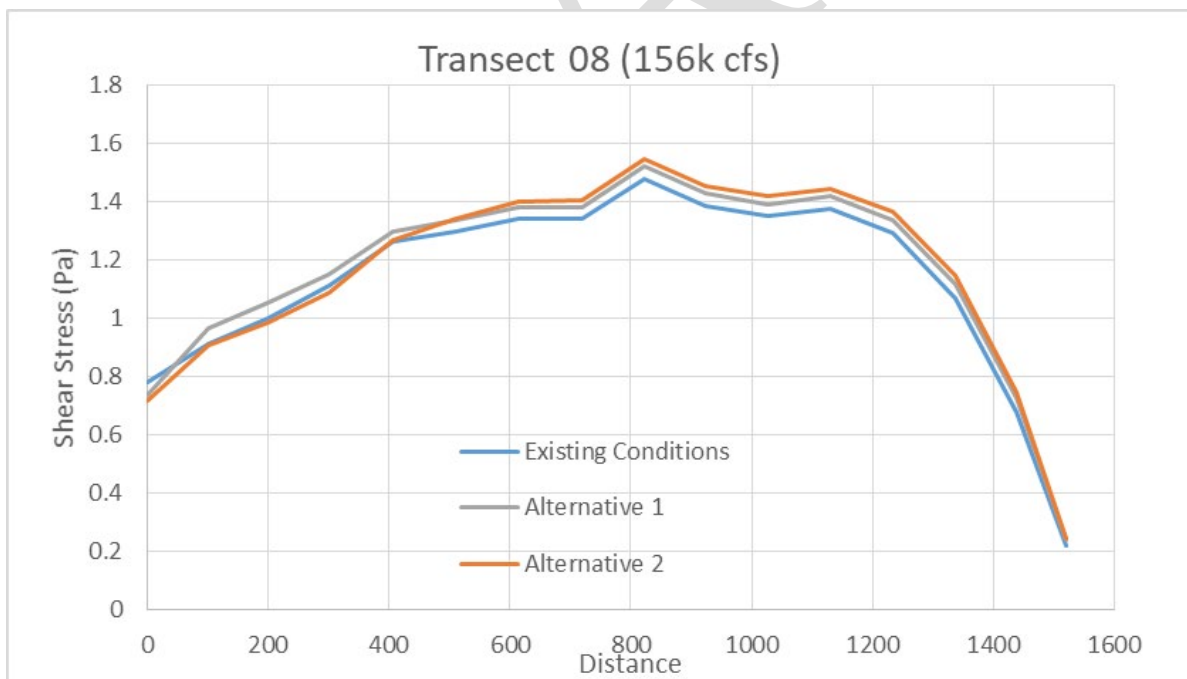
**Figure C-23(d).** Sediment Grain Size Distribution Curve with  $d_{50} = 0.64$  mm Collected at RM 599.1

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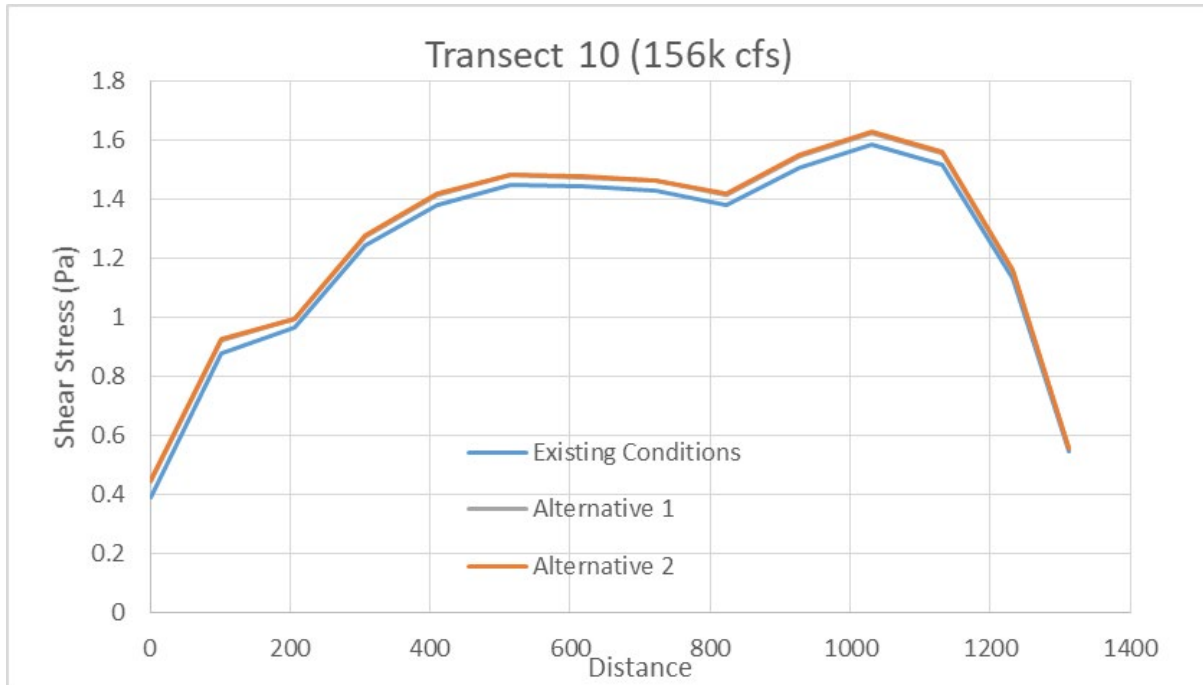
**Figure C-24(a).** Bed Shear Stress Comparison at Transect 02 for Q=156,750 cfs



**Figure C-24(b).** Bed Shear Stress Comparison at Transect 08 for Q=156,750 cfs

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**Figure C-24(c).** Bed Shear Stress Comparison at Transect 10 for Q=156,750 cfs



