WABASHA BARGE FACILITY

Draft Environmental Impact Statement

Wabasha Port Authority, City of Wabasha, Minnesota

September 2023

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DRAFT ENVIRONMENTAL IMPACT STATEMENT

For

WABASHA BARGE FACILITY

Wabasha Port Authority

City of Wabasha, Minnesota

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Abstract:

The City of Wabasha, in cooperation with the Wabasha Port Authority, is proposing to construct a commercial port facility on the Mississippi River in the City of Wabasha, Minnesota. The 8.2-acre Wabasha Barge Facility would facilitate the transfer of materials, to include but not limited to dredge material and other commodities, from river barges to trucks for transport to off-site facilities. The City of Wabasha would own the project site and contract out the port operations and transportation of materials.

Draft EIS Publication Date: October 2, 2023

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Draft EIS Public Meeting Time: 5:30 pm -7:30 pm

Draft EIS Public Meeting Location: 900 Hiawatha Dr E, Wabasha, MN 55981

Draft EIS Comment Deadline: November 1, 2023

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List of Acronyms

ACHP – Advisory Council on Historic Preservation

AADT – Annual Average Daily Traffic

ADT – Average Daily Traffic

APE – Area of Potential Effect

AST – Aboveground Storage Tank

B/C – Benefit-Cost

BMPs – Best Management Practices

CAAA – Clean Air Act Amendments

CCC – Civilian Conservation Corps

CEQ – Council on Environmental Quality

CO – Carbon Monoxide

CR – County Road

CRP – Conservation Reserve Program

CSAH – County and State Aid Highway

CWA – Clean Water Act

dBA – A-weighted Decibel

DCPT – Dodge County Public Transit

DM&E – Dakota, Minnesota, and Eastern

EAW – Environmental Assessment Worksheet

EIS – Environmental Impact Statement

EPA – Environmental Protection Agency

ESA – Environmental Site Assessment

EQB – Environmental Quality Board

FEMA – Federal Emergency Management Agency

FHWA – Federal Highway Administration

FIRM – Flood Insurance Rate Map

FSA – Farm Service Agency

GIS – Geographic Information System

HCADT – Heavy Commercial Average Daily Traffic

HCM – Highway Capacity Manual

I-35 – Interstate 35

IC&E – Iowa, Chicago, and Eastern

IRC – Interregional Corridor

IRIS – Integrated Risk Information System

JD – Jurisdiction Determination

LAWCON – Land and Water Conservation

LGU – Local Government Unit

LOS – Level of Service

LUST – Leaking Underground Storage Tank

MDA – Minnesota Department of Agriculture

MDH – Minnesota Department of Health

MEPA – Minnesota Environmental Policy Act

Mn/DOT – Minnesota Department of Transportation

MNDNR – Minnesota Department of Natural Resources

MNRAM – Minnesota Routine Assessment Method

MOA – Memorandum of Agreement

MPCA – Minnesota Pollution Control Agency

MSL – Mean Sea Level

MSAT – Mobile Source Air Toxics

MVM – Million Vehicle Miles

NAAQS – National Ambient Air Quality Standard

NATA – National Air Toxics Assessment

NEPA – National Environmental Policy Act

NHPA – National Historic Preservation Act

NHIS – Natural Heritage Information System

NHS – National Highway System

NPDES – National Pollutant Discharge Elimination System

NRCS – Natural Resource Conservation Service

NRHP – National Register of Historic Places

NWI – National Wetland Inventory

OHW – Ordinary High Water

OMLS – Online Multiple Listing Service

PA – Participating Agencies

PAC – Project Advisory Committee

RCV – Remaining Capital Value

RGU – Responsible Governmental Unit

ROD – Record of Decision

ROW – Right-of-Way

SAFETEA-LU – Safe Accountable Flexible Efficient Transportation Equity Act: A Legacy For Users

SCAT – Steele County Area Transit

SD – Scoping Document

SDD – Scoping Decision Document

SHPO – State Historic Preservation Office

SWPPP – Storm Water Pollution Prevention Plan

SQG – Small Quantity Generator

T & E – Threatened & Endangered

THPO – Tribal Historic Preservation Officer

TMDL – Total Maximum Daily Load

UP – Union Pacific

USACE – United States Army Corps of Engineers

USDOT – United States Department of Transportation

USFWS – United States Fish and Wildlife Service

USGS – United States Geological Service

UST – Underground Storage Tank

VHT – Vehicle Hours Traveled

VMT – Vehicle Miles Traveled

VPD – Vehicles Per Day

WCA – Wetland Conservation Act

WMA – Wildlife Management Area

WPA – Waterfowl Production Area

WSD – Watershed District

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EXECUTIVE SUMMARY

1.1 Purpose of the Draft Environmental Impact Statement

The construction of the Proposed Barge Facility site would involve dredging an access channel from the main navigation channel to the Barge Facility with an estimated total of 37,000 cubic yards (CY) of material removed. This exceeds the threshold of dredging 1,000 CY outlined in Minnesota Rules, 4410.4400, Subpart 17, thus requiring the preparation of this environmental impact statement.

1.2 Project Description

The City of Wabasha, in cooperation with the Wabasha Port Authority, is proposing to construct a commercial port facility on the Mississippi River in the City of Wabasha, Minnesota. The 8.2-acre Wabasha Barge Facility would facilitate the transfer of materials, to include but not limited to dredge material and other commodities, from river barges to trucks for transport to off-site facilities. The City of Wabasha would own the project site and contract out the port operations and transportation of materials.

After construction, it is anticipated that the City of Wabasha would partner with the United States Army Corps of Engineers ("USACE," "the Corps") to transfer material that is annually dredged from the Upper Mississippi River 9-foot navigation channel through the Wabasha Barge Facility for transport to off-site facilities. Navigational channel dredging, and all other activities performed by the USACE related to the maintenance of the Mississippi River navigation channel, are federal actions, considered separate from the proposed project, and are addressed in the 2023 Lower Pool 4 Dredged Material Management Plan (DMMP)[1] and integrated Environmental Assessment.

1.3 Purpose and Need for the Proposed Action

The Project Site is located within Lower Pool 4, a portion of the Upper Mississippi River (UMR), which is an important component of the United States' inland navigation system. Periodic removal of sediment material (dredging) deposited within the Lower Pool 4 navigation channel and placement of the material on temporary upland locations is necessary to maintain the navigation channel requirements for commercial vessels. According to the Corps, the navigation channel is currently maintained at minimum acceptable dimensions and any further reductions would lead to an unacceptable risk of tow boat groundings and channel closures. Additionally, the existing upland dredged material placement sites within Lower Pool 4 of the UMR are nearing capacity. The proposed Wabasha Barge Facility project represents a cost-effective strategy for allowing dredged materials to be transferred from the river, ensuring navigability through Lower Pool 4 is maintained, while minimizing impacts to natural, man-made, and community resources within the area to the fullest extent possible.

[1] USACE. 2023. Lower Pool 4 Dredged Material Management Plan. https://www.mvp.usace.army.mil/Portals/57/docs/Navigation/DMMP/Lower%20Pool%204/Pool%204_Final%20DMMP.pdf?ver=a8kfBkiPjAIcRyF76dhzjg%3d%3d, accessed July 2023.

1.4 Alternatives

Navigation channel dredging planning in Lower Pool 4 was conducted in two phases. Initial work resulted in a draft material management plan that was published in May 2017. The 2017 draft DMMP along with the comments the Corps received about it is available on the St. Paul District website: https://www.mvp.usace.army.mil/DMMP/. The second phase of planning reconsidered dredging methods and revised the alternatives considering the comments received on the May 2017 draft. Alternative geographic sites within Pool 4 were reviewed and dismissed from further consideration based on their assessed operational feasibility, cost effectiveness, and impacts of commercial truck traffic through developed areas within and near the City of Wabasha.[2]

1.5 Potential Environmental Effects

Anticipated environmental effects include: increase in barge traffic to and from the proposed barge facility site; temporary impacts to aquatic organisms during access channel dredging; change in site flood elevations from site regrading; tree clearing and ground disturbance; one permanently-impacted 0.40-acre wetland; increase in impervious surface; increase in truck traffic during construction and operation; disturbance of and minor reduction in terrestrial organism habitat; altered visual aesthetic of the project site; and temporary noise effects during construction and operation. As proposed, all potential environmental effects from the construction and operation of the Proposed Project would be mitigated to the fullest possible extent through ongoing coordination between the City of Wabasha and applicable local, State, and Federal agencies.

1.6 Project Cost and Funding Source

The estimated total cost of the project is $4.6 million (2024 dollars). This cost includes construction, contingency, engineering, administrative, and legal costs. Funding for the project currently includes a Port Development Assistance Program (PDAP) grant from the Minnesota Department of Transportation in the amount of $754,876. Remaining project funding is anticipated to come from potential additional MnDOT PDAP grant funding, potential US Department of Transportation Maritime Administration (MARAD) Port Infrastructure Development Program (PIDP) grant funding[3], and Wabasha Port Authority and/or City of Wabasha bond sales.

[2] USACE. 2023. Lower Pool 4 Dredged Material Management Plan. https://www.mvp.usace.army.mil/Portals/57/docs/Navigation/DMMP/Lower%20Pool%204/Pool%204_Final%20DMMP.pdf?ver=a8kfBkiPjAlcRyF76dhzjg%3d%3d, accessed July 2023.

[3] The City is aware that MARAD PIDP funding, if awarded, will require additional Federal environmental review.

1.7 Permits and Approvals

Government Agency	Type of Application/Permit	Status*
Federal Agencies		
U.S. Army Corps of Engineers (USACE)	Clean Water Act (CWA) Notification	To be updated
	No Rise Certification	To be completed
	Section 10 Rivers & Harbors Appropriation Act	To be updated
State Agencies		
Minnesota Department of Natural Resources (MNDNR)	Permit to Take	To be applied for, if necessary
	Public Waters Work Permit	To be updated
	Water Appropriations Permit	To be applied for, if necessary
Minnesota Board of Water and Soil Resources (BWSR)	Minnesota Wetland Conservation Act (WCA) Notification	To be updated
Minnesota Pollution Control Agency (MPCA)	National Pollutant Discharge Elimination System (NPDES) Construction General Storm Water Permit	To be updated
MPCA	Industrial Stormwater Permit	To be updated
Local Agencies		
City of Wabasha	Conditional Use Permit	To be updated
	Floodplain Permit / No Rise Certification	To be updated

* All permit requirements will be applied for prior to project or specific phase commencing.

1.9 Project Schedule

- Final Design – November 2023 – April 2024
- Permitting – January 2024 - June 2024
- Tree Removal Contract Bidding – February 2024
- Tree Removal – March 2024
- Site, Dock, and Dredging Contract Bidding – May 2024
- Site, Dock, and Dredging Construction – July 2024 – November 2024

PROJECT DESCRIPTION

2.1 Project Description

The City of Wabasha, in cooperation with the Wabasha Port Authority, is proposing to construct a commercial port facility ("Wabasha Barge Facility") at Upper Mississippi River mile 760 in Wabasha, Minnesota. The project site is located on tax parcels R27.00004.00 and R27.00005.03 within the City of Wabasha, Wabasha County, Minnesota (Section 30, Township 111N, Range 010W). These parcels are presently privately owned, and the city anticipates purchasing the requisite area to house the facility from a willing seller prior to construction activities.

The 26.8-acre site ("Study Area," "Project Site") would house the Wabasha Barge Facility on approximately 8.2 acres ("Proposed Barge Facility," "Proposed Project") and would facilitate the transfer of materials, including but not limited to dredge material and other commodities, from river barges to trucks for transport to off-site facilities. The City of Wabasha would own the barge facility site and contract out the port operations and transportation of materials. The city does not currently anticipate expanding the project beyond the proposed 8.2 acres, although that decision will be revisited at a future time if warranted.

Upon environmental clearance and acquisition of all required permits, the work elements to be completed as part of the proposed project include:

- Dredging an access channel from the main Mississippi River navigation channel to the proposed dock area. This will be performed by either hydraulic or mechanical dredging techniques and include deepening the side channel to enable barge traffic to access the proposed fleeting area for loading and unloading material.
- Dredging an area to accommodate barge maneuvering and docking. This will be performed by either hydraulic or mechanical dredging techniques and include widening the area immediately adjacent to the proposed fleeting area for improved barge maneuverability.
- The dredged material would be used as fill material on the barge terminal site to raise the site above the 100-year flood elevation. Initial dredge material offloaded at the site will be used, in addition to regrading the proposed area, to ensure the access road and temporary storage locations are removed from the 100-year floodplain.
- Construct the barge terminal pad and access road. This will include constructing a sheet pile dock face and upstream/downstream steel pipe pile clusters for barge mooring and maneuvering system. Additionally, the access road off of 5th Grant Boulevard West will be improved for truck and vehicle traffic hauling material to and from the proposed barge mooring site.
- Construct footings for conveyors and hoppers for material handling and loadout. These will be located immediately adjacent to the barge terminal pad to enable loading and unloading material from moored barges.

- Install electric, sewer and water utilities to the project site.
- Install a loading scale and construct a scale house/field office building (proposed future action).

The City of Wabasha has prepared this draft Environmental Impact Statement (DEIS) in accordance with Minnesota Rules 4410.4400, Subpart 17, "Barge Fleeting Facilities." This DEIS assesses the potential for the Proposed Project—i.e., the above-listed work elements related to the construction of, and operations within, the Wabasha Barge Facility—to result in significant adverse environmental impacts.

Following Wabasha Barge Facility construction completion, it is anticipated that the City of Wabasha would partner with the United States Army Corps of Engineers ("USACE" or "the Corps"), pursuant to Section 217(d) of the Water Resources Development Act of 1996, to transfer material that is annually dredged from the Upper Mississippi River 9-foot navigation channel through the Wabasha Barge Facility for transport to off-site facilities. Navigational channel dredging and all other activities performed by the USACE under the Section 217(d) agreement related to the maintenance of the Mississippi River navigation channel are federal actions, considered separate from the proposed project, and are addressed in the 2023 Lower Pool 4 Dredged Material Management Plan (DMMP)[4] and integrated Environmental Assessment.

The Wabasha Barge Facility would facilitate the transfer of dredged material from river barges to trucks for transport to off-site facilities for use as reclamation material for existing sand and gravel mines, local construction material, or other potential beneficial reuse options.

While detailed construction plans have not been completed, conceptual site design plans are provided in Figure 4, "Site Layout." Site design documents are anticipated to be completed in early 2024. The proposed letting date for construction is late Summer 2024. Construction is proposed to be complete with site operations commencing in Summer 2025, pending receipt of all permits and approvals.

2.2 Responsible Governmental Unit

The Wabasha Port Authority is the Responsible Governmental Unit (RGU) and the Proposer for the Wabasha Barge Facility project.

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[4] USACE. 2023. Lower Pool 4 Dredged Material Management Plan. https://www.mvp.usace.army.mil/Portals/57/docs/Navigation/DMMP/Lower%20Pool%204/Pool%204_Final%20DMMP.pdf?ver=a8kfBkiPjAIcRyF76dhzjg%3d%3d, accessed July 2023.

Phone:	651-565-4568
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2.3 Purpose of Draft Environmental Impact Statement

Minnesota Rules, 4410.4400, Subpart 17, "Barge Fleeting Facilities," states that an Environmental Impact Statement (EIS) is required for projects involving the construction of a barge fleeting facility at a new off-channel location that involves the dredging of 1,000 or more cubic yards.

The Proposed Project would facilitate dredging an access channel from the main navigation channel to the Barge Facility with an estimated total of 37,000 cubic yards (CY) of material removed. This exceeds the threshold of dredging 1,000 CY outlined in Minnesota Rules, 4410.4400, Subpart 17, thus requiring the preparation of this EIS document.

2.4 Purpose and Need for the Proposed Action

The Project Site is located within Lower Pool 4, a portion of the Upper Mississippi River (UMR), which is an important component of the United States' inland navigation system. Maintaining navigability through this reach is necessary to connect traffic moving between ports upstream as far as the Minneapolis-Saint Paul, Minnesota Metro Area, downstream as far as New Orleans, Louisiana, and to points east and west on the Illinois, Ohio, and Missouri Rivers.

The majority of sediment entering Lower Pool 4 are those carried by the Chippewa River.[5] Some of this material deposits within the designated navigation channel of Lower Pool 4, reducing the required nine-foot (minimum) clearance for commercial vessels such as barges. Periodic removal of this material (dredging) and placement of the material on temporary upland locations is necessary to maintain the nine-foot navigation channel requirements for commercial vessels, with a minimum width of 300 feet in Lower Pool 4. According to the Corps, the navigation channel is currently maintained at minimum acceptable dimensions and any further reductions would lead to an unacceptable risk of tow boat groundings and channel closures.

Additionally, the existing upland dredged material placement sites within Lower Pool 4 of the UMR are nearing capacity. The lack of conveniently available onshore transfer and placement sites within the area has led to increased management costs and reduced ability for the Corps to effectively manage dredged material and maintain navigability in Lower Pool 4. Additional capacity is needed to manage the approximately 5.3 million CY of dredged material the Corps expects to produce in Lower Pool 4 over the next 20 years.

The City of Wabasha would partner with USACE, pursuant to Section 217(d) of the Water Resources Development Act of 1996, to transfer material that is annually dredged from the Upper Mississippi River

[5] *ibid* 1.

9-foot navigation channel through the Wabasha Barge Facility for transport to off-site facilities. City of Wabasha proposes creating a facility that would transfer at least a portion of the 270,000 CY[6] of dredged materials annually from the Mississippi River. The implementation of the Proposed Project would allow the City to provide the Corps with critical additional capacity to manage dredged material and maintain navigability throughout Lower Pool 4. According to the Corps, the Proposed Barge Facility site is the only feasible, cost-effective location for offloading barges on the Minnesota shoreline of the Mississippi River in Lower Pool 4. Previously proposed transfer facility locations would have been in close proximity to and would have routed relatively high volumes of truck traffic through, residential neighborhoods within the City of Wabasha; therefore, these locations were removed from consideration due to their potential impact to residents within the City of Wabasha.

The Proposed Project represents a cost-effective strategy for allowing dredged materials to be transferred from the river, ensuring navigability through Lower Pool 4 is maintained, while minimizing impacts to natural, man-made, and community resources within the area to the fullest extent possible. Additional barge fleeting operations may also include transfer of agricultural and commercial commodities to and from barges for follow-on transportation to local and regional distribution sites or to other port facilities up and down the Mississippi River system.

Federal Standard and Base Plan

The Corps' dredged material management planning follows federal regulations. Engineering Regulation (ER) 1105-2-100 directs the Corps to define a "Base Plan." 33 C.F.R. 335.7 defines the "Federal standard" (which is the same as the Base Plan) as follows: "Federal standard means the dredged material disposal alternative or alternatives identified by the Corps which represent the least costly alternatives consistent with sound engineering practices and meeting the environmental standards established by the 404(b)(1) evaluation process or ocean dumping criteria."

ER 1105-2-100 requires that all federally maintained navigation projects must demonstrate that there is sufficient dredged material disposal capacity for a minimum of 20 years. Management plans must identify specific measures necessary to manage the volume of material likely to be dredged over a 20-year period. It is the Corps' policy to accomplish the disposal of dredged material associated with the construction or maintenance dredging of navigation projects in the least costly manner. Disposal is to be consistent with sound engineering practice and meet all federal environmental standards including the environmental standards established by Section 404 of the CWA of 1972, as amended. This constitutes the base disposal plan for the navigation purpose. Each management plan study must establish this "Base Plan."

[6] *ibid* 2.

2.5 Project Cost, Funding, and Schedule

The estimated total cost of the Proposed Project is $4.6 million (2024 dollars). This cost includes construction, contingency, engineering, administrative, and legal costs. Funding for the project currently includes a Port Development Assistance Program (PDAP) grant from the Minnesota Department of Transportation in the amount of $754,876. Remaining project funding is anticipated to come from potential additional MnDOT PDAP grant funding, potential US Department of Transportation Maritime Administration (MARAD) Port Infrastructure Development Program (PIDP) grant funding[7], and Wabasha Port Authority and/or City of Wabasha bond sales.

The current schedule for the project is as follows:

- Final Design – November 2023 – April 2024
- Permitting – January 2024 - June 2024
- Tree Removal Contract Bidding – February 2024
- Tree Removal – March 2024
- Site, Dock, and Dredging Contract Bidding – May 2024
- Site, Dock, and Dredging Construction – July 2024 – November 2024

Following completion of the site access, dock, and side channel access dredging, the agreement between the Corps and the City of Wabasha is anticipated to go into effect. This would initiate operations of offloading dredge material at the proposed project location, dewatering, and hauling to follow-on sites for potential construction, fill, and other uses based on the material quality.

[7] The City is aware that MARAD PIDP funding, if awarded, will require additional Federal environmental review.

ALTERNATIVES

This EIS document assesses the potential for the proposed project to result in significant adverse impacts by comparing conditions anticipated during the construction and operation of the Proposed Project ("Preferred Alternative") to conditions otherwise expected without the Proposed Project ("No-Build Alternative"). Alternatives considered, but dismissed from further consideration, are also discussed below.

3.1 No-Build Alternative

In the absence of the Proposed Project, no development is anticipated on the Project Site. Therefore, this EIS assumes that the physical condition of the Project Site without the Proposed Project generally would resemble existing conditions and remain vacant.

Under the No-Action Alternative, currently approved and available sites in Lower Pool 4 project area would not be expected to accommodate dredge material placement needs for the next 20 years. If approved, CMMP sites are not available when dredging is required in Lower Pool 4 due to navigation emergency situations, dredged material may need to be placed at non-CMMP designated placement locations. Non-designated placement sites would likely include temporarily placing dredged material in the aquatic main channel border areas (in-water placement). The use of non-designated placement sites may result in higher costs and greater environmental or social impacts. Presumably though, these instances would be short-term, and USACE would initiate a new planning effort to identify the most acceptable dredged material management methods for the pool.

The use of CMMP-identified sites that would continue under the no action alternative would be dredged material placement in the Read's Landing, Crats Island, Teepeeota Point, and Grand Encampment transfer sites, and in the Wabasha Gravel Pit and Alma Marina upland transfer sites. Also, as happens currently, material would be moved hydraulically to the Wabasha Gravel Pit. The use of the Carrels site, which is identified in the CMMP, is possible but would require acquisition of a real estate interest in the site because it is privately owned. Similarly, the Wabasha Sand and Gravel Pit was evaluated and approved for use in 2015 but is also privately owned. Because these sites are in private ownership, their use is uncertain and cannot be relied upon.

Under existing conditions, dredging activity is conducted proactively to prevent navigation channel closures. Channel conditions are monitored by the Corps to identify areas that are or will soon become problematic for navigation traffic. This allows the Corps to better prioritize efforts and most efficiently maintain the channel when equipment is mobilized in the area. Material is dredged from the navigation channel and temporarily placed on island transfer sites adjacent to the dredge locations. When island sites are nearly full, the Corps moves the dredged material to upland placement sites to restore island capacity. The Wabasha Gravel Pit is currently the only available site in Pool 4 for upland placement, and it is nearing capacity. The recently acquired Rolling Prairie site in Pool 5 could be used for upland placement, as it has ample capacity, but it's distance would make it costly and difficult to efficiently access.

In the best case where placement sites are full, dredging could be temporarily deferred and the navigation channel would remain functional for some period of time. This scenario has potential to occur for short periods of time (e.g., one dredging season at a minimum), but is extremely unlikely to persist based on known dredging requirements in this stretch of river.

Switching to a scenario of dredging only when absolutely necessary would increase the likelihood of experiencing imminent or emergency dredging conditions as described above, as was experienced at Grand Encampment in 2014.

3.2 Alternatives Considered but Dismissed from Consideration

Navigation channel dredging planning in Lower Pool 4 was conducted in two phases. Initial work resulted in a draft material management plan that was published in May 2017. The 2017 draft DMMP along with the comments the Corps received about it is available on the St. Paul District website: https://www.mvp.usace.army.mil/DMMP/.

The second phase of planning reconsidered dredging methods and revised the alternatives considering the comments received on the May 2017 draft.

Alternative geographic sites within Pool 4 were reviewed and dismissed from further consideration based on their assessed operational feasibility, cost effectiveness, and impacts of commercial truck traffic through developed areas within and near the City of Wabasha.[8]

The Corps developed a list of potential dredged material placement sites based on publicly available aerial imagery and property records. Consideration was given to the full range of measures for dredged material management including federally owned islands and upland placement sites, new sites, and potential future placement sites that could be made available for both mechanical and hydraulic placement. The reasoning for site dismissals are further discussed below.

St. Paul District Channel Maintenance Management Plan (CMMP)

Published in 1997, the CMMP and accompanying Final Environmental Impact Statement (FEIS), is the St. Paul District's plan for management of channel maintenance (USACE 1997). Much of the plan is devoted to the designation and design of dredged material placement sites. Included in the report is a discussion of the district's program for channel management. This DMMP for Lower Pool 4 is part of that program. The CMMP defines criteria to be used to evaluate and compare the various sites and alternatives in dredged material management plans. The Corps considered all of these criteria when evaluating sites for this DMMP. The criteria are as follows:

- Cost

[8] USACE. 2023. Lower Pool 4 Dredged Material Management Plan. https://www.mvp.usace.army.mil/Portals/57/docs/Navigation/DMMP/Lower%20Pool%204/Pool%204_Final%20DMMP.pdf?ver=a8kfBkiPjAIcRyF76dhzjg%3d%3d, accessed July 2023.

- Natural Resources
- Beneficial Use
- Cultural Resources
- Social Impacts
- Recreation

The social impacts criterion includes the following categories of socioeconomic factors to consider:

- Business and industrial activity and employment
- Community cohesion: proximity to residential development, landowner willingness to sell, public opposition, and adjacent land use
- Public services and facilities
- Property values and tax revenues
- Life, health, and safety
- Aesthetic values and noise levels

First Iteration – 2017 Draft Lower Pool 4 DMMP

The 2017 draft DMMP attempted to plan for a 40-year timeframe instead of the minimum 20-year timeframe required in Corps regulations. The longer planning horizon was intended to provide more certainty regarding the Corps' operations, knowing that additional development in the study area will affect the options available for dredged material management sites and complicate future planning efforts.

Discussion with state and federal natural resource agencies identified that in-river alternatives, including expanding the existing island transfer sites, were less desirable and had increased likelihood of adverse impacts to wetlands relative to upland alternatives. Mitigation for wetland impacts would likely have increased the cost of these options. The agencies preferred not to build islands or otherwise make beneficial use of the dredged material in Lower Pool 4 at that time.

The Corps began looking for sites to meet the variety of needs within Lower Pool 4. Sites were initially identified based on their operational feasibility, including access to the river and highway network, the acreage and site dimensions needed to support dredging operations, and the potential for public or specific beneficial use of the material. Sites were evaluated and compared using the general criteria in the St. Paul District CMMP plus additional factors including flood stage impacts, the potential to encounter hazardous, toxic, or radioactive wastes, and the potential to affect eligible or listed historic properties already known to exist.

The Corps looked for suitable sites for future large-scale hydraulic offloads from the island transfer sites. The large cost of setting up miles of hydraulic dredge pipeline is only cost-effective if the pipeline can be used to move very large volumes of material. For that reason, island offloads typically move at least 500,000 CY, which requires a placement site 20 acres or more near the river and the island sites and compatible with existing adjacent land use. The Corps-owned Wabasha Gravel Pit was nearing its capacity. Due to development in and near Wabasha on the Minnesota shoreline and the relative inaccessibility of upland sites on the Wisconsin shoreline, no new sites were found to be of adequate size and location.

In an effort to reduce the need for large-scale island offloads and reduce the cost of double handling the dredged material, the Corps developed a plan to switch from primarily hydraulic dredging methods to using mechanical methods. The plan identified several parcels of land needed to support onshore handling, transfer and upland placement of mechanically dredged material for a 40-year planning horizon.

The Corps also looked for suitable onshore locations to support mechanical and hydraulic dredging operations. Onshore transfer sites must be located relatively near the dredge cuts and support a variety of activities, depending on the type of dredging:

- Unloading barges
- Stockpiling dredged material
- Loading onto trucks
- Containing and dewatering hydraulically dredged material

Once the onshore transfer sites were located, the Corps looked for suitable upland placement sites. Sites smaller than 20 acres were not considered suitable unless a specific beneficial use was identified, such as mine reclamation or raising a site's elevation for development. In general, Corps Real Estate policy requires obtaining a fee simple interest in dredged material placement sites. That requirement contributed to the Corps' preference for sites with larger capacities to reduce the number of parcels needed. It also led to avoiding parcels within developed areas where the potential for private development is not compatible with federal ownership of the sites.

The Corps took the following steps to determine the least-costly environmentally acceptable sites:

- Estimate the cost to haul material to each site from the identified onshore transfer sites
- Estimate cost per cubic yard to use each site, including real estate, site development and hauling cost
- Rank the sites in order of cost from least to greatest
- Assess environmental acceptability of each site using criteria in the CWA, ESA, and other federal laws and regulations
- Eliminate sites that were not environmentally acceptable
- Identify the least-cost, environmentally acceptable sites necessary to provide the required capacity

The draft DMMP was released in May 2017 for public and agency review. Reviewers expressed concerns about taking farmland out of production and reducing the local tax base, social impacts of acquiring land from unwilling sellers and multi-generational farmers, noise and aesthetic impacts to residential properties, impacts to property values near DMMP sites, impacts to the viewshed from designated scenic highways and neighboring residences, and impacts of hauling material through the developed areas of Wabasha, Nelson, and Alma, Minnesota.

Second Iteration – 2022 Draft Lower Pool 4 DMMP

The second planning effort was more sensitive to social impacts, a factor that was overshadowed by cost-effectiveness and environmental acceptability during the first iteration. As part of the reconsideration, the Corps screened out some sites previously proposed in the May 2017 draft report, while retaining others and identifying additional sites. The Corps worked directly with the City of Wabasha to develop a plan that reduced impacts to the community. The Corps issued public notices and sent letters to individuals to find landowners willing to consider selling their property in areas likely to be cost-effective for the Corps.

Upland placement sites that required hauling through the developed areas of Wabasha, Nelson and Alma were screened out, because other cost-effective sites had lower impacts to traffic and affected fewer people along the haul routes.

The second iteration of planning followed the same regulations as the first iteration. It considered an array of features, including potential sites, activities, and modes of transportation useful for managing dredged material in Lower Pool 4. It evaluated the potential costs, environmental impacts, and social impacts associated with each feature. It compared the qualities of the features with each other to determine the least costly alternatives consistent with sound engineering practices and meeting required environmental standards. The Tentatively Selected Plan (TSP) presented in the 2022 DMMP constitutes the "Base Plan" and the "Federal standard" for managing dredged material in Lower Pool 4 through the year 2042.

3.3 Description of Preferred Alternative

The Preferred Alternative includes dredging an access channel from the Mississippi River main channel, creating a barge docking facility and area for material off-loading, and hauling to use in construction-type activities or move to storage sites. Work elements associated with the Preferred Alternative include:

- Dredging an access channel from the main Mississippi River navigation channel to the proposed dock area. This will be performed by either hydraulic or mechanical dredging techniques and include deepening the side channel to enable barge traffic to access the proposed fleeting area for loading and unloading material.
- Dredging an area to accommodate barge maneuvering and docking. This will be performed by either hydraulic or mechanical dredging techniques and include widening the area immediately adjacent to the proposed fleeting area for improved barge maneuverability.
- The dredged material would be used as fill material on the barge terminal site to raise the site above the 100-year flood elevation. Initial dredge material offloaded at the site will be used, in

addition to re-grading the proposed area, to ensure the access road and temporary storage locations are removed from the 100-year floodplain.

- Construct the barge terminal pad and access road. This will include constructing a sheet pile dock face and upstream/downstream steel pipe pile clusters for barge mooring and maneuvering system. Additionally, the access road off of County Road __ will be improved for truck and vehicle traffic hauling material to and from the proposed barge mooring site.
- Construct footings for conveyors and hoppers for material handling and loadout. These will be located immediately adjacent to the barge terminal pad to enable loading and unloading material from moored barges.
- Install electric, sewer and water utilities to the project site. Extend city utilities to the project site to ensure adequate operations for the proposed project.
- Install a loading scale and construct a scale house/field office building (proposed future action).

Final design and construction plans will be completed following environmental review and incorporation of any identified avoidance, minimization, or mitigation measures required.

EIS analyses herein are performed to assess the potential for the construction and operation of the Proposed Project ("Preferred Alternative") to result in significant adverse impacts.

As discussed in Section 2.1, "Project Description," dredging of the main navigation channel and all other activities performed by USACE under the Section 217(d) agreement related to the maintenance of the Mississippi River navigation channel are federal actions, considered separate from the proposed project, and are addressed in the 2023 Lower Pool 4 Dredged Material Management Plan (DMMP) and integrated EA.

SOCIAL, ECONOMIC, AND ENVIRONMENTAL IMPACTS

4.1 Permits and Approvals

All known permits at State, Federal, and local levels necessitated by the project are listed in Table 1, "Required Permits & Approvals," below. Public financial assistance is anticipated from the State of Minnesota through its PDAP and potentially from the federal Department of Transportation Maritime Administration (MARAD) PIDP grant.

Table 1: Required Permits & Approvals

Government Agency	Type of Application/Permit	Status*
Federal Agencies		
U.S. Army Corps of Engineers (USACE)	Clean Water Act (CWA) Notification	To be updated
	No Rise Certification	To be completed
	Section 10 Rivers & Harbors Appropriation Act	To be updated
State Agencies		
Minnesota Department of Natural Resources (MNDNR)	Permit to Take	To be applied for, if necessary
	Public Waters Work Permit	To be updated
	Water Appropriations Permit	To be applied for, if necessary
Minnesota Board of Water and Soil Resources (BWSR)	Minnesota Wetland Conservation Act (WCA) Notification	To be updated
Minnesota Pollution Control Agency (MPCA)	National Pollutant Discharge Elimination System (NPDES) Construction General Storm Water Permit	To be updated
MPCA	Industrial Stormwater Permit	To be updated
Local Agencies		
City of Wabasha	Conditional Use Permit	To be updated
	Floodplain Permit / No Rise Certification	To be updated

* All permit requirements will be applied for prior to project or specific phase commencing.

4.2 Cover Types

4.2.1 Cover Types

Table 2: Cover Types – Proposed Barge Facility Site

Cover Type	Before (acres)	After (acres)
Wetlands	0.4	0.0
Deep Water/Streams	0.0	0.0
Wooded/Forest	2.7	0.0
Brush/Grassland	0.4	0.0
Cropland	0.0	0.0
Lawn/Landscaping	0.0	0.0
Impervious Surface	4.7	8.0
Stormwater Pond/Ditch	0.0	0.1
Other (Barge Docking Area)	0.0	0.1
TOTAL	**8.2**	**8.2**

* Existing and proposed cover type acreage estimates for the 8.2-acre Proposed Barge Facility site are based on the National Land Cover Database (NLCD), aerial photo interpretation, wetland delineations, and the conceptual site layout. Changes to land cover will only occur within the 8.2-acre Proposed Barge Facility site, and the remaining portions of tax parcels R27.00004.00 and R27.00005.03 would maintain their existing condition. Acreages are estimates and subject to change based on further site planning and project development.

** The existing gravel driveway, which is classified as "Developed" in the NLCD, was considered an impervious surface. The proposed condition assumed the aggregate surfaces associated shown on the proposed site plan along with the remaining portions of the existing gravel driveway are considered impervious for the "After" condition.

4.2.2 Green Infrastructure and Trees

4.2.2.1 Existing Conditions

The existing 8.2-acre Proposed Barge Facility site includes approximately 2.7 acres of tree cover, 0.4 acres of wetlands, 0.4 acres of pervious brush/grassland areas, and 4.7 acres of impervious surfaces within the proposed project area.

4.2.2.2 Environmental Consequences: No-Build Alternative

The No-Build Alternative would maintain the Proposed Barge Facility site land cover as indicated in Table 2, "Cover Types – Proposed Barge Facility Site."

4.2.2.3 Environmental Consequences: Preferred Alternative

The City intends to purchase only the 8.2-acre portion of the Study Area that is necessary for the Proposed Barge Facility. The remaining areas would remain under private ownership. In order to construct the barge terminal, tree coverage within the proposed 8.2-acre barge facility site would be reduced from 2.7 acres to 0.0 acres. Additional brush/grassland areas would have vegetation removed and soils compacted. Dredge material removed from the access channel will be incorporated as fill material to raise the proposed access road above the 100-year floodplain. Impervious surfaces would increase to accommodate the proposed access road and other hard-structure surfaces to facilitate barge loading and off-loading operations, including truck traffic in and out of the Proposed Barge Facility site. 0.4 acres of wetlands would be impacted. A detailed discussion of wetland impacts and associated mitigation measures is included in Section 4.13.2, "Wetlands."

4.2.2.4 Mitigation Measures

The City of Wabasha will meet all required permits and approvals and ensure timing of tree removal does not interfere with bat roosting season. Stormwater runoff will be directed to an infiltration area on site to reduce impacts from additional impervious surface area. No additional mitigation measures are included in project plans at this time.

4.3 Economic Environment

4.3.1 Existing Conditions

Historic aerial imagery indicates that gravel mining occurred on the Study Area, beginning in earnest in 1949 and continuing into the early 1970s. By 2010, gravel mining had ended, and trees have primarily reclaimed the filled gravel pits. The Study Area is currently comprised of vacant woodland, appears to have been used for the dumping or storage of scrap metal, construction material, and various vehicle parts, and does not contribute to the existing economic environment within the City of Wabasha.

4.3.2 Environmental Consequences: No-Build Alternative

The No-Build Alternative would maintain the status of the project location and the City of Wabasha with regard to economic environment. The project site would not be used for any city or other improvements or potential economic development opportunities.

4.3.3 Environmental Consequences: Preferred Alternative

The current Wabasha Comprehensive Plan (2016-2035),[9] last amended July 6, 2021, lists the future land use of the project site as "Industrial." The Comprehensive Plan discusses Wabasha's unique location and opportunity for development of a commercial river port facility that would be used for commercial purposes including, but not limited to, the ongoing efforts by the Corps of Engineers in maintaining the

[9] City of Wabasha. 2023. Wabasha Comprehensive Plan, 2016-2035. https://www.wabasha.org/wp-content/uploads/Final-Plan-2016.pdf, accessed July 2023.

Mississippi River 9-foot navigation channel. The implementation of the Proposed Project would support these goals outlined in the City of Wabasha's Comprehensive Plan and is anticipated to increase the community's economic vitality.

4.3.4 Mitigation Measures

The Proposed Project would not result in adverse impacts to the City of Wabasha's economic environment. Thus, no mitigation measures related to the economic environment are included in project plans at this time.

4.4 Environmental Justice

According to the EPA's Environmental Justice Screening and Mapping Tool (EJScreen), approximately 38 percent of the population located within a ¼-mile radius of the Proposed Project is considered low income, and approximately one percent of the population located within a ¼-mile radius of the proposed project is considered minority population/people of color. Additional demographic information is included in Appendix B. All identified adverse impacts that would result from the implementation of the Proposed Project are capable of being mitigated and are expected to be reduced significantly with appropriate measures. These measures are outlined in Section 5, "Mitigation Measures." No disproportionately high environmental justice impacts are anticipated to occur as a result of the Proposed Project.

4.5 Utilities

4.5.1 Existing Conditions

The Project Site is not currently served by the City of Wabasha's existing public utilities system.

According to the City of Wabasha's Comprehensive Plan (2016-2035), an existing 6-inch water main runs along 5th Grant Boulevard West, immediately south of the Project Area. Similarly, a mixed 6-inch and 10-inch sanitary sewer pipe also runs along 5th Grant Boulevard West, immediately south of the Project Area.

There are currently no electrical utilities running to or within the Project Site.

4.5.2 Environmental Consequences: No-Build Alternative

In the No-Build Alternative, it is assumed that the physical condition of the Project Site generally would resemble existing conditions and remain vacant without utilities expanding inside the parcel boundaries.

4.5.3 Environmental Consequences: Preferred Alternative

The implementation of the Proposed Project would require the extension of the City of Wabasha's existing sewer, water, and electrical utilities to the Project Site. Sanitary sewer extension may include the installation of a lift station on a portion of the Project Site.

According to the City of Wabasha's Comprehensive Plan (2016-2035), the City's existing public utilities system (water, wastewater, and stormwater) is well-positioned and of adequate size to support the required expansion into the growth areas. The Comprehensive Plan anticipates extending the City's existing water and wastewater service area to include the Project Site. There are no expected impacts to the City's water or wastewater systems due to the slight usage increases as part of the proposed project.

Electric utilities would be required and coordinated through Northern States Power Company, who's parent company is Xcel Energy. In 2022, Xcel reported it used 53% non-carbon sources for its energy mix and has a goal of 100% net-zero emissions by 2050.

4.5.4 Mitigation Measures

The Proposed Project would not result in adverse impacts to the City of Wabasha's utilities system. No mitigation measures related to utilities are included in project plans at this time.

4.6 Land Use

4.6.1 Property and Right of Way Needs

4.6.1.1 Existing Conditions

The existing Project Site is currently privately owned. The current Wabasha Comprehensive Plan (2016-2035), identifies the Project Site as an opportunity for future industrial development and land use.

4.6.1.2 Environmental Consequences: No-Build Alternative

The No-Build Alternative would maintain the existing status of the project location with regard to property and right-of-way needs. The City of Wabasha would not purchase the Project Site, and the Project Site would maintain its existing vacant condition.

4.6.1.3 Environmental Consequences: Preferred Alternative

Under the Preferred Alternative, the City of Wabasha would own the Project Site and contract out the port operations and transportation of materials.

As part of the Proposed Project, a new entrance road would be constructed along 5th Grant Boulevard W to allow trucks to access the new site. Trucks accessing the site would follow a specific truck route to and from the site, which will take them from the project site on 5th Grant Boulevard W, to Trunk Highway 61 (TH 61), and then onto Shields Avenue.

Because the City of Wabasha would own the Project Site under the Preferred Alternative, no additional property and right-of-way needs are anticipated during the construction and/or operation of the Proposed Project.

4.6.1.4 Mitigation Measures

Prior to project construction, the City of Wabasha will work with the current landowner, who is identified as a willing seller, to determine fair market value for purchase of the Project Site. While this DEIS addresses the entirety of the two parcels, the City only intends to purchase the 8.2-acre portion that is necessary for the Proposed Barge Facility. The remaining areas would remain under private ownership.

4.6.2 Land Use, Plans, Zoning, and Special Districts/Overlays

4.6.2.1 Existing Conditions

The Project Site is located on tax parcels R27.00004.00 and R27.00005.03 within the City of Wabasha, Wabasha County, Minnesota (Section 30, Township 111N, Range 010W). These parcels are presently privately owned, and the City anticipates purchasing the requisite area to house the facility from a willing seller prior to construction activities.

The Project Site is bounded by the Mississippi River to the north and agricultural land to the east and west. 5th Grant Boulevard West (Wabasha County Road 59), which borders the Project Site to the south, provides connection to downtown Wabasha and U.S. Highway 61.

The Project Site is comprised of vacant woodland and appears to have been used for the dumping or storage of scrap metal, construction material, and various vehicle parts. According to historic aerial imagery—which is available for limited years from 1939 to the present—gravel mining occurred on the Project Site, beginning in earnest in 1949 and continuing into the early 1970s. By 2010, gravel mining had ended, and successional trees have reclaimed the filled gravel pits.

In July 2020, Bolton & Menk, Inc., conducted a wetland delineation that identified 16.1 acres of Type 1 Seasonally Flooded Wetlands located within the northernmost portions of the Project Site.

South of the Project Site, across 5th Grant Boulevard West, is predominantly agricultural land. Some of the agricultural lots adjacent to the Project Site contain houses, however the nearest lots that are primarily of residential use are located approximately ¼ mile southeast of the Study Area.

The two parcels that comprise the Project Site are both zoned R-1, "Low-Density Residential." R-1 zoning districts are intended to allow for the use and development of residential structures, yards, and directly related complimentary uses at a lower density than traditionally developed in the originally platted cities. The parcels bordering the project site to the east and west are also zoned R-1. The parcels located south of the project site, across 5th Grant Boulevard West, are zoned I, "Industrial."

The Project Site is also located in an S1 Shoreland Overlay Zone. Shoreland Overlay Zoning Ordinances typically contain a variety of provisions that guide land development and activity in shorelands with the goal of protecting surface water quality, near-shore habitat, and shoreland aesthetics. S1 Shoreland Overlay Zones are intended to provide standards for shoreland areas within the city that are primarily undeveloped.

The Project Site is located within the FEMA 100-Year floodplain. The Project Site is not located within a Drinking Water Management Supply Area (DWSMA)—however, the lots directly south of the project site, across 5th Grant Boulevard West, are located within a DWSMA.

4.6.2.2 Environmental Consequences: No-Build Alternative

The No-Build Alternative would maintain the existing status of the project location and surrounding areas with regard to land use, plans, zoning, and special districts/overlays.

4.6.2.3 Environmental Consequences: Preferred Alternative

The proposed development of the Project Site as a commercial port facility under the Preferred Alternative is consistent with the current Wabasha Comprehensive Plan (2016-2035), last amended July 6, 2021. The Comprehensive Plan lists the future land use of the project site as "Industrial" and discusses Wabasha's unique location and opportunity for development of a river port facility that would be used for commercial purposes.

Of the total Study Area, only approximately 8.2 acres would be used and developed for the Proposed Project, leaving the remaining area in its current undeveloped state.

One wetland (Wetland 1) would be permanently impacted by the Preferred Alternative. Proposed impacts to Wetland 1 are due to filling a portion of the wetland for grading and construction of the barge facility. Wetland 1 is adjacent to the proposed barge/dock and off-loading area, which contains the material hauler, hopper, scale, and conveyor system. A portion of that wetland will not be filled, however, as a conservative estimate the entire wetland is considered permanently impacted. Permanent proposed impacts to Wetland 1 are 0.40 acres. For more information, please refer to Section 4.13.2, "Wetlands."

The Preferred Alternative would also involve dredging a portion of the Mississippi River for barge traffic to access this barge facility. A portion of that material, once dewatered and available, would be used as fill to elevate the proposed project's access road and facilities out of the 100-year floodplain.

4.6.2.4 Mitigation Measures

Proposed fill – from side channel dredging and amended with other fill material as needed – would raise the project site to an elevation of approximately 678.6 feet to 680.5 feet, thereby removing the access road and other material transfer infrastructure from the 100-year floodplain, which is at an elevation of 678.6 feet. The dredged material will be tested prior to use as fill. Additionally, a "No-Rise" Certification is anticipated and will be submitted to FEMA with the project design to document no impact to flood elevations due to placement of fill within the Mississippi River floodplain (Appendix C). Wetland impacts will be mitigated and permitted through USACE and MNDNR application processes.

Upon completion and approval of the EIS, the City will initiate a zoning amendment to change the parcels from "R1" to "I" in accordance with the City's future land use plans. Construction standards and specifications will ensure compliance with the City of Wabasha's Shoreland Overlay Zone.

Mitigation efforts for impacts to wetlands will be completed in accordance with local, State, and Federal regulations. Mitigation requirements will be met prior to construction activities impacting wetlands or streams at the site. For more information, please refer to Section 4.13.2, “Wetlands.”

All direct and indirect impacts to other areas mentioned above will be specifically addressed later in this document. The City of Wabasha will meet all required permitting standards, zoning regulations, and ordinances related to the development of a commercial port facility.

4.6.3 Community Facilities/Critical Facilities

4.6.3.1 Existing Conditions

The Riverview Cemetery is located approximately 250 feet west of the Study Area, beyond the agricultural land that is adjacent to the Project Site. An active freight railroad line operated by Canadian Pacific Railway runs from the northeast to the southwest, between 5th Grant Boulevard West and U.S. Highway 61. A small rail yard is located approximately 400 feet southeast of the Project Site. The Gunderson St. Elizabeth’s Hospital is located approximately 0.40 miles southeast of the Project Site.

4.6.3.2 Environmental Consequences: No-Build Alternative

The No-Build Alternative would maintain the existing status of the Study Area and surrounding areas with regard to community facilities and critical facilities.

4.6.3.3 Environmental Consequences: Preferred Alternative

The Proposed Project would not directly impact any of the identified community or critical facilities. Indirect impacts may include increased truck traffic along 5th Grant Boulevard West, as well as minor, temporary noise effects during construction and loading/off-loading activities, although noise is anticipated to have minimal impact. For more information on traffic-related impacts, please refer to Section 4.20.1, “Traffic.” For more information on noise-related impacts, please refer to Section 4.19, “Noise.”

4.6.3.4 Mitigation Measures

The City of Wabasha will meet all required permitting standards, zoning regulations, and ordinances related to the development of a commercial port facility. Standard construction noise mitigation practices will be used to minimize any potential impacts to surrounding facilities.

4.6.4 Parks, Open Space, and Recreational Facilities

4.6.4.1 Existing Conditions

According to the City of Wabasha’s Comprehensive Plan (2016-2035), several trails and recreational facilities are located near the Proposed Project:

- The Nelson-Trevino Bottoms Natural Area is located across the Mississippi River, approximately 0.25 miles northeast of the Study Area.

- The City of Wabasha's Beach Park is located approximately 0.60 miles southeast of the Study Area.
- The Mississippi River Trail, a bike and pedestrian trail, is located within 0.5 miles of the Study Area.
- A City of Wabasha five-mile bike and pedestrian trail is located just east of the Study Area and travels through the Gunderson St. Elizabeth's Hospital parcel.
- Upper Mississippi River National Wildlife and Fish Refuge begins just up-river of the Study Area and stretches 261 river miles from Wabasha, Minnesota to Rock Island, Illinois.
- The Mississippi River Water Trail is located adjacent to the Study Area on the Mississippi River. This trail serves as a navigational guide for recreational travel on the river via boat or other watercraft, and highlights amenities and key destinations.
- The Great River Road, a National Scenic Byway, travels along the Mississippi River through ten States, and follows Highway 61 through the City of Wabasha.
- The National Eagle Center, a heavily-trafficked outdoor recreational and educational facility, is located approximately 1.5 miles from the Study Area.

In general, this area of the Upper Mississippi River has a substantial amount of fishing and boating activities. Small boats frequently use this area to access the side channel to the west of Drury Island, and there are also primitive camping sites on the interior of the island complex.

Additionally, the Study Area is located adjacent to the Upper Mississippi River National Wildlife and Fish Refuge. The Upper Mississippi National Wildlife and Fish Refuge is the longest national wildlife refuge in the lower 48 states, extending 261 miles from the Chippewa River in Wisconsin almost to Rock Island, Illinois. The Refuge is an Audubon designated Important Bird Area (ABA) and Ramsar designated Globally Important Bird Area. Lower Pool 4 of the Mississippi River is part of the Upper Mississippi National Wildlife and Fish Refuge which is managed by the USFWS. The USFWS also owns and manages adjacent land northwest of the Study Area.

4.6.4.2 Environmental Consequences: No-Build Alternative

The No-Build Alternative would maintain the existing status of the Study Area and surrounding areas with regard to available parks, open space, and recreational facilities.

4.6.4.3 Environmental Consequences: Preferred Alternative

For discussion of impacts related to the Upper Mississippi River National Wildlife and Fish Refuge, Audubon-designated Important Bird Area, Lower Pool 4 of the Mississippi River, and other nearby natural and biologically-significant areas, please refer to Section 4.15.1, "Resources, Habitats, and Vegetation."

The Proposed Project would not directly impact any of the identified trails or other land-based recreational features. Indirect impacts may include increased truck traffic along 5th Grant Boulevard West, potentially decreasing the semi-rural ambiance of this roadway. During construction and loading/unloading activities, noise may be a factor for persons participating in non-motorized recreational activities, immediately adjacent to the project location. For aquatic recreational users, an increase in barge traffic to and from the proposed project area will require increased vigilance to reduce impacts between barges and other boat – motorized or non-motorized – traffic.

4.6.4.4 Mitigation Measures

For discussion of mitigation measures related to the Upper Mississippi River National Wildlife and Fish Refuge, Audubon-designated Important Bird Area, Lower Pool 4 of the Mississippi River, and other nearby natural and biologically-significant areas, please refer to Section 4.15.1, "Resources, Habitats, and Vegetation."

Appropriate road and waterway signage will identify this area as increased truck and barge traffic, respectively. Additionally, the contracted operator of the facility will be required to comply with City of Wabasha noise ordinances, and to confine operations to set days and times during the regular work week. This information will be clearly articulated to the contracted facility construction personnel and operators. During the lifespan of the Proposed Barge Facility, the City will routinely audit operations through an impact assessment to identify future additional mitigation requirements and recommendations.

4.7 Climate Trends and Impacts

4.7.1 Existing Conditions

Minnesota's climate is trending generally towards warmer and wetter conditions with more frequent intense precipitation events.[10] The location of the Proposed Project is within the Mississippi River – Winona Watershed. Data from the Minnesota Department of Natural Resources' Minnesota Climate Explorer[11] tool shows both historical and projected future climate trends for this watershed. Historical data from 1895 to 2021 shows variable average temperatures and precipitation totals from year to year, as shown in the graphs below, and gives an impression of the existing climate conditions within the region. The historic trends for temperature and precipitation are:

- Average daily mean temperature of 44.25 degrees Fahrenheit with an increase of 0.17 degrees F per decade.
- Average daily maximum temperature of 54.39 degrees Fahrenheit with an increase of 0.10 degrees F per decade.
- Average daily minimum temperature of 34.11 degrees Fahrenheit with an increase of 0.25 degrees F per decade.
- Average annual precipitation of 32.26 inches with an increase of 0.57 inch per decade.

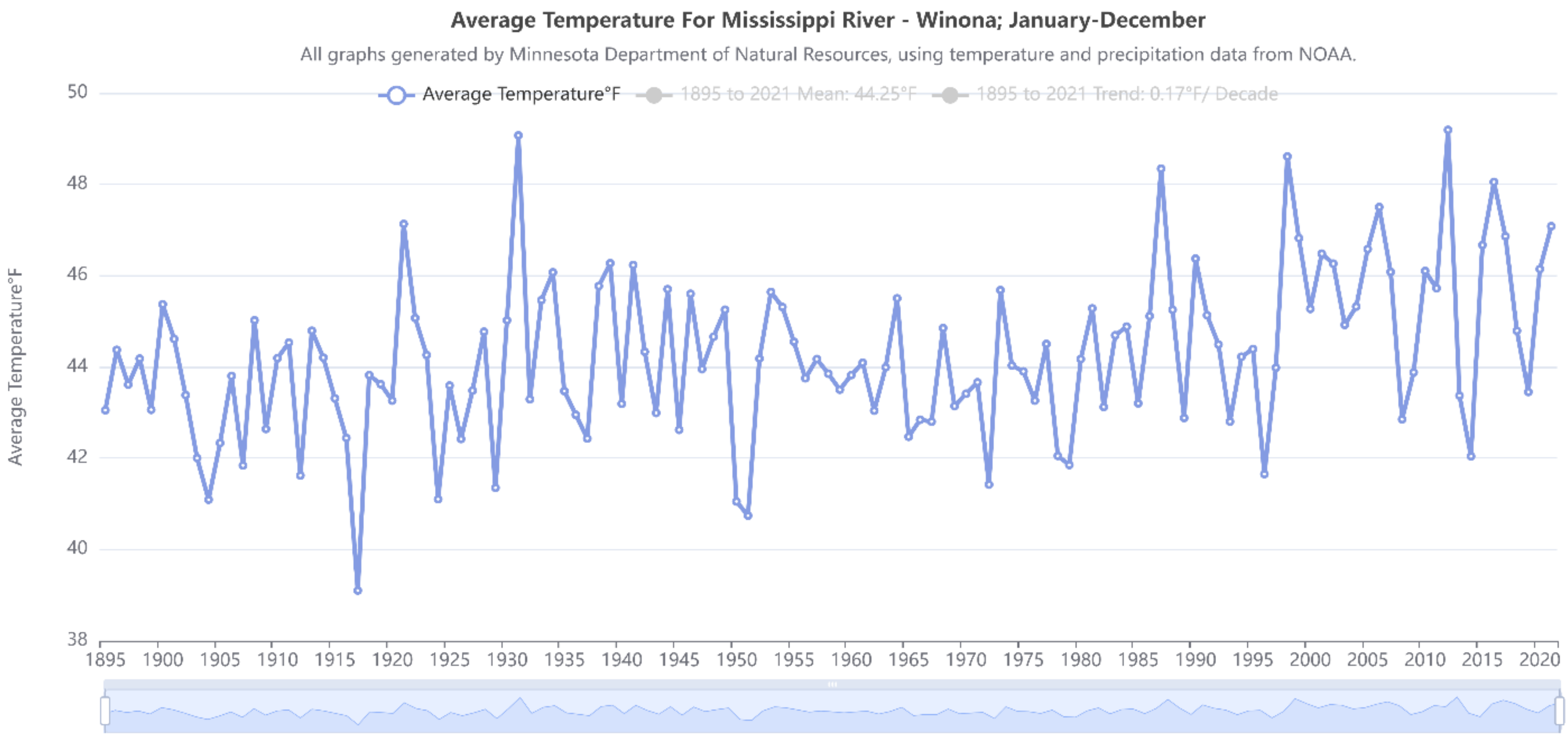
[10] Minnesota Department of Natural Resources. 2023. Climate Trends. Electronic document, https://www.dnr.state.mn.us/climate/climate_change_info/climate-trends.html, accessed February 2023.

[11] Minnesota Climate Explorer. 2022. Minnesota Department of Natural Resources. Electronic resource, https://arcgis.dnr.state.mn.us/ewr/climateexplorer/main/historical, accessed October 2022.

Wabasha County is currently considered to have a moderate heat exposure score compared to other counties in Minnesota (Exhibit 5, "Heat Exposure in Minnesota - Counties").[12] Trends of warmer temperatures may increase the risk of heat waves and vulnerability.

[12] Minnesota Department of Health's Climate & Health Program and U-Spatial. 2019. Heat Vulnerability in Minnesota. Electronic document, https://maps.umn.edu/climatehealthtool/heat_app/, accessed March 2023.

Exhibit 1


Average Temperature For Mississippi River - Winona; January-December
All graphs generated by Minnesota Department of Natural Resources, using temperature and precipitation data from NOAA.
Average Temperature°F
1895 to 2021 Mean: 44.25°F
1895 to 2021 Trend: 0.17°F/ Decade
Average Temperature°F
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48
46
44
42
40
38
1895
1900
1905
1910
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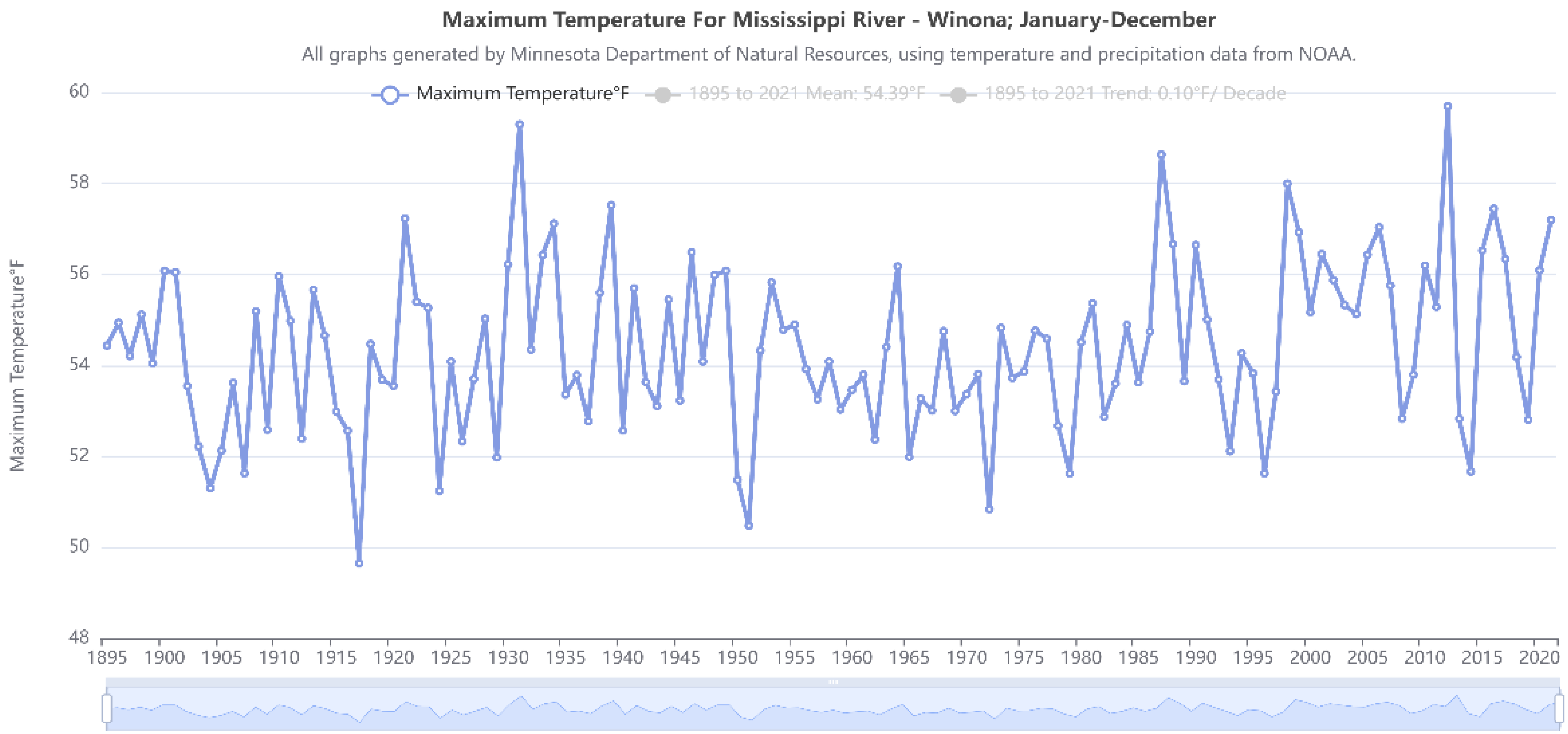
Exhibit 2


Maximum Temperature For Mississippi River - Winona; January-December
All graphs generated by Minnesota Department of Natural Resources, using temperature and precipitation data from NOAA.
Maximum Temperature°F
1895 to 2021 Mean: 54.39°F
1895 to 2021 Trend: 0.10°F/ Decade
Maximum Temperature°F
60
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56
54
52
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1895
1900
1905
1910
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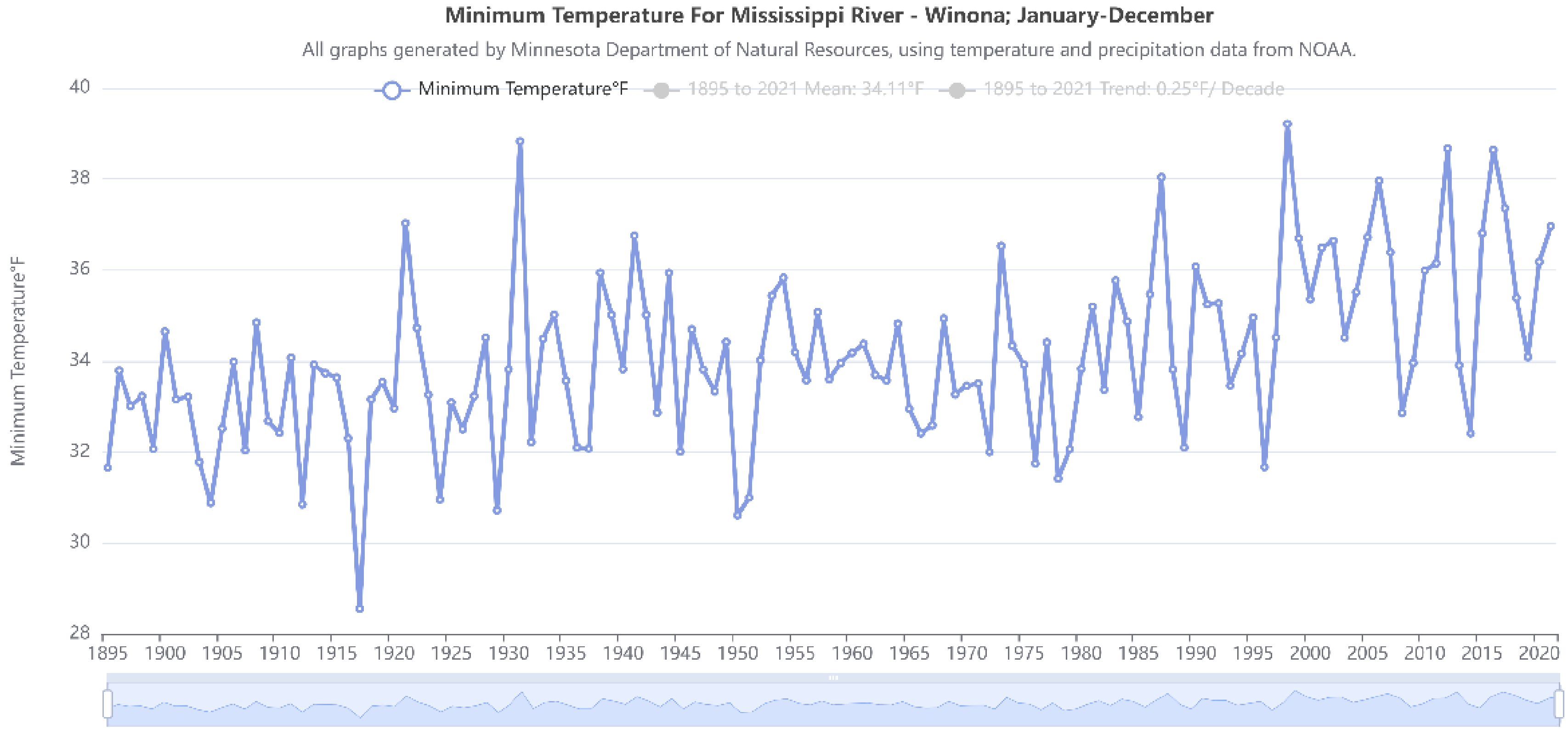
Exhibit 3


Minimum Temperature For Mississippi River - Winona; January-December
All graphs generated by Minnesota Department of Natural Resources, using temperature and precipitation data from NOAA.
Minimum Temperature°F
1895 to 2021 Mean: 34.11°F
1895 to 2021 Trend: 0.25°F/ Decade
Minimum Temperature°F
40
38
36
34
32
30
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1895
1900
1905
1910
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Exhibit 4

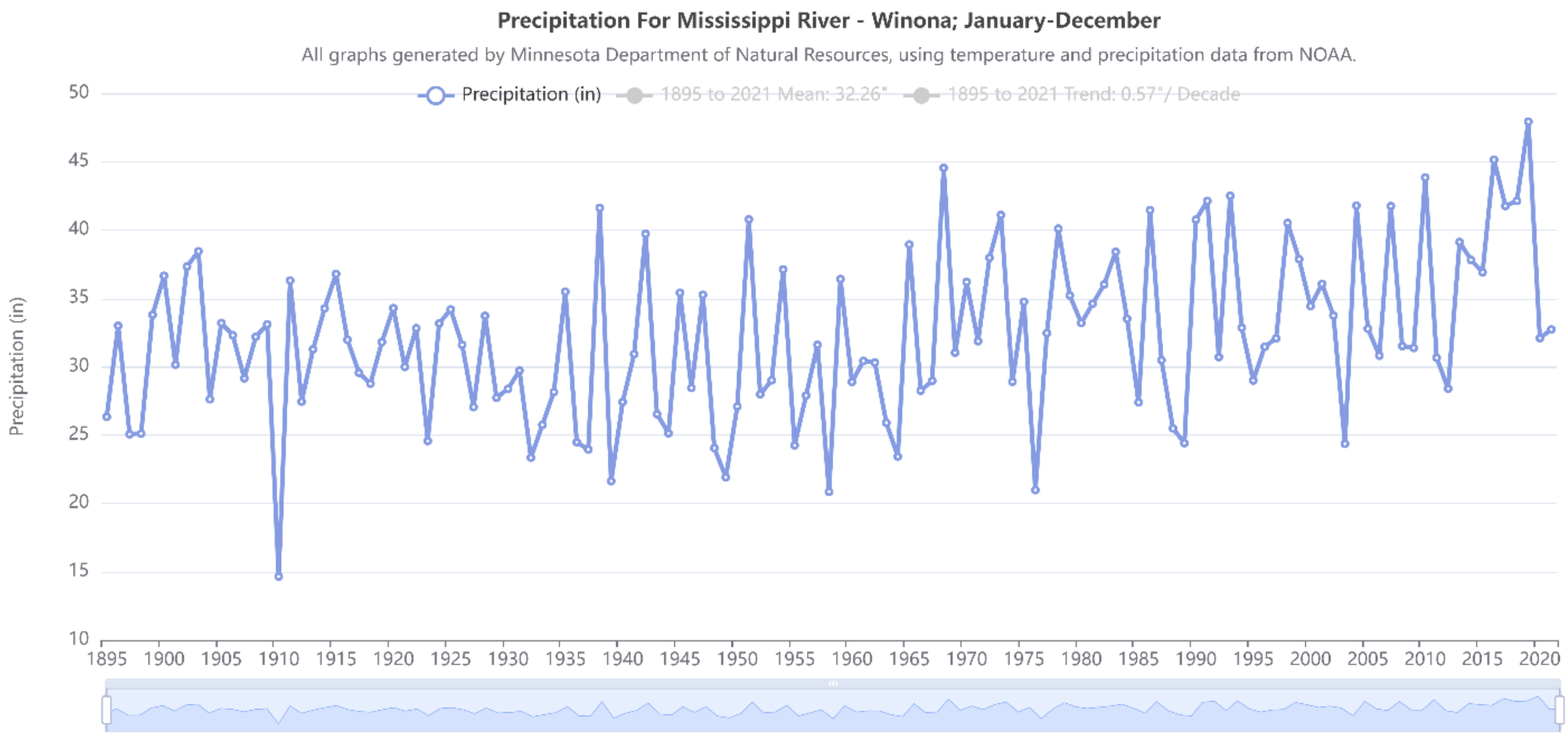
Precipitation For Mississippi River - Winona; January-December
All graphs generated by Minnesota Department of Natural Resources, using temperature and precipitation data from NOAA.
Precipitation (in)
1895 to 2021 Mean: 32.26"
1895 to 2021 Trend: 0.57"/ Decade
Precipitation (in)
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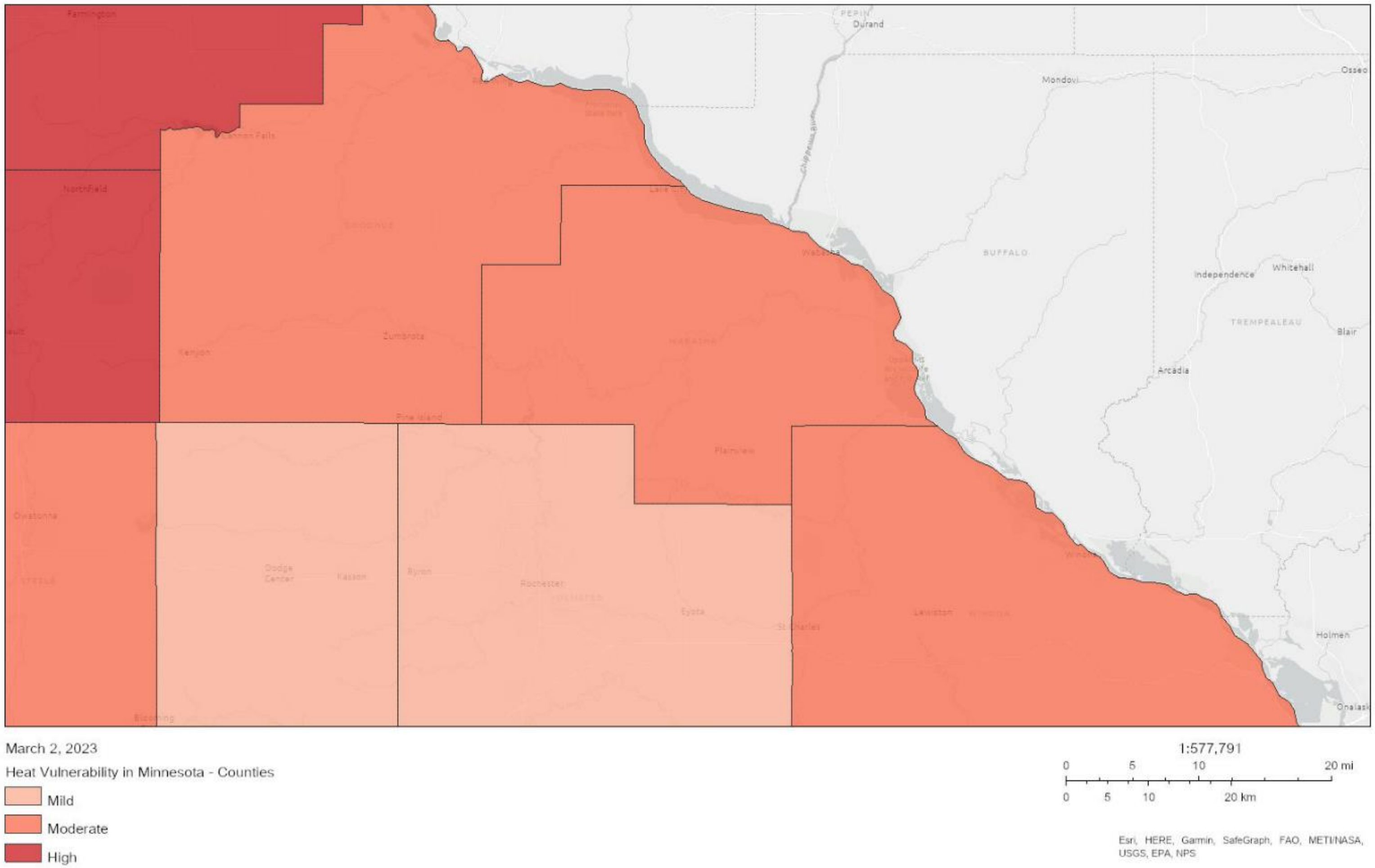
Exhibit 5: Heat Vulnerability in Minnesota – Counties



4.7.2 Environmental Consequences: No-Build Alternative

Projected future data for Mississippi River – Winona Watershed was also evaluated using the Minnesota Climate Explorer. The mid-century (2040-2059) projections fit with the life of the Proposed Project and are summarized below. The data makes projections using RCP 4.5 (representative concentration pathway), which is an intermediate stabilization scenario. The information shown is the model mean of eight general circulation global climate models. Assuming no impact from the Proposed Project, the climate in the region is anticipated to follow the trends below:

- Projected average daily mean temperature: 48.85 degrees Fahrenheit
- Projected daily maximum temperature: 55.52 degrees Fahrenheit
- Projected daily minimum temperature: 42.43 degrees Fahrenheit
- Projected average annual precipitation: 33.00 inches

Comparing the projected values with the historical values, the average daily mean, maximum, and minimum temperatures and the average annual precipitation are all expected to rise over the next few decades regardless of project impacts.

Increased annual average precipitation may also influence the risk of flooding as a result of climate changes. The project area is located within a 100-year floodplain, designated as Zone AE on the FEMA FIRM Map Set (Exhibit 10).[13] According to the Risk Factor tool, the City of Wabasha has a moderate risk of flooding over the next 30 years.[14] The chance of severe storm, or 100-year flood event are projected to increase from one percent in a given year to 26 percent over the next 30 years. This matches with projections for the State, in general, that indicate there will be a "continued loss of cold extremes and dramatic warming of coldest conditions," "continued increase in frequency and magnitude [of extreme rainfall]; unprecedented flash floods," and "more hot days with increases in severity, coverage, and duration of heat waves" by 2099.[15]

[13] Federal Emergency Management Agency (FEMA). 2000. FEMA Flood Map Service Center. Electronic resource, https://msc.fema.gov/portal/search?AddressQuery=wabasha%2C%20mn#, accessed March 2023.

[14] Risk Factor. 2023. "Flood Factor: Wabasha, Minnesota." Electronic resource, https://riskfactor.com/city/wabasha-mn/2767378_fsid/flood, accessed February 2023.

[15] Metropolitan Council. 2023. "Climate Vulnerability Assessment: Regional Risks and Opportunities." Electronic document, https://metrocouncil.org/Communities/Planning/Local-Planning-Assistance/CVA.aspx, accessed January 2023.

Exhibit 6

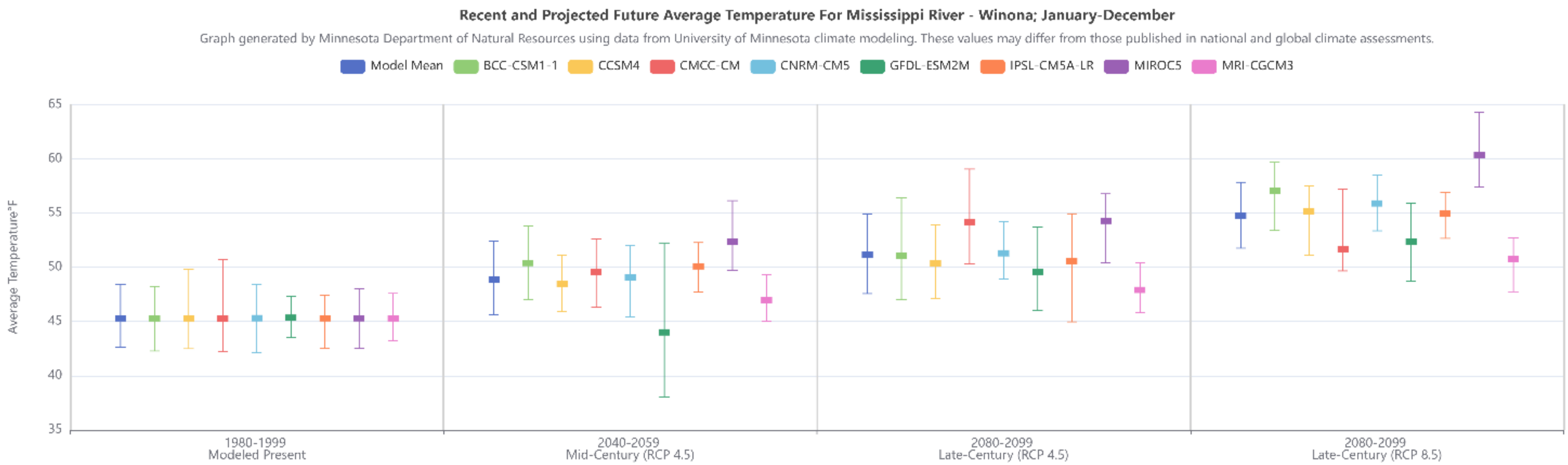

Recent and Projected Future Average Temperature For Mississippi River - Winona; January-December
Graph generated by Minnesota Department of Natural Resources using data from University of Minnesota climate modeling. These values may differ from those published in national and global climate assessments.
Model Mean
BCC-CSM1-1
CCSM4
CMCC-CM
CNRM-CM5
GFDL-ESM2M
IPSL-CM5A-LR
MIROC5
MRI-CGCM3
Average Temperature°F
65
60
55
50
45
40
35
1980-1999
Modeled Present
2040-2059
Mid-Century (RCP 4.5)
2080-2099
Late-Century (RCP 4.5)
2080-2099
Late-Century (RCP 8.5)

Exhibit 7

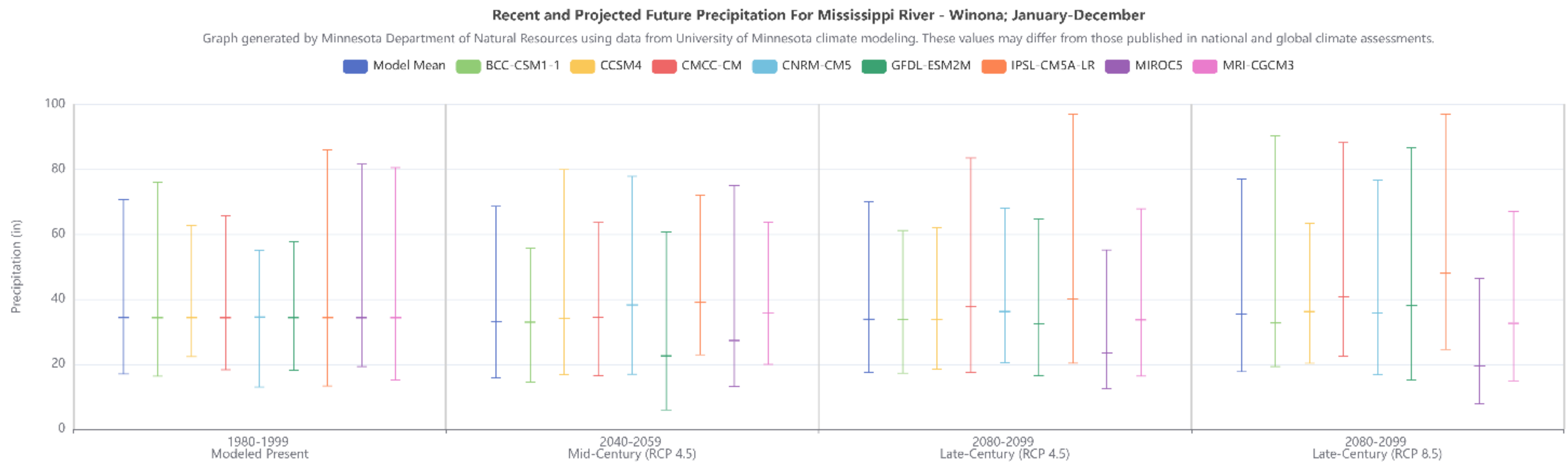

Recent and Projected Future Precipitation For Mississippi River - Winona; January-December
Graph generated by Minnesota Department of Natural Resources using data from University of Minnesota climate modeling. These values may differ from those published in national and global climate assessments.
Model Mean
BCC-CSM1-1
CCSM4
CMCC-CM
CNRM-CM5
GFDL-ESM2M
IPSL-CM5A-LR
MIROC5
MRI-CGCM3
Precipitation (in)
100
80
60
40
20
0
1980-1999
Modeled Present
2040-2059
Mid-Century (RCP 4.5)
2080-2099
Late-Century (RCP 4.5)
2080-2099
Late-Century (RCP 8.5)

Exhibit 8

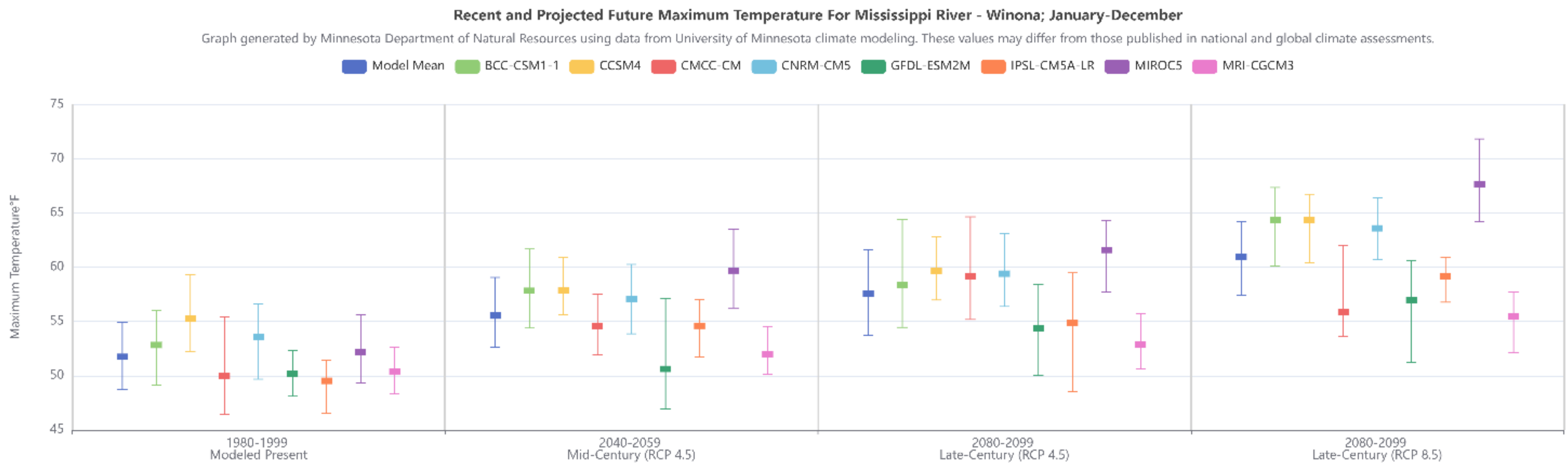

Recent and Projected Future Maximum Temperature For Mississippi River - Winona; January-December
Graph generated by Minnesota Department of Natural Resources using data from University of Minnesota climate modeling. These values may differ from those published in national and global climate assessments.
Model Mean
BCC-CSM1-1
CCSM4
CMCC-CM
CNRM-CM5
GFDL-ESM2M
IPSL-CM5A-LR
MIROC5
MRI-CGCM3
Maximum Temperature°F
75
70
65
60
55
50
45
1980-1999
Modeled Present
2040-2059
Mid-Century (RCP 4.5)
2080-2099
Late-Century (RCP 4.5)
2080-2099
Late-Century (RCP 8.5)

Exhibit 9

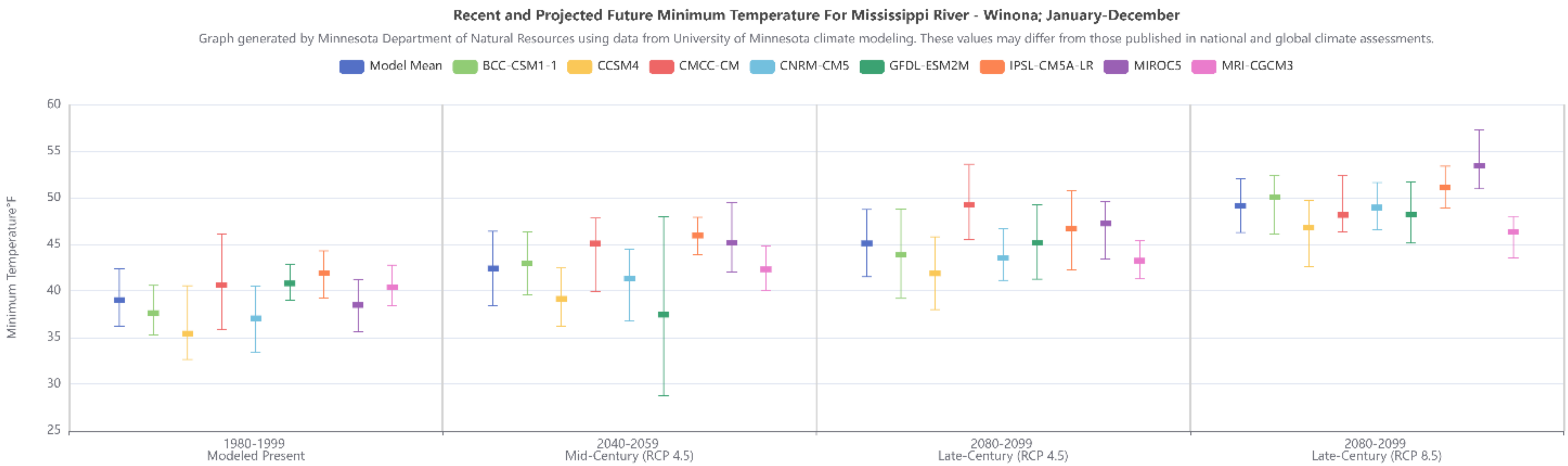
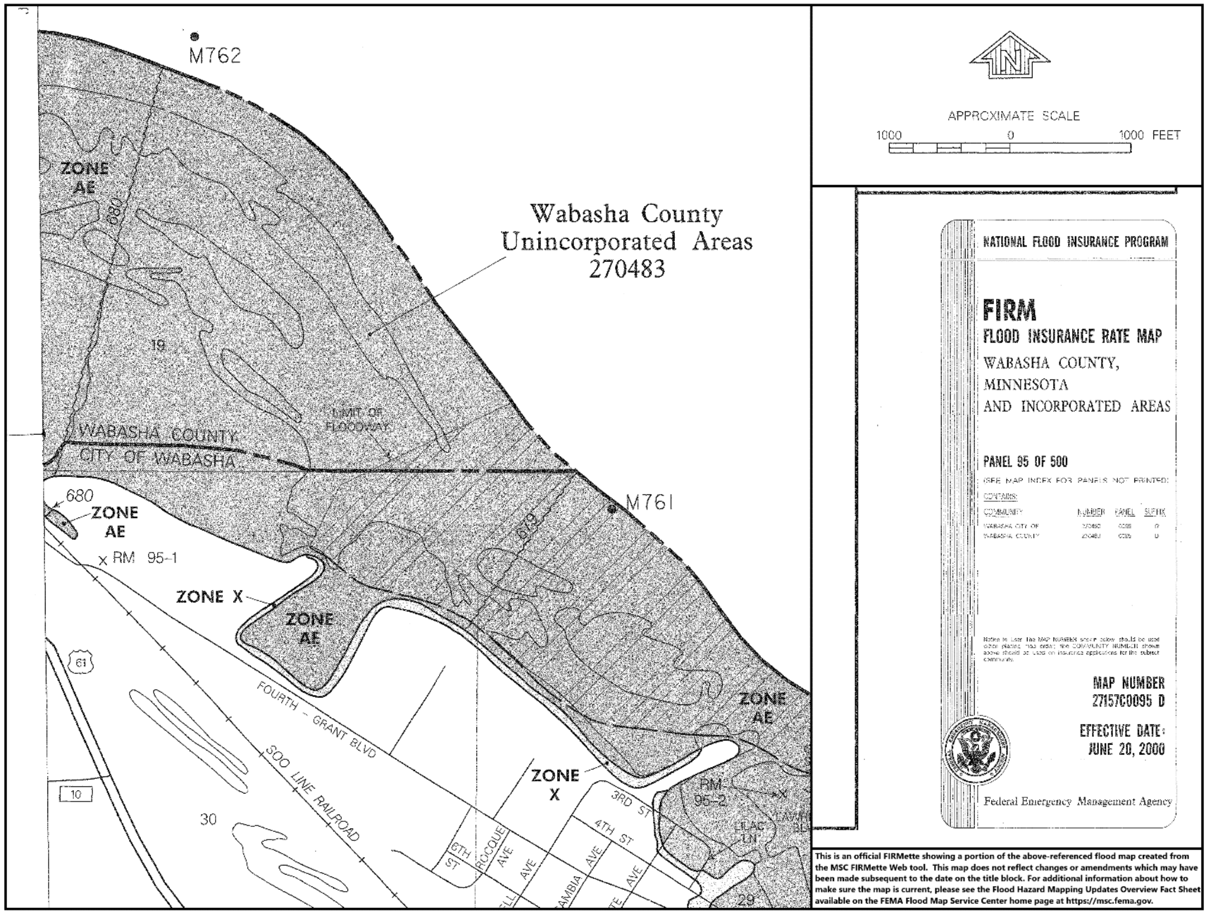

Recent and Projected Future Minimum Temperature For Mississippi River - Winona; January-December
Graph generated by Minnesota Department of Natural Resources using data from University of Minnesota climate modeling. These values may differ from those published in national and global climate assessments.
Model Mean
BCC-CSM1-1
CCSM4
CMCC-CM
CNRM-CM5
GFDL-ESM2M
IPSL-CM5A-LR
MIROC5
MRI-CGCM3
Minimum Temperature°F
60
55
50
45
40
35
30
25
1980-1999
Modeled Present
2040-2059
Mid-Century (RCP 4.5)
2080-2099
Late-Century (RCP 4.5)
2080-2099
Late-Century (RCP 8.5)

Exhibit 10: Section of FEMA FIRM Map Showing Project Area



4.7.3 Environmental Consequences: Preferred Alternative

Given the climate trends towards warmer and wetter conditions and increased potential for severe storm events, the following climate change risks have been identified in relation to the Proposed Project.

Table 3: Climate Trends and Impacts

Climate Trend	Project Information	Adaptations / Resilience
Current and future flood potential and stormwater management during increased rain events.	Clearing of trees and wetland areas and the addition of impervious surfaces may affect drainage within the floodplain.	Design plans for the project include considerations for stormwater maintenance. The City of Wabasha will continue to meet current permitting guidelines and restrictions related. Wetland considerations are further addressed in Section 4.13.2. Further stormwater management information is discussed in in Section 4.13.2.
Increasingly warmer temperatures.	No part of project design is anticipated to have any effect on increasing temperature.	N/A

4.7.4 Mitigation Measures

The City of Wabasha will meet all required permitting standards. No additional mitigation measures directly related to climate change are included in project plans at this time, although sustainable site design and best management practices are incorporated to address extreme weather events and other potential climate change impacts. Site and project design will be reviewed to ensure the Proposed Project is resilient to these potential impacts.

4.8 Greenhouse Gas

4.8.1 Existing Conditions

The Study Area is currently comprised of 16.1 acres of freshwater wetlands and 9.0 acres of wooded area. Wetlands are a source of emissions from various biogeochemical processes: “Under aerobic soil conditions, which are common in most upland ecosystems, organic matter decomposition releases CO_2, and atmospheric CH_4 can be oxidized in the surface soil layer. In contrast, the anaerobic soils that characterize wetlands can produce CH_4 (depending on the water table position) in addition to emitting CO_2. Accordingly, wetlands are an inherent source of CH_4, with globally estimated emissions of 55 to 150 teragrams (Tg) of CH_4 per year."[16] While data specific to the project location is unavailable, natural riparian wetlands in temperate America produce 0.758 $MTCO_2e$ in CH_4 annually with more methane being generated by wetlands that are permanently wet or more frequently inundated.[17] Conversely, wetlands remove CO_2 from the atmosphere and incorporate it into the vegetation and soil in a process known as carbon sequestration (Exhibit 11, "Carbon Sequestration Process"). One study of freshwater wetlands reported an average rate of carbon sequestration of 70.7 metric tons of CO_2 per acre.[18] Similarly, forested land serves as a carbon sink, reducing net emissions. According to data provided by the EPA, one acre of U.S. forest sequesters 0.84 metric tons of CO_2 per year.[19] Based on the acreage of wetlands and forest within the project area, this would result in an estimated -1,145.83 $MTCO_2e$ annually.

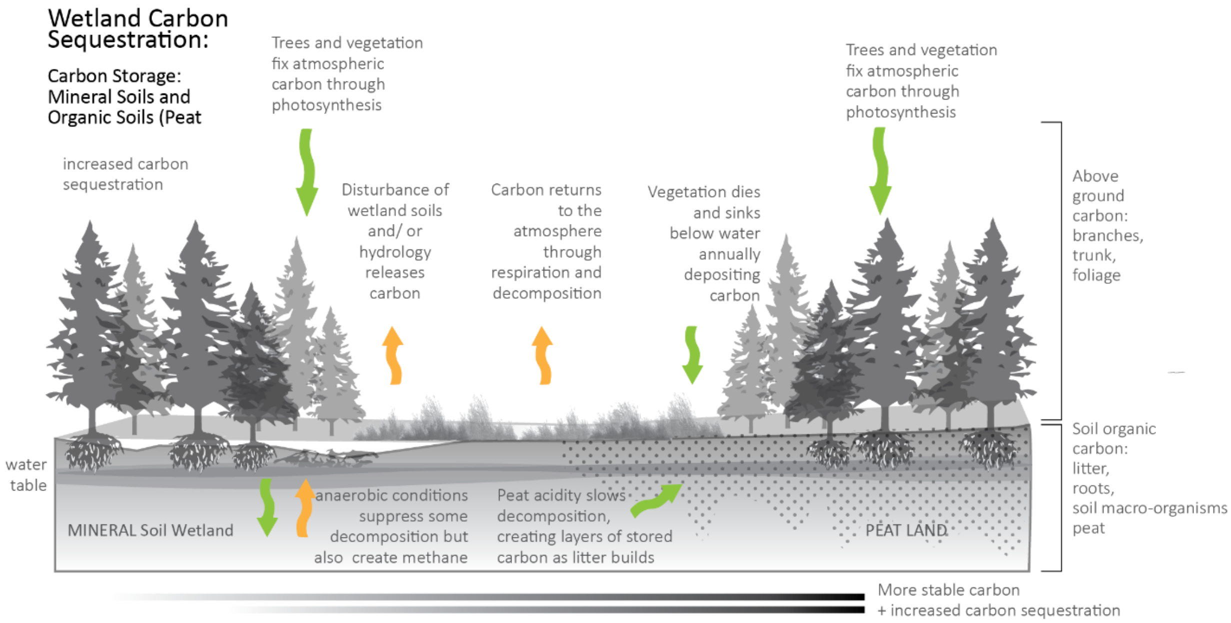
[16] Stephen M. Ogle, Patrick Hunt, and Carl Trettin. 2014. "Chapter 4: Quantifying Greenhouse Gas Sources and Sinks in Managed Wetland Systems." In *Quantifying Greenhouse Gas Fluxes in Agriculture and Forestry: Methods for Entity-Scale Inventory*. Technical Bulletin No. 1939. Office of the Chief Economist, U.S. Department of Agriculture, Washington, DC, p. 4-5.

[17] IPCC. 2014. *2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands*. Hiraishi, T., Krug, T., Tanabe, K., Srivastava, N., Baasansuren, J., Fukuda, M. and Troxler, T.G. (eds). Published: IPCC, Switzerland, p. 5.25

[18] Melanie Sturm. 2019. Stewardship of Wetlands and Soils Has Climate Benefits. Natural Resources Defense Council. Electronic document, https://www.nrdc.org/experts/melanie-sturm/stewardship-wetlands-and-soils-has-climate-benefits, accessed February 2023.

[19] U.S. EPA. 2022. Greenhouse Gases Equivalencies Calculator - Calculations and References. Electronic document, https://www.epa.gov/energy/greenhouse-gases-equivalencies-calculator-calculations-and-references, accessed February 2023.

Exhibit 11: Carbon Sequestration Process[20]



4.8.2 Environmental Consequences: No-Build Alternative

According to the USACE 2017 DMMP, the No-Build alternative would necessitate the transportation of dredged material entirely by trucks. This would require an estimated 459,000 annual haul miles. Assuming that these trucks are medium- to heavy-duty haul trucks that utilize diesel fuel, this would result in estimate annual emissions of 648.0 $MTCO_2e$.[21]

If these emissions are considered together with the carbon sequestration provided by the existing land use within the project area, this ultimately results in net annual emissions of -497.83 $MTCO_2e$ (Table 4, "Emissions Related to No-Build Alternative").

Table 4: Emissions Related to No-Build Alternative

Emissions Type	Emissions Source	Annual Emissions ($MTCO_2e$)
Existing Conditions	Land Cover	-1145.83
No-Build Scenario	Truck Hauling	648.0
		Total = -497.83

[20] Image from Minnesota Board of Water and Soil Resources. 2023. Carbon Sequestration in Wetlands. Electronic document, https://bwsr.state.mn.us/carbon-sequestration-wetlands#:~:text=Wetlands%20are%20some%20of%20the,(N2O)%202., accessed February 2023.

[21] Calculated utilizing the EPA Simplified GHG Emissions Calculator. 2022. Electronic document, https://www.epa.gov/climateleadership/simplified-ghg-emissions-calculator, accessed February 2023.

4.8.3 Environmental Consequences: Preferred Alternative

Greenhouse gas emissions sources are anticipated to include,

- Equipment usage at the project site during construction,
- Equipment usage at the project site for ongoing operations,
- Barge and towboat traffic to and from the docking site,
- Truck and vehicle traffic to and from the project location.

These and other sources of greenhouse gases for the proposed alternative are identified in Table 5, "Emissions Related to the Proposed Project" and discussed below.

Table 5: Emissions Related to the Proposed Project

Emissions Type	Emissions Source	Annual Emissions ($MTCO_2e$)
Construction	Construction Equipment	9.09 (annualized)
Construction	Land Conversion	-1115.28
Operations	Transfer Equipment	23.5
Operations	Truck Hauling	132.5
Operations	Barge Hauling	13.2
		Total = -936.99

Construction

Construction of the Proposed Barge Facility is projected to require a single construction season in 2024. Construction activities will include the filling of 0.4 acres of wetlands, the reduction of 2.7 acres of forested land, the addition of 3.3 acres of impervious surface, and the dredging of approximately 37,000 CY of material to create the access channel to the Proposed Barge Facility.