**Figure C-25(a).** Bed Shear Stress Comparison at Transect 08 for Q=76,295 cfs

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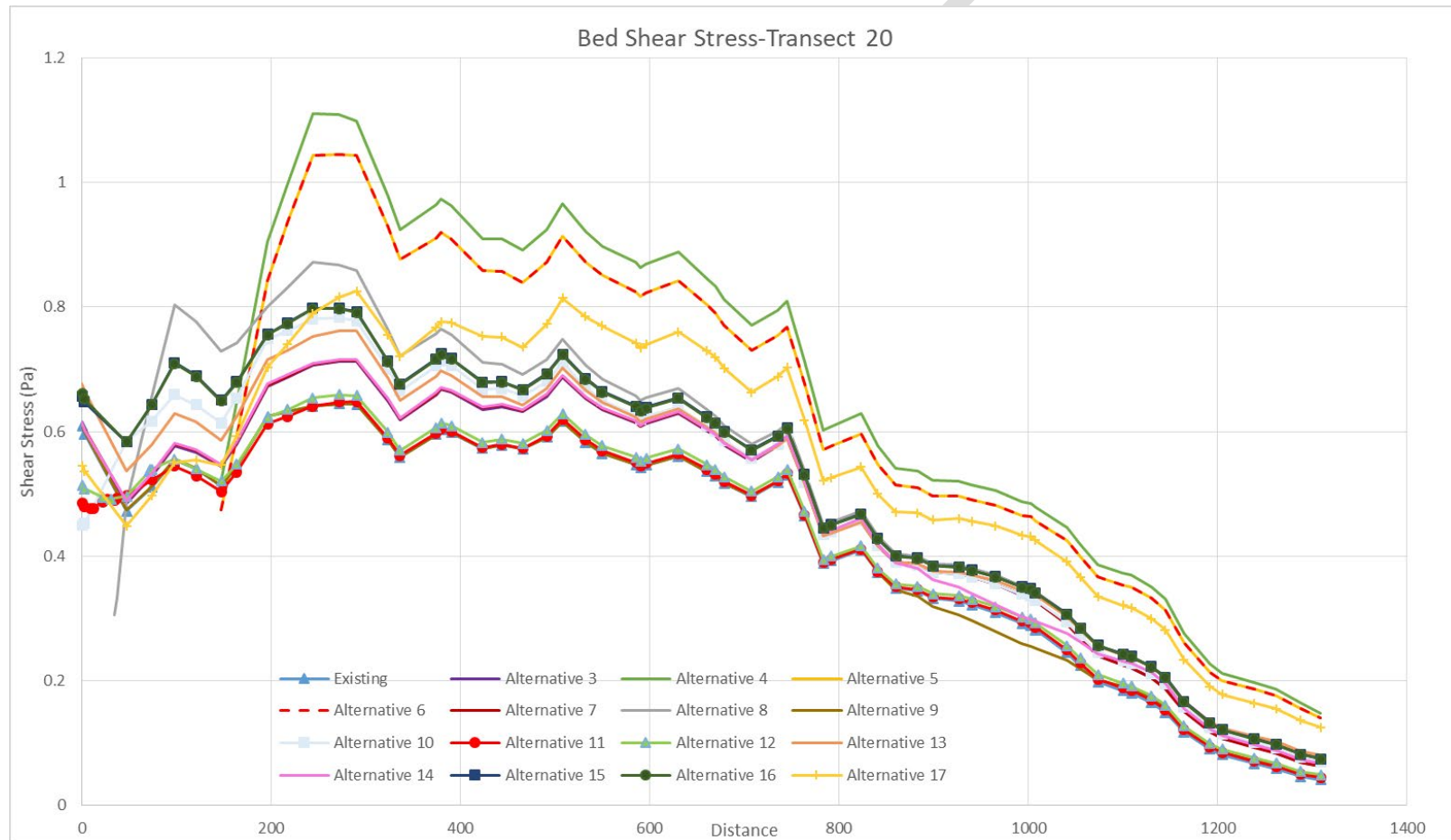


**Figure C-25(b).** Bed Shear Stress Comparison at Transect 10 for Q=76,295 cfs



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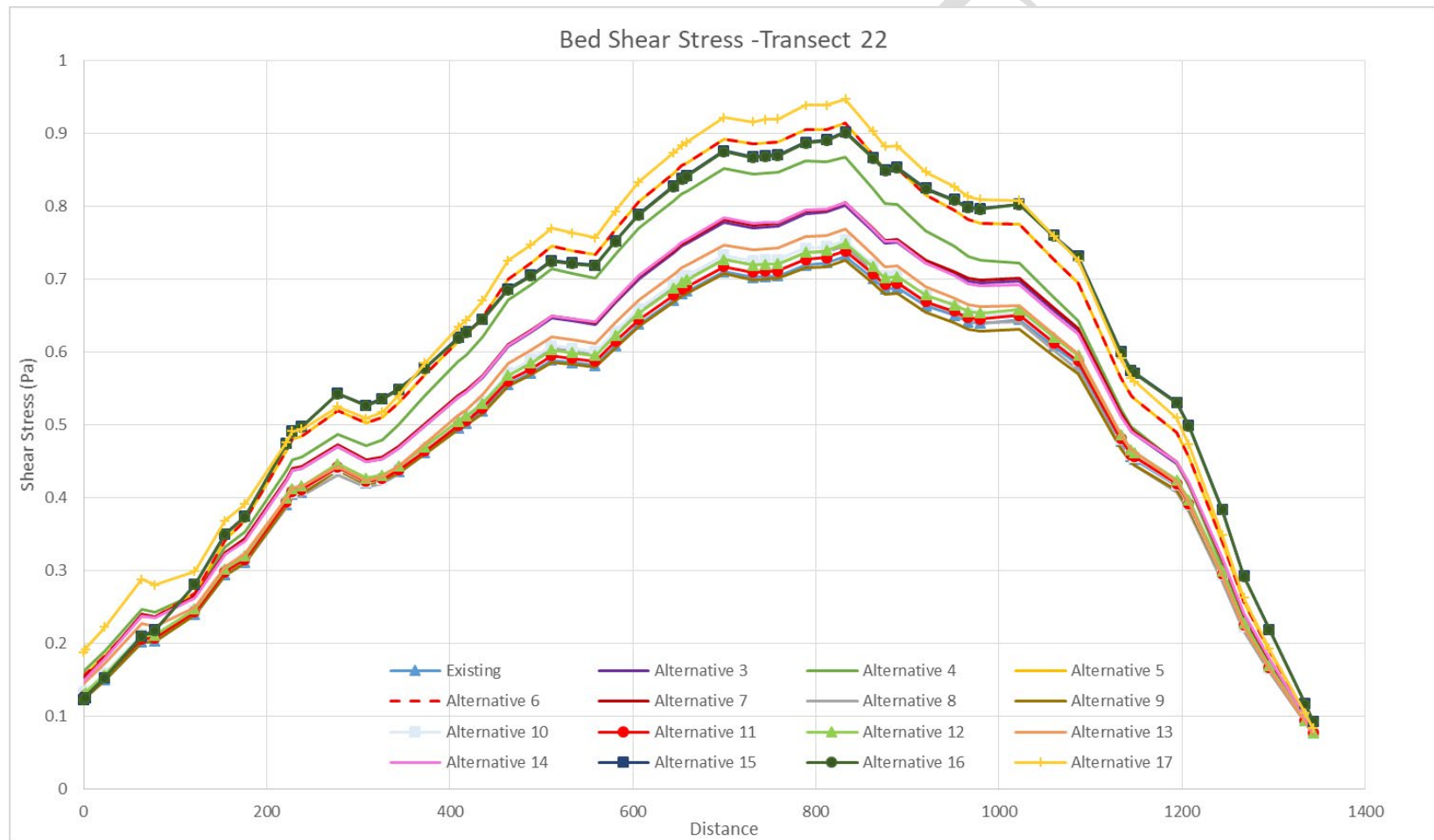
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**Figure C-25(c).** Bed Shear Stress Comparison at Transect 20 for Q=76,295 cfs

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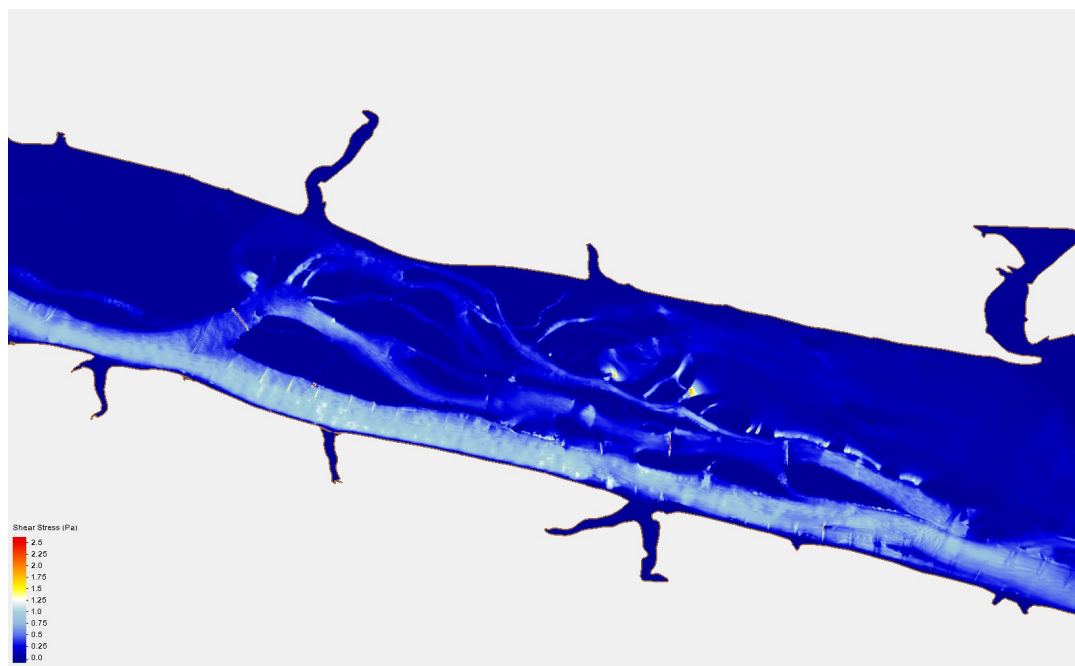
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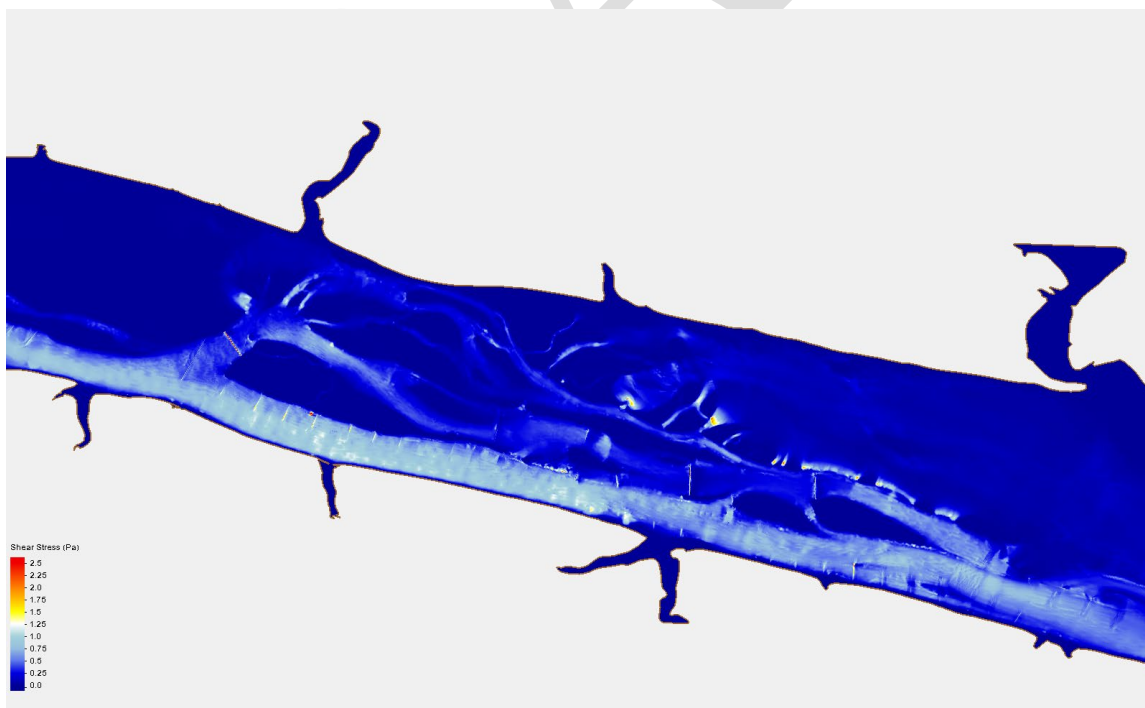
**Figure C-25(d).** Bed Shear Stress Comparison at Transect 22 for Q=76,295 cfs