<u>Construction Equipment</u>

Construction activities for this project are anticipated to include a wide variety of construction equipment of various equipment classes, sizes, and engine types. Typical construction equipment for the land conversion and facility construction activities includes, but is not limited to, excavators, material handlers, skid steers, cranes, bulldozers, pavers, compactors, jackhammers, and haul trucks. These types of vehicles primarily rely on diesel as a fuel source, which results in the emission of CO_2 and, to a lesser extent, CH_4 and N_2O. Dredging equipment may include hydraulic or mechanical types or equipment with different fuel requirements although both types typically utilize diesel fuel, as well.

Table 5 provides an estimate for the emissions generated by approximately 10 diesel-powered pieces of heavy equipment and 10 gasoline-powered passenger vehicles operating for the single construction season anticipated to complete the proposed project (approx. 120 working days)[22] as well as dredging equipment operating for an average of 411 total hours with an average fuel consumption of 16 gallons per hour.[23] The total emissions from these activities (272.6 $MTCO_2e$) are considered one-time emissions, however the industry standard for determining long-term impacts of construction-related GHG output is to annualize the total emissions over a project's lifetime, which is defined as a 30-year period.[24] Annualized, this would be 9.09 $MTCO_2e$.

Land Conversion

As discussed previously, wetlands and forests serve as carbon sinks and reduce net emissions. The reduction of land area for these two cover types will reduce the amount of carbon sequestration in the area from -1,145.83 to -1,115.28 $MTCO_2e$ per year based upon the resulting acreage. Ultimately, since the land conversion that would occur within the Proposed Barge Facility site is anticipated at only 15% of the total Study Area, the remaining wetland and forested areas should still provide an overall net reduction in emissions compared with those generated by the project (Table 5).

Operations

The barge terminal is projected to facilitate the transfer of at least a portion of the 270,000 CY of sand that is annually dredged from the Mississippi River. This material would be moved via river barges to the terminal, transferred using construction equipment such as excavators and backhoes to haul trucks, and transported to off-site facilities for use as reclamation material. Emissions related to dredging are not considered in this analysis as the amount of material being dredged is not anticipated to change from the No-Build alternative. The remaining operational activities (barge transport, transfer from barge to trucks, and truck transport) are sources of emissions that are evaluated in this document.

Barge Transport

Barge transport produces emissions via the combustion of diesel fuels used to power tow vessels. However, these emissions are generally considered relatively minor compared with other methods of transportation. For instance, data from the USACE indicates that barges are able to transport one ton of cargo 616 miles per gallon of fuel compared to the 478-mile capability of railcars and the 150-mile

[22] Calculated utilizing the EPA Simplified GHG Emissions Calculator. 2022. Electronic document, https://www.epa.gov/climateleadership/simplified-ghg-emissions-calculator, accessed February 2023.

[23] WillardSays.com. 2012. *Dredge Production Cost Analysis Spreadsheet*. Electronic document, https://www.willardsays.com/operation-management-safety/dredge-cost-analysis/, accessed March 2023.

[24] Meridian Consultants, LLC. 2016. *Environmental Impact Report (EIR 15-01): Lompoc Motorsports Project, City of Lompoc*. Prepared for the City of Lompoc. Section 4.6 Greenhouse Gas Emissions: 4.6-16.

capability of haul trucks.[25] Furthermore, a single barge has the capacity to haul 1,750 short tons, the equivalent of 16 railcars or 70 trucks.[26]

Given the projected volume of dredged material to be handled by the Proposed Project, and the average fuel capacity of barge transport, it is anticipated that these activities would result in 2.8 $MTCO_2e$ in emissions annually. However, it is anticipated that the Proposed Barge Facility will also facilitate non-USACE related cargo transport. The Proposed Barge Facility will be located midway between existing ports in Red Wing and Winona. In 2018, the Red Wing port received 680 barge loads across 3 docks and the Winona port received 1,512 barge loads across 8 docks. As a midway point between these ports, the proposed barge terminal is anticipated to receive some of this traffic. However, due to space constraints, it is assumed that the proposed terminal will receive no more than 300 barge loads of non-USACE cargo annually. Transport of this amount of cargo will generate approx. 10.4 $MTCO_2e$ annually.[27] Combined with the emissions from the transport of dredged material, this makes a total of barge transport-generated emissions 13.2 $MTCO_2e$ per year.

<u>Material Transfer</u>

In order to transfer dredged material from barges to the trucks that will haul the material off-site, construction equipment such as excavators and backhoes are typically utilized. These types of equipment primarily rely on diesel fuel. Given an estimated operating time of approximately 160 hours a year, based upon the USACE DMMP which outlined an operating period of one month, these types of equipment are anticipated to require approx. 2,240 gallons of fuel each year.[28] Combustion of this fuel results in annual emissions of 23.5 $MTCO_2e$.[29]

<u>Truck Transport</u>

Once transferred into haul trucks, dredged material will be transported to the Wabasha Sand & Gravel Facility. The material may then be transferred to other secondary locations from this point for reclamation activities and other uses, but this is outside of the scope of this analysis. The distance between the Proposed Barge Facility and the Wabasha Sand & Gravel Facility is approximately 1.2 miles (2.4-mile round trip). Transport from the barge terminal to the Wabasha Sand & Gravel Facility will

[25] USACE. 2019. Fact Sheet 13: Comparing Navigation. Electronic document, https://www.mvp.usace.army.mil/Media/Fact-Sheets/Fact-Sheet-Article-View/Article/588155/fact-sheet-13-comparing-navigation/, accessed February 2023.

[26] USACE 2019.

[27] Calculated utilizing the EPA Simplified GHG Emissions Calculator. 2022. Electronic document, https://www.epa.gov/climateleadership/simplified-ghg-emissions-calculator, accessed February 2023.

[28] Central Power Systems & Services. 2021. Types of Gas for your Rental Construction Vehicle. Electronic document, https://cpower.com/2021/11/16/types-of-gas-for-your-rental-construction-vehicle/#:~:text=While%20each%20make%20and%20model,to%202.5%20gallons%20per%20hour, accessed February 2023.

[29] Calculated utilizing the EPA Simplified GHG Emissions Calculator. 2022. Electronic document, https://www.epa.gov/climateleadership/simplified-ghg-emissions-calculator, accessed February 2023.

require an estimated 93,896 trucking miles annually. The resultant emissions from medium- to heavy-duty, diesel-powered trucks is 132.5 $MTCO_2e$.[30]

4.8.4 Mitigation Measures

In order to minimize any unnecessary emissions, best management practices such as anti-idling restrictions for fossil-fuel powered vehicles will be employed. Future evaluation of alternative fuel vehicles and other emerging technologies will be evaluated as those become cost-effective for construction and other operations. No additional mitigation measures are included in the project plans at this time.

4.9 Geology, Soils, and Topography/Landforms

4.9.1 Geology

4.9.1.1 Existing Conditions

Bedrock Geology

According to the Geologic Atlas of Wabasha County, C-14, Plate 2, bedrock geology beneath the Study Area is predominantly the Eau Claire Formation which consists of sandstone, siltstone, and shale interbedded in thin to medium beds. The sandstone is very fine grained to fine grained. The sandstone and siltstone are light to yellowish gray, variably glauconitic, and commonly contain gray to black brachiopod shell fragments. The shale is greenish gray. Unit coarsens upward, with siltstone and shale replaced in abundance by sandstone. Uppermost 10–20 feet is mostly very fine grained sandstone and minor amounts of siltstone. The unit is 125–150 feet thick. A tongue in the uppermost part of the Eau Claire Formation crops out near Wabasha. [31]

Surficial Geology

The Geologic Atlas of Wabasha County, C-14, Plate 3, shows the surficial geology consists of floodplain alluvium, West Campus Formation, and Grey Cloud terrace. Floodplain alluvium is mainly fine sand and silt on floodplains; includes sand and gravel that infills modern river channels. Some depressions have been filled with thick silty to clayey sediment and includes minor lakeshore sediment along Lake Pepin. Contacts with other map units are commonly scarps. The West Campus formation is comprised of sand and gravelly sand; coarsens to cobbly gravel in places. The sediment is largely reworked from the Mississippi valley train; deposited during early, high stages of the Mississippi River and preserved in terraces above the modern floodplain. The West Campus formation is mapped at three major terrace levels in Wabasha County. The Grey Cloud terrace is 40–50 feet (12–15 m) above Lake Pepin and the

[30] Calculated utilizing the EPA Simplified GHG Emissions Calculator. 2022. Electronic document, https://www.epa.gov/climateleadership/simplified-ghg-emissions-calculator, accessed February 2023.

[31] Mossler, John H. 2001. C-14 Geologic Atlas of Wabasha County, Minnesota. Plate 2-Bedrock Geology. Retrieved from University of Minnesota Digital Conservancy. Available at: https://conservancy.umn.edu/handle/11299/58557.

present floodplain level. The terrace elevation is 700–710 feet (214–216 m) in Lake City and Wabasha. Most contacts with other map units are scarps.[32]

The pollution sensitivity of near surface materials has a high rating across the majority of the Study Area. The sensitivity to pollution of near-surface materials is an estimate of the time it takes for water to infiltrate the land surface to a depth of 10 feet. Generally, areas of coarse-grained material have a higher sensitivity to pollution compared to areas of fine-grained material, except where special conditions (karst, bedrock at or near the surface, mining, and peatlands) occur. No special conditions are mapped or known within the project site.

While Wabasha County is located in a karst region, the Study Area consists of non-karst bedrock, with Cambrian sandstones and shales as the uppermost bedrock layers. Karst bedrock can be found in close proximity to the Study Area, both south and west (Figure 6, "Geologic Conditions/Groundwater").

4.9.1.2 Environmental Consequences: No-Build Alternative

There are no geologic impacts anticipated and existing site conditions will remain.

4.9.1.3 Environmental Consequences: Preferred Alternative

Any potential impacts to geology will occur solely during construction; therefore, no operating or long-term impacts are anticipated as a result of the Proposed Project. Construction impacts are anticipated to include grading of the Proposed Barge Facility site and raising the site to an elevation of approximately 678.6 feet to 680.5 feet, thereby removing the access road and other material transfer infrastructure from the 100-year floodplain, which is at an elevation of 678.6 feet.

No significant geologic features or hazards (karst formations) were identified in the immediate Study Area and therefore impacts are not anticipated.

4.9.1.4 Mitigation Measures

Project construction will limit excavation to ensure avoidance of any sensitive geologic features. Should any of these features be identified or discovered during construction, these activities will be halted until further consultation with state agency personnel is complete.

With karst features located approximately 3,000 feet from the Study Area, and the increased sensitivity of coarse-grained materials such as the sand and gravel aquifers, excavation will be limited to less than 10 feet and will only occur during project construction. Grading activities will include the use of fill material.

[32] Hobbs, Howard C. 2001. C-14 Geologic Atlas of Wabasha County, Minnesota. Plate 3-Surficial Geology. Retrieved from University of Minnesota Digital Conservancy. https://conservancy.umn.edu/handle/11299/58557.

4.9.2 Soils and Topography

4.9.2.1 Existing Conditions

Soils

United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Soil Maps were reviewed within and around the proposed project footprint. The predominant soil types and soil component names within the Study Area are listed in Table 6, "Soil Types Within the Study Area". Additional information regarding the soil hydrologic classification provides insights regarding potential runoff and erosion control measures that may be needed during construction.

Table 6: Soil Types within the Study Area[33]

Map Unit Symbol	Map Unit Key	Component Name	Soils Label	Hydric Rating	Estimated % of Study Area
N646A	1946882	Ceresco	N646A, Ceresco	No	18.8
N648A	1946885	Kalmarville	C648A, Kalmarville	Yes	13.9
MdA	2216395	Meridian	MdA, Meridian	No	2.4
DmA	2216322	Mt. Carroll	DmA, Mt. Carroll	No	3.8
ThA	2216437	Tell	ThA, Tell	No	1.9
Ts	2216441	Terrace escarpments, sandy	Terrace escarpments, sandy	No	3.9
GP	2216134	Udipsamments	GP, Upidsamments	No	49.7
W	2216215	Water	W, Water		5.6

Soils in Wabasha County are generally characterized in the soil survey as silty loam developed on alluvium and sedimentary bedrock. The river terrace and floodplain alluvium is composed of sand and gravel and is about 180 feet thick. This body of sand and gravel is underlain by lower permeability sedimentary bedrock.[34]

The Soil Survey Geographic Database (SSURGO) lists almost half of the Study Area soil as gravel pit and udipsamments. The udipsamments complex has a 0-25 percent slope, is excessively drained, and has sandy and gravelly outwash parent material. The next largest soil types within the Study Area are Ceresco and Kalmarville, respectively, which are *somewhat poorly drained* and *poorly drained*. The

[33] Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture.

[34] City of Wabasha. 2018. Hydrogeologic Assessment of the Drinking Water Source and Wells for the City of Wabasha, Part I.

majority of the Study Area has minimal slopes, except for the portion listed as Ts – terrace escarpments, sandy. This soil type is listed as having steep slopes, with a slope range of 15-60 percent.

The NRCS classifies soils into hydrologic soil groups, A – D:

- Group A – Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands.
- Group B – Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately course texture.
- Group C – Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture.
- Group D – Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays with high swelling potential, soils with a permanent high-water table, soils with a claypan or clay layer at or near the surface, and shallow soils over nearly impervious material.
- Group "/D" – Soils with a high-water table, but if drained conform to the first letter listed before "/D" (for example, A/D, B/D).

See Section 4.13.3. for a discussion of erosion/sedimentation control measures related to stormwater runoff.

Project activities during the construction phase that will impact soils include the dredging of river bottom sediment to create a navigable passage and construction of access road, weighing station, small operations structure, and barge fleeting area. Additionally, dredged sediment will be brought to an upland area of the site.

Operational activities of the Proposed Project will not further impact the soils and topography of the site beyond the temporary placement of transported goods on the site prior to being hauled off-site.

Dredged Material – Sediment and Substrate[35]

The Chippewa River is the major contributor of sand-sized sediment in Lower Pool 4. Sediment quality is generally good in Pool 4. Main channel sediments are primarily medium to coarse sands with only trace amounts (generally less than 3 percent by weight) of silts and clays. Sand, silt, and clay sediments are found within defined sloughs, while finer silt and clay materials are found in marshy backwater areas.

To broadly assess the concentrations and location of contaminants found in Lower Pool 4 sediments, USACE staff collected 28 sediment samples from Lower Pool 4 between 2013 and 2020 (see Figure 3 of the USACE Lower Pool 4 DMMP). To specifically assess the concentrations of contaminants within the

[35] USACE. 2023. Lower Pool 4 Dredged Material Management Plan. https://www.mvp.usace.army.mil/Portals/57/docs/Navigation/DMMP/Lower%20Pool%204/Pool%204_Final%20DMMP.pdf?ver=a8kfBkiPjAIcRyF76dhzjg%3d%3d, accessed July 2023.

Read's Landing access area, two borehole sediment samples were collected in June 2021 (see Figure 3 of the USACE Lower Pool 4 DMMP). Each sample was analyzed for polychlorinated biphenyl (PCB), polycyclic aromatic hydrocarbon (PAH), pesticides and heavy metals and compared to Minnesota Pollution Control Agency's (MPCA) sediment reference values (SRVs) and the sediment quality triad (SQTs), which refer to extent of degradation within the sediment caused by contamination. Of those 31 samples, two were collected in boat harbor at Alma, Wisconsin, three in shoreline access area (Alma Marina and Read's Landing), and 26 in the main navigation channel. Collection data can be found in Appendix F of the USACE Lower Pool 4 DMMP.

In general, the MPCA SRVs limits are higher concentration thresholds than SQTs. Furthermore, level II SQTs are higher than level I SQTs. In terms of concentration levels from low to high, if a contaminant found in sediment is below the SQT level I threshold, it has very low levels of that contaminant and is likely safe for bottom-dwelling aquatic organisms. If the contaminant level is higher than the SQT level I threshold but below the level II threshold, it is likely moderately safe for bottom-dwelling aquatic organisms. If the contaminant level is above the SQT level II threshold, that contaminant is likely at a level that is harmful to those organisms. An exceedance of the SQT level II threshold will often still be well below the SRV threshold, as the SRV thresholds are set at levels to protect human health based on contact with the material in two upland settings. Contaminant thresholds for SRVs in the recreational/residential setting are lower than the commercial/industrial settings because it is assumed that in the former settings there would likely be more contact with the sediment, including contact by children.

To summarize, in order from lowest to highest levels of contamination, are SQT level I, SQT level II, SRVs for residential/recreation, and then SRVs for commercial/industrial.

Results of the 2013-2020 Lower Pool 4 survey and the 2021 borehole samples showed that the sediments in Lower Pool 4 were uncontaminated. There were no SQT or SRV exceedances observed. Additionally, there are no restrictions for upland placement due to contaminant levels.

Topography/Land Forms

Elevations on the site range between 668 to 708 feet above mean sea level.[36] Two-foot contour mapping shows the lowest elevations along the Mississippi River, with a steep bluff along the edge of the floodplain. A USGS topographic map of the proposed site is included in Figure 2.

4.9.2.2 Environmental Consequences: No-Build Alternative

Future flood events are anticipated to increase due to climate change impacts, which may cause shoreline and overland soil erosion. These erosion events may cause increased sediment trapping in the backwater areas of the Mississippi River, reducing viable fishery and aquatic species' habitat. While extreme flood events may move some of this sediment downriver, silt deposition on the Study Area's

[36] Elevations taken from MnTOPO. http://arcgis.dnr.state.mn.us/maps/mntopo/.

floodplain area may lead to an increase of fine sediment on the landscape and potential deposition into wetland areas.

4.9.2.3 Environmental Consequences: Preferred Alternative

The Proposed Project will include dredging an access channel from the main Mississippi River navigation channel as well as areas immediately adjacent to the shoreline where the proposed barge dock will be constructed. The current estimate is 37,000 CY of bottom sediment removed to facilitate barge access to the Proposed Barge Facility site. This sediment will be used as fill – and augmented as needed – on the Proposed Barge Facility site to raise access road and facility locations elevations outside of the 100-year floodplain.

The majority of the Study Area served as a former sand and gravel quarry with areas of highly disturbed soils. Grading during project construction will primarily be completed using fill material from access channel dredging or brought in from offsite. Minimal excavation will occur during construction activities, except in the vicinity of stormwater infiltration areas. Maximum excavation is anticipated not to exceed 10 feet and will be sloped to facilitate stormwater infiltration versus surface runoff following rain events.

4.9.2.4 Mitigation Measures

All project-related construction activities will adhere to appropriate standards and applicable permitting requirements from MPCA and MNDNR for grading and erosion control. MNDNR and/or BWSR-approved seed mixes and wildlife friendly erosion control mesh will be used to ensure soil stabilization. Additionally, a “No-Rise” review and certificate will be requested from FEMA to identify and facilitate any additional floodplain mitigation requirements. The project proposer and contracted companies shall comply with all permits and approvals and include mitigation and monitoring requirements as needed.

4.10 Floodplains

4.10.1 Existing Conditions

The Study Area is subject to frequent inundation of the Mississippi River. The bank of the river is approximately 1500 feet from the Mississippi River centerline and Minnesota-Wisconsin state border within the 2-mile-wide FEMA Zone AE floodplain. This site is currently shown on FEMA FIRM 27157C0095D and can be seen in Figure 7, “Surface Water.” Preliminary hydraulic modeling data for the Mississippi River is available from the MNDNR at the site showing a 100-year flood elevation of 678.6 ft, approximately 8 ft above the existing riverbank. The site is part of an old quarry that falls from approximately elevation 700-feet down to the riverbank, creating a minor backwater bay along the valley wall. The existing river channel is over 35 feet deep in the 100-year flood condition and the side channel at the Study Area is approximately 18 feet deep in the 100-year flood condition, but shallower at normal river flows. The site is affected by backwater due to Lock and Dam 4 (Pool 4) at Alma, WI. This causes sediment to build up within the channel at this location. Additionally, the Chippewa River confluence is approximately two miles upstream of the project area, which carries a significant sediment load and creates a wide delta within the Nelson-Trevino Bottoms State Natural Area.

4.10.2 Environmental Consequences: No-Build Alternative

The no-build alternative would not change the flood flow regime within the Mississippi River. However, future flood events are anticipated to increase due to climate change impacts. Increased erosivity of future flood events may similarly result in increased sediment load and deposition within Lock and Dam Pool 4 and the project site's backwater areas, reducing viable fishery and aquatic species' habitat while depositing silt on the site's wetland areas. The backwater effects of the downstream dam at Alma would continue to slow down low flows and cause increasing sedimentation within the reservoir. Combined with high sediment loads from the Chippewa River, the channel would increasingly fill with sediment and potentially increase flood elevations and inundate wetland and floodplain forest communities.

4.10.3 Environmental Consequences: Preferred Alternative

The site will be regraded and fill will be added within the floodplain for the Preferred Alternative construction. Stockpiled dredge material will be placed on the terminal docking site above the 100-year flood elevation. Impacts to flood elevations are described in the attached report "Preliminary No Rise Certification: USACE Dredge Material Management Plan – Wabasha Barge Facility" (Appendix C). The report details no appreciable impact to flood elevations or velocity due to the proposed barge facility design, and a standard No Rise certification is included.

4.10.4 Mitigation Measures

Bank armoring along the barge dock area is proposed to reduce erosion potential during high flows. Permanent structural components are proposed along the river side of the barge facility to prevent bank erosion and sediment transport downstream. Dredging activities within the side channel to maintain the barge access lane are anticipated to decrease flood risk by increasing conveyance and flood volume storage within the floodplain.

4.11 Aquifers

4.11.1 Existing Conditions

Minnesota is divided into six groundwater provinces based on bedrock and glacial geology. The aquifers within these provinces occur in two general geologic settings: bedrock, and unconsolidated sediments deposited by glaciers, streams, and lakes. The project site is located in the East-Central Province and within the Quaternary water-table and buried unconfined aquifer. The East-Central Province has surficial and buried sand and gravel aquifers that are common. The East-Central Province's aquifers are underlain by thick and extensive sandstone and carbonate (Paleozoic) and (Precambrian) sandstone aquifers.[37]

Groundwater data for the Study Area was obtained from the MNDNR. No springs are currently identified onsite by the MNDNR Spring Inventory. Depth to groundwater within the site is generally 0-20 feet.[38] The project site is not within an existing Drinking Water Service Management Area (DWSMA) or a wellhead protection area (see Figure 6, "Geologic Conditions/Groundwater") but there are DWSMA and Wellhead protection areas within 300 feet. There is an existing unverified well onsite, Well ID: 536092.

4.11.2 Environmental Consequences: No-Build Alternative

There are no anticipated changes or impacts to the aquifer. The property owner may review options and opportunities to see the unverified well.

4.11.3 Environmental Consequences: Preferred Alternative

Although the Study Area is not located within the DWSMA, the sand and gravel nature of this region has the potential to transport potential contaminants to the aquifer. While not anticipated, new potential contaminants have the potential to infiltrate and reach the aquifer through the unverified well. Above-ground storage tanks, while not confirmed, may be incorporated as part of the Proposed Project.

4.11.4 Mitigation Measures

Following completion of project design plans, an Industrial Stormwater permit may be required through the MPCA (SIC Code 4491). The unverified well will be located and managed as needed, either by sealing or identifying its potential for future use. The project site will be in compliance with all MCPA permit requirements. Additionally, coordination with the Minnesota Department of Health (MDH) will help determine the feasibility of confirming and either using or sealing the unverified well currently listed on the site. Pending the incorporation of an above-ground storage tank and its proposed contents, additional requirements will be met through both the MPCA and the MDH, which may include a spill response plan and other requirements.

[37] Adams, Roberta. 2016. Pollution sensitivity of near-surface materials: St. Paul, Minnesota Department of Natural Resources, Minnesota Hydrogeology Atlas Series HG-02, report and plate. Available at: https://www.dnr.state.mn.us/waters/programs/gw_section/mapping/platesum/mha_ps-ns.html.

[38] Peterson, Todd A. 2005. C-14 Geologic Atlas of Wabasha County, Minnesota. Part B, Plate 8 – Hydrogeology of the Unconsolidated and Bedrock Aquifers. Retrieved from MNDNR. https://www.dnr.state.mn.us/waters/programs/gw_section/mapping/platesum/wabacga.html.

4.12 Farmlands

4.12.1 Existing Conditions

Based on information assessed from the Natural Resources Conservation Service Web Soil Survey (WSS), less than 3% of the project area is considered Prime Farmland and this area is confined to the eastern-most edge of the property and a small area right along the roadway (Exhibit 12).

Exhibit 12*:* Prime Farmland Areas[39]

39 Web Soil Survey, Natural Resources Conservation Service, U.S. Department of Agriculture. Data assessed January 17, 2023. https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx.

Summary by Map Unit — Wabasha County, Minnesota (MN157)

Summary by Map Unit — Wabasha County, Minnesota (MN157)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
1658A	Algansee-Kalmarville complex, river valleys, 0 to 3 percent slopes, frequently flooded	Not prime farmland	7.2	14.7%
FbB2	Festina silt loam, 1 to 6 percent slopes, moderately eroded	All areas are prime farmland	0.2	0.5%
GP	Pits, gravel-Udipsamments complex	Not prime farmland	26.3	53.7%
MdA	Meridian sandy loam, 0 to 2 percent slopes	All areas are prime farmland	0.6	1.2%
N646A	Ceresco-Spillville complex, 0 to 3 percent slopes, frequently flooded	Not prime farmland	11.3	23.0%
ThA	Tell silt loam, 0 to 2 percent slopes	All areas are prime farmland	0.9	1.8%
Ts	Plainfield sand, river valley, 15 to 60 percent slopes	Not prime farmland	2.4	4.9%
W	Water	Not prime farmland	0.0	0.1%
Totals for Area of Interest			**48.9**	**100.0%**

4.12.2 Environmental Consequences: No-Build Alternative

No changes are anticipated to the Study Area in the no-build condition. Therefore, farmland will be neither created nor developed. The areas identified are not currently under cultivation and not anticipated to be cultivated anytime in the near future.

4.12.3 Environmental Consequences: Preferred Alternative

Since there are no cultivated areas on the current Study Area, no impacts to farmland are anticipated. There may be minimal impacts to "Prime Farmland" soils in the southwest corner of the project area to facilitate construction of an access road to the barge facility.

4.12.4 Mitigation Measures

Since there are no identified farmland areas on the Study Area, no mitigation measures are required at this time. Best management practices will ensure soil transport is minimal during construction activities.

4.13 Water Resources

4.13.1 Surface Water

4.13.1.1 Existing Conditions

The project site is within the Buffalo-Whitewater watershed (HUC8: 07040003) and immediately adjacent to the Mississippi River. Impaired and public waters are described in Table 7, "Impaired and Public Waters Within One Mile of Wabasha Barge Facility." The Mississippi River is currently impaired for Mercury and PCBs in fish tissue.

Table 7: Impaired and Public Waters Within One Mile of Wabasha Barge Facility

AUID	Name	Impaired Use	Additional Impairments	Distance to Project Area
07-0400-03-627	Mississippi River - U.S. Lock & Dam #4 Pool	Aquatic Life / Consumption	Mercury in fish tissue PCB in fish tissue	Within/adjacent
NA	Brewery Creek	NA	NA	~0.25 mile

Brewery Creek is a steep, small stream within a 3.95 square mile highly-forested watershed that discharges into the Mississippi River just north of the Study Area halfway between the north end of Wabasha and Read's Landing. The Study Area does not directly influence the quality of Brewery Creek.

The Mississippi River receives drainage directly from the Study Area and has a 56,940 sq mi watershed at the project location. The direct drainage area from the Study Area represents less than 0.0003% of the total contributing area to the Mississippi River at the site location. As noted, the Mississippi River is currently impaired for Mercury and PCBs in fish tissue. Just upstream of the site is Lake Pepin, a natural lake formed by the backup of water behind sedimentary deposit of the Chippewa River's delta and Lock and Dam 4 downstream at Alma, Wis. The lake is currently impaired for excess sediment and nutrients which has resulted in multiple Total Maximum Daily Load (TMDL) studies. Lake Pepin is considered part of Pool 4 and its impairments have potential to propagate to the lower pool at the project site if sediment and nutrient loading from the larger watershed are not addressed.

USACE manages estimated dredged material quantities of approximately 270,000 CY of material per year within Lower Pool 4. Stockpiled material is often temporarily placed on elevated sediment deposits on the Chippewa River delta.

4.13.1.2 Environmental Consequences: No-Build Alternative

The Study Area would remain in a mix of natural and historically disturbed vegetated condition in the no-build alternative. This would not change the impairment status of the Mississippi River or other surface waters. Sediment loads from the upstream Lake Pepin, Chippewa River and larger contributing watershed would continue to threaten fish and aquatic life and threaten to fill Pool 4 over time. Dredging activities currently enacted by the USACE would need to find an alternate offloading facility for removal of sediment from the surface waters and floodplain areas. By not constructing the preferred alternative, which expedites the movement of dredged material away from the river, sediment is placed in flood-prone areas for longer periods of time which increases the likelihood that large storm events can sweep dredged material back into the river channel.

4.13.1.3 Environmental Consequences: Preferred Alternative

The construction of the Preferred Alternative includes tree clearing and ground disturbance, leading to increased likelihood for sediment to be transported to downstream surface waters. With cumulative watershed impacts, turbidity may be added to the list of items contributing to the Mississippi River impairment considerations. Furthermore, the site operator's equipment will require fuel (diesel and/or gasoline) and oils (lubricating and hydraulic). The use of these chemicals increases the likelihood of a spill on site that may flow to surface waters.

The in-stream impacts to the Mississippi River are anticipated from dredging for the side channel access that is anticipated along the path shown on Exhibit 1 of Appendix D. [Dredging within the main navigation channel is not the subject of this evaluation.] The dredging associated with the Wabasha Barge Facility includes creating a barge access channel for docking. Dredging associated with these activities will impact 10.2-acres of the Mississippi River, removing approximately 37,000 CY of material (Appendix D, Exhibit 2, "Proposed Wetland Impact Map").

4.13.1.4 Mitigation Measures

The impacts to the Mississippi River will include dredging approximately 37,000 CY of material to create the side access channel for barge traffic. There are no known or anticipated contaminants in the immediate vicinity of the Study Area. Dredging will require permitting through the Corps and MNDNR, and all necessary permit and approval requirements will be followed, in accordance with requisite standards.

The EPA-approved impairments for the Mississippi River are considered non-construction related and all project activities will comply with the NPDES construction stormwater permit. Bank armoring along the proposed transfer site is proposed to reduce erosion potential during high flows and reduce the likelihood of additional impairment to the Mississippi River and adjacent wetland areas. During construction, the contractor will follow stormwater and erosion control best management practices as dictated by the NPDES Permit to reduce or eliminate the potential for increased turbidity or other surface water impacts. Stormwater infiltration practices will filter runoff from the project site to offset sediment loading and treat runoff prior to discharging to surface waters. An Industrial Stormwater permit may be necessary and all site construction activities and operations will comply with these additional permit requirements.

4.13.2 Wetlands

4.13.2.1 Existing Conditions

On June 18, 2020, and June 25, 2020, a field investigation was performed to evaluate and verify the existence and boundary of any aquatic resources located within the study area. The boundaries of the wetlands study area, which do not include the edge of the Mississippi River, are shown on Exhibit 1 of Appendix D. The field investigation found a total of four Type 1 (Seasonally Flood Basin/Floodplain Forest) wetlands (Wetland 1 through Wetland 4). Wetland boundaries shown on Exhibit 1 of Appendix D were approved by the Minnesota Wetland Conservation Act (WCA) Notice of Decision dated September 4, 2020 (Appendix D).

The Study Area was historically used as a gravel pit, at least since the 1930s. Natural features, especially in upland areas of the site, have been degraded from a long history of site use. Site observations indicate that reclamation of the site never took place and it remains largely disturbed. Large stockpiles, abandoned equipment, and debris litter the upland portion of the site in its current state. Based on review of historical aerial photographs of the Project Site, Wetland 1, Wetland 4, and a small portion of Wetland 3 appear to be incidental in nature. The incidental wetlands were likely a result of depressions remaining from gravel mining operations. Invasive species were observed to dominate at least one strata of vegetation within Wetland 1, 2, and 4.

Section 404 of the Clean Water Act (CWA) regulates the discharge of dredged or fill material into waters of the United States, which includes on-site wetlands and the Mississippi River. Section 10 of the Rivers and Harbors Act regulates alteration of navigable waters of the United States. It is anticipated that an Individual Permit through the US Army Corps of Engineers (USACE) will be required to satisfy Clean Water Act Sections 404 and Section 10 of the Rivers and Harbors Act. Section 401 of the Clean Water Act requires a water quality certification for any activity that requires a federal permit for discharge into Waters of the United States. The Minnesota Pollution Control Agency (MPCA) certifies Section 401 water quality and has authority over Waters of the State, including incidental wetlands, isolated wetlands, streams, and other surface waters that are federally or WCA non-jurisdictional.

The CWA and WCA require that impacts to aquatic resources be avoided if practicable alternatives exist. An alternatives analysis to satisfy these regulations will be completed within the required State and Federal permitting documents.

The “No-Build Alternative” and a discussion of mitigation measures are described in the sections below.

4.13.2.2 Environmental Consequences: No-Build Alternative

Under the No-Build alternative, impacts to wetlands from the Wabasha Barge Terminal Project would be avoided. Under a No-Build Alternative, emergency actions such as placement of fill material within the main channel border of the Mississippi River could take place. Aquatic habitats and threatened and endangered species could be impacted by this action under emergency conditions. Project objectives would not be achieved by the No-Build Alternative.

4.13.2.3 Environmental Consequences: Preferred Alternative

The Preferred Alternative includes construction of the Proposed Barge Facility with wetland impacts that have been minimized to the greatest extent practicable while still achieving the project goals. The preferred alternative layout, approved wetlands, and aquatic resource impacts are shown on Appendix D, Exhibits 1 through 3.

The Proposed Project is within a site identified by the MBS as having Moderate Biodiversity Significance (Appendix D, Exhibit 3, “Minnesota Biological Survey Map”. Wetland 3 contributes to this designation and is considered a high value wetland and therefore avoidance of impacts to Wetland 3 was considered a high priority. Wetland 3 is the most natural and undisturbed portion of the site and provides the most potential habitat for protected species. Wetland 3 will not be directly impacted by the preferred alternative and the "Moderate Biodiversity" designation is anticipated to remain intact.

One wetland (Wetland 1) would be permanently impacted by the Preferred Alternative. Proposed impacts to Wetland 1 are due to filling a portion of the wetland for grading and construction of the barge facility. Wetland 1 is adjacent to the proposed barge/dock and off-loading area, which contains the material hauler, hopper, scale, and conveyor system. A portion of that wetland will not be filled, however, as a conservative estimate the entire wetland is considered permanently impacted. Permanent proposed impacts to Wetland 1 are 0.40 acres.

4.13.2.4 Mitigation Measures

Impacts to delineated wetlands and the Mississippi River are proposed as part of the Wabasha Barge Facility project. The proposed project will impact a total of up to 0.40 acres of wetland within Bank Service Area (BSA) 7 and the Mississippi River Watershed.

Mitigation efforts will be completed in accordance with local, State, and Federal regulations. Mitigation requirements will be met prior to construction activities impacting wetlands or streams at the site. The city will work closely with local (LGU), state (MNBWSR, MNDNR, and MPCA), and federal (USACE) agency staff to identify requirements and ensure all potential concerns are addressed. Permit applications and plan sets will be submitted to the appropriate agencies for review.

The preferred method of mitigation will be to purchase credits from a mitigation bank within the same BSA and major watershed as the site. It is anticipated that mitigation for the wetland impacts will occur at a minimum of a 2:1 ratio (i.e., 0.80 acres of wetland replacement for the 0.40 acres of impact) through a purchase of wetland credits within BSA 7.

4.13.3 Stormwater

4.13.3.1 Existing Conditions

The Wabasha Barge Terminal project area was historically used as a gravel pit. Natural features, especially in upland areas of the site, have been degraded from a long history of site use but remain heavily wooded with multiple wetlands on site at the toe of the bluff. Site observations indicate that reclamation of the site never took place and portions of the site remain disturbed. Existing conditions stormwater runoff flows through wooded and wetland areas down a steep bluff before joining the Mississippi River. Existing conditions hydrology is described in depth in the attached document "USACE Dredge Material Management Plan – Preliminary Drainage Memo" (Appendix E).

The Project Site and surrounding surface waters are not located within a defined watershed district or watershed management organization area and thus do not have specific and more stringent pollutant removal requirements for stormwater runoff.

4.13.3.2 Environmental Consequences: No-Build Alternative

The site would continue to experience natural filtering of stormwater through the forest regions, shallow wetlands, and shallow subsurface flow. There would be no anticipated change in flow rates, volumes, or timing of storm flows. Disturbed areas due to prior gravel pit operations would continue to transport more runoff, sediment, and nutrients to the Mississippi River than in naturally occurring conditions.

4.13.3.3 Environmental Consequences: Preferred Alternative

The preferred design adds 3.3 acres of impervious surface to the site by providing an access road and barge docking station with associated infrastructure, increasing discharge rates, runoff volumes, sediment loading and increasing the flashiness of flows within the grading footprint, which discharges directly to the Mississippi River. The preferred Site Plan minimizes the impervious footprint while providing adequate access and maneuverability for dredged material transport operations.

Tree clearing and ground disturbance will occur during construction, leading to increased likelihood for sediment to be transported to downstream surface waters.

4.13.3.4 Mitigation Measures

Ditches will be constructed around the perimeter of the active operations area to collect, store, and treat runoff prior to discharging to the Mississippi River. Areas not part of the facility operations will remain in natural or historically disturbed condition. An infiltration basin is proposed to mitigate impacts to stormwater runoff caused by the proposed alternative, catching stormwater from previously disturbed areas that are currently not receiving treatment.

The design of the infiltration basin is described in the document “USACE Dredge Material Management Plan – Preliminary Drainage Memo” (Appendix E). The water quality volume would infiltrate and receive treatment prior to entering the Mississippi River via shallow subsurface flow. Offsite discharge rates are not increased after mitigation and the majority of stormwater flow throughout the year is treated prior to discharge. Sediment is captured via infiltration pretreatment in the form of rock check dams, mitigating potential sediment load increases due to impervious surface construction.

During construction, the contractor will follow stormwater and erosion control best management practices as dictated by the MPCA NPDES Permit. The EPA-approved impairments for the Mississippi River are considered non-construction related and do not require any additional best management practices or plan review for compliance with the NPDES Construction Stormwater Permit.

4.13.4 Groundwater

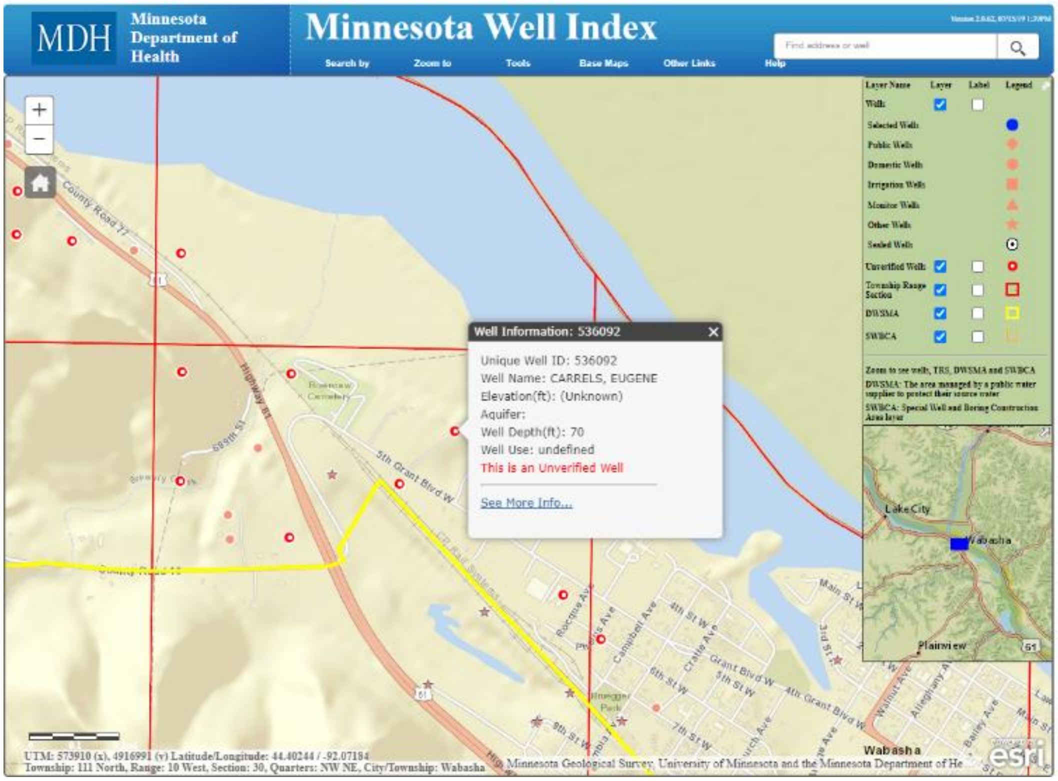
4.13.4.1 Existing Conditions

The Project Site is located within the East-Central Minnesota Groundwater Province and within the Quaternary water-table and buried unconfined aquiver. No springs are identified onsite by the MNDNR

Spring Inventory. Depth to groundwater within the site is generally 0-20 feet.[40] The Project Site is not located within an existing DWSMA or a wellhead protection area (see Figure 6, "Geologic Conditions/Groundwater") but there are DWSMA and Wellhead protection areas located nearby. There is an existing unverified well onsite, Well ID: 536092 (Exhibit 13, "Minnesota Well Index").

[40] Peterson, Todd A. 2005. C-14 Geologic Atlas of Wabasha County, Minnesota. Part B, Plate 8 – Hydrogeology of the Unconsolidated and Bedrock Aquifers. Retrieved from MNDNR. https://www.dnr.state.mn.us/waters/programs/gw_section/mapping/platesum/wabacga.html.

Exhibit 13: Minnesota Well Index



4.13.4.2 Environmental Consequences: No-Build Alternative

No impacts are anticipated to the groundwater aquifer in the No-Build alternative.

4.13.4.3 Environmental Consequences: Preferred Alternative

Although the Project Site is located outside of a DWSMA, the sand and gravel nature of this region has the potential to transport potential contaminants to the aquifer. While the region is within a potential karst area, there are no known karst features or springs that could directly link to groundwater resources.

The treatment of stormwater runoff via and infiltration swale and basin increase local flux of water to groundwater within the lower floodplain bench but is not anticipated to increase nutrient levels or affect groundwater reserves. The footprint of the basin is not expected to increase the water table, which will be most responsive to fluctuation in the Minnesota River levels. When the site gets connected to public utilities – water/wastewater – there are no anticipated impacts and the current system is sufficient to handle the increases.

4.13.4.4 Mitigation Measures

Follow all required guidelines and permit requirements, including best management practices. Should karst or other unique geologic conditions be identified during project construction, activities will halt and the contractor will immediately coordinate the MNDNR for next steps.

Coordination with MDH will help locate the unverified well and manage it appropriately by either sealing the well or otherwise evaluating for future use at the project site.

4.13.5 Wastewater

4.13.5.1 Existing Conditions

There are no wastewater utilities currently connected to the Study Area.

4.13.5.2 Environmental Consequences: No-Build Alternative

There are no anticipated wastewater connections with the No-Build alternative and existing site conditions will remain in place.

4.13.5.3 Environmental Consequences: Preferred Alternative

Wastewater connectivity may occur with future construction of a small operations facility. There are no anticipated impacts to the current wastewater system and it is of sufficient capacity to handle any identified additions.

4.13.5.4 Mitigation Measures

All required permits and regulatory requirements will be followed prior to connecting wastewater utility infrastructure.

4.13.6 Water Appropriation

4.13.6.1 Existing Conditions

There are no water utilities currently connected to the Study Area.

4.13.6.2 Environmental Consequences: No-Build Alternative

There are no anticipated water connections with the No-Build alternative and existing site conditions will remain in place.

4.13.6.3 Environmental Consequences: Preferred Alternative

Water connectivity may occur with future construction of a small operations facility, but no additional appropriations are anticipated as part of this utility connection. There are no anticipated mitigation requirements for when water utilities are expanded to the project site. The current system is of sufficient capacity to handle any anticipated additions.

4.13.6.4 Mitigation Measures

All required permits and regulatory requirements will be followed prior to connecting water utility infrastructure.

4.14 Contamination/Hazardous Materials/Wastes

4.14.1 Existing Conditions

Potentially Contaminated Sites

According to the MPCA's "What's in My Neighborhood" interactive mapping database, there are seven existing potential environmental hazards within ½-mile of the Study Area. Table 8, "MPCA "What's In My Neighborhood Sits within ½ Mile" and Figure 11, "Potentially Contaminated Sites" identifies those uses within a half-mile radius from the proposed site.

Table 8: MPCA "What's In My Neighborhood" Sites within ½ Mile

Site Number	Site Name	Distance of Proposed Site	Activity
No Number Available	KPR US Cardinal Health	0.35 miles	• Hazardous Waste – Minimal Quantity Generator (Active) (MNR000080846) • Industrial Stormwater (Active) (MNRNE338S) • Air Quality (Inactive) (15700031) • Industrial Stormwater (Inactive) (A00016400)
No Number Available	Timm Lawn Care	0.45 miles	• Aboveground Tanks (Active) (TS0124982)
No Number Available	Gunderson St. Elizabeth Medical Center	0.35 miles	• Air Quality (Active) (15700032) • Hazardous Waste – Very Small Quantity Generator (Active) (MND076513209)

Dredged Materials Testing

To broadly assess the concentrations and location of contaminants found in Lower Pool 4 sediments, USACE staff collected 28 sediment samples from Lower Pool 4 between 2013 and 2020 (see Figure 3 of the USACE Lower Pool 4 DMMP). To specifically assess the concentrations of contaminants within the Read's Landing access cut at the head of the pipeline, two borehole sediment samples were collected in June 2021 (see Figure 3 of the USACE Lower Pool 4 DMMP). Each sample was analyzed for polychlorinated biphenyl (PCB), polycyclic aromatic hydrocarbon (PAH), pesticides and heavy metals and compared to Minnesota Pollution Control Agency's (MPCA) sediment reference values (SRVs) and the sediment quality triad (SQTs), which refer to extent of degradation within the sediment caused by contamination. Of those 31 samples, two were collected in boat harbor at Alma, Wisconsin, three in shoreline access area (Alma Marina and Read's Landing), and 26 in the main navigation channel. Collection data can be found in Appendix F of the USACE Lower Pool 4 DMMP.[41]

In general, the MPCA SRVs limits are higher concentration thresholds than SQTs. Furthermore, level II SQTs are higher than level I SQTs. In terms of concentration levels from low to high, if a contaminant found in sediment is below the SQT level I threshold, it has very low levels of that contaminant and is likely safe for bottom-dwelling aquatic organisms. If the contaminant level is higher than the SQT level I threshold but below the level II threshold, it is likely moderately safe for those organisms. If the contaminant level is above the SQT level II threshold, that contaminant is likely at a level that is harmful to bottom-dwelling aquatic organisms. An exceedance of the SQT level II threshold will often still be well below the SRV threshold, as the SRV thresholds are set at levels to protect human health based on contact with the material in two upland settings. Contaminant thresholds for SRVs in the recreational/residential setting are lower than the commercial/industrial settings because it is assumed that in the former settings there would likely be more contact with the sediment, including contact by children.

To summarize, in order from lowest to highest levels of contamination, are SQT level I, SQT level II, SRVs for residential/recreation, and then SRVs for commercial/industrial.

Results of the 2013-2020 Lower Pool 4 survey and the 2021 borehole samples showed that the sediments in Lower Pool 4 were uncontaminated. There were no SQT or SRV exceedances observed. Additionally, there are no restrictions for upland placement due to contaminant levels.

4.14.2 Environmental Consequences: No-Build Alternative

The No-Build Alternative would maintain the current status of the project location with regard to potentially contaminated sites, hazardous materials, and wastes.

4.14.3 Environmental Consequences: Preferred Alternative

A Phase I Environmental Site Assessment was completed in January 2020 and determined that there is no potential risk for contamination due to recognized environmental conditions and previous land uses on the project site. The potential for impacts to the Study Area are considered as a low potential for encountering contaminated materials during project operations.

4.14.4 Mitigation Measures

Any potentially contaminated materials encountered during construction and operations will be handled and treated in accordance with applicable Federal, State, and local regulations. A Phase II Environmental Site Assessment was not recommended for the Project Site.

[41] USACE. 2023. Lower Pool 4 Dredged Material Management Plan. https://www.mvp.usace.army.mil/Portals/57/docs/Navigation/DMMP/Lower%20Pool%204/Pool%204_Final%20DMMP.pdf?ver=a8kfBkiPjAIcRyF76dhzjg%3d%3d, accessed July 2023.

All project-related construction activities will adhere to appropriate standards and applicable permitting requirements from the MPCA, MNDNR, and Wabasha County for grading and erosion control. DNR and/or BWSR-approved seed mixes and wildlife friendly erosion control mesh will be used to ensure soil stabilization.

4.15 Fish, Wildlife, Plant Communities, and Sensitive Ecological Resources

4.15.1 Resources, Habitats, and Vegetation

4.15.1.1 Existing Conditions

The Study Area is located at UMR Mile 760 within the Lower Pool 4 of the Upper Mississippi River. This section of the river is part of the "pooled portion" of the river, which exists upstream of St. Louis, controlled by a series of locks and dams. Construction of the dams in the 1930s significantly altered the ecology of the Upper Mississippi by creating a series of slackwater navigation pools. Pool 4, which is 44.2 miles long, extends from Lock and Dam 3 at Red Wing, Minnesota to Lock and Dam 4 at Alma, Wisconsin, and includes Lake Pepin. Lower Pool 4 provides a variety of aquatic habitats for fish and mussels within main channels, side channels, secondary channels, and backwater areas. Seasonally flooded backwaters also provide habitat for a variety of species including racoon, muskrat, beaver, mink, river otter, white-tailed deer, reptile species, amphibian species, and numerous waterfowl/migratory bird species.

The Upper Mississippi River National Wildlife and Fish Refuge was established in 1924 as a refuge for fish, wildlife and plants and a breeding place for migratory birds. The Upper Mississippi National Wildlife and Fish Refuge is the longest national wildlife refuge in the lower 48 states, extending 261 miles from the Chippewa River in Wisconsin almost to Rock Island, Illinois. The refuge is an important migration site for waterfowl (*e.g.,* ducks, swans, etc.) and the bald eagle, as well as an important nesting site for water birds (*e.g.,* herons, bitterns, etc.) and the bald eagle.[42] Approximately 50 percent of canvasback ducks occurring in the continental US use the refuge during fall migration. It is an Audubon designed Important Bird Area (ABA) and Ramsar designated Globally Important Bird Area. Lower Pool 4 of the Mississippi River is part of the Upper Mississippi National Wildlife and Fish Refuge which is managed by the USFWS. The USFWS also owns and manages adjacent land northwest of the Wabasha Barge Facility project.

According to MNDNR's Ecological Classification System, the Project Site is within the Eastern Broadleaf Forest Province, Paleozoic Section, Blufflands Subsection. "The Bufflands provide a critical migratory corridor for forest songbirds, raptors, and waterfowl. It is the most important subsection for reptiles and

[42] Audubon. 2023. Upper Mississippi River NWR IBA. Electronic document: https://www.audubon.org/important-bird-areas/upper-mississippi-river-nwr-iba, accessed on February 16, 2023.

one of the most important subsections for mollusks".[43] More USGS Species of Greatest Conservation Need (SGCN) are known or predicted to occur within the Blufflands Subsection than any other subsection in Minnesota. There are a total of 156 species on the SGCN list in the Blufflands subsection, 82 of those species are also listed as Federal or State endangered, threatened, or of special concern.

Steep bluffs and deep stream valleys up to 600 feet deep are characteristic of the Blufflands. Two key habitats for the Bufflands Subsection as identified in the Minnesota Comprehensive Wildlife Conservation Strategy[36] are present at the site: cliff/talus habitat and the Mississippi River.

The Minnesota Biological Survey (MBS) ranks survey sites at the conclusion of work in a region. The ranking is based on presence of rare species populations, size and condition of native plant communities, and the context of the site within the greater landscape. A Natural Heritage Review letter dated July 8, 2022 (Appendix G; MNDNR Correspondence # MCE 2022-00127) indicates the Proposed Project is within a site identified by the MBS as having Moderate Biodiversity Significance. "Sites ranked as moderate can contain occurrences of rare species, moderately disturbed native plant communities, and/or landscapes that have a strong potential for recovery." Three State-listed plant species of special concern have been documented at the MBS site, including: green dragon (*Arisaema dracontium*), Gray's sedge (*Carex grayi*), and cattail sedge (*C. typhina*) (MNDNR Correspondence # MCE 2022-00127).

Existing vegetation and conditions at the Project Site based on the wetland delineation completed in June 2020 are described below. Wetland 3, located on the northwest side of the site, is a seasonally flooded forested wetland dominated by silver maple (*Acer saccharinum*), green ash (*Fraxinus pennsylvanica*), and black willow (*Salix nigra*). Herbaceous vegetation observed in wetland 3 include jewelweed (*Impatiens capensis*), creeping jenny (*Lysimachia nummularia*), Canadian clearweed (*Pilea pumila*), and white vervain (*Verbena urticifolia*). Dominant species observed in Wetland 1 were American elm, boxelder, and European buckthorn. Wetlands 1 and 2 contained significant amounts of European buckthorn (*Rhamnus cathartica*), between 25 percent and 55 percent of total shrub cover. Wetlands 1 and 2 appear to have been incidentally created by historical gravel mining operations at the site rather than naturally occurring floodplain forests.

Species observed within upland areas or transition zones of the Project Site in June 2020 include: green ash, American elm, eastern cottonwood (*Populus deltoides*), and northern pin oak (*Quercus ellipsoidalis*) in the canopy layer; American elm, common pricklyash (*Zanthoxylum Americanum*), buckthorn, Bell's honeysuckle (*Lonicera x bella*), Siberian elm (*Ulmus pumila*), and green ash in the shrub/sapling layer; and Pennsylvania sedge (*Carex pensylvanica*), grass-leaved goldenrod (Euthamia graminifolia), creeping jenny, jewelweed, Canadian wood nettle (*Laportea canadensis*), white vervain, Black-fruited clearweed (*Pilea fontana*), switchgrass (*Panicum virgatum*), Virginia creeper (*Parthenocissus quinquefolia*), Kentucky blue grass (*Poa pratensis*), poison ivy (*Toxicodentron radicans*), common blue violet (*Viola

[43] Minnesota Department of Natural Resources. 2006. Tomorrow's Habitat for the Wild and Rare: An Action Plan for Minnesota Wildlife, Comprehensive Wildlife Conservation Strategy. Electronic document, https://files.dnr.state.mn.us/assistance/nrplanning/bigpicture/cwcs/profiles/blufflands.pdf, Accessed on February 20, 2023.

sororia), hop trefoil (*Trifolium campestre*), and American vetch (*Vicia americana*) in the herbaceous layer.

Much of the upland portion of the Project Site has been substantially disturbed by historic mining activities. Site observations indicate that reclamation of the site never took place and remains largely disturbed. To this day, large stockpiles, abandoned equipment, and debris litter the upland portion of the Project Site.

MNDNR has designated Pool 4 of the Mississippi River as a Lake of Outstanding Biological Significance. The criteria for biological significance are based on occurrence and analysis of communities of aquatic plants, fish, birds, and/or amphibians. A lake may meet criteria for only one of the four communities for it to be given a designation. The criteria for the designation of a Lake of Outstanding Biological Significance include:

- High aquatic plant richness, high floristic quality, and a population of an endangered or threatened plant species.
- Important wild rice lakes.
- Exceptional fishery for selected game fish or an outstanding nongame fish community.
- One or more of the following: endangered or threatened colonial waterbird nesting area, presence of several endangered, threatened, or special concern lake bird species, or six or more lake bird Species of Greatest Conservation Need.

4.15.1.2 Environmental Consequences: No-Build Alternative

No additional impacts would occur at the Project Site as a result of the no-build alternative. The project objectives would not be achieved.

4.15.1.3 Environmental Consequences: Preferred Alternative

The Proposed Project is expected to directly impact previously disturbed upland portions of the Project Site, Wetland 1, and the Mississippi River. Approximately 2.7 acres of trees will be cleared for site grading. Wetland 3 is the most natural and undisturbed portion of the Project Site. It is expected that rare and/or protected vegetation occurring at the site would likely occur within Wetland 3. Wetland 3 will not be directly impacted.

Direct impacts to the upland portion of the Project Site will have only a minor impact on habitat as the uplands are generally already impacted. Increased traffic from hauling trucks can pose a hazard to wildlife attempting to cross the Project Site. Increased noise at the Project Site may cause wildlife sensitive to noise to relocate or avoid the Site.

Wetland 1 would be directly impacted by adding fill associated with the barge facility. This would be a permanent impact of 0.40 acres of Type 1 – Seasonally Flooded Wetland. Impacts to Wetland 1 are unlikely to cause loss of rare or protected species as this wetland represents a smaller and lower quality wetland habitat than Wetlands 2 or 3. Wetland 1 is also likely to be incidental in nature, caused by historic mining operations at the site. Animal species would no longer be able to use this wetland and would likely relocate to Wetland 2 or Wetland 3.

Transportation of construction equipment and materials associated with the project site carries the risk of spreading invasive plant species. Invasive species (primarily European buckthorn) have been observed on site within Wetland 1 and Wetland 2. Other invasive species observed at the site include hop trefoil (*Trifolium campestre*), Canada thistle (*Cirsium arvense*), and reed canary grass (*Phalaris arundinacea*).

Impacts to cliff/talus habitat at the site are expected to be minimal and indirect. The existing road and river access will be improved, therefore, no additional bluff areas along the river will need to be altered. Impacts would be related to sound disturbance and increased human activity which may affect animal behavior within the habitat.

Impacts to vegetation within the MBS site of Moderate Biodiversity Significance are expected to be minimal and limited to construction of the barge facility infrastructure in uplands and Wetland 1.

Pool 4 of the Mississippi River is designated as a Lake of Outstanding Biological Significance. This project will not significantly impact valuable or protected plant species, wild rice communities, the use of the lake as an exceptional fishery, or the bird community. Specific impacts to protected species are discussed in Section 4.15.2.

4.15.1.4 Mitigation Measures

Preventing the spread of invasive species during construction and operation of the barge terminal facility will occur as part of BMPs measures that will be put in place to control and appropriately manage vegetation and invasive species. Disturbed areas on the site will primarily be replaced with gravel surfaces (access road, loading and stockpile areas). Reseeding and landscaping materials will be native seed mixes which are free of invasive plants or plant parts.

Impacts to wetlands will be mitigated per Section 4.13.2.

Tree removals will be limited to winter timelines to reduce potential impact to bat and bird species.

Ecologically Significant Areas:
Based on direction from MNDNR (Correspondence # MCE 2022-00127) the following Best Management Practices (BMPs) will be implemented to minimize impacts to the MBS Site of Moderate Diversity, including the minimization of impacts to state-listed plant species of special concern. All equipment will be cleaned and inspected prior to bringing to the site to prevent the introduction and spread of invasive species.

BMPs to mitigate impacts to resources, habitats, and vegetation:

- Vehicular disturbance will be minimized at the site. Vehicles are only to be allowed on the proposed access road.

- Necessary equipment and supplies will be stored/stockpiled in designated areas.
- Dredge material will only be placed in designated upland areas.
- Construction will be conducted during the winter months when the ground is frozen.
- Equipment will be cleaned and inspected prior to bringing to the site to prevent the introduction and spread of invasive species.
- To the extent possible, operations will occur within already-disturbed areas.
- Disturbed areas will be revegetated with native species suitable to the local habitat as soon as possible post-construction.
- Weed-free seed mixes, topsoils, and mulches will be used for revegetation.
- To prevent the release of plastic fibers to the aquatic resources, the use of erosion control blankets will be limited to bio-netting or natural netting that do not contain plastic components. Hydro-mulch products will also be limited to plastic-free types.

4.15.2 Rare, Threatened, and Endangered Species and Ecosystems

4.15.2.1 Existing Conditions

State-Listed Species

Minnesota's Endangered Species Statute and the associated Rules (Minnesota Rules, Chapter 6134 and Parts 6212.1800 to 6212.2300) impose a variety of restrictions, a permit program, and several exemptions pertaining to species designated as endangered or threatened. A person may not take, import, transport, or sell any portion of an endangered or threatened species. Species of special concern are not protected by Minnesota's Endangered Species Statute or the associated Rules.

A query of the Natural Heritage Information System (NHIS) database was completed to assess the potential presence of state-listed threatened, endangered, and species of special concern within a one-mile radius of the project area. The review identified several occurrences of invertebrate animals, vascular plants, and vertebrate animals, including the following:

<u>Invertebrates</u>

- Black Sandshell Mussel (*Ligumia recta*) – Special Concern
- Butterfly Mussel (*Ellipsaria lineolate*) – Threatened
- Monkeyface Mussel (*Theliderma metanevra*) – Threatened
- Mucket Mussel (*Actinonaias ligamentina*) – Threatened
- Purple Wartyback Mussel (*Cyclonaias tuberculata*) – Endangered
- Round Pigtoe Mussel (*Pleurobema sintoxia*) – Special Concern
- Sheepnose Mussel (*Plethobasus cyphyus*) – Endangered
- Spectaclecase Mussel (*Cumberlandia mondonta*) – Endangered
- Spike Mussel (*Euryna dilatate*) – Threatened

- Wartyback Mussel (*Quadrula nodulata*) – Threatened

Plants

- Cattail Sedge (*Carex typhina*) – Special Concern
- Gray's Sedge (*Carex grayi*) – Special Concern
- Green Dragon (*Arisaema dracontium*) – Special Concern
- Muskingum Sedge (*Carex muskingumensis*) – Special Concern

Fish

- American Eel (*Anguilla rostrata*) – Special Concern
- Blue Sucker (*Cycleptus elongatus*) – Special Concern
- Mississippi Silvery Minnow (*Hybognathus nuchalis*) – Special Concern
- Paddlefish (*Polyodon spathula*) – Threatened
- Pirate Perch (*Aphredoderus sayanus*) – Special Concern

Birds

- Peregrine Falcon (*Falco peregrinus*) – Special Concern

Snakes

- Timber Rattlesnake (*Crotalus horridus*) – Threatened

Federally-Listed Species

Under the Endangered Species Act (ESA) (16 U.S.C. §§ 1531-1544), all federal agencies shall, in consultation with the Secretary of the Interior, use their authority to ensure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered or threatened species, or result in the destruction or adverse modification of habitat determined under the ESA to be critical. The ESA provides a program for conserving threatened and endangered plants and animals, and the habitats in which they are found. It is designed to protect critically imperiled species from extinction. The ESA is administered by the United States Fish and Wildlife Service (USFWS). An "endangered" species is a species in danger of extinction throughout all or a significant portion of its range. A "threatened" species is one that is likely to become "endangered" in the foreseeable future without further protection.

A regulatory review for federally-listed species surrounding the project area was conducted using the USFWS's Information for Planning and Consultation (IPaC) tool. The following species were identified during the review:

- Northern Long-eared Bat (*Myotis septentrionalis*) – Endangered (effective 3/31/23)
- Higgins Eye Pearlymussel (*Lampsilis higginsii*) - Endangered
- Spectaclecase Mussel (*Cumberlandia monodonta*) - Endangered

Migratory Birds

The Migratory Bird Treaty Act (MBTA) of 1918 (16 U.S.C. 703-712) prohibits the take (including killing, capturing, selling, trading, and transport) of protected migratory bird species without prior authorization by the Department of Interior USFWS. The Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d) of 1940, amended several times since, prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" bald or golden eagles, including their parts (including feathers), nests, or eggs.

- Bald Eagle (*Haliaeetus leucocephalus*) - Protected
- Black-billed Cuckoo (*Coccyzus erythropthalmus*)
- Golden Eagle (*Aqulla chrysaetos*) - Protected
- Lesser Yellowlegs (*Tringa flaviper*)
- Red-headed Woodpecker (*Melanerpes erythrocephalus*)
- Rusty Blackbird (*Euphagus carolinus*)
- Short-billed Dowitcher (*Limnodromus griseus*)

Species Descriptions and Discussions

Mussels

Lower Pool 4 of the Mississippi River hosts large assemblages of aquatic invertebrates and mussels. Invertebrate diversity can be attributed to the variety of habitats found in the area. Specialized invertebrates that rely on running water can be found in a range of water velocities near the project area. Several mussel surveys have been completed within Lower Pool 4, many of which were associated with channel maintenance and dredging activities. As many as 43 species of mussels have historically been observed in Pool 4.[44] In 2002, 2015, and 2021, the Corps of Engineers completed mussel skimmer dredge transects along the stretch of the river located immediately adjacent to the proposed Barge Terminal Facility. According to the Corps mussel survey data, only two live mussels of two common species (Threehorn Wartyback and Threeridge) were found in 2002. No live mussels were found in this stretch of the Mississippi River during the 2015 or 2021 surveys.

[44] Kelner. 2021. Upper Mississippi River mussel species list. US Army Corps of Engineers, St. Paul District.

The MNDNR and USFWS required a mussel survey for this project. Level II and Level III surveys were conducted June 6th through June 8th, 2023 under Minnesota DNR Special Permit No. 32812 and USFWS Recovery Permit ES59798B-2. No federally listed mussel species were detected during the surveys. One state-listed threatened species, the Mucket, was detected as a rare occurrence. Two species of special concern, the black sandshell and the round pigtoe, were detected live and considered relatively common through the study area. The Final Report – Mussel Survey of the Mississippi River for a Proposed Barge Terminal in Wabasha, MN is included as Appendix F.

The mucket, once a widely distributed species within the Mississippi and Hudson Bay drainages, is not common only in the St. Croix River and some of its tributaries and occurs at low densities in the Mississippi, Zumbro, and Otter Creek rivers according to the MNDNR Rare Species Guide. The mussel prefers medium to large rivers with coarse sand and gravel. Threats to this species includes dams, small population sizes, sedimentation, pollution, channelization, and non-native species, particularly invasive zebra mussels (*Dreissena polumorpha*).

Background review of federally listed mussel species:

The Wisconsin Department of Natural Resources (WIDNR) conducted a survey of unionid mussels throughout the Upper Mississippi River from 1977 through 1979. During that survey, 115 specimens were collected in the Lower Pool 4, of which 13 species were documented, the most abundant being Threeridge, Pigtoe, and Pimpleback.[45] No Higgins eye mussels were observed, Sheepnose and spectaclecase mussels were not listed, and one purple wartyback mussel was observed in Lower Pool 4.

Ten state-listed species of mussel have been observed within a mile of project area including the endangered purple wartyback, sheepnose, and spectaclecase mussels.[46] The spectaclecase mussel is also Federally-listed as endangered as well as the Higgins eye mussel.[47]

Spectaclecase mussels are a large species of mussel, growing up to 9 inches in length. Spectaclecase mussels are found partially or fully buried in sediments of large rivers, preferably in firm mud and sheltered areas. They are known to be extant within 20 streams in 11 states, including the Mississippi River in Minnesota. Within Pool 4, at river mile 760 to 760.5, two individuals were documented in 2009.[48] Threats to this species includes dams, small population sizes, sedimentation, pollution, channelization, and non-native species, particularly invasive zebra mussels (*Dreissena polumorpha*).

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[45] Wisconsin Department of Natural Resources. 1981. A Survey of Unionid Mussels in the Upper Mississippi River (Pools 3-11). Technical Bulletin No. 124. Madison, WI. Electronic document, https://search.library.wisc.edu/digital/AFF3IUKQUQYSEJ8M, accessed on February 20, 2023.

[46] Minnesota Department of Natural Resources. 2023. Natural Heritage Information System. Electronic Resource, https://www.dnr.state.mn.us/nhnrp/nhis.html, accessed on February 17, 2023.

[47] United States Fish and Wildlife Service. 2023. Information Planning and Consultation (IPaC). United States Fish & Wildlife Service. Electronic resource, https://ipac.ecosphere.fws.gov/, Accessed on February 16, 2023.

[48] United States Fish and Wildlife Service. 2019. Spectaclecase (Cumberlandia monodonta) 5-Year Review: Summary and Evaluation. August 12, 2019. Electronic document, https://ecos.fws.gov/docs/five_year_review/doc6103.pdf, accessed on February 22, 2023.

Higgins eye mussel is only found in the Upper Mississippi River, north of Lock and Dam 9 and three tributaries of the Mississippi. USFWS defined ten Essential Habitat Areas (EHAs) for this species as areas of utmost importance to the conservation of the species.[49] The list of EHAs does not include any areas within Pool 4. This species depends on deep, free flowing rivers and clean water. Causes of decline include introduction of invasive species, habitat loss, altered water flow patterns, and dredging and waterway traffic silting over mussel beds. Colonization of exotic and invasive zebra mussels are currently considered the largest threat to this species. Zebra mussels attach to shells of mussels preventing them from normal movement (traveling, burrowing, and closing an opening shells).[8]

In Minnesota, the purple wartyback mussel is currently only known to be extant within the Mississippi River and portions of the St. Croix River.[50] It is considered extremely rare within the Mississippi River. The preferred habitat for this species is gravel substrates in moderate currents of large rivers. Suitable host fish for the glochidia of purple wartyback mussels include: channel catfish, yellow bullhead, flathead catfish, and black bullhead. Threats to the purple wartyback and other protected mussel species are similar to the threats for spectaclecase and higgins eye mussels: dams, sedimentation, pollution, channelization, and non-native species (particularly zebra mussels).

Plants

Four state-listed plant species of special concern have been documented near the site, including: green dragon (*Arisaema dracontium*), Gray's sedge (*Carex grayi*), *Muskingum sedge* (*Carex muskingumensis*), and cattail sedge (*Carex typhina*) (MNDNR Correspondence # MCE 2022-00127).

Green dragon is a facultative-wet species found in active floodplain forests in the eastern United States. The following tree species are often observed occurring with this species: *Populus deltoides*, *Acer saccharinum, Fraxinus pennsylvanica*, *Ulmus americana, Ulmus rubra, Juglans nigra, and Tilia americana.* Ground vegetation occurring in the same habitat may include *Laportea canadensis and Arisaema triphyllum.*[51]

Each of the listed sedge species are perennial wetland species with a clump forming habit. Cattail and Muskingum sedges are wetland obligates. In Minnesota, the habitat for these sedges is restricted to mature floodplain forests along the Mississippi and Saint Croix Rivers. Cattail and Muskingum sedges

[49] United States Fish and Wildlife Service. 2004. Higgins Eye Pearlymussel (Lampsilis higginsii) Recovery Plan: First Revisions. May 2004. Electronic document, https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1031&context=endangeredspeciesbull, accessed on February 22, 2023.

[50] Minnesota Department of Natural Resources. 2018a. Rare Species Guide: Cyclonaias tuberculata. Rev. by Bernard Sietman. Electronic document, https://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=IMBIV09010

Accessed on February 22, 2023.

[51] Minnesota Department of Natural Resources. 2023. Rare Species Guide: Arisaema dracontium. Electronic resource, https://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=PMARA04020, accessed on February 17, 2023.

typically occur in forests dominated by *Populus deltoides* and *Acer saccharinum* with very few shrubs.[52] Gray's sedge is a shade tolerant facultative-wet species. It is found in mature alluvial forests of the eastern United States, particularly along the Mississippi River.[53] Co-occurring canopy tree species for Gray's sedge include *Populus deltoides*, *Acer saccharinum*, *Salix nigra*, *Fraxinus pennsylvanica*, *Ulmus americanus*, *Betula nigra*, *Quercus bicolor*, and *Celtis occidentalus*.[12]

Fish

Pool 4 features a wide variety of aquatic habitats including fast flowing main channels, variable width and depth side channels, secondary channels, and backwater areas. Tailwater habitat is absent in this pool. The diversity of habitat types allows for a wide range of aquatic species. The Upper Mississippi River Restoration (UMRR) program has a Long Term Resource Monitoring (LTRM) station in Lake City that is operated by MNDNR. The Lake City field station performs LTRM of Pool 4 including monitoring water quality, vegetation, macroinvertebrates, and fish. For the period of record (1993 to present), 85 fish species are listed as having been observed in Pool 4.[54]

In 2017, the United States Geological Survey (USGS) released the Species of Greatest Conservation Need national database. This list identifies the species which are most in need of conservation within a given state or territory. Sixteen species from the SGCN database for Minnesota are also recorded as observations in UMRR's LTRM data for Pool 4. Those species include:

- Lake sturgeon *(Acipenser fulvescens)*
- Skipjack herring *(Alosa chrysochloris)*
- Western sand darter *(Ammocrypta clara)*
- American eel *(Anguilla rostrata)*
- Pirate perch *(Aphredoderus sayanus)*
- Crystal darter *(Crystallaria asprella)*
- Blue sucker *(Cycleptus elongatus)*
- Black buffalo *(Ictiobus niger)*
- American brook lamprey *(Lethenteron appendix)*
- River redhorse *(Moxostoma carinatum)*
- Black redhorse *(Moxostoma duquesnei)*
- Hornyhead chub *(Nocomis biguttatus)*
- Weed shiner *(Notropis texanus)*
- Pugnose minnow *(Opsopoeodus emiliae)*
- Paddlefish *(Polyodon spathula)*
- Shovelnose sturgeon *(Scaphirhynchus platorynchus)*

[52] Minnesota Department of Natural Resources. 2023. Rare Species Guide: Carex typhina. Electronic resource, https://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=PMCYP03E40, accessed on February 17, 2023.

[53] Minnesota Department of Natural Resources. 2023c. Rare Species Guide: Carex grayi. Electronic resource, https://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=PMCYP035H0, accessed on February 17, 2023.

[54] Upper Mississippi River Restoration program. 2015. Graphical Fisheries Database Browser – Stratified Random Sampling. United States Geological Survey, Upper Midwest Environmental Sciences Center. Electronic resource, https://www.umesc.usgs.gov/data_library/fisheries/graphical/fish_front.html, accessed on February 16, 2023.

Nine of those species have been observed in Lower Pool 4 within the last 10 years (UMRR 2015):

- Western sand darter *(Ammocrypta clara)*
- American eel *(Anguilla rostrata)*
- Pirate perch *(Aphredoderus sayanus)*
- Blue sucker *(Cycleptus elongatus)*
- American brook lamprey *(Lethenteron appendix)*
- River redhorse *(Moxostoma carinatum)*
- Black redhorse *(Moxostoma duquesnei)*
- Weed shiner *(Notropis texanus)*
- Pugnose minnow *(Opsopoeodus emiliae)*

Paddlefish (*Polyodon spathula*), a state-listed threatened fish, as well as several other state-listed fish have been documented in Pool 4 of the Mississippi River. Paddlefish populations have decreased in recent decades and are now primarily found in the slower and deeper sections of the Mississippi and St. Croix Rivers.[55] Research completed by UMRCC list paddlefish as an occasional species (occasionally collected, not generally distributed, but local concentrations may occur) in Pool 4.[56] Paddlefish use a wide variety of habitat types within the UMR, including tailwaters (absent from Pool 4), backwaters, main channel borders, and main channels. They may also be found near structures where scour holes, eddies, or current breaks occur.[57] Paddlefish have not been observed in Lower Pool 4 within the last 10 years.[58]

Other state-listed fish species including blue sucker (*Cycleptus elongatus),* Mississippi silvery minnow *(Hybognathus nuchalis),* and pirate perch (*Aphredoderus sayanus)* are listed as species of Special Concern. Research by Steuck et al in 2010 indicates that *blue sucker* is uncommon in Pool 4 and *Mississippi silvery minnow*has been historically documented in Pool 4.

Birds

The Upper Mississippi National Wildlife Refuge (UMNWR – shown in Figure 10, "Outdoor Recreation") is an Audubon Important Bird Area (IBA). Audubon estimates that approximately 40 percent of the

[55] Minnesota Department of Natural Resources. 2016. Minnesota Profile. Paddlefish (Polyodon spathula). Electronic resource, https://www.dnr.state.mn.us/mcvmagazine/issues/2016/may-jun/minnesota-profile-paddlefish.html, accessed on February 16, 2023.

[56] Steuck, M.J., Yess, S., Vooren, A.V., Pitlo, J.M., & Rasmussen, J. 2010. Distribution and Relative Abundance of Upper Mississippi River Fishes. Electronic document, https://docs.wixstatic.com/ugd/d70a05_eb4f98d13f514733b3a43ef8447390ca.pdf, accessed on February 16, 2023.

[57] Upper Mississippi River Conservation Committee. 2020. UMRCC Fisheries Compendium 4th Edition. Electronic resource, https://umrcc.org/wp-content/uploads/2022/04/Compendium-4th-Edition-Final-For-Printer-2-28-2020.pdf, accessed on February 16, 2023.

[58] Upper Mississippi River Restoration program. 2015. Graphical Fisheries Database Browser – Stratified Random Sampling. United States Geological Survey, Upper Midwest Environmental Sciences Center. Electronic resource, https://www.umesc.usgs.gov/data_library/fisheries/graphical/fish_front.html, accessed on February 16, 2023.

nation's waterfowl and shorebirds use the river valley during spring and fall migrations. Three-hundred and five species of birds have been observed in the Upper Mississippi NWR.[59]

In a letter dated July 20, 2022 (Appendix J), the USFWS indicated that there are approximately 60 bald eagle nests in Lower Pool 4 and a nesting colony of great blue herons near the proposed project site. Three of the bald eagle nests are described as being in the vicinity of the project area in the letter.

Bald and golden eagles are currently protected by the Bald and Golden Eagle Protection Act which was enacted in 1940. Bald eagles are also known to occur at the open water at the confluence of the Chippewa River with the Mississippi River during the winter. The nesting season for the bald eagle in the northern United States is from December to September.[60] Bald eagles typically prefer nesting in mature or old-growth forests. A study of 53 active bald eagle nests in the USFWS Winona District of the UMR in 2009 indicated that 93 percent of nesting sites had a supercanopy of eastern cottonwood and silver maple.[61] Nest trees were observed to be the tallest trees in the immediate area at 67 percent of nest sites, however, the nests were on average situated just below the level of the surrounding tree canopy.[20] The majority of nests observed in the Winona District (79%) were on islands or island complexes within the Mississippi corridor.[20]

The peregrine falcon is a state-listed species of special concern and is on the USGS list of SGCN. Peregrine falcons often nest on building and bridges in urban environments. The species is also known to inhabit the cliff/talus system along the Mississippi River within the Blufflands subsection.[62]

Other Wildlife

Northern Long-eared Bat (*Myotis septentrionalis*)

The federal listing of the northern long-eared bat (NLEB) was recently changed from threatened to endangered. Potential threats to the NLEB include white-nose syndrome (WNS), human disturbance in caves, wind turbine-caused mortalities, and habitat loss and degradation. An estimated population decline of 97 to 100-percent over 79 percent of the species range has been caused by WNS.[63]

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[59] Audubon. 2023. Upper Mississippi River NWR IBA. Electronic resource, https://www.audubon.org/important-bird-areas/upper-mississippi-river-nwr-iba, accessed on February 16, 2023.

[60] United States Fish and Wildlife Service. 2007. National Bald Eagle Management Guidelines. Electronic document, https://www.fws.gov/sites/default/files/documents/national-bald-eagle-management-guidelines_0.pdf, accessed on March 2, 2023.

[61] Mundahl, Neal & Bilyeu, Anthony & Maas, Lisa. 2013. Bald Eagle Nesting Habitats in the Upper Mississippi River National Wildlife and Fish Refuge. Journal of Fish and Wildlife Management. 4. 131120115259003. 10.3996/012012-JFWM-009. Electronic document, https://www.researchgate.net/publication/274427630_Bald_Eagle_Nesting_Habitats_in_the_Upper_Mississippi_River_National_Wildlife_and_Fish_Refuge, accessed on February 27, 2023.

[62] Minnesota Department of Natural Resources. 2018b. Rare Species Guide: Falco peregrinus. Electronic resource,

https://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=ABNKD06070#:~:text=The%20Peregrine%20Falcon%20is%20best,are%20brown%20or%20blue%2Dbrown, accessed on February 22, 2023.

[63] United States Fish & Wildlife Service. 2022. Species Status Assessment Report for the Northern long-eared bat (*Myotis septentrionalis*) version 1.2., Electronic document, https://www.fws.gov/sites/default/files/documents/Species%20Status%20Assessment%20Report%20for%20the%20Northern%20long-eared%20bat-%20Version%201.2.pdf, accessed on February 27, 2023.

The NLEB can be found in Minnesota in both the summer and winter. Winter hibernacula including caves, mines, and tunnels, are not present at the Wabasha Barge Terminal site. Summer roosting sites include floodplain forests. NLEB prefer intact mature forest for foraging but are also known to use fragmented and immature forests. Roosting trees have loose bark, broken limbs, cavities, or cracks. Wabasha County is not on the list of known maternity roost trees and/or hibernacula entrances for Minnesota.[64]

Timber Rattlesnake

The timber rattlesnake is a state-listed threatened species. According to the MNDNR, the timber rattlesnake has been observed near the project site. The ideal habitats for the timber rattlesnake in Minnesota are within the Blufflands Subsection of the Mississippi River valley in forested bluffs, south-facing rock outcrops, and bluff prairies.[65] They may be active outside of their dens from April to October. They are most active during the day in spring and fall and at night in summer.

4.15.2.2 Environmental Consequences: No-Build Alternative

No additional impacts would occur at the site as a result of the no-build alternative. The project objectives would not be achieved.

4.15.2.3 Environmental Consequences: Preferred Alternative

Aquatic Organisms

Dredging has the potential to directly affect fish and benthic invertebrates by capturing and removing organisms via the dredge head or push boat propeller, causing harm or fatalities. Direct impacts could also include mortality due to the burial of sessile or less mobile organisms with sediment and degradation of water quality. Dredging operations cause the re-suspension of sediments into the water column, reducing transparency and lowering the amount of available oxygen.

Available dissolved oxygen (DO) in the water column may be reduced due to dredging as a result of the suspension of anaerobic sediments and resulting chemical and biological oxygen demands. Dissolved oxygen may decrease almost 100% in near-bottom waters around a bucket dredge in operation (USACE 2015). The observed decreases in DO are likely to be greatest near the bottom at the dredging location, however, low to moderate DO decreases in the upper water column and general area are also likely.

Impacts to aquatic organisms from dredging are largely correlated with the organism's motility (USACE 2015). Mobile organisms are less affected by dredging activities because they are able to move away from disturbed areas.

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[64] Minnesota Department of Natural Resources and United States Fish and Wildlife Service. 2021. Townships Containing Documented Northern Long-Eared Bat (NLEB) Maternity Roost Trees and/or Hibernacula Entrances in Minnesota. Electronic document, http://files.dnr.state.mn.us/eco/ereview/minnesota_nleb_township_list_and_map.pdf, accessed on March 2, 2023.

[65] Minnesota Department of Natural Resources. 2023d. Rare Species Guide: Crotalus horridus. Electronic resource, https://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=ARADE02040, accessed on March 2, 2023.

Indirect impacts to fish and benthic invertebrates may also be caused by dredging. Indirect impacts could include degradation of water quality, noise disturbance, and physical habitat disturbance including spawning habitat. Indirect impacts may cause behavioral changes in aquatic organisms. Direct and indirect dredging-related impacts would be localized and temporary.

Below is a discussion of the environmental consequences to rare, threatened, and endangered aquatic organisms.

Mussels

Existing mussel species may experience direct mortality and short-term impacts because of the proposed project (dredging activities). Based on the recent mussel survey conducted within the project area June 6th through June 8th, 2023, one state-listed threatened species, the mucket, may be present within the dredging area. Based on historical data and the results of the recent survey, the project would have no impacts on federally listed species.

Fish

Studies have shown that fish move away from actively disturbed areas during dredging and return after completion (USACE 2015). Use of the habitat by fish after dredging depends on the resulting water quality in those locations. Dredged habitats may attract fish due to warmer water during winter months and suspended food.

Fish may be affected by the removal and burial of sessile or less mobile organisms on which the fish feed. The extent of this effect on fish would be determined by the extent and presence of the existing benthic communities in the area and fish that prey on them.

Habitat loss and alteration have been linked to the decline in population of numerous fish species within the Mississippi River, including the paddlefish. Human alteration of rivers has also been cited as one of the contributors to the decline of paddlefish populations in the Upper Mississippi River. Turbulence from barges have also been known to cause mortality of yolk-sac paddlefish larvae (UMRCC 2020). Based on the items listed above, the proposed dredging and barge operations could have an effect on the listed fish species, including paddlefish if present.

Terrestrial Organisms

Vegetation

Potential habitat for cattail sedge, Muskingum sedge, and gray’s sedge exist on-site within Wetland 3. Construction at the site will not impact Wetland 3 and therefore no direct impacts are anticipated for these protected species.

Transportation of construction equipment and materials associated with the project site carries the risk of spreading invasive plant species. Ground disturbance from construction activities also presents a chance for aggressive and opportunistic invasive species to spread. The spread of invasive species can have a detrimental effect on native plant communities and wildlife that use those communities. Impacts associated with the spread of invasive species will be mitigated through the use of BMPs as described in Section 4.15.2.4.

Birds

The project is likely to have some temporary and long-term effects on the bird community due to construction activities (including tree cutting), increased traffic (road and near shore), and anthropogenic noise.

Tree cutting has the potential to reduce the available habitat and nesting sites for bird species. Forested areas along the river at the site, including Wetlands 2 and 3 with eastern cottonwood and silver maple documented as dominant vegetation, have the potential for suitable nesting sites for the bald eagle. A survey of active bald eagle nests should be performed within the vicinity of the site prior to site disturbance which would take place in the nesting season. Buffer guidelines are given in Section 4.15.2.4.

Anthropogenic noise caused by road noise has been linked with the avoidance of those areas by birds, including migratory birds (McClure et al. 2013). Impacts due to noise are limited as individuals are able to avoid noise at the site.

With the very large amount of habitat available in the general project area for the full variety of bird behaviors, impacts to the wading bird community are expected to be temporary and minimal.

Cliff/talus habitat near the site could provide suitable habitat for the peregrine falcon. Cliff/talus habitat will not be directly impacted since the existing road and boat ramp locations will be used and improved. Impacts to potential peregrine falcons using the cliff/talus habitat at the site would be limited to potential behavioral changes due to an increase in anthropogenic noise.

Timber Rattlesnake

Forested bluffs along the Minnesota River at the project site could provide habitat for this species. Existing forested bluffs along the river will not be directly impacted by site construction. Infrastructure at the docking area near the river will be constructed in a previously disturbed area where an existing road/path is located. Therefore, habitat for the timber rattlesnake will not be directly impacted.

The three highest causes of mortality in Minnesota's timber rattlesnake populations are poaching, vehicle collisions, and habitat destruction (MNDNR Correspondence # MCE 2022-00127). Snakes, including the timber rattlesnake, are known to use roads for thermoregulation. The chance for vehicle collisions could increase with the construction of this project.

Northern Long-Eared Bat

Potential summer foraging and roosting habitat for the NELB is present at the site. Wetlands 2 and 3, as well as forested uplands could provide habitat for the NELB. Construction at the site will not impact Wetlands 2 or 3. Tree clearing will be limited to 2.7 acres.

4.15.2.4 Mitigation Measures

Minnesota's Endangered Species Statute (Minnesota Statutes, Section 84.0895) and associated Rules (Minnesota Rules, part 6212.1800 to 6212.2300 and 134) prohibit the take of threatened or endangered species without a permit. Prior to the take of a protected species, a USFWS permit to take will be approved. There are no critical habitats listed at the project site for the endangered species (USFWS 2023). The USFWS and MNDNR will be notified in the event of sighting or contact with protected species.

Mitigation measures for aquatic species:

Additional coordination with MNDNR will occur in order to determine the potential for impacts and/or takings of state-protected mussel species in the Mississippi River dredge areas. MNDNR is expected to provide guidance on potential mitigation measures associated with species that may be impacted by site activities.

To prevent harm to spawning populations of paddlefish and other listed fish species, work within the water will be avoided from April to mid-June or further consultation and/or permitting with MN DNR will be required (MNDNR Correspondence # MCE 2022-00127).

To mitigate impacts from dredging operations, standard Best Management Practices (BMPs) will be implemented for dredging activities which includes:

- Dredging locations will be restricted to authorized locations
- Dredging will be restricted to daytime operations during summer months
- Dredging will abide by all applicable federal and/or state regulations which are designed to be protective of aquatic organisms

Mitigation measures for terrestrial species:

Erosion control BMPs will be used on newly exposed soils. These may include the use of wildlife friendly natural fiber, erosion control blankets, silt fencing, synthetic fiber-free hydro-mulch, and rock checks; specifications for BMPs and allowed materials would be included in construction contracts and specifications. Exposed areas of sediment would be stabilized as soon as possible and seeded with an approved BWSR seed mix to establish vegetative cover. Invasive plant species would be monitored and managed to ensure success of native species establishment.

Surveys of nesting bald eagles will be performed prior to on-land construction activities at the site. If active nests are found, no construction activities will be completed within a buffer of 660-feet from the nest (USFWS 2007).

Tree cutting will be minimized at the site to preserve habitat. Minimizing areas of disturbance, including natural vegetation and tree removals, will be limited to the extent possible. Approximately 2.7 acres of trees will be cut. Tree removal will be limited to the winter months, between November 1 and March 31.

Potential habitat for the timber rattlesnake may occur on site, however, direct impacts are not expected. Because this is a ground dwelling motile species, the potential does exist for vehicular impacts. To mitigate potential impacts to this species:

- Erosion control blankets will be limited to "bio-netting" or other natural netting types
- Working crews will be made aware of the potential to encounter the timber rattlesnake and instructed to not disturb
- DNR will be contacted if rattlesnakes are encountered at the site

4.16 Historic Resources

4.16.1 Existing Conditions

A Phase IA archaeological literature review was prepared by Secretary of the Interior (SOI) standards qualified archaeologists at Bolton & Menk, Inc. (BMI) for the proposed project in August 2021.[66] This report reviewed prior land uses and disturbance within the proposed project area, documented previously recorded cultural resources pertinent to the project area, and made recommendations of proposed appropriate archaeological investigation fieldwork methodology. In a letter dated September 15, 2021, the State Historic Preservation Office (SHPO) concurred with the recommendations pertaining to proposed archaeological field methodology pursuant to its review of the proposed project under applicable State statues (MS 138.665-666 and 138.40).[67] The letter clarified that review pursuant to Section 106, if applicable, would need to be initiated by the lead federal agency, which was anticipated to be the US Army Corps of Engineers (Corps). Since the time of the Phase IA and SHPO review, the proposed ground disturbance limits associated with the project were further defined, limiting the recommended archaeological reconnaissance survey area.

On September 13, 2022, BMI SOI qualified archaeologists conducted a Phase I archaeological reconnaissance survey on the Wabasha Port Authority on privately owned land.[68] No new archaeological sites were identified in the course of the survey and additional testing within a previously recorded archaeological site boundary (21WB0076) outside of the ground disturbance limits failed to yield

[66] August 2021. *Phase IA Archaeological Literature Review for the Wabasha Barge Facility Project, City of Wabasha, Wabasha County, Minnesota*. Prepared for the City of Wabasha. Bolton & Menk, Inc.

[67] September 15, 2021. Wabasha Barge Terminal, T111N, R10W, S30 NE, Wabasha, Wabasha County, SHPO Number 2021-2509. Letter from SHPO to Bolton & Menk, Inc.

[68] September 20, 2022. Phase I Archaeological Survey Letter Report for the Wabasha Barge Facility Project, SHPO No. 2021-2509. Letter report from Bolton & Menk, Inc. to Wabasha Port Authority.

additional cultural materials. BMI recommended no further archaeological investigations for the project as proposed at the time of survey, and recommended a finding of no adverse effect to historic properties. At the time of the archaeological survey, land included in the project area was in private ownership; as such State statutes pertinent to cultural resources did not apply at the time of survey. If the property becomes non-federal, public lands, then MS 138.665-666 and 138.40 will apply.

As part of Corps permitting anticipated to be required for the project, it is anticipated that the Corps will consult with necessary cultural resource parties pursuant to Section 106 of the National Historic Preservation Act (NHPA). If the project receives federal funding through the Maritime Administration (MIRAD), however, the lead federal agency may be the US Department of Transportation (DOT). As the project moves toward the permitting stage it is anticipated these agencies will determine whom will lead the Section 106 process.

4.16.2 Environmental Consequences: No-Build Alternative

There are no identified consequences to historic properties under the No-Build Alternative.

4.16.3 Environmental Consequences: Preferred Alternative

There are no identified consequences to historic properties under the Preferred Alternative as long as the proposed ground disturbance limits are not expanded and/or there are no other significant project modifications relative to that proposed at the time of the Phase I archaeological reconnaissance survey.

4.16.4 Mitigation Measures

There are no identified mitigation measures concerning historic properties.

4.17 Visual Resources

4.17.1 Existing Conditions

The existing visual aesthetic of the project site is primarily woodlands with an assortment of left behind construction equipment and materials (scrap metal and various vehicle parts) that were abandoned following the mining operation that previously occupied this site.

The northern and northwestern portions of the project site contain wetlands and provide views of the Mississippi River. The eastern, western, and southern borders of the project site provide views of the surrounding agricultural land and the forested hillside located west of US Highway 61.

4.17.2 Environmental Consequences: No-Build Alternative

The No-Build Alternative would maintain the current status of the project location with regard to scenic views, vistas, and visual effects.

4.17.3 Environmental Consequences: Preferred Alternative

The proposed project would alter the existing visual aesthetic of the project site with the introduction of trucks, barges, other industrial equipment, storage facilities, and the temporary introduction of construction vehicles and equipment. This altered visual aesthetic would be visible from neighboring parcels, roadways, the Mississippi River, and from the surrounding hillside.

4.17.4 Mitigation Measures

Barge facility operations will occur primarily during day-time working hours. Exterior lights, if installed at the facility, will be down-casting and set on timers to reduce wildlife and aesthetic impacts during non-operating hours.

4.18 Dust and Odors

4.18.1 Existing Conditions

The existing project site is of vacant land use and there are no activities currently occurring on the project site that contribute existing dust- or odor-related effects.

4.18.2 Environmental Consequences: No-Build Alternative

The No-Build Alternative would maintain the current status of the project location with regard to dust and odors.

4.18.3 Environmental Consequences: Preferred Alternative

The proposed project may generate minor dust-related impacts during construction and operation because of vehicles operating within the site along internal roads. Dust may also be generated from the offloading of materials, transportation, and loading operations. All dust-related impacts are anticipated to be minor and typical of an industrial facility located in a rural setting.

The Proposed Project is not anticipated to generate any nauseous odors during construction or operations.

4.18.4 Mitigation Measures

The operation of the proposed project is not anticipated to generate any adverse impacts or effects related to dust and odors. Any unanticipated dust- or odor-related effects resulting from the construction or operation of the proposed project will be fully mitigated through standard Best Management Practices.

4.19 Noise

4.19.1 Existing Conditions

Existing sources of noise in the vicinity of the proposed project include vehicle traffic on 5th Grant Boulevard West (County Road 59), noise from farming located on parcels adjacent to the project site, and an active freight railroad line located approximately 300 feet south of the project site.

The project site is bounded by the Mississippi River to the north and active agricultural land to the south, east, and west. Some of the agricultural lots adjacent to the project site contain houses, however the nearest lots to the project site that are primarily of residential use are located approximately 0.25 miles southeast of the project site. Additional noise receptors in the vicinity of the proposed project include: the Riverview Cemetery, approximately 250 feet west of the project site; the Gunderson St. Elizabeth Hospital, approximately 2,000 feet east of the project site; and a couple rural residents south of 5th Grant Blvd (County Road 59), approximately 1,600 and 1,750 feet south.

4.19.2 Environmental Consequences: No-Build Alternative

The No-Build Alternative would maintain the current status of the project location with regard to noise.

4.19.3 Environmental Consequences: Preferred Alternative

Operational Noise

The proposed project would follow the noise regulations outlined in the project operator agreement, which limit construction and operational activities to 7:00am - 6:00pm, Monday through Friday. Construction-related noise effects from the proposed project would be minor and temporary in nature, generated by the use of construction vehicles and equipment, as well as barges, during the construction of the barge terminal pad, access road, dock/mooring piles, barge staging winch system, loading truck scale, and scale house/field office building. See Table 9, “Typical Construction Equipment Noise Levels at 50 Feet,” for typical noise levels of construction equipment measured at 50 feet.

Table 9: Typical Construction Equipment Noise Levels at 50 Feet

Equipment	Manufacturers Sampled	Total Number of Models in Sample	Peak Noise Level (dBA*)	
			Range	Average
Backhoes	5	6	74-92	83
Front Loaders	5	30	75-96	85
Dozers	8	41	65-95	85
Graders	3	15	72-92	84
Scrapers	2	27	76-98	87
Pile Drivers	N/A	N/A	95-105	101

* Units of “A-weighted decibels”

Source: United States Environmental Protection Agency and Federal Highway Administration

Noise resulting from the proposed project’s operational activities—occurring between 7:00am and 6:00pm, Monday through Friday—would be generated by the loading and unloading of barges and trucks, from trucks and barges used to transport commercial and/or dredged materials to and from the project site, as well as from the personal vehicles of employees traveling to and from the project site, and internal site operations equipment (e.g., material haulers: hoppers, conveyors, etc.).

Traffic Noise

The proposed project would generate traffic-related noise from trucks hauling construction materials during the construction of the proposed project, trucks hauling dredged materials during the operation of the proposed project, and from employees using personal vehicles to travel to and from the project site. However, because the proposed project would include no more than ten parking spaces for employee and operator parking and would generate less than 250 vehicle trips during peak hour operations and less than 2,500 daily trips, traffic congestion and traffic-related noise are not anticipated to adversely affect surrounding areas or sensitive receptors. The proposed project would follow the noise regulations outlined in the project operator agreement, which limit construction and operational activities to 7:00am - 6:00pm, Monday through Friday.

4.19.4 Mitigation Measures

The proposed project would follow the noise regulations outlined in the project operator agreement, which limit construction and operational activities to 7:00am - 6:00pm, Monday through Friday.

The project operator agreement is consistent with the State of Minnesota rules (MN Statute 7030.0020), which define daytime hours as 7am to 10pm, and nighttime hours as 10pm to 7am. All construction and operational activities associated with the proposed project would conform with the project operator agreement as well as the State of Minnesota noise standards listed in Table 10, “Noise Standards (MN Statute 7030.0040).”

Table 10: Noise Standards (MN Statute 7030.0040)

Noise Area Classification	Daytime		Nighttime	
	L_{50}	L_{10}	L_{50}	L_{10}
1 (Residential)	60	65	50	55
2 (Commercial)	65	70	65	70
3 (Industrial)	75	80	75	80

*L_{10} is the sound level, expressed in dBA, which is exceeded 10% of the time for one hour

*L_{50} is the sound level, expressed in dBA, which is exceeded 50% of the time for one hour

4.20 Transportation

4.20.1 Traffic

4.20.1.1 Existing Conditions

The barge terminal site is located along 5th Grant Boulevard W (also known as Wabasha County Road 10), a collector roadway with low traffic volumes. Access to the site is approximately a half mile south of the 5th Grant Boulevard intersection with Minnesota Trunk Highway (TH) 61, a principal arterial that provides regional mobility for passenger vehicle and freight trips along this segment of the Mississippi River. Operations to the barge terminal site would see trucks traveling to/from the site using 5th Grant Boulevard W to the north and accessing TH 61 at the 5th Grant Boulevard/County Road 10 intersection. There are two existing intersections that are along the truck route between the barge site and one of the proposed onshore transfer sites: TH 61 and 5th Grant Boulevard W, and TH 61 and Shields Avenue. This onshore transfer site is being used in the EIS analysis as a reference to calculate distance and potential impacts in transportation routes and greenhouse gas emissions (see Section 4.8).

Existing (2022) average daily traffic volume (ADT) along 5th Grant Boulevard is approximately 525 vehicles, Highway 61 is 5,700 vehicles, and Shields Avenue has an ADT of 1,700 vehicles. Based on current levels of traffic, there is minimal approach delays for all roads within the study area. The intersections of TH 61 at 5th Grant Boulevard W/County Road 10 and TH 61 at Shields Avenue operate at level of service (LOS) A during both the AM peak hour and the PM peak hour. A LOS of A indicates free-flow conditions with minimal travel delays. Therefore, there are no mobility concerns at these intersections.

A 3-year (2019-2021) crash analysis was completed for the three intersections being investigated in the study area. Crash data was reviewed from the Minnesota Crash Mapping Analysis Tool. Intersection crash rates and critical rates were calculated, and all three intersections are operating within the normal range for similar intersections. Therefore, there are no safety concerns at these intersections.

4.20.1.2 Environmental Consequences: No-Build Alternative

In a no-build scenario, traffic operations will remain the same, and all study area intersections will operate with acceptable LOS, and traffic volumes will remain unchanged. The 5th Grant Boulevard roadway will not see an increase in traffic nor will construction of the Barge Terminal Site Driveway occur under the No-Build Alternative.

4.20.1.3 Environmental Consequences: Preferred Alternative

With construction of the preferred alternative, the Barge Terminal Site will be constructed along 5th Grant Avenue and a new driveway entrance to the site will be built. Dredged material would be offloaded from barges at the site. Material will then be loaded into trucks and taken offsite, including the site located along Shields Avenue. Traffic entering and exiting the barge terminal site will be minor, with an average of ten trucks in and ten trucks out per hour, between 8:00 AM and 4:00 PM Monday through Friday. There will be a minimal number of additional vehicles accessing the site, including employees and equipment service/delivery vehicles that will periodically visit the site. Due to the low volume of traffic that will be accessing the site, a left turn lane to access the site is not warranted and is not proposed to be constructed.

At each of the study area intersections, traffic operations are not expected to be adversely impacted by the preferred alternative. The low volume of vehicles being added per hour, with approximately 20 movements per intersection, will not result in measurable impacts to the current operations or safety conditions.

4.20.1.4 Mitigation Measures

Based upon the analysis completed and documented in the Traffic Impacts Memorandum, included in Appendix H, no transportation mitigation measures are recommended with the construction of the preferred alternative. The analysis of traffic safety and operations suggests that the intersections affected by the operations associated with the new barge terminal facility will continue to safely operate with minimal delay and an acceptable LOS through at least 2042. It is recommended that the traffic volumes and operational LOS continue to be monitored into the future to ensure safety issues do not arise and traffic operations remain high.

4.20.2 Water-Based Transportation

4.20.2.1 Existing Conditions

Lower Pool 4 is a portion of the Upper Mississippi River and describes the region of the river between Lock and Dam 3, located near Hager City, Wisconsin and Lock and Dam 4, located near Alma, Wisconsin. It is an important part of the US Inland Navigation System. The river is an active commercial corridor, with major types of cargo on the river including grain, fertilizer, coal, and petroleum. Maintaining navigability through this reach of the Mississippi River is necessary to connect barge traffic moving between ports upstream as far as Minneapolis-Saint Paul, Minnesota, downstream as far as New Orleans, Louisiana, and to points east and west on the Illinois, Ohio and Missouri Rivers. USACE maintains the navigable river channel at dimensions suitable for commercial vessels drafting 9 feet. The depth of the channel is typically at least 12 feet with a minimum width of 300 feet.

If dredging activities were not to occur, the shipping channel would become unnavigable during periods of low water levels. This would have a large economic impact, as all river shipping would have to be shut down until the river is either high enough for boats to navigate or the river is dredged to allow boats to pass. It is the goal of the USACE to prevent these conditions from occurring.

The river is also heavily used for recreation purposes, with popular water activities including fishing, recreational boating, canoeing, and island beach use. Recreational use activities mostly occur on the river and within Refuge lands. The entire area of the river is very popular and receives high levels of recreational use. This section of the river is part of the Upper Mississippi River National Wildlife and Fish Refuge, which provides high quality fish and wildlife habitat, which are further described in Sections 4.6.4 and 4.15.1.

4.20.2.2 Environmental Consequences: No-Build Alternative

Sediment deposits, which are primarily deposited from the Chippewa River, gradually shrink the depth of the navigable channel. The USACE dredges and removes the sediment deposits from the river. In the no-build alternative, dredging activity will continue, but costs of this process will continue to increase. In recent years, costs have increased dramatically due to the increased distance the dredged material needs to be shipped along the river for long-term placement sites and the related transportation and logistics costs. The current system is not cost-effective and could lead to less dredging activity taking place and the potential for restricted water transportation during low water level events.

4.20.2.3 Environmental Consequences: Preferred Alternative

With the preferred alternative, the proposed Barge Terminal Facility would be chosen by USACE as the onshore transfer site, as it is the best feasible location (per the DMMP) to offload barges on the Minnesota shore of Pool 4 of the Mississippi River. This would change the current process for removing sediment from trucking deposits from current sites adjacent to the river. As it provides a more convenient system for removing sediment for the USACE, this alternative would provide a minor beneficial effect to commercial navigation through its use in maintaining the navigation channel.

4.20.2.4 Mitigation Measures

As dredging activity is already being undertaken, there is very little that will change with water transportation and the dredging process beyond the change in the location of the onshore transfer site. As a result, no mitigation measures are proposed, other than potential signage to inform recreational watercraft of potential barge traffic in the vicinity of the project area. However, future operations should be monitored to ensure challenges do not arise.

4.21 Cumulative Potential Effects

4.21.1 Geographic Scales and Timeframes

It is currently estimated that the port facility will operate for at least 20 years and continue to facilitate the transfer of materials, including but not limited to dredge material and other commodities, from river barges to trucks for transport to off-site facilities. The City of Wabasha would own the project site and contract out the port operations and transportation of materials.

4.21.2 Future Projects

Future projects may include private land use developments in portions of the city planned for future development and redevelopment.

The current Wabasha Comprehensive Plan (2016-2035), last amended July 6, 2021, lists the future land use of the project site as “Industrial.” The Comprehensive Plan discusses Wabasha’s unique location and opportunity for development of a commercial river port facility that would be used for commercial purposes.

Transportation projects are likely to be planned and programmed for construction may involve safety, capacity, pavement preservation, and active transportation modes (ped/bike). These projects will be carried out by MnDOT, Wabasha County, or the city.

4.21.3 Cumulative Effects

Impacts include changes in land cover type (e.g., increased impervious and vegetation/habitat loss), impacts to wetlands, disruption of aquatic and terrestrial species habitat, slight increases in traffic volumes, and adding side channel barge access to the project site. While not anticipated to involve significant social, economic, or environmental effects, all future projects would be subject to applicable local, state, and federal environmental reviews and permitting.

The construction and operation of the Wabasha Barge Facility, as outlined in this DEIS, have the potential to contribute to cumulative effects in the project area. While this DEIS primarily assesses the direct impacts of the proposed project, it is essential to consider its interactions with other past, present, and reasonably foreseeable actions in the region.

Cumulative effects may result from the combined impacts of the proposed project with other local developments, such as transportation infrastructure improvements, nearby land use changes, or other industrial activities. These effects could manifest in various ways, including alterations to traffic patterns, potential changes in air and water quality, habitat fragmentation, and socio-economic dynamics within the community.

While there are no known projects immediately adjacent to the proposed project, ongoing monitoring, consultation with stakeholders, and adaptive management strategies will be incorporated to comprehensively assess and address these cumulative impacts over time.

4.22 Other Potential Environmental Effects

No other potential environmental effects were identified in the development of this DEIS document.

MITIGATION MEASURES

Table 11: Mitigation Measures

SEE Factor	Anticipated Impact	Proposed Mitigation Measures
Property and Right of Way Needs	Purchase of 8.2-acre Proposed Barge Facility site.	Prior to project construction, the City of Wabasha will work with the current landowner, who is identified as a willing seller, to determine fair market value for purchase of the project site. While this DEIS addresses the entirety of the two parcels, the City only intends to purchase the 8.2-acre portion that is necessary for the Proposed Barge Facility. The remaining areas would remain under private ownership.
Land Use, Plans, Zoning, and Special Districts/Overlays	Impact to existing zoning.	Upon completion and approval of the EIS, the city will initiate a zoning amendment to change the parcels from “R1” to “I” in accordance with the city’s future land use plans. Construction standards and specifications will ensure compliance with the City of Wabasha’s Shoreland Overlay Zone.
Parks, Open Space, and Recreational Facilities	Impact to aquatic recreational users from an increase in barge traffic to and from the proposed project site.	Appropriate road and waterway signage will identify this area as increased truck and barge traffic, respectively. Additionally, the contracted operator of the facility will be required to comply with City of Wabasha noise ordinances, and to confine operations to set days and times during the regular work week. This information will be clearly articulated to the contracted facility construction personnel and operators. During the lifespan of the barge facility, the city will routinely audit operations through an impact assessment to identify future additional mitigation requirements and recommendations.
Soils and Topography	The proposed project will include dredging an access channel from the main Mississippi River navigation channel as well as areas immediately	All project-related construction activities will adhere to appropriate standards and applicable permitting requirements from MPCA and MNDNR for grading and erosion control. MNDNR and/or BWSR-approved seed mixes and wildlife friendly erosion control mesh will be used to ensure soil

	adjacent to the shoreline where the proposed barge dock will be constructed. The current estimate is 37,000 CY of bottom sediment removed to facilitate barge access to the project site. This sediment will be used as fill – and augmented as needed – on the project site to raise access road and facility locations elevations outside of the 100-year floodplain.	stabilization. Additionally, a "No-Rise" review and certificate will be requested from FEMA to identify and facilitate any additional floodplain mitigation requirements. The project proposer and contracted companies shall comply with all permits and approvals and include mitigation and monitoring requirements as needed.
Floodplains	The site will be regraded and fill will be added within the floodplain for the preferred alternative construction. Stockpiled dredge material will be placed on the terminal docking site above the 100-year flood elevation. Impacts to flood elevations are described in the attached report "Preliminary No Rise Certification: USACE Dredge Material Management Plan – Wabasha Barge Facility" (Appendix C). The report details no appreciable impact to flood elevations or velocity due to the proposed barge facility design, and a standard No Rise certification is included.	Bank armoring along the barge dock area is proposed to reduce erosion potential during high flows. Permanent structural components are proposed along the river side of the barge facility to prevent bank erosion and sediment transport downstream. Dredging activities within the side channel to maintain the barge access lane are anticipated to decrease flood risk by increasing conveyance and flood volume storage within the floodplain.
Surface Water	The construction of the preferred alternative includes tree clearing and	The EPA-approved impairments for the Mississippi River are considered non-construction related and all project activities will comply with the

	ground disturbance, leading to increased likelihood for sediment to be transported to downstream surface waters. With cumulative watershed impacts, turbidity may be added to the list of items contributing to the Mississippi River impairment considerations. Furthermore, the site operator's equipment will require fuel (diesel and/or gasoline) and oils (lubricating and hydraulic). The use of these chemicals increases the likelihood of a spill on site that may flow to surface waters.	NPDES construction stormwater permit. Bank armoring along the proposed transfer site is proposed to reduce erosion potential during high flows and reduce the likelihood of additional impairment to the Mississippi River and adjacent wetland areas. During construction, the contractor will follow stormwater and erosion control best management practices as dictated by the NPDES Permit to reduce or eliminate the potential for increased turbidity or other surface water impacts. Stormwater infiltration practices will filter runoff from the project site to offset sediment loading and treat runoff prior to discharging to surface waters. An Industrial Stormwater permit may be necessary and all site construction activities and operations will comply with these additional permit requirements.
Wetlands	One wetland (Wetland 1) would be permanently impacted by the preferred alternative. Proposed impacts to Wetland 1 are due to filling a portion of the wetland for grading and construction of the barge facility. Wetland 1 is adjacent to the proposed barge/dock and off-loading area, which contains the material hauler, hopper, scale, and conveyor system. A portion of that wetland will not be filled, however, as a conservative estimate the entire wetland is considered permanently	Mitigation efforts will be completed in accordance with local, state and federal regulations. Mitigation requirements will be met prior to construction activities impacting wetlands or streams at the site. The city will work closely with local (LGU), state (MNBWSR, MNDNR, and MPCA), and federal (USACE) agency staff to identify requirements and ensure all potential concerns are addressed. Permit applications and plan sets will be submitted to the appropriate agencies for review. The preferred method of mitigation will be to purchase credits from a mitigation bank within the same BSA and major watershed as the site. It is anticipated that mitigation for the wetland impacts will occur at a minimum of a 2:1 ratio (i.e., 0.80 acres of wetland replacement for the 0.40 acres of impact) through a purchase of wetland credits within BSA 7.

	impacted. Permanent proposed impacts to Wetland 1 are 0.40 acres.	
Stormwater	The preferred design adds 3.3 acres of impervious surface to the site by providing an access road and barge docking station with associated infrastructure, increasing discharge rates, runoff volumes, sediment loading and increasing the flashiness of flows within the grading footprint, which discharges directly to the Mississippi River.	Ditches will be constructed around the perimeter of the active operations area to collect, store, and treat runoff prior to discharging to the Mississippi River. Areas not part of the facility operations will remain in natural or historically disturbed condition. An infiltration basin is proposed to mitigate impacts to stormwater runoff caused by the proposed alternative, catching stormwater from previously disturbed areas that are currently not receiving treatment. The design of the infiltration basin is described in the document “USACE Dredge Material Management Plan – Preliminary Drainage Memo” (Appendix E). The water quality volume would infiltrate and receive treatment prior to entering the Mississippi River via shallow subsurface flow. Offsite discharge rates are not increased after mitigation and the majority of stormwater flow throughout the year is treated prior to discharge. Sediment is captured via infiltration pretreatment in the form of rock check dams, mitigating potential sediment load increases due to impervious surface construction. During construction, the contractor will follow stormwater and erosion control best management practices as dictated by the MPCA NPDES Permit. The EPA-approved impairments for the Mississippi River are considered non-construction related and do not require any additional best management practices or plan review for compliance with the NPDES Construction Stormwater Permit.
Resources, Habitats, and Vegetation	The Wabasha Barge Facility project is expected to directly impact previously disturbed upland portions of the site, Wetland 1, and the Mississippi River. Approximately 2.7	Preventing the spread of invasive species during construction and operation of the barge terminal facility will occur as part of BMPs measures that will be put in place to control and appropriately manage vegetation and invasive species. Disturbed areas on the site will primarily be replaced with gravel surfaces (access road, loading and stockpile areas). Reseeding and

	acres of trees will be cleared for site grading. Increased traffic from hauling trucks can pose a hazard to wildlife attempting to cross the site. Increased noise at the site may cause wildlife sensitive to noise to relocate or avoid the site. Impacts to Wetland 1 are unlikely to cause loss of rare or protected species as this wetland represents a smaller and lower quality wetland habitat than Wetlands 2 or 3. Wetland 1 is also likely to be incidental in nature, caused by historic mining operations at the site. Animal species would no longer be able to use this wetland and would likely relocate to Wetland 2 or Wetland 3. Impacts to vegetation within the MBS site of Moderate Biodiversity Significance are expected to be minimal and limited to construction of the barge facility infrastructure in uplands and Wetland 1.	landscaping materials will be native seed mixes which are free of invasive plants or plant parts. Tree removals will be limited to winter timelines to reduce potential impact to bat and bird species. Based on direction from MNDNR (Correspondence # MCE 2022-00127) the following Best Management Practices (BMPs) will be implemented to minimize impacts to the MBS Site of Moderate Diversity, including the minimization of impacts to state-listed plant species of special concern. All equipment will be cleaned and inspected prior to bringing to the site to prevent the introduction and spread of invasive species. Additional BMPs to mitigate impacts to resources, habitats, and vegetation include: • Vehicular disturbance will be minimized at the site. Vehicles are only to be allowed on the proposed access road. • Necessary equipment and supplies will be stored/stockpiled in designated areas. • Dredge material will only be placed in designated upland areas. • Construction will be conducted during the winter months when the ground is frozen. • Equipment will be cleaned and inspected prior to bringing to the site to prevent the introduction and spread of invasive species. • To the extent possible, operations will occur within already-disturbed areas. • Disturbed areas will be revegetated with native species suitable to the local habitat as soon as possible post-construction.

		• Weed-free seed mixes, topsoils, and mulches will be used for revegetation. • To prevent the release of plastic fibers to the aquatic resources, the use of erosion control blankets will be limited to bio-netting or natural netting that do not contain plastic components. Hydro-mulch products will also be limited to plastic-free types.
Rare, Threatened, and Endangered Species and Ecosystems	Aquatic Organisms: Existing mussel species may experience direct mortality and short-term impacts because of the proposed project (dredging activities). Based on the recent mussel survey conducted within the project area June 6th through June 8th, 2023, one state-listed threatened species, the mucket, may be present within the dredging area. Based on historical data and the results of the recent survey, the project would have no impacts on federally listed species. Fish may be affected by the removal and burial of sessile or less mobile organisms on which the fish feed. The extent of this effect on fish would be determined by the extent and presence of the existing benthic communities in the area and fish that prey on them.	Minnesota's Endangered Species Statute (Minnesota Statutes, Section 84.0895) and associated Rules (Minnesota Rules, part 6212.1800 to 6212.2300 and 134) prohibit the take of threatened or endangered species without a permit. Prior to the take of a protected species, a USFWS permit to take will be approved. There are no critical habitats listed at the project site for the endangered species (USFWS 2023). The USFWS and MNDNR will be notified in the event of sighting or contact with protected species. Aquatic Organisms: Additional coordination with MNDNR will occur in order to determine the potential for impacts and/or takings of state-protected mussel species in the Mississippi River dredge areas. MNDNR is expected to provide guidance on potential mitigation measures associated with species that may be impacted by site activities. To prevent harm to spawning populations of paddlefish and other listed fish species, work within the water will be avoided from April to mid-June or further consultation and/or permitting with MN DNR will be required (MNDNR Correspondence # MCE 2022-00127). To mitigate impacts from dredging operations, standard Best Management Practices (BMPs) will be implemented for dredging activities which includes: • Dredging locations will be restricted to authorized locations

	Habitat loss and alteration have been linked to the decline in population of numerous fish species within the Mississippi River, including the paddlefish. Human alteration of rivers has also been cited as one of the contributors to the decline of paddlefish populations in the Upper Mississippi River. Turbulence from barges have also been known to cause mortality of yolk-sac paddlefish larvae (UMRCC 2020). Based on the items listed above, the proposed dredging and barge operations could have an effect on the listed fish species, including paddlefish if present. Terrestrial Organisms: Transportation of construction equipment and materials associated with the project site carries the risk of spreading invasive plant species. Ground disturbance from construction activities also presents a chance for aggressive and opportunistic invasive species to spread. The spread of invasive species can have a detrimental effect on native plant communities and wildlife that use those communities.	• Dredging will be restricted to daytime operations during summer months • Dredging will abide by all applicable federal and/or state regulations which are designed to be protective of aquatic organisms Terrestrial Organisms: Erosion control BMPs will be used on newly exposed soils. These may include the use of wildlife friendly natural fiber, erosion control blankets, silt fencing, synthetic fiber-free hydro-mulch, and rock checks; specifications for BMPs and allowed materials would be included in construction contracts and specifications. Exposed areas of sediment would be stabilized as soon as possible and seeded with an approved BWSR seed mix to establish vegetative cover. Invasive plant species would be monitored and managed to ensure success of native species establishment. Surveys of nesting bald eagles will be performed prior to on-land construction activities at the site. If active nests are found, no construction activities will be completed within a buffer of 660-feet from the nest (USFWS 2007). Tree cutting will be minimized at the site to preserve habitat. Minimizing areas of disturbance, including natural vegetation and tree removals, will be limited to the extent possible. Approximately 2.7 acres of trees will be cut. Tree removal will be limited to the winter months, between November 1 and March 31. Potential habitat for the timber rattlesnake may occur on site, however, direct impacts are not expected. Because this is a ground dwelling motile species, the potential does exist for vehicular impacts. To mitigate potential impacts to this species:

	Impacts associated with the spread of invasive species will be mitigated through the use of BMPs as described in Section 4.15.2.4. Tree cutting has the potential to reduce the available habitat and nesting sites for bird species. Forested areas along the river at the site, including Wetlands 2 and 3 with eastern cottonwood and silver maple documented as dominant vegetation, have the potential for suitable nesting sites for the bald eagle. A survey of active bald eagle nests should be performed within the vicinity of the site prior to site disturbance which would take place in the nesting season. Buffer guidelines are given in Section 4.15.2.4. With the very large amount of habitat available in the general project area for the full variety of bird behaviors, impacts to the wading bird community are expected to be temporary and minimal. Potential summer foraging and roosting habitat for the NELB is	• Erosion control blankets will be limited to "bio-netting" or other natural netting types • Working crews will be made aware of the potential to encounter the timber rattlesnake and instructed to not disturb • DNR will be contacted if rattlesnakes are encountered at the site

	present at the site. Wetlands 2 and 3, as well as forested uplands could provide habitat for the NELB. Construction at the site will not impact Wetlands 2 or 3. Tree clearing will be limited to 2.7 acres.	
Visual Resources	The proposed project would alter the existing visual aesthetic of the project site with the introduction of trucks, barges, other industrial equipment, storage facilities, and the temporary introduction of construction vehicles and equipment. This altered visual aesthetic would be visible from neighboring parcels, roadways, the Mississippi River, and from the surrounding hillside.	Barge facility operations will occur primarily during day-time working hours. Exterior lights, if installed at the facility, will be down-casting and set on timers to reduce wildlife and aesthetic impacts during non-operating hours.
Noise	Construction-related noise effects from the proposed project would be minor and temporary in nature, generated by the use of construction vehicles and equipment, as well as barges, during the construction of the barge terminal pad, access road, dock/mooring piles, barge staging winch system, loading truck scale, and scale house/field office building. Noise resulting from the proposed project's operational activities—	The proposed project would follow the noise regulations outlined in the project operator agreement, which limit construction and operational activities to 7:00am - 6:00pm, Monday through Friday. The project operator agreement is consistent with the State of Minnesota rules (MN Statute 7030.0020), which define daytime hours as 7am to 10pm, and nighttime hours as 10pm to 7am. All construction and operational activities associated with the proposed project would conform with the project operator agreement as well as the State of Minnesota noise standards.

	occurring between 7:00am and 6:00pm, Monday through Friday—would be generated by the loading and unloading of barges and trucks, from trucks and barges used to transport commercial and/or dredged materials to and from the project site, as well as from the personal vehicles of employees traveling to and from the project site, and internal site operations equipment (e.g., material haulers: hoppers, conveyors, etc.). The proposed project would generate traffic-related noise from trucks hauling construction materials during the construction of the proposed project, trucks hauling dredged materials during the operation of the proposed project, and from employees using personal vehicles to travel to and from the project site. However, because the proposed project would include no more than ten parking spaces for employee and operator parking and would generate less than 250 vehicle trips during peak hour operations and less than 2,500 daily trips, traffic congestion and traffic-related noise are not	

	anticipated to adversely affect surrounding areas or sensitive receptors.	
All Other Factors	Minimal impact	Follow local, state, and federal permit and approval requirements.

PROJECT COORDINATION

6.1 Federal Agencies

Coordination with Federal Agencies includes the following:

- USACE: No-rise certification; river and wetland impacts; 217(d) Agreement (relative but beyond the scope of this review)
- USFWS: Threatened and endangered species and critical habitat areas; Wildlife Refuge areas.

All permits and approvals will be secured prior to construction activities.

Should future federal funding be applied to the project, additional environmental review documentation will meet any additional federal requirements.

6.2 State Agencies and Organizations

Coordination with State Agencies and Organizations includes the following:

- MDH: Unknown well sealing or repair
- MNDNR: Rare, threatened and endangered species and critical habitats; Floodplain and water resources
- MNDOT: Funding; Transportation
- MPCA: Industrial Stormwater permitting
- SHPO: Review of historic resources

All permits and approvals will be secured prior to construction activities.

6.3 Local Agencies and Organizations

Coordination with Local Agencies and Organizations includes the following:

- Wabasha County: Transportation; Water resources
- Izaak Walton League: Environmental concerns

All permits and approvals and continued coordination efforts will occur prior to construction activities.

6.4 Other Project Coordination

Other project coordination includes the following:

- Tribal Organizations

Continued coordination efforts will occur prior to construction activities.

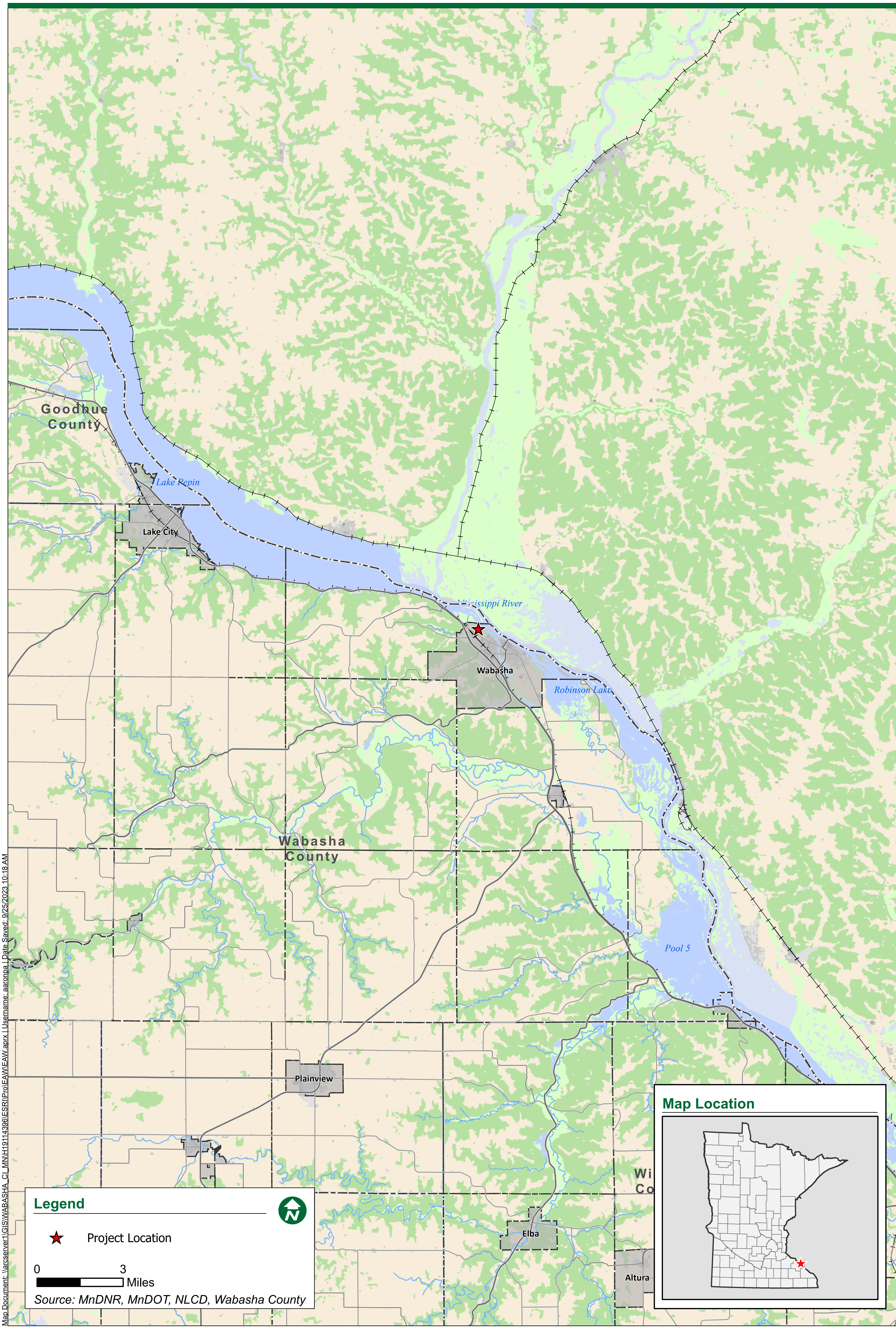
UNRESOLVED OR CONTROVERSIAL ISSUES

7.1 Unresolved or Controversial Issues

There are no known unresolved or controversial issues that are not addressed in the previous sections.

APPENDIX A

Figures



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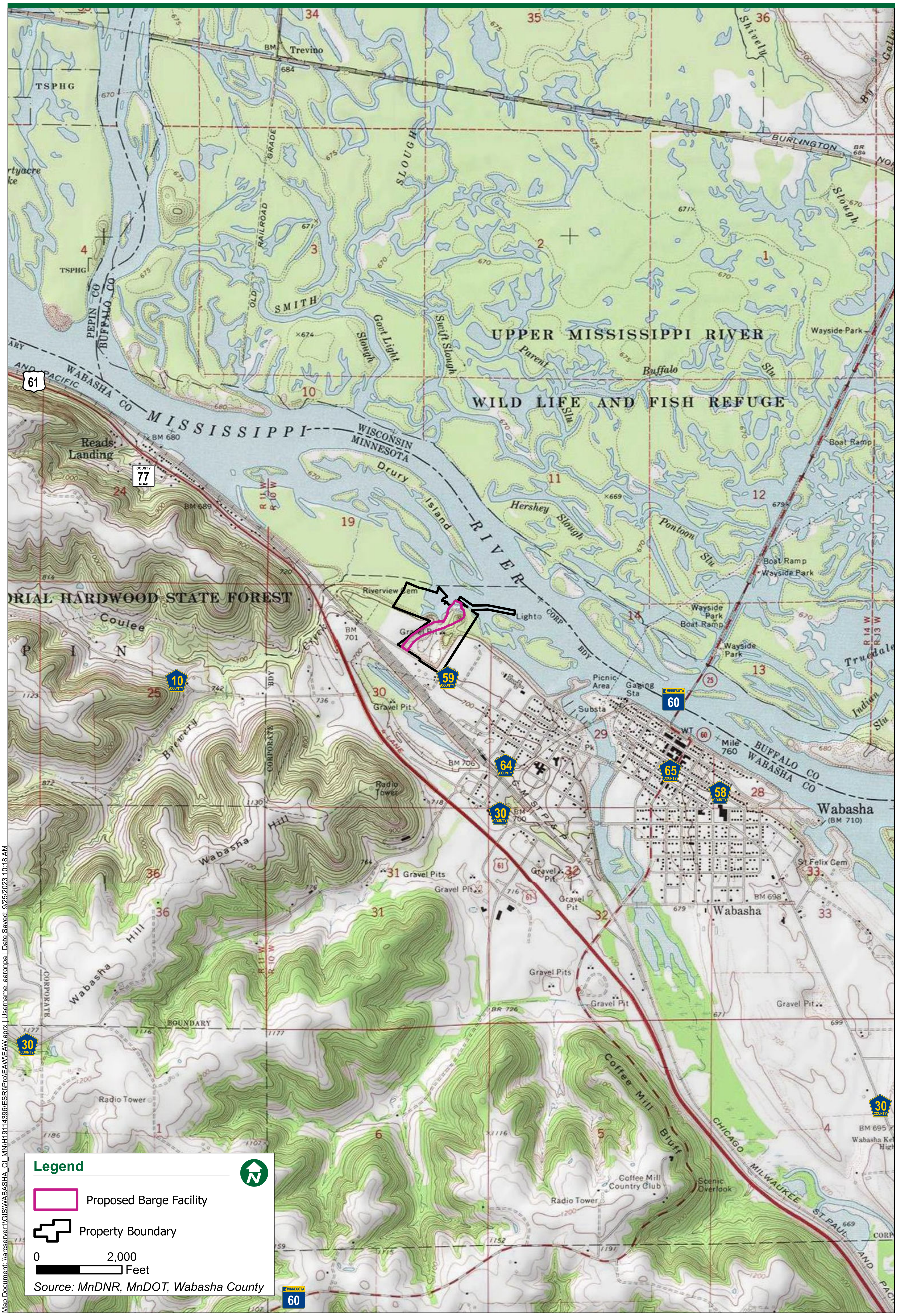
Legend
Proposed Barge Facility
Property Boundary
0
2,000
Feet
Source: MnDNR, MnDOT, Wabasha County
UPPER MISSISSIPPI RIVER
WILD LIFE AND FISH REFUGE
MISSISSIPPI
RIVER
WISCONSIN
MINNESOTA
WABASHA CO
BUFFALO CO
PEPIN CO
Wabasha
Trevino
Reads Landing
Riverview Cem
Drury Island
Hershey Slough
Pontoon Slu
Smith Slough
Swift Slough
Gort Light
Shively
Buffalo
Wayside Park
Boat Ramp
Picnic Area
Gaging Sta
Substa
Gravel Pit
Radio Tower
Wabasha Hill
Brewery
Coulee
St Felix Cem
Coffee Mill Bluff
Coffee Mill Country Club
Scenic Overlook
CHICAGO MILWAUKEE ST PAUL AND PACIFIC
BURLINGTON
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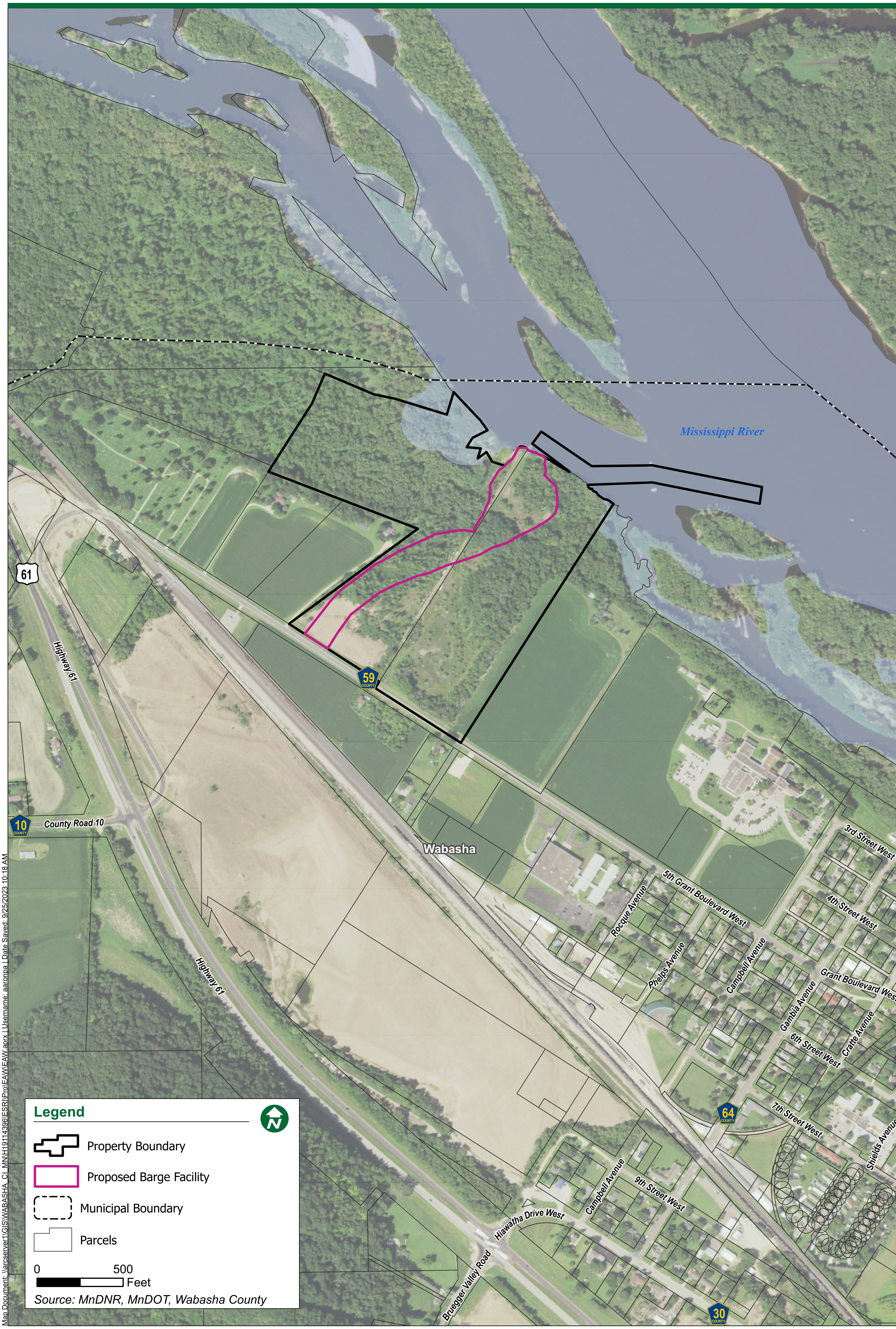
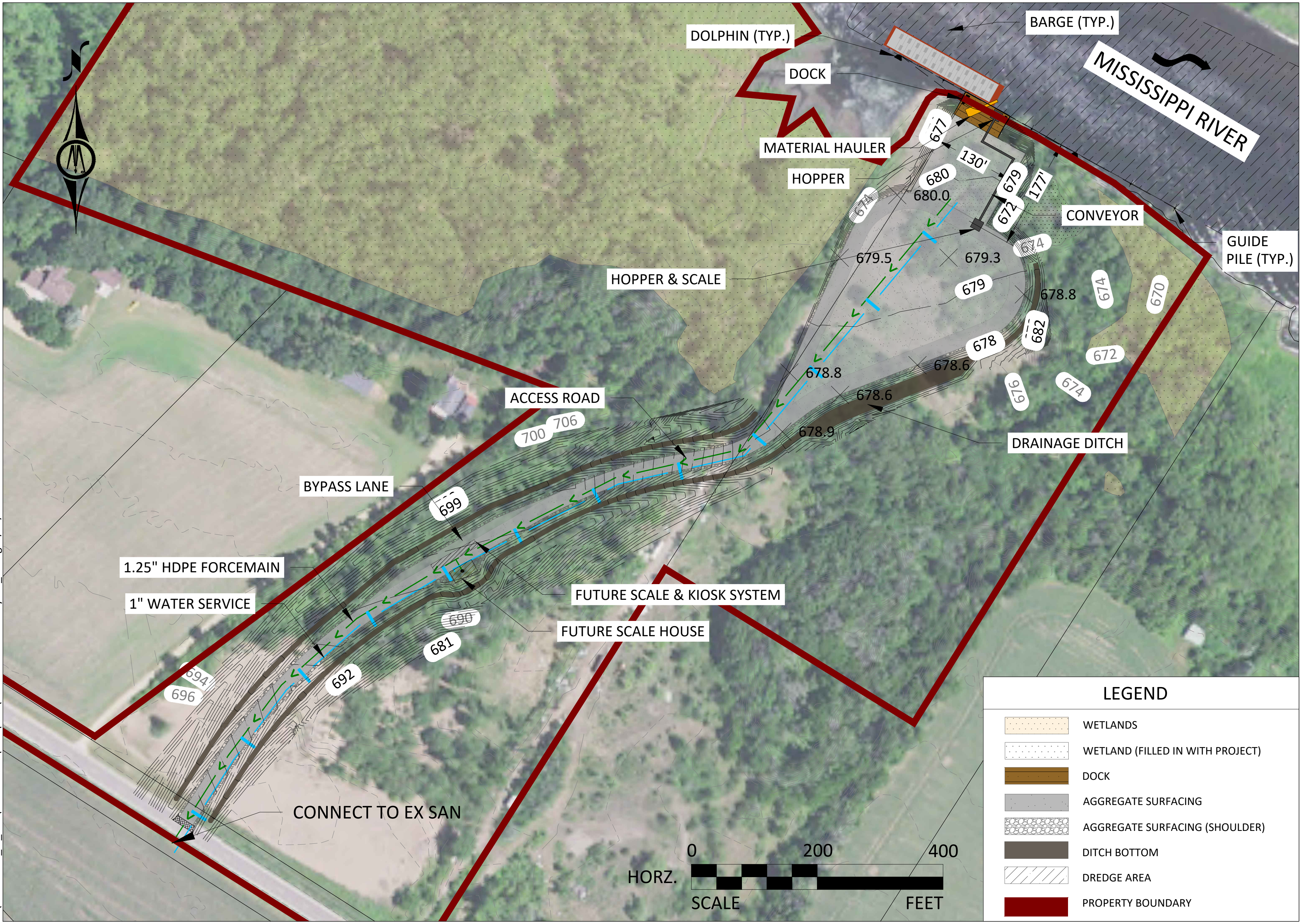

Mississippi River
Wabasha
61
Highway 61
10
County Road 10
59
64
30
Highway 61
3rd Street West
4th Street West
5th Grant Boulevard West
Grant Boulevard West
Rocque Avenue
Phelps Avenue
Campbell Avenue
Gambia Avenue
Cratte Avenue
6th Street West
7th Street West
Shields Avenue
9th Street West
Campbell Avenue
Hiawatha Drive West
Bruegger Valley Road
Legend
Property Boundary
Proposed Barge Facility
Municipal Boundary
Parcels
0
500
Feet
Source: MnDNR, MnDOT, Wabasha County
Map Document: \\arcserver1\GIS\WABASHA_CI_MN\T19114396\ESRI\Pro\EAW\EAW.aprx | Username: aaronpa | Date Saved: 9/25/2023 10:18 AM

Figure 4: Site Layout

August 2023



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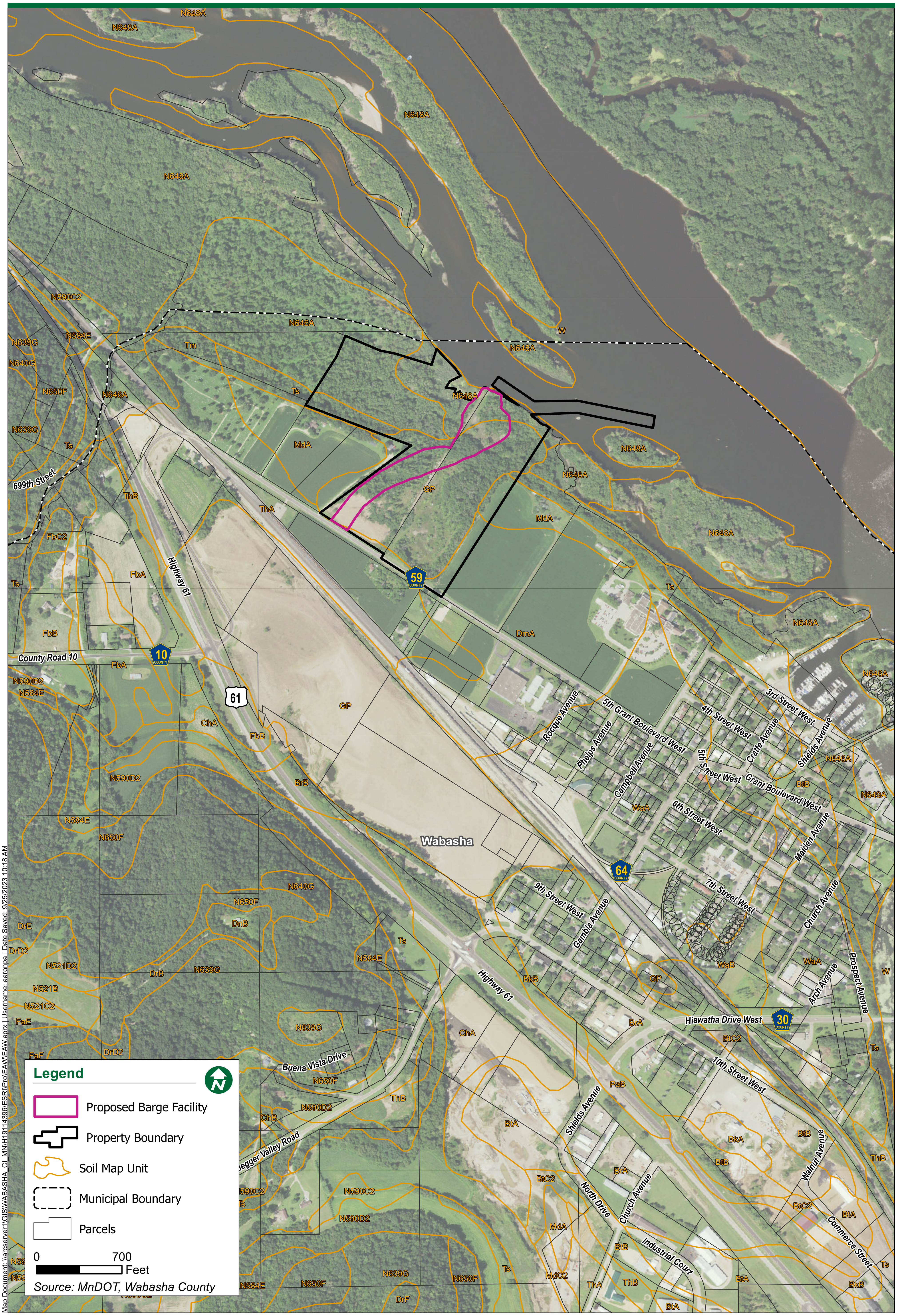
Wabasha Barge Facility

Environmental Impact Statement

Figure 5: Soils

September 2023

BOLTON & MENK



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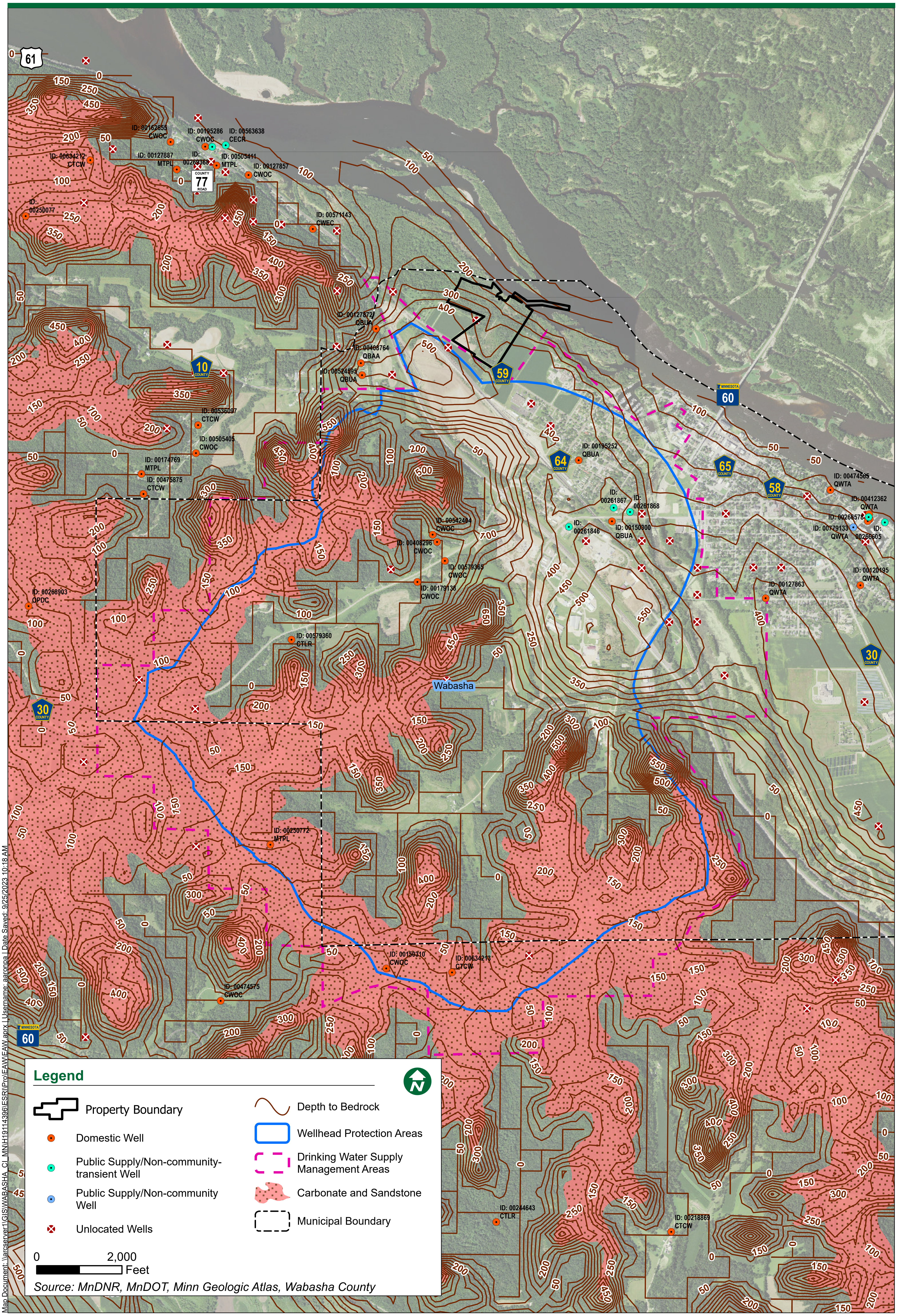
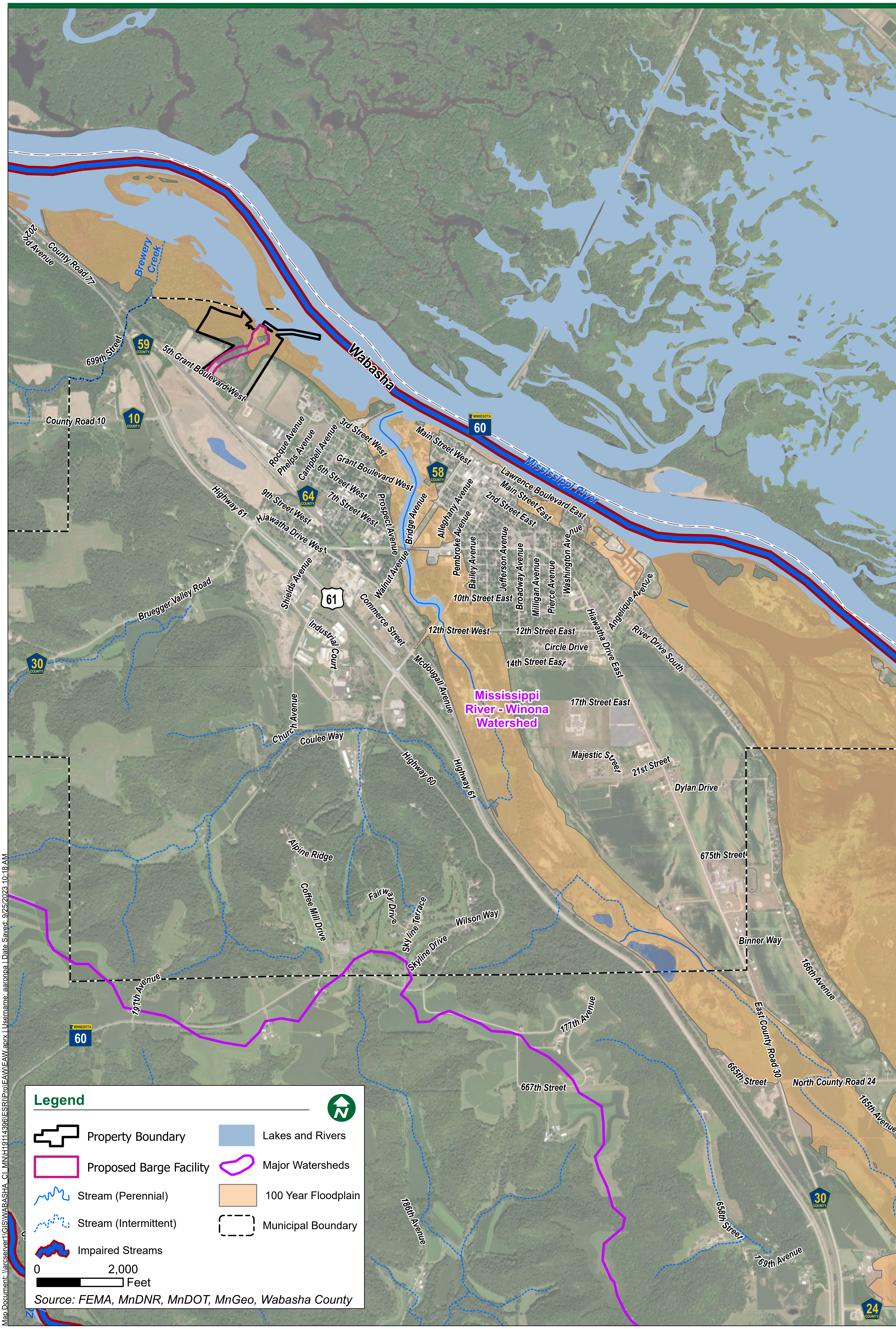

Wabasha
Legend
Property Boundary
Domestic Well
Public Supply/Non-community-transient Well
Public Supply/Non-community Well
Unlocated Wells
Depth to Bedrock
Wellhead Protection Areas
Drinking Water Supply Management Areas
Carbonate and Sandstone
Municipal Boundary
0
2,000
Feet
Source: MnDNR, MnDOT, Minn Geologic Atlas, Wabasha County

Figure 7: Surface Water

September 2023

BOLTON & MENK



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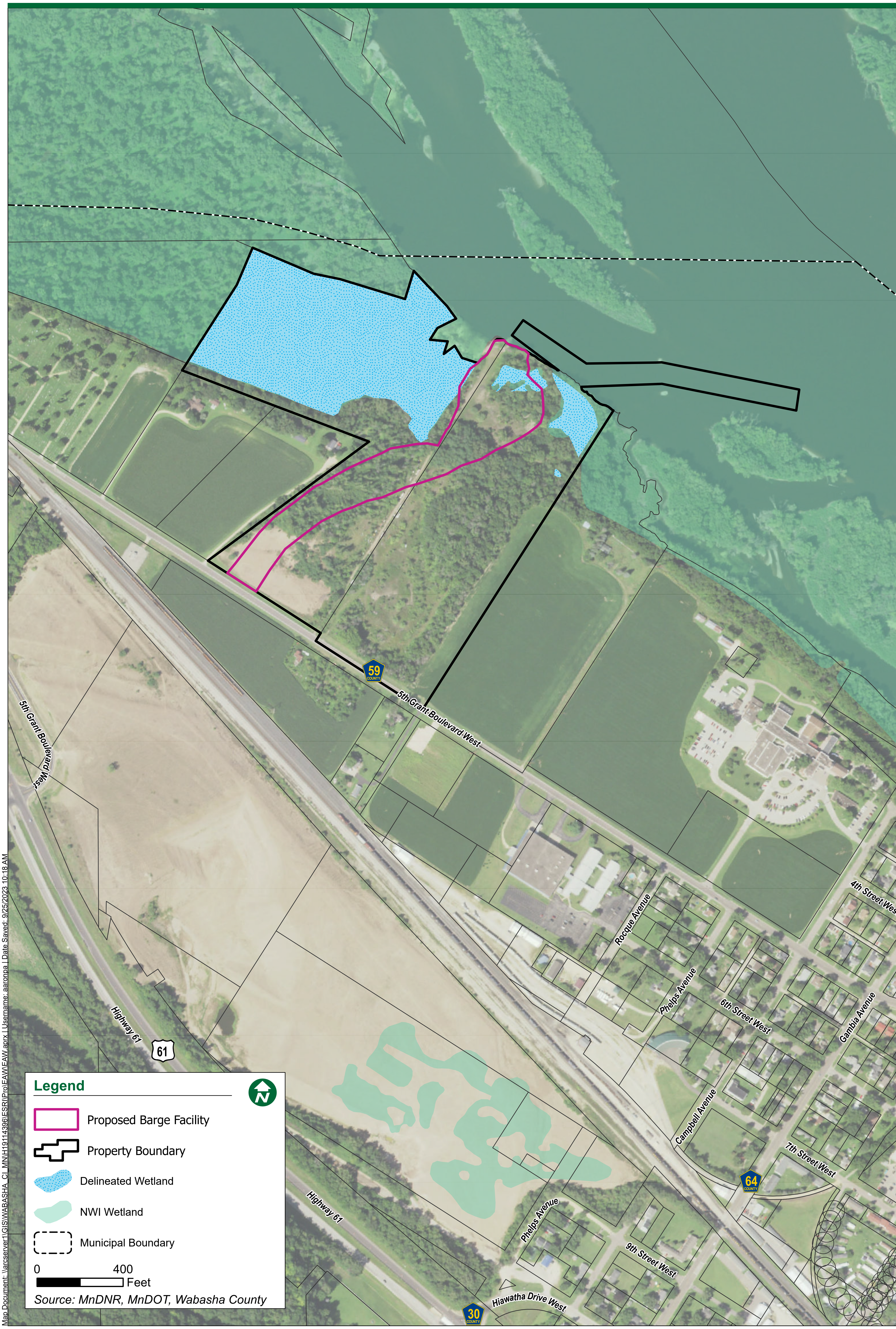
5th Grant Boulevard West
5th Grant Boulevard West
59 COUNTY
Highway 61
61
Highway 61
Rocque Avenue
Phelps Avenue
6th Street West
4th Street West
Gambia Avenue
Campbell Avenue
7th Street West
64 COUNTY
Phelps Avenue
9th Street West
Hiawatha Drive West
30 COUNTY
Legend
Proposed Barge Facility
Property Boundary
Delineated Wetland
NWI Wetland
Municipal Boundary
0
400
Feet
Source: MnDNR, MnDOT, Wabasha County
Map Document: \\arcserver1\GIS\WABASHA_CI_MN\H19114396\ESRI\Pro\EAW\EAW.aprx | Username: aaronpa | Date Saved: 9/25/2023 10:18 AM

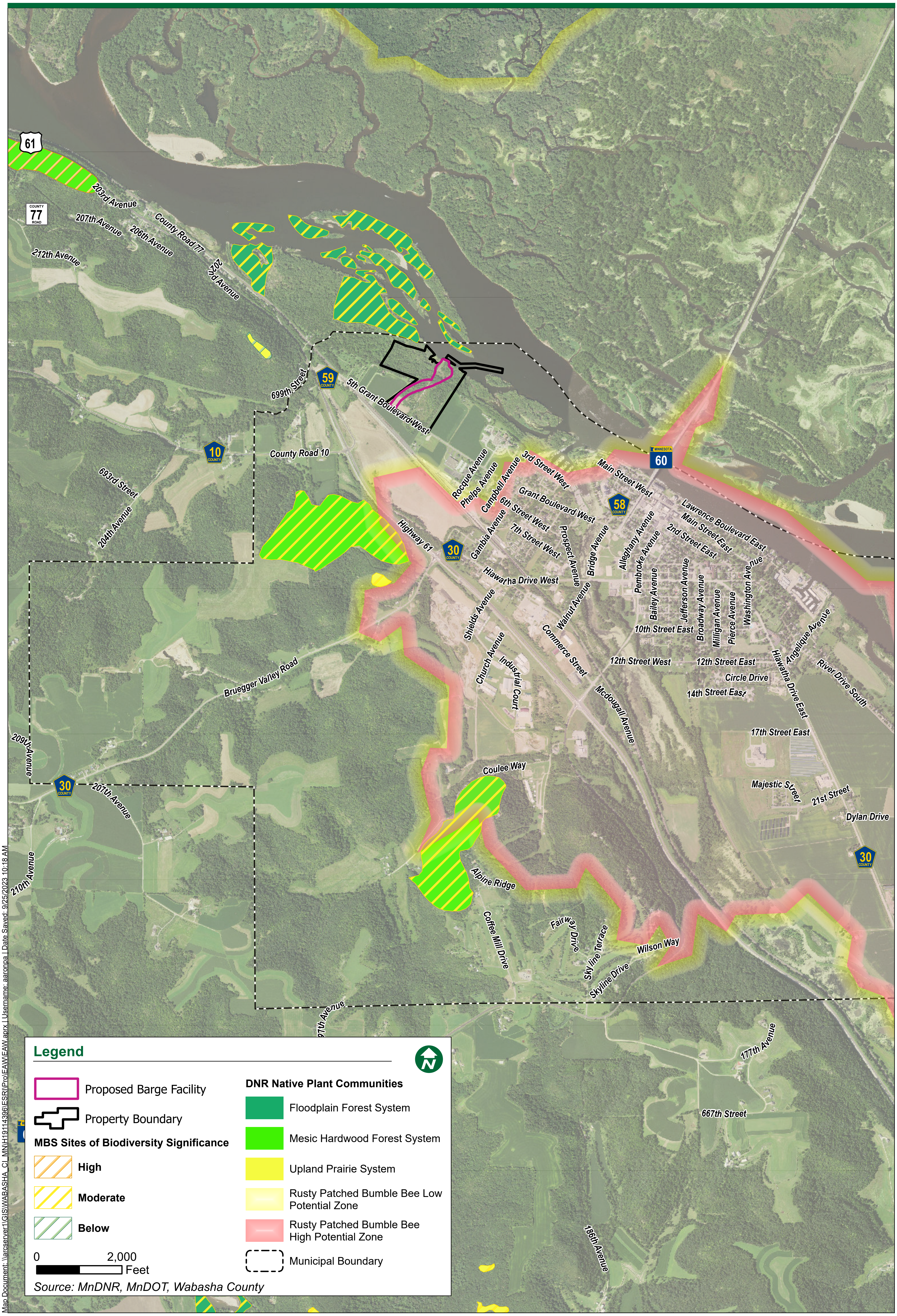
61
203rd Avenue
COUNTY 77 ROAD
207th Avenue
206th Avenue
County Road 77
212th Avenue
202nd Avenue
699th Street
59 COUNTY
5th Grant Boulevard West
10 COUNTY
County Road 10
693rd Street
204th Avenue
Highway 61
30 COUNTY
Rocque Avenue
Phelps Avenue
Campbell Avenue
3rd Street West
Grant Boulevard West
6th Street West
7th Street West
Gambia Avenue
Prospect Avenue
Main Street West
MINNESOTA 60
58 COUNTY
Lawrence Boulevard East
Main Street East
2nd Street East
Allegheny Avenue
Pembroke Avenue
Bridge Avenue
Hiawatha Drive West
Walnut Avenue
Bailey Avenue
Jefferson Avenue
Broadway Avenue
Milligan Avenue
Pierce Avenue
Washington Avenue
Shields Avenue
10th Street East
Commerce Street
Church Avenue
Industrial Court
12th Street West
12th Street East
Circle Drive
14th Street East
Angelique Avenue
Hiawatha Drive East
River Drive South
Mcdougall Avenue
Bruegger Valley Road
17th Street East
209th Avenue
30 COUNTY
207th Avenue
Coulee Way
Majestic Street
21st Street
Dylan Drive
30 COUNTY
210th Avenue
Alpine Ridge
Coffee Mill Drive
Fairway Drive
Sky line Terrace
Skyline Drive
Wilson Way
177th Avenue
667th Street
186th Avenue
Legend
Proposed Barge Facility
Property Boundary
MBS Sites of Biodiversity Significance
High
Moderate
Below
DNR Native Plant Communities
Floodplain Forest System
Mesic Hardwood Forest System
Upland Prairie System
Rusty Patched Bumble Bee Low Potential Zone
Rusty Patched Bumble Bee High Potential Zone
Municipal Boundary
0 2,000 Feet
Source: MnDNR, MnDOT, Wabasha County

Figure 10: Outdoor Recreation

September 2023

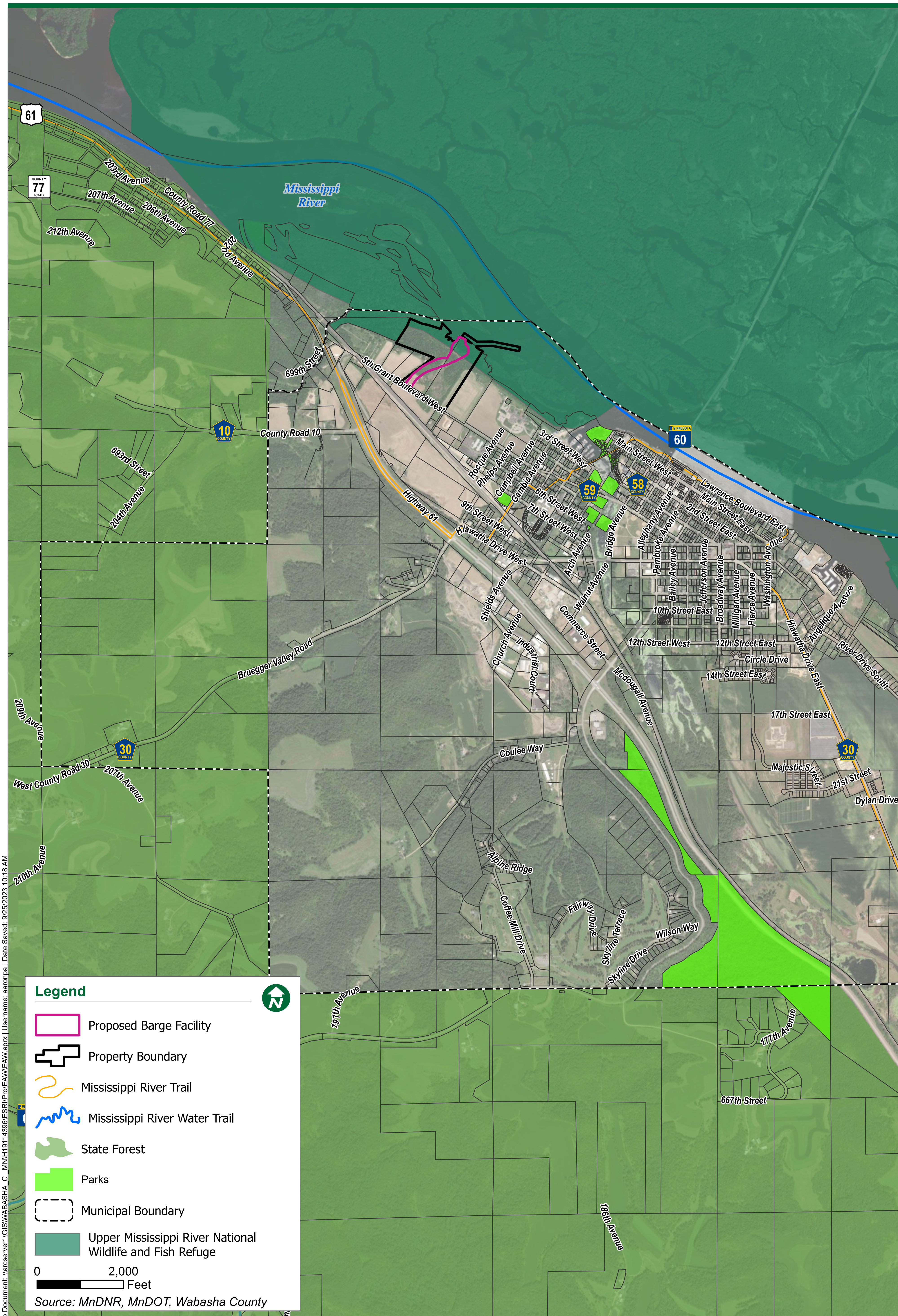

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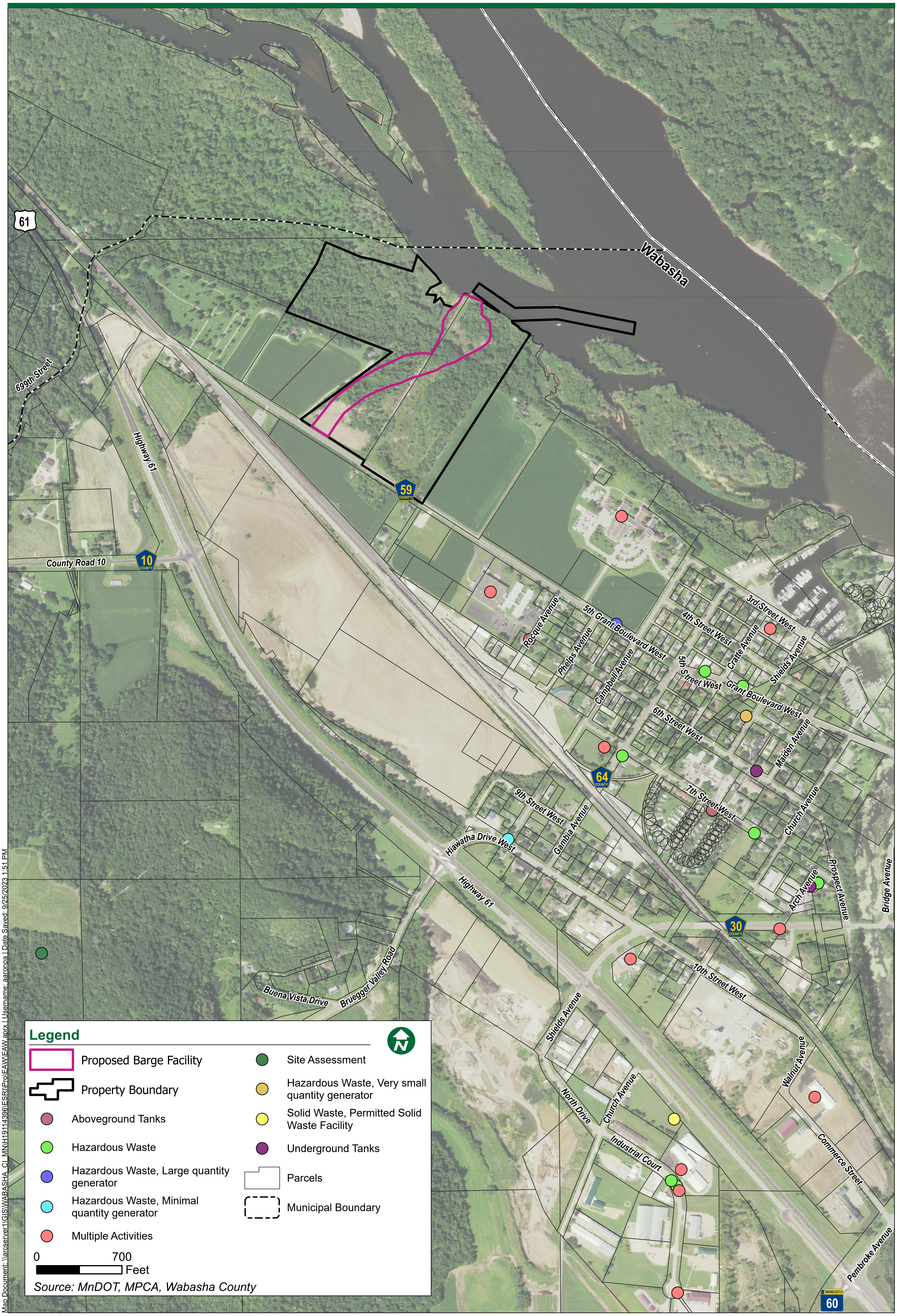
Figure 11: Potentially Contaminated Sites

September 2023

BOLTON & MENK



APPENDIX B

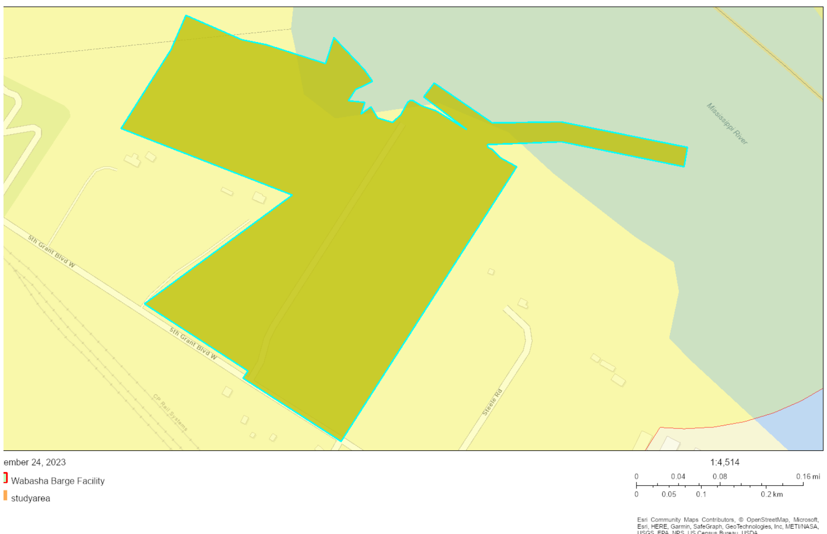
EPA EJScreen Community Report

EJScreen Community Report

This report provides environmental and socioeconomic information for user-defined areas, and combines that data into environmental justice and supplemental indexes.

Wabasha, MN

0.25 miles Ring around the Area
Population: 158
Area in square miles: 0.68



COMMUNITY INFORMATION

Low income: 38 percent
People of color: 1 percent
Less than high school education: 7 percent
Limited English households: 0 percent
Unemployment: 1 percent
Persons with disabilities: 17 percent
Male: 43 percent
Female: 57 percent
78 years Average life expectancy
$32,067 Per capita income
Number of households: 44
Owner occupied: 67 percent

LANGUAGES SPOKEN AT HOME

LANGUAGE	PERCENT
No language data available.	

BREAKDOWN BY RACE

White: 99%
Black: 0%
American Indian: 0%
Asian: 1%
Hawaiian/Pacific Islander: 0%
Other race: 0%
Two or more races: 1%
Hispanic: 0%

BREAKDOWN BY AGE

From Ages 1 to 4	2%
From Ages 1 to 18	20%
From Ages 18 and up	80%
From Ages 65 and up	33%

LIMITED ENGLISH SPEAKING BREAKDOWN

Speak Spanish	0%
Speak Other Indo-European Languages	0%
Speak Asian-Pacific Island Languages	0%
Speak Other Languages	0%

Notes: Numbers may not sum to totals due to rounding. Hispanic population can be of any race.
Source: U.S. Census Bureau, American Community Survey (ACS) 2017 -2021. Life expectancy data comes from the Centers for Disease Control.

www.epa.gov/ejscreen

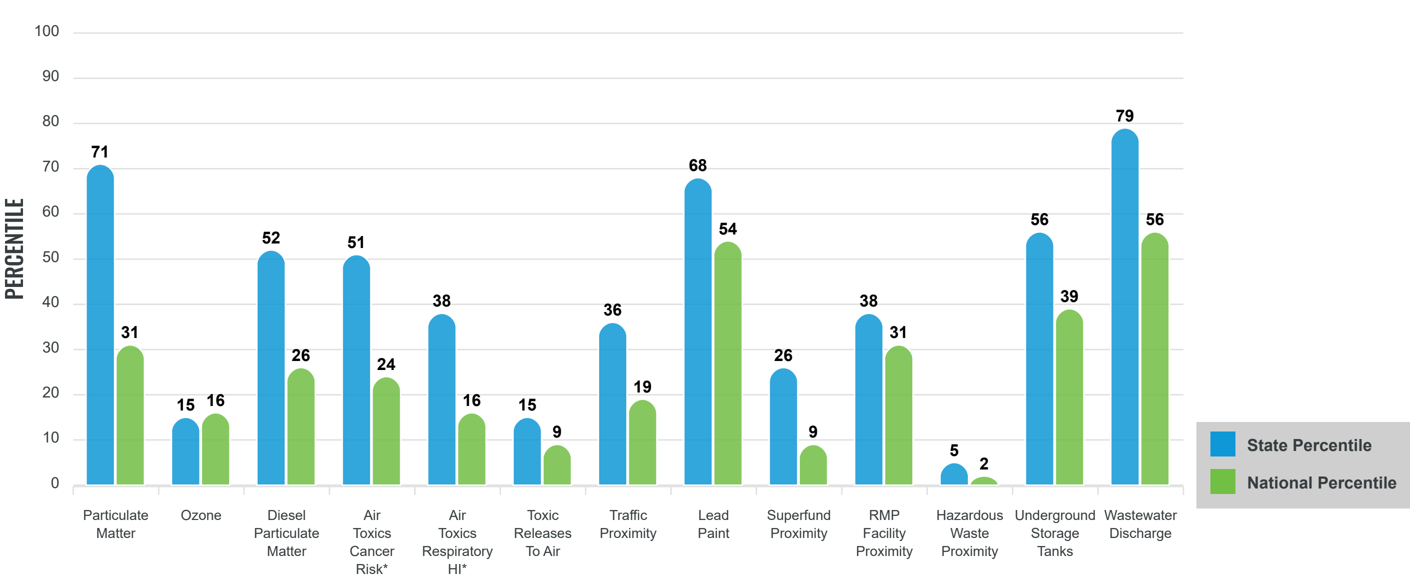
Environmental Justice & Supplemental Indexes

The environmental justice and supplemental indexes are a combination of environmental and socioeconomic information. There are thirteen EJ indexes and supplemental indexes in EJScreen reflecting the 13 environmental indicators. The indexes for a selected area are compared to those for all other locations in the state or nation. For more information and calculation details on the EJ and supplemental indexes, please visit the EJScreen website.

EJ INDEXES

The EJ indexes help users screen for potential EJ concerns. To do this, the EJ index combines data on low income and people of color populations with a single environmental indicator.

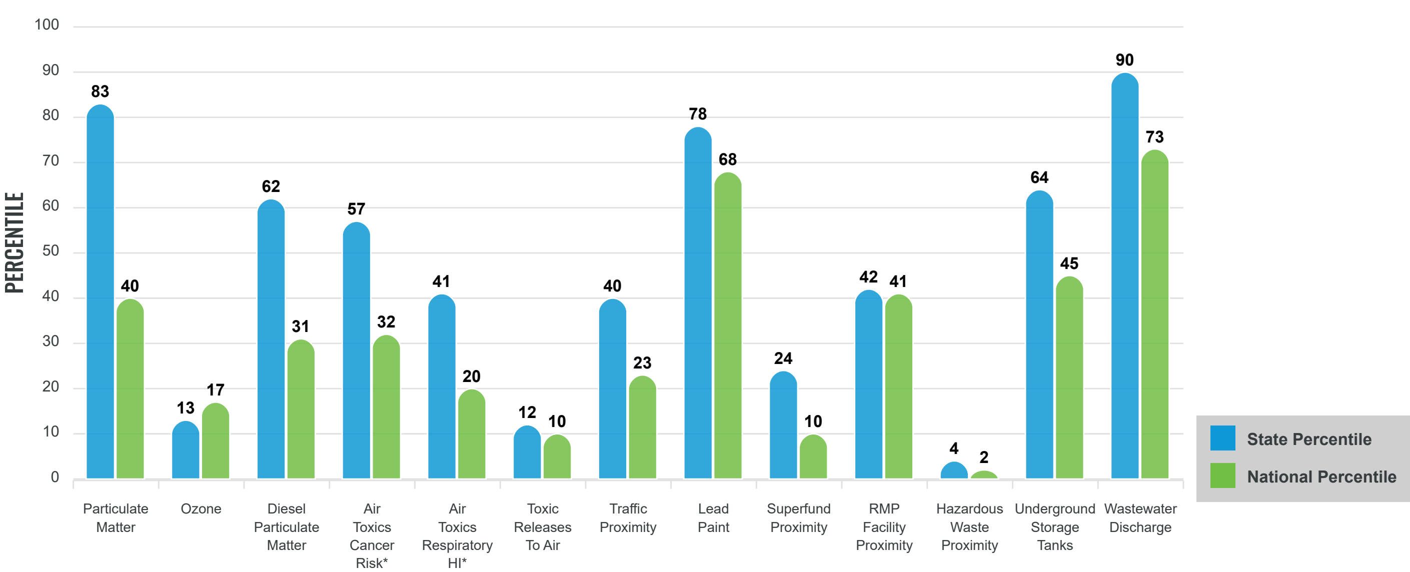
EJ INDEXES FOR THE SELECTED LOCATION



SUPPLEMENTAL INDEXES

The supplemental indexes offer a different perspective on community-level vulnerability. They combine data on percent low-income, percent linguistically isolated, percent less than high school education, percent unemployed, and low life expectancy with a single environmental indicator.

SUPPLEMENTAL INDEXES FOR THE SELECTED LOCATION



These percentiles provide perspective on how the selected block group or buffer area compares to the entire state or nation.

Report for 0.25 miles Ring around the Area

www.epa.gov/ejscreen

EJScreen Environmental and Socioeconomic Indicators Data

SELECTED VARIABLES	VALUE	STATE AVERAGE	PERCENTILE IN STATE	USA AVERAGE	PERCENTILE IN USA
POLLUTION AND SOURCES					
Particulate Matter (µg/m^3)	7.52	6.78	68	8.08	32
Ozone (ppb)	56.3	58.2	8	61.6	14
Diesel Particulate Matter (µg/m^3)	0.124	0.21	36	0.261	23
Air Toxics Cancer Risk* (lifetime risk per million)	20	22	12	25	5
Air Toxics Respiratory HI*	0.2	0.26	7	0.31	4
Toxic Releases to Air	9.4	1,500	8	4,600	8
Traffic Proximity (daily traffic count/distance to road)	9.6	140	22	210	16
Lead Paint (% Pre-1960 Housing)	0.43	0.33	66	0.3	68
Superfund Proximity (site count/km distance)	0.014	0.19	15	0.13	9
RMP Facility Proximity (facility count/km distance)	0.1	0.48	23	0.43	31
Hazardous Waste Proximity (facility count/km distance)	0.021	1.3	3	1.9	2
Underground Storage Tanks (count/km^2)	0.31	1.8	44	3.9	35
Wastewater Discharge (toxicity-weighted concentration/m distance)	0.024	0.19	92	22	74
SOCIOECONOMIC INDICATORS					
Demographic Index	20%	22%	58	35%	31
Supplemental Demographic Index	13%	11%	76	14%	53
People of Color	1%	20%	7	39%	5
Low Income	38%	23%	82	31%	67
Unemployment Rate	1%	4%	25	6%	24
Limited English Speaking Households	0%	2%	0	5%	0
Less Than High School Education	7%	7%	67	12%	46
Under Age 5	2%	6%	17	6%	25
Over Age 64	33%	17%	94	17%	92
Low Life Expectancy	20%	17%	84	20%	60

*Diesel particulate matter, air toxics cancer risk, and air toxics respiratory hazard index are from the EPA's Air Toxics Data Update, which is the Agency's ongoing, comprehensive evaluation of air toxics in the United States. This effort aims to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that the air toxics data presented here provide broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. Cancer risks and hazard indices from the Air Toxics Data Update are reported to one significant figure and any additional significant figures here are due to rounding. More information on the Air Toxics Data Update can be found at: https://www.epa.gov/haps/air-toxics-data-update.

Sites reporting to EPA within defined area:

Superfund 0
Hazardous Waste, Treatment, Storage, and Disposal Facilities 0
Water Dischargers 0
Air Pollution 0
Brownfields 0
Toxic Release Inventory 0

Other community features within defined area:

Schools 0
Hospitals 0
Places of Worship 0

Other environmental data:

Air Non-attainment .... No
Impaired Waters .... Yes

Selected location contains American Indian Reservation Lands* .... No
Selected location contains a "Justice40 (CEJST)" disadvantaged community .... No
Selected location contains an EPA IRA disadvantaged community .... Yes

Report for 0.25 miles Ring around the Area

EJScreen Environmental and Socioeconomic Indicators Data

HEALTH INDICATORS

INDICATOR	HEALTH VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Low Life Expectancy	20%	17%	84	20%	60
Heart Disease	8.1	5.6	91	6.1	85
Asthma	8.9	9	47	10	22
Cancer	9.2	6.4	97	6.1	96
Persons with Disabilities	18.1%	11.4%	91	13.4%	79

CLIMATE INDICATORS

INDICATOR	HEALTH VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Flood Risk	12%	8%	80	12%	73
Wildfire Risk	0%	4%	0	14%	0

CRITICAL SERVICE GAPS

INDICATOR	HEALTH VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Broadband Internet	25%	11%	92	14%	83
Lack of Health Insurance	4%	5%	48	9%	27
Housing Burden	No	N/A	N/A	N/A	N/A
Transportation Access	Yes	N/A	N/A	N/A	N/A
Food Desert	No	N/A	N/A	N/A	N/A

Footnotes

Report for 0.25 miles Ring around the Area

APPENDIX C

Preliminary No-Rise Certification

Real People. Real Solutions.

DRAFT

Preliminary No Rise Certification

USACE Dredge Material Management Plan
Wabasha Barge Facility

City of Wabasha, Wabasha County, Minnesota

August 2023

Submitted by:
Bolton & Menk, Inc.
2900 43rd Street NW
Rochester, MN 55901
Phone: (507) 208-4332

Certification

Preliminary

No Rise Certification

For

USACE Dredge Material Management Plan – Wabasha Barge Facility

Mississippi River, MN

H19.114396

August 2023

I hereby certify that this report was prepared by me or under my direct supervision, and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

By: ______DRAFT____________________________________
Roberta R. Cronquist, P.E.
License No. 52570

Date: ______DRAFT____________________________________

Table of Contents

Tables

Appendices

MINNESOTA NO RISE CERTIFICATION

This is to certify that I am a duly qualified professional engineer licensed to practice in the State of Minnesota.

It is further to certify that the attached technical data supports the fact that the proposal to perform the following construction activities associated with the USACE Dredge Material Management Plan Project within the floodplain for the Mississippi River between the Chippewa River and Alma Marina (WI) will not impact the 100-year flood elevation.

This includes the following construction activities:

1. Construction of infrastructure including a site access road, weighing station and small operations facility
2. Construction of a sheet pile dock wall, mooring and maneuvering facilities, and conveyers and hoppers for material processing
3. Temporary storage of dredged material on site
4. Channel dredging for barge access to the proposed docking and off-loading facilities
5. Use of dredged material as fill on the terminal site to raise the dredge material storage area above the 100-year flood elevation

These construction activities will not impact the floodway width or increase the 100-year flood elevation (will not raise by more than 0.00 feet) on the Mississippi River at any published cross sections in the Flood Insurance Study for Wabasha County Minnesota, dated June 20, 2000 or Buffalo County Wisconsin, dated May 3, 2010 and will not increase the 100-year flood elevation (will not raise by more than 0.00 feet) at unpublished cross-sections in the vicinity of the proposed project.

HEC-RAS hydraulic analyses have been prepared for the Mississippi River from the Prescott, WI to La Crosse, WI and are included to support my findings.

Date: 08/31/2023

Signature:_______**DRAFT**_____________________

Name: Roberta Cronquist

Title: Project Engineer

License Number: #52570, exp. 6/30/2024

MN DNR Waters - 4/2/2004 revision

I. INTRODUCTION

The City of Wabasha in conjunction with the Wabasha Port Authority is working on a dredge material management plan for the Mississippi River that includes constructing a barge facility on the north end of the City of Wabasha, MN (River Mile 760). Approximately 270,000 CY of sand will be dredged annually to maintain a 9-ft navigable channel. This barge facility is intended to facilitate dredged material storage and transportation of agricultural products and shipping containers on the Mississippi River. The primary purpose is to transport sand from the navigation channel dredging operations to offsite locations for beneficial re-use.

Specifically, the following activities may affect the Mississippi River floodplain hydraulics:

1. Construction of infrastructure including a site access road, weighing station and small operations facility
2. Construction of a sheet pile dock wall, mooring and maneuvering facilities, and conveyers and hoppers for material processing
3. Temporary storage of dredged material on site
4. Channel dredging for barge access to the proposed docking and off-loading facilities
5. Use of dredged material as fill on the terminal site to raise the dredge material storage area above the 100-year flood elevation

The project impacts the floodplain limits for the Mississippi River within the City of Wabasha, Wabasha County (WBCO), Minnesota. This portion of the Minnesota River floodplain is also within Buffalo County (BUCO), WI. Because portions of the project propose construction activities within a FEMA designated floodplain, this report documents the no rise condition of the proposed site development.

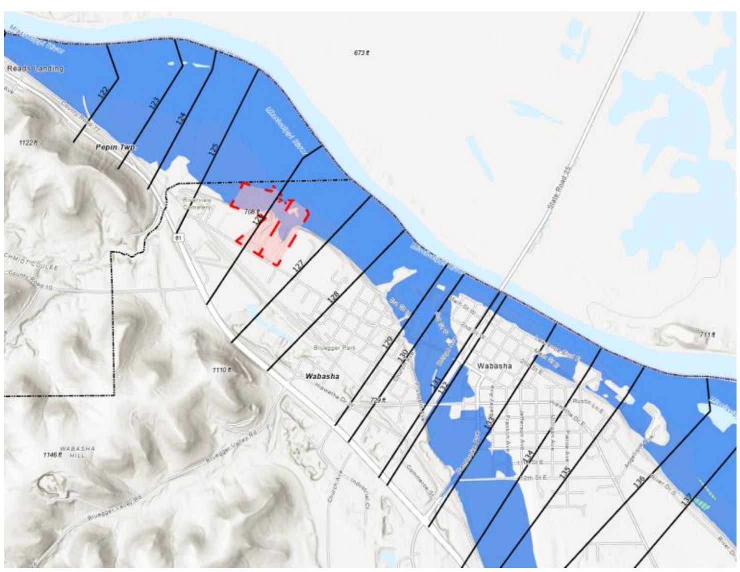


Figure 1: Vicinity Map
(not to scale)

II. EFFECTIVE FLOOD INSURANCE STUDY DATA

The Mississippi River is currently mapped by FEMA as a Zone AE floodplain with a floodway, and is shown on the FEMA FIRM Panels listed in Table 1. Preliminary FIRM panels and a Flood Insurance Study for Wabasha County are expected in December of 2022.

Table 1: Effective FIRM Panels

County	Map No.	Panel No.	Effective Date
Minnesota			
Wabasha	27157C	0090D	June 20, 2000
Wabasha	27157C	0095D	June 20, 2000
Wabasha	27157C	0210D	June 20, 2000
Wabasha	27157C	0230D	June 20, 2000
Wabasha	27157C	0235D	June 20, 2000
Wisconsin			
Buffalo	55011C	0140D	May 3, 2010
Buffalo	55011C	0145D	May 3, 2010
Buffalo	55011C	0165D	May 3, 2010
Buffalo	55011C	0285D	May 3, 2010

Excerpts from the effective Wabasha County FIS, Buffalo County FIS, and a copy of the listed effective FIRMs are included in Appendix B of this report. Buffalo County FIRMs and FIS excerpts are included for reference and that data is reported in the NAVD 88 datum.

III. HYDROLOGY

A. Effective Discharges

Information about effective FEMA discharges for the Mississippi River are included in the Effective FIS for Wabasha County and Buffalo County. FIS flow values matched those in the effective HEC-RAS model received from the MnDNR.

Table 2: Effective FEMA Discharges

Flooding Source and Location	Drainage Area (sq-miles)	Peak Discharges (cubic feet per second)			
		10% Annual-Chance	2% Annual-Chance	1% Annual-Chance	0.2% Annual-Chance
Mississippi River (WBCO FIS) At Wabasha	56,610	145,000	210,000	240,000	320,000
Mississippi River (BUCO FIS) Just Downstream of Chippewa River	-	-	-	229,611	-
Mississippi River (Effective Model) XS 761.327 XS 760.994	- -	- -	- -	229,611 229,611	- -

IV. TOPOGRAPHIC DATA

The following topographic data was utilized to develop the hydraulic models for this study.

A. LiDAR Data

Table 3: Topography Data Sources

County	Topography Source	Datum
Wabasha	Wabasha County LiDAR – 2008	NAVD 88

The effective model for the Mississippi River was based on the NAVD 88 vertical datum. The Buffalo County FIS reports a datum conversion of 0.0 between the NGVD 29 and NAVD 88 datums. All results are reported in the NAVD 88 datum.

V. HYDRAULIC MODELING

A. Duplicate Effective HEC-RAS Model

The duplicate effective HEC-RAS analysis for Mississippi River was obtained from the Minnesota Department of Natural Resources (MNDNR), updated in 2018 from a prior 2004 study and using the NAVD 88 datum. The duplicate effective model was computed in its native HEC-RAS version 4.1.0 to confirm the model results. No changes were made in the duplicate effective model.

Table 4: Duplicate Effective Digital Files

Source	File Name	Description
USACE (~ 2004, 2018)	UMR_floodway.prj	HEC-RAS 4.1.0 model from Prescott, WI to Guttenburg, IA

HEC-RAS model output for the duplicate effective model is included in Appendix C. A workmap is provided in Appendix A. Digital files of the received HEC-RAS models are included in the link in Appendix G.

B. Corrected Effective HEC-RAS Model

No corrections were made to the effective model and the duplicate effective model was treated as the corrected effective model.

C. Existing Condition HEC-RAS Model

An existing conditions HEC-RAS analysis for the Mississippi River was updated throughout the project area to provide better geometric data at the project site.

The following modifications were made in HEC-RAS to reflect the existing condition within the Mississippi River:

- Added 4 new cross sections (761.296, 761.268, 761.207, 761.2) to intersect the proposed barge docking site
  - Left overbank geometry and channel bathymetry were copied from adjacent cross sections into the new cross sections
  - Right overbank and some channel data came from LiDAR, site topographic survey, and site bathymetric survey data collected by AMI, Inc in 2022
- Geometry data and the right bank station was modified slightly in effective cross section 761.327 using LiDAR and site survey

Table 5: Existing Condition HEC-RAS Digital Files

File Name	Type	Description
Mississippi_USACEModel_2018.prj	Project File	
Mississippi_USACEModel_2018.g03	Geometry	Existing terrain
Mississippi_USACEModel_2018.f02	Flow	Multiple Profile
Mississippi_USACEModel_2018.p03	Plan	Existing MP

The Existing Condition HEC-RAS data is provided in Appendix D. HEC-RAS workmaps are included in Appendix A. Digital files of all HEC-RAS files are included in the link in Appendix G.

D. Proposed Condition HEC-RAS Model

This condition includes all of the modifications made through the existing conditions model. The following modifications were made in HEC-RAS to reflect the proposed conditions of the Barge Facility site:

- Right overbank topographic data was extracted between XS 760.994 and 761.327 to reflect proposed development of the barge terminal facility, including temporary stockpiling of dredged material.
- Manning's n values were modified at the barge terminal cross sections to reflect the paved surface and access road
- Permanent ineffective flow regions were added at cross sections 761.268 and 761.296 to model stagnant regions on the upstream side of the unloading facility

Dredged areas within the Mississippi River shown in Appendix F were not accounted for in the proposed conditions analysis to provide a conservative estimate of project impacts.

Table 6: Proposed Condition HEC-RAS Digital Files

File Name	Type	Description
Mississippi_USACEModel_2018.prj	Project File	
Mississippi_USACEModel_2018.g08	Geometry	Proposed grading
Mississippi_USACEModel_2018.f02	Flow	Multiple Profile
Mississippi_USACEModel_2018.p07	Plan	Proposed MP

The Proposed Condition HEC-RAS data is provided in Appendix E. HEC-RAS workmaps are included in Appendix A. A preliminary site plan showing the proposed site layout is included in Appendix F. Digital files of all HEC-RAS files are included in the link in Appendix G.

VI. COMPARISON OF 100-YEAR RESULTS

Table 8 summarizes the impact of the proposed project on the 100-year water surface elevations along the Mississippi River. The analyses presented address only the 100-year floodplain modeling, and does not include revised floodway analyses, or a determination of impacts other than the 100-year event.

*Table 7: Comparison of 100-year WSELs**

HEC-RAS Cross Section**	FEMA Cross Section (Model)	Published BFE WBCO, Prelim Model	DE WSE (100yr)	EX WSE (100yr)	Impact (DE-EX)	PR WSE (100yr)	Impact (PR – EX)
769.696	111	681.3	681.2528	681.2452	-0.0076	681.2452	0.0000
768.717	112	681.3	681.2484	681.2407	-0.0077	681.2407	0.0000
767.605	113	681.2	681.2431	681.2355	-0.0076	681.2355	0.0000
766.672	114	681.2	681.2372	681.2296	-0.0076	681.2296	0.0000
765.995	115	681.2	681.2308	681.2232	-0.0076	681.2232	0.0000
765.528	116	681.2	681.2227	681.2151	-0.0076	681.2151	0.0000
765.103	117	681.1	681.1874	681.1797	-0.0077	681.1797	0.0000
764.552	118	681	681.0563	681.0485	-0.0078	681.0485	0.0000
764.091	119	680.8	680.8628	680.8549	-0.0079	680.8549	0.0000
763.659	120	680.5	680.5348	680.5265	-0.0083	680.5264	-0.0001
763.082	121	680.1	680.1697	680.1608	-0.0089	680.1607	-0.0001
762.578	122	679.8	679.8575	679.8479	-0.0096	679.8478	-0.0001
762.273	123	679.5	679.5953	679.5851	-0.0102	679.5850	-0.0001
762.062	124	679.3	679.2567	679.2457	-0.0110	679.2454	-0.0003
761.826	125	679.1	679.0542	679.0428	-0.0114	679.0425	-0.0003
761.327	126	678.7	678.6602	678.6478	-0.0124	678.6475	-0.0003
761.296	---	---	---	678.6328	---	678.6293	-0.0035
761.268	---	---	---	678.6108	---	678.6052	-0.0056
761.207	---	---	---	678.5510	---	678.5463	-0.0047
761.2	---	---	---	678.5391	---	678.5364	-0.0027
760.994	127	678.3	678.2943	678.3035	0.0092	678.3035	0.0000
760.759	128	678.1	678.0528	678.0528	0.0000	678.0528	0.0000
760.495	129	677.8	677.8153	677.8153	0.0000	677.8153	0.0000
760.4	130	677.7	677.7733	677.7733	0.0000	677.7733	0.0000
760.216	131	677.6	677.6870	677.6870	0.0000	677.6870	0.0000
760.2	HWY 25						
760.181	132	677.5	677.4159	677.4159	0.0000	677.4159	0.0000
759.926	133	677.4	677.3667	677.3667	0.0000	677.3667	0.0000
759.684	134	677.3	677.3054	677.3054	0.0000	677.3054	0.0000
759.458	135	677.3	677.2606	677.2606	0.0000	677.2606	0.0000
759.17	136	677.2	677.1453	677.1453	0.0000	677.1453	0.0000
758.833	137	677	677.0261	677.0261	0.0000	677.0261	0.0000

*DE = Duplicate Effective Model, EX = Existing Model, PR = Proposed Model
**Gray cells denote approximate project grading extents.