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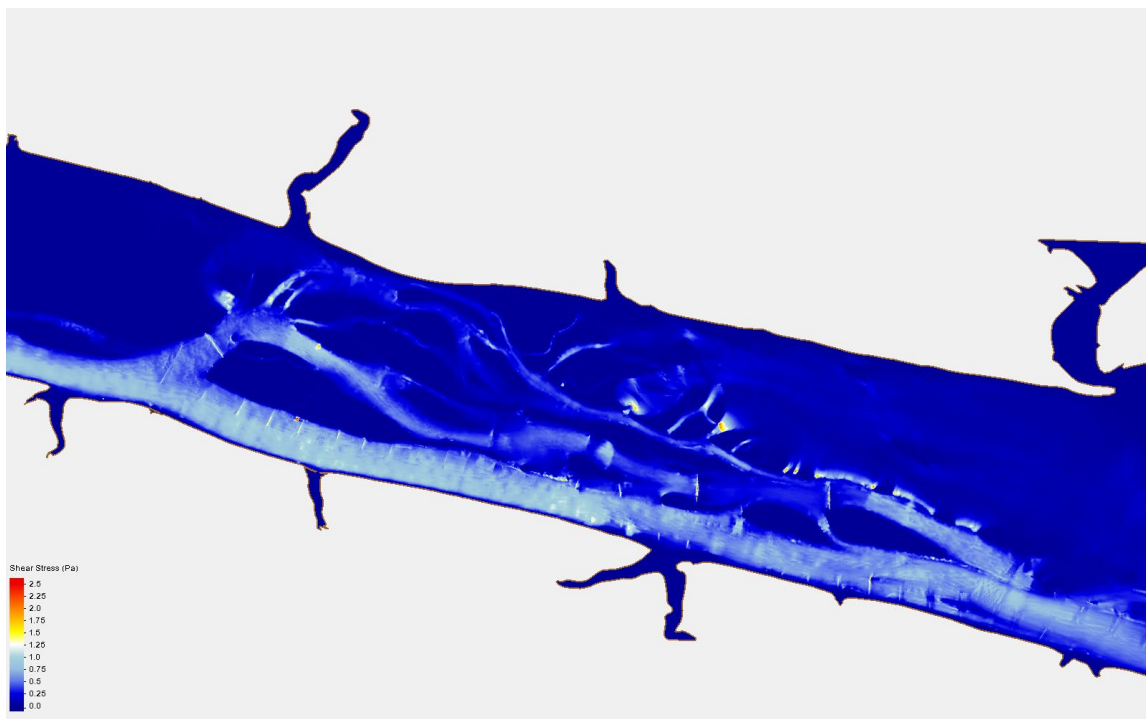
**Figure C-26(a).** Shear Stress Contour Map for Alternative 5 When  $Q=76,295$  cfs



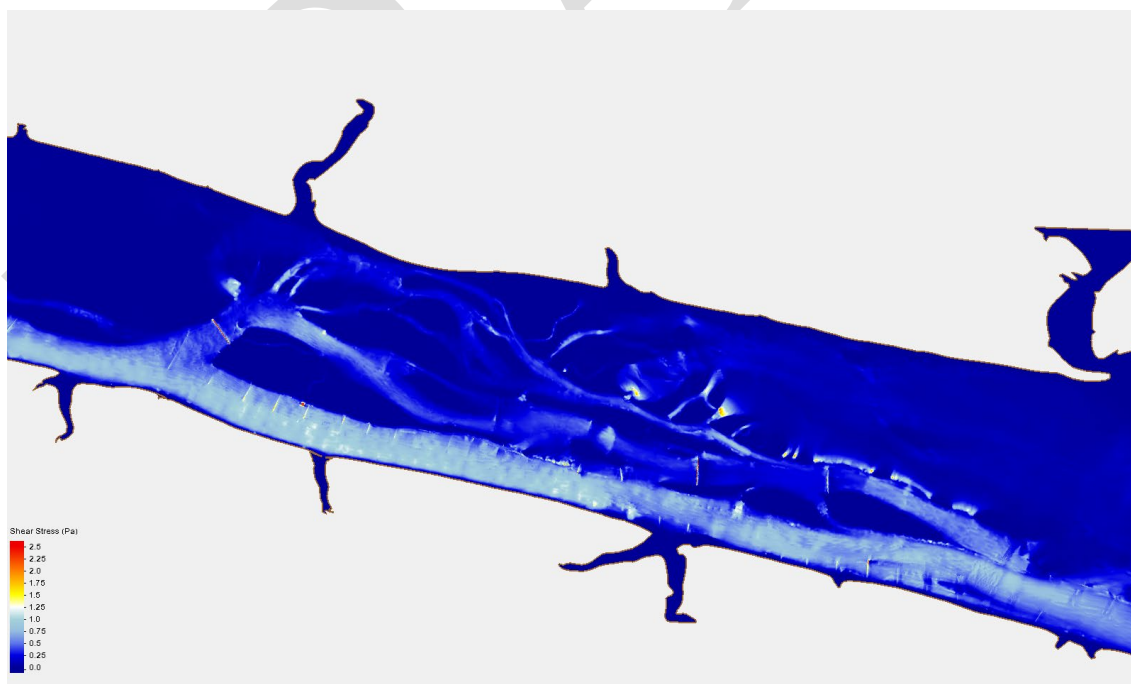
**Figure C-26(b).** Shear Stress Contour Map for Alternative 7 When  $Q=76,295$  cfs

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**Figure C-26(c).** Shear Stress Contour Map for Alternative 10 When  $Q=76,295$  cfs

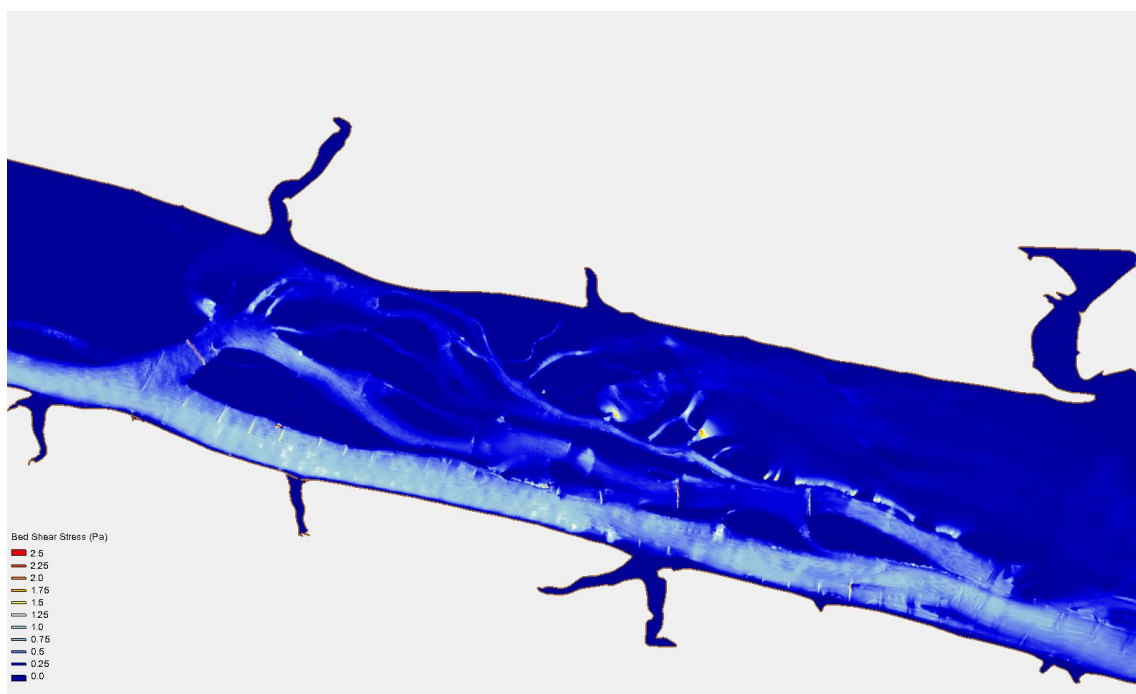


**Figure C-26(d).** Shear Stress Contour Map for Alternative 15 When  $Q=76,295$  cfs

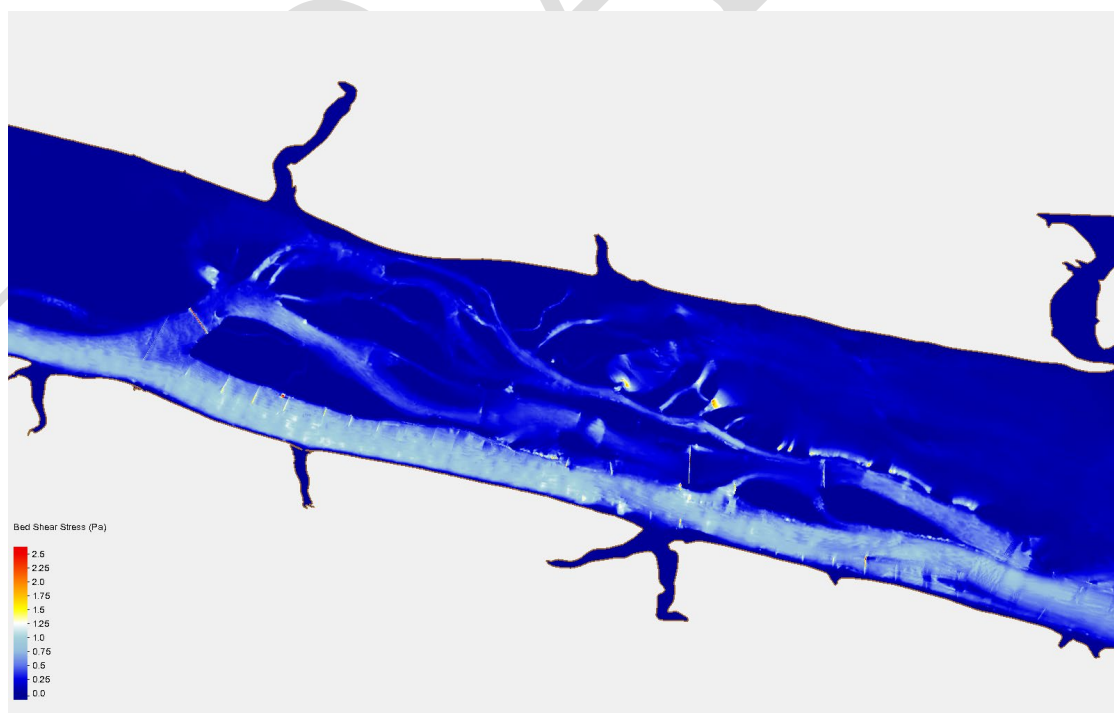


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**Figure C-26(e).** Shear Stress Contour Map for Alternative 16 When  $Q=76,295$  cfs



**Figure C-26(f).** Shear Stress Contour Map for Alternative 17 When  $Q=76,295$  cfs

## **VIII. CONSTRAINTS AND UNKNOWNNS**

- An unknown factor that may impact the Pool 11 reach would be whether or not the deposition would occur further downstream and move the dredging location if any of the alternatives are implemented. The AdH model may not be fully representative of what is actually happening in the lower end of the model due to lack of detailed survey data in certain locations.
- The methodology for determining if alternatives will be effective in reducing sediment deposition for this study is based on velocity and bed shear stress. Throughout the Finley's Landing reach, the bed shear stress values for the alternatives and existing conditions were already higher than the critical shear stress which should mean sediment deposition would not occur.
- Constructing any feature greater than the original design or what is included in the effective hydraulic floodplain model would require floodplain permit approval from the Wisconsin Department of Natural Resources.

## **IX. HYDRAULIC MODELING CONCLUSIONS**

Because of limited available funding, only the objective "sediment deposition reduction in the river reach around Finley's Island" was investigated. Conclusions summarized here are based on results related with that objective.

- From velocity comparison figures for the flow of 76,295 cfs, Alternatives 4-6 have the largest impact on velocities at Transect 20, but Alternatives 15-17 also have an impact at Transect 22 near the dredging site.
- From shear stress comparison figures for flow of 76,295 cfs, Alternatives 4-6 have the largest impact on shear stress at Transect 20, but Alternatives 15-17 also have an impact at Transect 22. There are shear stresses changed within the dredging area for each alternative, but all the alternatives and even existing conditions had bed shear stresses higher than the critical shear stress, 0.194 Pa to 0.27 Pa.
- From velocity distribution and difference figures shown for the flow of 76,295 cfs, Alternative 5, 15, 16 and 17 show an impact in the velocity distribution throughout the Finley's Landing reach.
- Most of the alternatives for the flow of 76,295 cfs have an increase of velocity and shear stress in the Finley's Landing reach, but the alternatives that include restoring Island 205 or features near Island 205 show the largest increase. Alternative 17 also created similar or greater impacts to the main channel than the other options and could be more feasible to construct.
- Only restoring the structures 599\_2\_CL, 599\_3\_TL and 595\_8\_CL (Alternative 3), would provide an increase in velocity and shear stress in the main channel but may not reduce sediment deposition to meet the project objective.
- Alternative 17a is the preferred alternative out of the alternatives due to the greatest increase in velocity and shear stress near the dredge cut with the least amount of material required; however, if only having two feet of depth between flat pool and the crown of 595\_8\_CL is an issue then only raising the top elevation by one foot could be explored.

## **X. FLOODPLAIN ANALYSIS**

An analysis using a 1D steady state HEC-RAS model of Pool 11 was completed to see if the alternatives had any floodplain impacts. To meet the State of Wisconsin's "no-rise" criteria of impacts being less than 0.00 ft, any rise in the 0.01 annual exceedance probability (AEP) event profile must be below 0.004 ft to account for rounding. Alternatives 15, 16, 17, and 17a were analyzed.