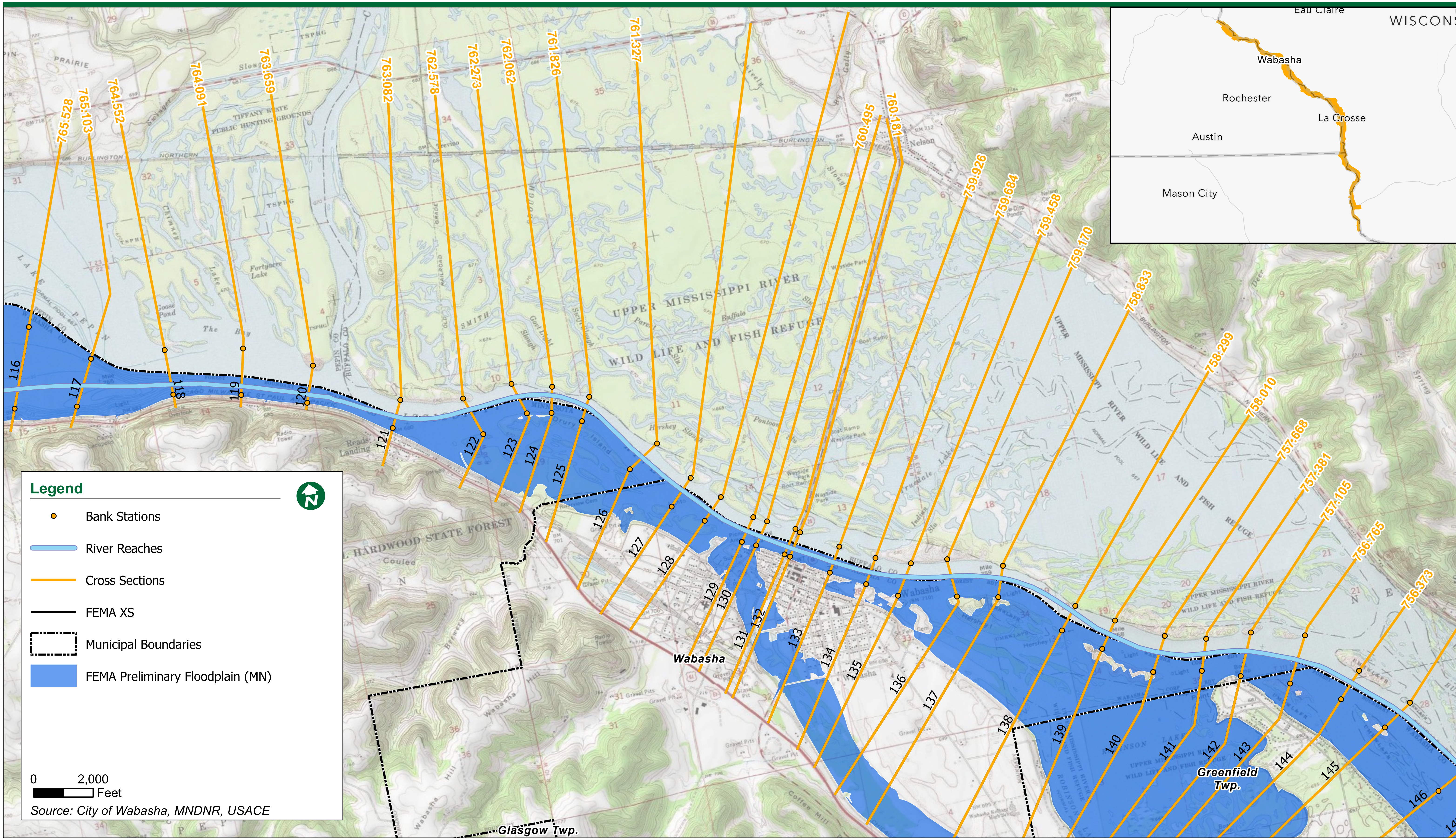
Appendix A:
HEC-RAS Workmaps

USACE Dredge Material Management Plan

City of Wabasha

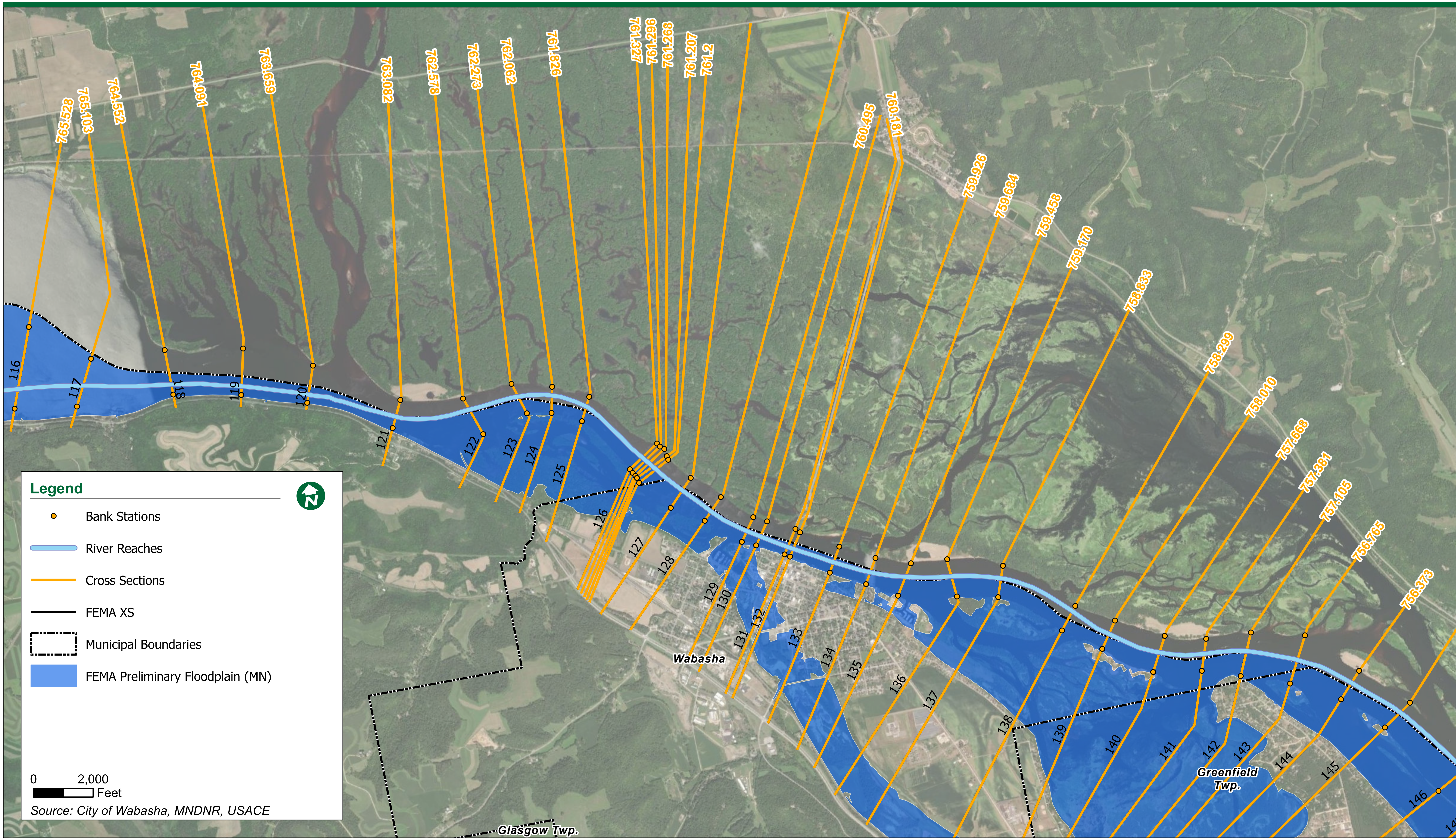
Corrected Effective HECRAS Workmap

December 2022



USACE Dredge Material Management Plan
City of Wabasha

Existing and Proposed HECRAS Workmap
December 2022

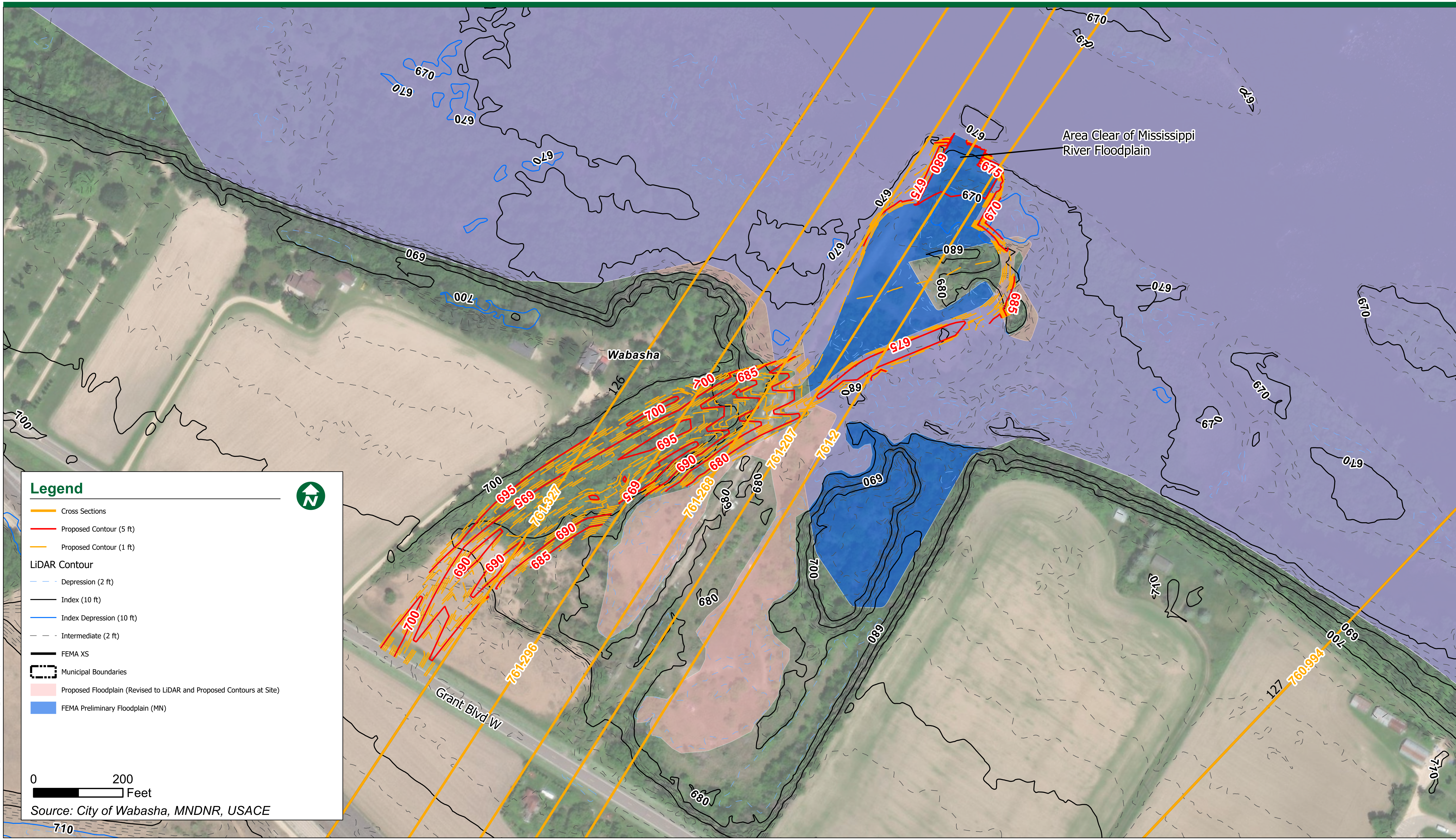


USACE Dredge Material Management Plan

City of Wabasha

HECRAS Workmap

August 2023



Map Document: H:\WABASHA_CI_MN\H19114396\GIS\Pro_Hydraulics.aprx | Username: Brady.Nahkala | Date Saved: 7/31/2023 8:19 PM

Appendix B:
Effective Flood Insurance Study and Flood Insurance Rate Maps

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program; it does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size, or all planimetric features outside Special Flood Hazard Areas. The community map repository should be consulted for possible updated flood hazard information prior to use of this map for property purchase or construction purposes.

To obtain more detailed information in areas where Base Flood Elevations (BFEs) and/or floodways have been determined, users are encouraged to consult the Flood Profiles and Floodway Data tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole–foot elevations and therefore may not exactly reflect the flood elevation data presented in the FIS report. For construction and/or floodplain management purposes, users are encouraged to use the flood elevation data presented in the FIS report in conjunction with the data shown on this FIRM.

Elevation Reference Mark (ERM) elevations listed on this map were obtained and/or developed to establish vertical control for determination of flood elevations and floodplain boundaries portrayed on this map. Users should be aware that these ERM elevations may have changed since the publication of this map. To obtain up–to–date elevation information on National Geodetic Survey (NGS) ERMs shown on this map, please contact the Information Services Branch of the NGS at (301) 713–3242, or visit their website at WWW.NGS.NOAA.GOV. Map users should seek verification of non–NGS ERM monument elevations when using these elevations for construction or floodplain management purposes.

Coastal base flood elevations apply only landward of 0.0' National Geodetic Vertical Datum of 1929 (NGVD), and include the effects of wave action; these elevations may also differ significantly from those developed by the National Weather Service for hurricane evacuation planning.

Areas of special flood hazard (100–year flood) include Zones A, AE, AH, AO, A99, V, and VE.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures.

Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the Federal Emergency Management Agency.

Floodway widths in some areas may be too narrow to show to scale. Floodway widths are provided in the Flood Insurance Study Report.

Corporate limits shown on this map are based on the best data available. The user should contact appropriate community officials to verify the corporate limit delineations shown on this map.

For community map revision history prior to countywide mapping, see section 6.0 of the Flood Insurance Study Report.

For adjoining map panels see separately printed Map Index.

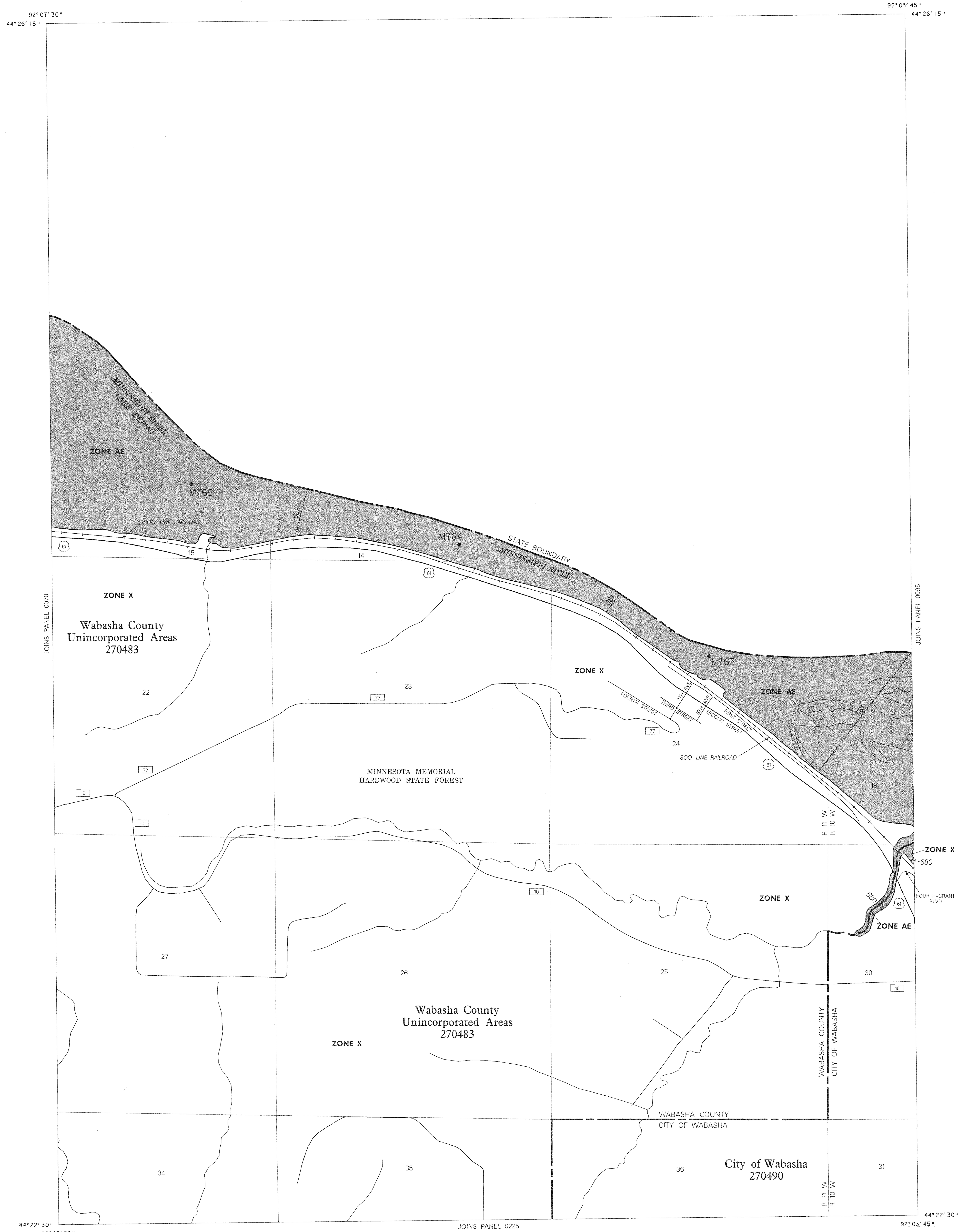
DIGITAL DATA AVAILABILITY: Digital files containing the thematic floodplain information shown on this map can be made available on CD–ROM by request. The files are currently archived in MicroStation design (DGN) file format referenced to the Universal Transverse Mercator (UTM) projection and the North American Datum of 1927 (NAD27). To obtain the digital files, send a written request to: Flood Insurance Information Specialist, 2977 Prosperity Avenue, Fairfax, Virginia 22031. Telephone (703) 876–0148, FAX (703) 876–0073.

NOTE: The coordinate system used for the production of this Flood Insurance Rate Map (FIRM) is Universal Transverse Mercator (UTM), North American Datum of 1927 (NAD27), Clarke 1866 spheroid. Corner coordinates shown on the FIRM are in latitude and longitude referenced to the Universal Transverse Mercator projection, NAD27. Differences in the datum and spheroid used in the production of FIRMs for adjacent counties may result in slight positional differences in map features at the county boundaries. These differences do not affect the accuracy of the information shown on the FIRM.

ATTENTION: Flood elevations on this map are referenced to the National Geodetic Vertical Datum of 1929. These flood elevations must be compared to structure and ground elevations referenced to the same datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, contact the National Geodetic Survey at the following address:

Vertical Network Branch, N/CG13
National Geodetic Survey, NOAA
Silver Spring Metro Center 3
1315 East–West Highway
Silver Spring, Maryland 20910
(301) 713–3191

BASE MAP SOURCE: Base map files were provided by the State of Minnesota Department of Transportation. These files were compiled at a scale of 1:24,000 from U.S. Geological Survey 7.5–Minute Series Topographic Maps and updated using aerial photographs and road construction plans. Users of this FIRM should be aware that minor adjustments may have been made to specific road locations.



LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100–YEAR FLOOD

ZONE A	No base flood elevations determined.
ZONE AE	Base flood elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE A99	To be protected from 100–year flood by Federal flood protection system under construction; no base flood elevations determined.
ZONE V	Coastal flood with velocity hazard (wave action); no base flood elevations determined.
ZONE VE	Coastal flood with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

ZONE X	Areas of 500–year flood; areas of 100–year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100–year flood.

OTHER AREAS

ZONE X	Areas determined to be outside 500–year floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

UNDEVELOPED COASTAL BARRIERS*

Identified 1983

Identified 1990 or Later

Otherwise Protected Areas Identified 1991 or Later

* Coastal barrier areas are normally located within or adjacent to Special Flood Hazard Areas.

Floodplain Boundary

Floodway Boundary

Zone D Boundary

Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones.

513	Base Flood Elevation Line; Elevation in Feet**
A — A	Cross Section Line
(EL 987)	Base Flood Elevation in Feet Where Uniform Within Zone**
RM7 x	Elevation Reference Mark
• M1.5	River Mile

**Referenced to the National Geodetic Vertical Datum of 1929

MAP REPOSITORY

Refer to Repository Listing on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
JUNE 20, 2000

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

Please refer to the Listing of Communities table on the FIRM Index for NFIP Initial Identification and Post–FIRM dates for all jurisdictions shown on this map.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at (800) 638–6620.

APPROXIMATE SCALE

1000 0 1000 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP
WABASHA COUNTY, MINNESOTA AND INCORPORATED AREAS

PANEL 90 OF 500

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
WABASHA, CITY OF	270490	0090	D
WABASHA COUNTY	270483	0090	D

Notice to User: The MAP NUMBER shown below should be used when placing map order; the COMMUNITY NUMBER shown above should be used on insurance applications for the subject community.

MAP NUMBER 27157C0090 D

EFFECTIVE DATE: JUNE 20, 2000

Federal Emergency Management Agency

NOTES TO USERS

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Elevation Reference Mark (ERM) elevations listed on this map were obtained and/or developed to establish vertical control for determination of flood elevations and floodplain boundaries portrayed on this map. Users should be aware that these ERM elevations may have changed since the publication of this map. To obtain up–to–date elevation information on National Geodetic Survey (NGS) ERMs shown on this map, please contact the Information Services Branch of the NGS at (301) 713–3242, or visit their website at WWW.NGS.NOAA.GOV. Map users should seek verification of non–NGS ERM monument elevations when using these elevations for construction or floodplain management purposes.

Coastal base flood elevations apply only landward of 0.0' National Geodetic Vertical Datum of 1929 (NGVD), and include the effects of wave action; these elevations may also differ significantly from those developed by the National Weather Service for hurricane evacuation planning.

Areas of special flood hazard (100–year flood) include Zones A, AE, AH, AO, A99, V, and VE.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures.

Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the Federal Emergency Management Agency.

Floodway widths in some areas may be too narrow to show to scale. Floodway widths are provided in the Flood Insurance Study Report.

Corporate limits shown on this map are based on the best data available. The user should contact appropriate community officials to verify the corporate limit delineations shown on this map.

For community map revision history prior to countywide mapping, see section 6.0 of the Flood Insurance Study Report.

For adjoining map panels see separately printed Map Index.

DIGITAL DATA AVAILABILITY: Digital files containing the thematic floodplain information shown on this map can be made available on CD–ROM by request. The files are currently archived in MicroStation design (DGN) file format referenced to the Universal Transverse Mercator (UTM) projection and the North American Datum of 1927 (NAD27). To obtain the digital files, send a written request to: Flood Insurance Information Specialist, 2977 Prosperity Avenue, Fairfax, Virginia 22031. Telephone (703) 876–0148, FAX (703) 876–0073.

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ATTENTION: Flood elevations on this map are referenced to the National Geodetic Vertical Datum of 1929. These flood elevations must be compared to structure and ground elevations referenced to the same datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, contact the National Geodetic Survey at the following address:

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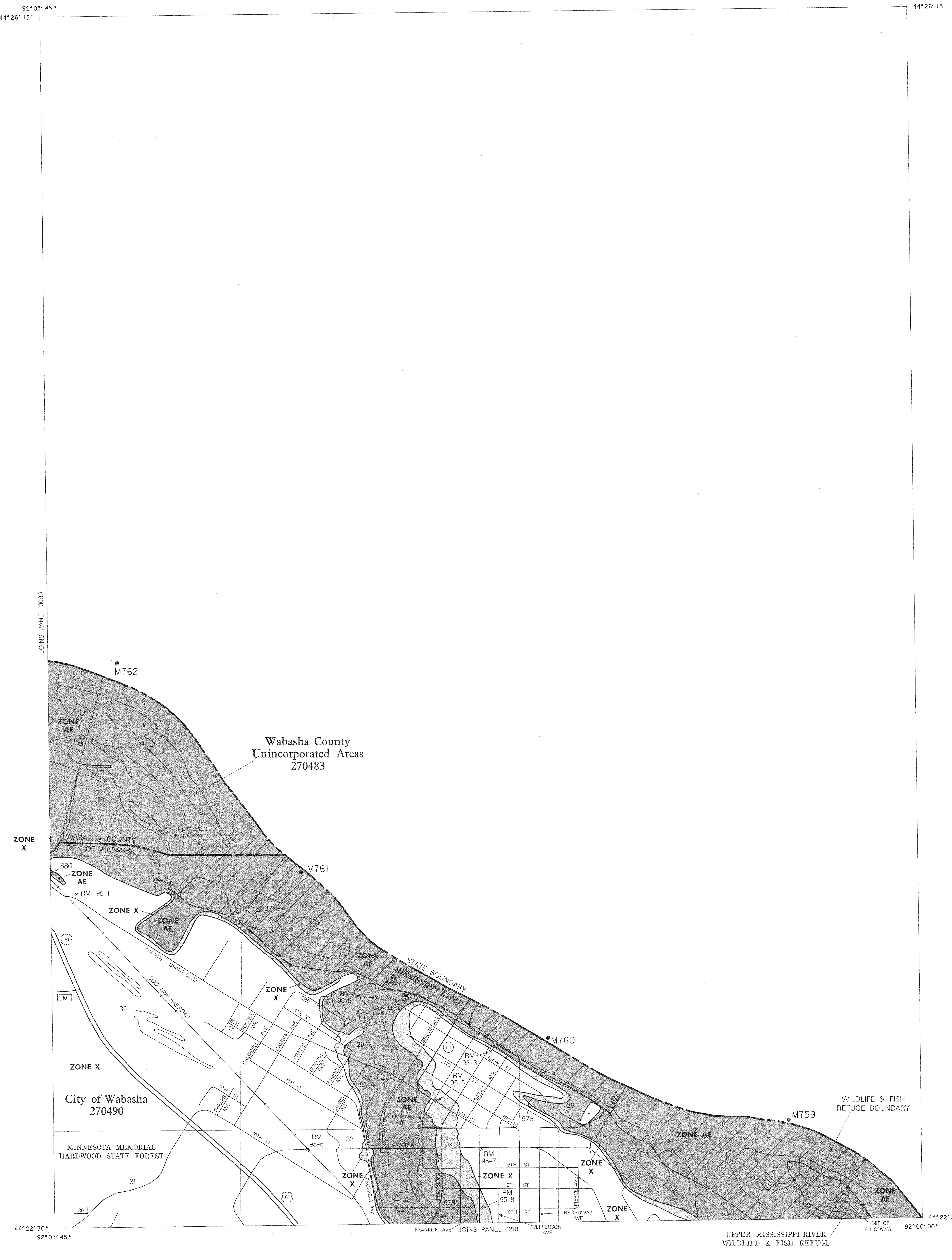
National Geodetic Survey, NOAA
Silver Spring Metro Center 3
1315 East–West Highway
Silver Spring, Maryland 20910
(301) 713–3191

BASE MAP SOURCE: Base map files were provided by the State of Minnesota Department of Transportation. These files were compiled at a scale of 1:24,000 from U.S. Geological Survey 7.5–Minute Series Topographic Maps and updated using aerial photographs and road construction plans. Users of this FIRM should be aware that minor adjustments may have been made to specific road locations.

ELEVATION REFERENCE MARKS

REFERENCE MARK	ELEVATION IN FT. (NGVD)[1]	DESCRIPTION OF LOCATION
RM 95–1	700.806	U.S. Coast and Geodetic Survey disk stamped N 248 1970, set on top of copper coated rod and is encased in 4–inch iron pipe which projects 2 inches above surface, located approximately 154 feet southeast of centerline of crossing of Soo Line Railroad and Fourth–Grant Boulevard, approximately 25 feet northeast of centerline of Fourth–Grant Boulevard, approximately 33 feet northwest of main entrance to Riverview Cemetery.
RM 95–2	673.72	Top of water valve, approximately 3 feet west of concrete pad in picnic area, approximately 50 feet west of large swing set, and approximately 320 feet north of railroad spur, and approximately 610 feet west of gaging station.
RM 95–3	691.311	U.S. Coast and Geodetic Survey disk stamped B 26 1933, set in top of southwest end of concrete guardrail, approximately 77 feet north of north corner of post office, approximately 175 feet northeast of centerline of Main Street, approximately 11.7 feet southeast of centerline of Pembroke Avenue.
RM 95–4	677.49	Minnesota Highway Department disk set in southeast corner wing wall at intersection of crossing river bed at Fourth–Grant Boulevard.
RM 95–5	682.93	Top nut of fire hydrant at intersection of Fourth–Grant Boulevard and Alleghany Avenue.
RM 95–6	700.035	U.S. Geological Survey standard disk, stamped A–26, set in concrete at base of southeast concrete bridge pier crossing Soo Line Railroad on Hiawatha Drive.
RM 95–7	691.67	Top nut of fire hydrant at intersection of Franklin Avenue and Hiawatha Drive.
RM 95–8	685.59	Top nut of fire hydrant at intersection of 10th Street and Franklin Avenue.

[1] National Geodetic Vertical Datum of 1929



LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100–YEAR FLOOD

ZONE A	No base flood elevations determined.
ZONE AE	Base flood elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE A99	To be protected from 100–year flood by Federal flood protection system under construction; no base flood elevations determined.
ZONE V	Coastal flood with velocity hazard (wave action); no base flood elevations determined.
ZONE VE	Coastal flood with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

ZONE X	Areas of 500–year flood; areas of 100–year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100–year flood.

OTHER AREAS

ZONE X	Areas determined to be outside 500–year floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

UNDEVELOPED COASTAL BARRIERS*

Identified 1983 — Identified 1990 or Later — Otherwise Protected Areas Identified 1991 or Later

*Coastal barrier areas are normally located within or adjacent to Special Flood Hazard Areas.

Floodplain Boundary

Floodway Boundary

Zone D Boundary

Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones.

513 — Base Flood Elevation Line; Elevation in Feet**

A — A Cross Section Line

(EL 987) Base Flood Elevation in Feet Where Uniform Within Zone**

RM7 x Elevation Reference Mark

● M1.5 River Mile

**Referenced to the National Geodetic Vertical Datum of 1929

MAP REPOSITORY

Refer to Repository Listing on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
JUNE 20, 2000

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

Please refer to the Listing of Communities table on the FIRM Index for NFIP Initial Identification and Post–FIRM dates for all jurisdictions shown on this map.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at (800) 638–6620.

N

APPROXIMATE SCALE

1000 0 1000 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

WABASHA COUNTY,
MINNESOTA
AND INCORPORATED AREAS

PANEL 95 OF 500

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
WABASHA, CITY OF	270490	0095	D
WABASHA COUNTY	270483	0095	D

Notice to User: The MAP NUMBER shown below should be used when placing map order; the COMMUNITY NUMBER shown above should be used on insurance applications for the subject community.

MAP NUMBER
27157C0095 D

EFFECTIVE DATE:
JUNE 20, 2000

Federal Emergency Management Agency

NOTES TO USERS

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Coastal base flood elevations apply only landward of 0.0' National Geodetic Vertical Datum of 1929 (NGVD), and include the effects of wave action; these elevations may also differ significantly from those developed by the National Weather Service for hurricane evacuation planning.

Areas of special flood hazard (100-year flood) include Zones A, AE, AH, AO, A99, V, and VE.

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Floodway widths in some areas may be too narrow to show to scale. Floodway widths are provided in the Flood Insurance Study Report.

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For adjoining map panels see separately printed Map Index.

DIGITAL DATA AVAILABILITY: Digital files containing the thematic floodplain information shown on this map can be made available on CD-ROM by request. The files are currently archived in MicroStation design (DGN) file format referenced to the Universal Transverse Mercator (UTM) projection and the North American Datum of 1927 (NAD27). To obtain the digital files, send a written request to: Flood Insurance Information Specialist, 2977 Prosperity Avenue, Fairfax, Virginia 22031. Telephone (703) 876-0148, FAX (703) 876-0073.

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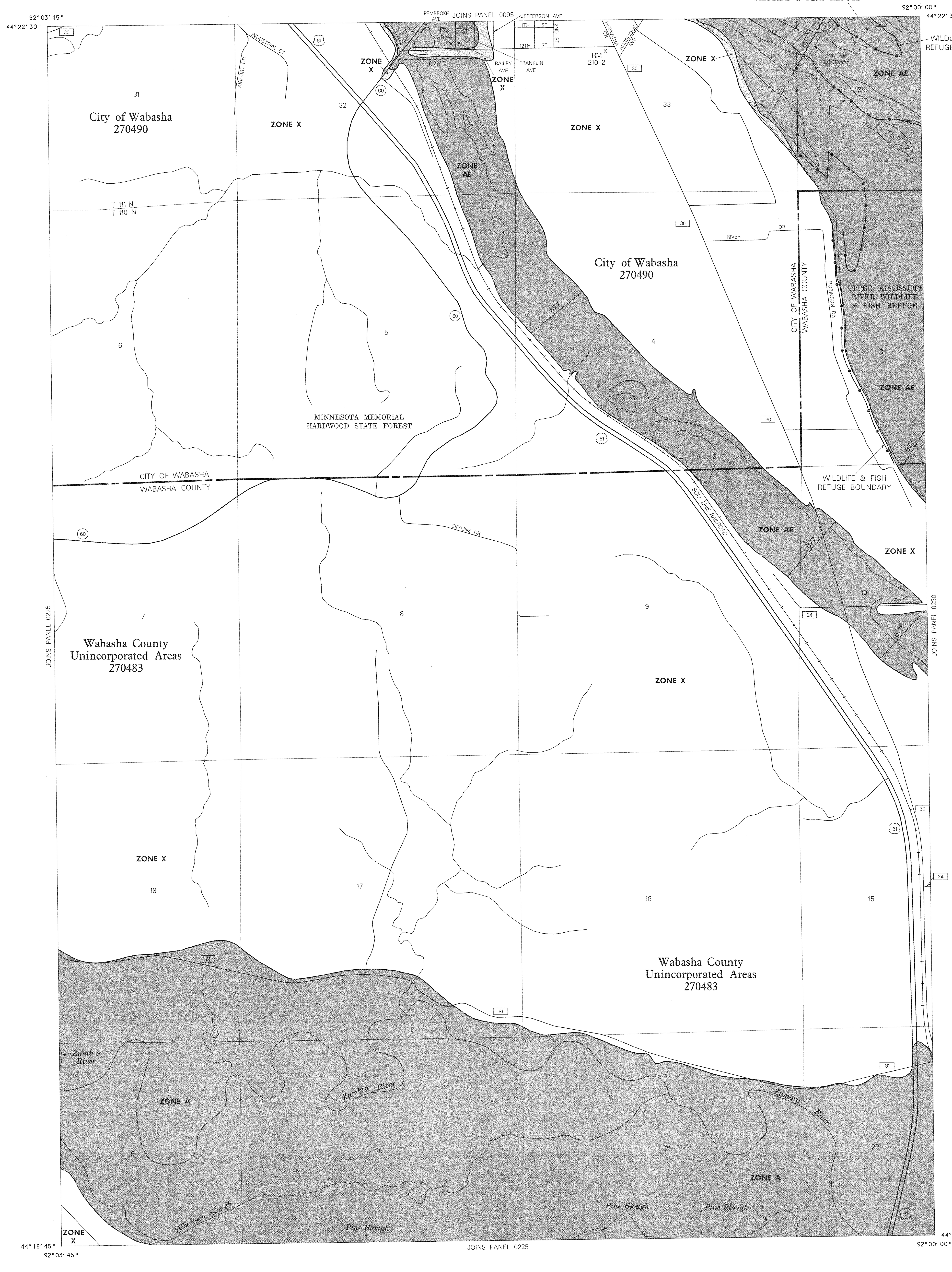
BASE MAP SOURCE: Base map files were provided by the State of Minnesota Department of Transportation. These files were compiled at a scale of 1:24,000 from U.S. Geological Survey 7.5-Minute Series Topographic Maps and updated using aerial photographs and road construction plans. Users of this FIRM should be aware that minor adjustments may have been made to specific road locations.

ELEVATION REFERENCE MARKS

REFERENCE MARK	ELEVATION IN FT. (NGVD)[1]	DESCRIPTION OF LOCATION
RM 210-1	676.49	Top nut of fire hydrant at intersection of 12th Street and Bailey Avenue.
RM 210-2	698.440	U.S. Coast and Geodetic Survey disk stamped M 248 1970, set in top of concrete post which is level with surface of ground, located approximately 150 feet west of intersection of 12th Street and Hiawatha Drive, approximately 30 feet south of centerline of 12th Street.

[1] National Geodetic Vertical Datum of 1929



LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD

ZONE A	No base flood elevations determined.
ZONE AE	Base flood elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE A99	To be protected from 100-year flood by Federal flood protection system under construction; no base flood elevations determined.
ZONE V	Coastal flood with velocity hazard (wave action); no base flood elevations determined.
ZONE VE	Coastal flood with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

ZONE X	Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.

OTHER AREAS

ZONE X	Areas determined to be outside 500-year floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

UNDEVELOPED COASTAL BARRIERS*

Identified 1983 — Identified 1990 or Later — Otherwise Protected Areas Identified 1991 or Later

* Coastal barrier areas are normally located within or adjacent to Special Flood Hazard Areas.

Floodplain Boundary

Floodway Boundary

Zone D Boundary

Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones.

513 — Base Flood Elevation Line; Elevation in Feet**

A — A — Cross Section Line

(EL 987) — Base Flood Elevation in Feet Where Uniform Within Zone**

RM7 x — Elevation Reference Mark

● M1.5 — River Mile

**Referenced to the National Geodetic Vertical Datum of 1929

MAP REPOSITORY

Refer to Repository Listing on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
JUNE 20, 2000

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

Please refer to the Listing of Communities table on the FIRM Index for NFIP Initial Identification and Post-FIRM dates for all jurisdictions shown on this map.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at (800) 638-6620.

APPROXIMATE SCALE

1000 — 0 — 1000 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP
WABASHA COUNTY,
MINNESOTA
AND INCORPORATED AREAS

PANEL 210 OF 500

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
WABASHA, CITY OF	270490	0210	D
WABASHA COUNTY	270483	0210	D

Notice to User: The MAP NUMBER shown below should be used when placing map order; the COMMUNITY NUMBER shown above should be used on insurance applications for the subject community.

MAP NUMBER
27157C0210 D

EFFECTIVE DATE:
JUNE 20, 2000

Federal Emergency Management Agency

NOTES TO USERS

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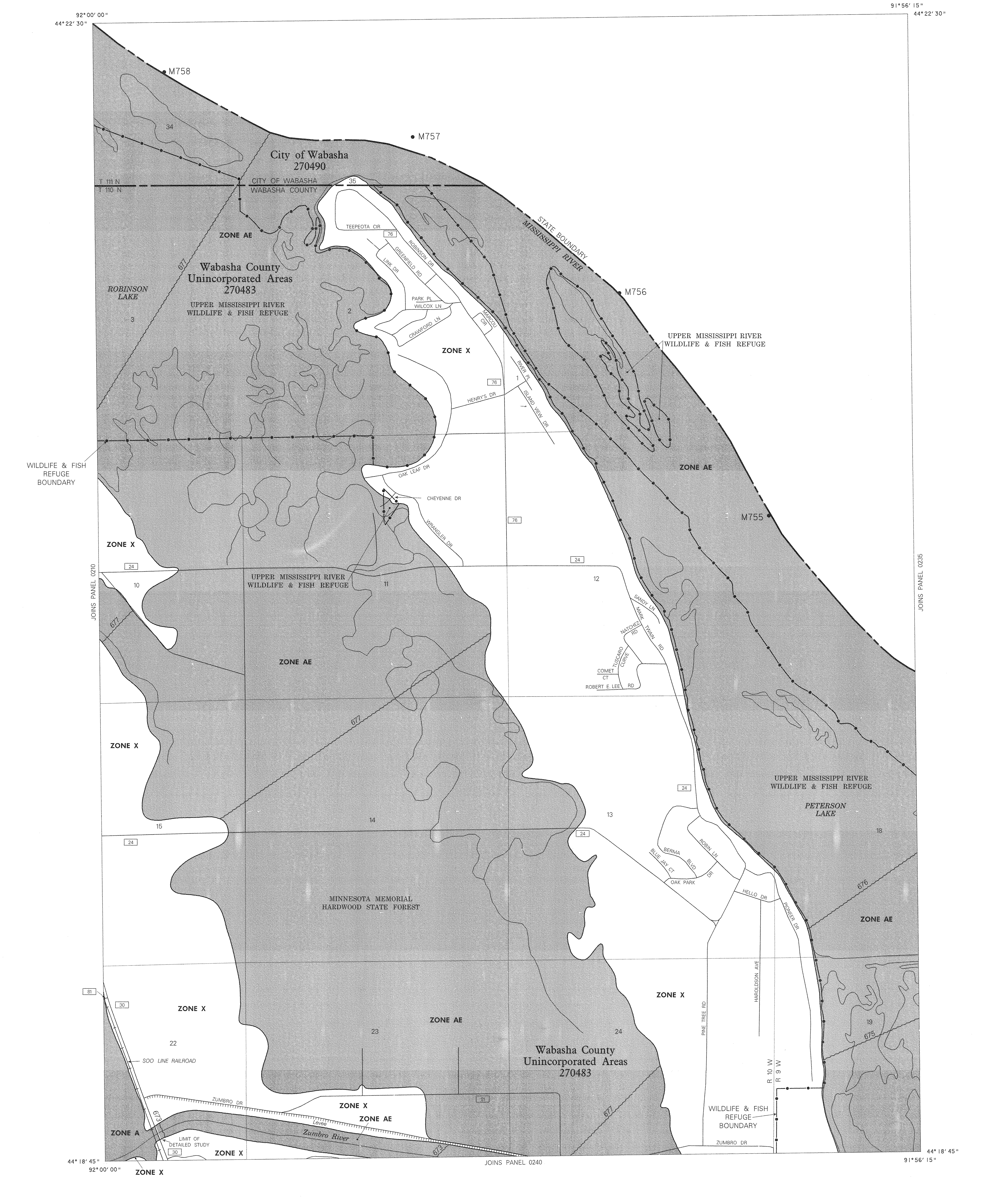

LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100–YEAR FLOOD

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ZONE AE	Base flood elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.
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ZONE A99	To be protected from 100–year flood by Federal flood protection system under construction; no base flood elevations determined.
ZONE V	Coastal flood with velocity hazard (wave action); no base flood elevations determined.
ZONE VE	Coastal flood with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

ZONE X	Areas of 500–year flood; areas of 100–year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100–year flood.

OTHER AREAS

ZONE X	Areas determined to be outside 500–year floodplain.
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UNDEVELOPED COASTAL BARRIERS*

Identified 1983 — Identified 1990 or Later — Otherwise Protected Areas Identified 1991 or Later

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Floodplain Boundary

Floodway Boundary

Zone D Boundary

Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones.

513 — Base Flood Elevation Line; Elevation in Feet**

A — A — Cross Section Line

(EL 987) — Base Flood Elevation in Feet Where Uniform Within Zone**

RM7 x — Elevation Reference Mark

● M1.5 — River Mile

**Referenced to the National Geodetic Vertical Datum of 1929

MAP REPOSITORY

Refer to Repository Listing on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
JUNE 20, 2000

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

Please refer to the Listing of Communities table on the FIRM Index for NFIP Initial Identification and Post–FIRM dates for all jurisdictions shown on this map.

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APPROXIMATE SCALE

1000 0 1000 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

WABASHA COUNTY,
MINNESOTA
AND INCORPORATED AREAS

PANEL 230 OF 500

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
WABASHA, CITY OF	270490	0230	D
WABASHA COUNTY	270483	0230	D

Notice to User: The MAP NUMBER shown below should be used when placing map order; the COMMUNITY NUMBER shown above should be used on insurance applications for the subject community.

MAP NUMBER
27157C0230 D

EFFECTIVE DATE:
JUNE 20, 2000

Federal Emergency Management Agency

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program; it does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size, or all planimetric features outside Special Flood Hazard Areas. The community map repository should be consulted for possible updated flood hazard information prior to use of this map for property purchase or construction purposes.

To obtain more detailed information in areas where Base Flood Elevations (BFEs) and/or floodways have been determined, users are encouraged to consult the Flood Profiles and Floodway Data tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations and therefore may not exactly reflect the flood elevation data presented in the FIS report. For construction and/or floodplain management purposes, users are encouraged to use the flood elevation data presented in the FIS report in conjunction with the data shown on this FIRM.

Elevation Reference Mark (ERM) elevations listed on this map were obtained and/or developed to establish vertical control for determination of flood elevations and floodplain boundaries portrayed on this map. Users should be aware that these ERM elevations may have changed since the publication of this map. To obtain up-to-date elevation information on National Geodetic Survey (NGS) ERMs shown on this map, please contact the Information Services Branch of the NGS at (301) 713-3242, or visit their website at WWW.NGS.NOAA.GOV. Map users should seek verification of non-NGS ERM monument elevations when using these elevations for construction or floodplain management purposes.

Coastal base flood elevations apply only landward of 0.0' National Geodetic Vertical Datum of 1929 (NGVD), and include the effects of wave action; these elevations may also differ significantly from those developed by the National Weather Service for hurricane evacuation planning.

Areas of special flood hazard (100-year flood) include Zones A, AE, AH, AO, A99, V, and VE.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures.

Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the Federal Emergency Management Agency.

Floodway widths in some areas may be too narrow to show to scale. Floodway widths are provided in the Flood Insurance Study Report.

Corporate limits shown on this map are based on the best data available. The user should contact appropriate community officials to verify the corporate limit delineations shown on this map.

For community map revision history prior to countywide mapping, see section 6.0 of the Flood Insurance Study Report.

For adjoining map panels see separately printed Map Index.

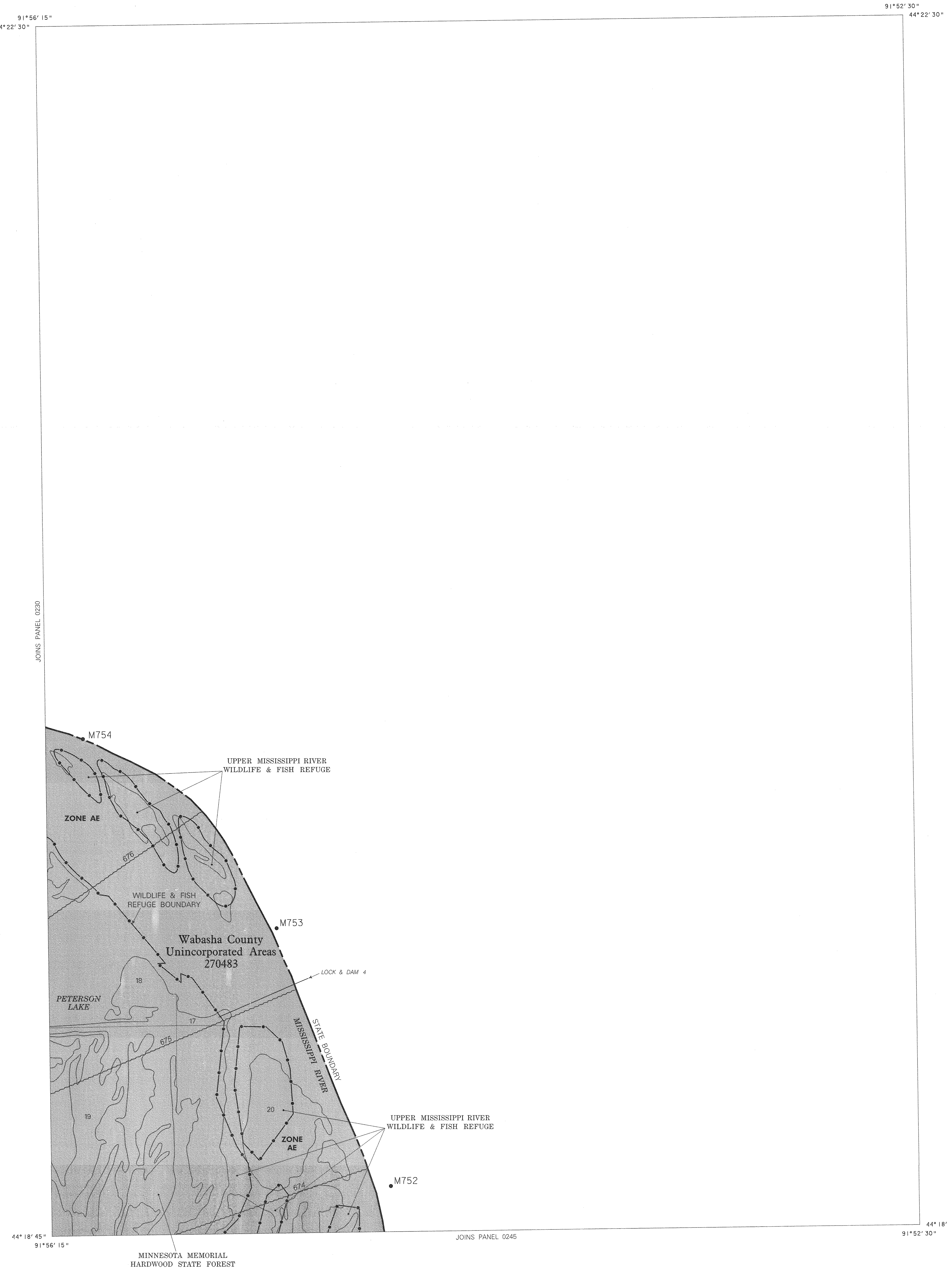
DIGITAL DATA AVAILABILITY: Digital files containing the thematic floodplain information shown on this map can be made available on CD-ROM by request. The files are currently archived in MicroStation design (DGN) file format referenced to the Universal Transverse Mercator (UTM) projection and the North American Datum of 1927 (NAD27). To obtain the digital files, send a written request to: Flood Insurance Information Specialist, 2977 Prosperity Avenue, Fairfax, Virginia 22031. Telephone (703) 876-0148, FAX (703) 876-0073.

NOTE: The coordinate system used for the production of this Flood Insurance Rate Map (FIRM) is Universal Transverse Mercator (UTM), North American Datum of 1927 (NAD27), Clarke 1866 spheroid. Corner coordinates shown on the FIRM are in latitude and longitude referenced to the Universal Transverse Mercator projection, NAD27. Differences in the datum and spheroid used in the production of FIRMs for adjacent counties may result in slight positional differences in map features at the county boundaries. These differences do not affect the accuracy of the information shown on the FIRM.

ATTENTION: Flood elevations on this map are referenced to the National Geodetic Vertical Datum of 1929. These flood elevations must be compared to structure and ground elevations referenced to the same datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, contact the National Geodetic Survey at the following address:

Vertical Network Branch, N/CG13
National Geodetic Survey, NOAA
Silver Spring Metro Center 3
1315 East-West Highway
Silver Spring, Maryland 20910
(301) 713-3191

BASE MAP SOURCE: Base map files were provided by the State of Minnesota Department of Transportation. These files were compiled at a scale of 1:24,000 from U.S. Geological Survey 7.5-Minute Series Topographic Maps and updated using aerial photographs and road construction plans. Users of this FIRM should be aware that minor adjustments may have been made to specific road locations.



LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD

ZONE A	No base flood elevations determined.
ZONE AE	Base flood elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE A99	To be protected from 100-year flood by Federal flood protection system under construction; no base flood elevations determined.
ZONE V	Coastal flood with velocity hazard (wave action); no base flood elevations determined.
ZONE VE	Coastal flood with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

ZONE X	Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.

OTHER AREAS

ZONE X	Areas determined to be outside 500-year floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

UNDEVELOPED COASTAL BARRIERS*

Identified 1983 | Identified 1990 or Later | Otherwise Protected Areas Identified 1991 or Later

*Coastal barrier areas are normally located within or adjacent to Special Flood Hazard Areas.

Floodplain Boundary

Floodway Boundary

Zone D Boundary

Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones.

~~513~~ Base Flood Elevation Line; Elevation in Feet**

(A)——(A) Cross Section Line

(EL 987) Base Flood Elevation in Feet Where Uniform Within Zone**

RM7 x Elevation Reference Mark

• M1.5 River Mile

**Referenced to the National Geodetic Vertical Datum of 1929

MAP REPOSITORY

Refer to Repository Listing on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
JUNE 20, 2000

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

Please refer to the Listing of Communities table on the FIRM Index for NFIP Initial Identification and Post-FIRM dates for all jurisdictions shown on this map.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at (800) 638-6620.

N

APPROXIMATE SCALE

1000 0 1000 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP
WABASHA COUNTY, MINNESOTA AND INCORPORATED AREAS

PANEL 235 OF 500

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
WABASHA COUNTY	270483	0235	D

Notice to User: The MAP NUMBER shown below should be used when placing map order; the COMMUNITY NUMBER shown above should be used on insurance applications for the subject community.

MAP NUMBER
27157C0235 D

EFFECTIVE DATE:
JUNE 20, 2000

Federal Emergency Management Agency

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) Report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS Report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study Report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 15. The **horizontal datum** was NAD 83, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713- 3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from digital orthophotography provided by the Buffalo County Land Management Office. This information was derived from 2006 digital orthophotography produced at a resolution of 1 foot.

The **profile baselines** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the **profile baseline**, in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

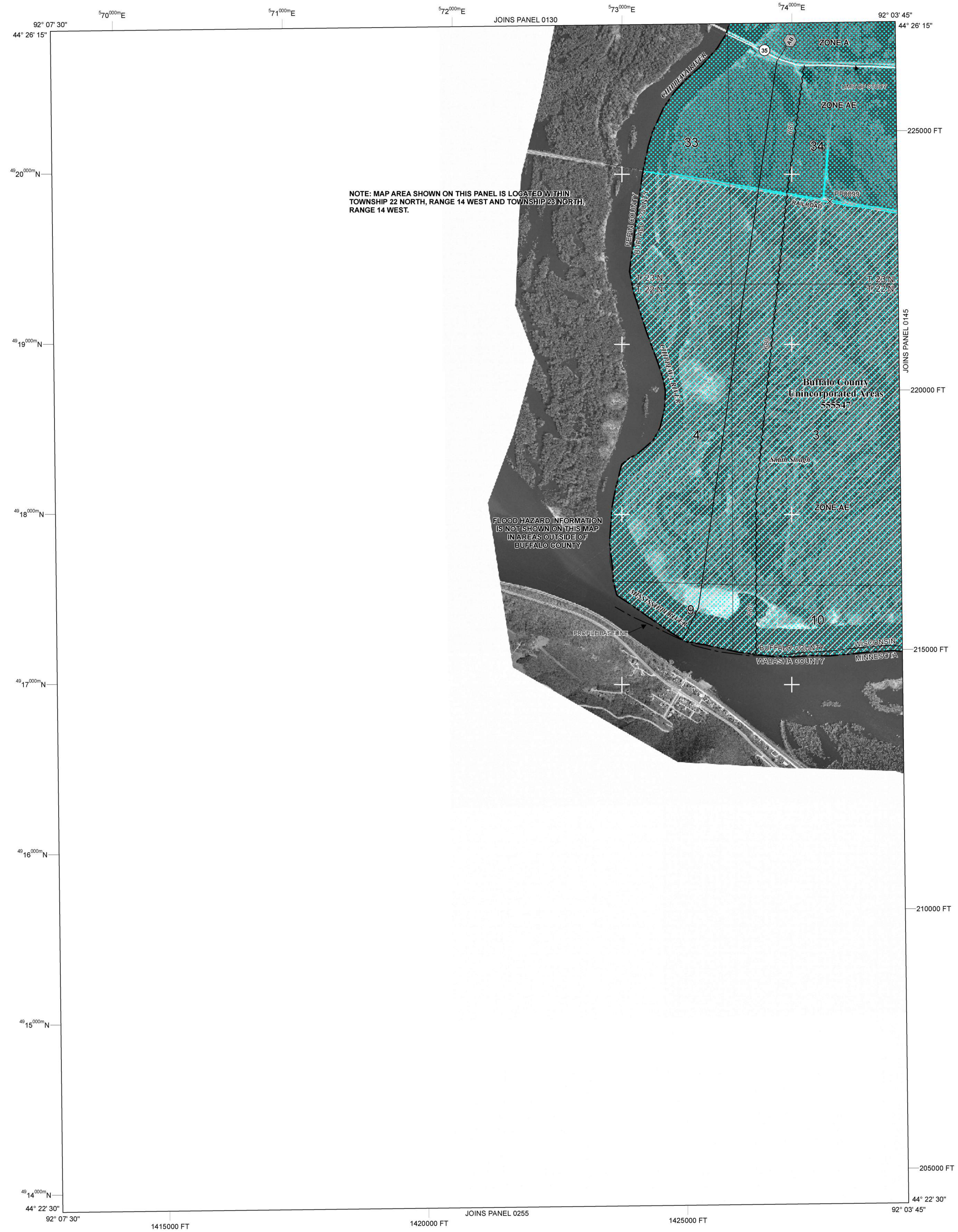
Based on updated topographic information, this map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. As a result, the Flood Profiles and Floodway Data tables for multiple streams in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on the map. Also, the road to floodplain relationships for unrevised streams may differ from what is shown on previous maps.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://msc.fema.gov.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1- 877- FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip/.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% Annual Chance Floodplain Boundary

0.2% Annual Chance Floodplain Boundary

Floodway boundary

Zone D boundary

CBRS and OPA boundary

Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

A — A	Cross section line
23 - - - - - - 23	Transect line
45° 02' 08", 93° 02' 12"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere
3100000 FT	5000-foot ticks: Wisconsin State Plane Central Zone (FIPS Zone 4802), Lambert Conformal Conic projection
$^{49}89^{000m}$ N	1000-meter Universal Transverse Mercator grid values, zone 15
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
May 3, 2010

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

N

MAP SCALE 1" = 1000'

FEET: 500 0 1000 2000
METERS: 300 0 300 600

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0140D

FIRM

FLOOD INSURANCE RATE MAP

BUFFALO COUNTY, WISCONSIN

AND INCORPORATED AREAS

PANEL 140 OF 520

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BUFFALO COUNTY	555547	0140	D

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
55011C0140D

EFFECTIVE DATE
MAY 3, 2010

Federal Emergency Management Agency

NOTES TO USERS

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To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) Report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS Report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study Report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 15. The **horizontal datum** was NAD 83, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713- 3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from digital orthophotography provided by the Buffalo County Land Management Office. This information was derived from 2006 digital orthophotography produced at a resolution of 1 foot.

The **profile baselines** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the **profile baseline**, in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

Based on updated topographic information, this map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. As a result, the Flood Profiles and Floodway Data tables for multiple streams in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on the map. Also, the road to floodplain relationships for unrevised streams may differ from what is shown on previous maps.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

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LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A No Base Flood Elevations determined.

ZONE AE Base Flood Elevations determined.

ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.

ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE AR Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

ZONE A99 Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.

ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.

ZONE VE Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% Annual Chance Floodplain Boundary

0.2% Annual Chance Floodplain Boundary

Floodway boundary

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Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

513 Base Flood Elevation line and value; elevation in feet*

(EL 987) Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

A — A Cross section line

23 - - - - - 23 Transect line

45° 02' 08", 93° 02' 12" Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere

3100000 FT 5000-foot ticks: Wisconsin State Plane Central Zone (FIPS Zone 4802), Lambert Conformal Conic projection

$^{49}89^{000m}$ N 1000-meter Universal Transverse Mercator grid values, zone 15

DX5510 × Bench mark (see explanation in Notes to Users section of this FIRM panel)

• M1.5 River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
May 3, 2010

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

N

MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

300 0 300 600 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0145D

FIRM

FLOOD INSURANCE RATE MAP

BUFFALO COUNTY, WISCONSIN
AND INCORPORATED AREAS

PANEL 145 OF 520
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BUFFALO COUNTY	555547	0145	D
NELSON, VILLAGE OF	550232	0145	D

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
55011C0145D

EFFECTIVE DATE
MAY 3, 2010

Federal Emergency Management Agency

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Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study Report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 15. The **horizontal datum** was NAD 83, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

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NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713- 3242**, or visit its website at http://www.ngs.noaa.gov.

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The **profile baselines** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the **profile baseline**, in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

Based on updated topographic information, this map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. As a result, the Flood Profiles and Floodway Data tables for multiple streams in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on the map. Also, the road to floodplain relationships for unrevised streams may differ from what is shown on previous maps.

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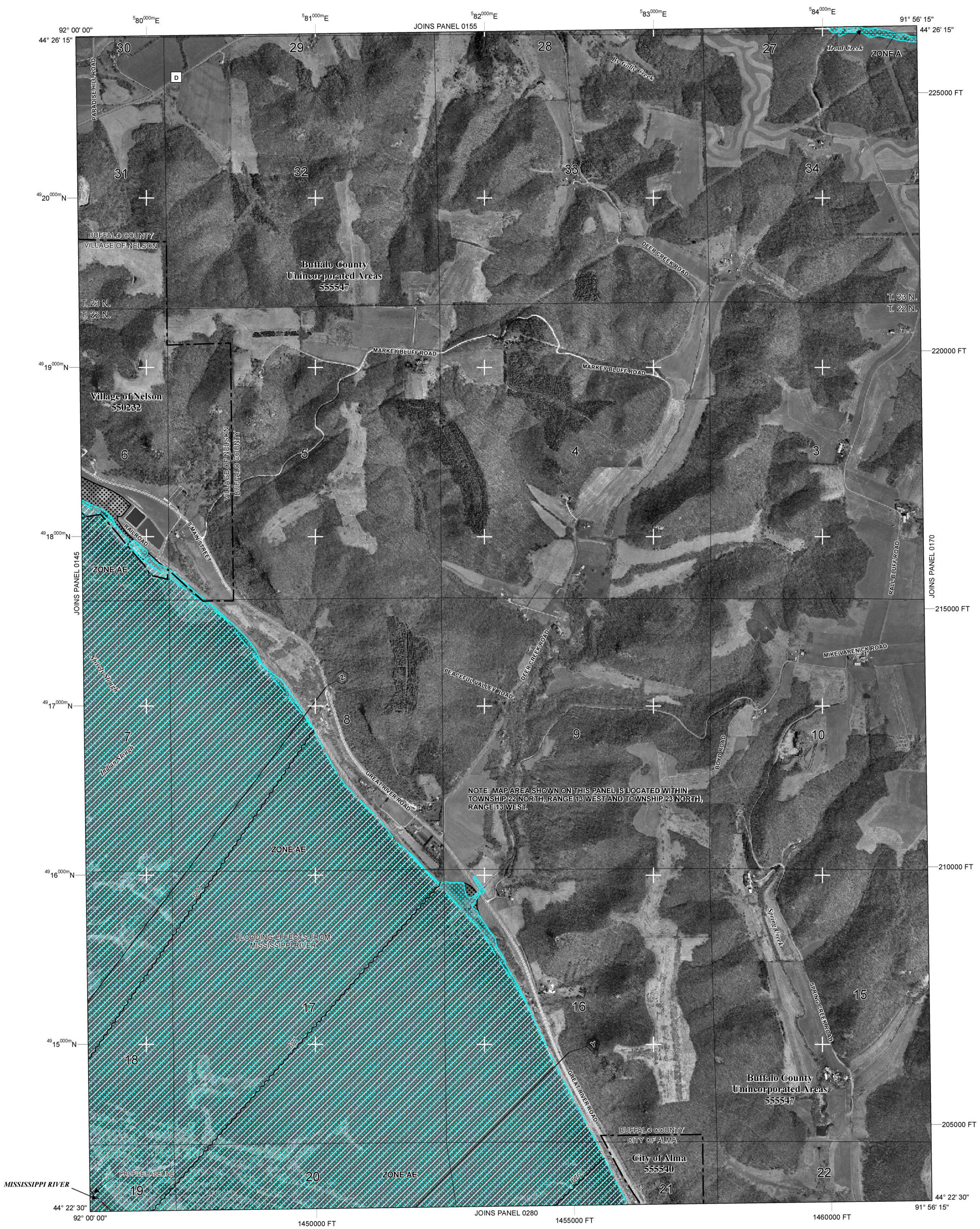
Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://msc.fema.gov.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1- 877- FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip/.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% Annual Chance Floodplain Boundary

0.2% Annual Chance Floodplain Boundary

Floodway boundary

Zone D boundary

CBRS and OPA boundary

Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

A — A	Cross section line
23 - - - - 23	Transect line
45° 02' 08", 93° 02' 12"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere
3100000 FT	5000-foot ticks: Wisconsin State Plane Central Zone (FIPS Zone 4802), Lambert Conformal Conic projection
$^{49}89^{000m}$ N	1000-meter Universal Transverse Mercator grid values, zone 15
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
May 3, 2010

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 1000'

500 0 1000 2000 FEET
300 0 300 600 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0165D

FIRM

FLOOD INSURANCE RATE MAP

BUFFALO COUNTY, WISCONSIN AND INCORPORATED AREAS

PANEL 165 OF 520

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ALMA, CITY OF	555540	0165	D
BUFFALO COUNTY	555547	0165	D
NELSON, VILLAGE OF	550232	0165	D

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
55011C0165D

EFFECTIVE DATE
MAY 3, 2010

Federal Emergency Management Agency

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) Report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS Report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study Report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 15. The **horizontal datum** was NAD 83, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713- 3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from digital orthophotography provided by the Buffalo County Land Management Office. This information was derived from 2006 digital orthophotography produced at a resolution of 1 foot.

The **profile baselines** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the **profile baseline**, in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

Based on updated topographic information, this map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. As a result, the Flood Profiles and Floodway Data tables for multiple streams in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on the map. Also, the road to floodplain relationships for unrevised streams may differ from what is shown on previous maps.

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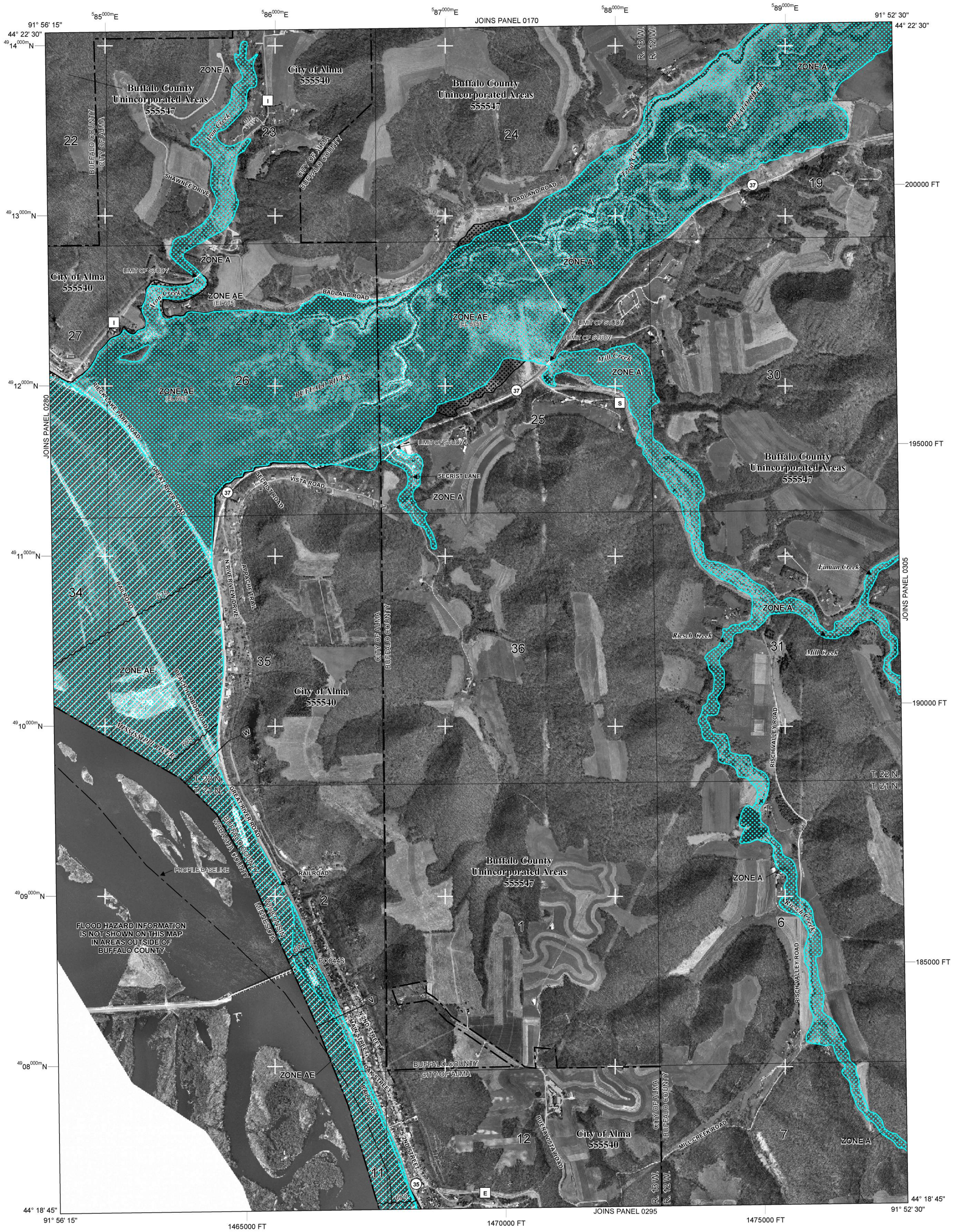

LEGEND

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FLOODWAY AREAS IN ZONE AE

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1% Annual Chance Floodplain Boundary

0.2% Annual Chance Floodplain Boundary

Floodway boundary

Zone D boundary

CBRS and OPA boundary

Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

A —— A	Cross section line
23 - - - - - 23	Transect line
45° 02' 08", 93° 02' 12"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere
3100000 FT	5000-foot ticks: Wisconsin State Plane Central Zone (FIPS Zone 4802), Lambert Conformal Conic projection
$^{49}89^{000m}$ N	1000-meter Universal Transverse Mercator grid values, zone 15
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
May 3, 2010

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

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N

MAP SCALE 1" = 1000'

500 0 1000 2000 FEET
300 0 300 600 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0285D

FIRM

FLOOD INSURANCE RATE MAP

BUFFALO COUNTY, WISCONSIN
AND INCORPORATED AREAS

PANEL 285 OF 520

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ALMA, CITY OF	555540	0285	D
BUFFALO COUNTY	555547	0285	D

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
55011C0285D

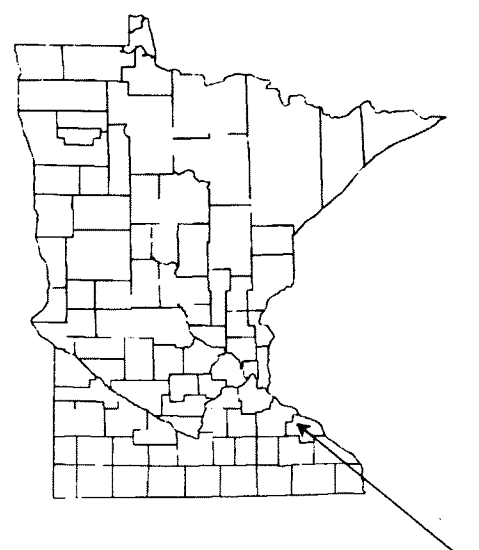
EFFECTIVE DATE
MAY 3, 2010

Federal Emergency Management Agency

FLOOD INSURANCE STUDY

WABASHA COUNTY, MINNESOTA
AND INCORPORATED AREAS

COMMUNITY NAME	COMMUNITY NUMBER
ELGIN, CITY OF	270484
HAMMOND, CITY OF	270485
KELLOGG, CITY OF	270655
LAKE CITY, CITY OF	270486
MAZEPPA, CITY OF	270487
MILLVILLE, CITY OF	270488
MINNEISKA, CITY OF	270489
WABASHA, CITY OF	270490
WABASHA COUNTY (UNINCORPORATED AREAS)	270483
ZUMBRO FALLS, CITY OF	270491



Wabasha County

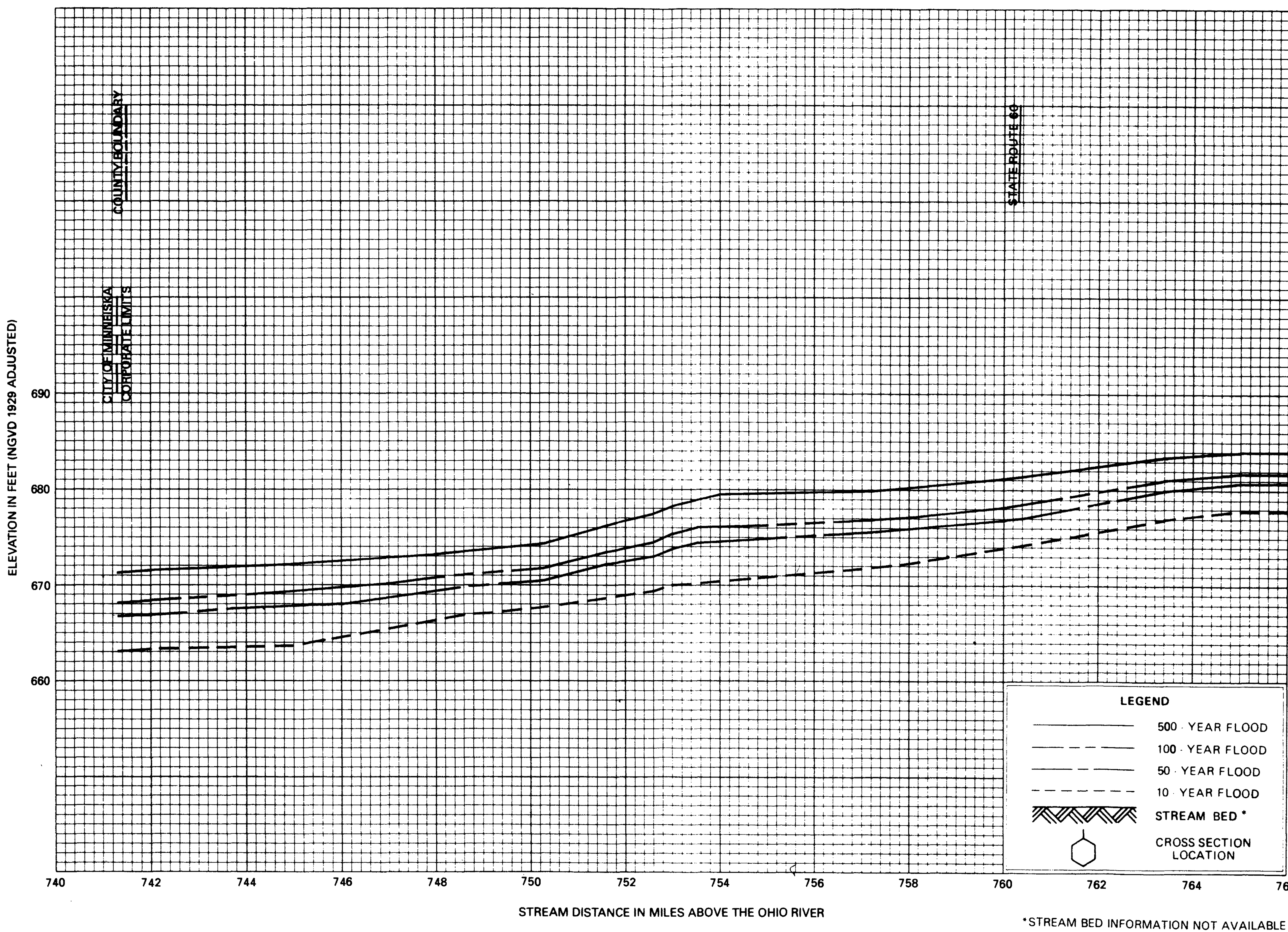
EFFECTIVE:

JUNE 20, 2000

Federal Emergency Management Agency

TABLE 2 - SUMMARY OF DISCHARGES - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
GILBERT CREEK					
At mouth	27.06	3,200	5,100	6,300	10,000
Above confluence with Sugarloaf Creek	15.63	1,690	2,800	3,500	5,600
MILLER CREEK					
At confluence with Mississippi River	17.24	2,100	3,400	4,300	7,100
MISSISSIPPI RIVER					
At USGS gage No. 5-3835 at LaCrosse	62,800	162,000	229,000	260,000	*
At USGS gage No. 5-3785 at Winona	59,200	154,000	223,000	254,000	331,000
At Wabasha	56,610	145,000	210,000	240,000	320,000
At USGS gage No. 5-3445 at Prescott	44,800	113,000	176,000	207,000	290,000
At USGS gage No. 5-3310 at St. Paul	36,800	79,500	133,000	160,000	232,000
NORTH FORK ZUMBRO RIVER					
At confluence with Zumbro River	239	9,427	17,849	22,358	35,194
Upstream of confluence of Trout Brook	182	8,151	16,220	20,710	33,966
SOUTH ZUMBRO RIVER TRIBUTARY					
At mouth	1.59	490	880	1,115	1,765
SUGARLOAF CREEK					
At confluence with Gilbert Creek	8.15	1,350	2,100	2,600	4,300
WEST ZUMBRO RIVER TRIBUTARY					
At confluence with Zumbro River	9.68	2,255	3,930	4,880	7,470



FLOOD PROFILES

MISSISSIPPI RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

WABASHA COUNTY, MN AND INCORPORATED AREAS

15P

FLOOD INSURANCE STUDY

BUFFALO COUNTY, WISCONSIN
AND INCORPORATED AREAS

Community Name	Community Number
Alma, City of	555540
Buffalo, City of	555546
Buffalo County (Unincorporated Areas)	555547
Cochrane, Village of	555550
Fountain City, City of	555555
Mondovi, City of	550031
Nelson, Village of	550232

EFFECTIVE:
MAY 3, 2010

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
55011CV000A

Analyst Extension and ArcHydro Tools in conjunction with the USGS canopy cover raster (Reference 13).

Peak discharge-drainage area relationships for streams studied by detailed methods are shown in Table 2, Summary of Discharges.

TABLE 2 – SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES(cfs) 10-PERCENT ANNUAL CHANCE	2-PERCENT ANNUAL CHANCE	1-PERCENT ANNUAL CHANCE	0.2-PERCENT ANNUAL CHANCE
BROWNLEE CREEK					
At Confluence with Mirror Lake	4.1	500	950	1,200	2,000
BUFFALO RIVER					
At Southern Mondovi Corporate Limit	218	6,000	10,000	12,000	16,000
MISSISSIPPI RIVER					
Just Downstream of Confluence with Chippewa River	*	*	*	229,611	*
At Buffalo City	*	*	*	236,145	*
At southern county boundary	*	*	*	238,959	*
PEESO CREEK					
Above Mirror Lake	14.1	1,200	2,400	3,000	4,800
Below Mirror Lake	18.2	1,700	3,400	3,600	5,650

* Data not available or not calculated

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals. Users should be aware that flood elevations shown on the FIRM represent rounded whole-foot elevations and may not exactly reflect the elevations shown on the Flood Profiles or in the Floodway Data tables in the FIS report. Flood elevations shown on the FIRM are primarily intended for flood insurance rating purposes. For construction and/or floodplain management purposes, users are cautioned to use the flood elevation data presented in this FIS in conjunction with the data shown on the FIRM.

City of Mondovi is the only community in Buffalo County which has a previously printed FIS report. The hydraulic analyses described in that report have been compiled and summarized below.

Roughness factors (Manning's “n” values) used in the hydraulic computations were chosen by engineering judgment and were based on field observations of the streams and floodplain areas. Roughness factors for all streams studied by detailed methods are shown in Table 3, "Manning's “n” Values."

TABLE 3 – MANNINGS "N" VALUES

Stream	Channel “n”	Overbank “n”
Brownlee Creek	0.040	0.080
Buffalo River	0.035	0.090-0.110
Mississippi River	0.028-0.038	0.045-0.150
Peeso Creek	0.040	0.080-0.110

For the flooding sources which are studied approximate analyses and listed in “2.1 Scope of Study”, HEC-GeoRAS was used to convert centerline and cross section data created in ArcGIS (Reference 13) for use in HEC-RAS 3.1.3 (Reference 11). HEC-GeoRAS utilized an area Triangulated Irregular Network (TIN) model developed from 10 and 30 meter resolution National Elevation Dataset (NED) Digital Elevation Model (DEM) files to develop the model cross sections. The same TIN which was used for floodplain mapping. Road crossing locations were selected by looking at the aerial photos and modeled as inline structures. Normal depth was used as the downstream boundary condition for reaches in this study. The slope was calculated using the channel invert profile between the five downstream most cross sections (approximately most downstream mile of channel).

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 4.2), selected cross-section locations are also shown on the FIRM (Exhibit 2).

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the Flood Profiles (Exhibit 1) are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

3.3 Vertical Datum

All FIS reports and FIRMs are referenced to a specific vertical datum. The vertical datum provides a starting point against which flood, ground, and structure elevations can be referenced and compared. Until recently, the standard vertical datum used for newly created or revised FIS reports and FIRMs was the National Geodetic Vertical Datum of 1929 (NGVD). With the completion of the North American Vertical Datum of 1988 (NAVD), many FIS reports and FIRMs are now prepared using NAVD as the referenced vertical datum.

Flood elevations shown in this FIS report and on the FIRM are referenced to the NAVD. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. Some of the data used in this revision were taken from the prior effective FIS reports and FIRMs and adjusted to NAVD88. The datum conversion factor from NGVD29 to NAVD88 in Buffalo County is 0.

For additional information regarding conversion between the NGVD and NAVD, visit the National Geodetic Survey website at www.ngs.noaa.gov, or contact the National Geodetic Survey at the following address:

Vertical Network Branch, N/CG13
National Geodetic Survey, NOAA
Silver Spring Metro Center 3
1315 East-West Highway
Silver Spring, Maryland 20910
(301) 713-3191

Temporary vertical monuments are often established during the preparation of a flood hazard analysis for the purpose of establishing local vertical control. Although these monuments are not shown on the FIRM, they may be found in the Technical Support Data Notebook associated with the FIS report and FIRM for this community. Interested individuals may contact FEMA to access these data.

To obtain current elevation, description, and/or location information for benchmarks shown on this map, please contact the Information Services Branch of the NGS at (301) 713-3242, or visit their website at www.ngs.noaa.gov.

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound floodplain management programs. To assist in this endeavor, each FIS report provides 1-percent-annual-chance floodplain data, which may include a combination of the following: 10-, 2-, 1-, and 0.2-percent-annual-chance flood elevations; delineations of the 1- and 0.2-percent-annual-chance floodplains; and a 1-percent-annual-chance floodway. This information is presented on the FIRM and in many components of the FIS report, including Flood Profiles, Floodway Data tables, and Summary of Stillwater Elevation tables. Users should reference the data presented in the FIS report as well as additional information that may be available at the local community map repository before making flood elevation and/or floodplain boundary determinations.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent-annual-chance flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent-annual-chance flood is employed to indicate additional areas of flood risk in the community. For each stream studied

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
MISSISSIPPI RIVER (continued)								
Y	757.38[1]	6,993[3] / 7,732	107,582	2.1	676.5	676.5	676.5	0.0
Z	758.83[1]	10,110[3] / 12,695	151,616	1.5	677.0	677.0	677.0	0.0
AA	759.93[1]	12,570[3] / 12,654	146,492	1.6	677.4	677.4	677.4	0.0
AB	763.08[1]	8,823[3] / 9,234	106,298	2.2	680.2	680.2	680.2	0.0
PEESO CREEK								
A	1,320[2]	245	1,273	2.8	787.9	787.9	787.9	0.0
B	2,640[2]	75	1,095	3.3	791.4	791.4	791.4	0.0
C	3,379[2]	121	968	3.7	792.0	792.0	792.0	0.0
D	6,072[2]	440	2,156	1.4	813.5	813.5	813.5	0.0
E	6,917[2]	428	1,337	2.2	816.7	816.7	816.7	0.0
F	8,395[2]	368	1,468	2.0	818.4	818.4	818.4	0.0
G	9,557[2]	359	1,301	2.3	820.8	820.8	820.8	0.0
H	10,718[2]	415	1,036	2.9	824.2	824.2	824.2	0.0

[1]MILES ABOVE CONFLUENCE OF OHIO RIVER, [2]FEET ABOVE CONFLUENCE WITH BUFFALO RIVER, [3]FLOODWAY WIDTH WITHIN BUFFALO COUNTY

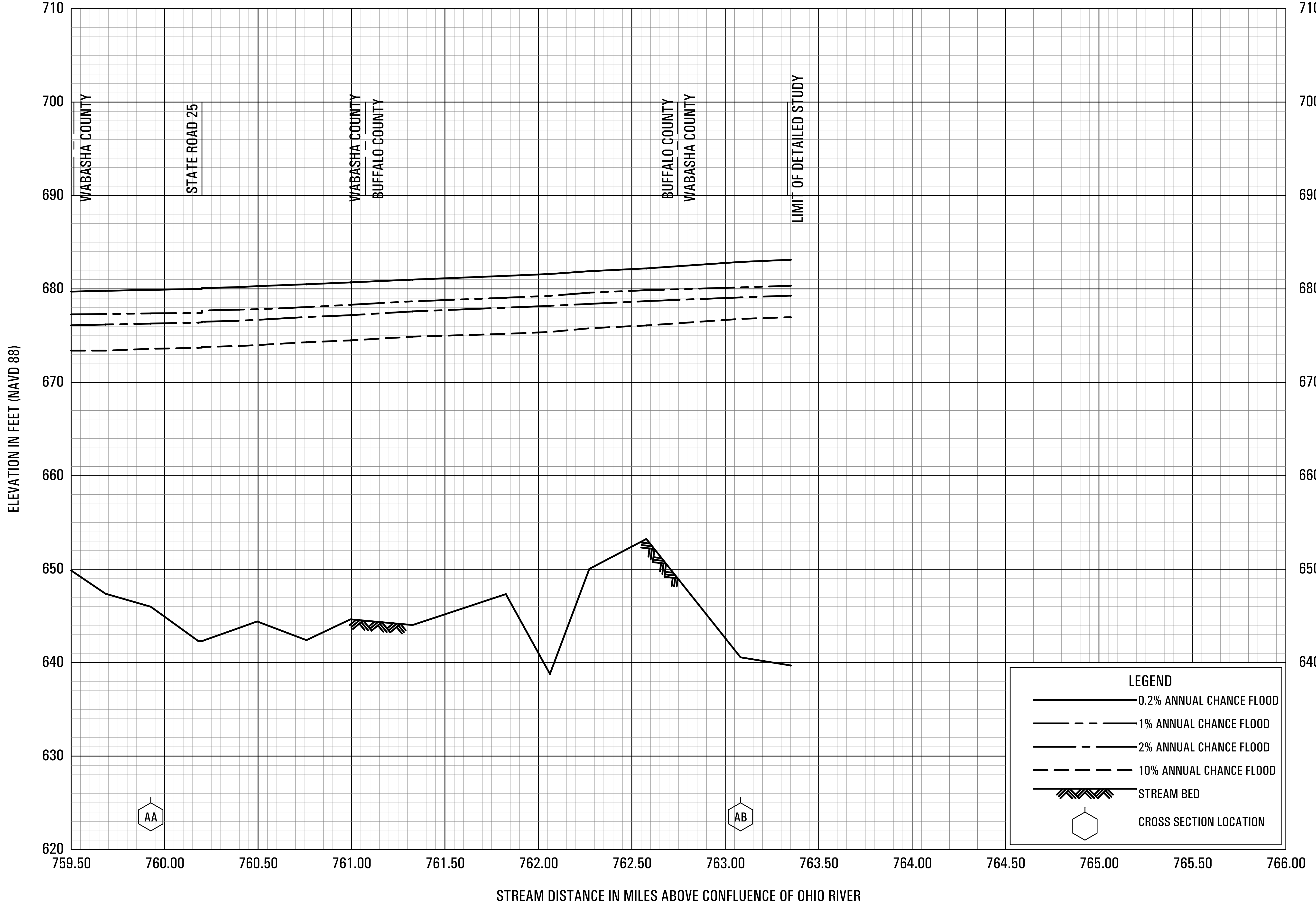
TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

BUFFALO COUNTY AND INCORPORATED AREAS

FLOODWAY DATA

MISSISSIPPI RIVER - PEESO CREEK



FLOOD PROFILES

MISSISSIPPI RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

BUFFALO COUNTY, WI

AND INCORPORATED AREAS

10P

Appendix C:
Duplicate Effective Condition HEC-RAS

HEC-RAS Plan: Plan1 Locations: User Defined

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Mississippi	PrIslToLaCrosse	796.385	100-yr Base	192930.00	648.28	685.68	663.85	685.73	0.000046	2.92	187564.30	14650.31	0.10
Mississippi	PrIslToLaCrosse	796.385	IA/MN Max	192930.00	648.28	686.14	663.85	686.19	0.000045	2.90	179526.80	11840.76	0.10
Mississippi	PrIslToLaCrosse	796.385	WI Fldwy	192930.00	648.28	685.68	663.85	685.73	0.000046	2.92	187485.80	13784.54	0.10
Mississippi	PrIslToLaCrosse	796.000	100-yr Base	192930.00	643.51	685.46	660.87	685.59	0.000056	3.75	175775.00	13735.46	0.11
Mississippi	PrIslToLaCrosse	796.000	IA/MN Max	192930.00	643.51	685.93	660.87	686.06	0.000055	3.74	165603.40	10748.33	0.11
Mississippi	PrIslToLaCrosse	796.000	WI Fldwy	192930.00	643.51	685.47	660.87	685.60	0.000056	3.75	175618.40	13657.18	0.11
Mississippi	PrIslToLaCrosse	795.445	100-yr Base	192930.00	641.65	685.35	663.22	685.47	0.000062	3.82	184014.20	19506.75	0.12
Mississippi	PrIslToLaCrosse	795.445	IA/MN Max	192930.00	641.65	685.82	663.22	685.94	0.000062	3.86	169215.50	12245.59	0.12
Mississippi	PrIslToLaCrosse	795.445	WI Fldwy	192930.00	641.65	685.35	663.22	685.48	0.000062	3.82	183776.20	19463.52	0.12
Mississippi	PrIslToLaCrosse	795.000	100-yr Base	192930.00	639.73	685.23	663.51	685.37	0.000071	4.08	174186.00	14198.15	0.12
Mississippi	PrIslToLaCrosse	795.000	IA/MN Max	192930.00	639.73	685.70	663.51	685.84	0.000071	4.12	165870.10	12310.53	0.12
Mississippi	PrIslToLaCrosse	795.000	WI Fldwy	192930.00	639.73	685.24	663.51	685.37	0.000071	4.09	174023.00	14169.68	0.12
Mississippi	PrIslToLaCrosse	794.671	100-yr Base	196287.00	650.73	685.15	665.78	685.25	0.000080	3.57	186436.40	14193.77	0.11
Mississippi	PrIslToLaCrosse	794.671	IA/MN Max	196287.00	650.73	685.62	665.78	685.72	0.000080	3.60	176270.30	12461.18	0.11
Mississippi	PrIslToLaCrosse	794.671	WI Fldwy	196287.00	650.73	685.15	665.78	685.25	0.000080	3.57	186102.60	14155.82	0.11
Mississippi	PrIslToLaCrosse	794.379	100-yr Base	196231.00	650.68	685.01	667.96	685.14	0.000082	3.79	166574.60	13249.98	0.13
Mississippi	PrIslToLaCrosse	794.379	IA/MN Max	196231.00	650.68	685.48	667.96	685.61	0.000083	3.82	155273.80	11468.66	0.13
Mississippi	PrIslToLaCrosse	794.379	WI Fldwy	196231.00	650.68	685.02	667.96	685.14	0.000082	3.78	166615.90	13247.32	0.13
Mississippi	PrIslToLaCrosse	794.078	100-yr Base	196276.00	644.35	684.90	665.58	685.04	0.000082	3.95	159785.40	12555.05	0.13
Mississippi	PrIslToLaCrosse	794.078	IA/MN Max	196276.00	644.35	685.36	665.58	685.51	0.000082	3.99	147640.50	10495.11	0.13
Mississippi	PrIslToLaCrosse	794.078	WI Fldwy	196276.00	644.35	684.90	665.58	685.04	0.000081	3.94	159826.80	12552.36	0.13
Mississippi	PrIslToLaCrosse	793.829	100-yr Base	196321.00	645.57	684.80	666.01	684.94	0.000079	3.98	158531.70	12273.51	0.13
Mississippi	PrIslToLaCrosse	793.829	IA/MN Max	196321.00	645.57	685.27	666.01	685.41	0.000079	4.02	147591.60	9999.41	0.13
Mississippi	PrIslToLaCrosse	793.829	WI Fldwy	196321.00	645.57	684.81	666.01	684.94	0.000079	3.98	158499.60	12254.52	0.13
Mississippi	PrIslToLaCrosse	793.559	100-yr Base	196366.00	654.79	684.75	667.42	684.82	0.000051	2.92	171040.00	11794.31	0.10
Mississippi	PrIslToLaCrosse	793.559	IA/MN Max	196366.00	654.79	685.22	667.41	685.29	0.000051	2.96	157729.00	9978.20	0.10
Mississippi	PrIslToLaCrosse	793.559	WI Fldwy	196366.00	654.79	684.76	667.42	684.83	0.000051	2.92	170970.00	11769.49	0.10
Mississippi	PrIslToLaCrosse	793.302	100-yr Base	196412.00	652.56	684.72	668.29	684.76	0.000037	2.43	173988.40	11833.52	0.08
Mississippi	PrIslToLaCrosse	793.302	IA/MN Max	196412.00	652.56	685.19	668.26	685.23	0.000037	2.46	165441.50	10708.68	0.08
Mississippi	PrIslToLaCrosse	793.302	WI Fldwy	196412.00	652.56	684.73	668.30	684.76	0.000037	2.43	173907.60	11812.73	0.08
Mississippi	PrIslToLaCrosse	793.000	100-yr Base	196355.00	654.16	684.65	668.44	684.70	0.000048	2.79	173376.90	11766.48	0.10
Mississippi	PrIslToLaCrosse	793.000	IA/MN Max	196355.00	654.16	685.12	668.51	685.17	0.000048	2.82	168595.00	10848.41	0.10
Mississippi	PrIslToLaCrosse	793.000	WI Fldwy	196355.00	654.16	684.66	668.42	684.71	0.000048	2.79	173416.40	11764.02	0.10
Mississippi	PrIslToLaCrosse	792.640	100-yr Base	196445.00	651.01	684.57	667.14	684.62	0.000046	2.93	168609.30	11179.80	0.10
Mississippi	PrIslToLaCrosse	792.640	IA/MN Max	196445.00	651.01	685.04	667.20	685.09	0.000046	2.97	165429.30	10531.88	0.10
Mississippi	PrIslToLaCrosse	792.640	WI Fldwy	196445.00	651.01	684.57	667.14	684.63	0.000046	2.94	168238.00	11124.58	0.10
Mississippi	PrIslToLaCrosse	792.261	100-yr Base	196491.00	649.10	684.51	666.99	684.56	0.000051	3.04	165372.00	12153.93	0.10
Mississippi	PrIslToLaCrosse	792.261	IA/MN Max	196491.00	649.10	684.97	667.01	685.03	0.000051	3.07	158080.20	10890.89	0.10
Mississippi	PrIslToLaCrosse	792.261	WI Fldwy	196491.00	649.10	684.51	666.98	684.57	0.000051	3.04	165410.70	12151.06	0.10
Mississippi	PrIslToLaCrosse	791.792	100-yr Base	196479.00	643.53	684.31	665.27	684.46	0.000077	4.08	87137.81	6936.83	0.13
Mississippi	PrIslToLaCrosse	791.792	IA/MN Max	196479.00	643.53	684.77	665.25	684.92	0.000077	4.12	83953.83	5244.41	0.13
Mississippi	PrIslToLaCrosse	791.792	WI Fldwy	196479.00	643.53	684.31	665.27	684.46	0.000077	4.08	87153.33	6936.15	0.13
Mississippi	PrIslToLaCrosse	791.531	100-yr Base	196524.00	639.03	684.17	664.97	684.36	0.000092	4.54	73116.74	5474.92	0.14
Mississippi	PrIslToLaCrosse	791.531	IA/MN Max	196524.00	639.03	684.62	664.97	684.82	0.000092	4.59	70361.47	4403.72	0.14
Mississippi	PrIslToLaCrosse	791.531	WI Fldwy	196524.00	639.03	684.17	664.96	684.36	0.000092	4.54	73040.93	5449.89	0.14
Mississippi	PrIslToLaCrosse	791.273	100-yr Base	196570.00	635.36	684.01	665.67	684.25	0.000118	5.25	70319.23	5513.64	0.16
Mississippi	PrIslToLaCrosse	791.273	IA/MN Max	196570.00	635.36	684.47	665.68	684.72	0.000118	5.30	66895.91	4611.66	0.16
Mississippi	PrIslToLaCrosse	791.273	WI Fldwy	196570.00	635.36	684.02	665.69	684.26	0.000118	5.25	70242.34	5489.69	0.16
Mississippi	PrIslToLaCrosse	790.974	100-yr Base	196615.00	643.70	683.91	665.49	684.15	0.000121	4.89	67803.86	6017.63	0.16
Mississippi	PrIslToLaCrosse	790.974	IA/MN Max	196615.00	643.70	684.37	665.48	684.61	0.000123	4.91	66319.66	5521.83	0.16
Mississippi	PrIslToLaCrosse	790.974	WI Fldwy	196615.00	643.70	683.91	665.49	684.15	0.000121	4.89	67574.91	5965.48	0.16
Mississippi	PrIslToLaCrosse	790.604	100-yr Base	196558.00	641.25	683.48	665.90	683.91	0.000183	6.26	42269.49	8473.58	0.20
Mississippi	PrIslToLaCrosse	790.604	IA/MN Max	196558.00	641.25	683.97	665.90	684.38	0.000172	6.13	43401.88	8570.36	0.19
Mississippi	PrIslToLaCrosse	790.604	WI Fldwy	196558.00	641.25	683.48	665.90	683.91	0.000183	6.26	42277.02	8473.98	0.20
Mississippi	PrIslToLaCrosse	790.6		Bridge									
Mississippi	PrIslToLaCrosse	790.563	100-yr Base	196558.00	642.03	683.45	665.98	683.86	0.000177	6.14	44264.93	8452.49	0.19
Mississippi	PrIslToLaCrosse	790.563	IA/MN Max	196558.00	642.03	683.95	665.98	684.34	0.000167	6.01	45403.81	8299.07	0.19
Mississippi	PrIslToLaCrosse	790.563	WI Fldwy	196558.00	642.03	683.46	665.98	683.87	0.000177	6.14	44272.11	8305.89	0.19
Mississippi	PrIslToLaCrosse	790.442	100-yr Base	196604.00	638.05	683.35	660.85	683.56	0.000087	4.75	103697.90	7528.26	0.14
Mississippi	PrIslToLaCrosse	790.442	IA/MN Max	196604.00	638.05	683.84	660.85	684.05	0.000089	4.75	100447.10	7093.95	0.14
Mississippi	PrIslToLaCrosse	790.442	WI Fldwy	196604.00	638.05	683.35	660.85	683.56	0.000087	4.75	103716.60	7528.34	0.14
Mississippi	PrIslToLaCrosse	790.302	100-yr Base	196604.00	640.72	683.24	663.03	683.42	0.000087	4.44	102764.10	6412.14	0.14
Mississippi	PrIslToLaCrosse	790.302	IA/MN Max	196604.00	640.72	683.73	663.01	683.91	0.000088	4.44	97743.20	5776.19	0.13
Mississippi	PrIslToLaCrosse	790.302	WI Fldwy	196604.00	640.72	683.25	663.03	683.42	0.000087	4.44	102630.00	6386.29	0.14
Mississippi	PrIslToLaCrosse	789.992	100-yr Base	196649.00	652.00	683.12	668.86	683.24	0.000111	3.78	102201.80	6271.39	0.13
Mississippi	PrIslToLaCrosse	789.992	IA/MN Max	196649.00	652.00	683.60	668.86	683.73	0.000110	3.82	100565.60	5917.70	0.13
Mississippi	PrIslToLaCrosse	789.992	WI Fldwy	196649.00	652.00	683.12	668.86	683.24	0.000110	3.78	102222.10	6271.42	0.13
Mississippi	PrIslToLaCrosse	789.574	100-yr Base	196739.00	644.09	682.80	668.35	682.96	0.000116	4.50	92405.25	6593.69	0.15
Mississippi	PrIslToLaCrosse	789.574	IA/MN Max	196739.00	644.09	683.29	668.34	683.45	0.000115	4.55	89344.31	5970.54	0.15