To evaluate the floodplain impacts of the proposed designs, the effective HEC-RAS model for the reach was downloaded and used in the analysis. Cross sections were added to the model at the different project feature locations for the Corrected Effective geometry. The new cross sections and the adjacent Effective cross sections were cut from updated bathymetry and terrain. The top elevation of the closing dam 599\_2\_CL from the Effective model was still used in the Corrected Effective cross sections since it represented the condition of the structure when the Effective model was created. The Existing geometry has updated cross sections with the design elevations of the "Bathtub" placement site that is actively being constructed and was coordinated with the WI DNR. Then the cross sections in the Proposed geometry incorporated the proposed project features.

Alternative 15 and Alternative 16 created an increase in the 0.01 AEP water surface elevation greater than 0.00 ft. The top elevation of the chevron design in Alternative 16 was decreased by 0.5 ft and still had too large of an increase in the water surface profile. Alternatives 17 and 17a did meet the floodplain requirement of not increasing the flood profile.

## **XI. REFERENCES**

- USACE, Engineer Research and Development Center (2015). Adaptive Hydraulics (AdH) Version 4.5 Hydrodynamic User Manual.
- USACE, Rock Island District (2004). Upper Mississippi River System Flow Frequency Study, Final Report.
- USGS Scientific Investigations Report 2008-5093, Simulation of Flow, Sediment Transport, and Sediment Mobility of the Lower Coeur d'Alene River, Idaho.

**REGULATING STRUCTURE REPAIR**

**RIVER MILES 595.4 – 599.0  
POOL 11, MISSISSIPPI RIVER**

**GRANT COUNTY, WISCONSIN**

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**ENVIRONMENTAL ASSESSMENT**

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**APPENDIX D**

**ENGINEERING PLAN SET**

DRAFT

**JANUARY 2021**





MISSISSIPPI RIVER BASIN

POOL 11 MISSISSIPPI RIVER

GRANT COUNTY, WI

RIVER MILES 595.4 TO 599.0

REGULATING STRUCTURE REPAIR

## DMMP - DREDGED MATERIAL MANAGEMENT PROGRAM

**Solicitation:**

Contract:

AUGUST 2020

[illegible]

ROCK ISLAND DISTRICT	ROCK ISLAND, ILLINOIS	6/201	SOLUTION NO.:	
DRAW BY:	CRD BY:		PROJECT CODE:	BHURRIC 1901
J. FRATIMICO	K. NEPAO		CONTRACT NO.:	
SUBMITTED BY:	A. HEDDLSTEIN		PLOT SCALE:	PLOT DATE:
			N.T.S.	
DATE:	FILE NAME:		ANSI D	BHURRIC1901

POOL 11 MISSISSIPPI RIVER  
GRANT COUNTY, WI  
RIVER MILES 595.4 TO 599.0  
REGULATING STRUCTURE REPAIR  
COVER SHEET

SHEET ID

-001

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

APPROVAL RECOMMENDED BY:

CHIEF, DESIGN BRANCH \_\_\_\_\_ DATE \_\_\_\_\_

CHIEF, HYDROLOGY &amp; HYDRAULICS BRANCH DATE

CHIEF, GEOTECHNICAL BRANCH \_\_\_\_\_ DATE \_\_\_\_\_

CHIEF, TECHNICAL SERVICES BRANCH DATE

CHIEF, ENGINEERING & CONSTRUCTION DIVISION \_\_\_\_\_ DATE \_\_\_\_\_

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2

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6

7

8

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INDEX

VICINITY MAP

GENERAL NOTES

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Sheet Id	Sheet Title
GENERAL	
G-001	COVER SHEET
G-002	INDEX AND GENERAL NOTES
G-003	LEGEND AND ABBREVIATIONS

CIVIL

C-101	SITE PLAN
C-101	PLAN NORTH CLOSURE DAM
C-103	PLAN SOUTH CLOSURE DAM
C-104	PLAN PLACEMENT SITE AND ROCK VANES
C-301	TYPICAL SECTIONS
C-501	DETAILS
C-502	DETAILS

VICINITY MAP

GENERAL NOTES

1. THE PROJECT IS LOCATED ON THE MISSISSIPPI RIVER BETWEEN RIVER MILES 595.4 TO 599.0 IN GRANT COUNTY WISCONSIN.

2. THE AERIAL PHOTOGRAPH WAS TAKEN IN 2017.

3. THE PROJECT WILL CONSIST OF DREDGED SAND PLACEMENT, RESTORING CLOSURE AND WING DAMS, AND CONSTRUCTING ROCK VANES.

4. CONSTRUCTION OF THE ROCK VANES WOULD OCCUR CONCURRENTLY OR SHORTLY AFTER PLACEMENT AT THE DREDGE MATERIAL BANK LINE SITE.

5. THE DISTRICT'S MAINTENANCE CREW (CONTRACTOR) IS BASED AT THE MISSISSIPPI RIVER PROJECT OFFICE IN LaCLAIRE, IOWA. CREWS WOULD DEPART VIA WITH EQUIPMENT LOADED ONTO BARGES AND TRANSIT TO POOL 11. APPROXIMATELY 4 TO 6 VEHICLES WOULD REPORT TO THE PROJECT AREA DAILY VIA FINLEY'S LANDING, A PUBLIC BOAT LAUNCH MANAGED BY THE COUNTY.

6. THE CONTRACTOR WILL DETERMINE THE ROCK GRADE(S) FOR THE PROJECT DURING THE CONTRACTING PROCESS.

7. STAGING SHALL BE COORDINATED WITH THE CONTRACTOR AND REMAIN WITHIN THE WORK LIMITS, CONTRACTOR IS RESPONSIBLE FOR PROTECTING OR REMOVING ANY STAGED EQUIPMENT OR OTHER ITEMS PRIOR TO HIGH RIVER CONDITIONS (FLOOD EVENT).

U.S. ARMY CORPS OF ENGINEERS

MISSISSIPPI RIVER BASIN

POOL 11, MISSISSIPPI RIVER

CLARE, IOWA

RIVER MILES 595.4 TO 599.0

REGULATING STRUCTURE REPAIR

INDEX, VICINITY MAP, AND GENERAL NOTES

SHEET ID

G-002

DESIGNED BY: L. POCOMORE

DRAWN BY: J. KENDRICK

CHECKED BY: J. KENDRICK

SUBMITTED BY: A. HEDDLESTEN

PLOT SCALE: N.T.S.

FILE NAME: BSHURRIC1901

ANSI D

DATE:

SOLICITATION NO.:

CONTRACT NO.:

PROJECT CODE:

BSHURRIC1901

MARK

DESCRIPTION

DATE

APPR.