HEC-RAS Plan: Plan1 Locations: User Defined (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Mississippi	PrIslToLaCrosse	789.574	WI Fldwy	196739.00	644.09	682.81	668.35	682.97	0.000115	4.50	92427.75	6593.63	0.15
Mississippi	PrIslToLaCrosse	789.000	100-yr Base	196728.00	645.43	682.53	666.57	682.65	0.000084	3.72	117110.00	7798.20	0.13
Mississippi	PrIslToLaCrosse	789.000	IA/MN Max	196728.00	645.43	683.01	666.54	683.14	0.000083	3.76	114597.40	7119.46	0.13
Mississippi	PrIslToLaCrosse	789.000	WI Fldwy	196728.00	645.43	682.53	666.57	682.65	0.000083	3.72	117137.70	7547.64	0.13
Mississippi	PrIslToLaCrosse	788.538	100-yr Base	196819.00	652.50	682.41	662.57	682.46	0.000045	2.76	133198.20	8108.47	0.09
Mississippi	PrIslToLaCrosse	788.538	IA/MN Max	196819.00	652.50	682.90	662.53	682.95	0.000045	2.79	133036.80	7810.16	0.09
Mississippi	PrIslToLaCrosse	788.538	WI Fldwy	196819.00	652.50	682.41	662.57	682.47	0.000045	2.76	133062.50	8080.88	0.09
Mississippi	PrIslToLaCrosse	787.988	100-yr Base	196807.00	635.48	682.27	667.70	682.34	0.000059	2.99	117606.40	7465.81	0.10
Mississippi	PrIslToLaCrosse	787.988	IA/MN Max	196807.00	635.48	682.76	667.72	682.83	0.000059	3.02	111667.70	6509.01	0.10
Mississippi	PrIslToLaCrosse	787.988	WI Fldwy	196807.00	635.48	682.28	667.70	682.34	0.000059	2.99	117634.10	7465.82	0.10
Mississippi	PrIslToLaCrosse	787.726	100-yr Base	196852.00	640.50	682.16	666.21	682.24	0.000067	3.47	106969.50	7360.30	0.11
Mississippi	PrIslToLaCrosse	787.726	IA/MN Max	196852.00	640.50	682.64	665.95	682.73	0.000067	3.49	106891.00	7100.28	0.11
Mississippi	PrIslToLaCrosse	787.726	WI Fldwy	196852.00	640.50	682.16	666.21	682.25	0.000067	3.47	106734.50	7326.86	0.11
Mississippi	PrIslToLaCrosse	787.466	100-yr Base	196898.00	644.85	682.01	664.20	682.09	0.000058	3.21	114502.50	7641.71	0.11
Mississippi	PrIslToLaCrosse	787.466	IA/MN Max	196898.00	644.85	682.50	664.20	682.58	0.000058	3.24	114624.50	7381.92	0.11
Mississippi	PrIslToLaCrosse	787.466	WI Fldwy	196898.00	644.85	682.02	664.19	682.09	0.000058	3.22	114300.60	7610.39	0.11
Mississippi	PrIslToLaCrosse	787.094	100-yr Base	196943.00	650.12	681.87	665.34	681.96	0.000069	3.42	122804.90	7668.62	0.12
Mississippi	PrIslToLaCrosse	787.094	IA/MN Max	196943.00	650.12	682.36	665.34	682.45	0.000070	3.44	113730.40	6405.07	0.12
Mississippi	PrIslToLaCrosse	787.094	WI Fldwy	196943.00	650.12	681.87	665.34	681.96	0.000069	3.42	122607.20	7535.80	0.12
Mississippi	PrIslToLaCrosse	786.623	100-yr Base	196932.00	647.42	681.72	666.85	681.81	0.000069	3.48	124788.60	8330.97	0.12
Mississippi	PrIslToLaCrosse	786.623	IA/MN Max	196932.00	647.42	682.20	666.85	682.30	0.000070	3.50	116666.00	6883.66	0.12
Mississippi	PrIslToLaCrosse	786.623	WI Fldwy	196932.00	647.42	681.72	666.85	681.81	0.000069	3.48	124812.90	8321.70	0.12
Mississippi	PrIslToLaCrosse	786.191	100-yr Base	197022.00	649.40	681.61	667.63	681.66	0.000045	2.69	153450.50	9456.37	0.09
Mississippi	PrIslToLaCrosse	786.191	IA/MN Max	197022.00	649.40	682.10	667.60	682.15	0.000045	2.72	146057.20	8323.46	0.09
Mississippi	PrIslToLaCrosse	786.191	WI Fldwy	197022.00	649.40	681.62	667.63	681.66	0.000045	2.69	153289.00	9212.24	0.09
Mississippi	PrIslToLaCrosse	785.857	100-yr Base	197068.00	647.16	681.57	667.79	681.59	0.000022	2.05	166759.00	11945.99	0.07
Mississippi	PrIslToLaCrosse	785.857	IA/MN Max	197068.00	647.16	682.05	667.79	682.08	0.000022	2.07	146722.50	8708.91	0.07
Mississippi	PrIslToLaCrosse	785.857	WI Fldwy	197068.00	647.16	681.57	667.79	681.60	0.000022	2.05	166781.80	10926.58	0.07
Mississippi	PrIslToLaCrosse	785.584	100-yr Base	197011.00	652.56	681.55	666.97	681.57	0.000015	1.41	177659.80	11191.75	0.05
Mississippi	PrIslToLaCrosse	785.584	IA/MN Max	197011.00	652.56	682.03	666.99	682.05	0.000015	1.43	170527.20	9871.01	0.05
Mississippi	PrIslToLaCrosse	785.584	WI Fldwy	197011.00	652.56	681.55	666.97	681.57	0.000015	1.41	177688.30	11142.60	0.05
Mississippi	PrIslToLaCrosse	785.329	100-yr Base	197056.00	650.40	681.52	666.22	681.54	0.000014	1.46	166766.40	10502.23	0.05
Mississippi	PrIslToLaCrosse	785.329	IA/MN Max	197056.00	650.40	682.01	666.48	682.03	0.000014	1.48	160780.30	8925.93	0.05
Mississippi	PrIslToLaCrosse	785.329	WI Fldwy	197056.00	650.40	681.52	666.22	681.55	0.000014	1.46	166748.60	10466.58	0.05
Mississippi	PrIslToLaCrosse	785.017	100-yr Base	197102.00	652.52	681.49	666.06	681.52	0.000017	1.58	148301.90	9163.74	0.06
Mississippi	PrIslToLaCrosse	785.017	IA/MN Max	197102.00	652.52	681.97	665.95	682.00	0.000017	1.61	143081.60	8028.24	0.06
Mississippi	PrIslToLaCrosse	785.017	WI Fldwy	197102.00	652.52	681.49	666.04	681.52	0.000017	1.58	148260.30	9087.17	0.06
Mississippi	PrIslToLaCrosse	784.715	100-yr Base	197147.00	650.20	681.45	665.65	681.49	0.000018	1.63	138980.80	8268.56	0.06
Mississippi	PrIslToLaCrosse	784.715	IA/MN Max	197147.00	650.20	681.94	665.84	681.97	0.000018	1.63	133313.70	7065.73	0.06
Mississippi	PrIslToLaCrosse	784.715	WI Fldwy	197147.00	650.20	681.46	665.65	681.49	0.000018	1.63	138910.80	8206.29	0.06
Mississippi	PrIslToLaCrosse	784.471	100-yr Base	197090.00	649.82	681.44	664.44	681.46	0.000013	1.42	157382.70	8355.15	0.05
Mississippi	PrIslToLaCrosse	784.471	IA/MN Max	197090.00	649.82	681.93	664.44	681.95	0.000013	1.44	154828.90	7892.35	0.05
Mississippi	PrIslToLaCrosse	784.471	WI Fldwy	197090.00	649.82	681.44	664.44	681.47	0.000013	1.42	157407.50	8294.68	0.05
Mississippi	PrIslToLaCrosse	784.243	100-yr Base	197136.00	647.59	681.42	664.87	681.45	0.000013	1.49	152636.30	8072.39	0.05
Mississippi	PrIslToLaCrosse	784.243	IA/MN Max	197136.00	647.59	681.91	664.94	681.94	0.000013	1.50	149230.50	7448.05	0.05
Mississippi	PrIslToLaCrosse	784.243	WI Fldwy	197136.00	647.59	681.43	664.87	681.45	0.000013	1.49	152658.70	8015.38	0.05
Mississippi	PrIslToLaCrosse	784.020	100-yr Base	197181.00	650.53	681.42	663.18	681.44	0.000009	1.20	180051.80	8796.44	0.04
Mississippi	PrIslToLaCrosse	784.020	IA/MN Max	197181.00	650.53	681.90	663.21	681.92	0.000009	1.21	176602.40	8305.17	0.04
Mississippi	PrIslToLaCrosse	784.020	WI Fldwy	197181.00	650.53	681.42	663.18	681.44	0.000009	1.20	180077.60	8793.51	0.04
Mississippi	PrIslToLaCrosse	783.652	100-yr Base	197226.00	650.49	681.41	660.33	681.42	0.000005	0.91	217873.30	9686.19	0.03
Mississippi	PrIslToLaCrosse	783.652	IA/MN Max	197226.00	650.49	681.90	660.32	681.91	0.000005	0.92	213394.40	9031.64	0.03
Mississippi	PrIslToLaCrosse	783.652	WI Fldwy	197226.00	650.49	681.41	660.33	681.42	0.000005	0.91	217891.50	9624.99	0.03
Mississippi	PrIslToLaCrosse	783.304	100-yr Base	197170.00	650.69	681.40	658.55	681.41	0.000004	0.88	232379.60	9984.76	0.03
Mississippi	PrIslToLaCrosse	783.304	IA/MN Max	197170.00	650.69	681.89	658.55	681.90	0.000004	0.87	224753.50	8744.21	0.03
Mississippi	PrIslToLaCrosse	783.304	WI Fldwy	197170.00	650.69	681.40	658.55	681.42	0.000004	0.88	232409.30	9983.38	0.03
Mississippi	PrIslToLaCrosse	783.000	100-yr Base	197215.00	649.31	681.40	656.78	681.41	0.000003	0.73	271963.60	10415.25	0.02
Mississippi	PrIslToLaCrosse	783.000	IA/MN Max	197215.00	649.31	681.89	656.78	681.89	0.000003	0.73	265943.60	9749.04	0.02
Mississippi	PrIslToLaCrosse	783.000	WI Fldwy	197215.00	649.31	681.40	656.78	681.41	0.000003	0.73	271994.70	10412.90	0.02
Mississippi	PrIslToLaCrosse	781.990	100-yr Base	197294.00	646.75	681.39	653.65	681.39	0.000002	0.62	335887.70	11492.02	0.02
Mississippi	PrIslToLaCrosse	781.990	IA/MN Max	197294.00	646.75	681.87	653.65	681.88	0.000002	0.62	328322.90	10749.50	0.02
Mississippi	PrIslToLaCrosse	781.990	WI Fldwy	197294.00	646.75	681.39	653.65	681.40	0.000002	0.62	335921.90	11445.54	0.02
Mississippi	PrIslToLaCrosse	781.468	100-yr Base	197385.00	644.58	681.38	652.63	681.39	0.000002	0.61	350903.20	11860.60	0.02
Mississippi	PrIslToLaCrosse	781.468	IA/MN Max	197385.00	644.58	681.87	652.62	681.88	0.000002	0.61	342643.40	11015.29	0.02
Mississippi	PrIslToLaCrosse	781.468	WI Fldwy	197385.00	644.58	681.39	652.63	681.39	0.000002	0.61	350756.00	11760.95	0.02
Mississippi	PrIslToLaCrosse	780.984	100-yr Base	197476.00	643.00	681.38	651.11	681.38	0.000002	0.70	317206.40	11414.83	0.02
Mississippi	PrIslToLaCrosse	780.984	IA/MN Max	197476.00	643.00	681.86	651.12	681.87	0.000002	0.71	307463.90	10401.18	0.02
Mississippi	PrIslToLaCrosse	780.984	WI Fldwy	197476.00	643.00	681.38	651.11	681.39	0.000002	0.70	317202.60	11397.29	0.02
Mississippi	PrIslToLaCrosse	780.631	100-yr Base	197419.00	642.60	681.37	650.23	681.38	0.000003	0.84	277136.90	13165.90	0.03
Mississippi	PrIslToLaCrosse	780.631	IA/MN Max	197419.00	642.60	681.86	650.22	681.86	0.000003	0.85	257451.90	8948.73	0.03

HEC-RAS Plan: Plan1 Locations: User Defined (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Mississippi	PrIsIToLaCrosse	780.631	WI Fldwy	197419.00	642.60	681.37	650.23	681.38	0.000003	0.84	277171.20	11478.29	0.03
Mississippi	PrIsIToLaCrosse	780.191	100-yr Base	197510.00	642.01	681.36	649.67	681.37	0.000003	0.83	273337.60	11036.73	0.03
Mississippi	PrIsIToLaCrosse	780.191	IA/MN Max	197510.00	642.01	681.85	649.68	681.86	0.000003	0.84	259801.60	9354.60	0.03
Mississippi	PrIsIToLaCrosse	780.191	WI Fldwy	197510.00	642.01	681.36	649.67	681.37	0.000003	0.83	273370.50	11035.33	0.03
Mississippi	PrIsIToLaCrosse	779.984	100-yr Base	198626.00	642.80	681.36	649.94	681.37	0.000002	0.74	292751.20	10640.15	0.02
Mississippi	PrIsIToLaCrosse	779.984	IA/MN Max	198626.00	642.80	681.85	649.93	681.85	0.000002	0.74	285430.10	9589.15	0.02
Mississippi	PrIsIToLaCrosse	779.984	WI Fldwy	198626.00	642.80	681.36	649.94	681.37	0.000002	0.74	292783.00	10637.98	0.02
Mississippi	PrIsIToLaCrosse	779.811	100-yr Base	198615.00	642.80	681.36	649.88	681.37	0.000002	0.66	317517.60	10485.84	0.02
Mississippi	PrIsIToLaCrosse	779.811	IA/MN Max	198615.00	642.80	681.85	649.88	681.85	0.000002	0.67	310787.90	9826.24	0.02
Mississippi	PrIsIToLaCrosse	779.811	WI Fldwy	198615.00	642.80	681.36	649.88	681.37	0.000002	0.66	317521.10	10473.85	0.02
Mississippi	PrIsIToLaCrosse	779.388	100-yr Base	198832.00	643.00	681.35	649.80	681.36	0.000002	0.67	307850.30	9928.49	0.02
Mississippi	PrIsIToLaCrosse	779.388	IA/MN Max	198832.00	643.00	681.84	649.80	681.85	0.000002	0.67	300637.00	9014.51	0.02
Mississippi	PrIsIToLaCrosse	779.388	WI Fldwy	198832.00	643.00	681.36	649.80	681.36	0.000002	0.67	307880.00	9915.47	0.02
Mississippi	PrIsIToLaCrosse	779.187	100-yr Base	198866.00	642.80	681.35	649.46	681.36	0.000002	0.71	293556.80	12155.20	0.02
Mississippi	PrIsIToLaCrosse	779.187	IA/MN Max	198866.00	642.80	681.84	649.45	681.85	0.000002	0.71	285342.60	8490.13	0.02
Mississippi	PrIsIToLaCrosse	779.187	WI Fldwy	198866.00	642.80	681.35	649.45	681.36	0.000002	0.71	293585.00	9449.95	0.02
Mississippi	PrIsIToLaCrosse	779.000	100-yr Base	198900.00	642.80	681.35	649.02	681.36	0.000002	0.70	288168.40	8854.24	0.02
Mississippi	PrIsIToLaCrosse	779.000	IA/MN Max	198900.00	642.80	681.84	649.02	681.84	0.000002	0.71	282411.00	8138.86	0.02
Mississippi	PrIsIToLaCrosse	779.000	WI Fldwy	198900.00	642.80	681.35	649.02	681.36	0.000002	0.70	288194.60	8817.69	0.02
Mississippi	PrIsIToLaCrosse	778.664	100-yr Base	199026.00	643.20	681.35	649.19	681.35	0.000002	0.73	278804.40	8443.44	0.02
Mississippi	PrIsIToLaCrosse	778.664	IA/MN Max	199026.00	643.20	681.83	649.19	681.84	0.000002	0.74	273571.70	7922.29	0.02
Mississippi	PrIsIToLaCrosse	778.664	WI Fldwy	199026.00	643.20	681.35	649.19	681.36	0.000002	0.73	278829.60	8437.31	0.02
Mississippi	PrIsIToLaCrosse	778.290	100-yr Base	199152.00	643.00	681.34	648.85	681.35	0.000003	0.85	252871.70	8402.05	0.02
Mississippi	PrIsIToLaCrosse	778.290	IA/MN Max	199152.00	643.00	681.83	648.85	681.84	0.000003	0.85	244461.40	7323.56	0.02
Mississippi	PrIsIToLaCrosse	778.290	WI Fldwy	199152.00	643.00	681.34	648.85	681.35	0.000003	0.85	252896.80	8392.53	0.02
Mississippi	PrIsIToLaCrosse	778.074	100-yr Base	199186.00	642.60	681.33	648.04	681.34	0.000003	0.96	227615.70	8275.74	0.03
Mississippi	PrIsIToLaCrosse	778.074	IA/MN Max	199186.00	642.60	681.82	648.04	681.83	0.000003	0.96	211534.40	5970.74	0.03
Mississippi	PrIsIToLaCrosse	778.074	WI Fldwy	199186.00	642.60	681.33	648.04	681.35	0.000003	0.96	227640.50	8275.77	0.03
Mississippi	PrIsIToLaCrosse	777.875	100-yr Base	199232.00	641.22	681.33	647.37	681.34	0.000003	0.94	228968.40	8214.97	0.03
Mississippi	PrIsIToLaCrosse	777.875	IA/MN Max	199232.00	641.22	681.82	647.37	681.83	0.000003	0.95	216609.70	6130.99	0.03
Mississippi	PrIsIToLaCrosse	777.875	WI Fldwy	199232.00	641.22	681.33	647.37	681.34	0.000003	0.94	228944.10	8189.28	0.03
Mississippi	PrIsIToLaCrosse	777.488	100-yr Base	199232.00	639.64	681.31	646.63	681.33	0.000005	1.18	200816.40	8529.91	0.03
Mississippi	PrIsIToLaCrosse	777.488	IA/MN Max	199232.00	639.64	681.80	646.63	681.82	0.000005	1.19	188679.50	6284.56	0.03
Mississippi	PrIsIToLaCrosse	777.488	WI Fldwy	199232.00	639.64	681.32	646.63	681.34	0.000005	1.18	200818.00	8502.00	0.03
Mississippi	PrIsIToLaCrosse	777.080	100-yr Base	199232.00	639.25	681.31	646.05	681.32	0.000003	0.93	239466.20	8219.94	0.03
Mississippi	PrIsIToLaCrosse	777.080	IA/MN Max	199232.00	639.25	681.80	646.05	681.81	0.000003	0.93	226582.10	6592.74	0.03
Mississippi	PrIsIToLaCrosse	777.080	WI Fldwy	199232.00	639.25	681.31	646.05	681.32	0.000003	0.93	239397.50	8187.34	0.03
Mississippi	PrIsIToLaCrosse	776.665	100-yr Base	199232.00	638.46	681.30	645.03	681.31	0.000003	0.87	235203.20	6742.25	0.02
Mississippi	PrIsIToLaCrosse	776.665	IA/MN Max	199232.00	638.46	681.79	645.03	681.80	0.000003	0.88	229092.10	5931.80	0.02
Mississippi	PrIsIToLaCrosse	776.665	WI Fldwy	199232.00	638.46	681.31	645.03	681.32	0.000003	0.87	235223.20	6728.42	0.02
Mississippi	PrIsIToLaCrosse	776.002	100-yr Base	199232.00	639.45	681.30	644.60	681.31	0.000002	0.82	256289.40	7015.05	0.02
Mississippi	PrIsIToLaCrosse	776.002	IA/MN Max	199232.00	639.45	681.78	644.60	681.79	0.000002	0.82	248922.40	6456.90	0.02
Mississippi	PrIsIToLaCrosse	776.002	WI Fldwy	199232.00	639.45	681.30	644.60	681.31	0.000002	0.82	256310.30	7001.74	0.02
Mississippi	PrIsIToLaCrosse	775.186	100-yr Base	199232.00	636.49	681.29	644.23	681.30	0.000002	0.75	285520.80	8317.92	0.02
Mississippi	PrIsIToLaCrosse	775.186	IA/MN Max	199232.00	636.49	681.78	644.23	681.78	0.000002	0.75	272979.80	7421.44	0.02
Mississippi	PrIsIToLaCrosse	775.186	WI Fldwy	199232.00	636.49	681.29	644.23	681.30	0.000002	0.75	285544.30	8315.76	0.02
Mississippi	PrIsIToLaCrosse	774.739	100-yr Base	199232.00	636.68	681.28	644.14	681.29	0.000003	0.81	262015.80	8225.18	0.02
Mississippi	PrIsIToLaCrosse	774.739	IA/MN Max	199232.00	636.68	681.77	644.14	681.78	0.000003	0.82	248122.20	6477.78	0.02
Mississippi	PrIsIToLaCrosse	774.739	WI Fldwy	199232.00	636.68	681.28	644.14	681.29	0.000003	0.81	261957.00	8209.27	0.02
Mississippi	PrIsIToLaCrosse	774.330	100-yr Base	199232.00	637.58	681.27	644.78	681.28	0.000003	1.02	217298.80	8549.18	0.03
Mississippi	PrIsIToLaCrosse	774.330	IA/MN Max	199232.00	637.58	681.76	644.78	681.77	0.000003	1.03	201372.70	5245.21	0.03
Mississippi	PrIsIToLaCrosse	774.330	WI Fldwy	199232.00	637.58	681.27	644.78	681.29	0.000003	1.02	217324.00	8509.62	0.03
Mississippi	PrIsIToLaCrosse	774.110	100-yr Base	199232.00	637.48	681.27	643.30	681.28	0.000002	0.74	294488.30	9496.50	0.02
Mississippi	PrIsIToLaCrosse	774.110	IA/MN Max	199232.00	637.48	681.76	643.30	681.77	0.000002	0.75	281926.80	7379.76	0.02
Mississippi	PrIsIToLaCrosse	774.110	WI Fldwy	199232.00	637.48	681.27	643.30	681.28	0.000002	0.74	294493.20	9470.86	0.02
Mississippi	PrIsIToLaCrosse	773.832	100-yr Base	199232.00	637.48	681.27	642.91	681.28	0.000001	0.64	328770.40	9884.96	0.02
Mississippi	PrIsIToLaCrosse	773.832	IA/MN Max	199232.00	637.48	681.76	642.91	681.76	0.000001	0.64	316778.10	7815.81	0.02
Mississippi	PrIsIToLaCrosse	773.832	WI Fldwy	199232.00	637.48	681.27	642.91	681.28	0.000001	0.64	328799.10	9882.99	0.02
Mississippi	PrIsIToLaCrosse	773.623	100-yr Base	199232.00	638.07	681.27	642.94	681.27	0.000001	0.57	366788.50	10392.47	0.02
Mississippi	PrIsIToLaCrosse	773.623	IA/MN Max	199232.00	638.07	681.76	642.94	681.76	0.000001	0.57	355849.90	9153.40	0.02
Mississippi	PrIsIToLaCrosse	773.623	WI Fldwy	199232.00	638.07	681.27	642.94	681.28	0.000001	0.57	366817.80	10384.46	0.02
Mississippi	PrIsIToLaCrosse	773.342	100-yr Base	199232.00	637.94	681.27	643.11	681.27	0.000001	0.56	370102.20	10624.69	0.02
Mississippi	PrIsIToLaCrosse	773.342	IA/MN Max	199232.00	637.94	681.76	643.11	681.76	0.000001	0.57	357607.80	9068.54	0.02
Mississippi	PrIsIToLaCrosse	773.342	WI Fldwy	199232.00	637.94	681.27	643.11	681.28	0.000001	0.56	370130.40	10607.93	0.02
Mississippi	PrIsIToLaCrosse	772.832	100-yr Base	199232.00	637.08	681.26	643.38	681.27	0.000001	0.66	313843.40	9562.99	0.02
Mississippi	PrIsIToLaCrosse	772.832	IA/MN Max	199232.00	637.08	681.75	643.38	681.76	0.000001	0.67	303217.50	7677.77	0.02
Mississippi	PrIsIToLaCrosse	772.832	WI Fldwy	199232.00	637.08	681.27	643.38	681.27	0.000001	0.66	313861.70	9546.98	0.02
Mississippi	PrIsIToLaCrosse	772.560	100-yr Base	199232.00	636.29	681.26	642.39	681.27	0.000001	0.58	355996.10	10878.88	0.02
Mississippi	PrIsIToLaCrosse	772.560	IA/MN Max	199232.00	636.29	681.75	642.40	681.75	0.000001	0.58	346150.40	8531.46	0.02

HEC-RAS Plan: Plan1 Locations: User Defined (Continued)

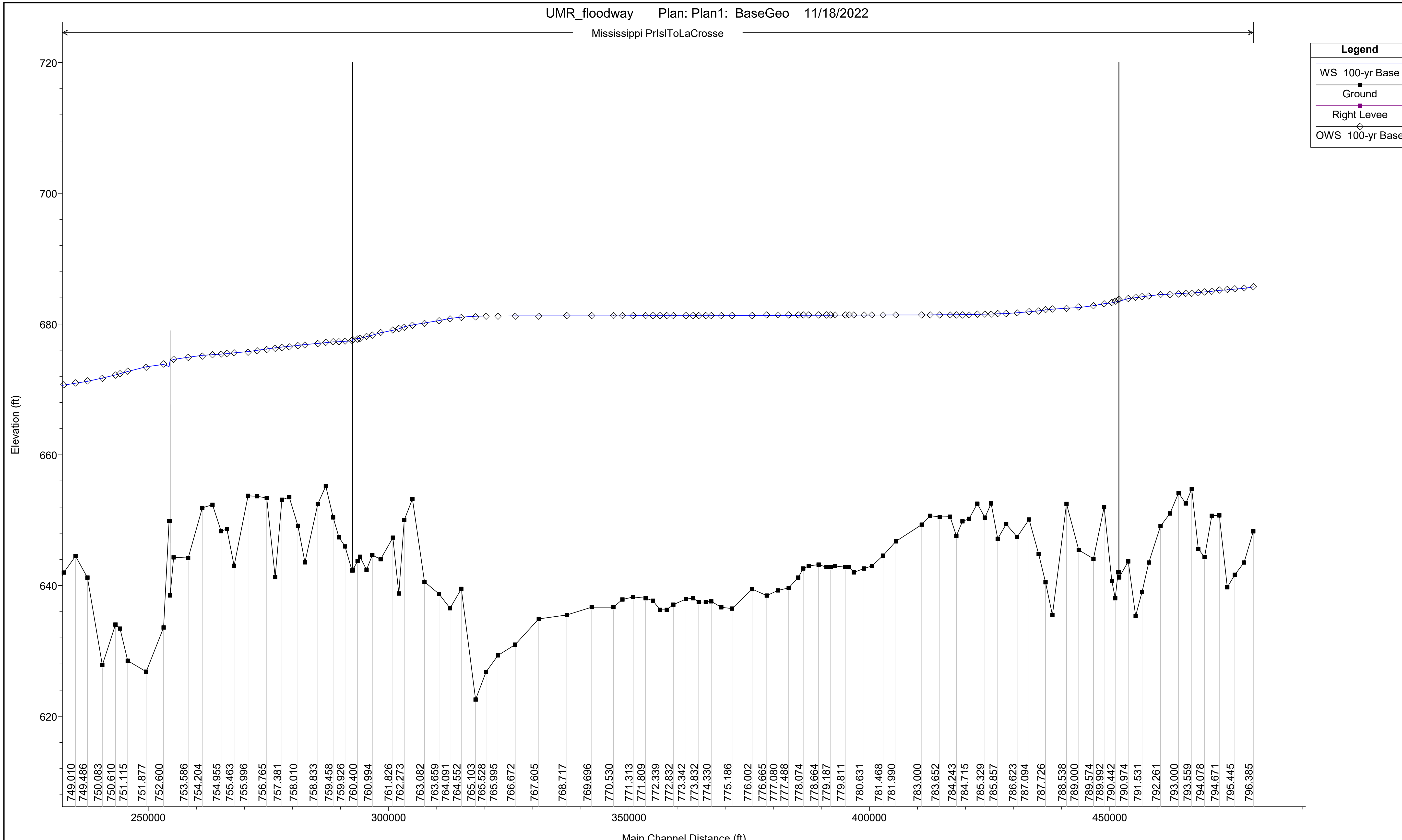
River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Mississippi	PrIslToLaCrosse	772.560	WI Fldwy	199232.00	636.29	681.27	642.39	681.27	0.000001	0.58	356025.40	10849.35	0.02
Mississippi	PrIslToLaCrosse	772.339	100-yr Base	199232.00	636.29	681.26	642.02	681.27	0.000001	0.50	412704.50	11546.76	0.01
Mississippi	PrIslToLaCrosse	772.339	IA/MN Max	199232.00	636.29	681.75	642.02	681.75	0.000001	0.50	403139.30	9915.38	0.01
Mississippi	PrIslToLaCrosse	772.339	WI Fldwy	199232.00	636.29	681.26	642.02	681.27	0.000001	0.50	412732.00	11404.84	0.01
Mississippi	PrIslToLaCrosse	772.092	100-yr Base	199232.00	637.67	681.26	642.09	681.26	0.000001	0.46	452880.60	11919.31	0.01
Mississippi	PrIslToLaCrosse	772.092	IA/MN Max	199232.00	637.67	681.75	642.09	681.75	0.000001	0.46	443069.80	11001.16	0.01
Mississippi	PrIslToLaCrosse	772.092	WI Fldwy	199232.00	637.67	681.26	642.09	681.27	0.000001	0.45	452916.20	11918.09	0.01
Mississippi	PrIslToLaCrosse	771.809	100-yr Base	199232.00	638.07	681.26	642.33	681.26	0.000001	0.44	476863.60	13982.99	0.01
Mississippi	PrIslToLaCrosse	771.809	IA/MN Max	199232.00	638.07	681.75	642.33	681.75	0.000001	0.44	463854.20	11797.73	0.01
Mississippi	PrIslToLaCrosse	771.809	WI Fldwy	199232.00	638.07	681.26	642.33	681.27	0.000001	0.44	476870.60	13968.64	0.01
Mississippi	PrIslToLaCrosse	771.313	100-yr Base	199232.00	638.26	681.26	642.68	681.26	0.000001	0.42	496085.70	13716.15	0.01
Mississippi	PrIslToLaCrosse	771.313	IA/MN Max	199232.00	638.26	681.75	642.68	681.75	0.000001	0.43	484403.30	12607.02	0.01
Mississippi	PrIslToLaCrosse	771.313	WI Fldwy	199232.00	638.26	681.26	642.68	681.26	0.000001	0.42	496126.70	13716.19	0.01
Mississippi	PrIslToLaCrosse	770.876	100-yr Base	199232.00	637.87	681.26	642.56	681.26	0.000001	0.45	476189.50	14553.49	0.01
Mississippi	PrIslToLaCrosse	770.876	IA/MN Max	199232.00	637.87	681.74	642.56	681.75	0.000001	0.46	448273.30	11393.25	0.01
Mississippi	PrIslToLaCrosse	770.876	WI Fldwy	199232.00	637.87	681.26	642.56	681.26	0.000001	0.45	476044.70	14511.52	0.01
Mississippi	PrIslToLaCrosse	770.530	100-yr Base	199232.00	636.69	681.26	642.40	681.26	0.000001	0.45	472145.60	13811.54	0.01
Mississippi	PrIslToLaCrosse	770.530	IA/MN Max	199232.00	636.69	681.74	642.40	681.75	0.000001	0.46	454841.30	11647.54	0.01
Mississippi	PrIslToLaCrosse	770.530	WI Fldwy	199232.00	636.69	681.26	642.40	681.26	0.000001	0.45	472186.90	13803.99	0.01
Mississippi	PrIslToLaCrosse	769.696	100-yr Base	199232.00	636.69	681.25	642.80	681.26	0.000001	0.45	482406.60	14292.23	0.01
Mississippi	PrIslToLaCrosse	769.696	IA/MN Max	199232.00	636.69	681.74	642.80	681.74	0.000001	0.45	458496.90	11613.89	0.01
Mississippi	PrIslToLaCrosse	769.696	WI Fldwy	199232.00	636.69	681.26	642.80	681.26	0.000001	0.45	482224.80	14235.88	0.01
Mississippi	PrIslToLaCrosse	768.717	100-yr Base	199232.00	635.50	681.25	642.85	681.25	0.000001	0.49	434893.80	11581.23	0.01
Mississippi	PrIslToLaCrosse	768.717	IA/MN Max	199232.00	635.50	681.74	642.85	681.74	0.000001	0.49	424027.40	10773.37	0.01
Mississippi	PrIslToLaCrosse	768.717	WI Fldwy	199232.00	635.50	681.25	642.85	681.25	0.000001	0.49	434928.40	11572.79	0.01
Mississippi	PrIslToLaCrosse	767.605	100-yr Base	199232.00	634.91	681.24	642.08	681.25	0.000001	0.51	409876.40	10764.57	0.01
Mississippi	PrIslToLaCrosse	767.605	IA/MN Max	199232.00	634.91	681.73	642.06	681.73	0.000001	0.51	398986.80	9908.92	0.01
Mississippi	PrIslToLaCrosse	767.605	WI Fldwy	199232.00	634.91	681.25	642.07	681.25	0.000001	0.51	409903.50	10756.58	0.01
Mississippi	PrIslToLaCrosse	766.672	100-yr Base	199232.00	630.97	681.24	640.45	681.24	0.000001	0.60	358500.20	9429.39	0.02
Mississippi	PrIslToLaCrosse	766.672	IA/MN Max	199232.00	630.97	681.72	640.45	681.73	0.000001	0.60	349098.80	8716.27	0.02
Mississippi	PrIslToLaCrosse	766.672	WI Fldwy	199232.00	630.97	681.24	640.45	681.25	0.000001	0.60	358528.30	9427.60	0.02
Mississippi	PrIslToLaCrosse	765.995	100-yr Base	199232.00	629.32	681.23	638.79	681.24	0.000001	0.74	313765.10	8697.49	0.02
Mississippi	PrIslToLaCrosse	765.995	IA/MN Max	199232.00	629.32	681.72	638.79	681.72	0.000001	0.75	305568.70	8030.31	0.02
Mississippi	PrIslToLaCrosse	765.995	WI Fldwy	199232.00	629.32	681.23	638.79	681.24	0.000001	0.74	313785.90	8690.08	0.02
Mississippi	PrIslToLaCrosse	765.528	100-yr Base	199232.00	626.80	681.22	637.59	681.23	0.000002	0.91	273769.60	8769.91	0.02
Mississippi	PrIslToLaCrosse	765.528	IA/MN Max	199232.00	626.80	681.71	637.59	681.72	0.000002	0.92	263654.80	7674.01	0.02
Mississippi	PrIslToLaCrosse	765.528	WI Fldwy	199232.00	626.80	681.23	637.59	681.24	0.000002	0.91	273795.80	8759.29	0.02
Mississippi	PrIslToLaCrosse	765.103	100-yr Base	199232.00	622.56	681.19	634.06	681.22	0.000006	1.68	215139.20	9096.80	0.04
Mississippi	PrIslToLaCrosse	765.103	IA/MN Max	199232.00	622.56	681.67	634.06	681.71	0.000006	1.69	206390.30	7752.42	0.04
Mississippi	PrIslToLaCrosse	765.103	WI Fldwy	199232.00	622.56	681.19	634.06	681.23	0.000006	1.68	215165.40	8755.97	0.04
Mississippi	PrIslToLaCrosse	764.552	100-yr Base	199232.00	639.50	681.06	660.87	681.18	0.000078	3.34	113343.90	8825.10	0.11
Mississippi	PrIslToLaCrosse	764.552	IA/MN Max	199232.00	639.50	681.54	660.87	681.67	0.000079	3.35	106645.90	7082.32	0.11
Mississippi	PrIslToLaCrosse	764.552	WI Fldwy	199232.00	639.50	681.06	660.87	681.19	0.000078	3.34	113369.10	8079.17	0.11
Mississippi	PrIslToLaCrosse	764.091	100-yr Base	199232.00	636.52	680.86	659.34	680.99	0.000079	3.25	123821.50	10520.38	0.11
Mississippi	PrIslToLaCrosse	764.091	IA/MN Max	199232.00	636.52	681.34	659.34	681.47	0.000081	3.27	117418.40	7149.97	0.11
Mississippi	PrIslToLaCrosse	764.091	WI Fldwy	199232.00	636.52	680.87	659.34	680.99	0.000079	3.25	123847.60	8066.23	0.11
Mississippi	PrIslToLaCrosse	763.659	100-yr Base	199232.00	638.70	680.53	661.86	680.76	0.000124	4.43	104038.50	11188.56	0.15
Mississippi	PrIslToLaCrosse	763.659	IA/MN Max	199232.00	638.70	681.00	661.86	681.24	0.000125	4.46	96774.06	7316.29	0.15
Mississippi	PrIslToLaCrosse	763.659	WI Fldwy	199232.00	638.70	680.54	661.86	680.76	0.000124	4.43	104067.00	8357.31	0.15
Mississippi	PrIslToLaCrosse	763.082	100-yr Base	229611.00	640.57	680.17	663.96	680.38	0.000124	4.73	106218.20	11723.27	0.16
Mississippi	PrIslToLaCrosse	763.082	IA/MN Max	229611.00	640.57	680.64	663.96	680.85	0.000125	4.76	98845.95	8008.56	0.16
Mississippi	PrIslToLaCrosse	763.082	WI Fldwy	229611.00	640.57	680.17	663.96	680.38	0.000123	4.72	106252.60	9249.15	0.16
Mississippi	PrIslToLaCrosse	762.578	100-yr Base	229611.00	653.24	679.86	665.76	680.06	0.000142	4.51	129288.20	13485.32	0.16
Mississippi	PrIslToLaCrosse	762.578	IA/MN Max	229611.00	653.24	680.32	665.77	680.54	0.000143	4.58	122441.60	9460.39	0.17
Mississippi	PrIslToLaCrosse	762.578	WI Fldwy	229611.00	653.24	679.86	665.77	680.07	0.000142	4.51	129328.00	10804.65	0.16
Mississippi	PrIslToLaCrosse	762.273	100-yr Base	229611.00	650.04	679.60	666.97	679.76	0.000236	4.39	127226.10	14424.04	0.16
Mississippi	PrIslToLaCrosse	762.273	IA/MN Max	229611.00	650.04	680.05	666.97	680.23	0.000236	4.45	117730.20	9727.76	0.16
Mississippi	PrIslToLaCrosse	762.273	WI Fldwy	229611.00	650.04	679.60	666.97	679.77	0.000235	4.39	127272.70	11576.30	0.16
Mississippi	PrIslToLaCrosse	762.062	100-yr Base	229611.00	638.79	679.26	664.97	679.52	0.000168	5.41	123067.10	14804.18	0.18
Mississippi	PrIslToLaCrosse	762.062	IA/MN Max	229611.00	638.79	679.71	664.97	679.99	0.000169	5.48	113931.10	9501.80	0.18
Mississippi	PrIslToLaCrosse	762.062	WI Fldwy	229611.00	638.79	679.26	664.97	679.53	0.000168	5.41	123114.30	11774.09	0.18
Mississippi	PrIslToLaCrosse	761.826	100-yr Base	229611.00	647.34	679.05	665.46	679.31	0.000170	5.44	136286.10	15237.57	0.18
Mississippi	PrIslToLaCrosse	761.826	IA/MN Max	229611.00	647.34	679.51	665.47	679.78	0.000170	5.51	125335.40	9686.78	0.19
Mississippi	PrIslToLaCrosse	761.826	WI Fldwy	229611.00	647.34	679.06	665.47	679.31	0.000170	5.44	136338.40	12012.16	0.18
Mississippi	PrIslToLaCrosse	761.327	100-yr Base	229611.00	644.03	678.66	664.10	678.89	0.000157	4.80	134838.80	16334.71	0.17
Mississippi	PrIslToLaCrosse	761.327	IA/MN Max	229611.00	644.03	679.11	664.06	679.35	0.000158	4.87	127235.80	11167.42	0.17
Mississippi	PrIslToLaCrosse	761.327	WI Fldwy	229611.00	644.03	678.66	664.10	678.89	0.000157	4.80	134898.00	12774.44	0.17
Mississippi	PrIslToLaCrosse	760.994	100-yr Base	229611.00	644.64	678.29	664.27	678.57	0.000177	5.22	133539.20	17359.24	0.19
Mississippi	PrIslToLaCrosse	760.994	IA/MN Max	229611.00	644.64	678.74	664.26	679.03	0.000178	5.29	124673.90	11754.29	0.19

HEC-RAS Plan: Plan1 Locations: User Defined (Continued)

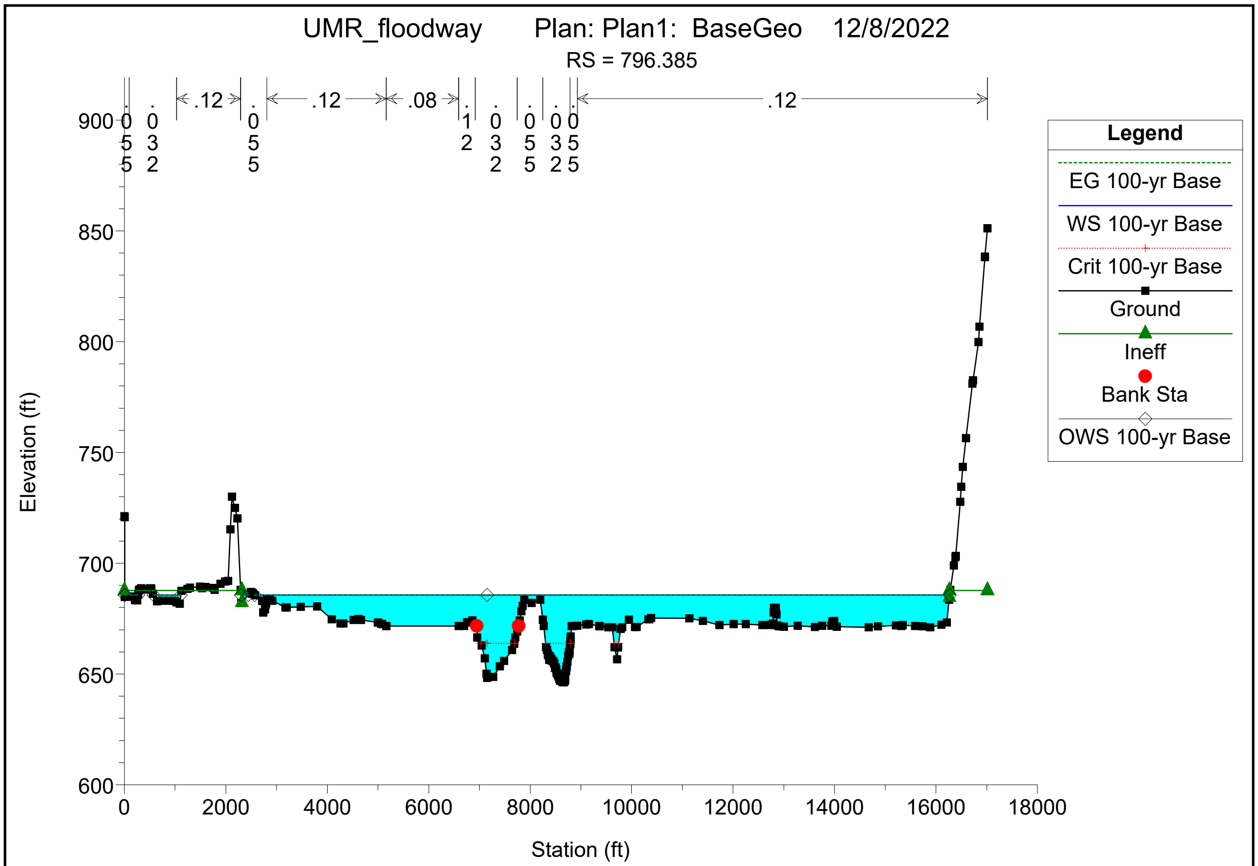
River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Mississippi	PrIslToLaCrosse	760.994	WI Fldwy	229611.00	644.64	678.30	664.27	678.58	0.000177	5.21	133607.20	13263.59	0.19
Mississippi	PrIslToLaCrosse	760.759	100-yr Base	229611.00	642.41	678.05	663.34	678.34	0.000178	5.47	142371.60	15918.74	0.19
Mississippi	PrIslToLaCrosse	760.759	IA/MN Max	229611.00	642.41	678.50	663.34	678.80	0.000179	5.54	131785.30	11953.28	0.19
Mississippi	PrIslToLaCrosse	760.759	WI Fldwy	229611.00	642.41	678.06	663.34	678.34	0.000178	5.47	142447.90	14602.07	0.19
Mississippi	PrIslToLaCrosse	760.495	100-yr Base	229611.00	644.41	677.82	662.94	678.10	0.000170	5.50	141621.90	15728.67	0.18
Mississippi	PrIslToLaCrosse	760.495	IA/MN Max	229611.00	644.41	678.26	662.92	678.56	0.000173	5.54	134811.50	12174.27	0.18
Mississippi	PrIslToLaCrosse	760.495	WI Fldwy	229611.00	644.41	677.82	662.94	678.11	0.000169	5.49	141698.80	15063.63	0.18
Mississippi	PrIslToLaCrosse	760.400	100-yr Base	229611.00	643.73	677.77	665.31	678.00	0.000173	5.25	122586.30	15909.14	0.18
Mississippi	PrIslToLaCrosse	760.400	IA/MN Max	229611.00	643.73	678.23	665.31	678.46	0.000168	5.18	119933.70	12235.25	0.18
Mississippi	PrIslToLaCrosse	760.400	WI Fldwy	229611.00	643.73	677.78	665.31	678.01	0.000173	5.25	122654.40	14994.04	0.18
Mississippi	PrIslToLaCrosse	760.216	100-yr Base	229611.00	642.43	677.69	664.11	677.87	0.000079	4.02	70217.59	15434.44	0.14
Mississippi	PrIslToLaCrosse	760.216	IA/MN Max	229611.00	642.43	678.15	664.09	678.33	0.000074	3.93	71520.89	12325.44	0.14
Mississippi	PrIslToLaCrosse	760.216	WI Fldwy	229611.00	642.43	677.69	664.11	677.87	0.000079	4.02	70240.44	13915.57	0.14
Mississippi	PrIslToLaCrosse	760.2		Bridge									
Mississippi	PrIslToLaCrosse	760.181	100-yr Base	229611.00	642.30	677.42	666.65	677.82	0.000185	6.20	54347.52	15557.62	0.22
Mississippi	PrIslToLaCrosse	760.181	IA/MN Max	229611.00	642.30	677.91	666.66	678.29	0.000171	5.98	55927.42	12308.07	0.21
Mississippi	PrIslToLaCrosse	760.181	WI Fldwy	229611.00	642.30	677.42	666.65	677.83	0.000185	6.20	54367.45	14023.73	0.22
Mississippi	PrIslToLaCrosse	759.926	100-yr Base	229611.00	645.99	677.37	667.35	677.53	0.000113	4.66	140750.90	15098.92	0.17
Mississippi	PrIslToLaCrosse	759.926	IA/MN Max	229611.00	645.99	677.84	667.35	678.01	0.000114	4.69	133505.30	11552.81	0.17
Mississippi	PrIslToLaCrosse	759.926	WI Fldwy	229611.00	645.99	677.37	667.35	677.53	0.000113	4.65	140792.20	15032.40	0.17
Mississippi	PrIslToLaCrosse	759.684	100-yr Base	229611.00	647.38	677.31	667.75	677.39	0.000066	3.61	147763.40	15160.14	0.13
Mississippi	PrIslToLaCrosse	759.684	IA/MN Max	229611.00	647.38	677.78	667.70	677.87	0.000067	3.63	140359.90	11529.75	0.13
Mississippi	PrIslToLaCrosse	759.684	WI Fldwy	229611.00	647.38	677.31	667.75	677.40	0.000066	3.60	147791.80	14971.20	0.13
Mississippi	PrIslToLaCrosse	759.458	100-yr Base	229611.00	650.43	677.26	663.72	677.31	0.000041	2.67	148451.40	14237.99	0.10
Mississippi	PrIslToLaCrosse	759.458	IA/MN Max	229611.00	650.43	677.74	663.72	677.79	0.000041	2.69	142074.30	10964.86	0.10
Mississippi	PrIslToLaCrosse	759.458	WI Fldwy	229611.00	650.43	677.27	663.72	677.32	0.000041	2.67	148308.00	14109.08	0.10
Mississippi	PrIslToLaCrosse	759.170	100-yr Base	229611.00	655.22	677.15	668.29	677.23	0.000090	3.51	147218.40	14647.94	0.14
Mississippi	PrIslToLaCrosse	759.170	IA/MN Max	229611.00	655.22	677.62	668.17	677.71	0.000090	3.57	143966.30	11956.86	0.14
Mississippi	PrIslToLaCrosse	759.170	WI Fldwy	229611.00	655.22	677.15	668.29	677.24	0.000090	3.51	147247.60	14627.17	0.14
Mississippi	PrIslToLaCrosse	758.833	100-yr Base	229611.00	652.49	677.03	667.37	677.09	0.000060	3.13	155104.20	15160.93	0.12
Mississippi	PrIslToLaCrosse	758.833	IA/MN Max	229611.00	652.49	677.50	667.41	677.57	0.000060	3.17	148992.20	11971.29	0.12
Mississippi	PrIslToLaCrosse	758.833	WI Fldwy	229611.00	652.49	677.03	667.37	677.09	0.000060	3.13	155070.50	15129.55	0.12
Mississippi	PrIslToLaCrosse	758.299	100-yr Base	229611.00	643.54	676.85	666.70	676.91	0.000057	3.01	152263.80	14301.85	0.11
Mississippi	PrIslToLaCrosse	758.299	IA/MN Max	229611.00	643.54	677.33	666.68	677.39	0.000057	3.06	141023.30	11170.66	0.11
Mississippi	PrIslToLaCrosse	758.299	WI Fldwy	229611.00	643.54	676.86	666.70	676.92	0.000056	3.01	152351.40	14289.49	0.11
Mississippi	PrIslToLaCrosse	758.010	100-yr Base	229611.00	649.15	676.72	666.84	676.80	0.000068	3.39	133920.50	14848.46	0.13
Mississippi	PrIslToLaCrosse	758.010	IA/MN Max	229611.00	649.15	677.20	666.76	677.28	0.000068	3.44	127634.90	9851.17	0.13
Mississippi	PrIslToLaCrosse	758.010	WI Fldwy	229611.00	649.15	676.73	666.84	676.81	0.000068	3.39	133999.40	14700.91	0.13
Mississippi	PrIslToLaCrosse	757.668	100-yr Base	229611.00	653.51	676.59	666.97	676.68	0.000073	3.26	119497.60	15488.71	0.13
Mississippi	PrIslToLaCrosse	757.668	IA/MN Max	229611.00	653.51	677.07	667.01	677.16	0.000073	3.31	116479.50	8669.63	0.13
Mississippi	PrIslToLaCrosse	757.668	WI Fldwy	229611.00	653.51	676.60	666.97	676.68	0.000073	3.26	119565.70	15487.39	0.13
Mississippi	PrIslToLaCrosse	757.381	100-yr Base	229611.00	653.12	676.47	665.14	676.57	0.000080	3.53	107455.30	16049.33	0.14
Mississippi	PrIslToLaCrosse	757.381	IA/MN Max	229611.00	653.12	676.95	665.14	677.05	0.000080	3.59	105899.30	7427.78	0.14
Mississippi	PrIslToLaCrosse	757.381	WI Fldwy	229611.00	653.12	676.48	665.14	676.58	0.000080	3.53	107513.80	16049.88	0.14
Mississippi	PrIslToLaCrosse	757.105	100-yr Base	229611.00	641.29	676.35	661.79	676.47	0.000067	3.43	94481.04	14793.31	0.13
Mississippi	PrIslToLaCrosse	757.105	IA/MN Max	229611.00	641.29	676.83	661.75	676.95	0.000067	3.47	93916.81	6287.12	0.13
Mississippi	PrIslToLaCrosse	757.105	WI Fldwy	229611.00	641.29	676.36	661.79	676.48	0.000067	3.43	94531.42	14790.63	0.13
Mississippi	PrIslToLaCrosse	756.765	100-yr Base	229611.00	653.40	676.20	663.00	676.34	0.000098	3.67	86410.75	14366.27	0.15
Mississippi	PrIslToLaCrosse	756.765	IA/MN Max	229611.00	653.40	676.67	663.35	676.82	0.000098	3.73	84744.23	5816.77	0.15
Mississippi	PrIslToLaCrosse	756.765	WI Fldwy	229611.00	653.40	676.21	663.00	676.34	0.000098	3.67	86344.86	14346.50	0.15
Mississippi	PrIslToLaCrosse	756.373	100-yr Base	229611.00	653.66	675.97	664.47	676.13	0.000104	3.70	75525.72	12656.26	0.15
Mississippi	PrIslToLaCrosse	756.373	IA/MN Max	229611.00	653.66	676.44	664.59	676.61	0.000104	3.76	73858.54	4900.56	0.15
Mississippi	PrIslToLaCrosse	756.373	WI Fldwy	229611.00	653.66	675.98	664.47	676.13	0.000104	3.70	75519.13	12643.04	0.15
Mississippi	PrIslToLaCrosse	755.996	100-yr Base	229611.00	653.73	675.79	662.73	675.92	0.000099	3.68	84299.00	13938.42	0.15
Mississippi	PrIslToLaCrosse	755.996	IA/MN Max	229611.00	653.73	676.26	662.81	676.40	0.000099	3.75	81967.23	5258.53	0.15
Mississippi	PrIslToLaCrosse	755.996	WI Fldwy	229611.00	653.73	675.80	662.73	675.93	0.000099	3.68	84348.21	13938.88	0.15
Mississippi	PrIslToLaCrosse	755.463	100-yr Base	229611.00	643.03	675.60	657.27	675.68	0.000045	2.55	104051.30	13327.38	0.10
Mississippi	PrIslToLaCrosse	755.463	IA/MN Max	229611.00	643.03	676.08	657.27	676.16	0.000045	2.58	99527.84	5827.44	0.10
Mississippi	PrIslToLaCrosse	755.463	WI Fldwy	229611.00	643.03	675.61	657.27	675.69	0.000045	2.55	104104.80	13320.97	0.10
Mississippi	PrIslToLaCrosse	755.186	100-yr Base	229611.00	648.65	675.47	662.62	675.59	0.000077	3.61	97485.73	13844.89	0.14
Mississippi	PrIslToLaCrosse	755.186	IA/MN Max	229611.00	648.65	675.94	662.65	676.07	0.000077	3.66	95979.17	6498.93	0.14
Mississippi	PrIslToLaCrosse	755.186	WI Fldwy	229611.00	648.65	675.48	662.62	675.60	0.000077	3.61	97549.19	13847.77	0.14
Mississippi	PrIslToLaCrosse	754.955	100-yr Base	229611.00	648.31	675.40	662.26	675.50	0.000065	3.15	108445.30	14745.09	0.12
Mississippi	PrIslToLaCrosse	754.955	IA/MN Max	229611.00	648.31	675.87	662.21	675.98	0.000065	3.19	104159.00	6979.75	0.12
Mississippi	PrIslToLaCrosse	754.955	WI Fldwy	229611.00	648.31	675.41	662.26	675.51	0.000065	3.14	108516.70	14369.67	0.12
Mississippi	PrIslToLaCrosse	754.592	100-yr Base	229611.00	652.36	675.30	664.44	675.38	0.000058	2.77	108146.10	16529.92	0.12
Mississippi	PrIslToLaCrosse	754.592	IA/MN Max	229611.00	652.36	675.77	664.32	675.86	0.000058	2.82	104317.10	7491.60	0.12
Mississippi	PrIslToLaCrosse	754.592	WI Fldwy	229611.00	652.36	675.31	664.43	675.39	0.000058	2.77	108225.10	16027.50	0.11

HEC-RAS Plan: Plan1 Locations: User Defined (Continued)

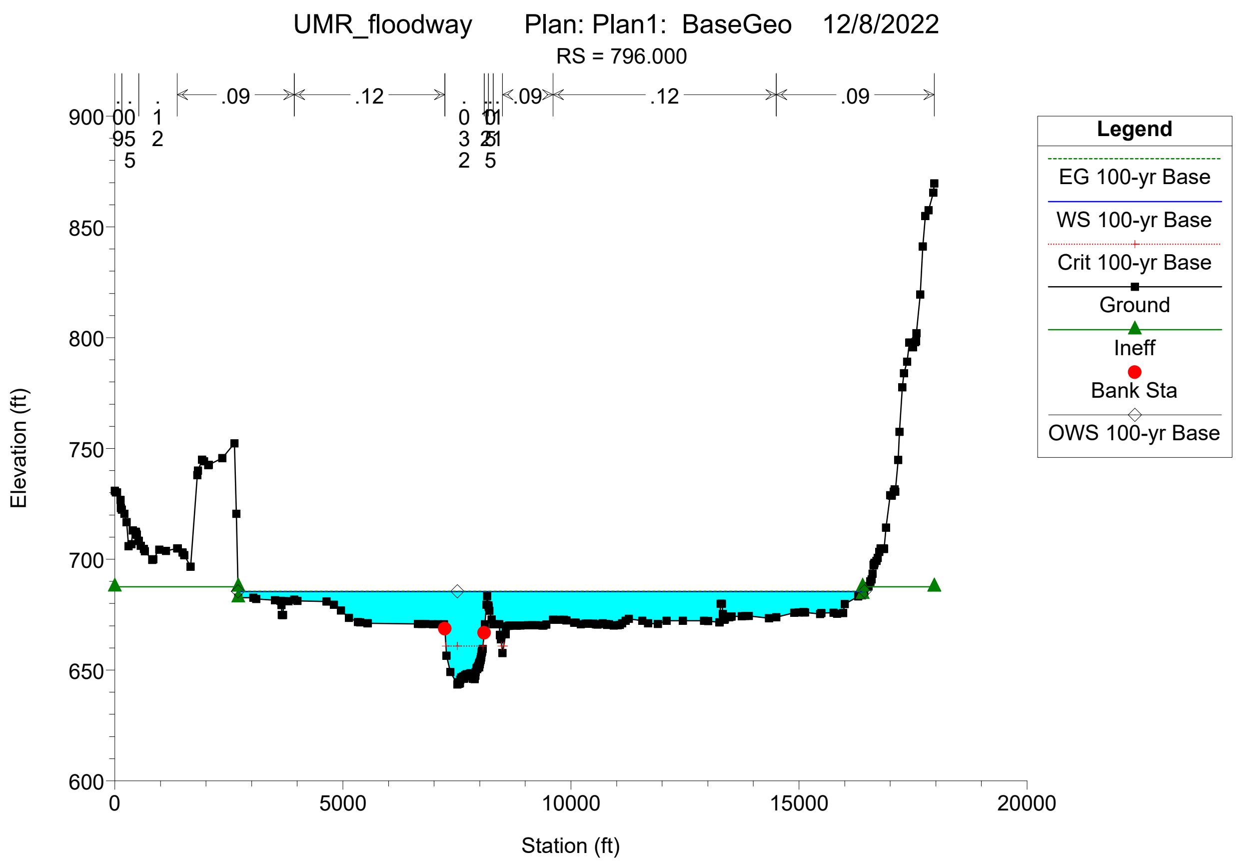
River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Mississippi	PrIslToLaCrosse	754.204	100-yr Base	231280.00	651.87	675.21	662.92	675.27	0.000042	2.31	120203.60	17923.70	0.10
Mississippi	PrIslToLaCrosse	754.204	IA/MN Max	231280.00	651.87	675.68	663.03	675.75	0.000042	2.35	118520.00	8413.40	0.10
Mississippi	PrIslToLaCrosse	754.204	WI Fldwy	231280.00	651.87	675.22	662.92	675.28	0.000042	2.31	120290.30	17595.90	0.10
Mississippi	PrIslToLaCrosse	753.586	100-yr Base	231280.00	644.22	674.92	661.74	675.09	0.000072	3.50	71972.00	12640.25	0.15
Mississippi	PrIslToLaCrosse	753.586	IA/MN Max	231280.00	644.22	675.38	661.78	675.57	0.000072	3.57	69207.11	4506.69	0.15
Mississippi	PrIslToLaCrosse	753.586	WI Fldwy	231280.00	644.22	674.93	661.73	675.10	0.000071	3.50	72023.44	12626.73	0.15
Mississippi	PrIslToLaCrosse	752.950	100-yr Base	231280.00	644.31	674.60	658.21	674.87	0.000059	4.21	55018.50	11437.57	0.15
Mississippi	PrIslToLaCrosse	752.950	IA/MN Max	231280.00	644.31	675.08	658.18	675.35	0.000058	4.17	55420.85	2347.97	0.15
Mississippi	PrIslToLaCrosse	752.950	WI Fldwy	231280.00	644.31	674.61	658.20	674.88	0.000059	4.21	55043.86	11287.12	0.15
Mississippi	PrIslToLaCrosse	752.823	100-yr Base	231280.00	638.50	674.34	654.22	674.80	0.000080	5.49	42262.00	10128.84	0.18
Mississippi	PrIslToLaCrosse	752.823	IA/MN Max	231280.00	638.50	674.82	654.19	675.29	0.000080	5.46	42391.96	1410.95	0.18
Mississippi	PrIslToLaCrosse	752.823	WI Fldwy	231280.00	638.50	674.35	654.22	674.81	0.000080	5.49	42277.44	9715.23	0.18
Mississippi	PrIslToLaCrosse	752.8		Inl Struct									
Mississippi	PrIslToLaCrosse	752.781	100-yr Base	231280.00	649.88	673.48	662.91	674.47	0.000286	8.03	28904.10	10012.96	0.32
Mississippi	PrIslToLaCrosse	752.781	IA/MN Max	231280.00	649.88	673.94	662.98	674.95	0.000288	8.06	28698.47	1407.39	0.31
Mississippi	PrIslToLaCrosse	752.781	WI Fldwy	231280.00	649.88	673.49	662.91	674.49	0.000288	8.06	28919.79	9705.64	0.32
Mississippi	PrIslToLaCrosse	752.600	100-yr Base	231280.00	633.59	673.81	651.22	674.06	0.000044	4.37	60690.73	11106.44	0.13
Mississippi	PrIslToLaCrosse	752.600	IA/MN Max	231280.00	633.59	674.28	651.22	674.54	0.000044	4.41	59832.17	2313.18	0.13
Mississippi	PrIslToLaCrosse	752.600	WI Fldwy	231280.00	633.59	673.82	651.20	674.07	0.000044	4.40	60719.56	10964.78	0.14
Mississippi	PrIslToLaCrosse	751.877	100-yr Base	231280.00	626.83	673.45	650.02	673.80	0.000274	5.56	94419.30	11983.71	0.16
Mississippi	PrIslToLaCrosse	751.877	IA/MN Max	231280.00	626.83	673.92	650.02	674.28	0.000280	5.59	90553.02	4702.19	0.16
Mississippi	PrIslToLaCrosse	751.877	WI Fldwy	231280.00	626.83	673.46	650.02	673.81	0.000273	5.56	94445.61	11975.72	0.16



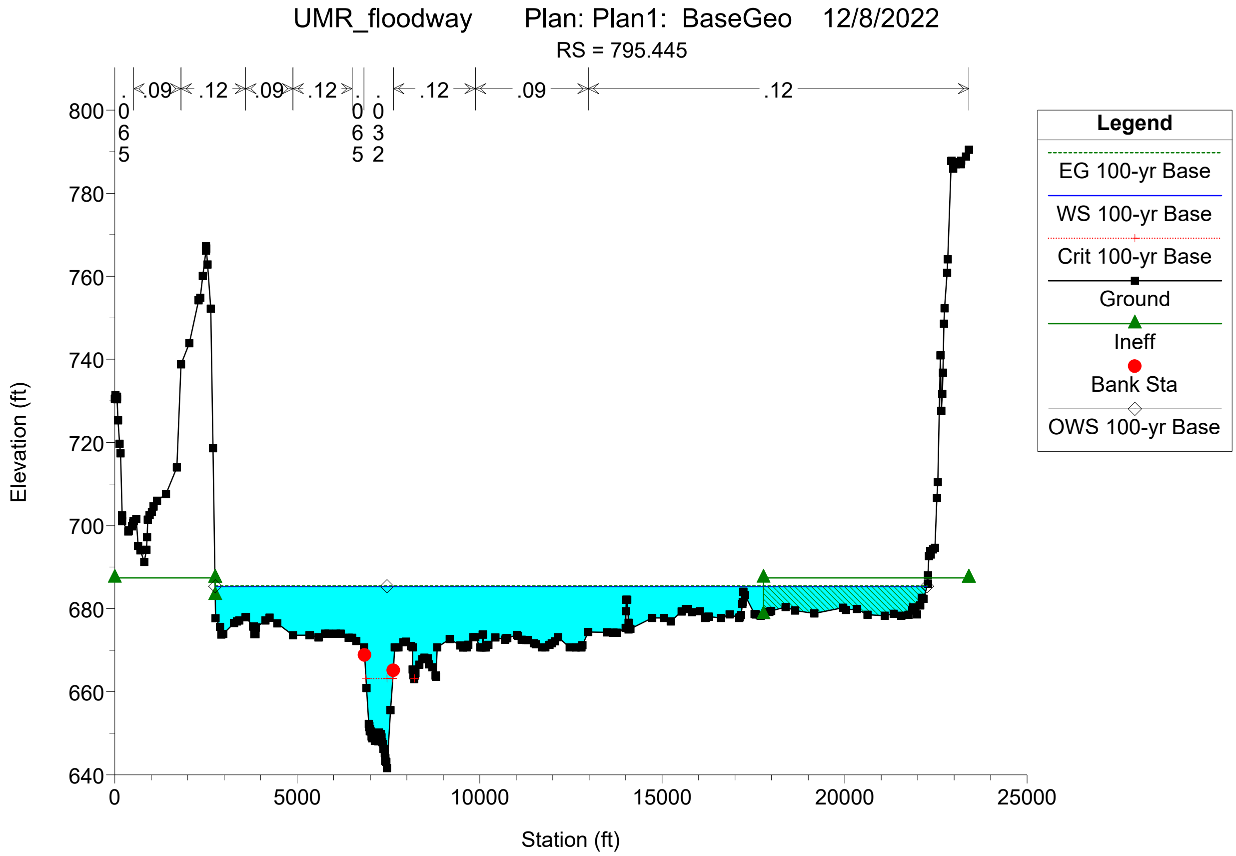
UMR_floodway Plan: Plan1: BaseGeo 11/18/2022
Mississippi PrIslToLaCrosse
Legend
WS 100-yr Base
Ground
Right Levee
OWS 100-yr Base
Elevation (ft)
Main Channel Distance (ft)
720
700
680
660
640
620
250000
300000
350000
400000
450000
749.010
749.486
750.083
750.610
751.115
751.877
752.600
753.586
754.204
754.955
755.463
755.996
756.765
757.381
758.010
758.833
759.458
759.926
760.400
760.994
761.826
762.273
763.082
763.659
764.091
764.552
765.103
765.528
765.995
766.672
767.605
768.717
769.696
770.530
771.313
771.809
772.339
772.832
773.342
773.832
774.330
775.186
776.002
776.665
777.080
777.488
778.074
778.664
779.187
779.811
780.631
781.468
781.990
783.000
783.652
784.243
784.715
785.329
785.857
786.623
787.094
787.726
788.538
789.000
789.574
789.992
790.442
790.974
791.531
792.261
793.000
793.559
794.078
794.671
795.445
796.385

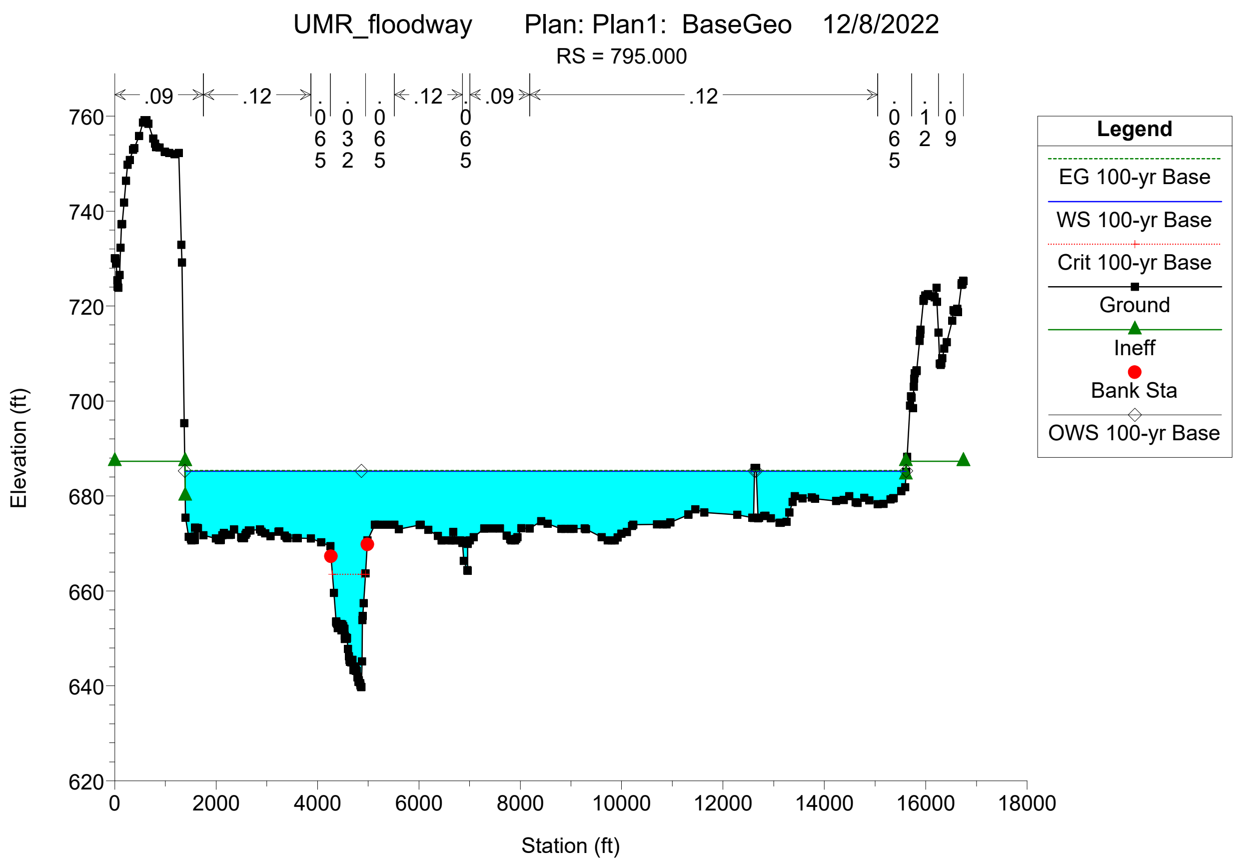


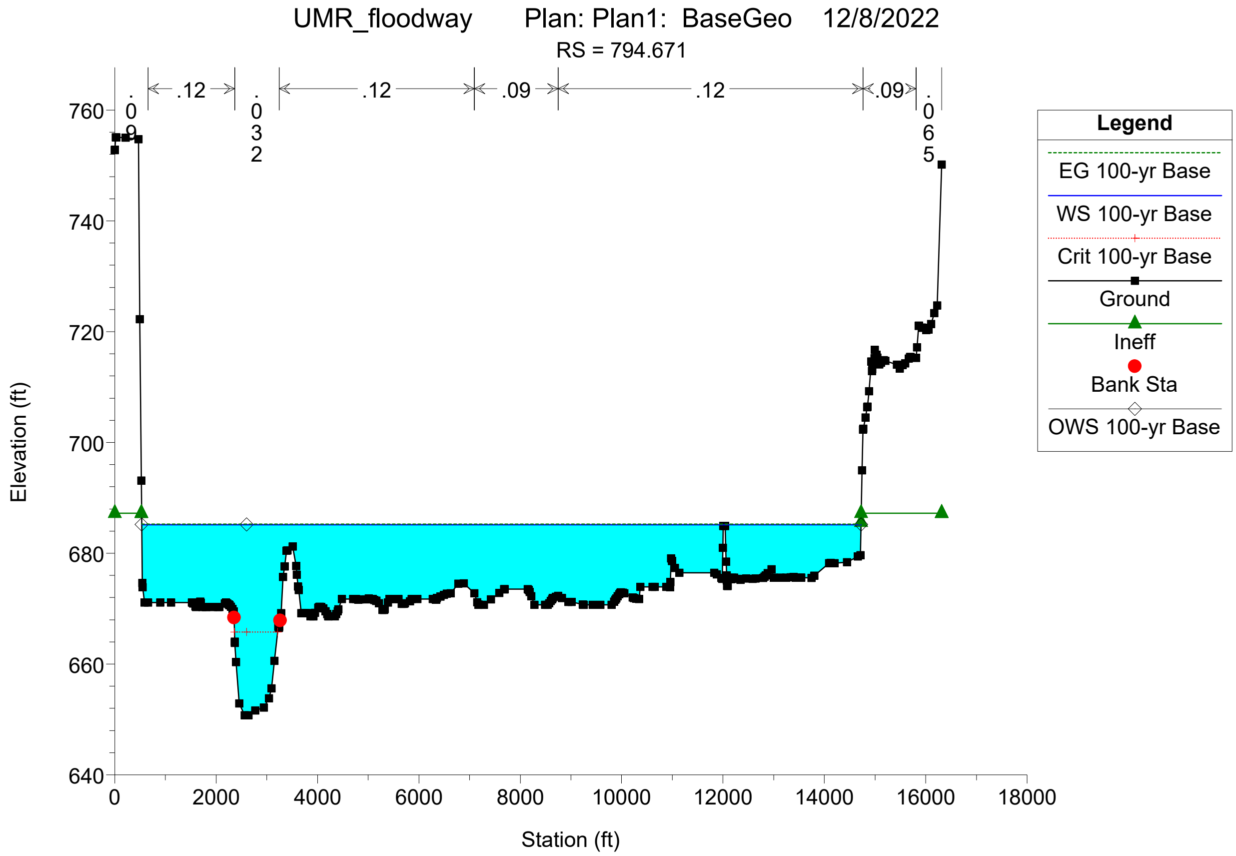
UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 796.385
.12
.12
.08
.12
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base



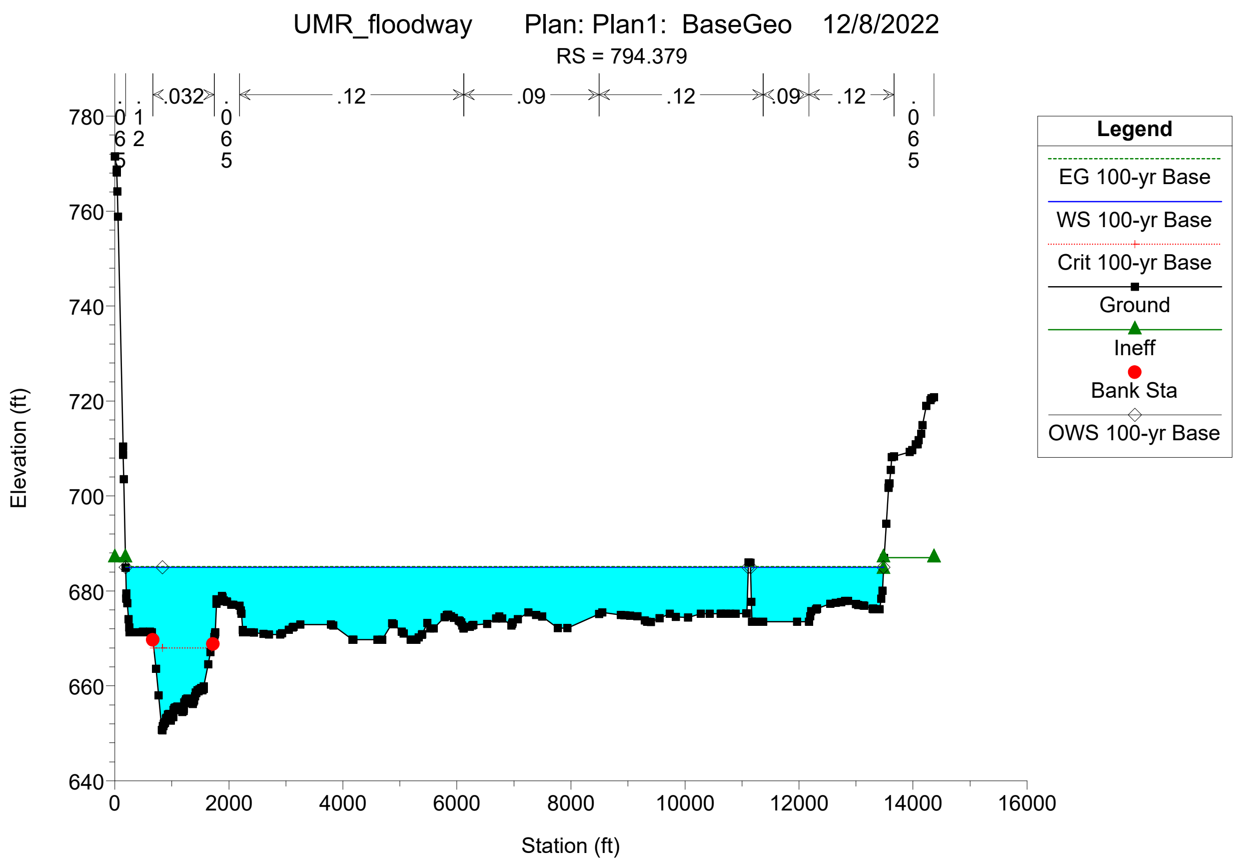
UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 796.000
.09
.12
.09
.12
.09
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base


UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 795.445
.065
.09
.12
.09
.12
.065
.032
.12
.09
.12
Elevation (ft)
800
780
760
740
720
700
680
660
640
0
5000
10000
15000
20000
25000
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

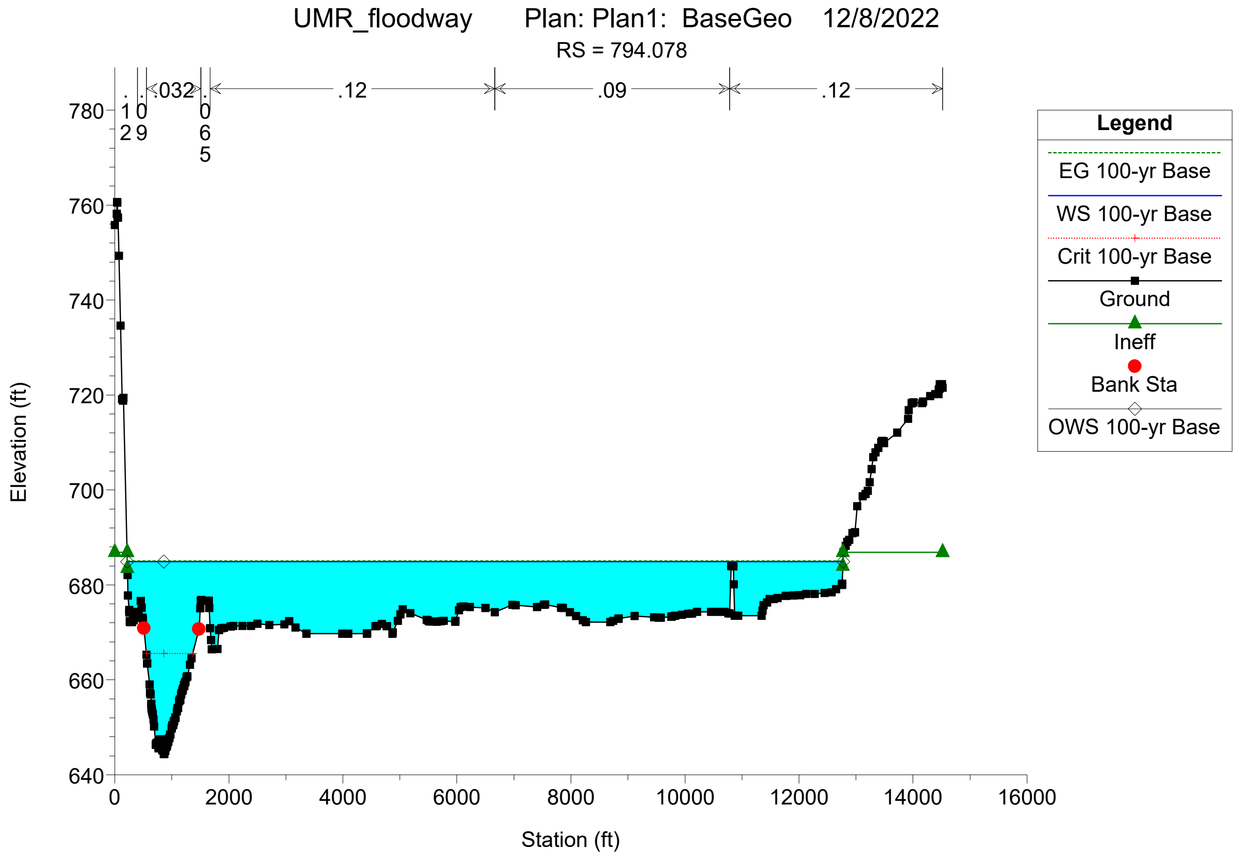

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 795.000
.09
.12
.065
.032
.065
.12
.065
.09
.12
.065
.12
.09
Elevation (ft)
760
740
720
700
680
660
640
620
0
2000
4000
6000
8000
10000
12000
14000
16000
18000
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base



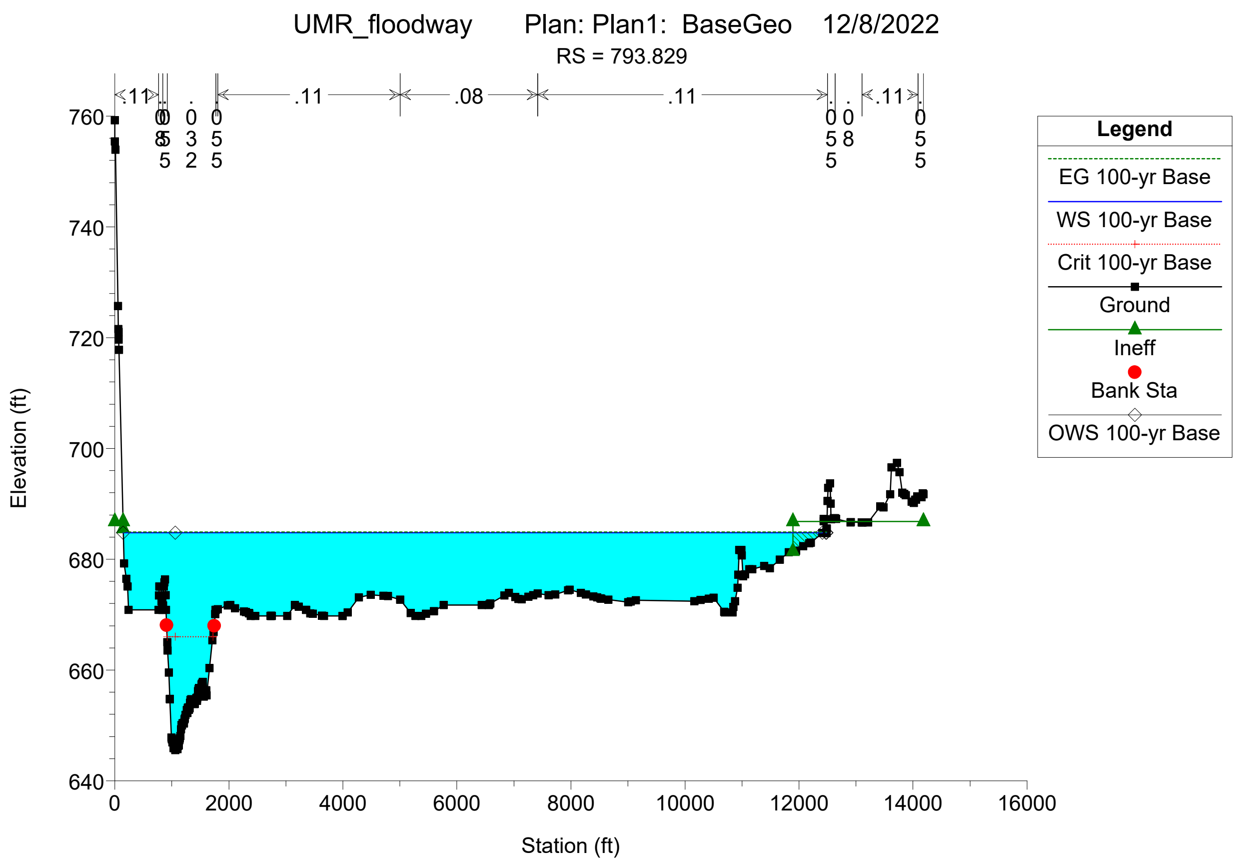
UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 794.671
.12
.12
.09
.12
.09
.09
.032
.065
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base



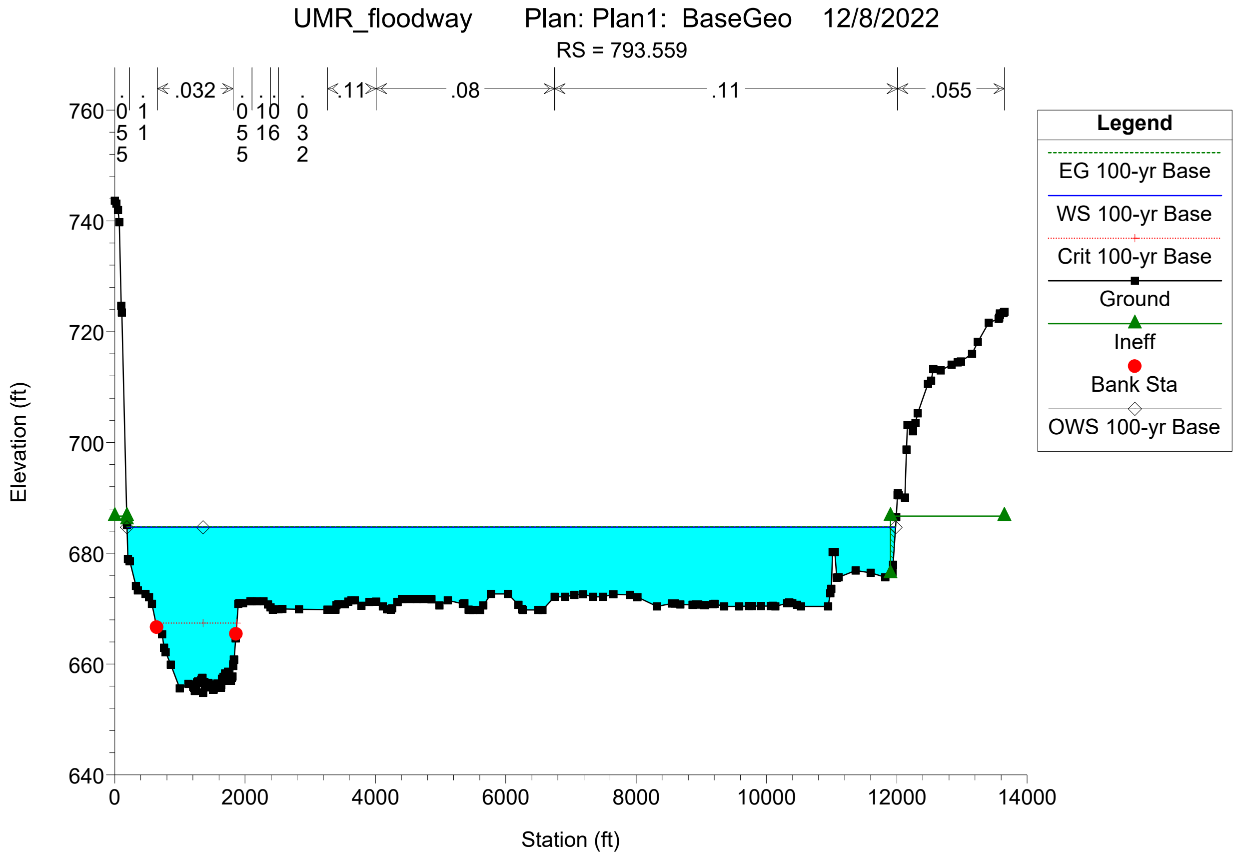
UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 794.379
.032
.12
.09
.12
.09
.12
.065
.12
.065
.065
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

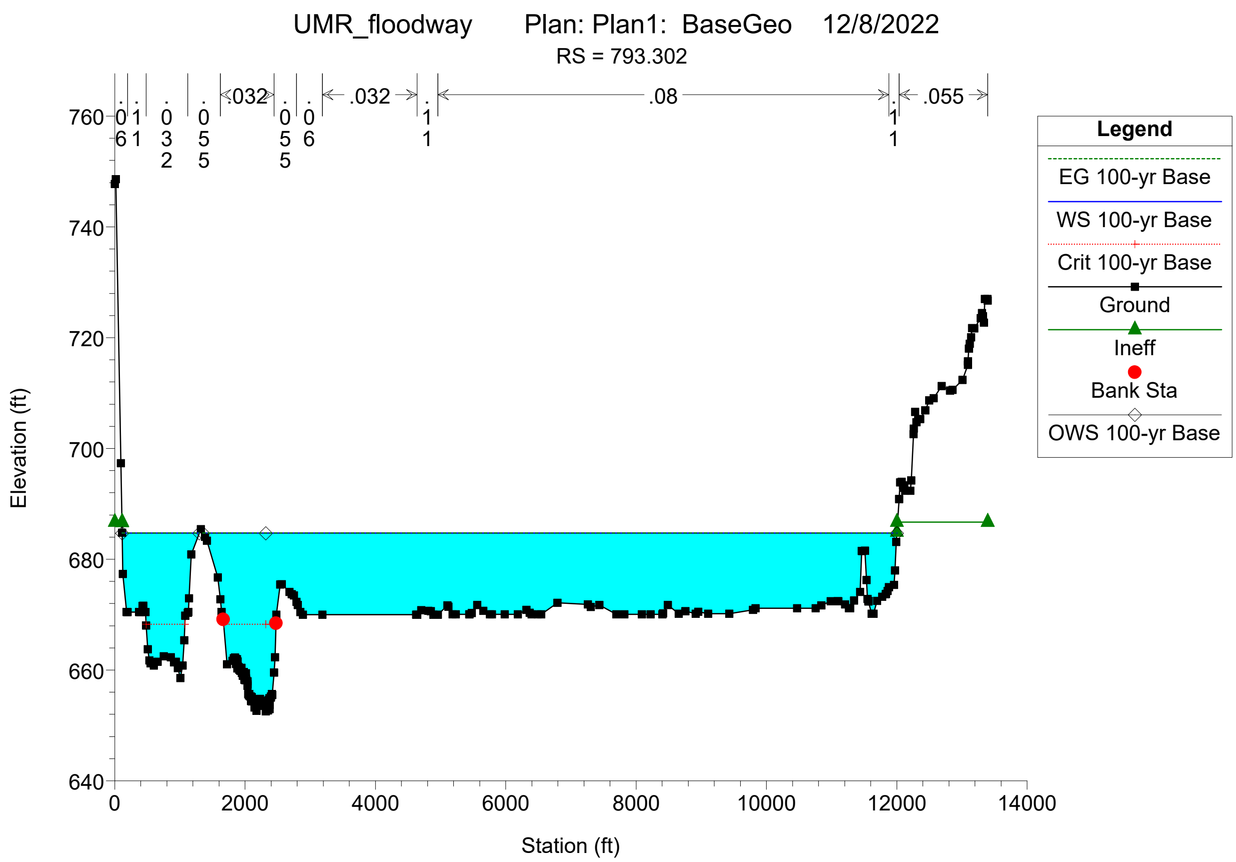


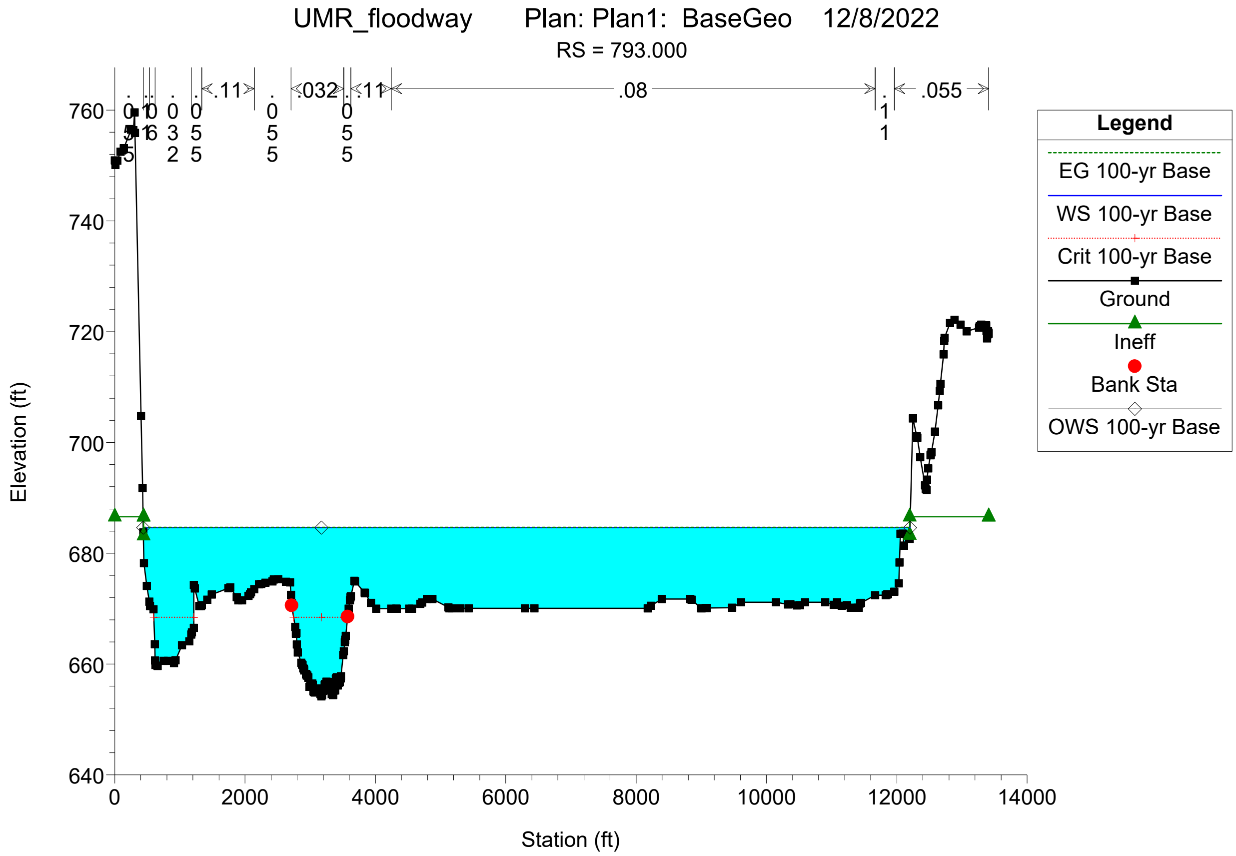
UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 794.078
.12
.09
.12
.032
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

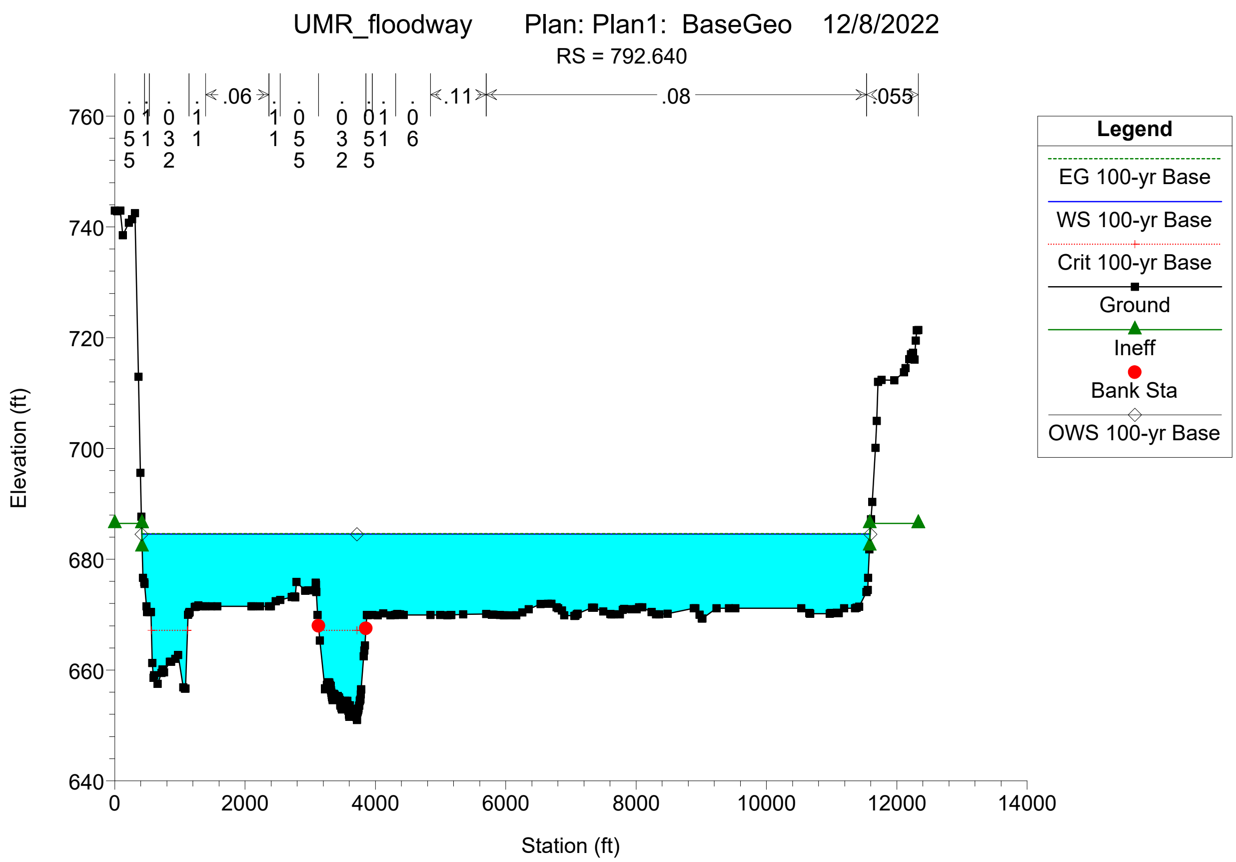


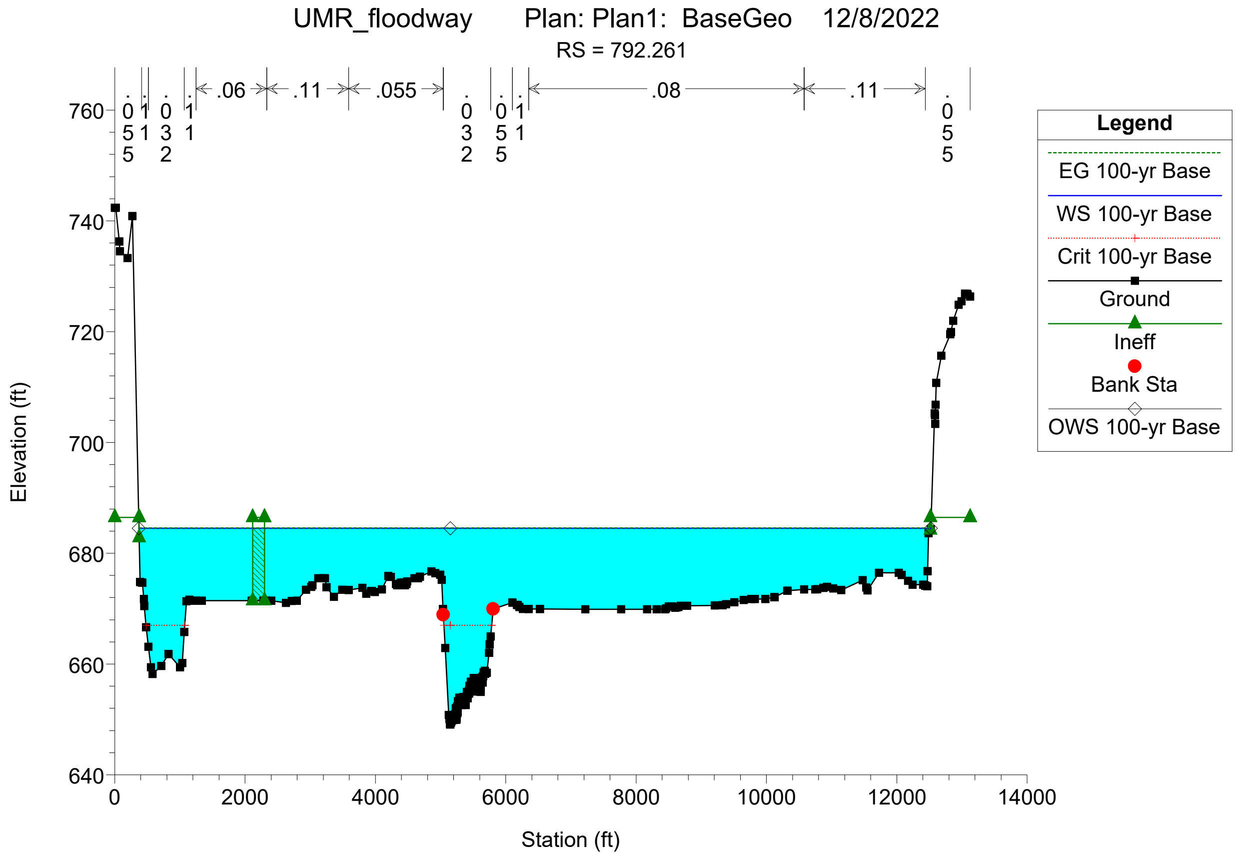
UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 793.829
.11
.11
.08
.11
.11
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base


UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 793.559
.032
.11
.08
.11
.055
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

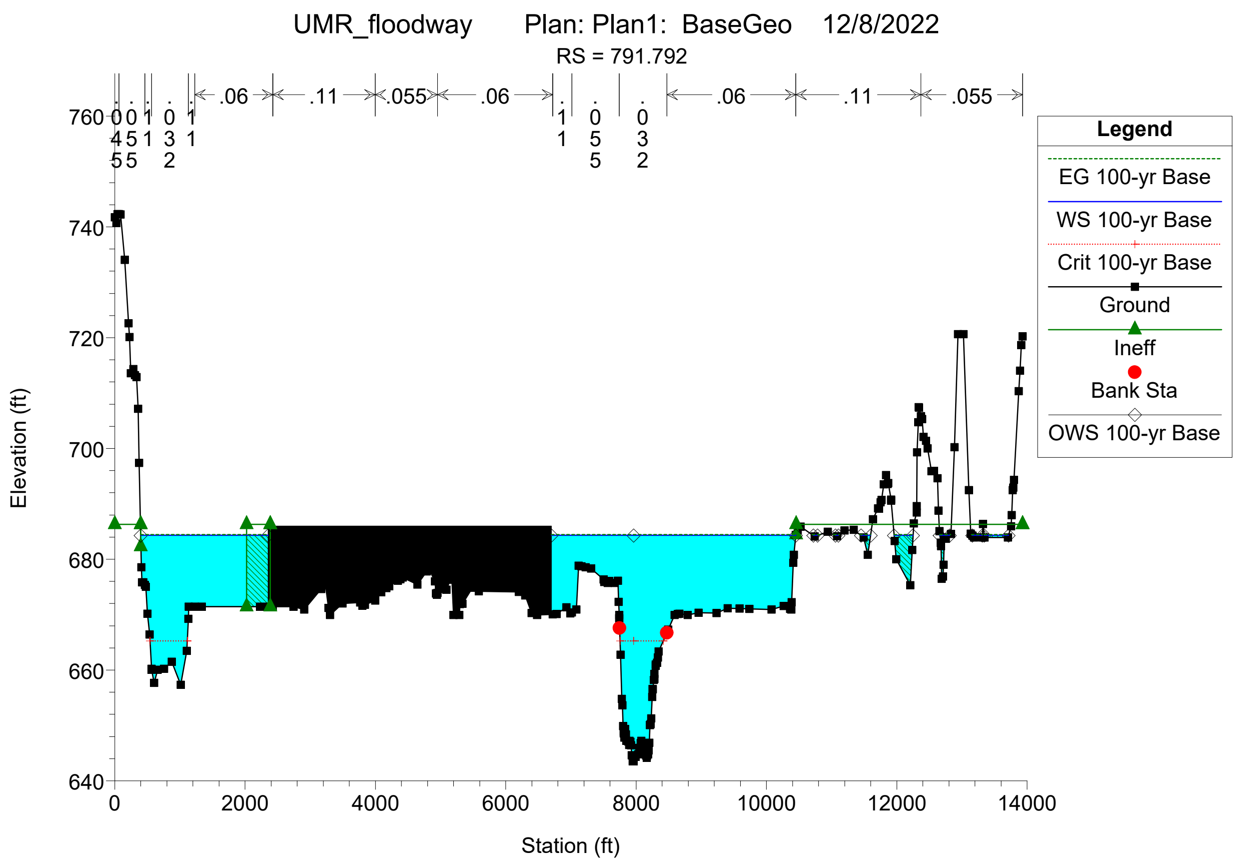

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 793.302
.032
.032
.08
.055
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base


UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 793.000
.11
.032
.11
.08
.055
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

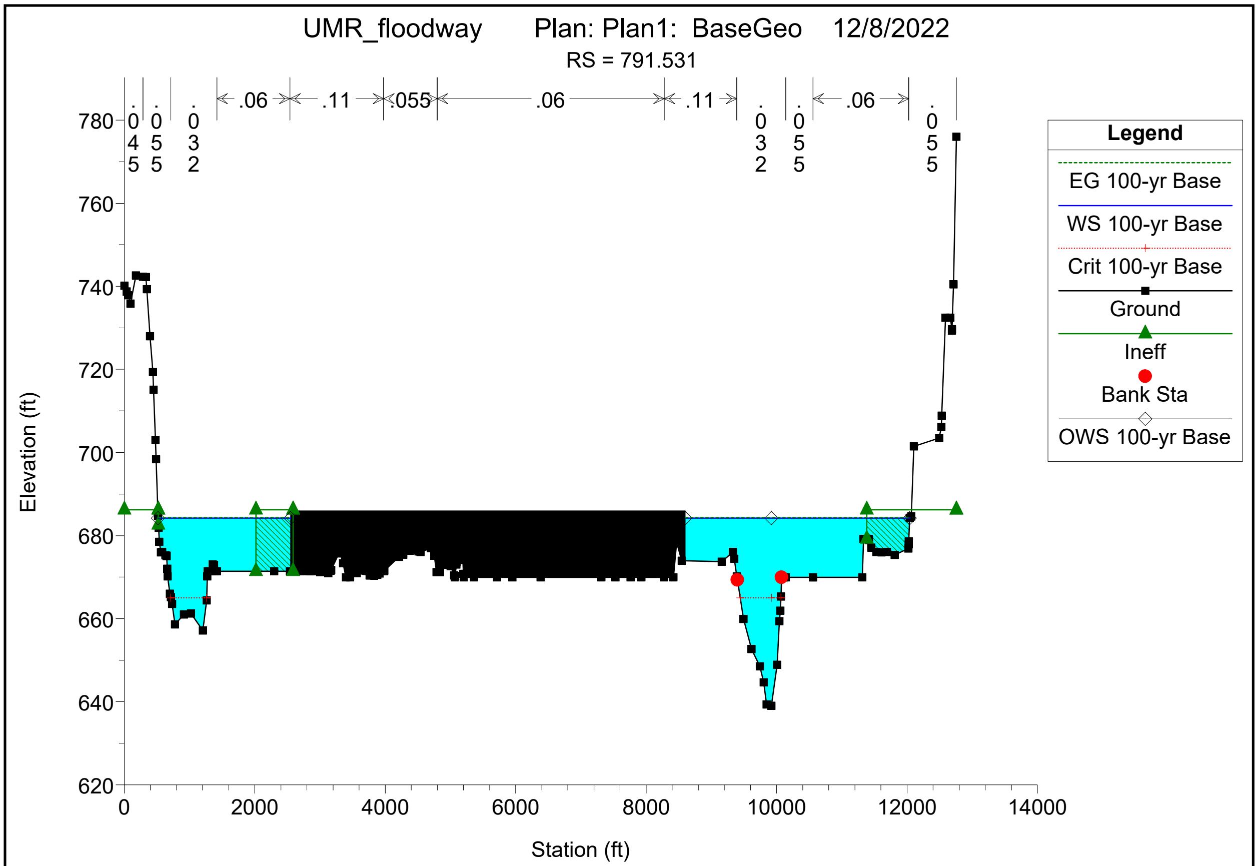

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 792.640
.06
.11
.08
.055
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

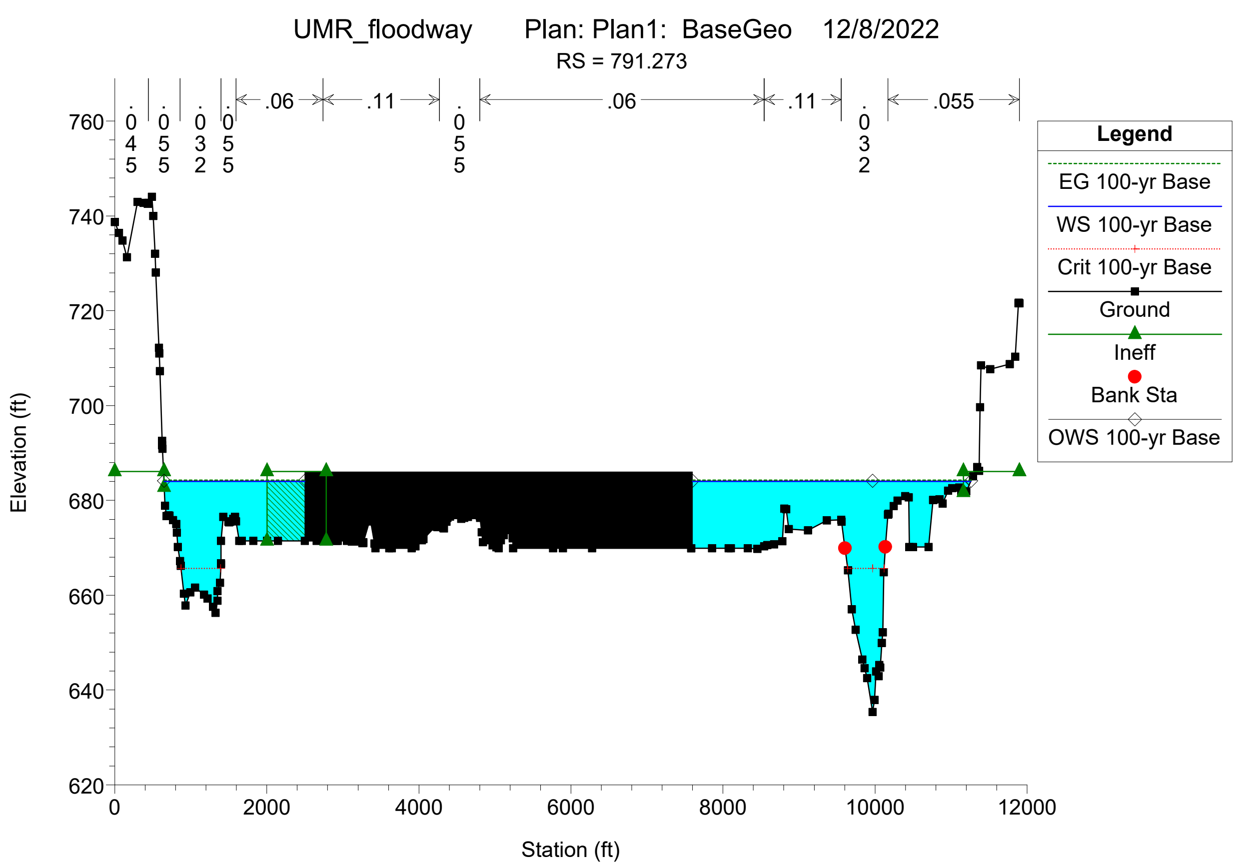


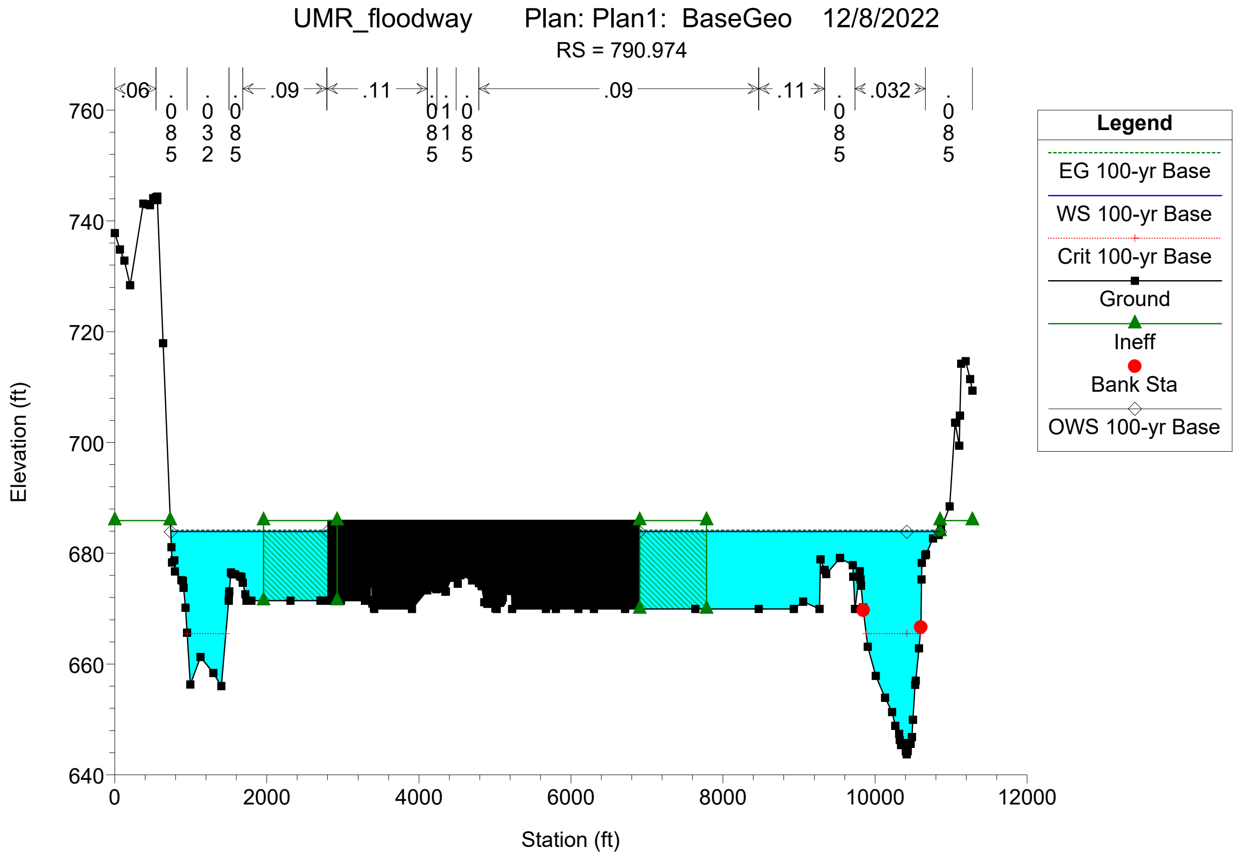
UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 792.261
.06
.11
.055
.08
.11
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)
760
740
720
700
680
660
640
0
2000
4000
6000
8000
10000
12000
14000

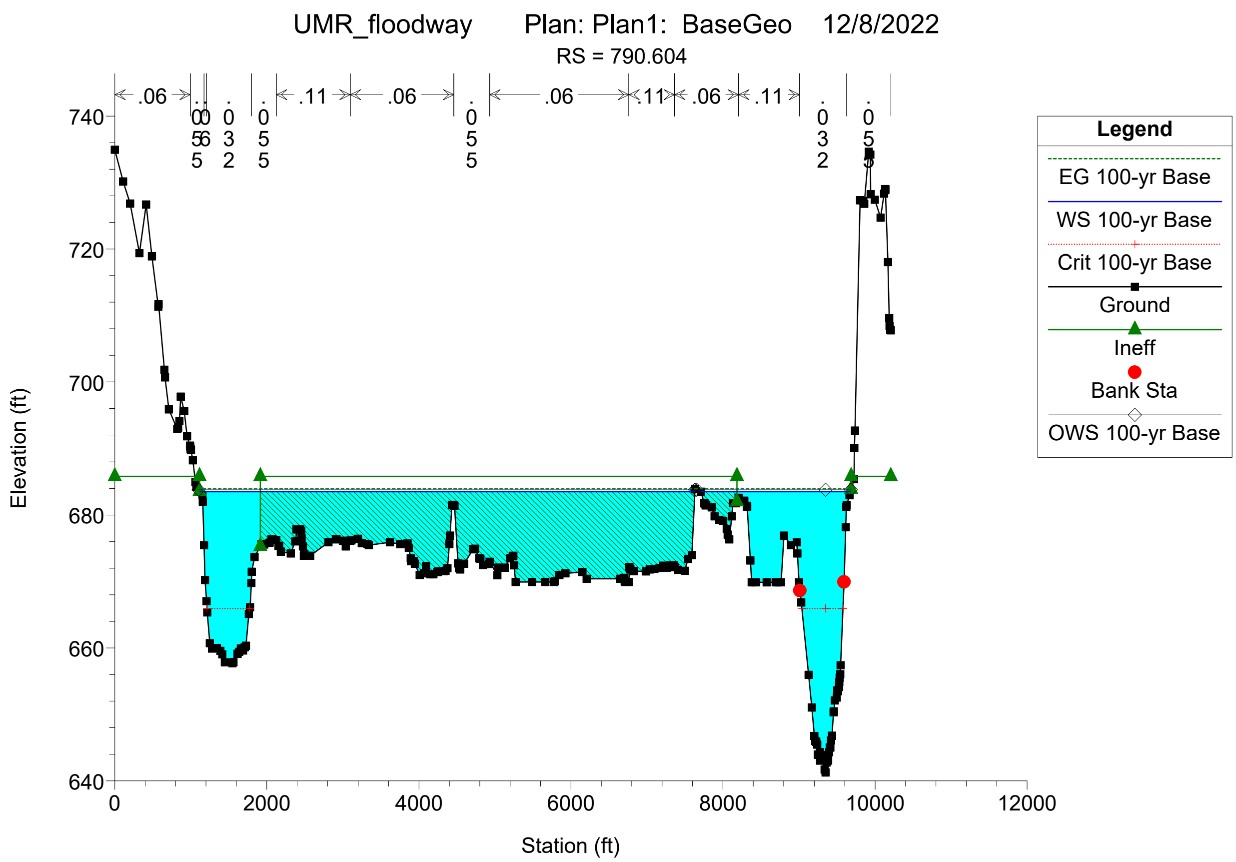


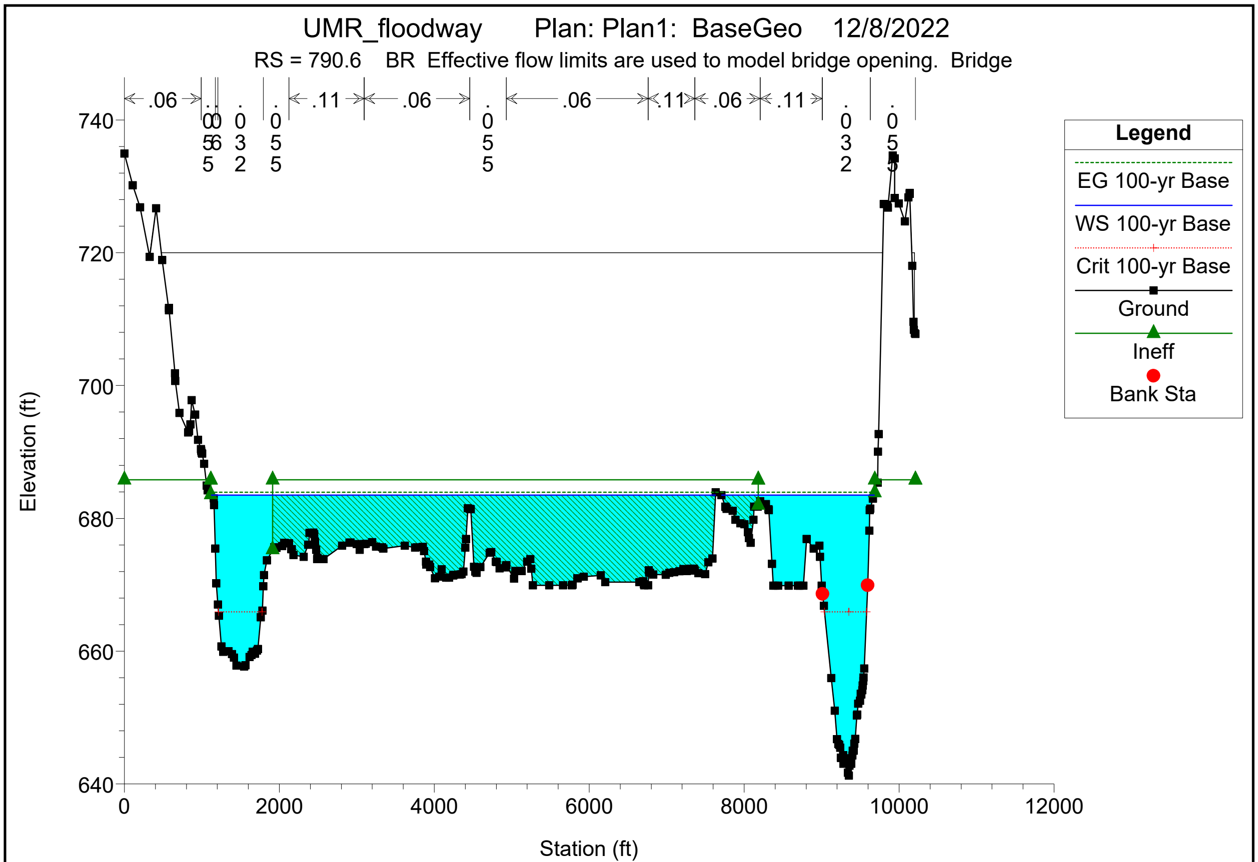
UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 791.792
.06
.11
.055
.06
.06
.11
.055
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)
760
740
720
700
680
660
640
0
2000
4000
6000
8000
10000
12000
14000

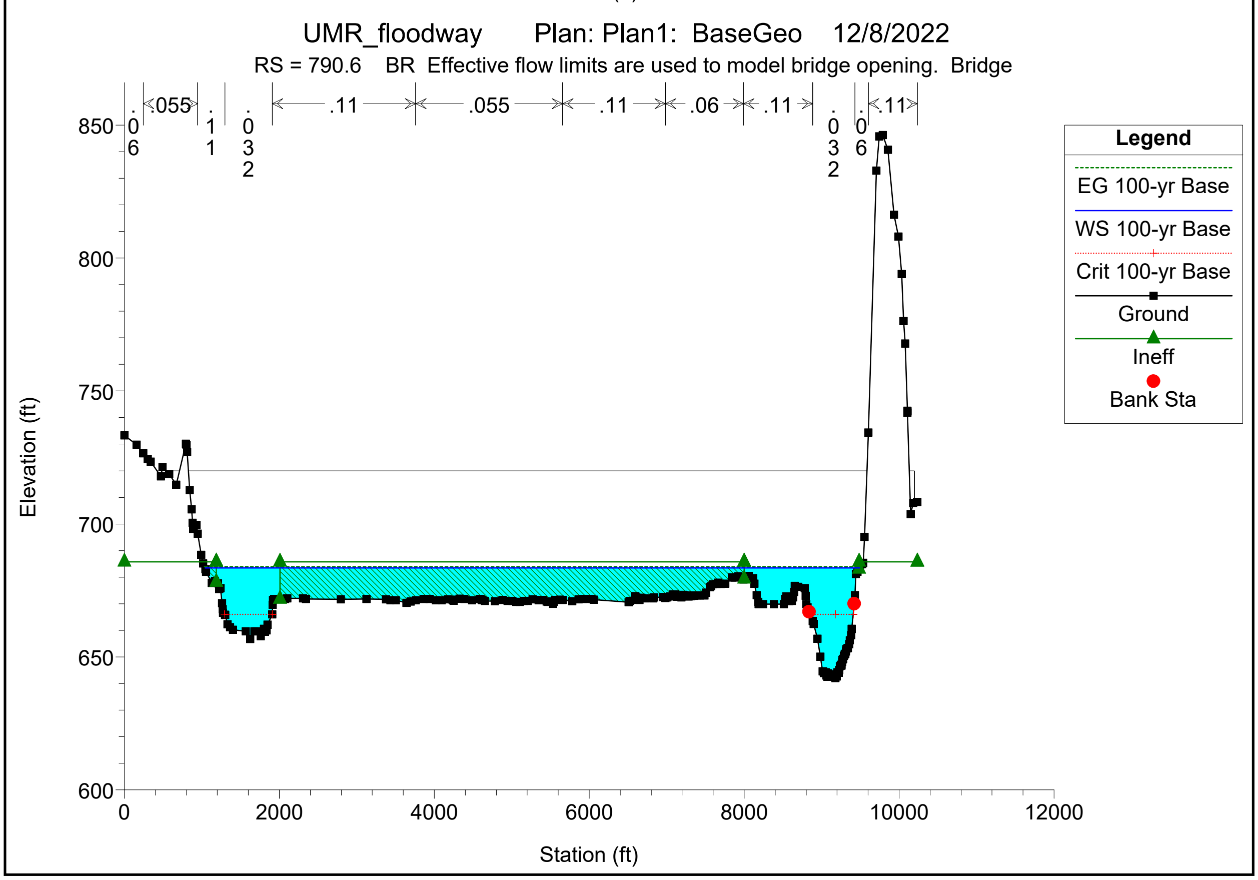

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 791.531
.045
.055
.032
.06
.11
.055
.06
.11
.032
.055
.06
.055
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)
620
640
660
680
700
720
740
760
780
0
2000
4000
6000
8000
10000
12000
14000

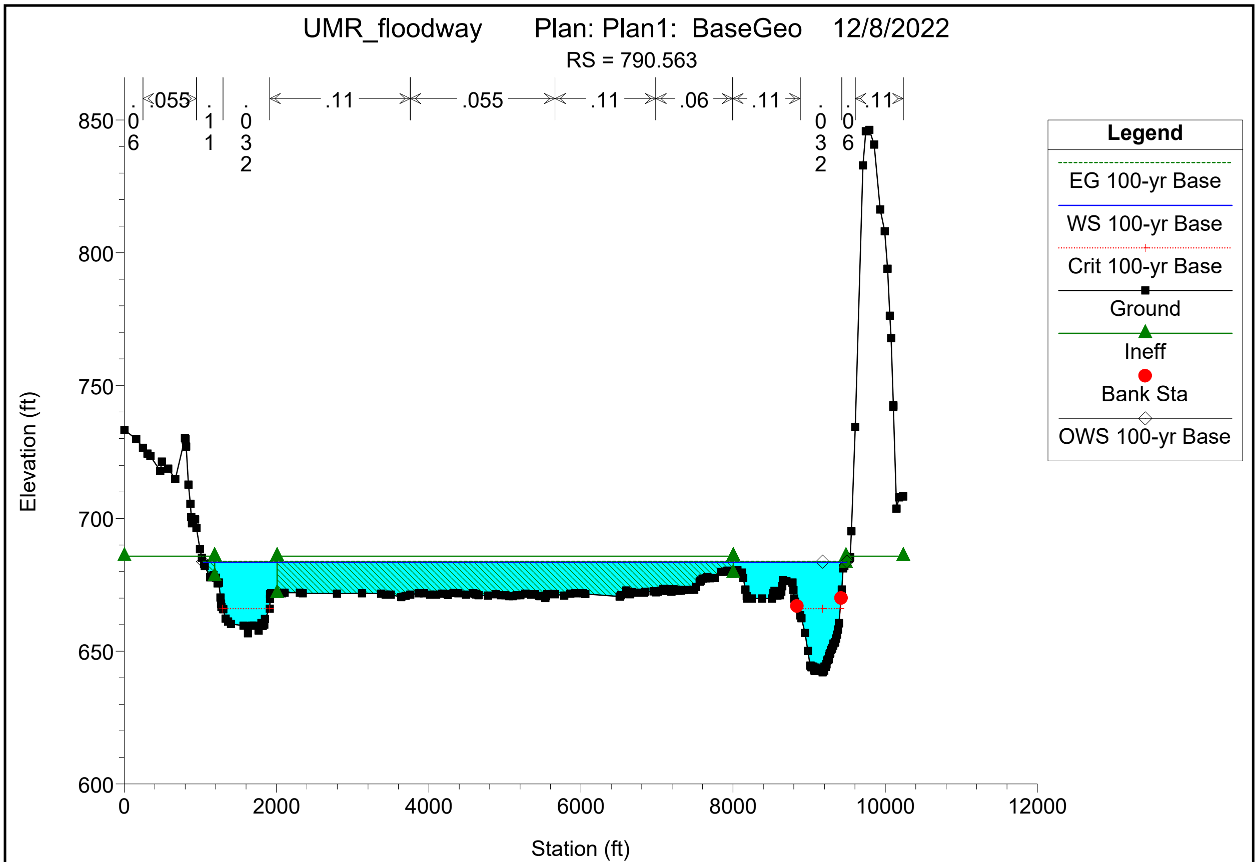

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 791.273
.045
.055
.032
.055
.06
.11
.055
.06
.11
.032
.055
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)
620
640
660
680
700
720
740
760
0
2000
4000
6000
8000
10000
12000


UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 790.974
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

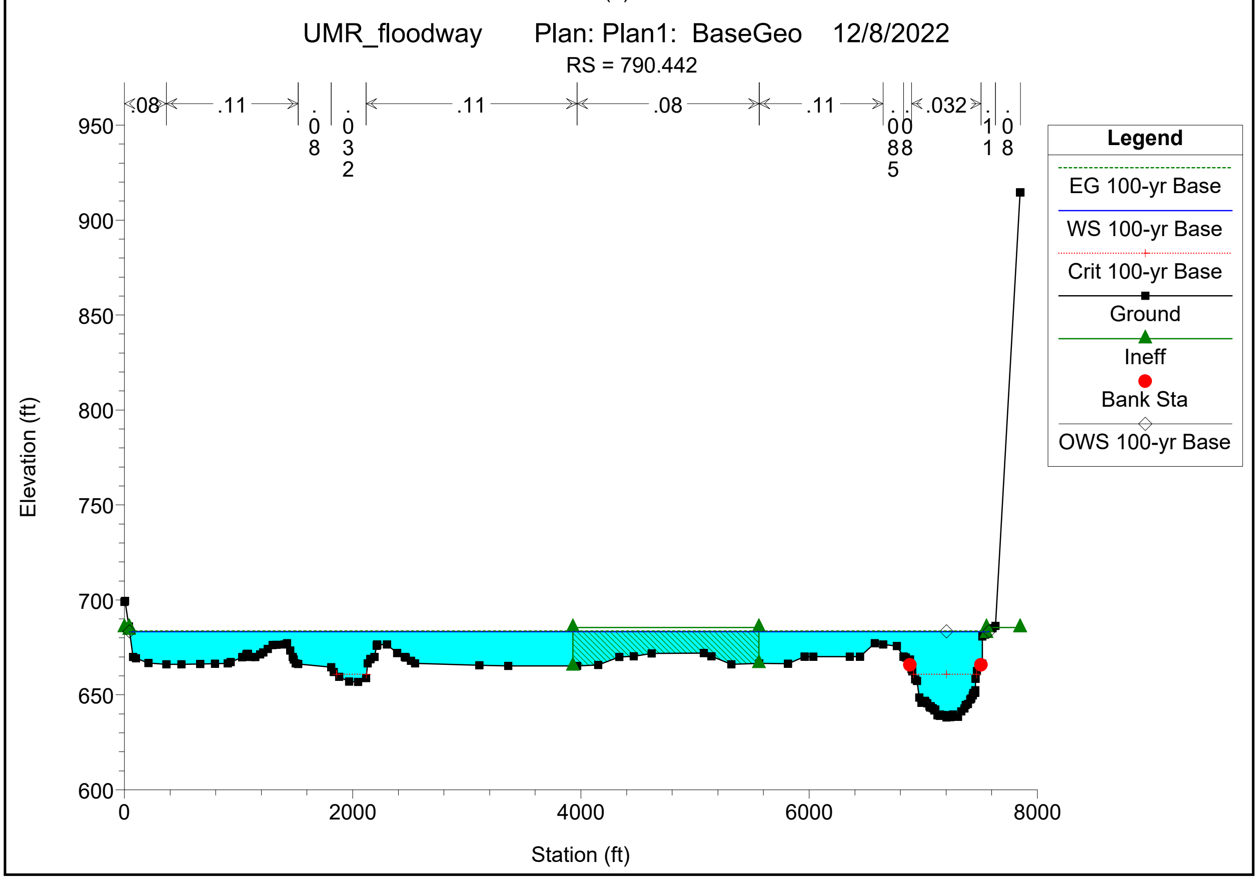

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 790.604
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base


UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 790.6 BR Effective flow limits are used to model bridge opening. Bridge
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta

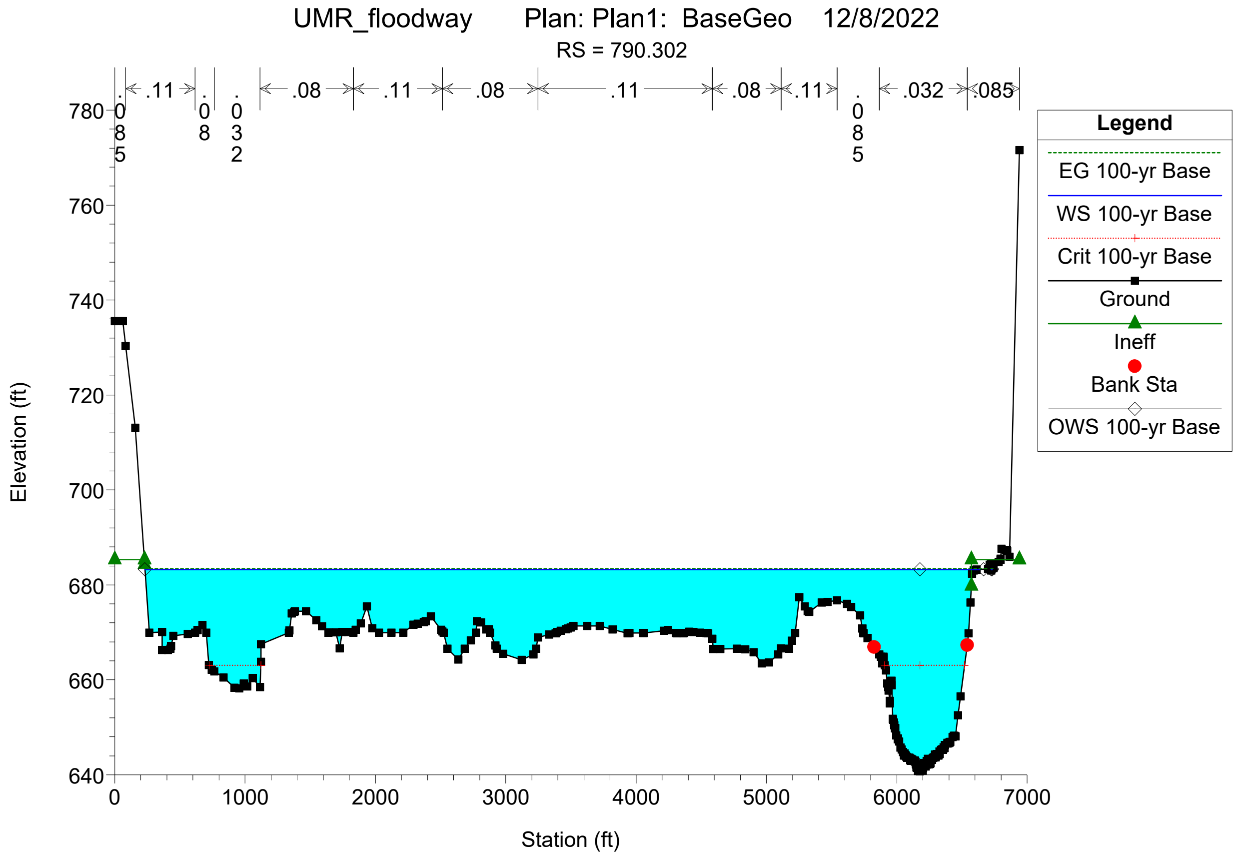

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 790.6 BR Effective flow limits are used to model bridge opening. Bridge
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta

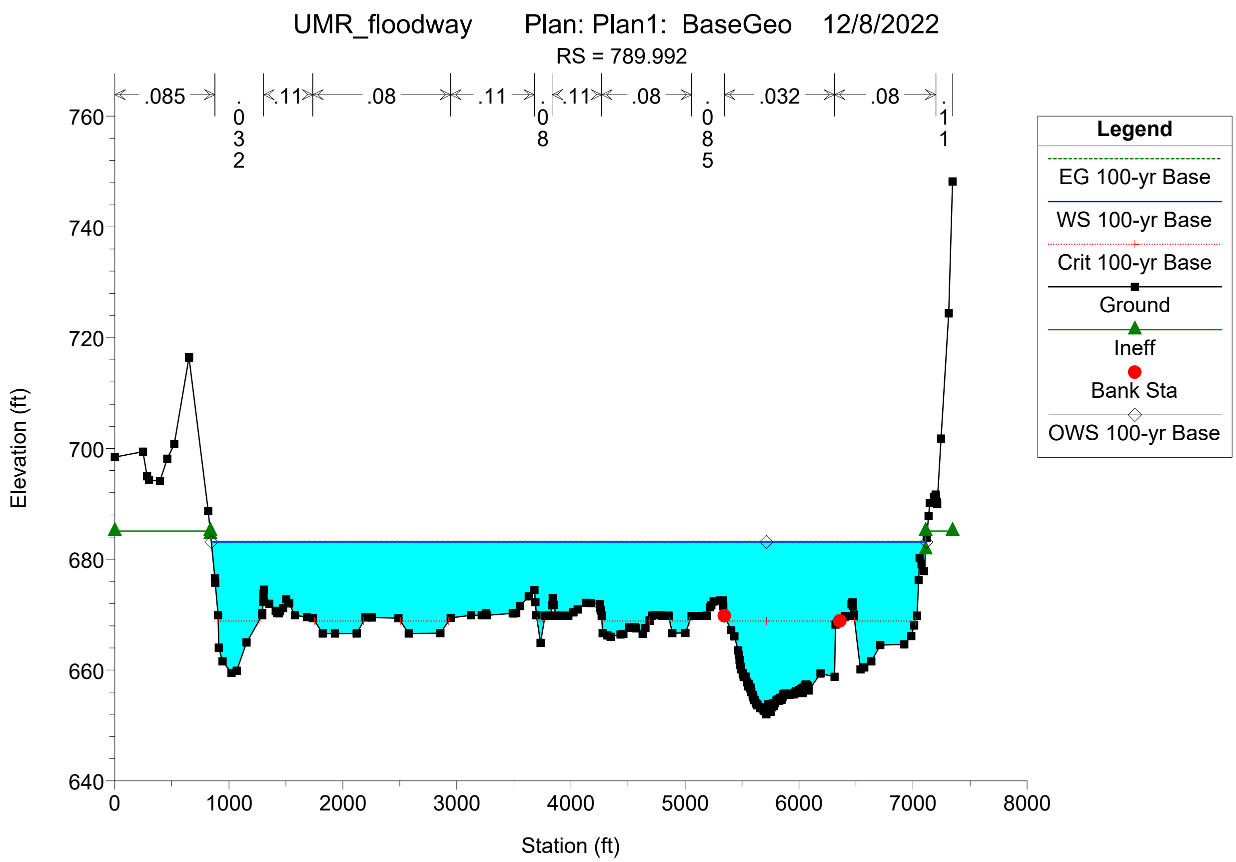


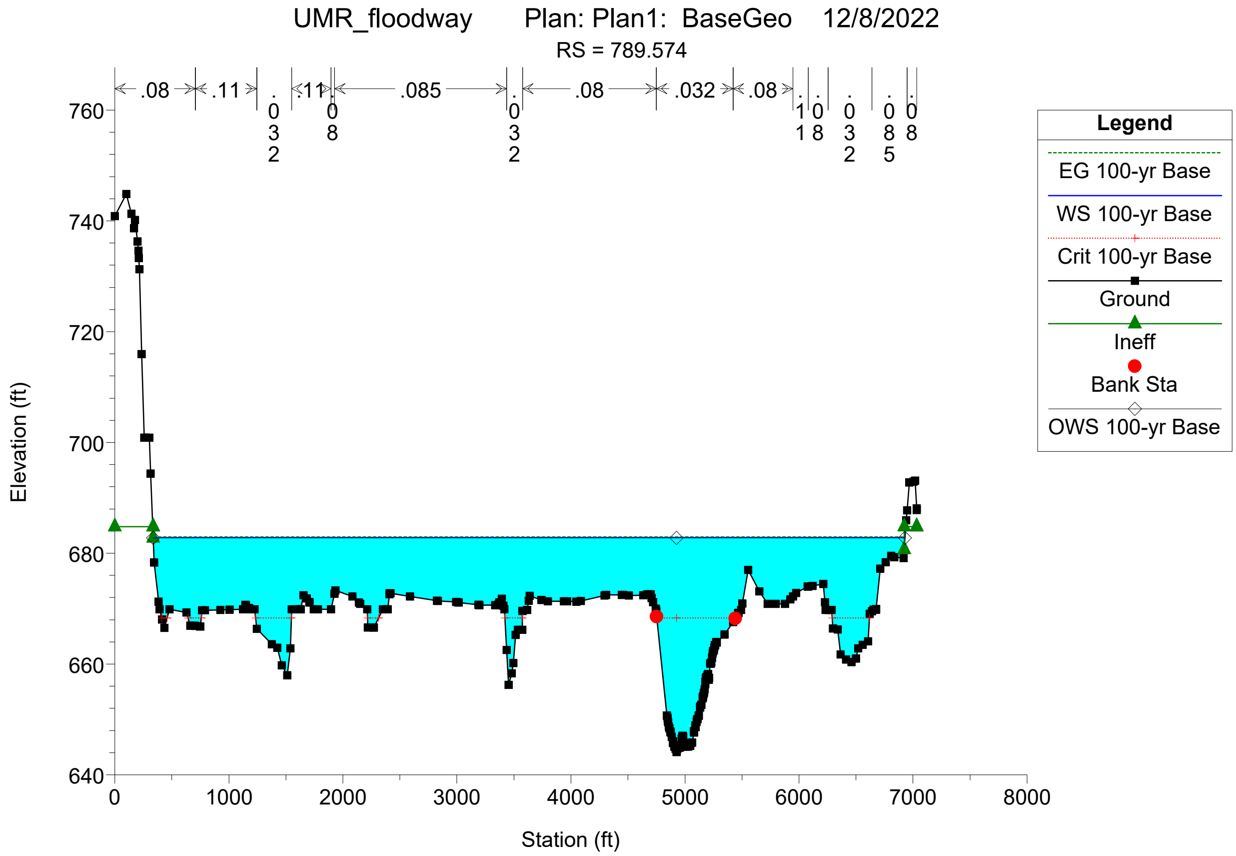
UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 790.563
.055
.11
.055
.11
.06
.11
.11
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

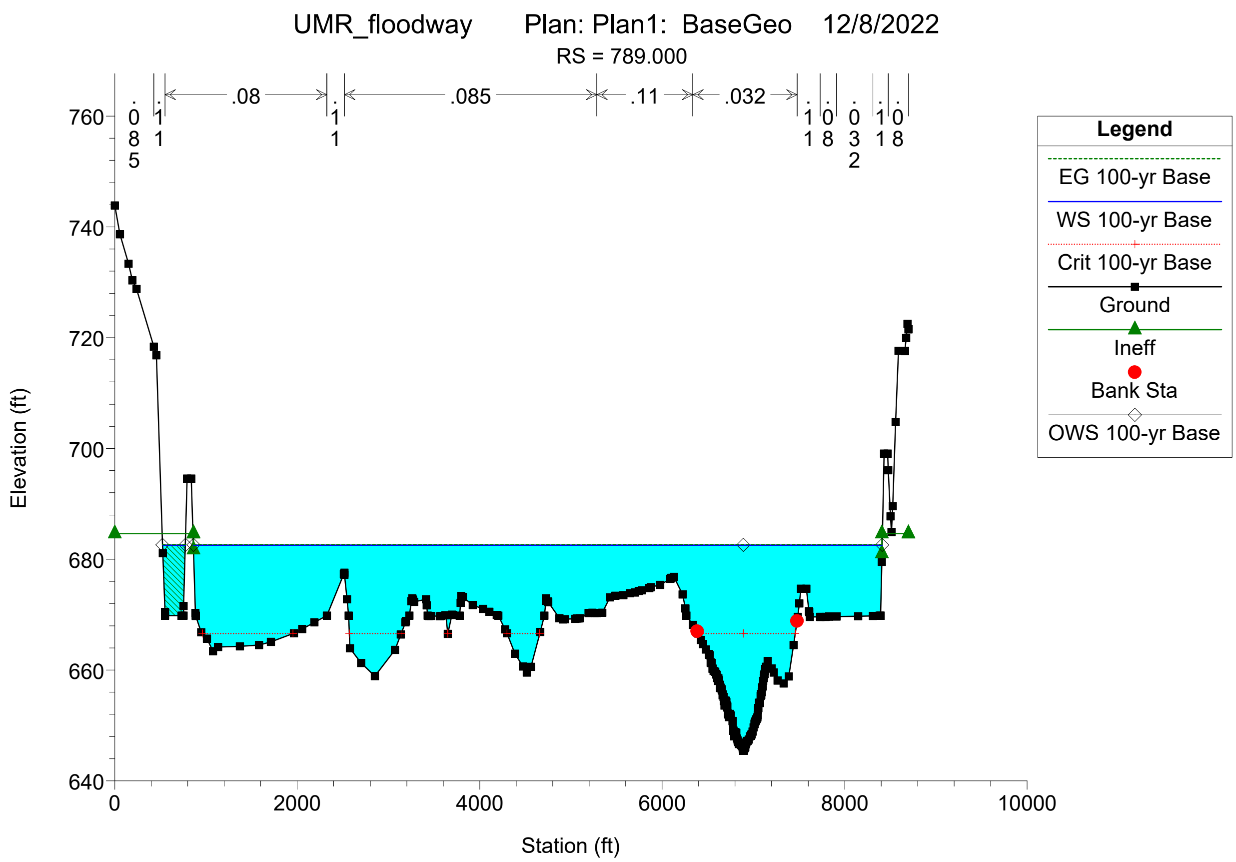


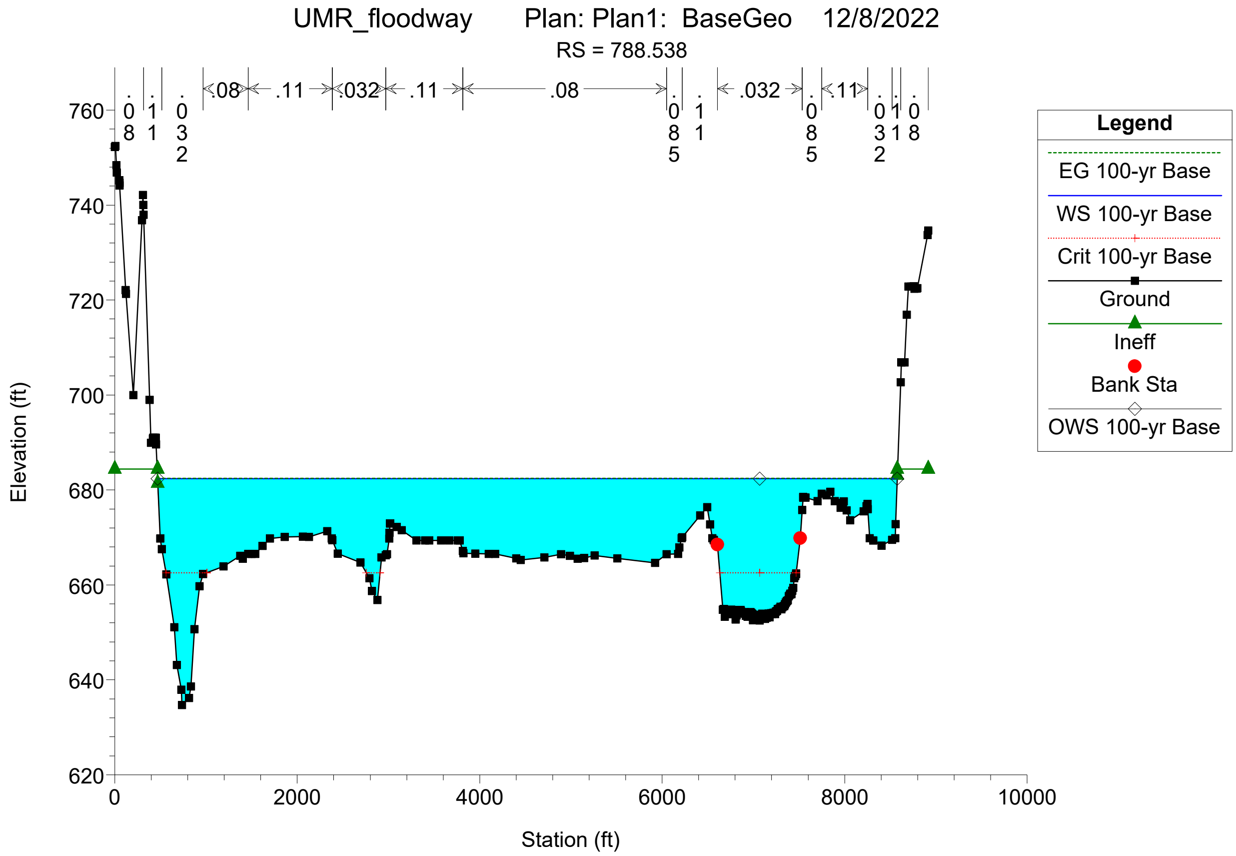
UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 790.442
.08
.11
.11
.08
.11
.032
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

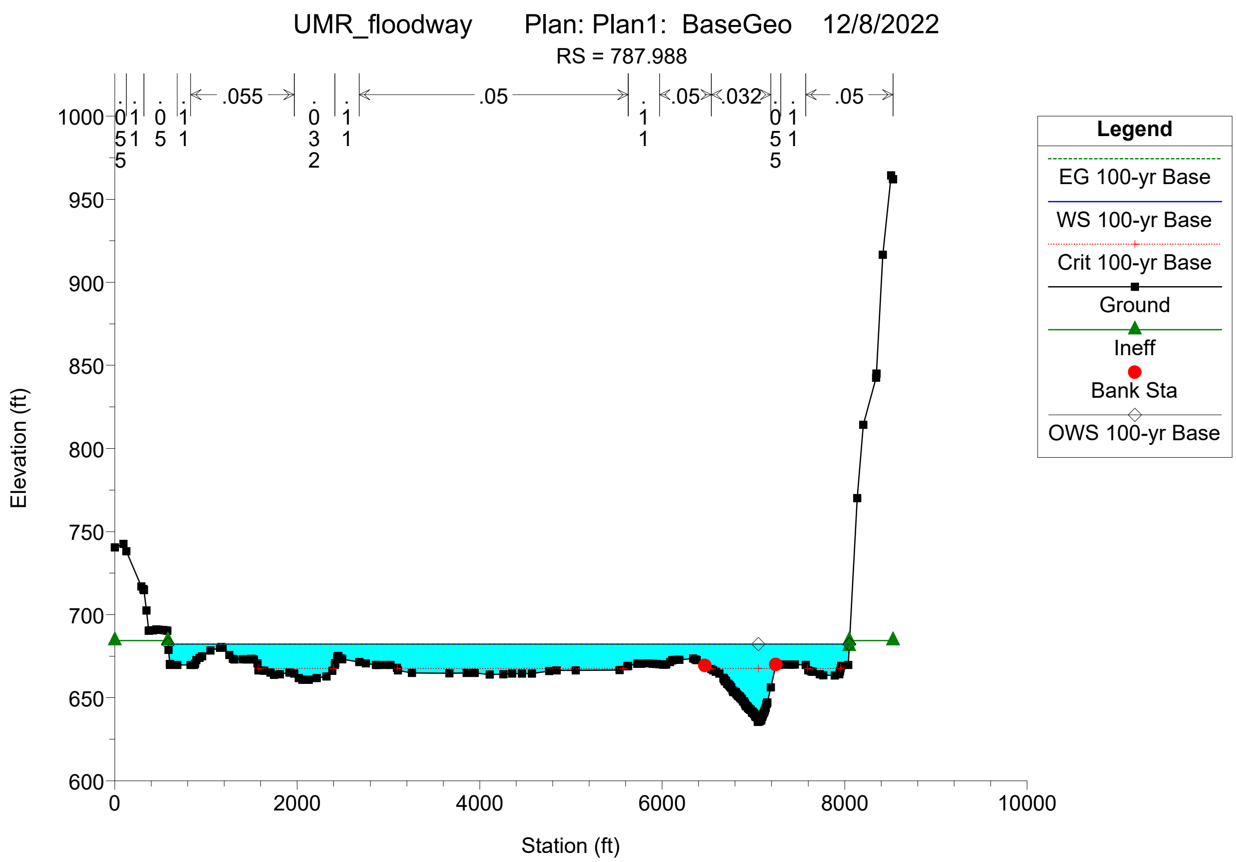

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 790.302
.085
.11
.08
.032
.08
.11
.08
.11
.08
.11
.085
.032
.085
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)
640
660
680
700
720
740
760
780
0
1000
2000
3000
4000
5000
6000
7000

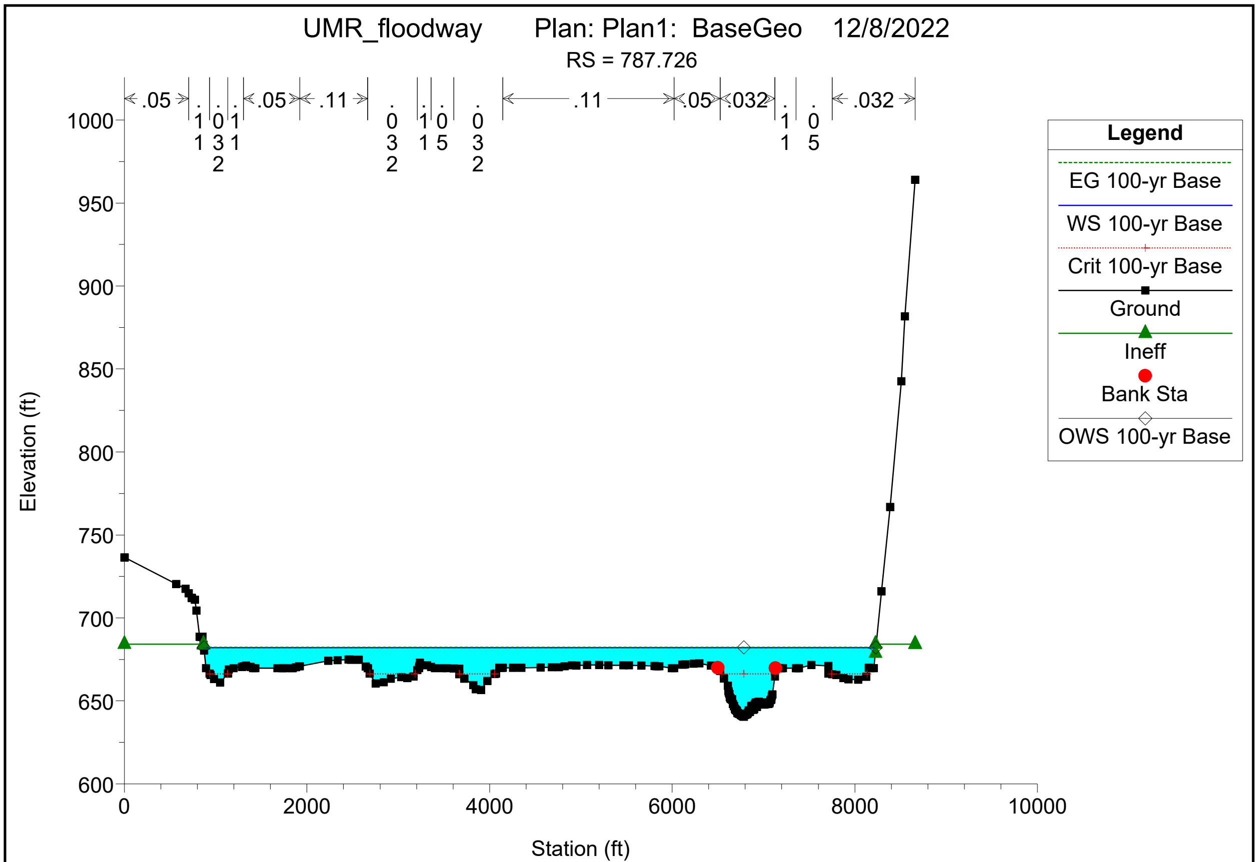

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 789.992
.085
.032
.11
.08
.11
.08
.11
.08
.085
.032
.08
.11
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)
640
660
680
700
720
740
760
0
1000
2000
3000
4000
5000
6000
7000
8000


UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 789.574
.08
.11
.032
.11
.08
.085
.032
.08
.032
.08
.11
.08
.032
.085
.08
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

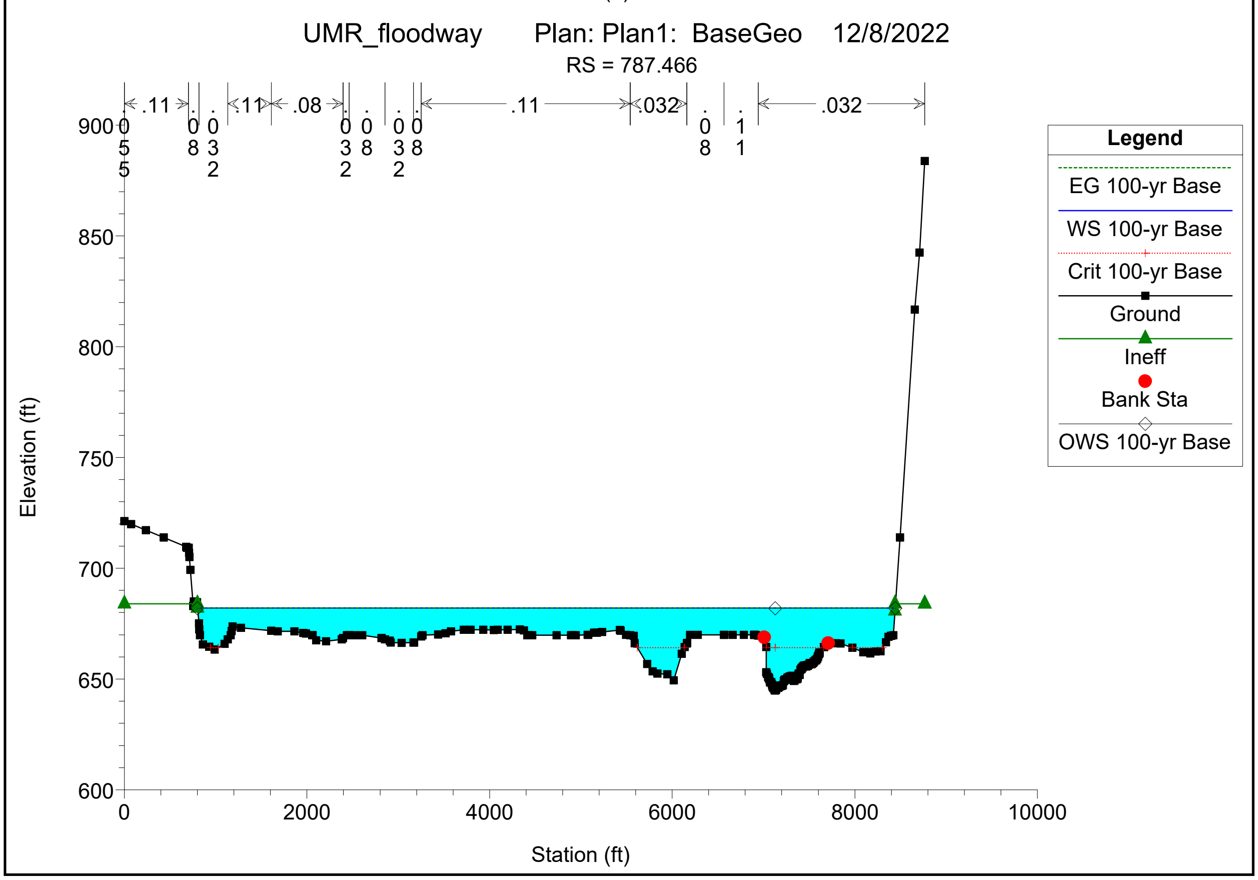

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 789.000
.085
.11
.08
.11
.085
.11
.032
.11
.08
.032
.11
.08
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base


UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 788.538
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

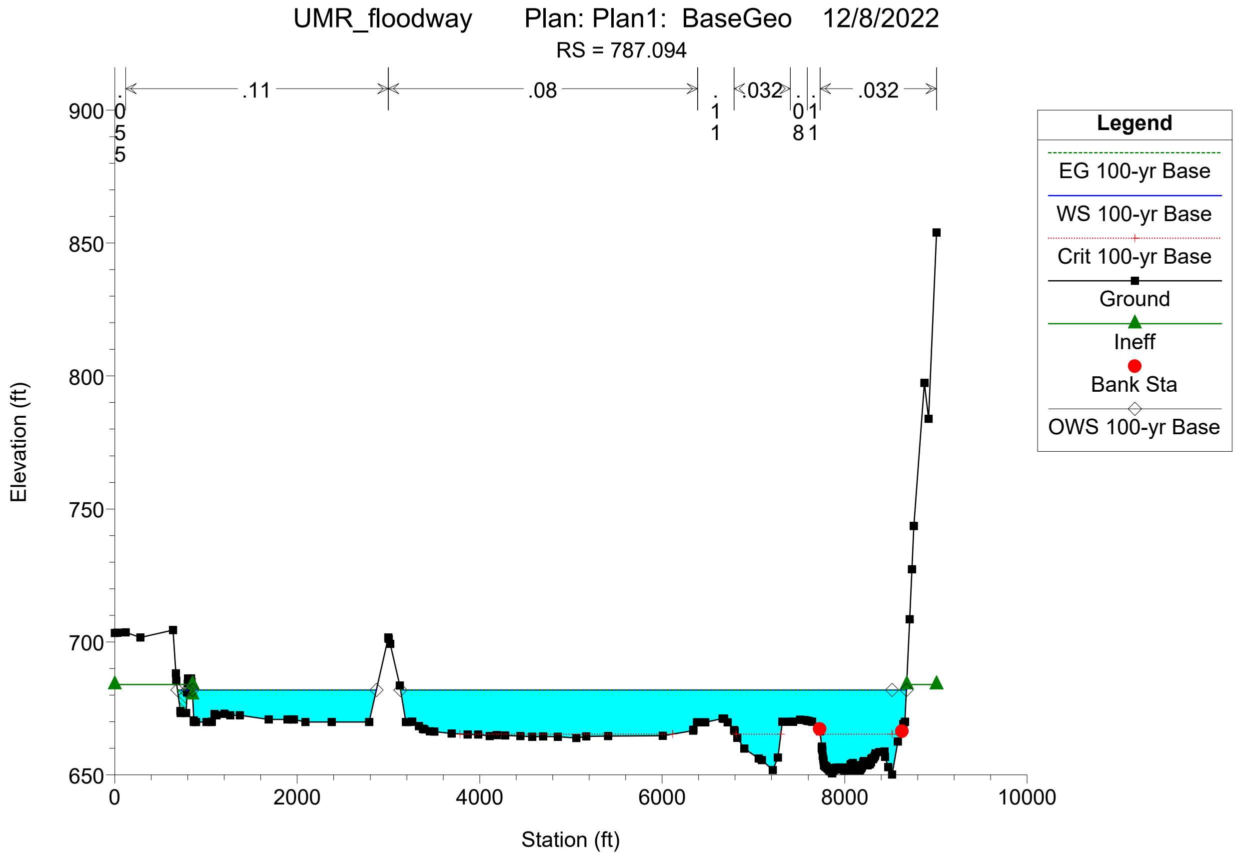

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 787.988
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)



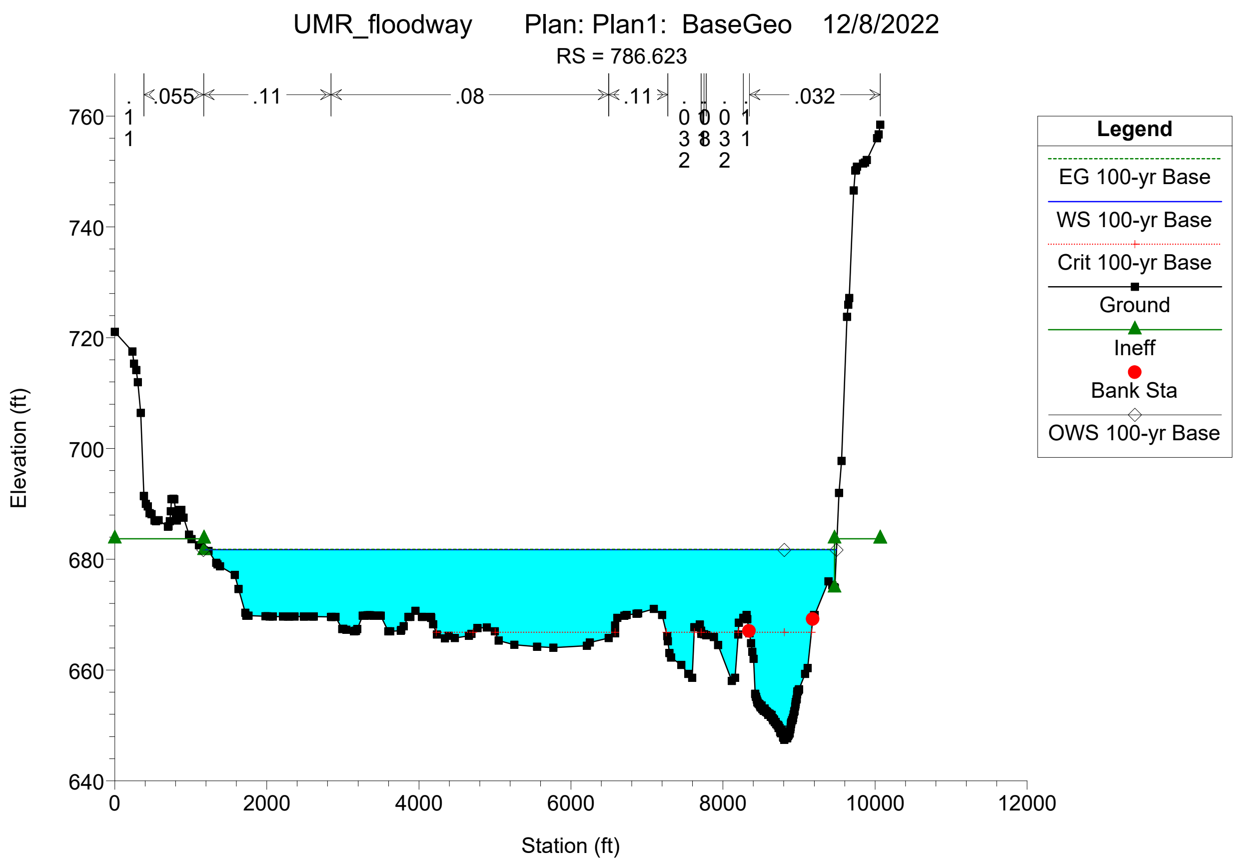
UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 787.726
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base



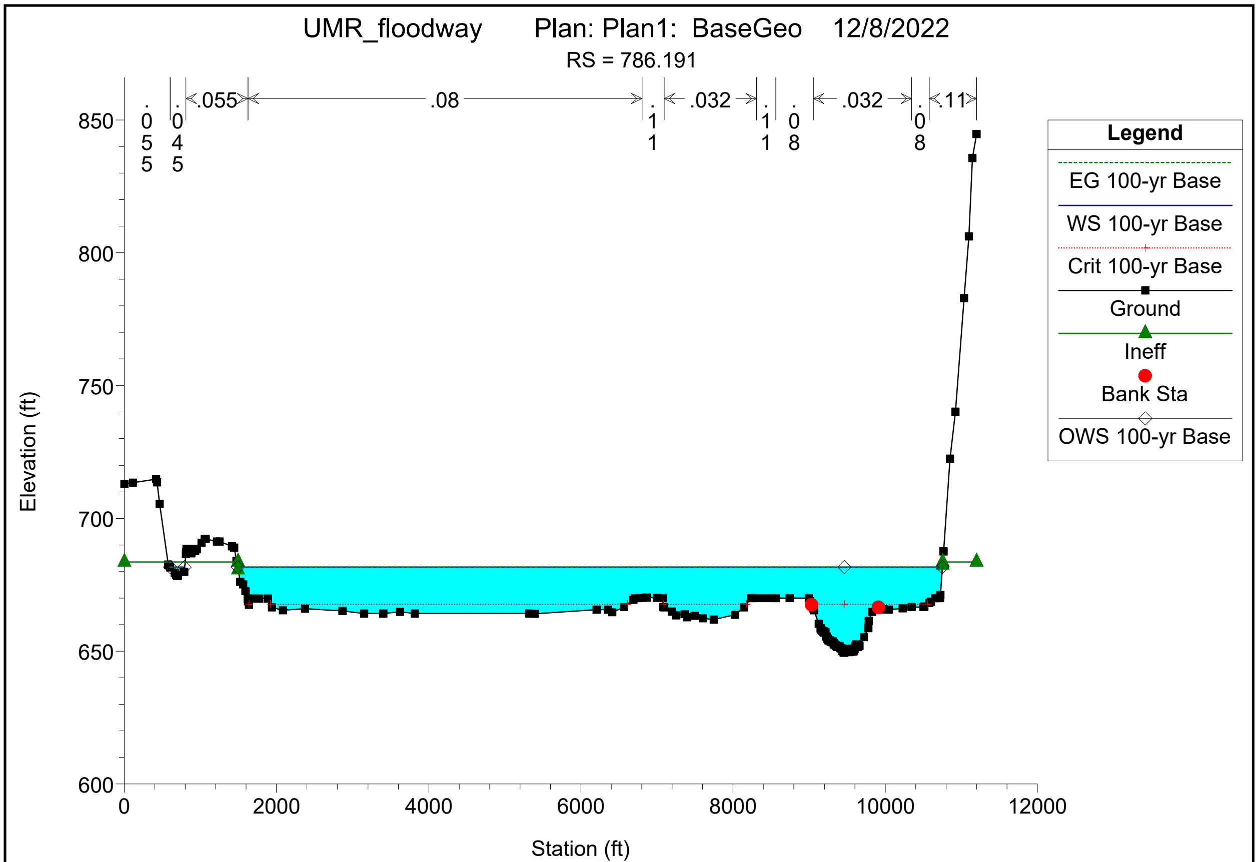
UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 787.466
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

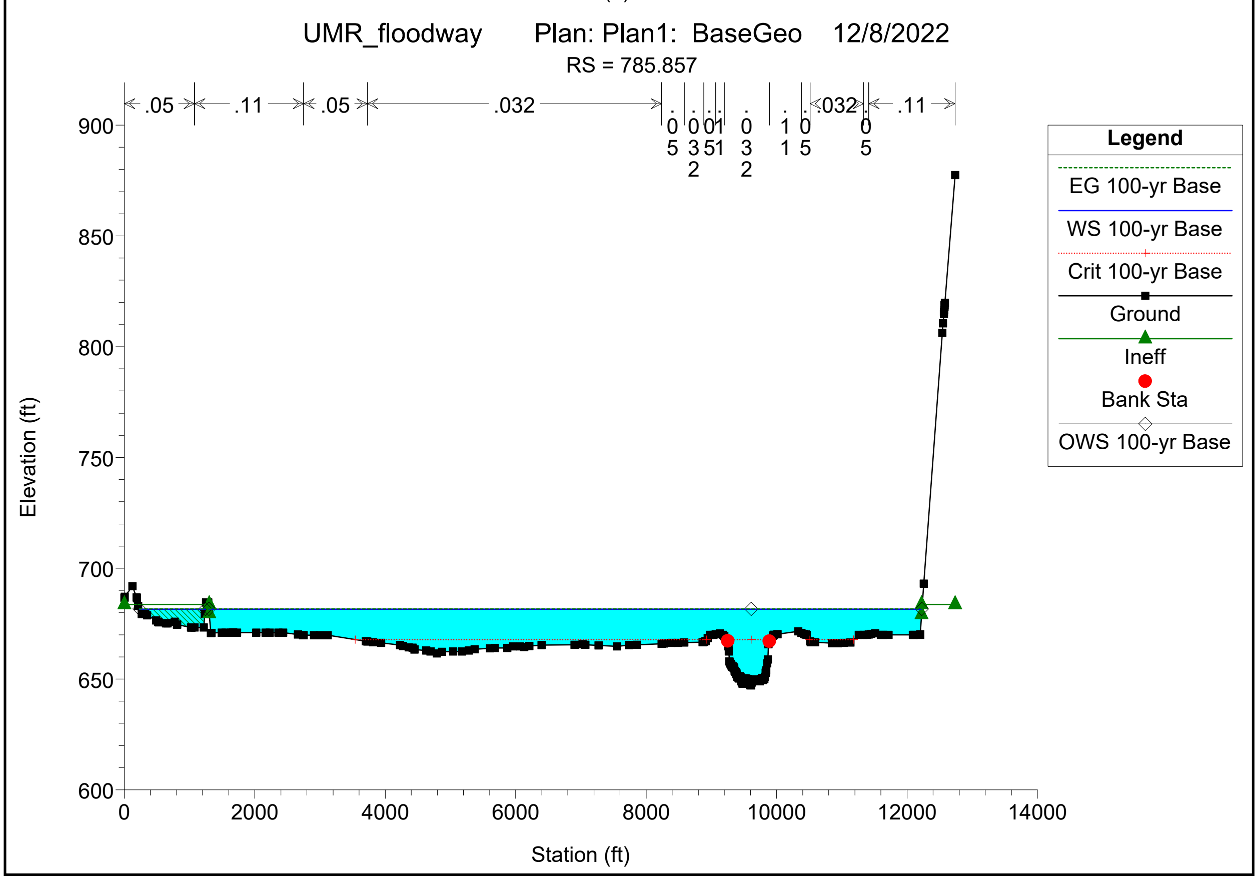


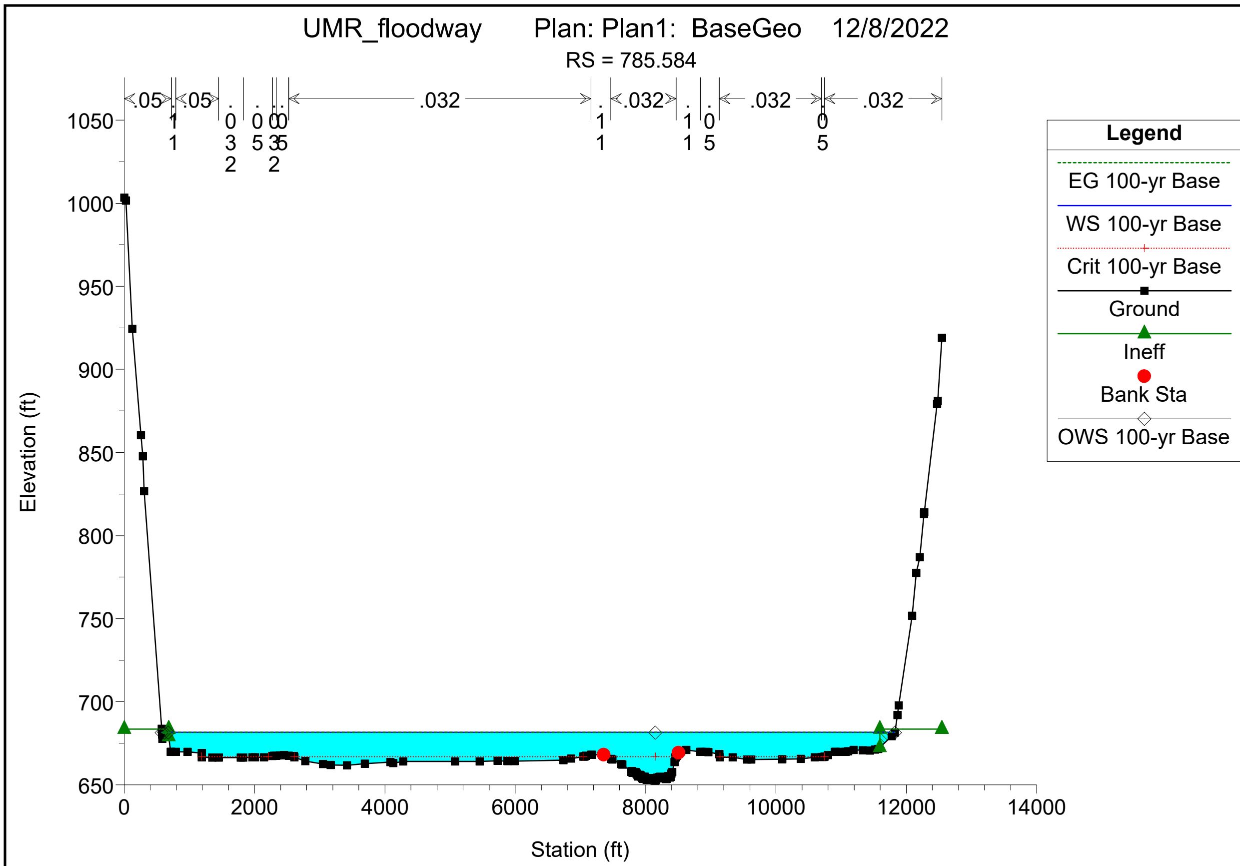
UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 787.094
.11
.08
.032
.032
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)



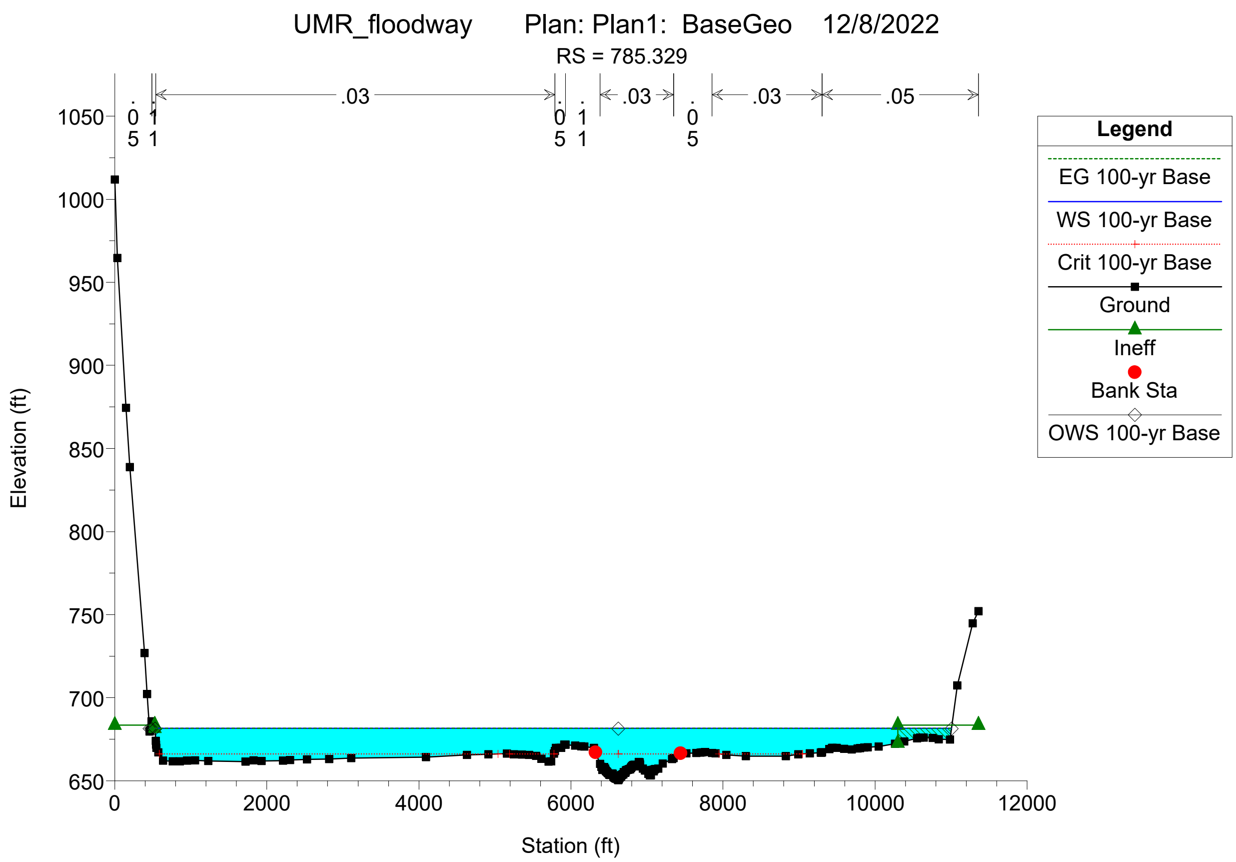
UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 786.623
.055
.11
.08
.11
.032
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)


UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 786.191
.055
.08
.032
.032
.11
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

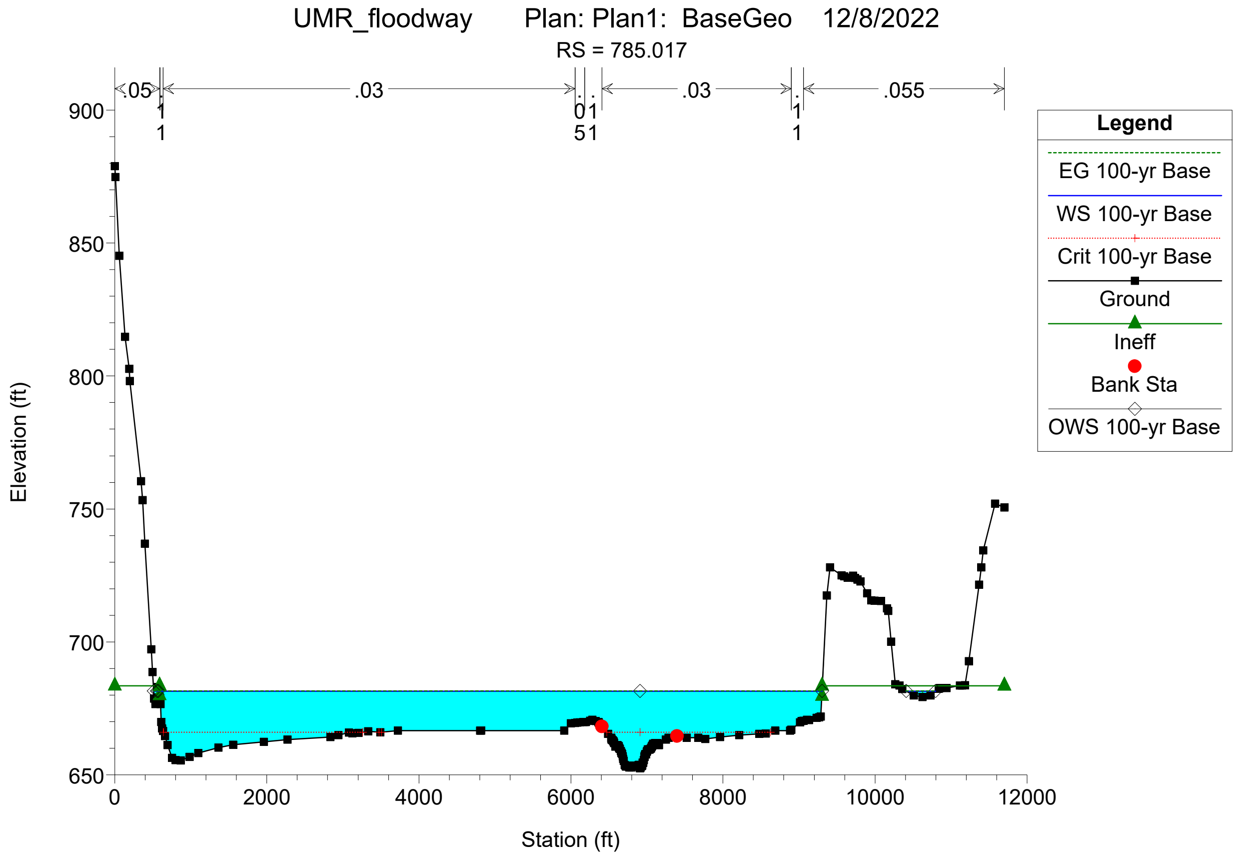

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 785.857
.05
.11
.05
.032
.032
.11
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

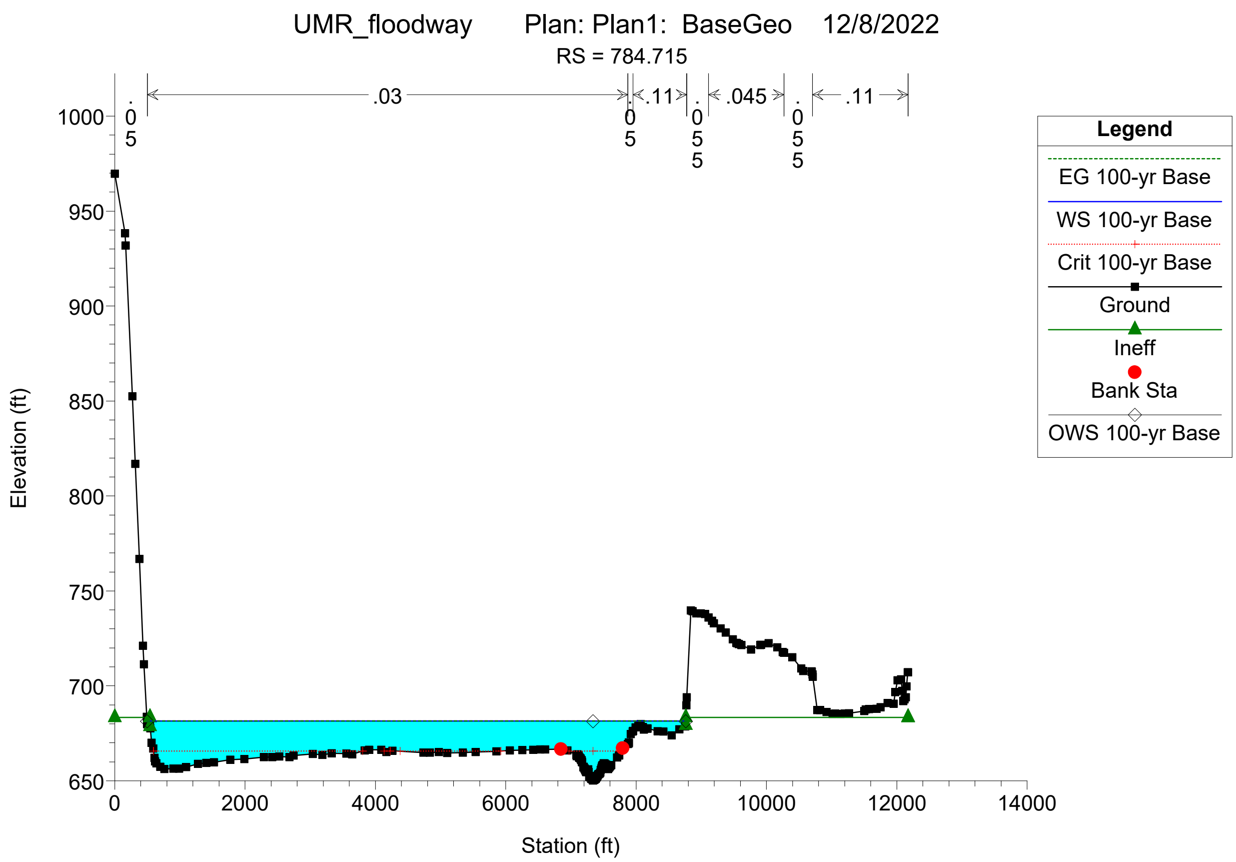


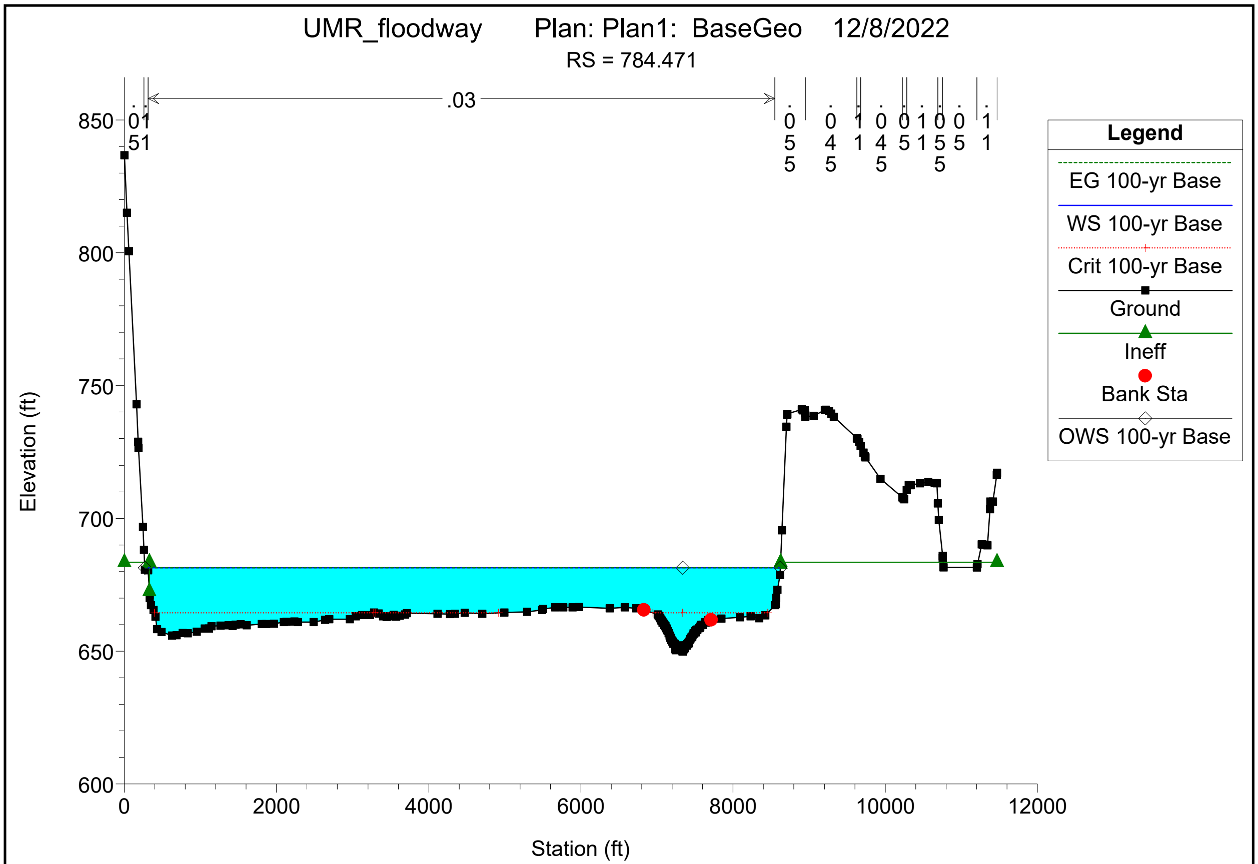
UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 785.584
.05
.05
.032
.032
.032
.032
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

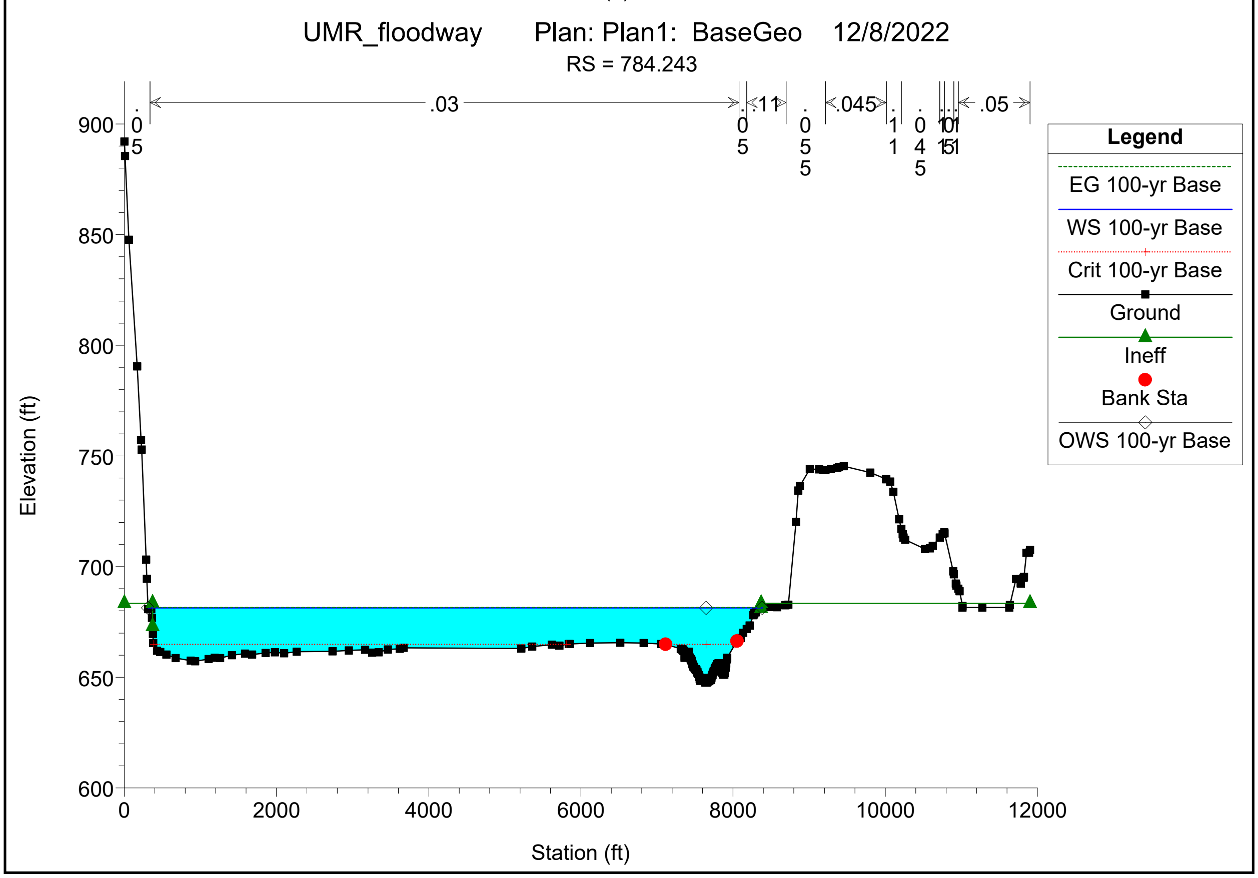


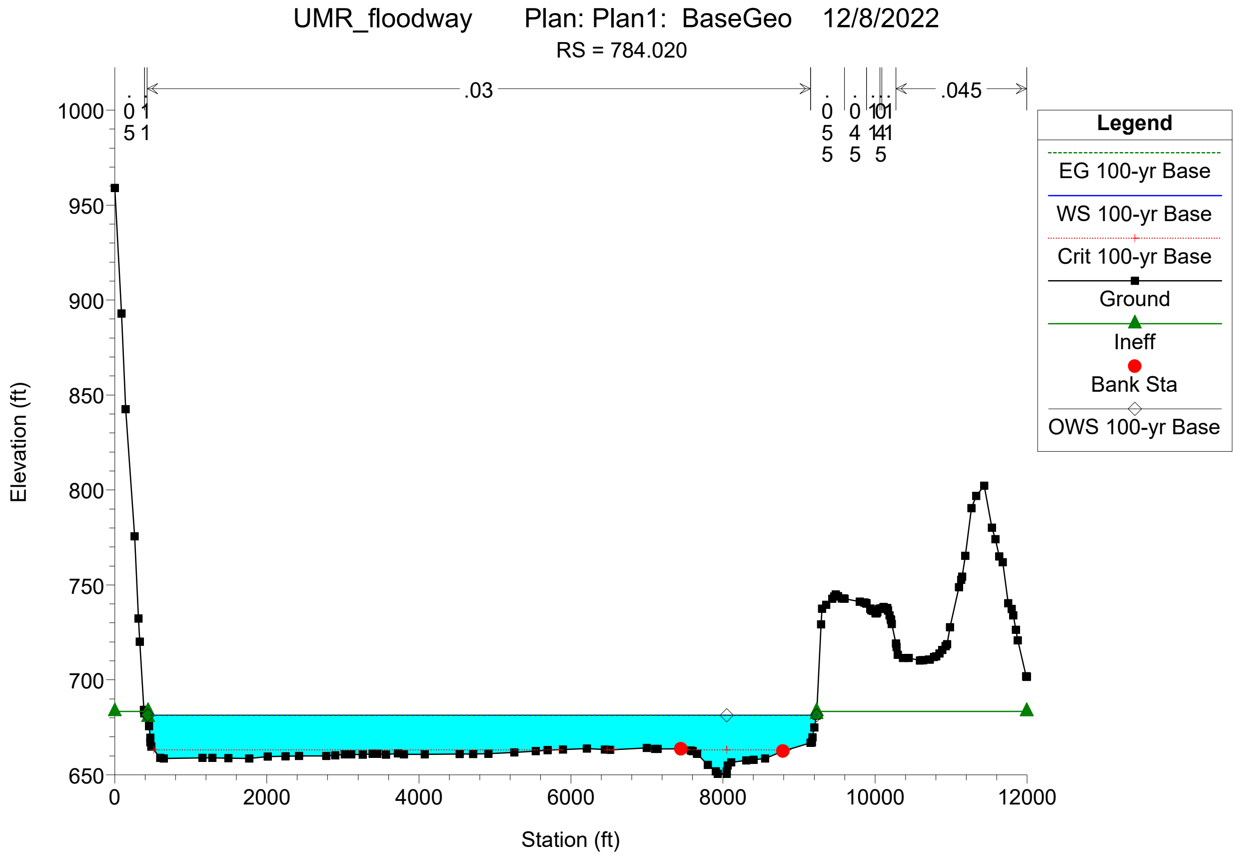
UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 785.329
.03
.03
.03
.05
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base


UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 785.017
.05
.03
.03
.055
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

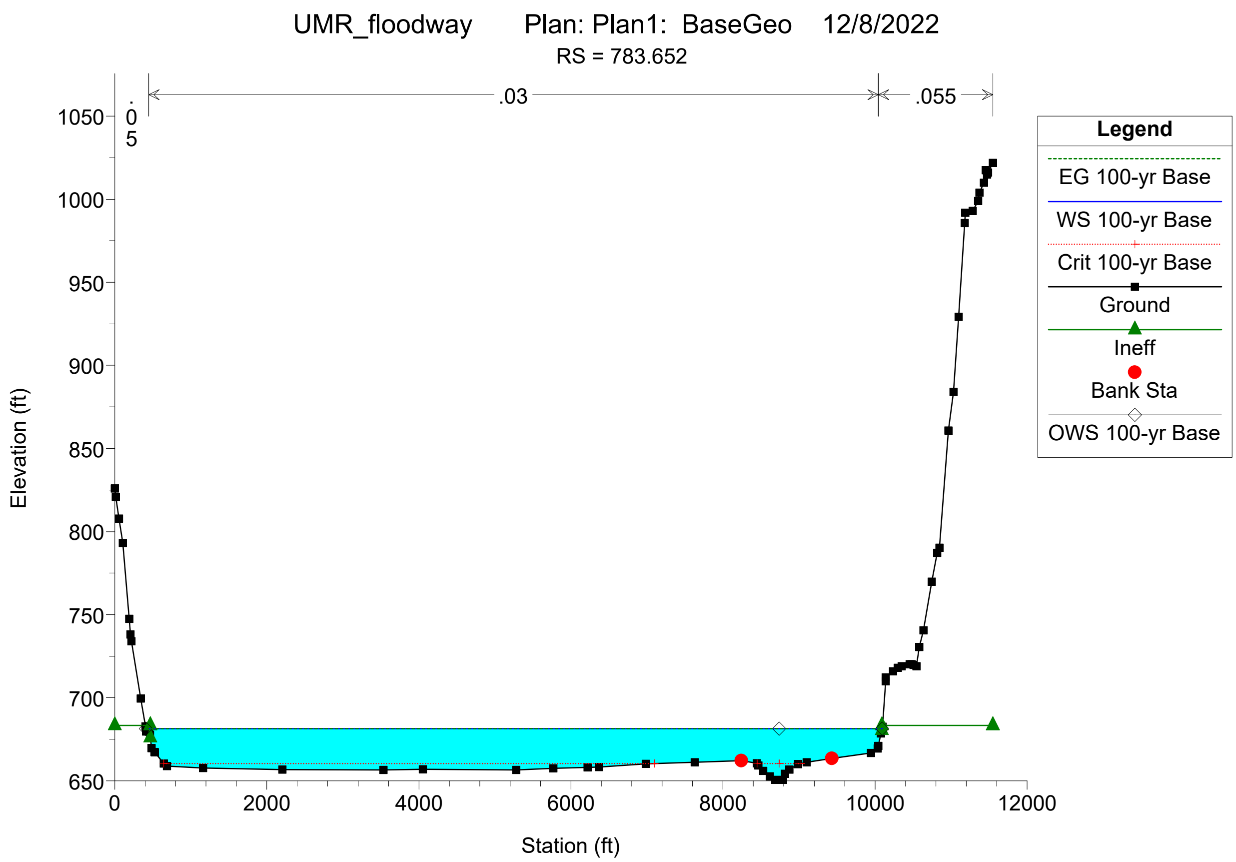

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 784.715
.03
.11
.045
.11
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base


UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 784.471
.03
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

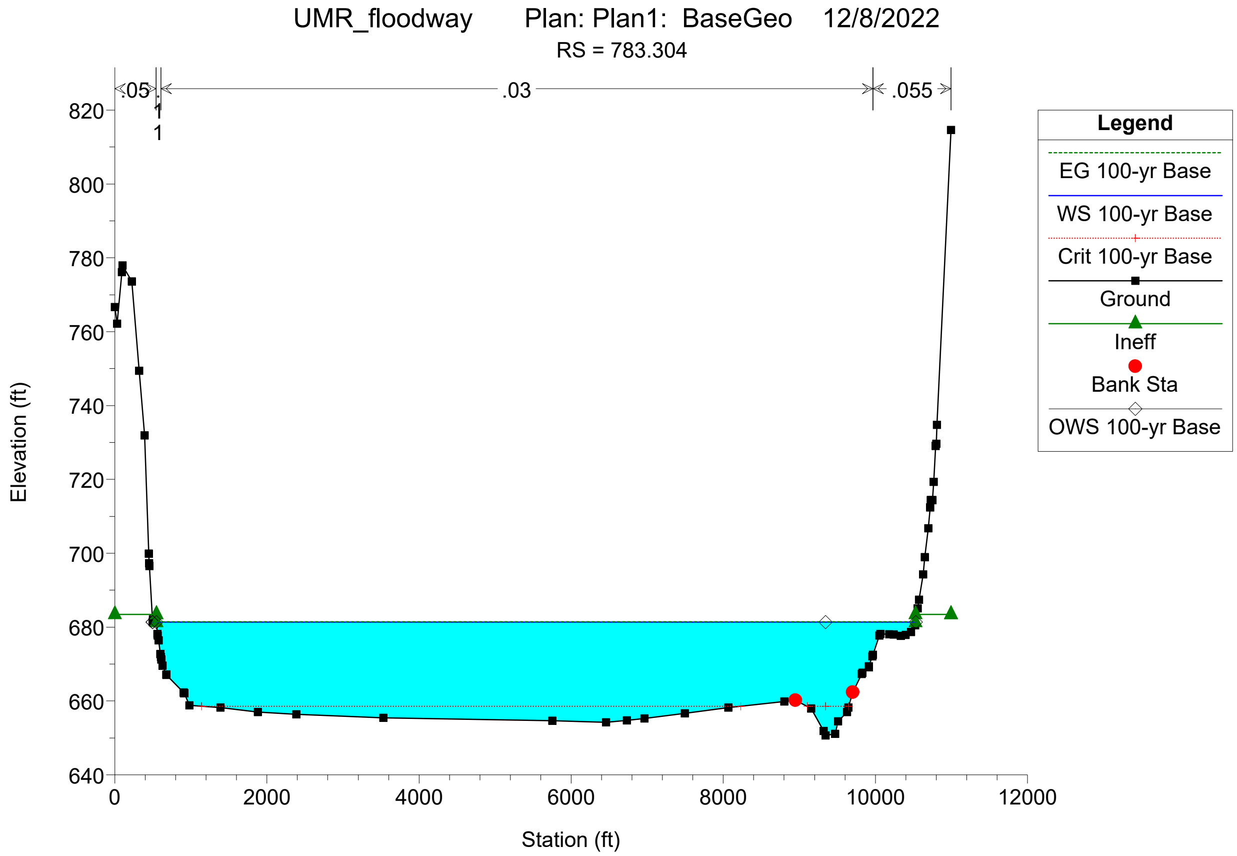

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 784.243
.03
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