8/27/2020 3:17:58 PM

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D-2

REVIEW








A1  
SITE PLAN

SCALE : 1"=600'-0"

D-4

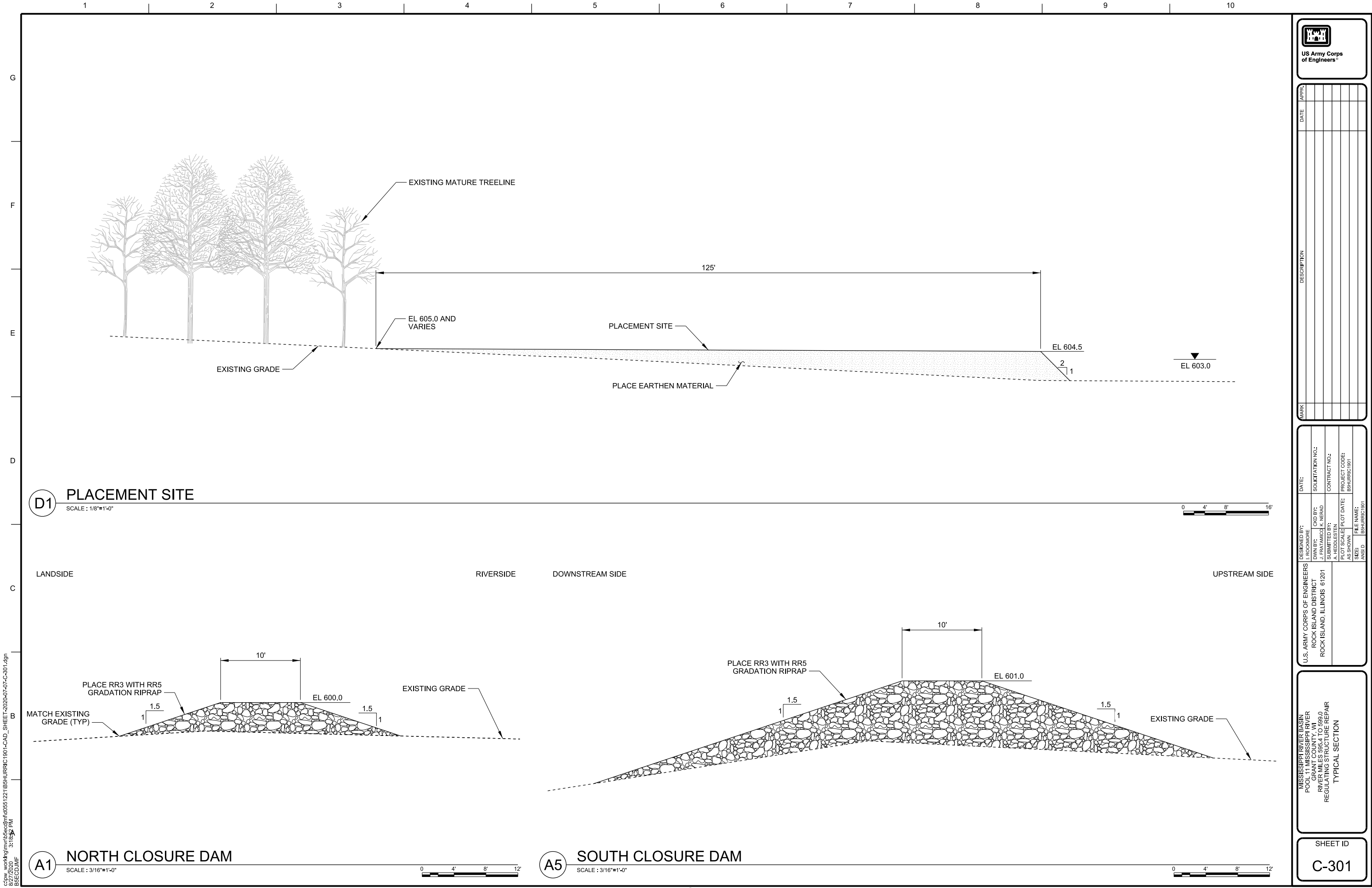
SHEET ID C-101	MISSISSIPPI RIVER BASIN POOL, 11 MISSISSIPPI RIVER GRANT COUNTY, WI RIVER MILES 595.4 TO 599.0 REGULATING STRUCTURE REPAIR SITE PLAN	U.S. ARMY CORPS OF ENGINEERS ROCK ISLAND DISTRICT ROCK ISLAND, ILLINOIS 61201	DESIGNED BY: J. ROCKMORE	DATE:	MARK	DESCRIPTION	DATE	APPR.	 US Army Corps of Engineers®
			DRAWN BY: J. FRATAMICO SUBMITTED BY: A. HEDDLESTEN PLOT SCALE: AS SHOWN SIZE: ANSI D	CKD BY: K. NERAD PROJECT CODE: B5HURRIC1901 FILE NAME: B5HURRIC1901					

















**REGULATING STRUCTURE REPAIR**

**RIVER MILES 595.4 – 599.0  
POOL 11, MISSISSIPPI RIVER**

**GRANT COUNTY, WISCONSIN**

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**ENVIRONMENTAL ASSESSMENT**

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**APPENDIX E**

**DISTRIBUTION LIST**

DRAFT

**JANUARY 2021**

*Regulating Structure Repair  
River Miles 595.4 - 599.0, Pool 11, Mississippi River  
Grant County, Wisconsin  
Environmental Assessment*

*Appendix E  
Distribution List*

**Note:** The District sent a Press Release to media outlets throughout the Project Area.

**LEGISLATIVE**

**Federal**

Charles Grassley	US Senator for Iowa
Joni Ernst	US Senator for Iowa
Abby Finkenauer	US Representative, Iowa 1 <sup>st</sup> District
Ron Johnson	US Senator for Wisconsin
Tammy Baldwin	US Senator for Wisconsin
Ron Kind	US Representative, Wisconsin 3 <sup>rd</sup> District

**Iowa**

Kim Reynolds	Governor of the State of Iowa
Carrie Koelker	Senator Iowa Senate District 29
Pam Jochum	Senator Iowa Senate District 50
Shannon Lundgren	Representative District 57
Charles Isenhardt	Representative District 100

**Wisconsin**

Tony Evers	Governor of the State of Wisconsin
Howard L. Marklein	Senator District 17
Travis Tranel	Assembly District 49

**SHPO/TRIBES**

John Barrett	Chairperson, Citizen Potawatomi Nation
Dr. Kelli Mosteller	THPO, Citizen Potawatomi Nation
Wilfrid Cleveland	President, Ho-Chunk Nation
Mr. Bill Quackenbush	THPO, Ho-Chunk Nation
Tim Rhodd	Chairperson, Iowa Tribe of Kansas and Nebraska
Mr. Lance Foster	THPO, Iowa Tribe of Kansas and Nebraska
C. J. Watkins	Vice President, Delaware Nation
Ms. Sonnie Allen	Director, Cultural Preservation Department, Delaware Nation
Dr. Brice Obermeyer	Section 106 Director, Delaware Nation
Chester Brooks	Chief, Delaware Tribe of Indians of Oklahoma
Bobby Walkup	Chairperson, Iowa Tribe of Oklahoma
Mr. Eagle McClellan	Cultural Preservation Director, Iowa Tribe of Oklahoma
Lester Randall	Chairperson, Kickapoo Tribe in Kansas
Mr. Cirtis Simon	NAGPRA Director, Kickapoo Tribe in Kansas
Ned Daniels	Chairperson, Forest County Potawatomi Community
Michael LaRonge	THPO, Forest County Potawatomi Community
David Pachecho, Jr.	Chairperson, Kickapoo Tribe of Oklahoma
Mr. Kent Collier	NAGPRA Coordinator, Kickapoo Tribe of Oklahoma
Joan Delabreau	Chairperson, Menominee Indian Tribe of Wisconsin



*Regulating Structure Repair  
River Miles 595.4 - 599.0, Pool 11, Mississippi River  
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Distribution List*

Mr. David J. Grignon	THPO, Menominee Indian Tribe of Wisconsin
Geoffrey Standing Bear	Principal Chief, Osage Nation
Dr. Andrea Hunter	THPO, Osage Nation
Brian Buchanan	Chief, Miami Nation of Indians in Indiana
Dr. Scott Shoemaker	THPO, Miami Nation of Indians in Indiana
John Shotton	Chairperson, Otoe-Missouri Tribe
Ms. Elsie Whitehorn	THPO, Otoe-Missouri Tribe
Douglas G. Lankford	Chief, Miami Tribe of Oklahoma
Ms. Diane Hunter	THPO, Miami Tribe of Oklahoma
Matthew Wesaw	Tribal Chairperson, Pokagon Band of Potawatomi Indians
Matthew Bussler	THPO, Pokagon Band of Potawatomi Indians
Vernon Miller	Chairperson, Omaha Tribe of Nebraska
Mr. Thomas Parker	THPO, Omaha Tribe of Nebraska
Larry Wright, Jr.	Chairperson, Ponca Tribe of Nebraska
Mr. Shannon Wright, Jr.	THPO, Ponca Tribe of Nebraska
Cristina Danforth	Chairperson, Oneida Tribe of Indians of Wisconsin
Ms. Corina Williams	THPO, Oneida Tribe of Indians of Wisconsin
Earl Howe III	Chairperson, Ponca Tribe of Oklahoma
Ms. Halona Cabe	THPO, Ponca Tribe of Oklahoma
Joseph Rupnick	Chairperson, Prairie Band Potawatomi Nation
Ms. Hattie Mitchell	NAGPRA Representative, Prairie Band Potawatomi Nation
Tiauna Carnes	Chairperson, Sac and Fox Nation of Missouri in Kansas and Nebraska
Elizabeth Kay Rhoads	Principal Chief, Sac and Fox Nation of Oklahoma
Ms. Sandra Massey	NAGPRA Representative, Sac and Fox Nation of Oklahoma
Gailey Wanatee	Chief, Sac and Fox Tribe of the Mississippi in Iowa
Troy Wanatee	Tribal Chairperson, Sac and Fox Tribe of the Mississippi in Iowa
Mr. Johnathan Buffalo	Director, Historic Preservation Department, Sac and Fox Tribe of the Mississippi in Iowa
Shannon Holsey	Tribal President, Stockbridge-Munsee Band Community Band of Mohican Indians
Ms. Bonney Hartley	THPO, Stockbridge-Munsee Band Community Band of Mohican Indians
Mr. Coly Brown	Chairperson, Winnebago Tribe of Nebraska
Mr. John Snowball	THPO, Winnebago Tribe of Nebraska
Ms. Daina Penkiunas	Deputy SHPO, Wisconsin Historical Society

**FEDERAL AGENCIES**

Mr. Kenneth Westlake	US EPA, Region 5
Kathy Kowal	NEPA Implementation Section, US EPA Region 5
Joe Summerlin	US EPA, Region 7
Joshua Tapp	NEPA Program Director, US EPA, Region 7
Brandon Jones	District Manager, USFWS UMR National Wildlife and Fish Refuge
Wendy Woyczik	USFWS UMR National Wildlife and Fish Refuge
Kraig McPeck	Project Director, Illinois Iowa Field Office, USFWS
Sara Schmuecker	Illinois Iowa Field Office, USFWS; OSIT Co-Chair

*Regulating Structure Repair  
River Miles 595.4 - 599.0, Pool 11, Mississippi River  
Grant County, Wisconsin  
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*Appendix E  
Distribution List*

Supervisor  
Kristy Oates  
Angela Biggs  
Theresa Weiss  
Joe Schmelz

Marine Safety Detachment Quad Cities, U.S. Coast Guard  
Acting State Conservationist USDA NRCS IA  
State Conservationist USDA NRCS WI  
District Conservationist, USDA NRCS Epworth Service Center  
District Conservationist, USDA NRCS Lancaster Service Center

**STATE AGENCIES**

**Iowa**

Ms. Kayla Lyon  
Kirk Hanson  
Kelly Poole  
Scott Gritters

Director, Iowa Department of Natural Resources  
Iowa Department of Natural Resources  
Iowa Department of Natural Resources  
Iowa Department of Natural Resources

**Wisconsin**

Cathy Stepp  
Jim Fischer  
Jordan Weeks  
Sara Strassman  
Chris Olds

Secretary, Wisconsin Department of Natural Resources  
Wisconsin Department of Natural Resources  
Wisconsin Department of Natural Resources  
Wisconsin Department of Natural Resources  
Engineer, Wisconsin Department of Natural Resources

**COUNTIES AND CITIES**

**Dubuque County, Iowa**

Anthony Bardgett  
Ann McDonough  
Brian Preston

Dubuque County Engineer  
Dubuque County Board of Supervisors  
Dubuque County Conservation Board, Ex Dir

**Grant County, Wisconsin**

Linda K Gebhard  
Robert Keeney  
Justin Johnson

Grant County Clerk  
Chairman, Grant County Board of Supervisors  
Grant County Conservation, Sanitation and Zoning Board

**Dubuque, Iowa**

Roy D. Buol

Mayor, City of Dubuque

**Cassville, Wisconsin**

Keevin Williams

Village President, City of Cassville