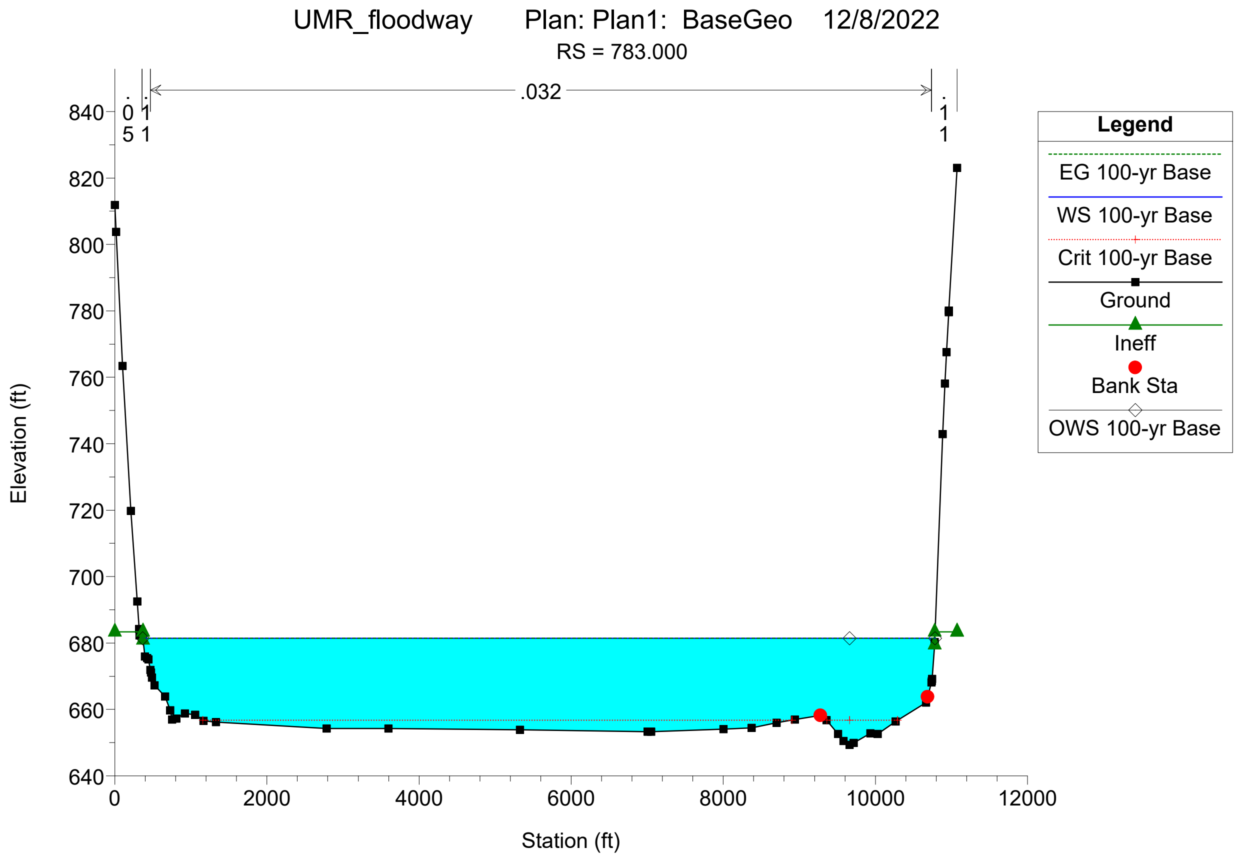


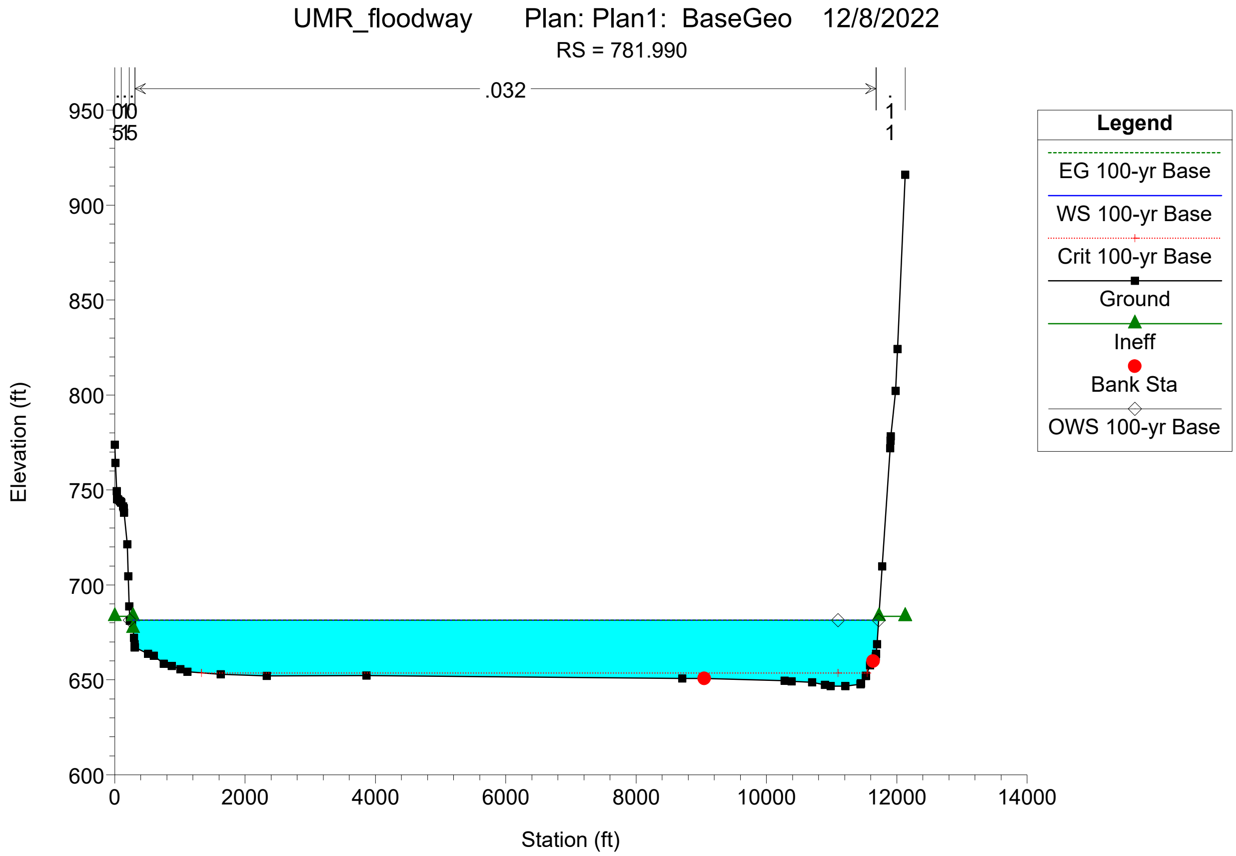
UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 784.020
.03
.045
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

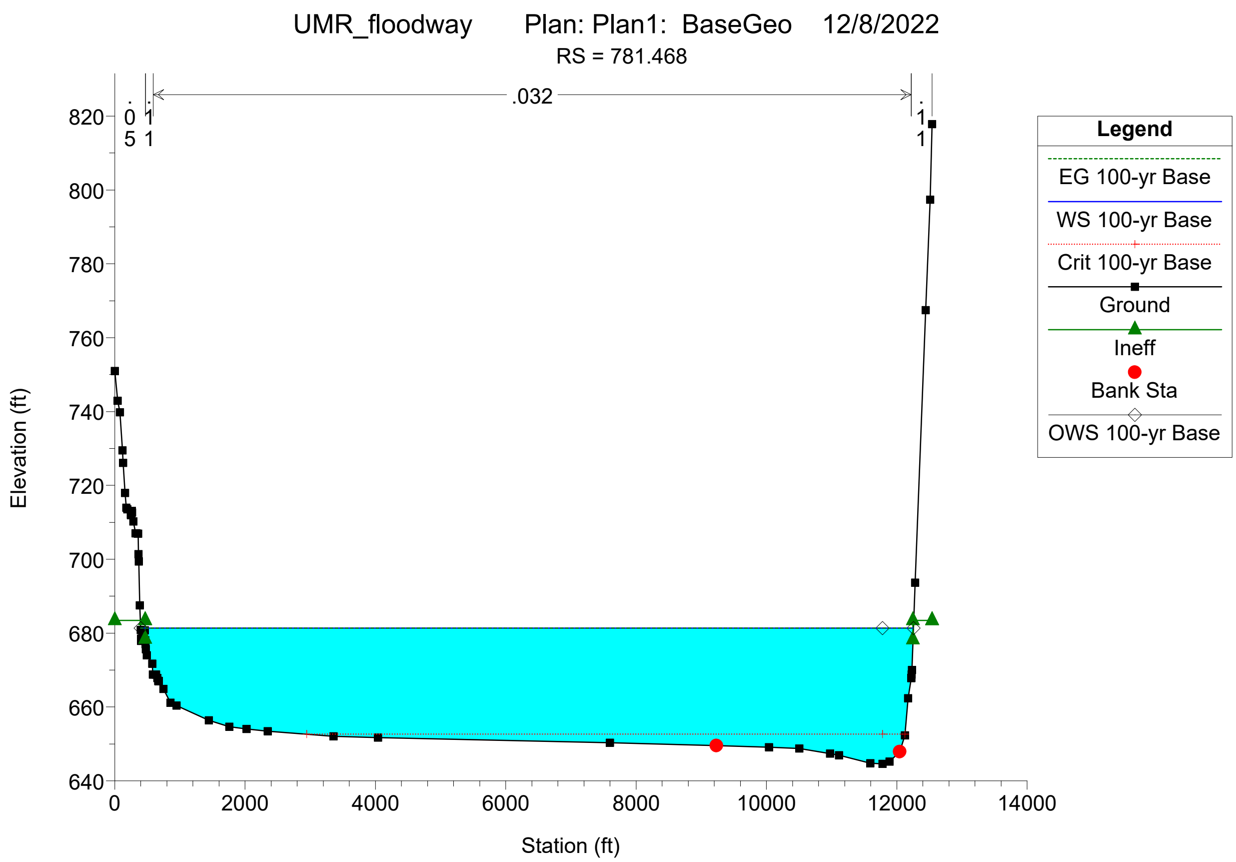


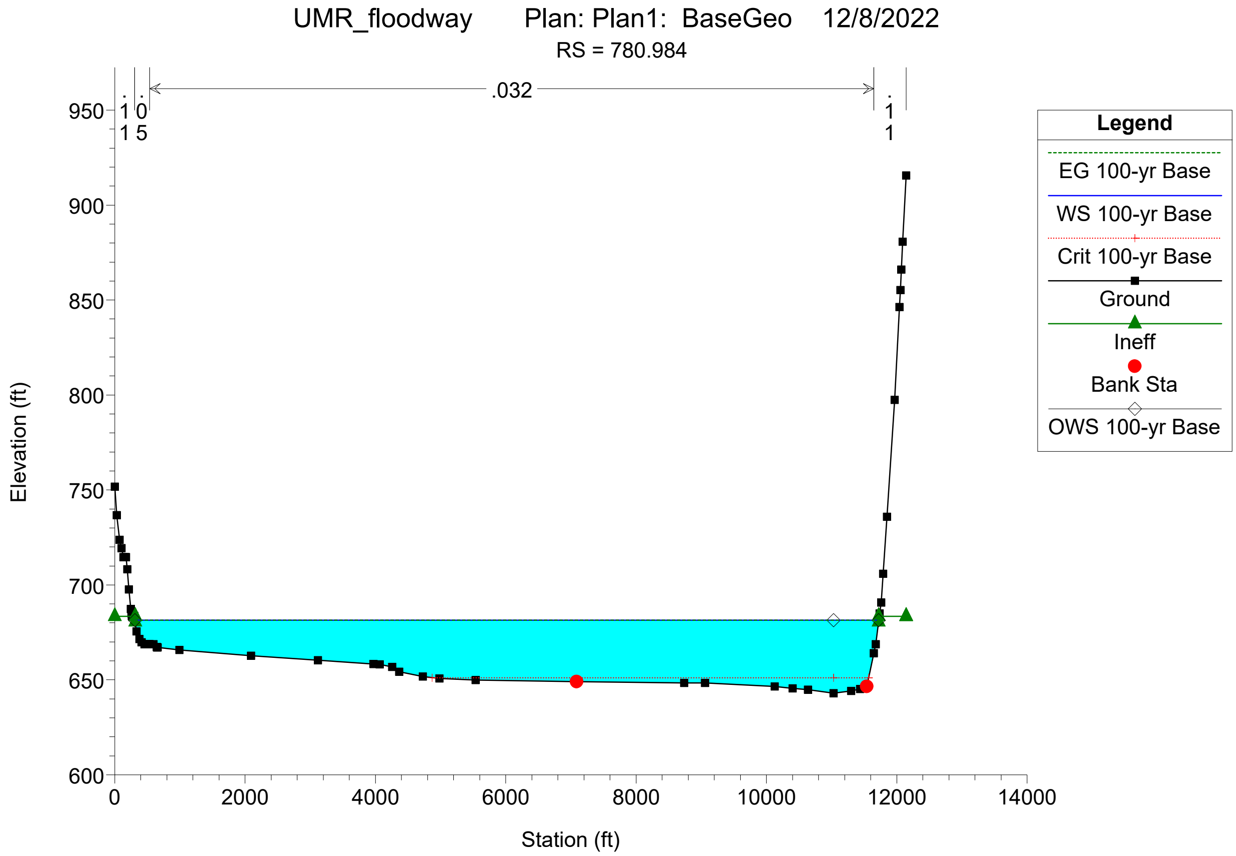
UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 783.652
.03
.055
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)


UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 783.304
.05
.03
.055
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)
820
800
780
760
740
720
700
680
660
640
0
2000
4000
6000
8000
10000
12000

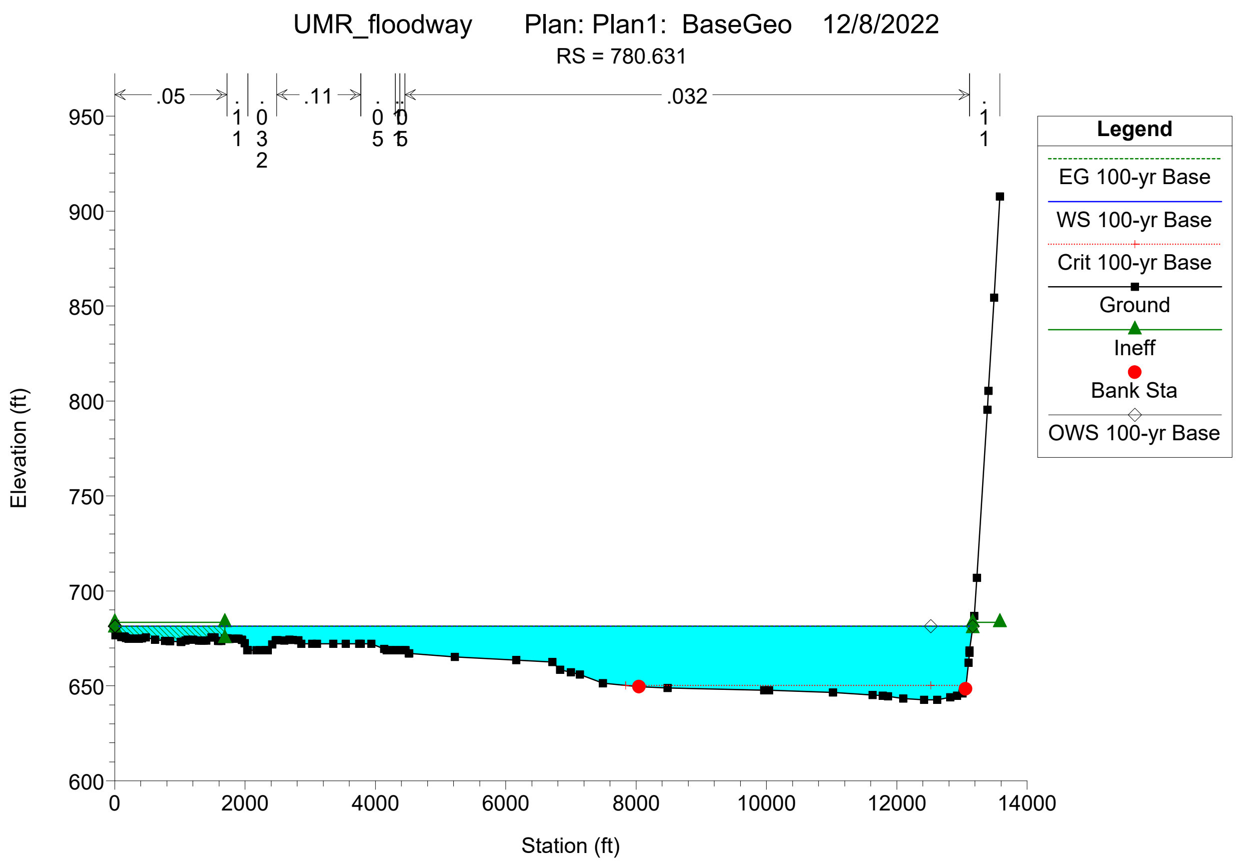

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 783.000
.032
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)
840
820
800
780
760
740
720
700
680
660
640
0
2000
4000
6000
8000
10000
12000


UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 781.990
.032
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

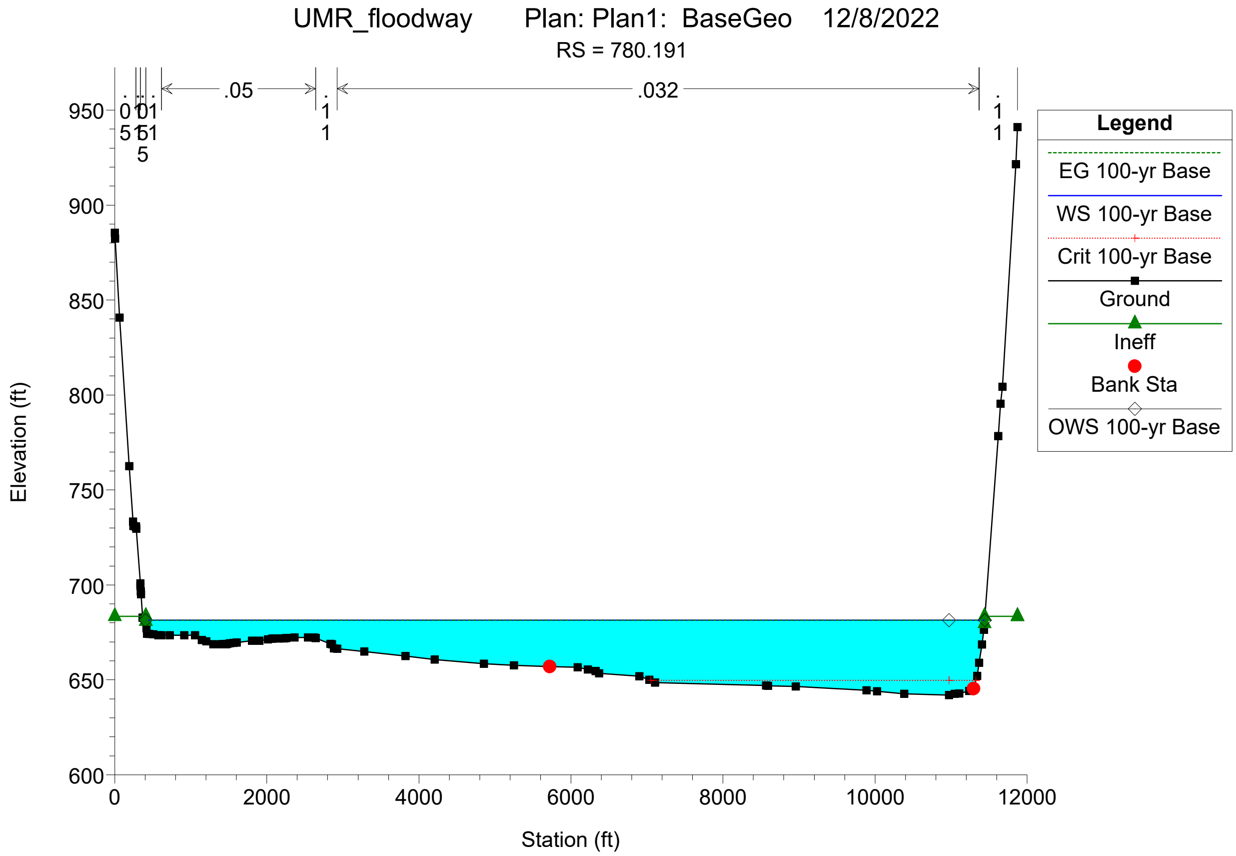

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 781.468
.032
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

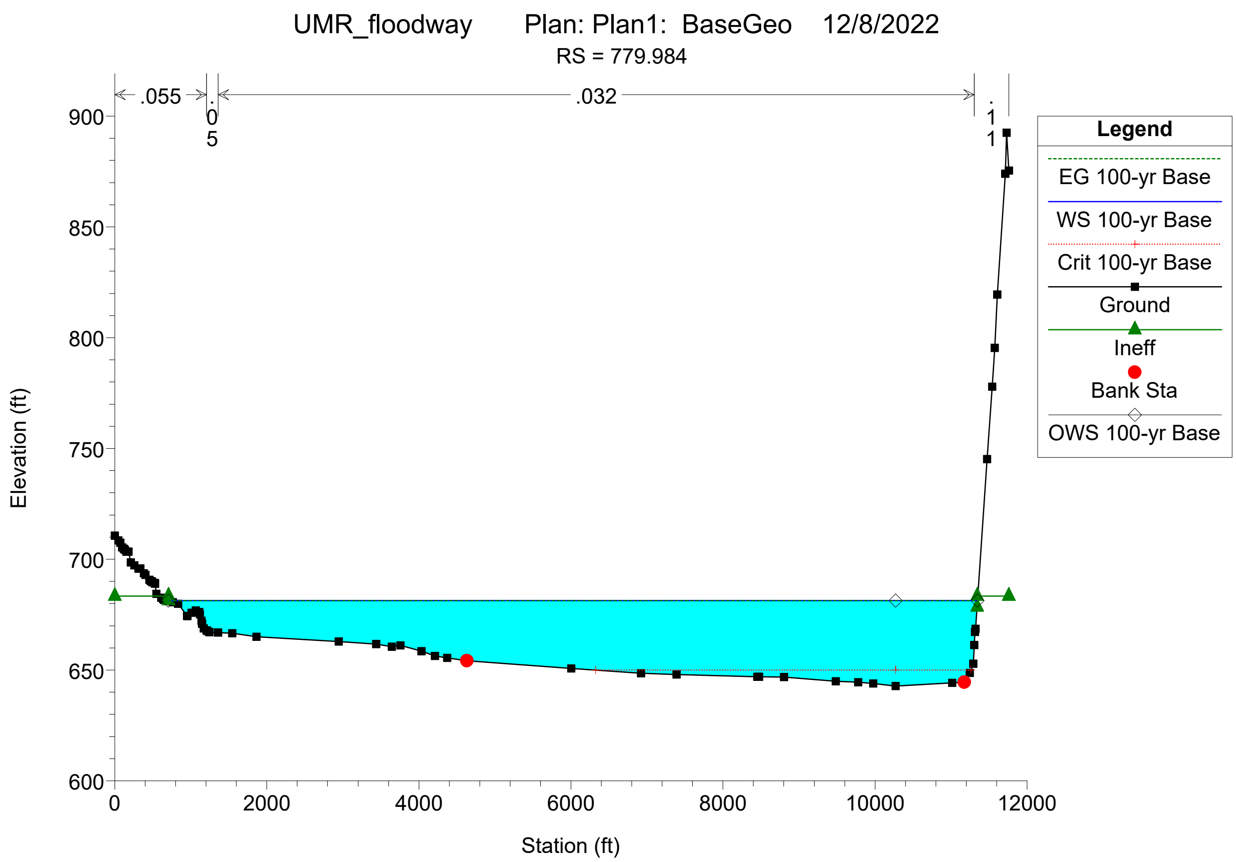


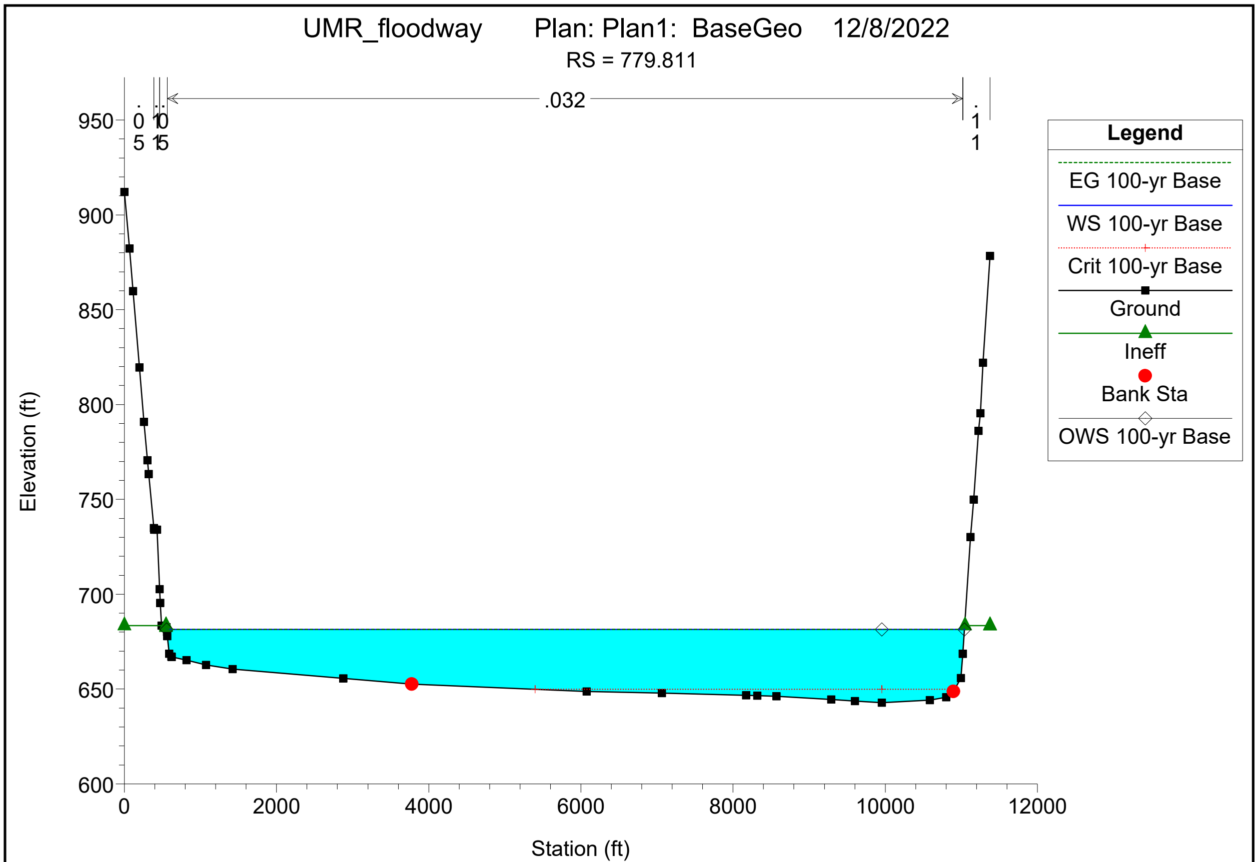
UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 780.984
.032
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

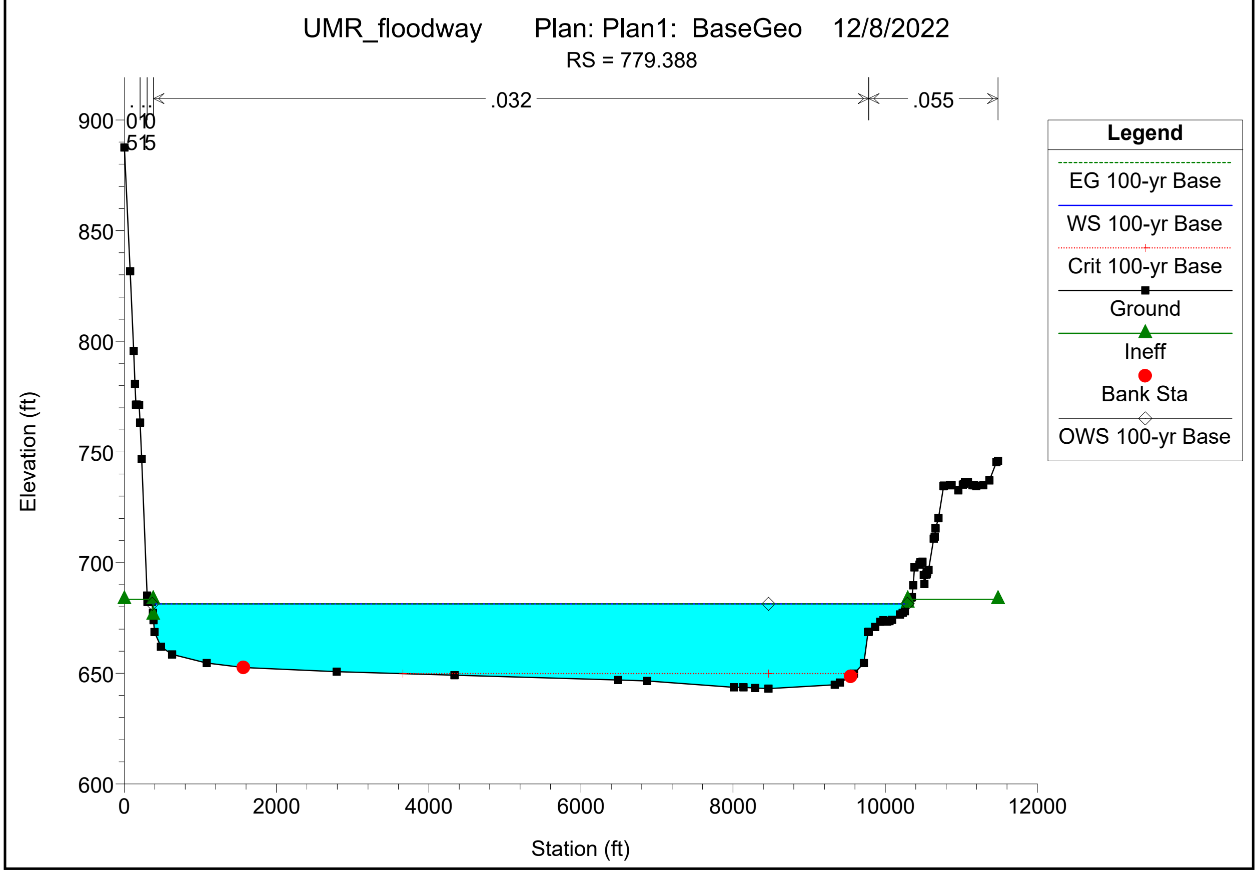


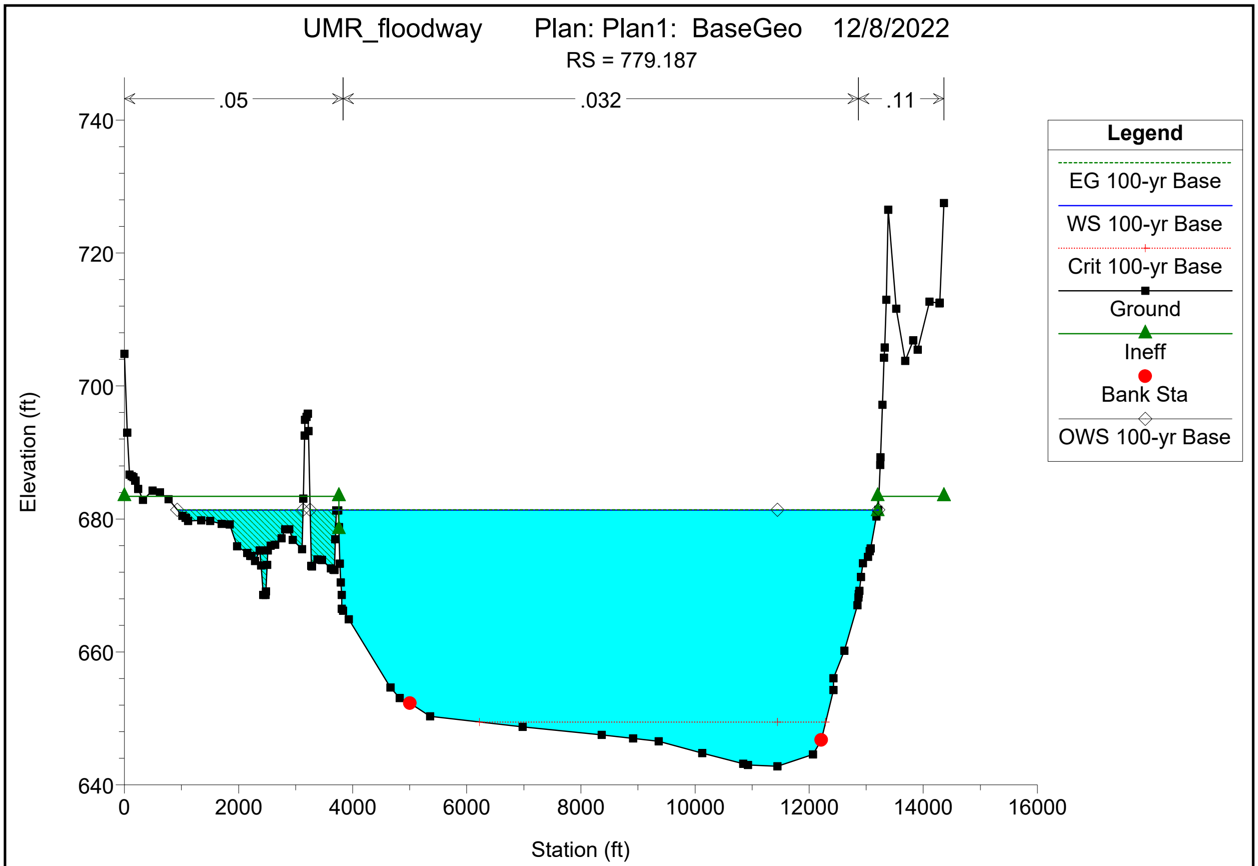
UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 780.631
.05
.11
.032
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

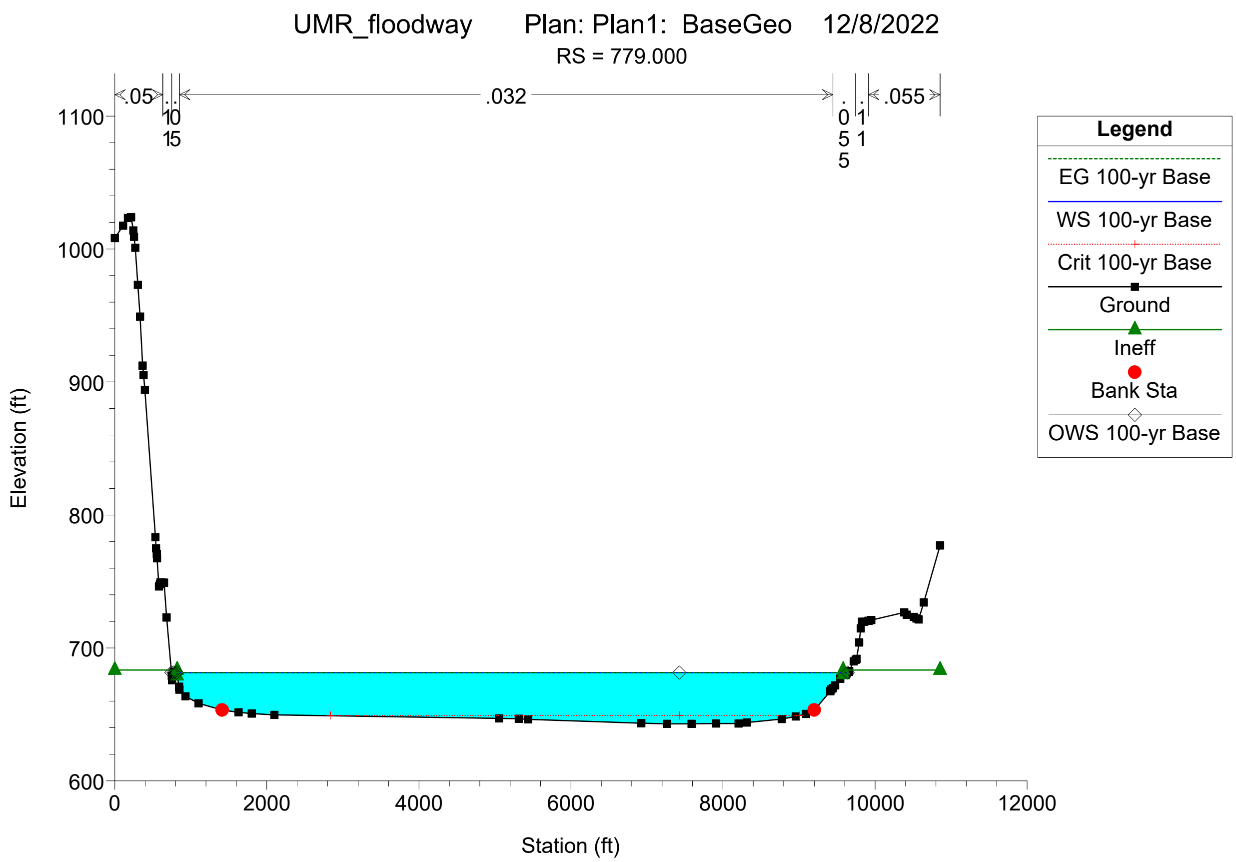

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 780.191
.05
.032
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

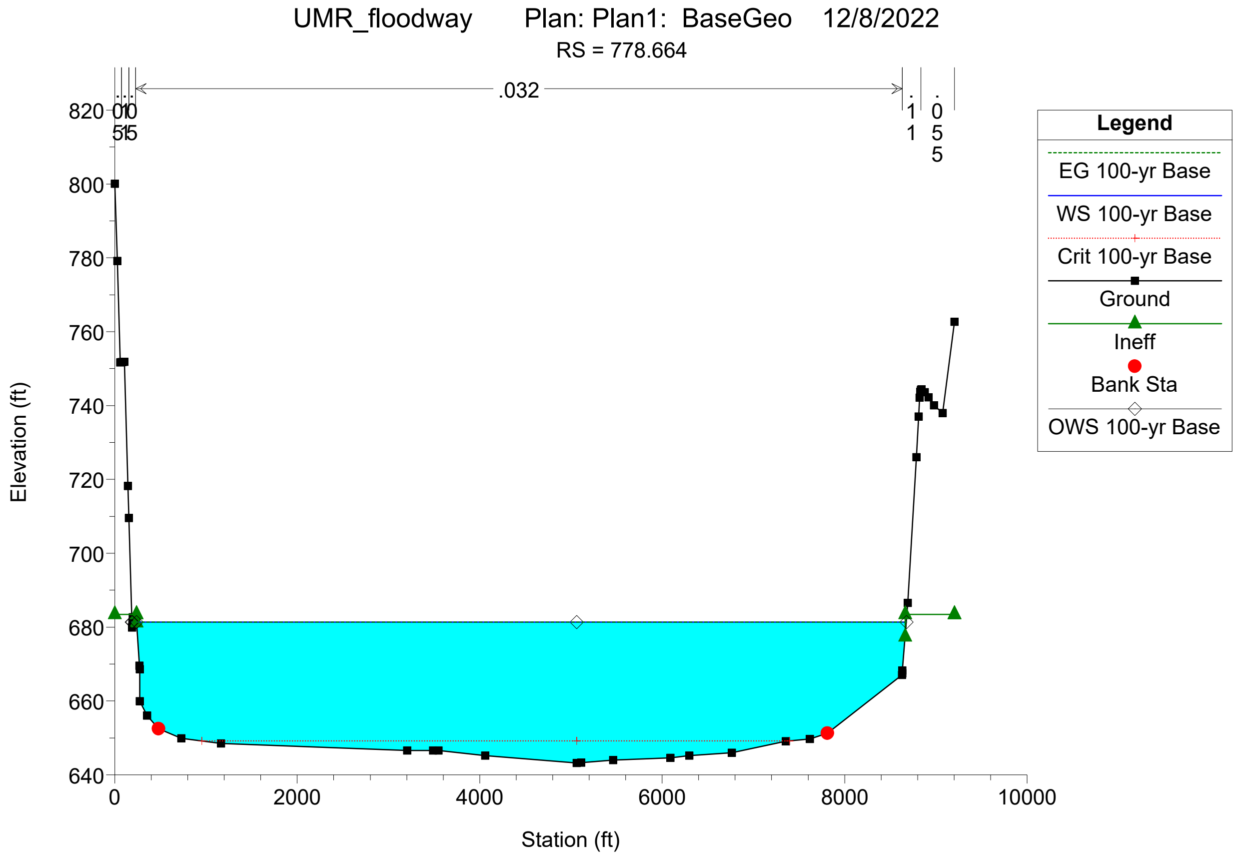

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 779.984
.055
.032
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

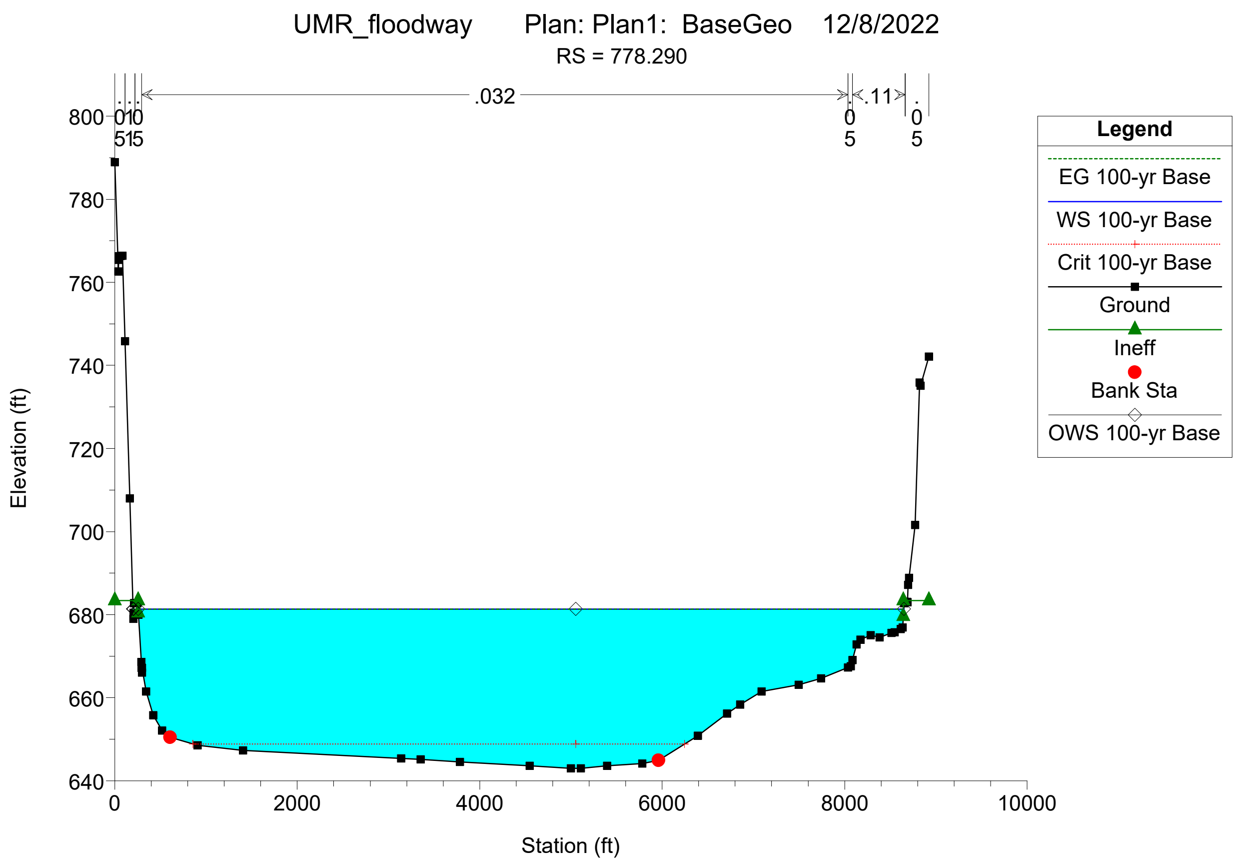

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 779.811
.032
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

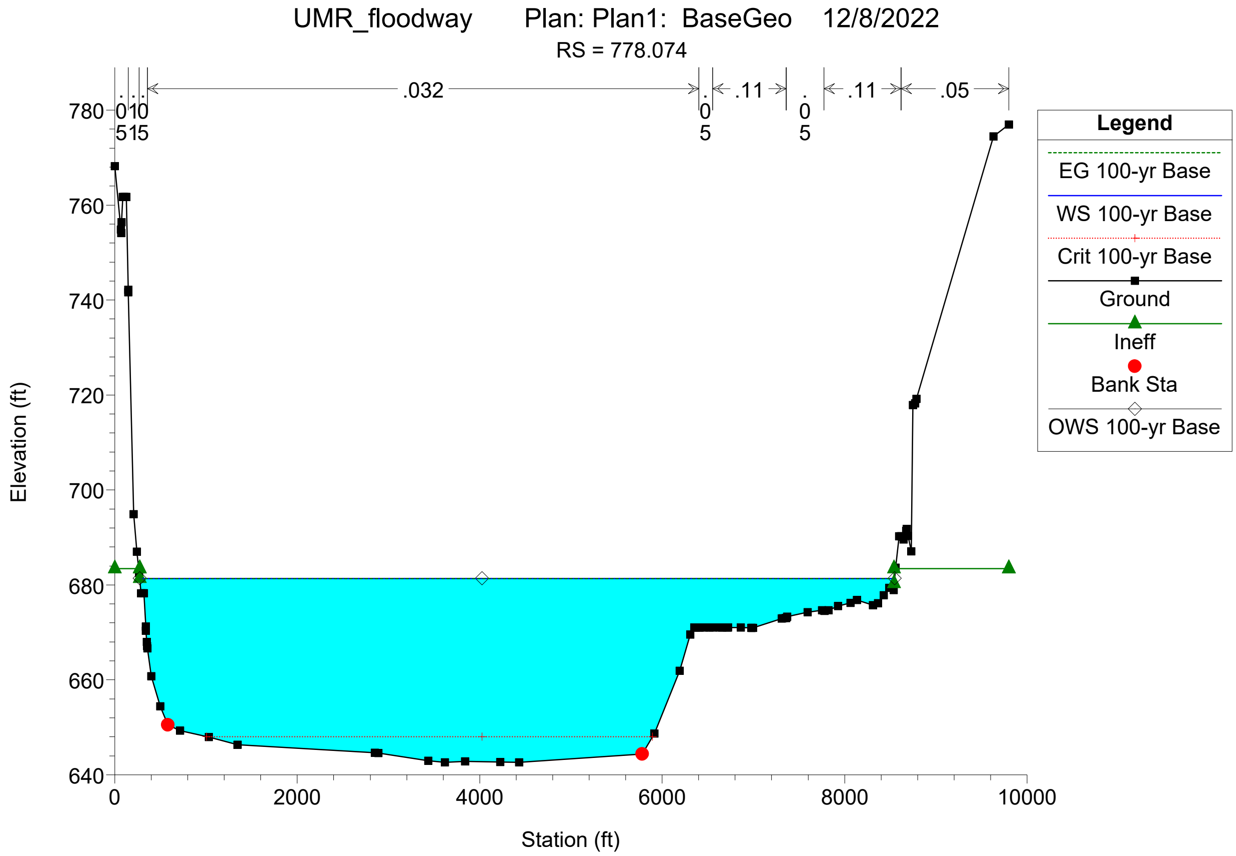

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 779.388
.032
.055
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

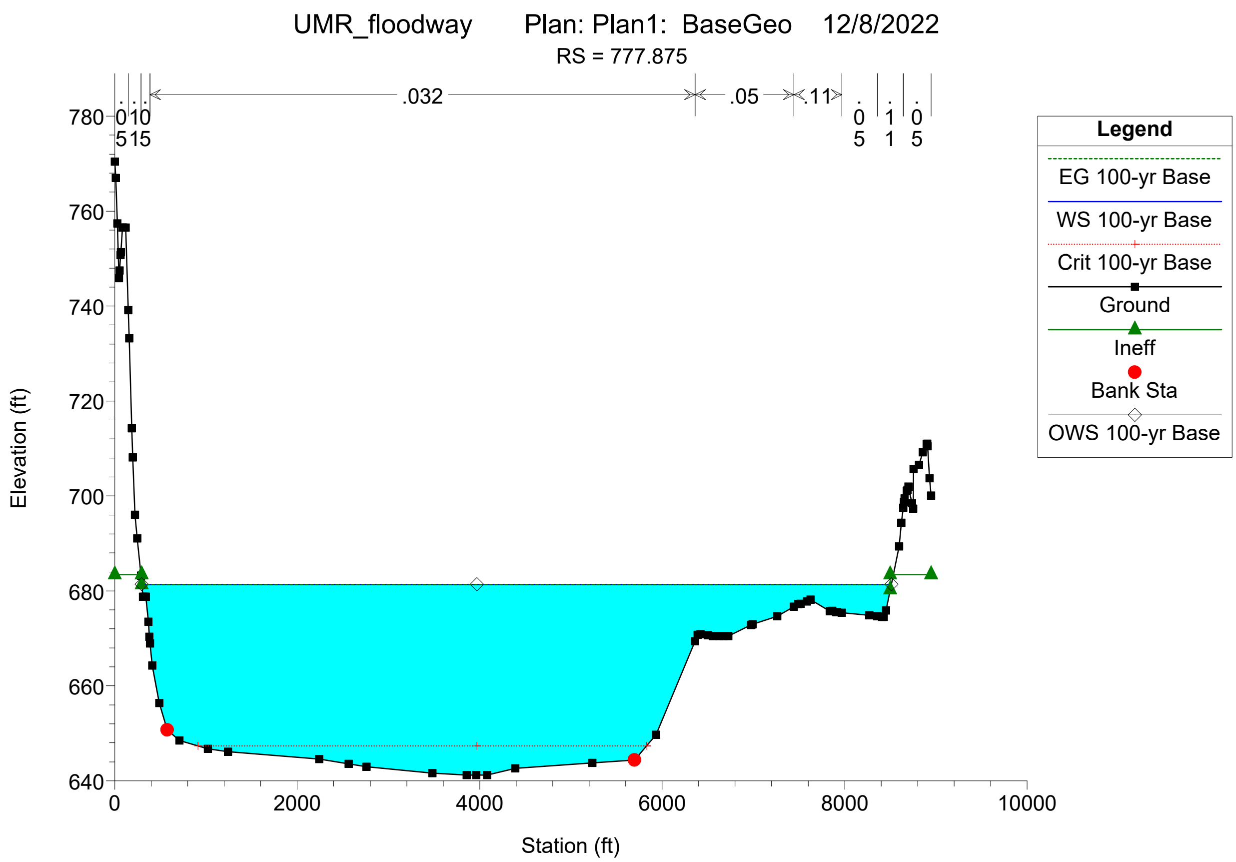

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 779.187
.05
.032
.11
Elevation (ft)
Station (ft)
740
720
700
680
660
640
0
2000
4000
6000
8000
10000
12000
14000
16000
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

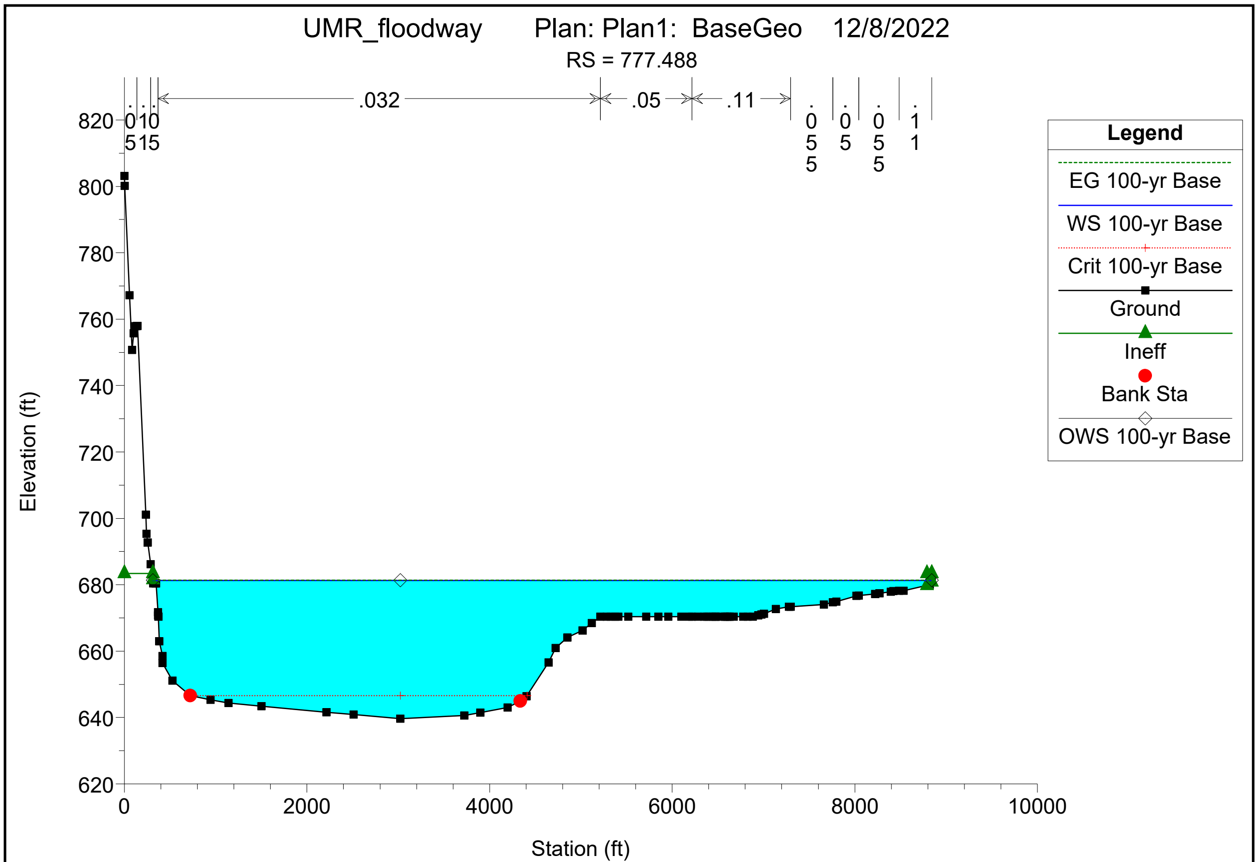

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 779.000
.05
.032
.055
Elevation (ft)
Station (ft)
1100
1000
900
800
700
600
0
2000
4000
6000
8000
10000
12000
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

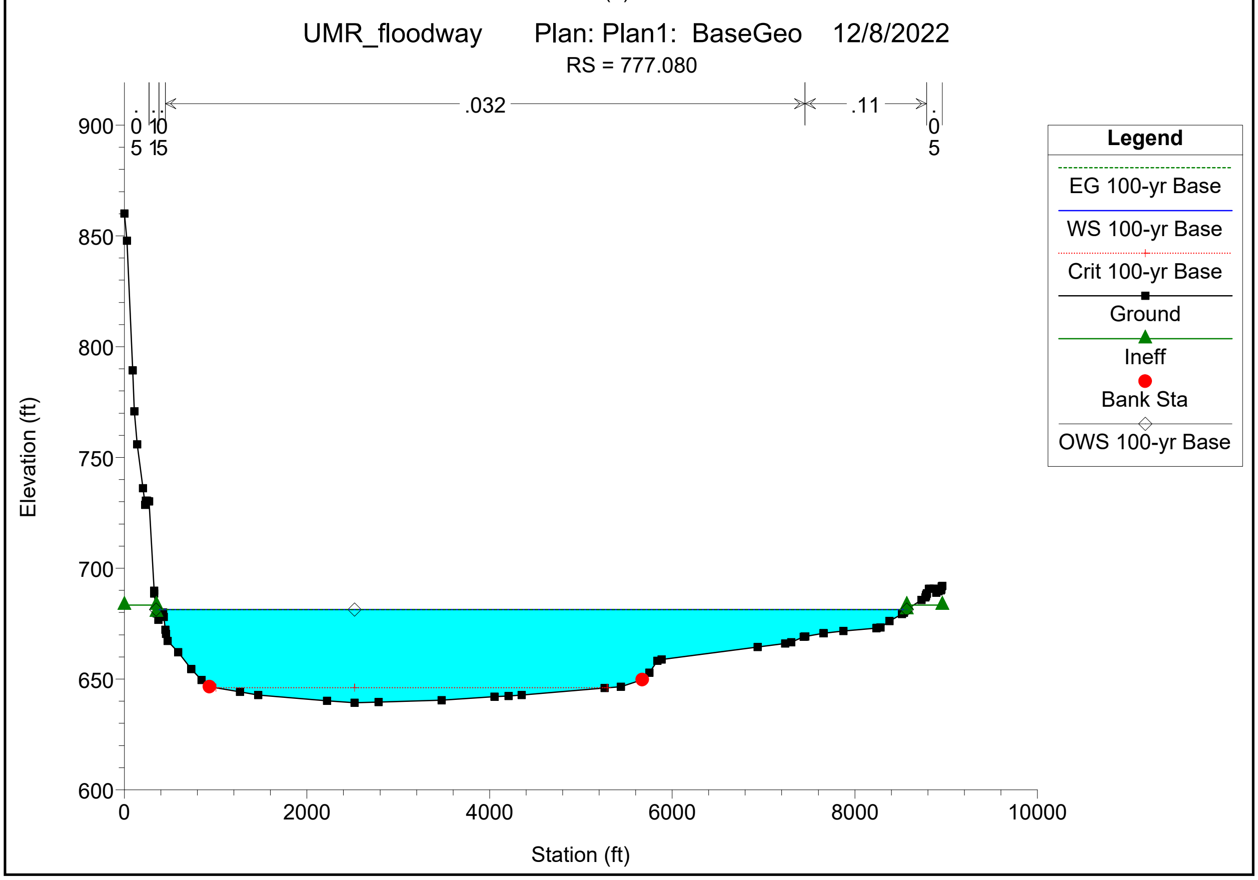

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 778.664
.032
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

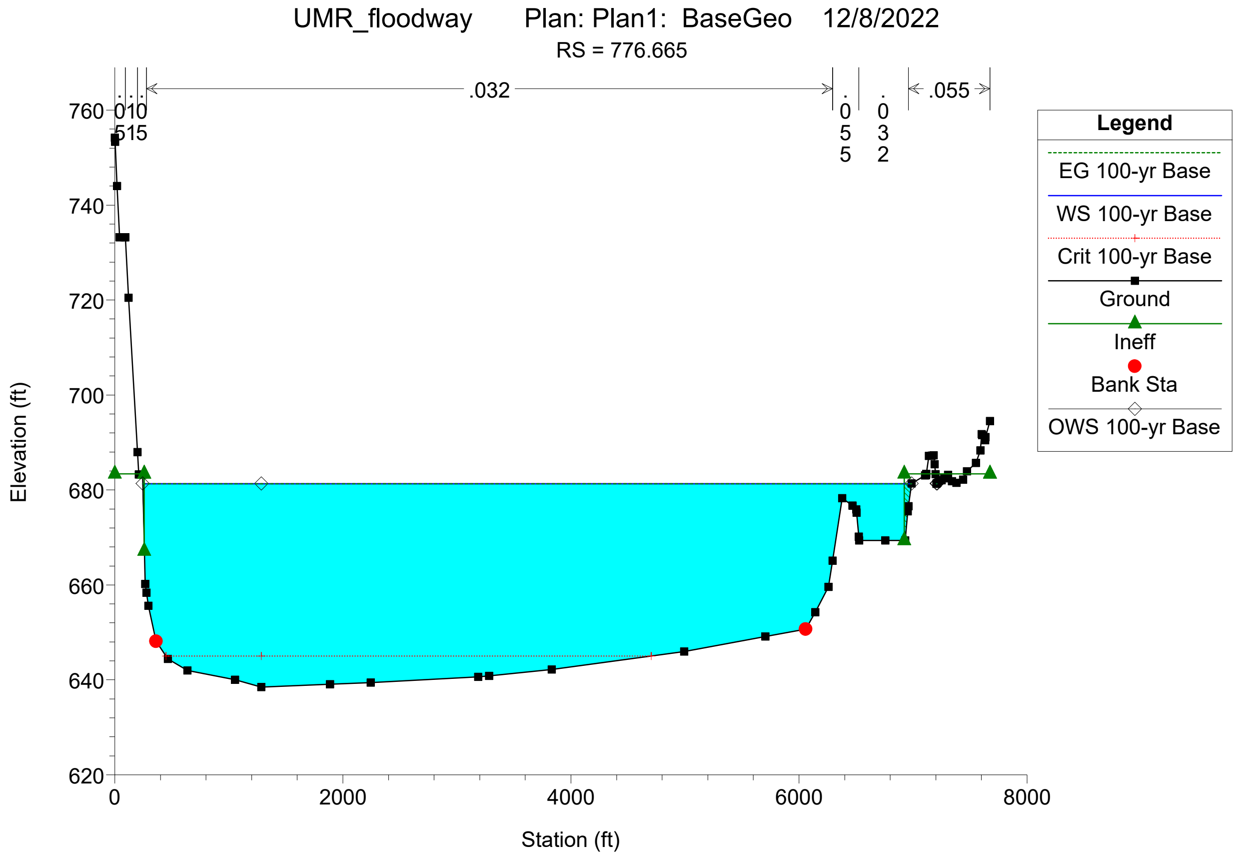

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 778.290
.032
.11
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

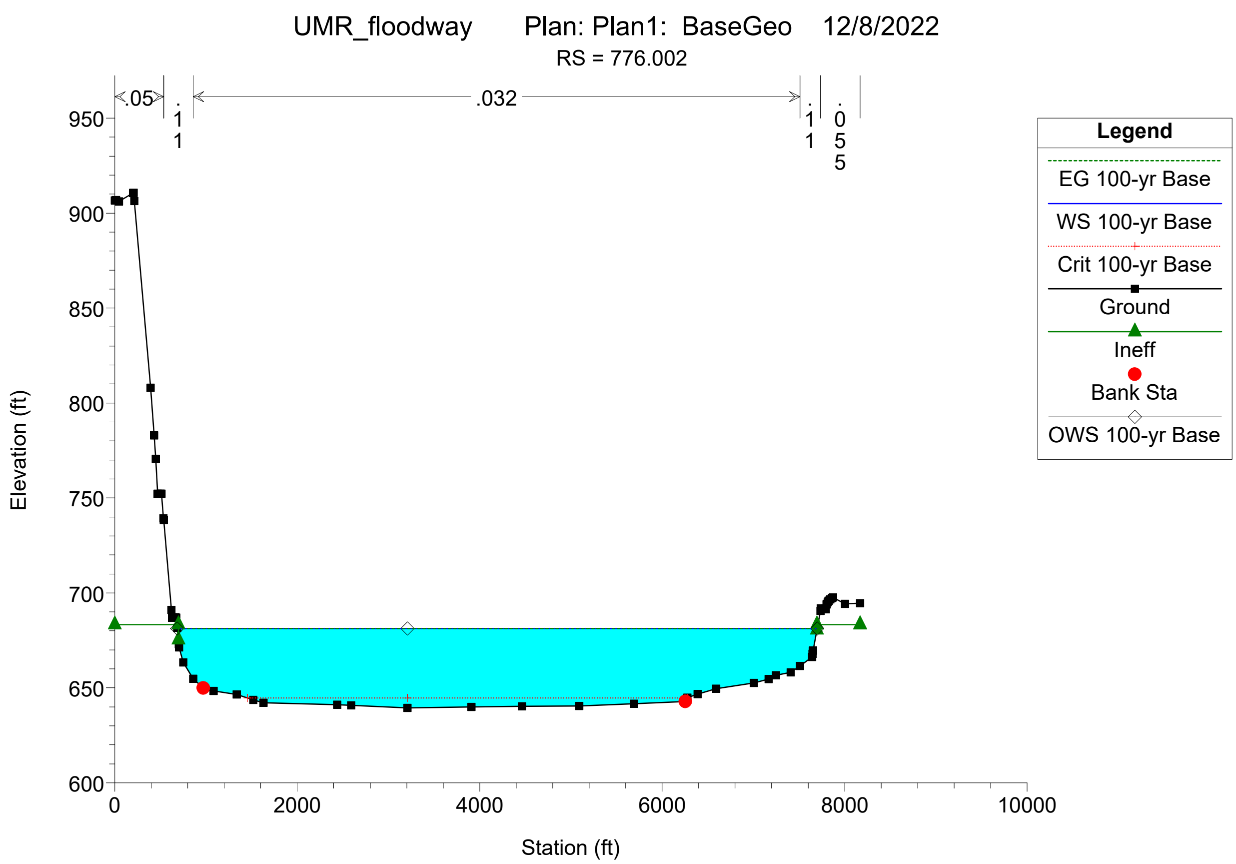

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 778.074
.032
.11
.11
.05
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)
780
760
740
720
700
680
660
640
0
2000
4000
6000
8000
10000

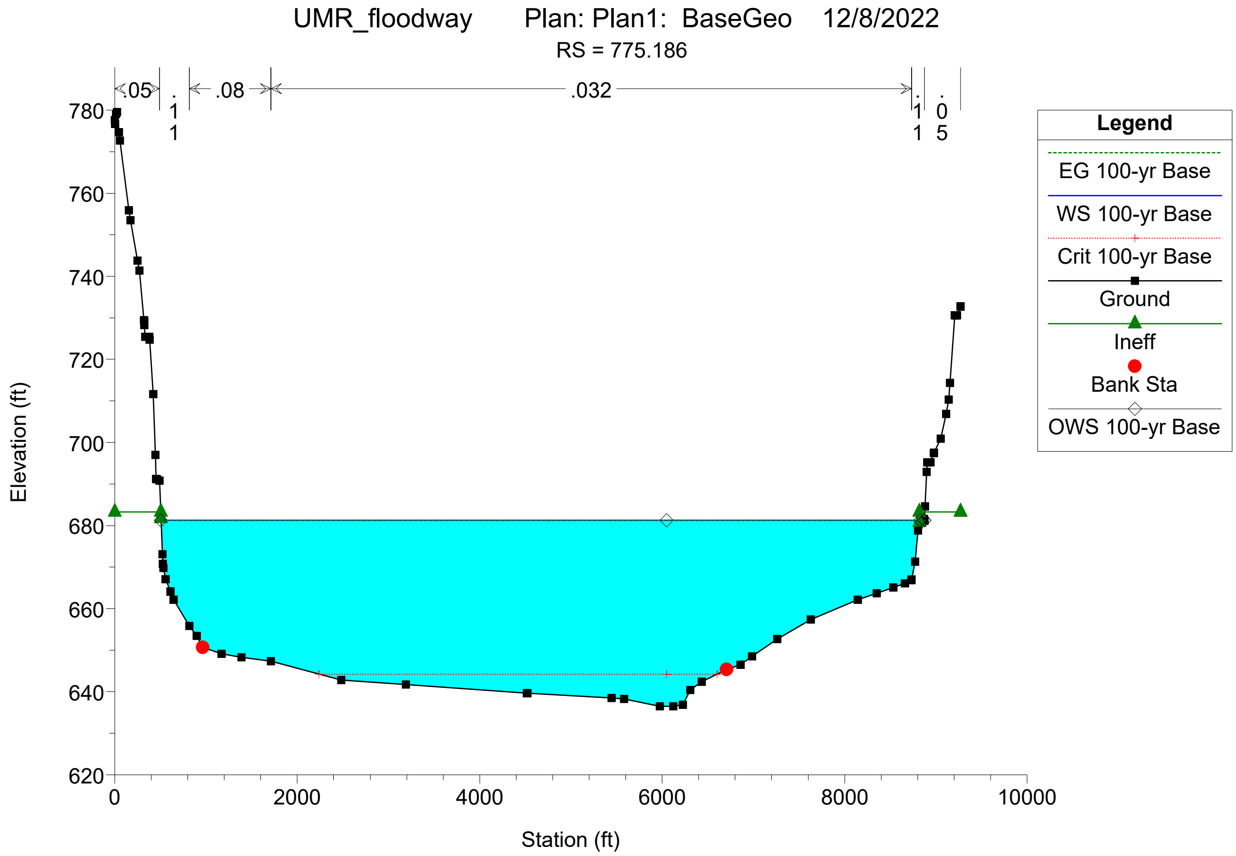

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 777.875
.032
.05
.11
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)
780
760
740
720
700
680
660
640
0
2000
4000
6000
8000
10000

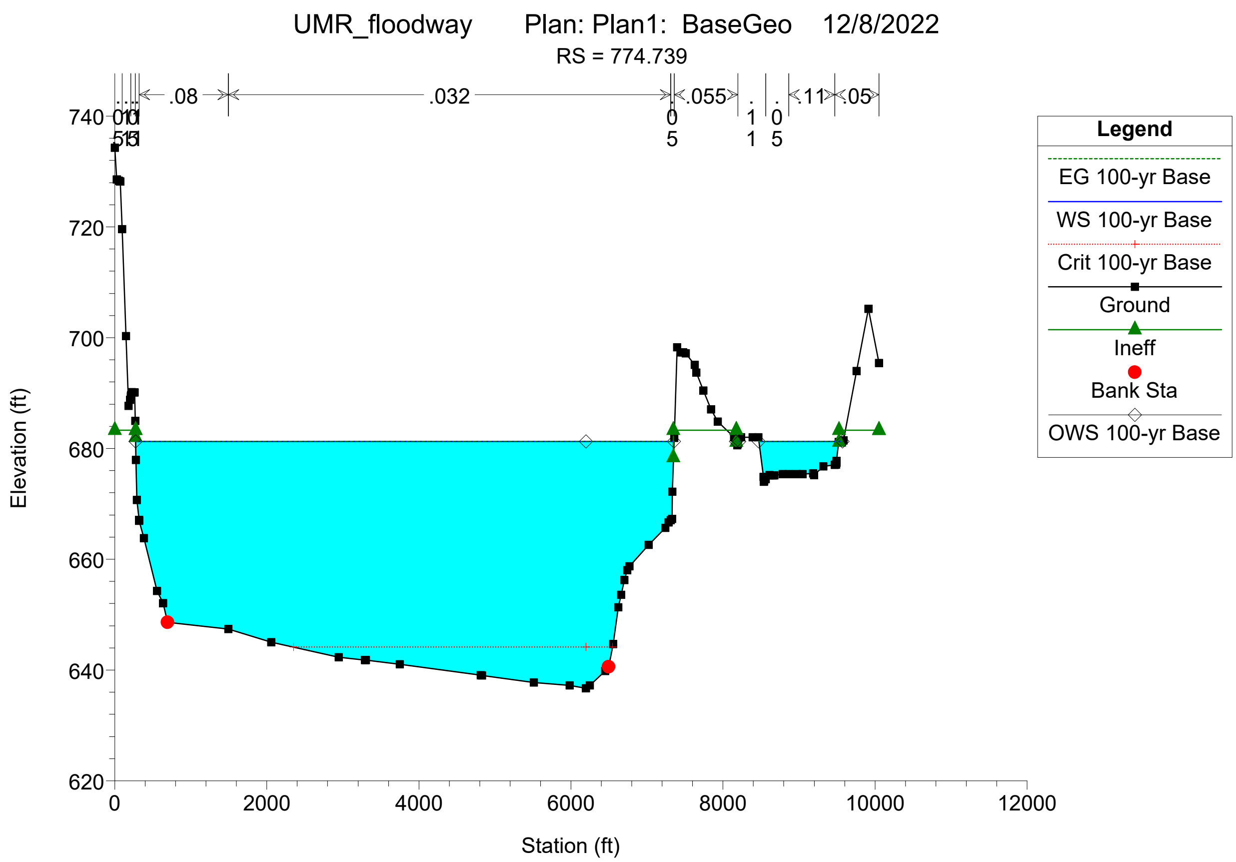

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 777.488
.032
.05
.11
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)
0
2000
4000
6000
8000
10000
620
640
660
680
700
720
740
760
780
800
820

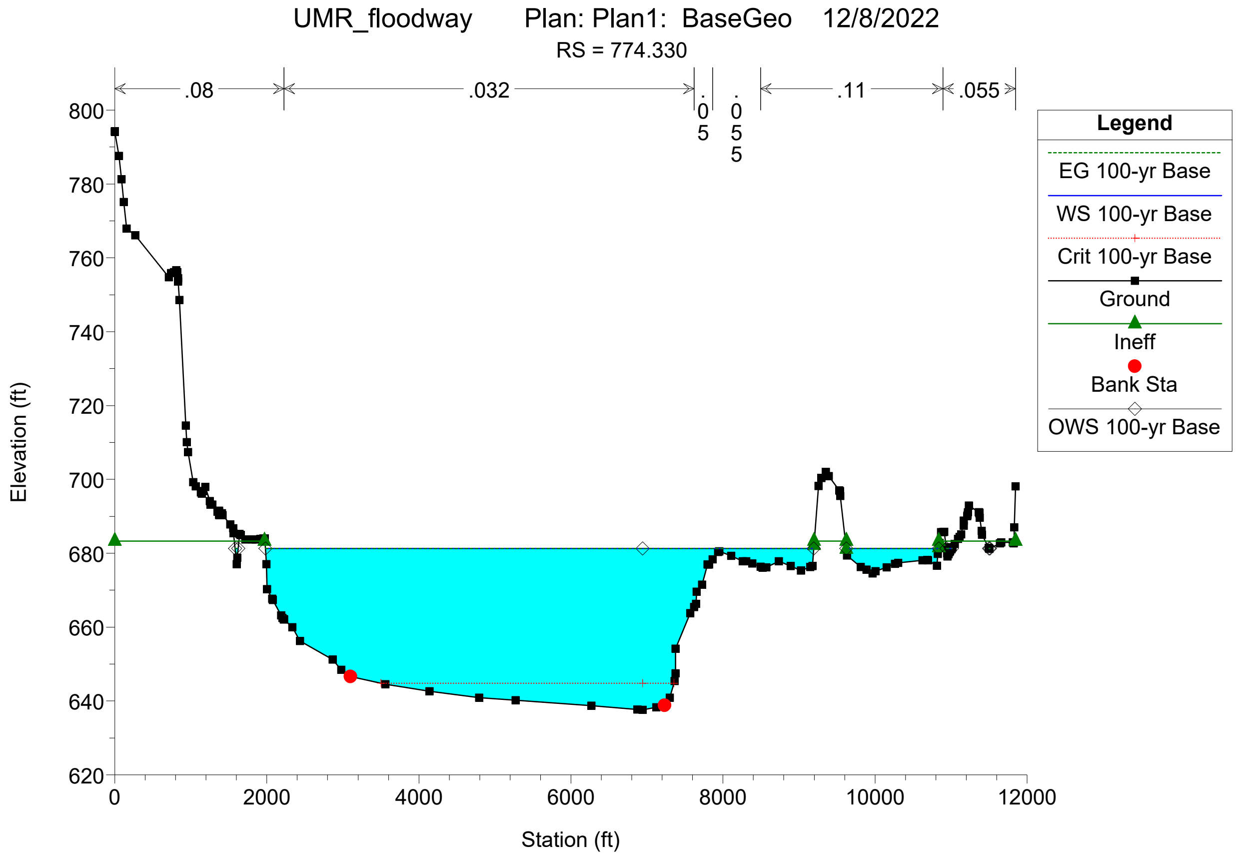

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 777.080
.032
.11
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)
0
2000
4000
6000
8000
10000
600
650
700
750
800
850
900


UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 776.665
.010
.015
.032
.055
.032
.055
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
620
640
660
680
700
720
740
760
Station (ft)
0
2000
4000
6000
8000

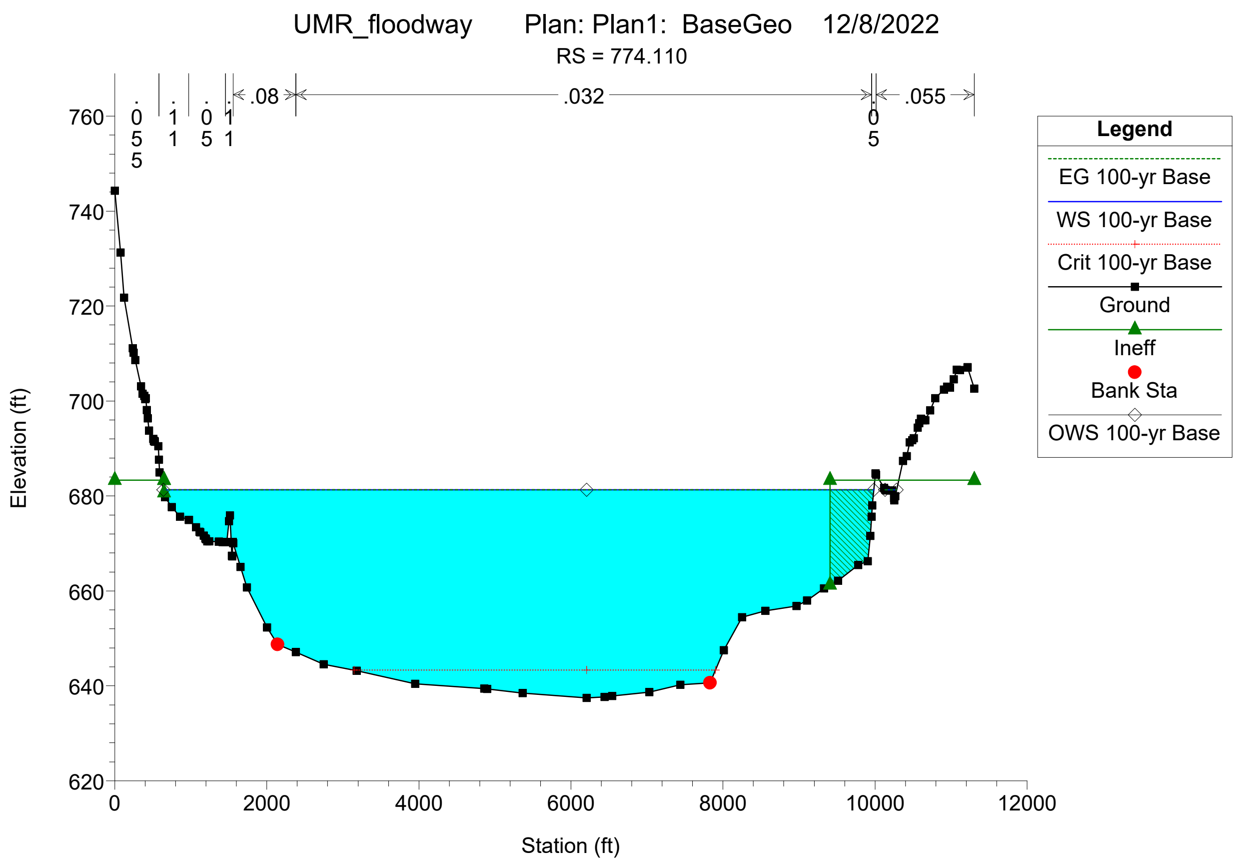

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 776.002
.05
.11
.032
.11
.055
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
600
650
700
750
800
850
900
950
Station (ft)
0
2000
4000
6000
8000
10000


UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 775.186
.05
.08
.032
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

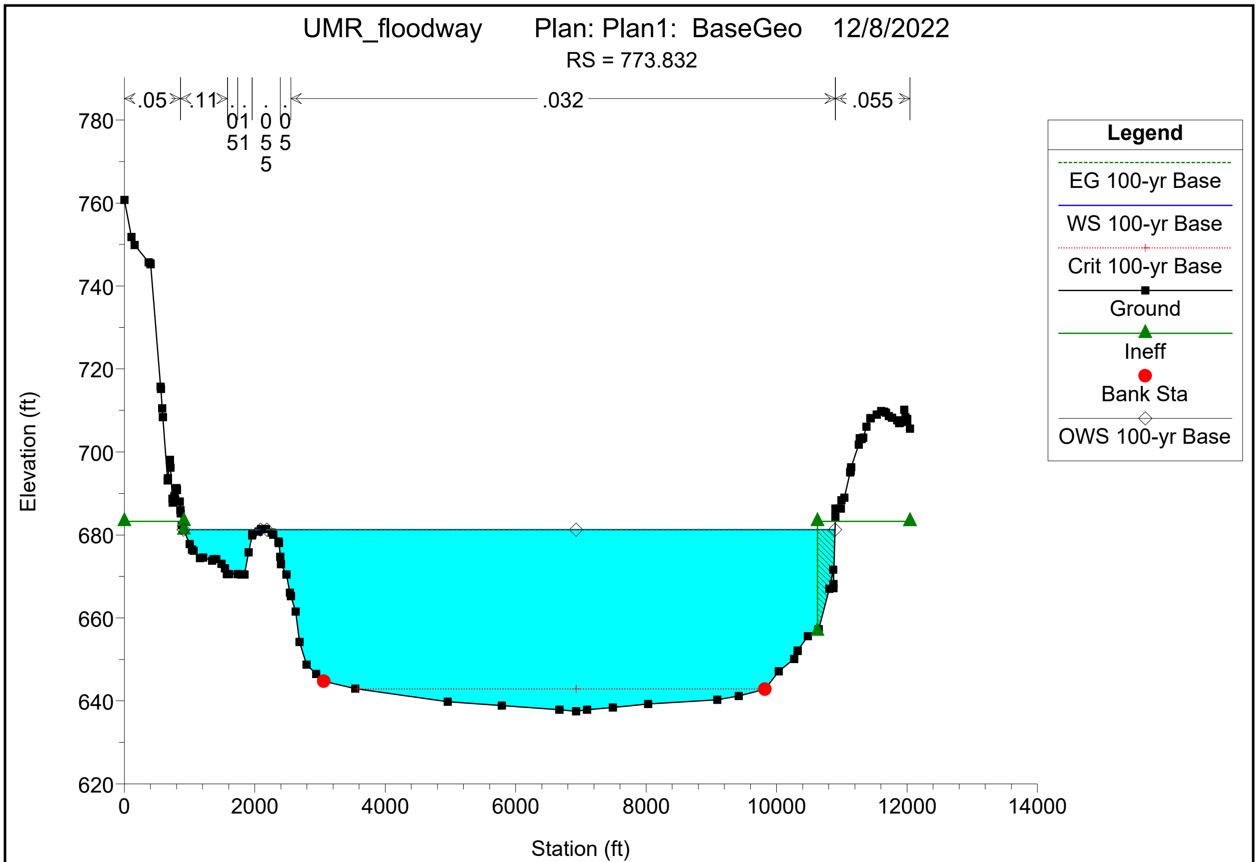

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 774.739
.08
.032
.055
.11
.05
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

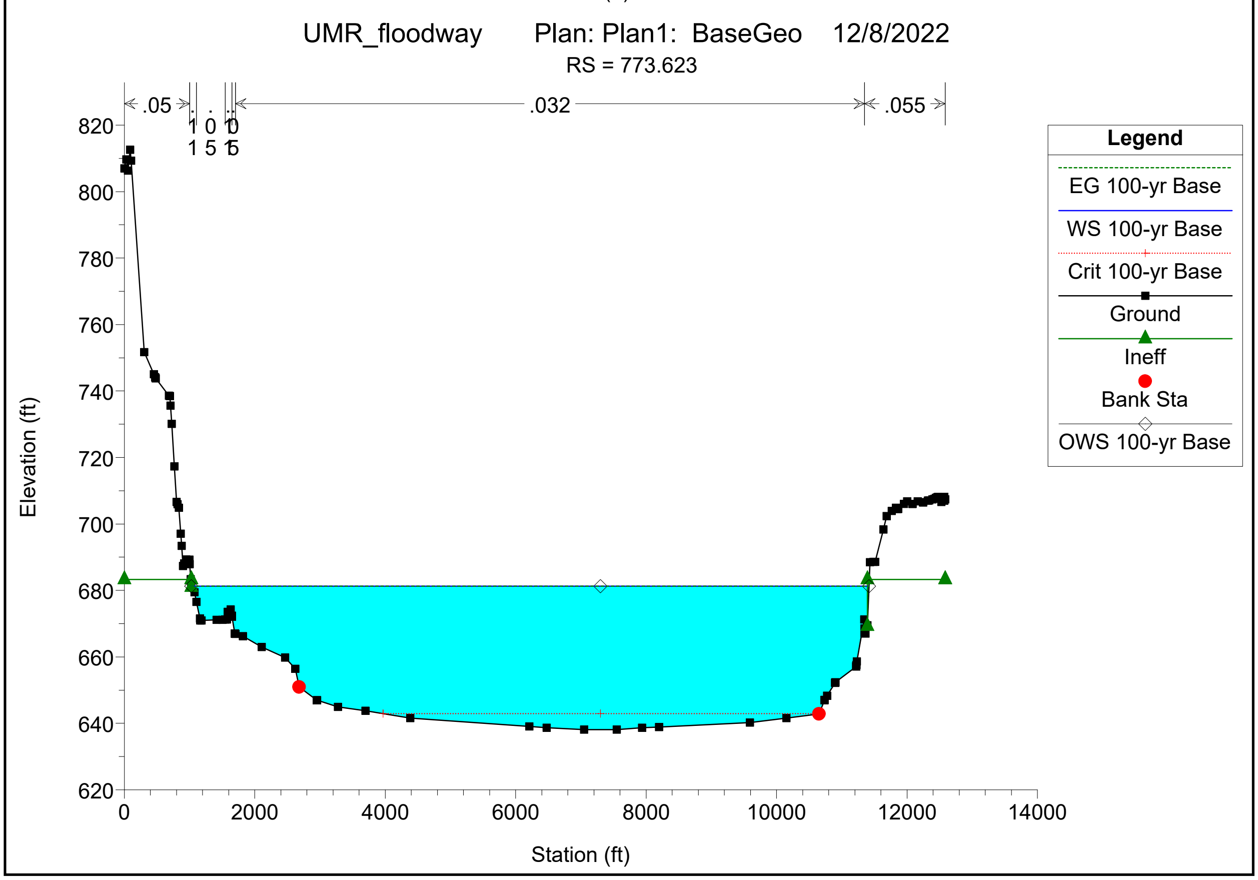


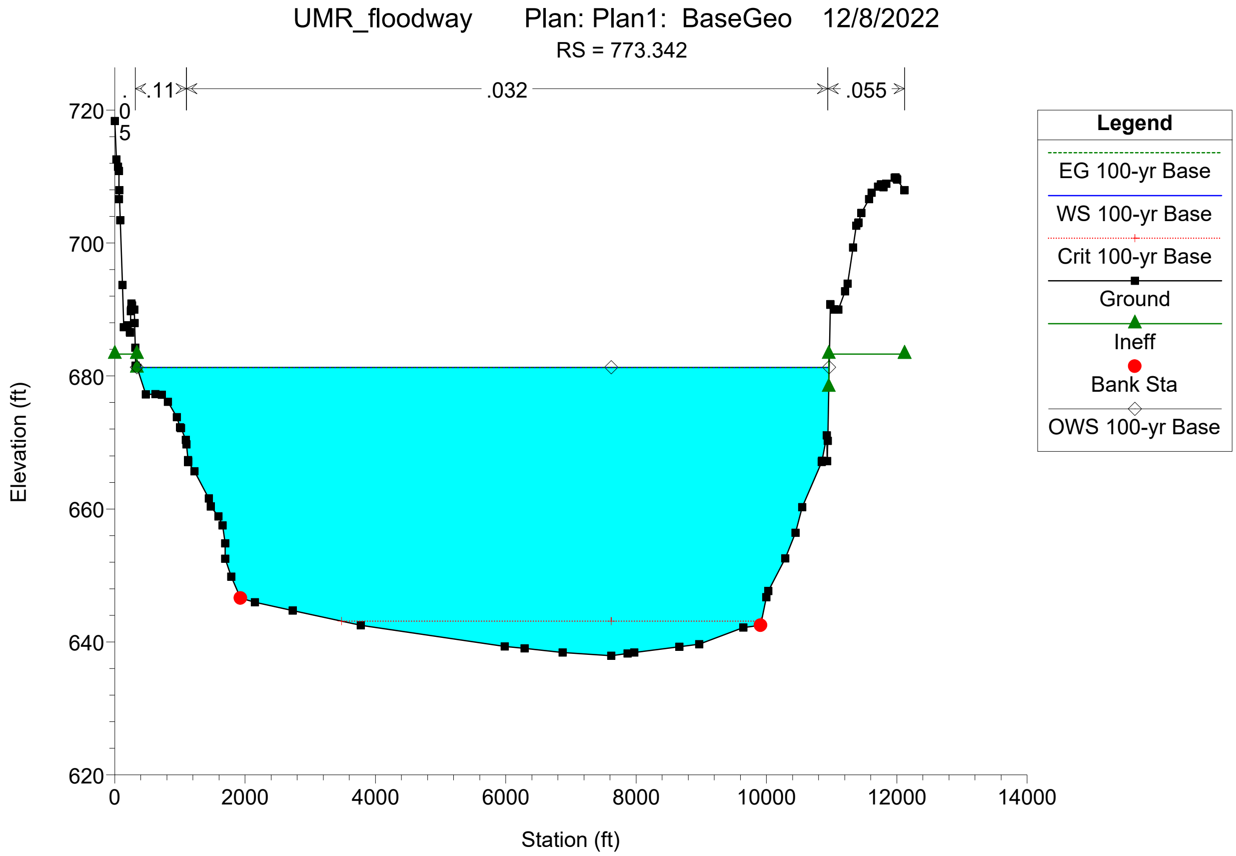
UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 774.330
.08
.032
.05
.055
.11
.055
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

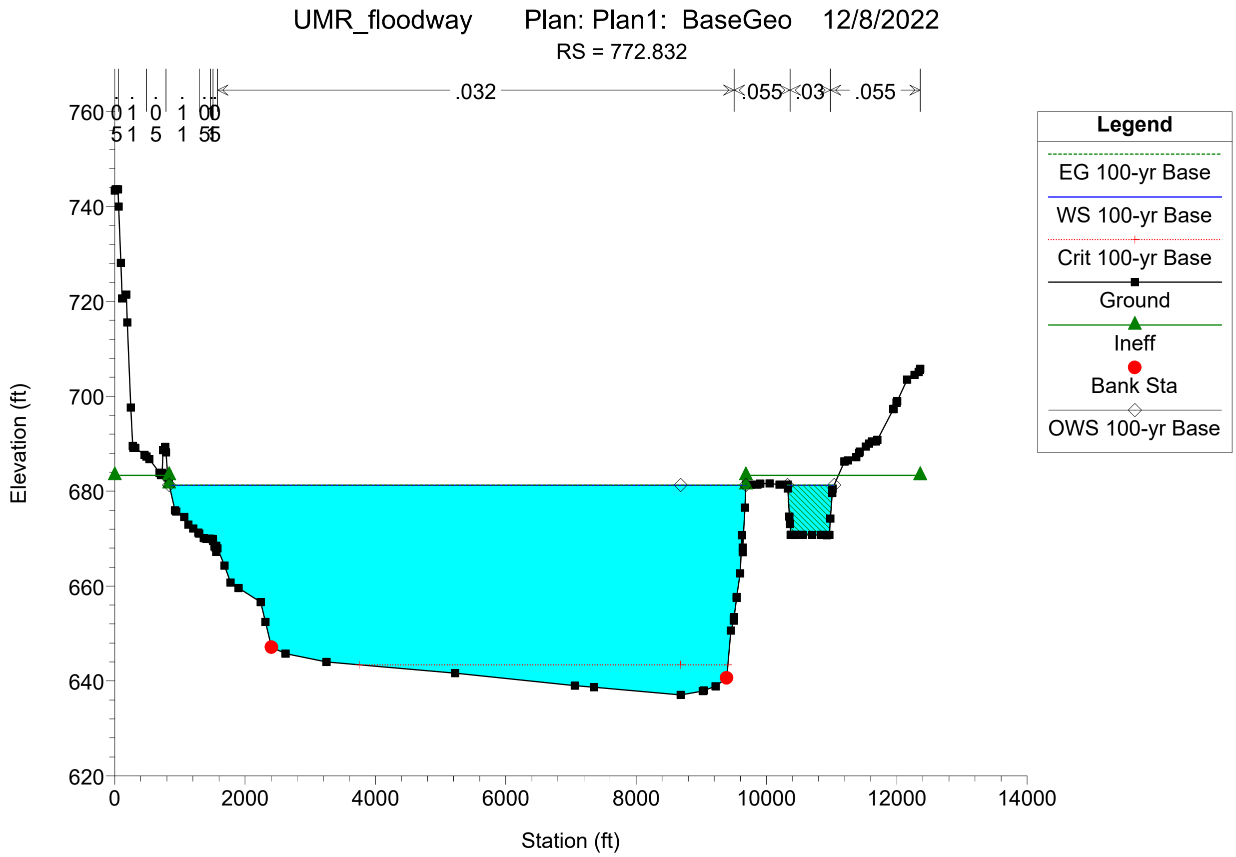


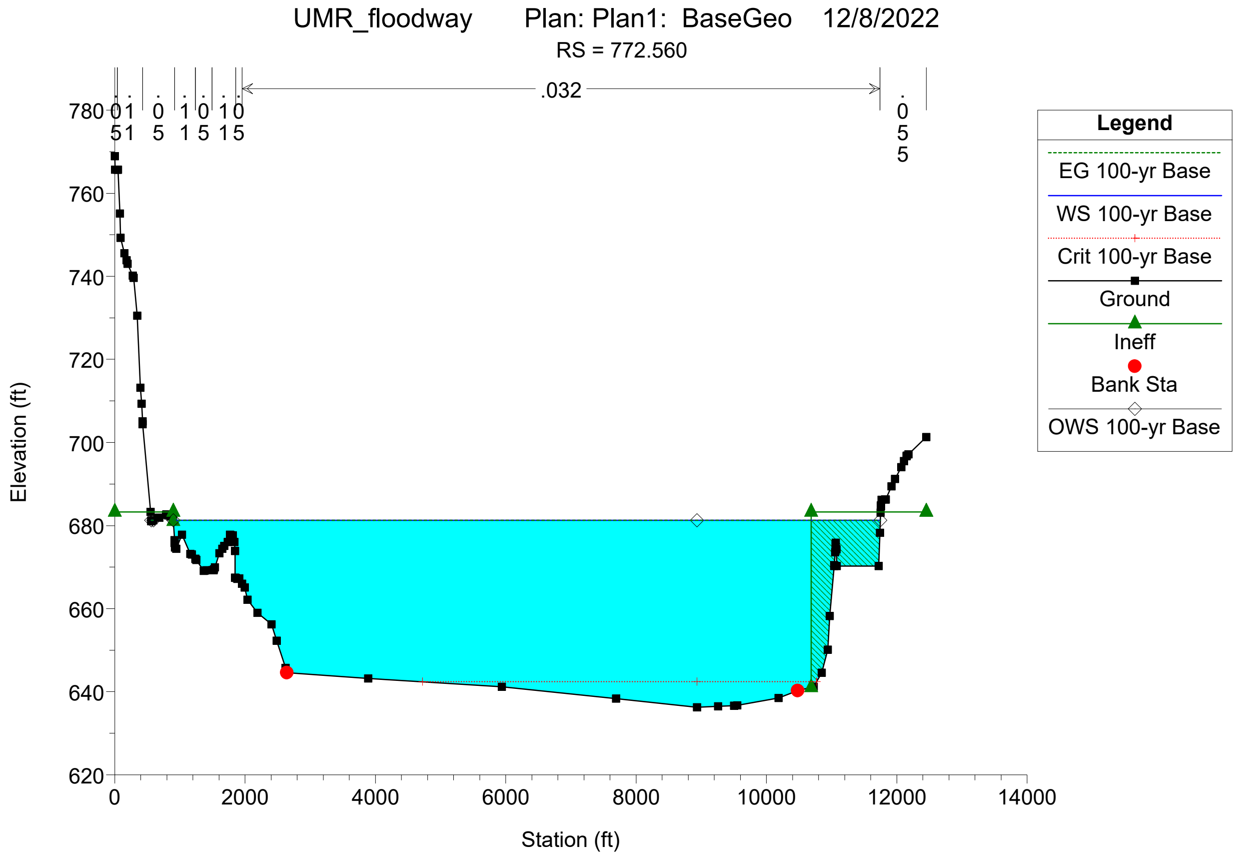
UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 774.110
.055
.11
.05
.11
.08
.032
.05
.055
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)


UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 773.832
.05
.11
.032
.055
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

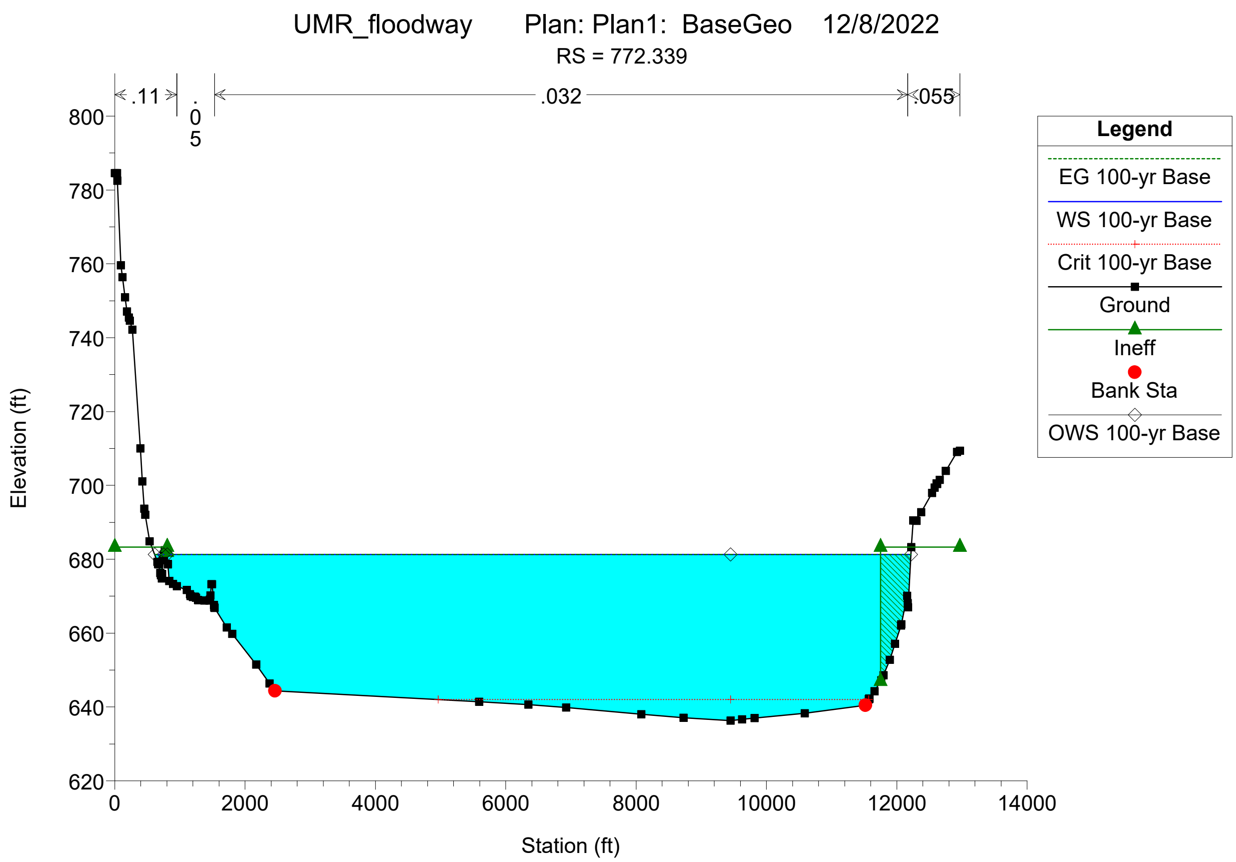

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 773.623
.05
.032
.055
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base


UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 773.342
.11
.032
.055
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

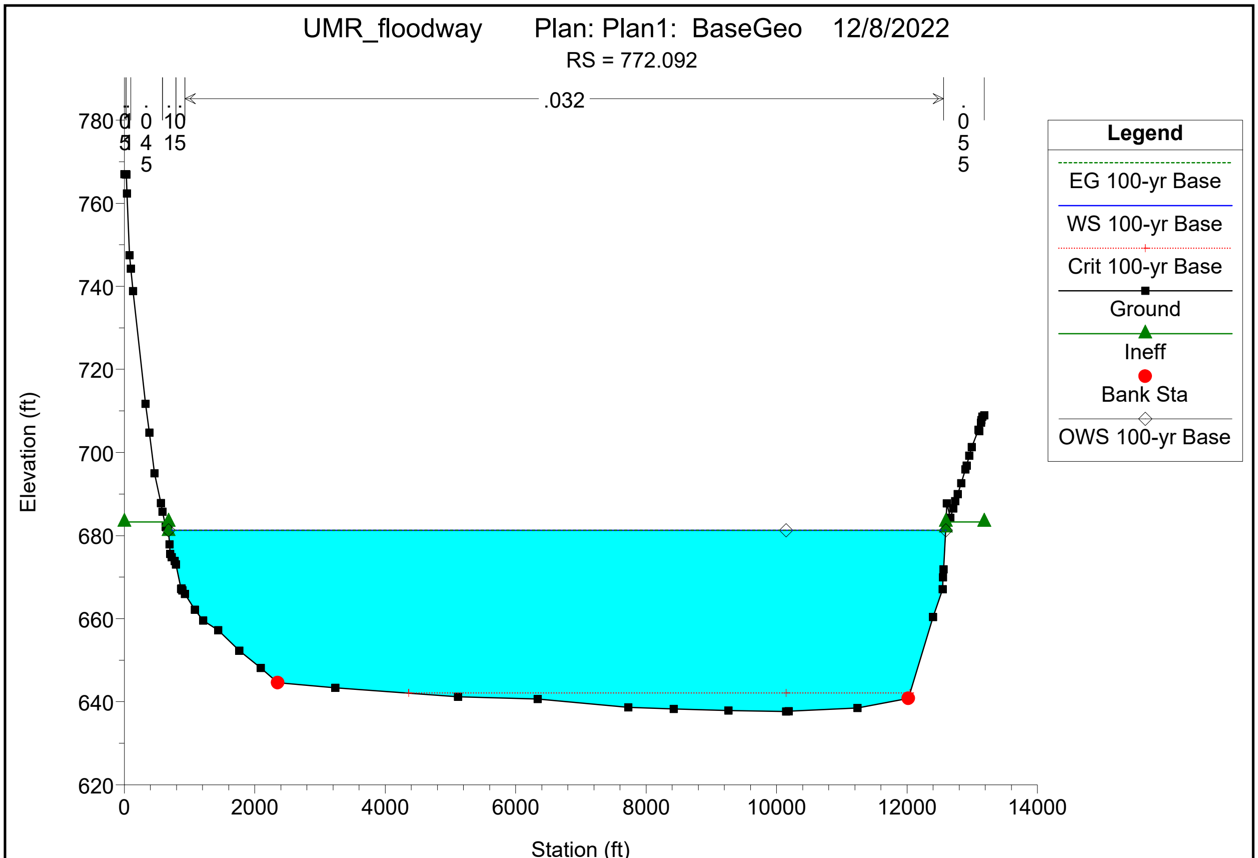

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 772.832
.032
.055
.03
.055
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

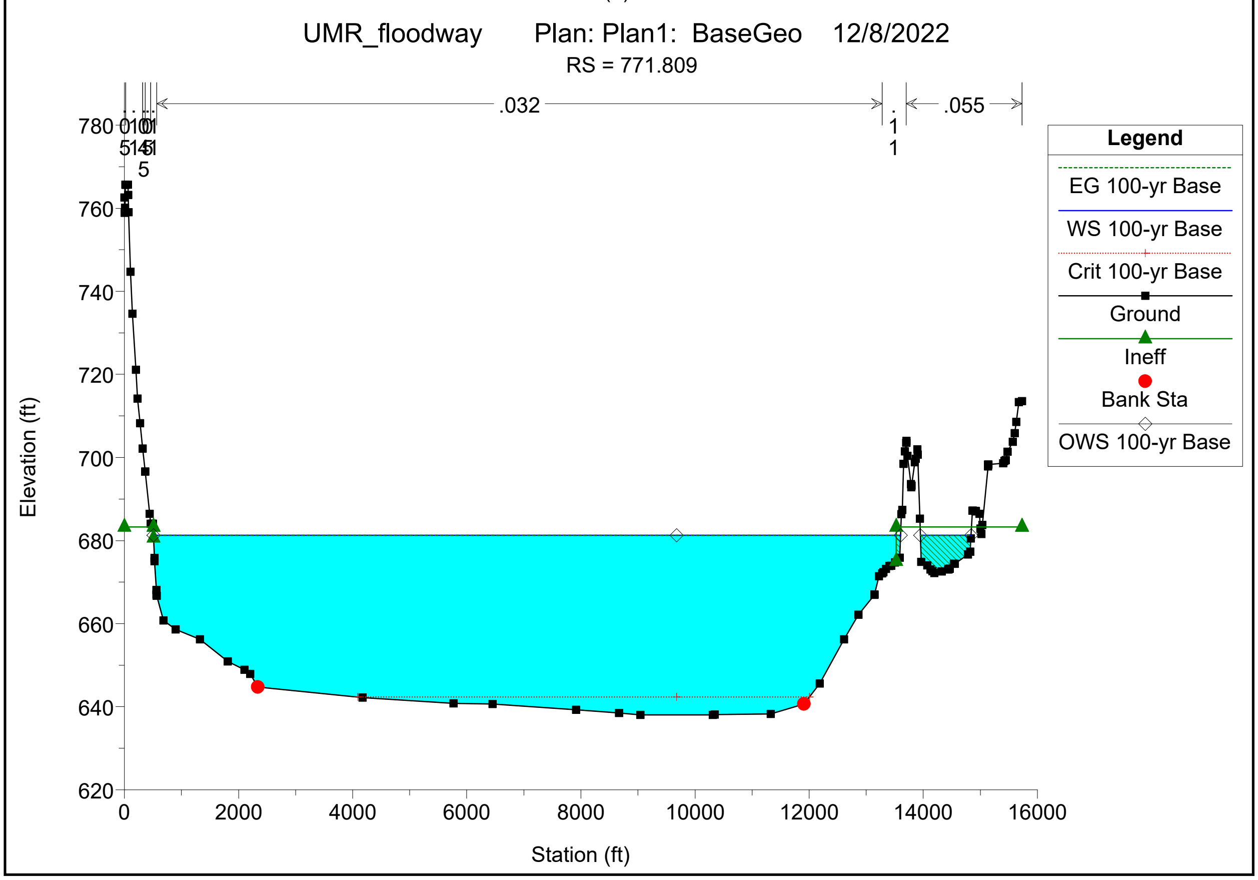


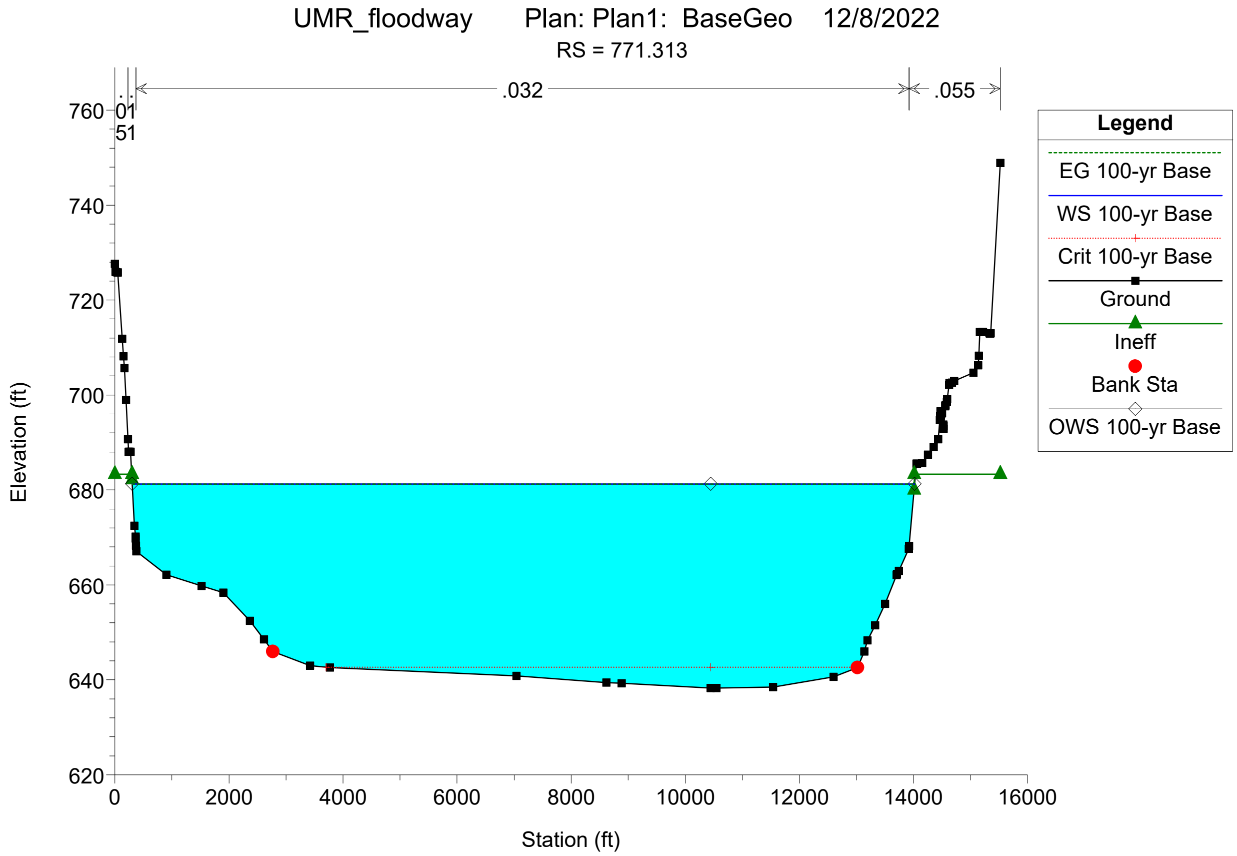
UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 772.560
.032
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

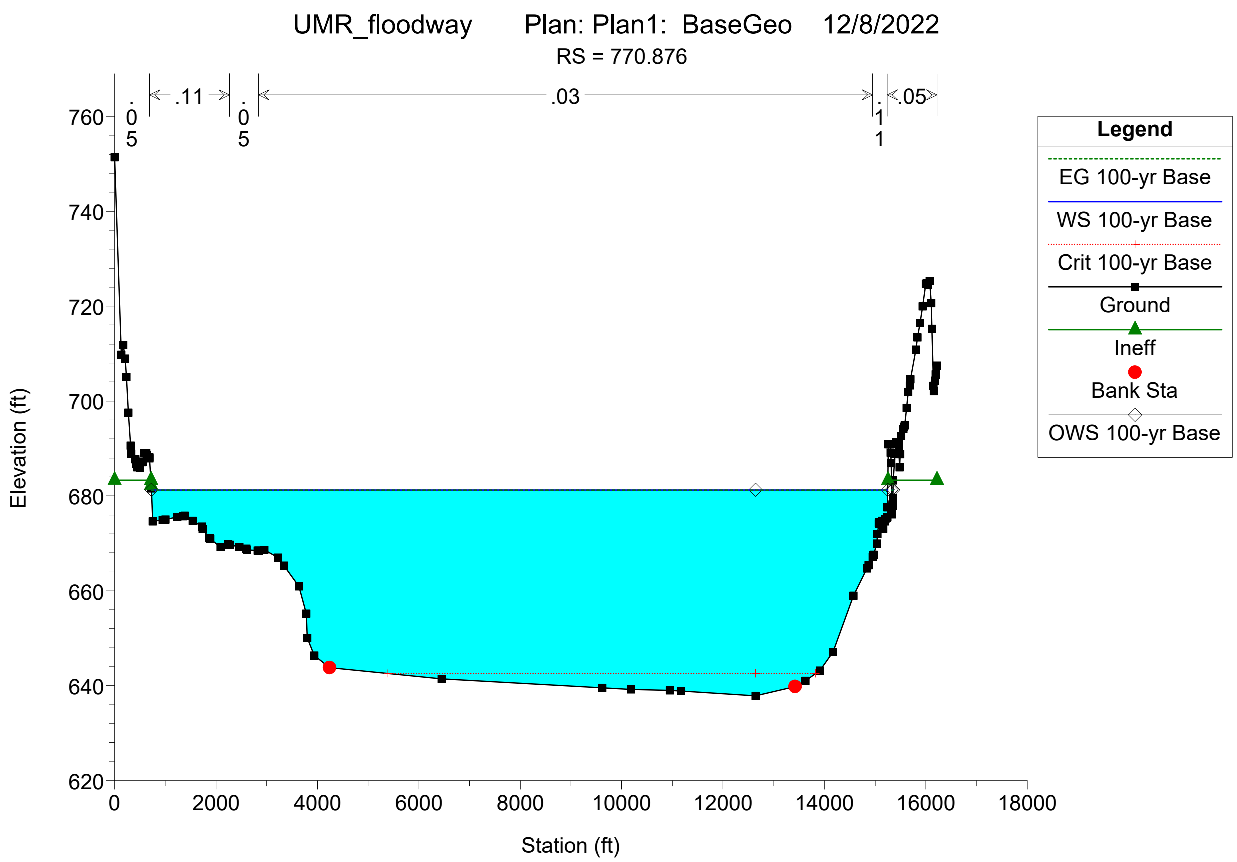


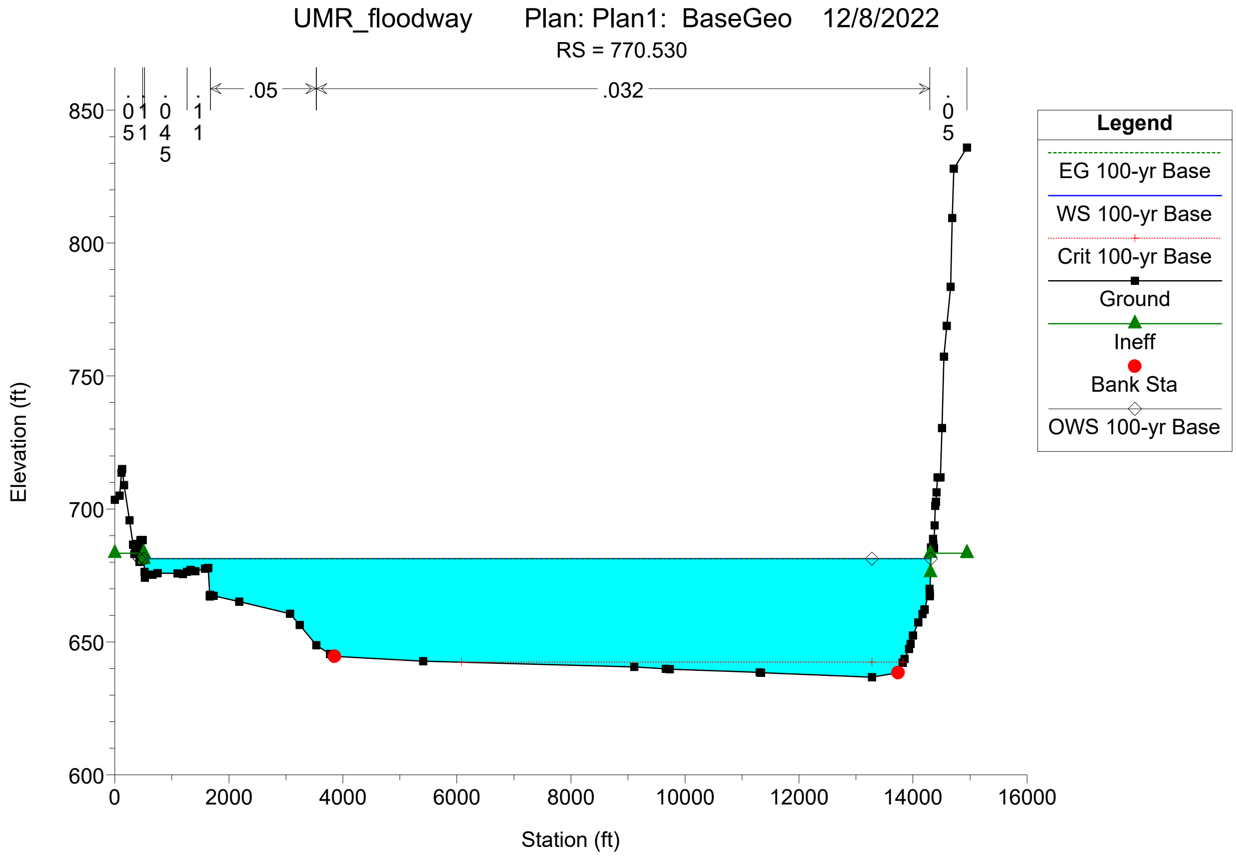
UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 772.339
.11
.032
.055
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

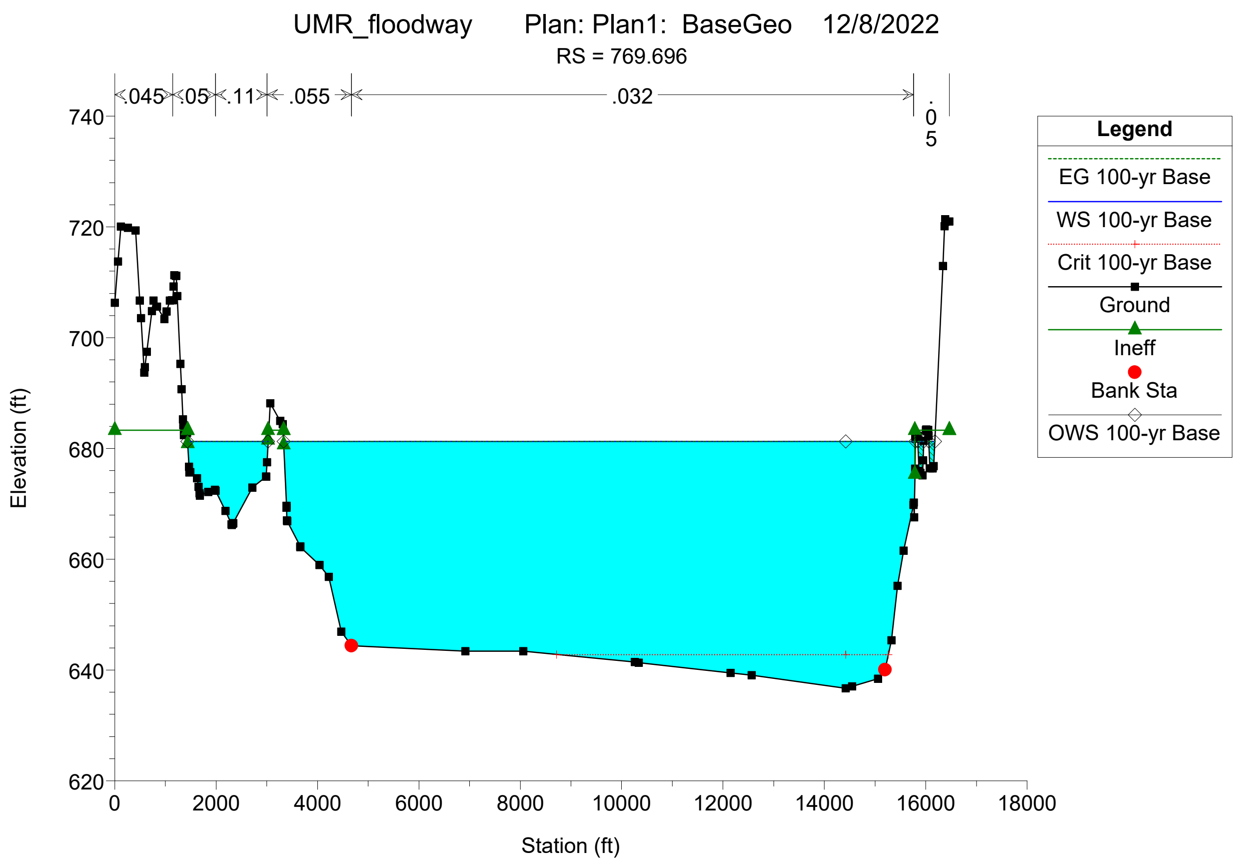

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 772.092
.032
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

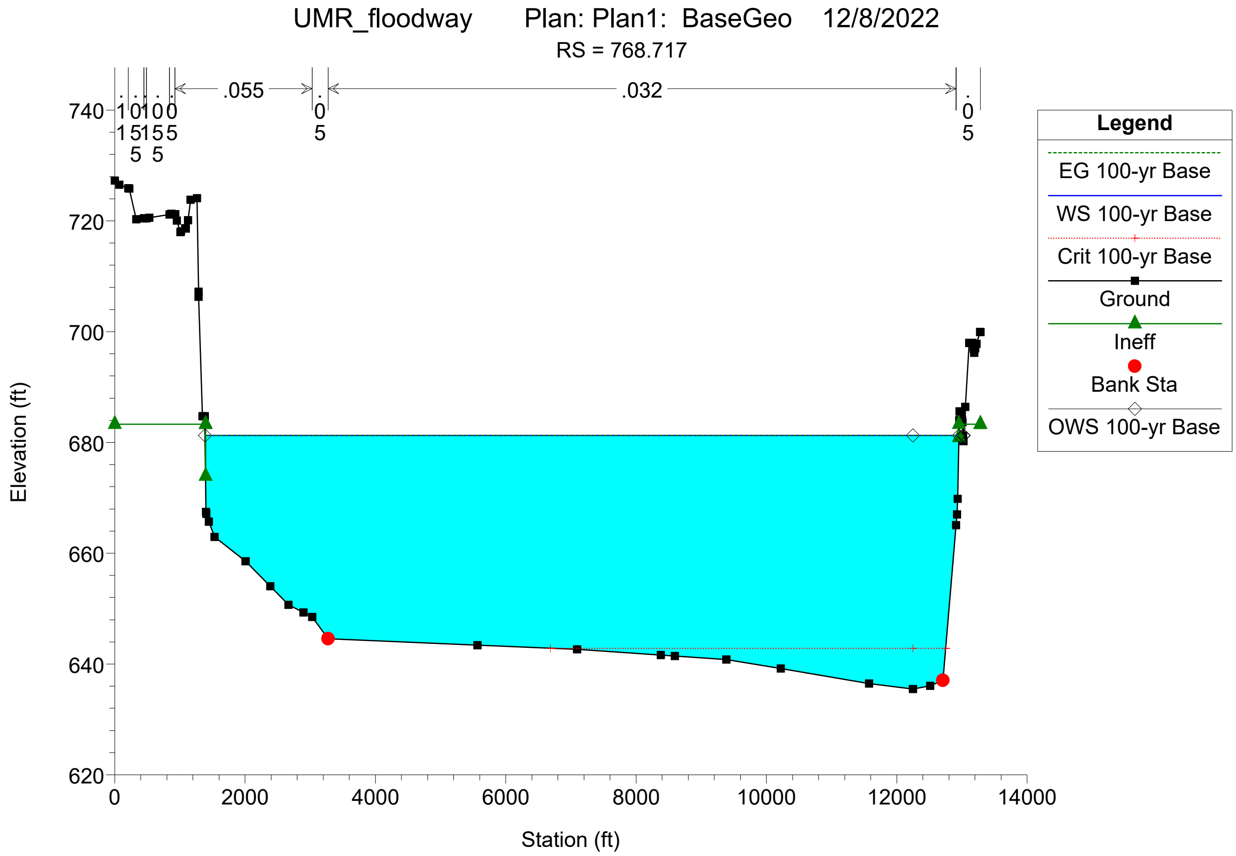

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 771.809
.032
.055
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base


UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 771.313
.032
.055
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

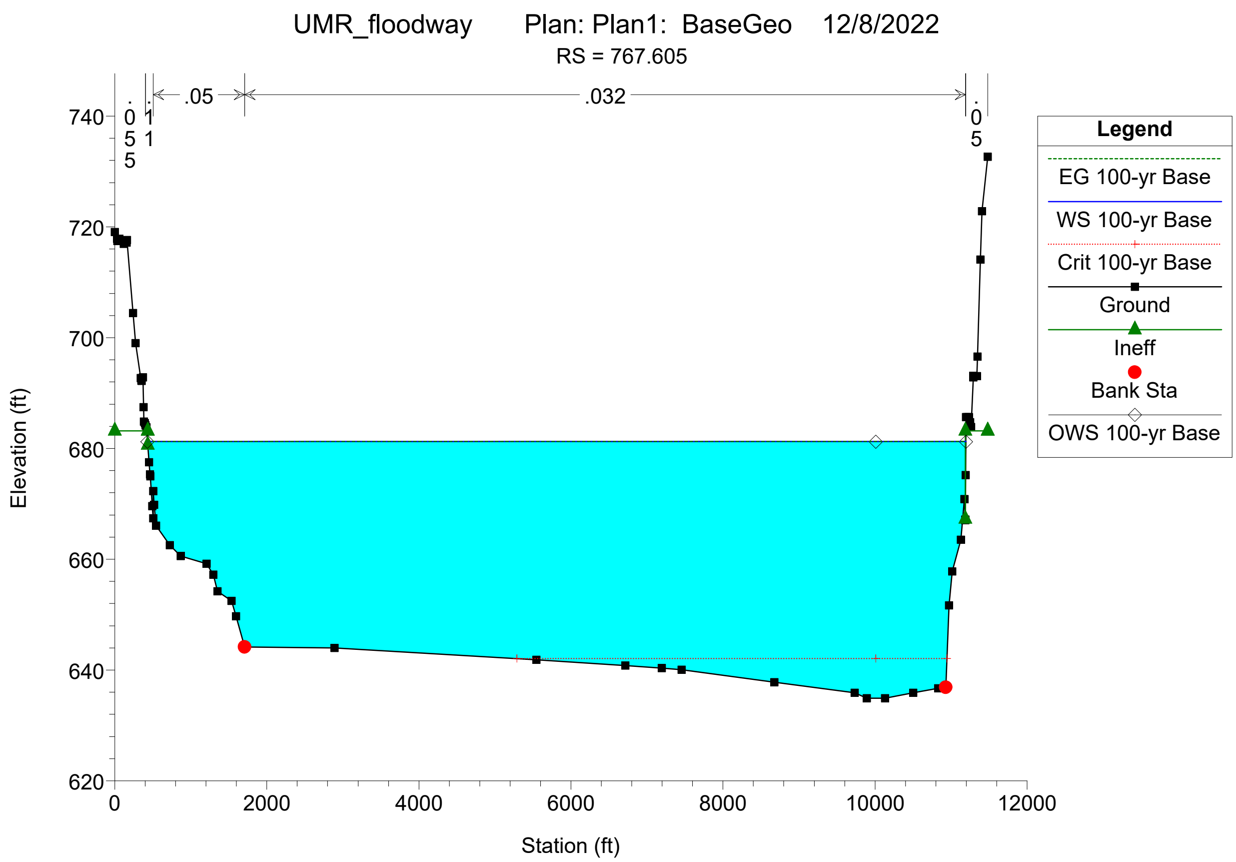

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 770.876
.11
.03
.05
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)


UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 770.530
.05
.032
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

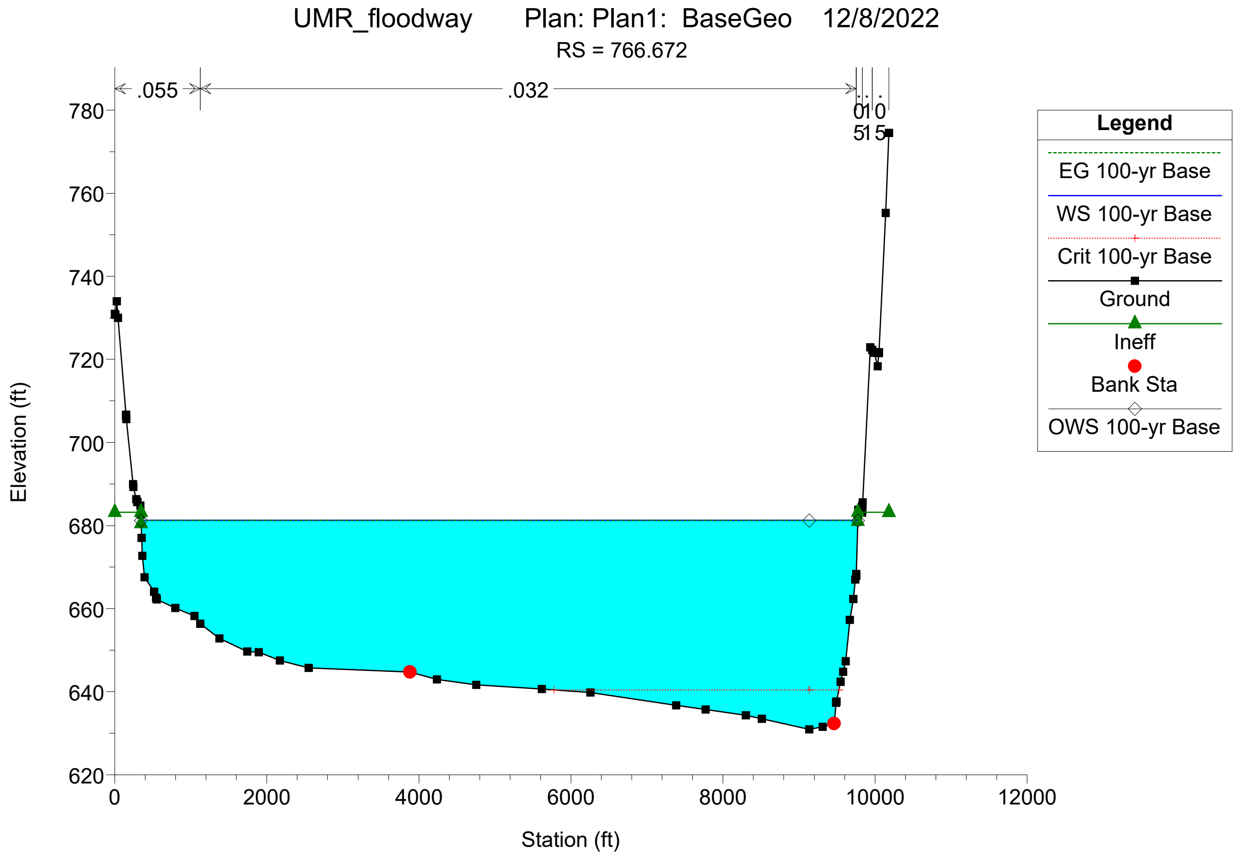

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 769.696
.045
.05
.11
.055
.032
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

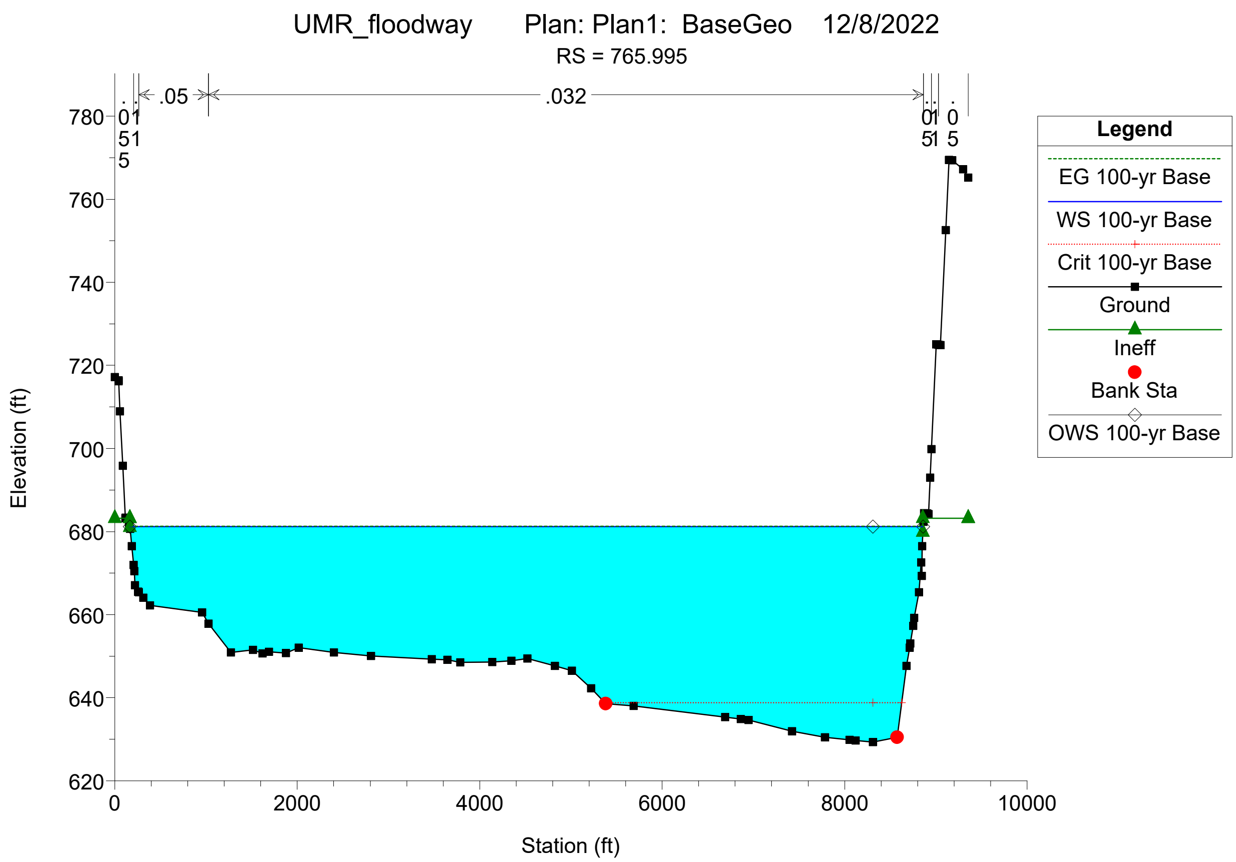


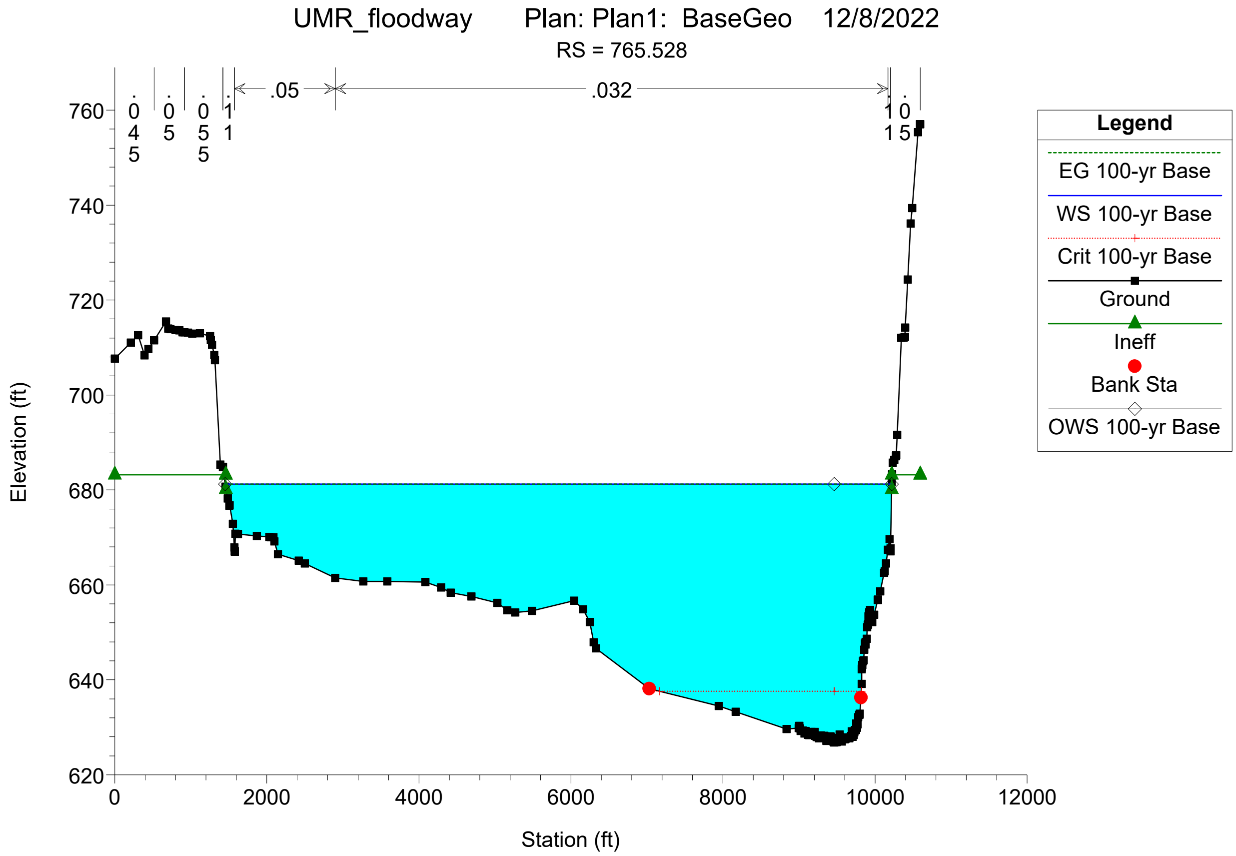
UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 768.717
.055
.032
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

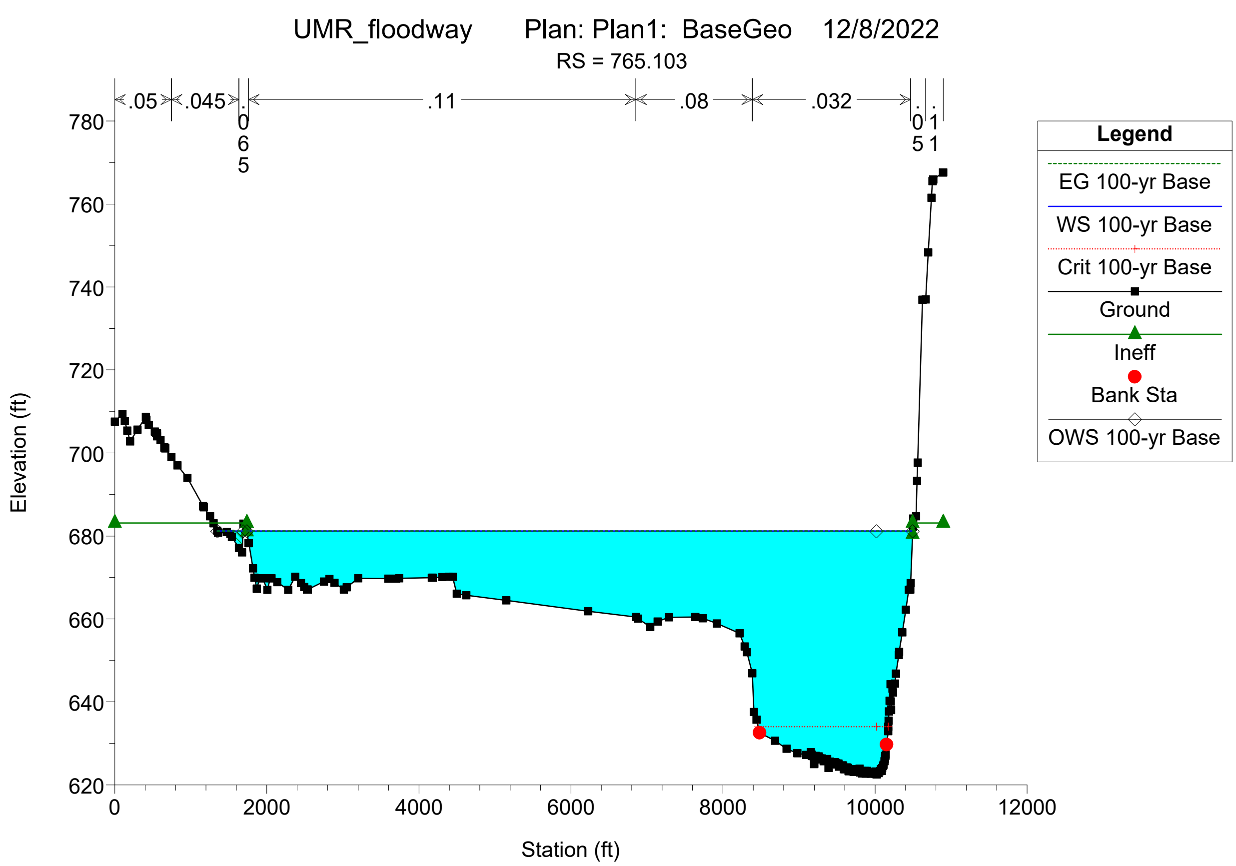


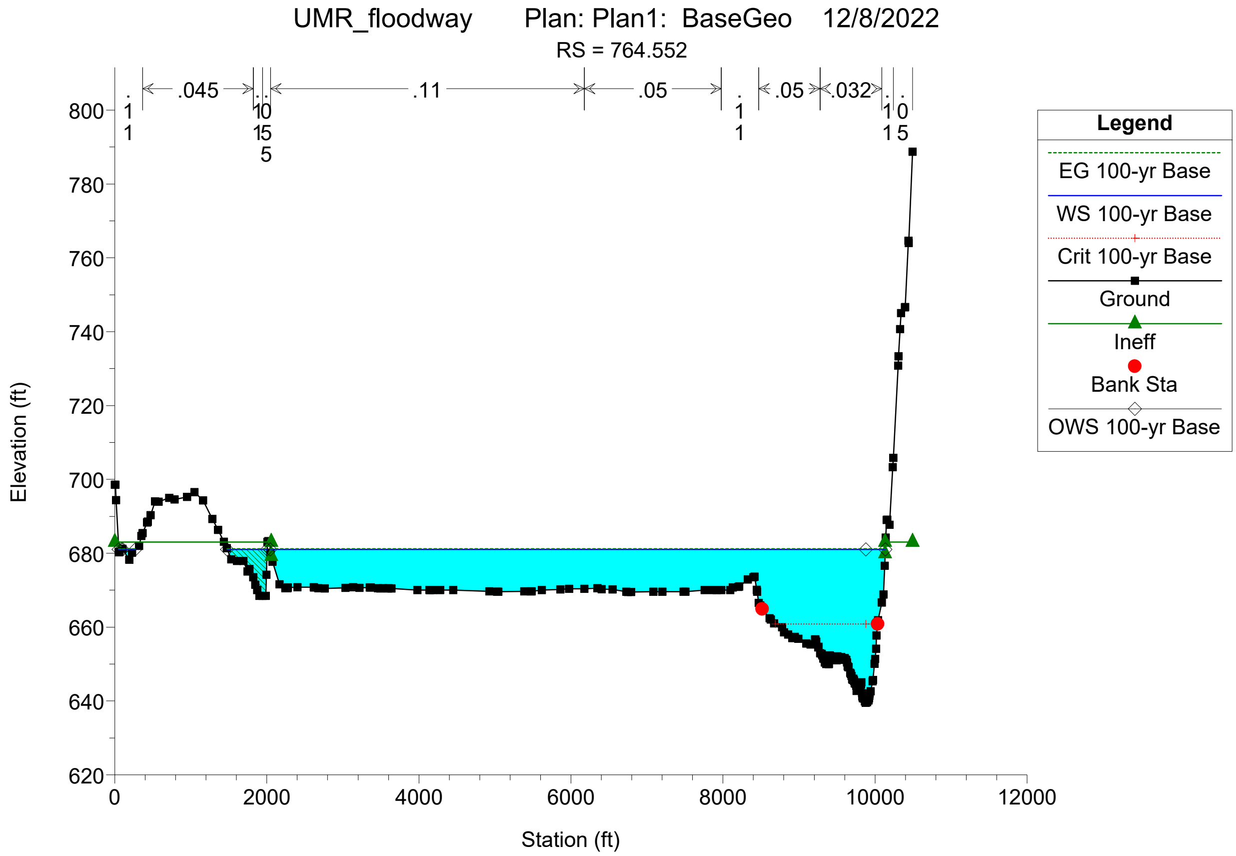
UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 767.605
.05
.032
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)


UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 766.672
.055
.032
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

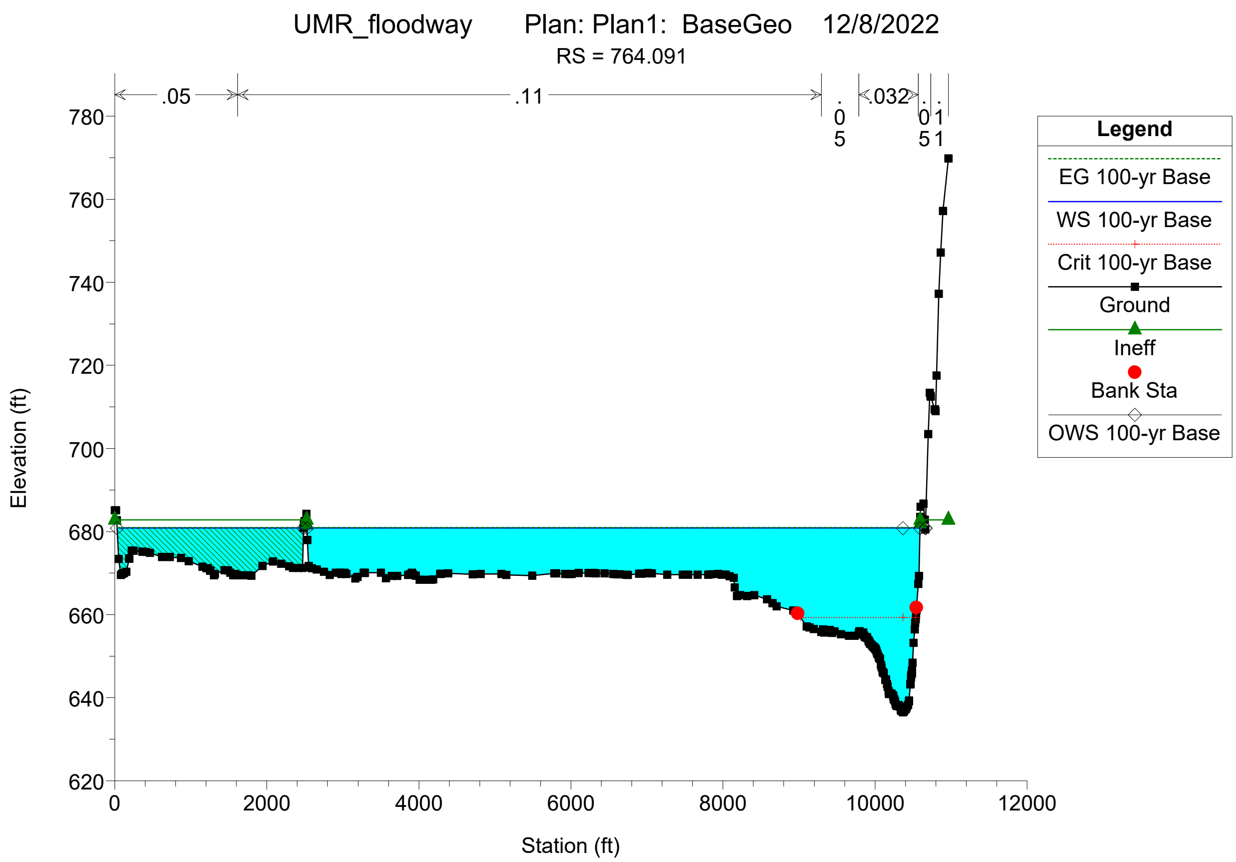

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 765.995
.05
.032
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base


UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 765.528
.045
.05
.055
.1
.05
.032
.1
.05
Elevation (ft)
760
740
720
700
680
660
640
620
0
2000
4000
6000
8000
10000
12000
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

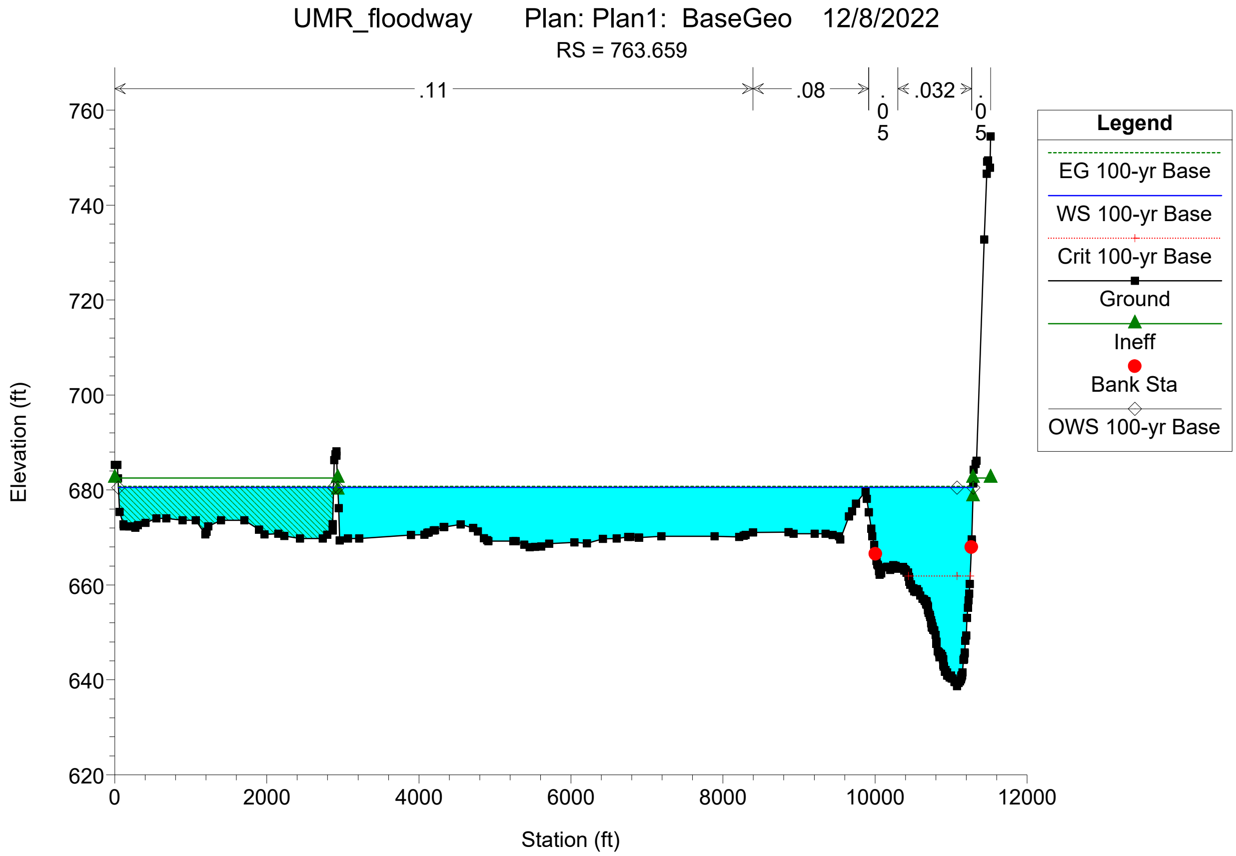

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 765.103
.05
.045
.065
.11
.08
.032
.05
.1
Elevation (ft)
780
760
740
720
700
680
660
640
620
0
2000
4000
6000
8000
10000
12000
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

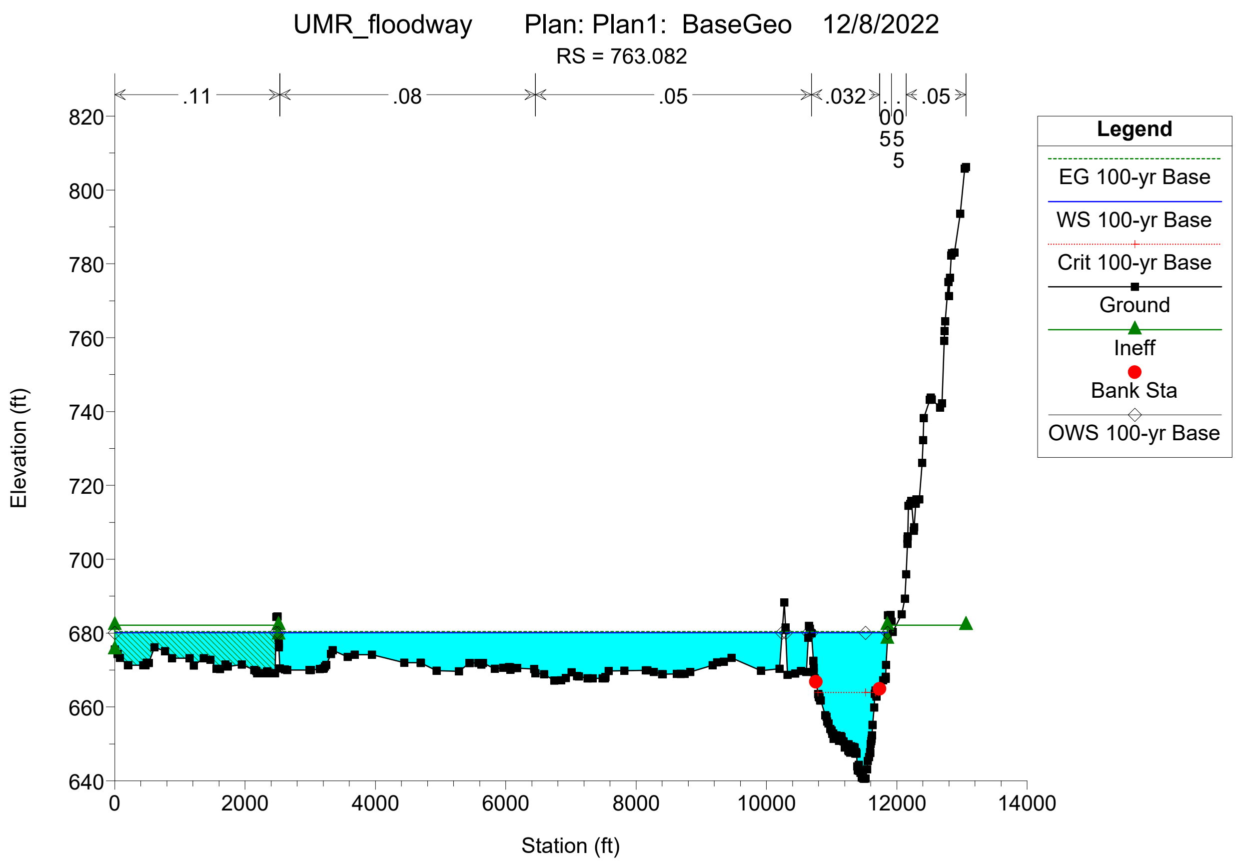


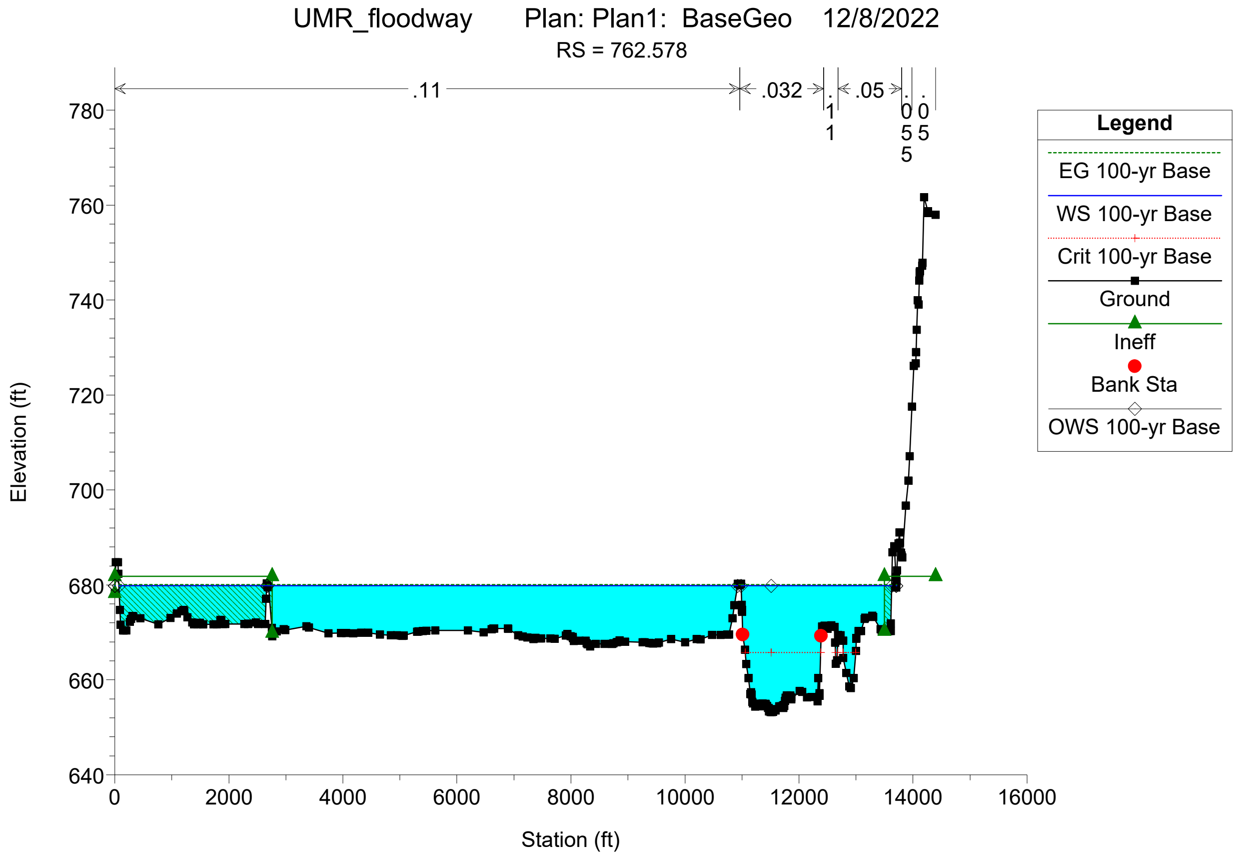
UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 764.552
.045
.11
.05
.05
.032
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

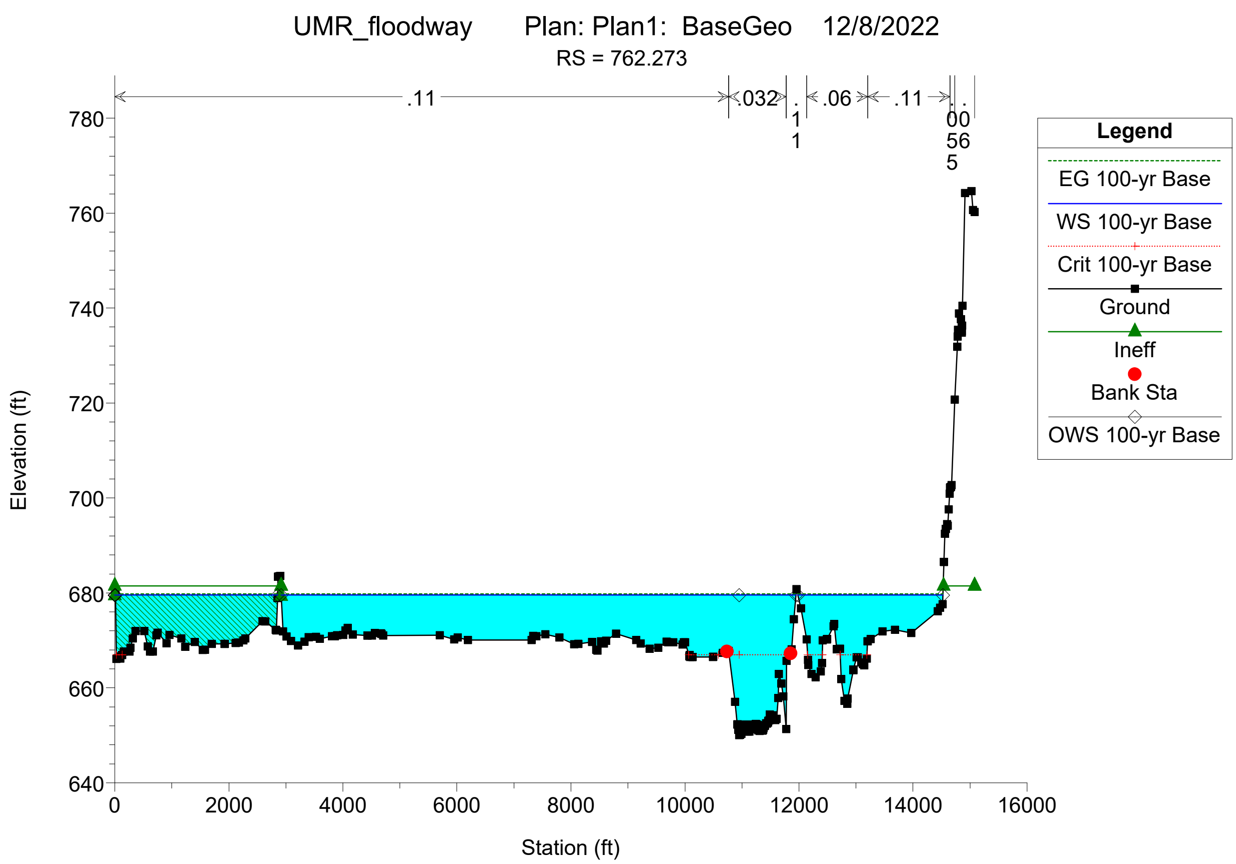


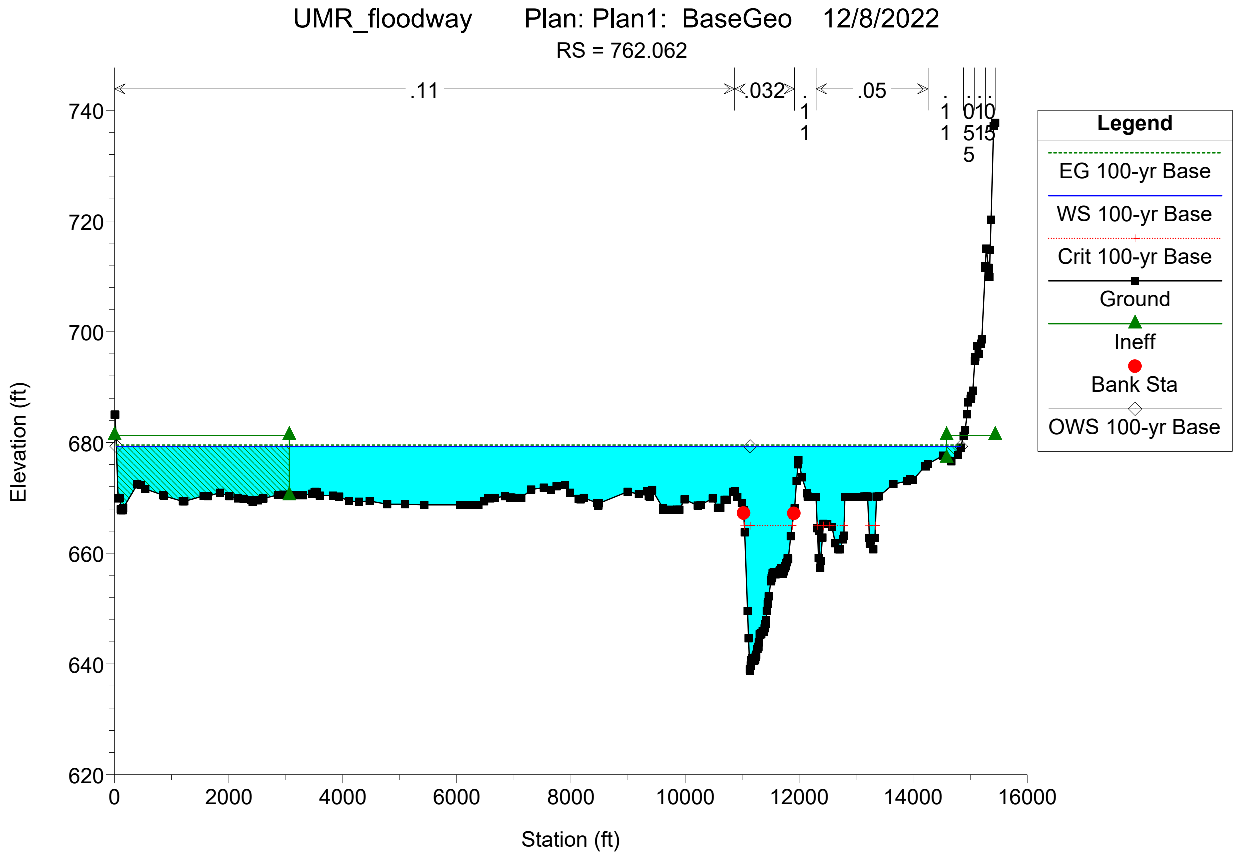
UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 764.091
.05
.11
.032
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

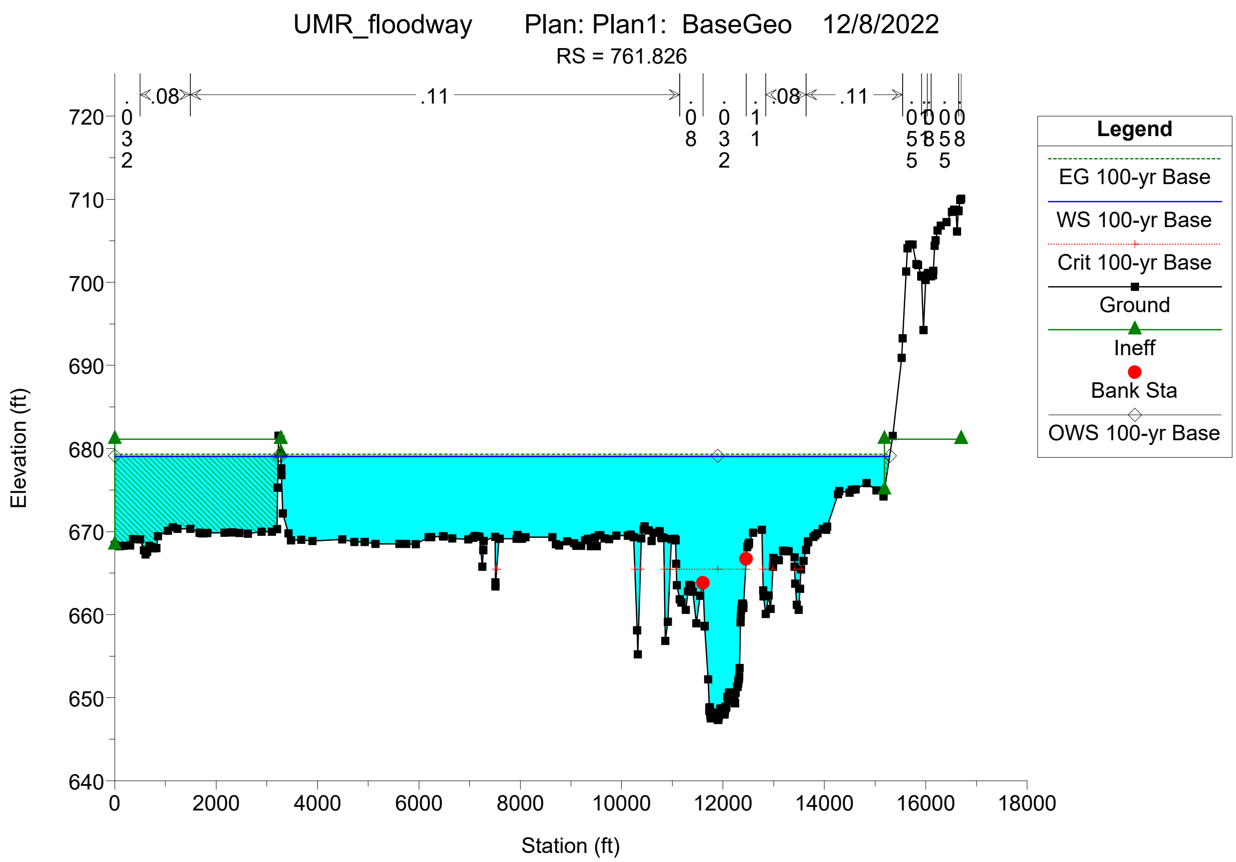

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 763.659
.11
.08
.
0
5
.032
.
0
5
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
760
740
720
700
680
660
640
620
0
2000
4000
6000
8000
10000
12000
Station (ft)

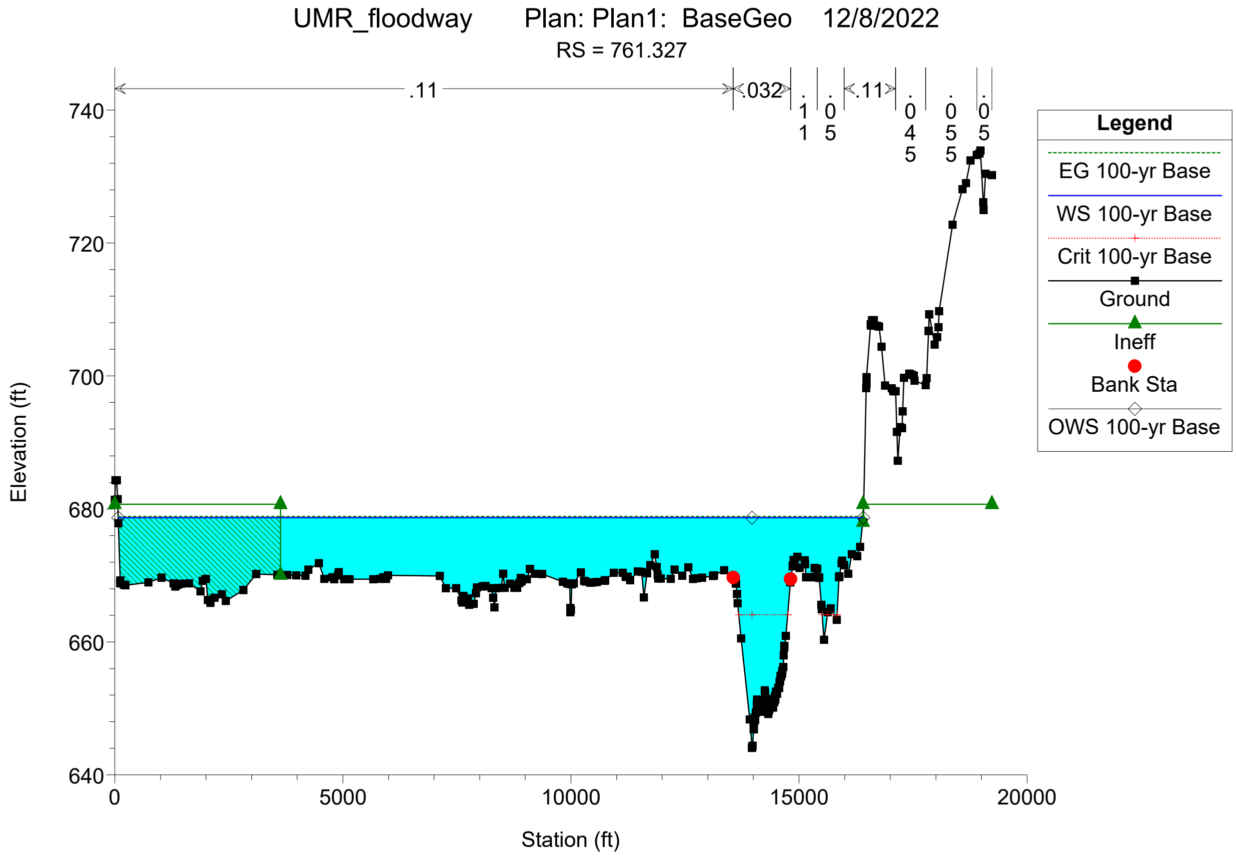

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 763.082
.11
.08
.05
.032
.
.
00
55
5
.05
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
820
800
780
760
740
720
700
680
660
640
0
2000
4000
6000
8000
10000
12000
14000
Station (ft)

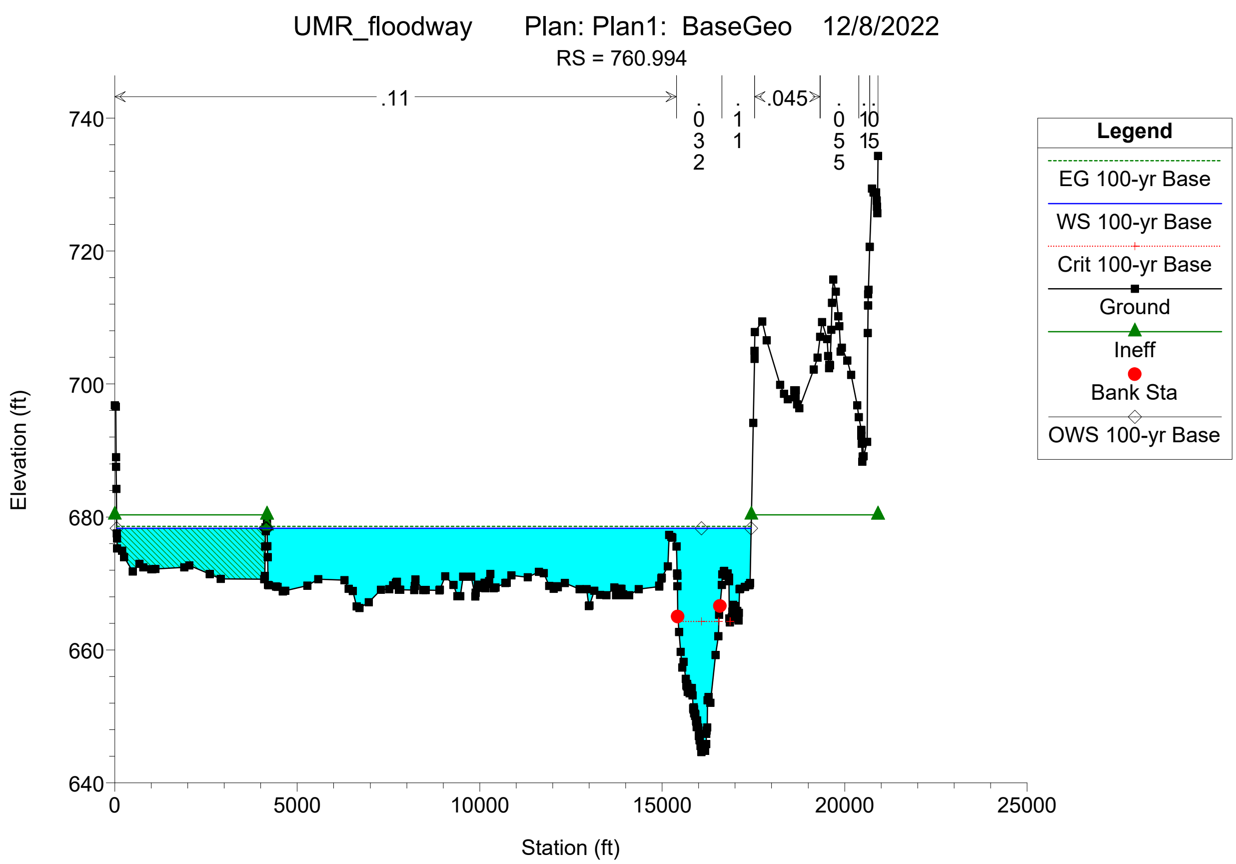

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 762.578
.11
.032
.05
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
780
760
740
720
700
680
660
640
0
2000
4000
6000
8000
10000
12000
14000
16000
Station (ft)

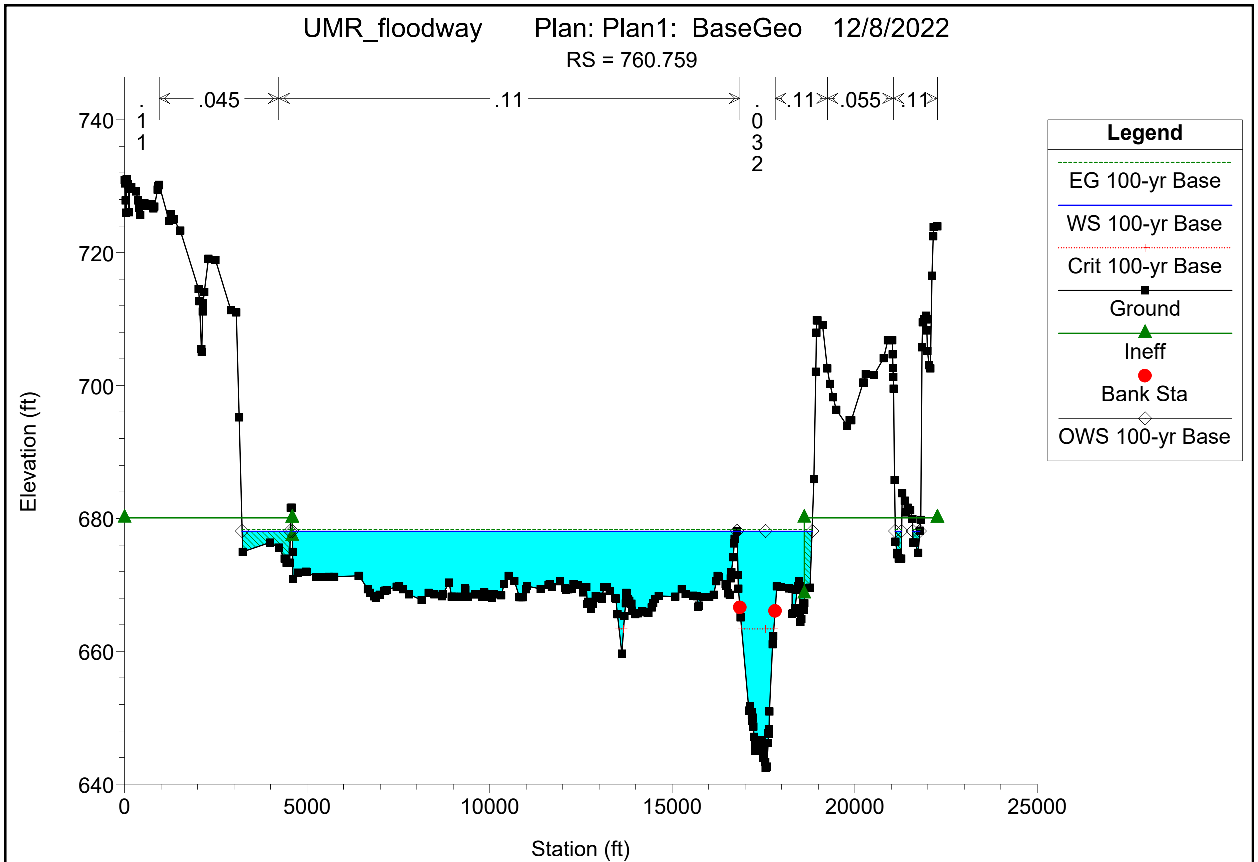

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 762.273
.11
.032
.06
.11
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
780
760
740
720
700
680
660
640
0
2000
4000
6000
8000
10000
12000
14000
16000
Station (ft)

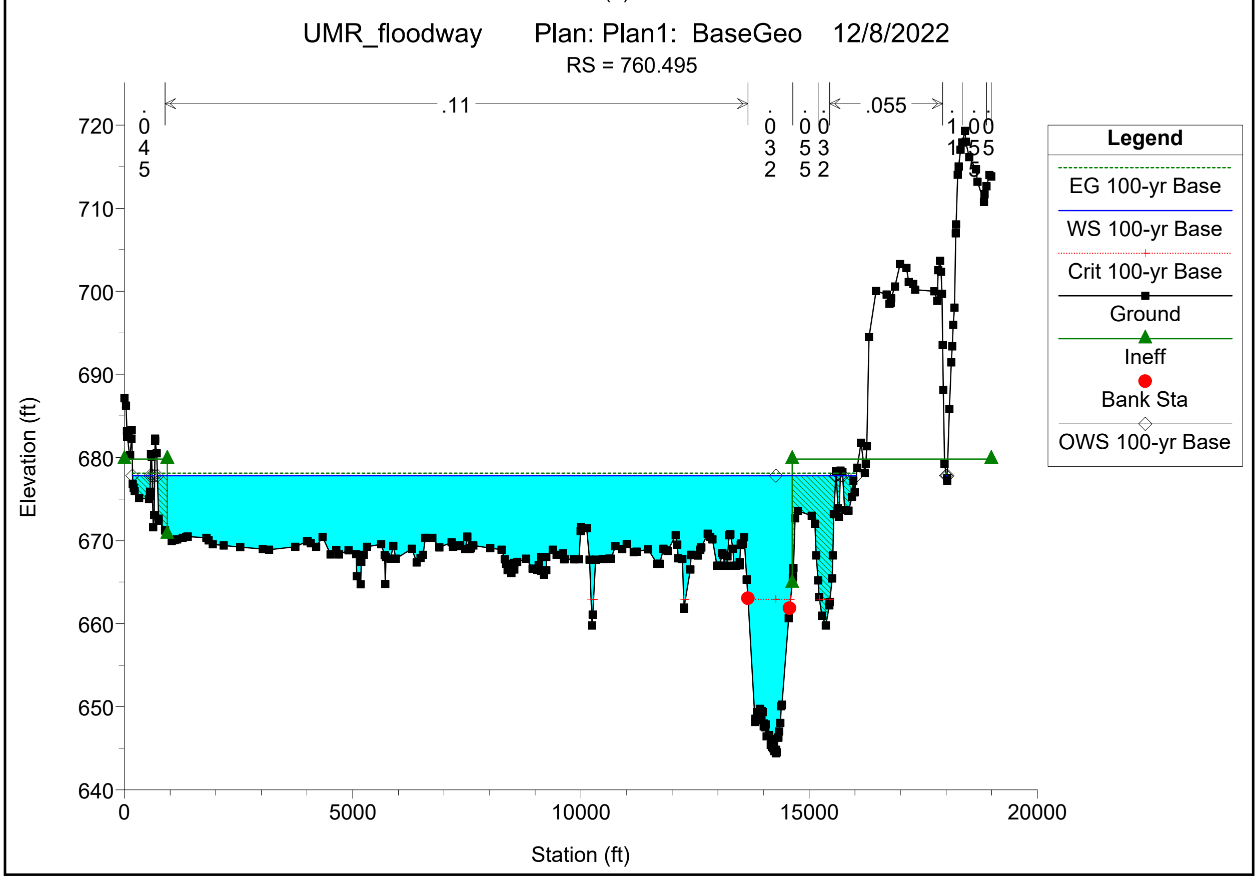

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 762.062
.11
.032
.05
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)
740
720
700
680
660
640
620
0
2000
4000
6000
8000
10000
12000
14000
16000

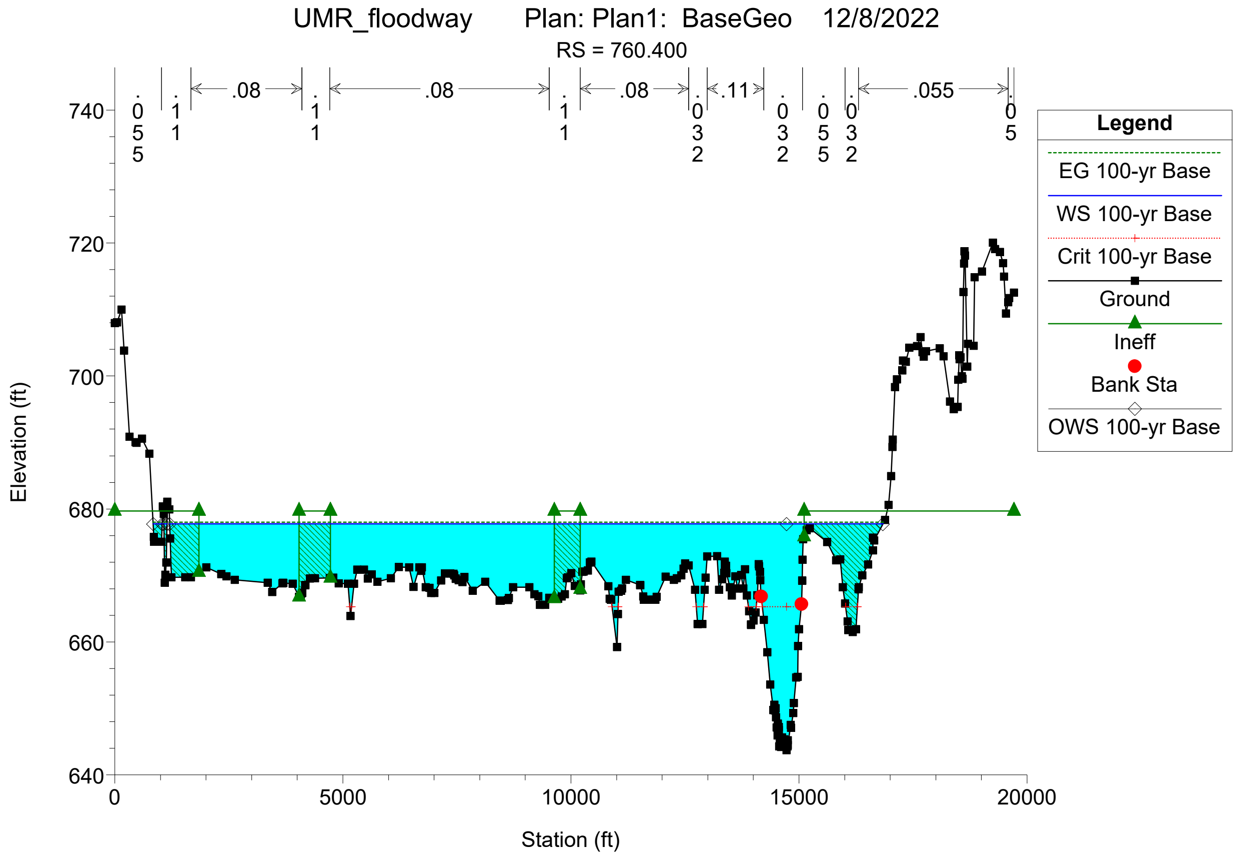

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 761.826
.08
.11
.08
.11
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)
720
710
700
690
680
670
660
650
640
0
2000
4000
6000
8000
10000
12000
14000
16000
18000

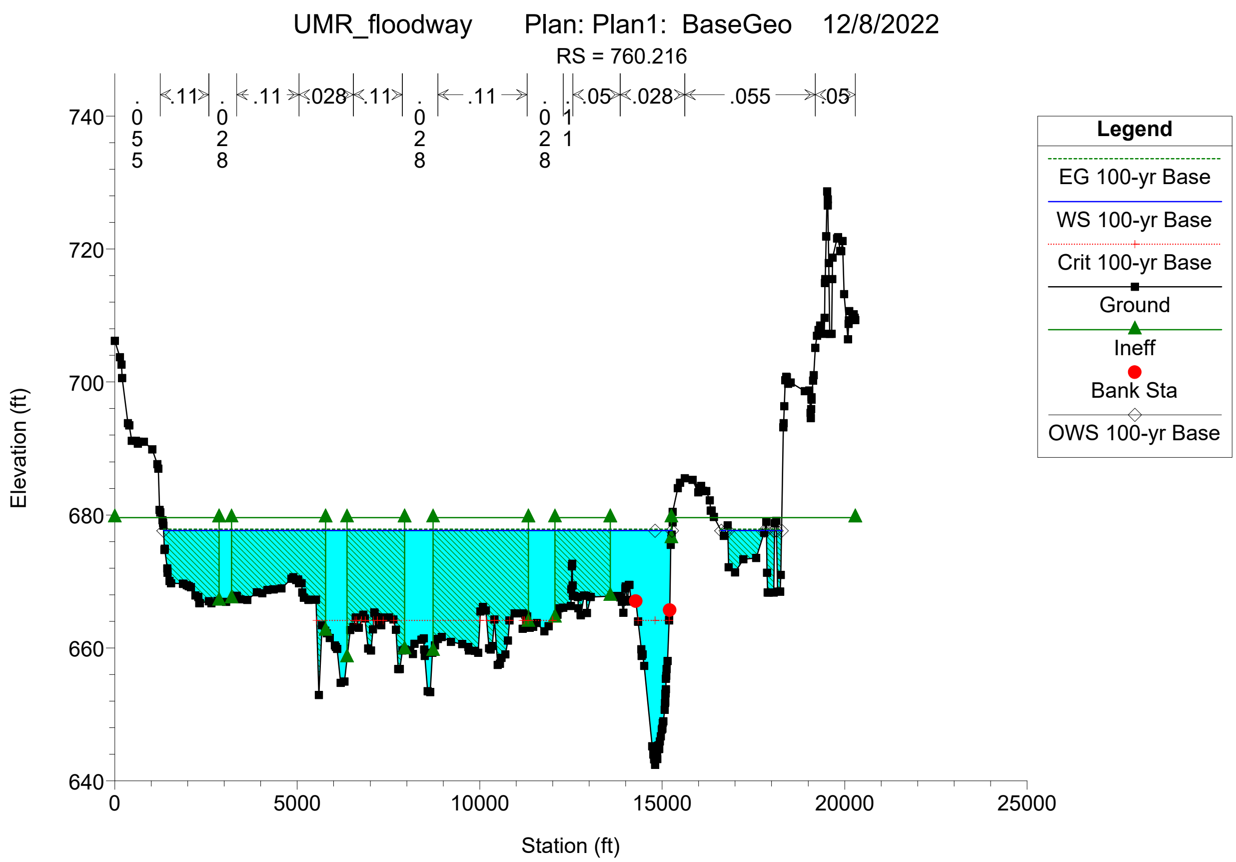

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 761.327
.11
.032
.11
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)
640
660
680
700
720
740
0
5000
10000
15000
20000

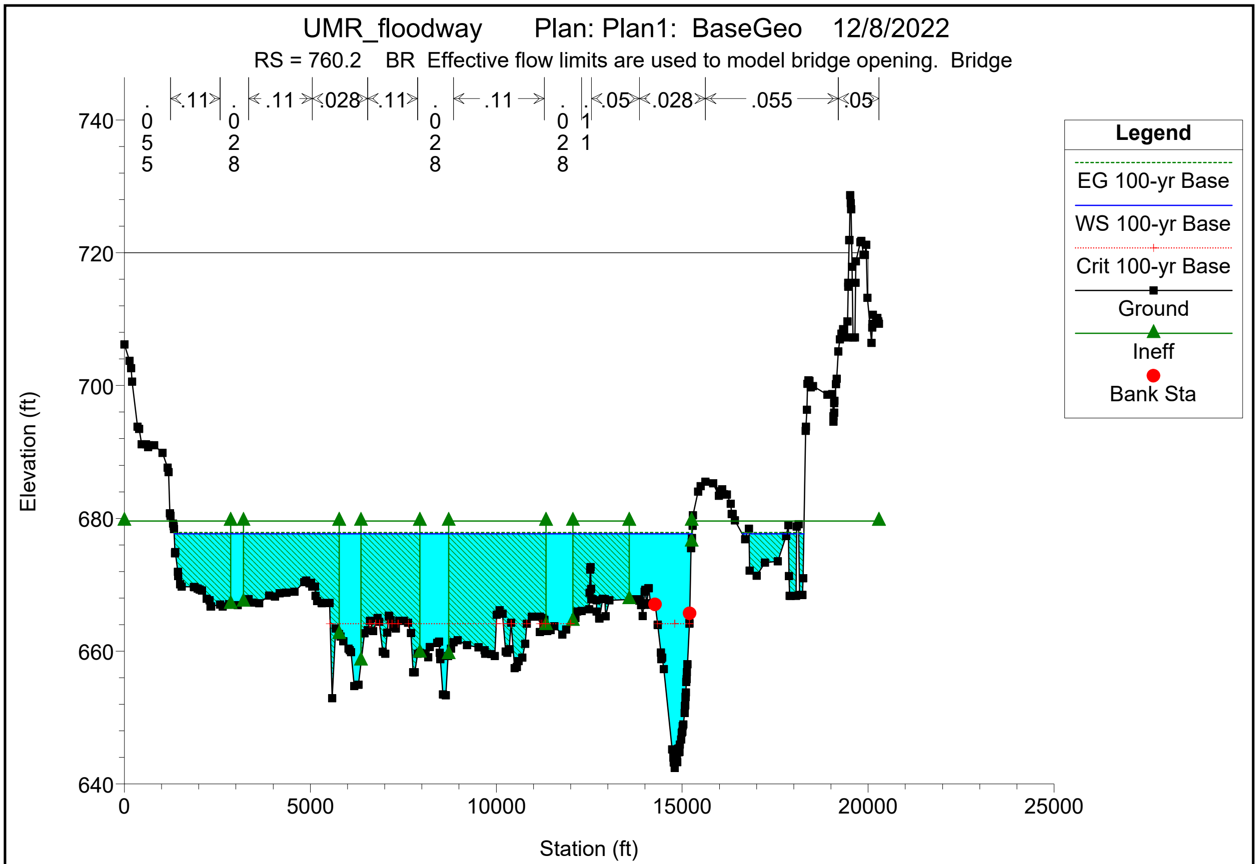

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 760.994
.11
.045
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)
640
660
680
700
720
740
0
5000
10000
15000
20000
25000

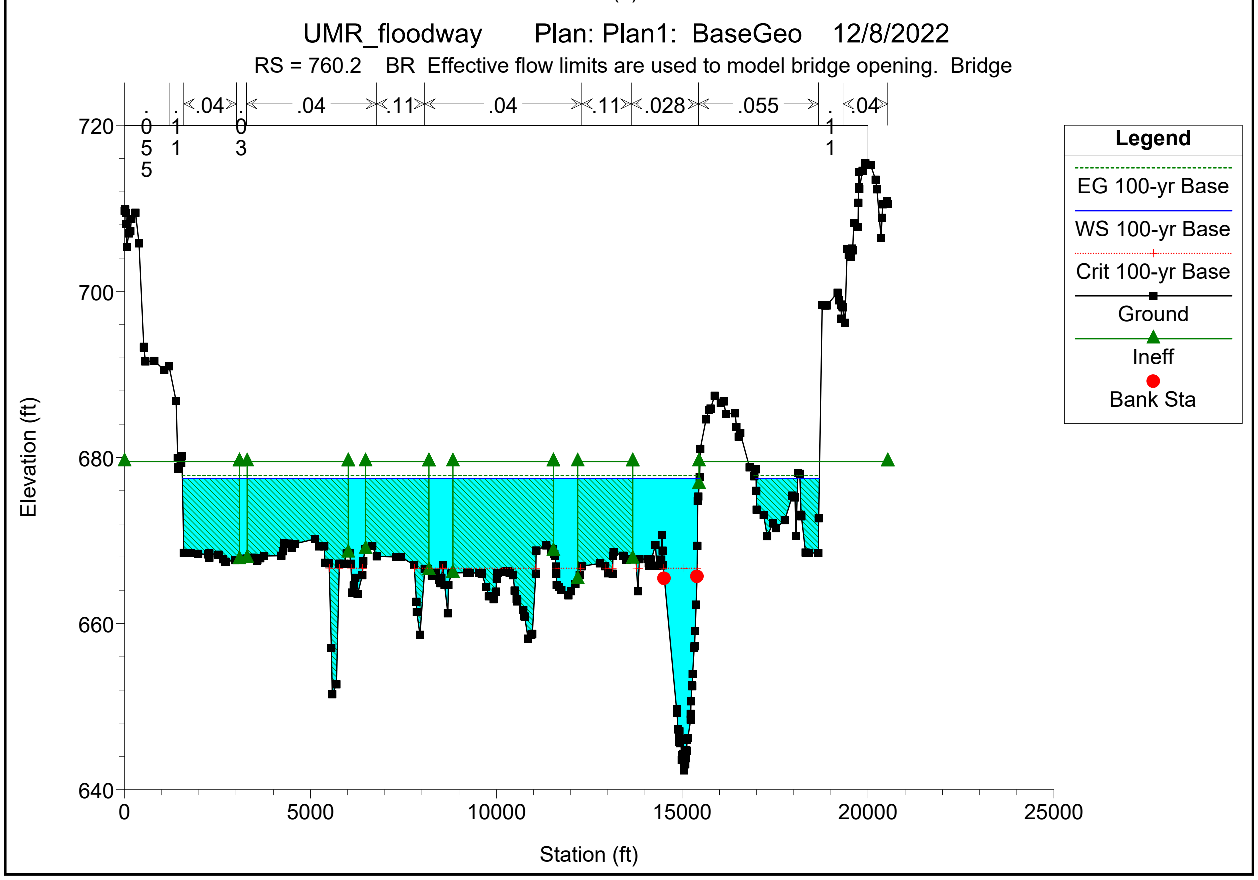

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 760.759
.045
.11
.11
.055
.11
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

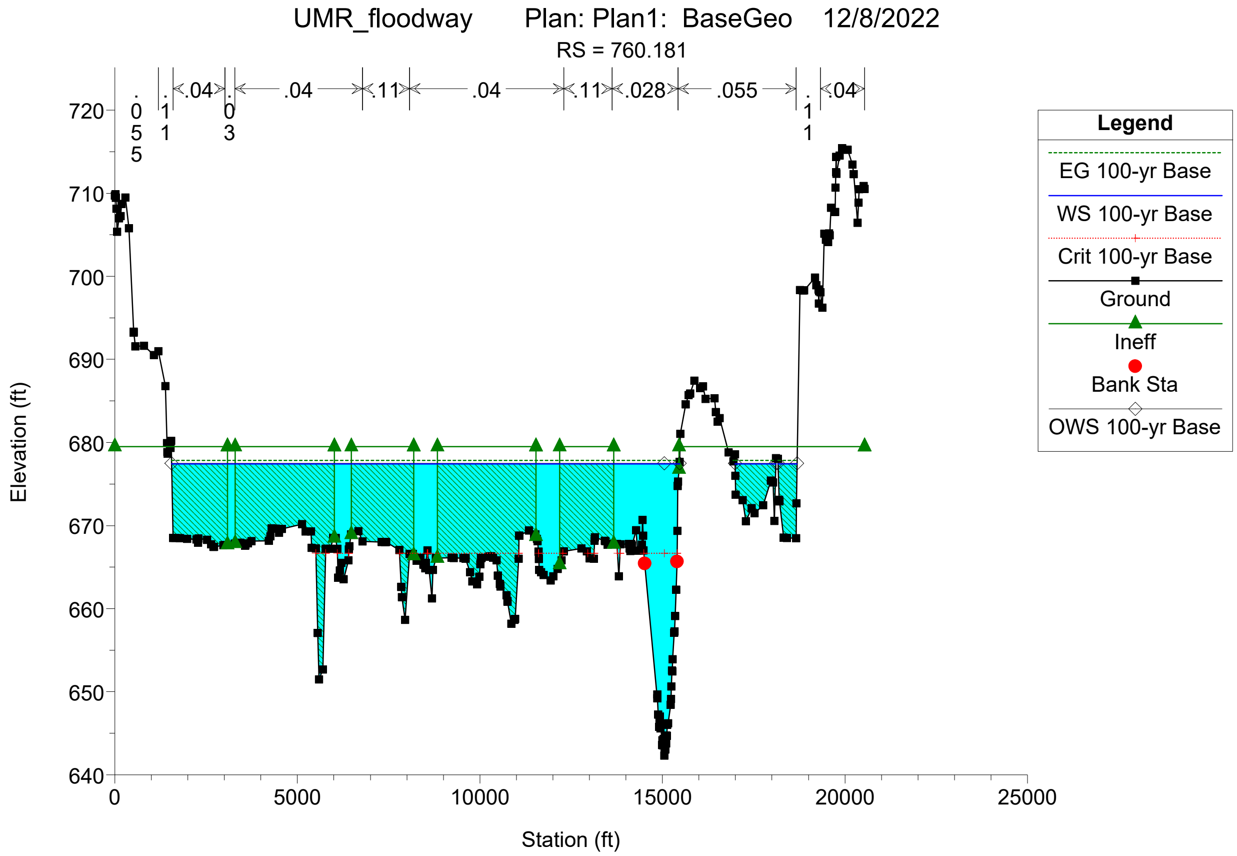

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 760.495
.11
.055
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

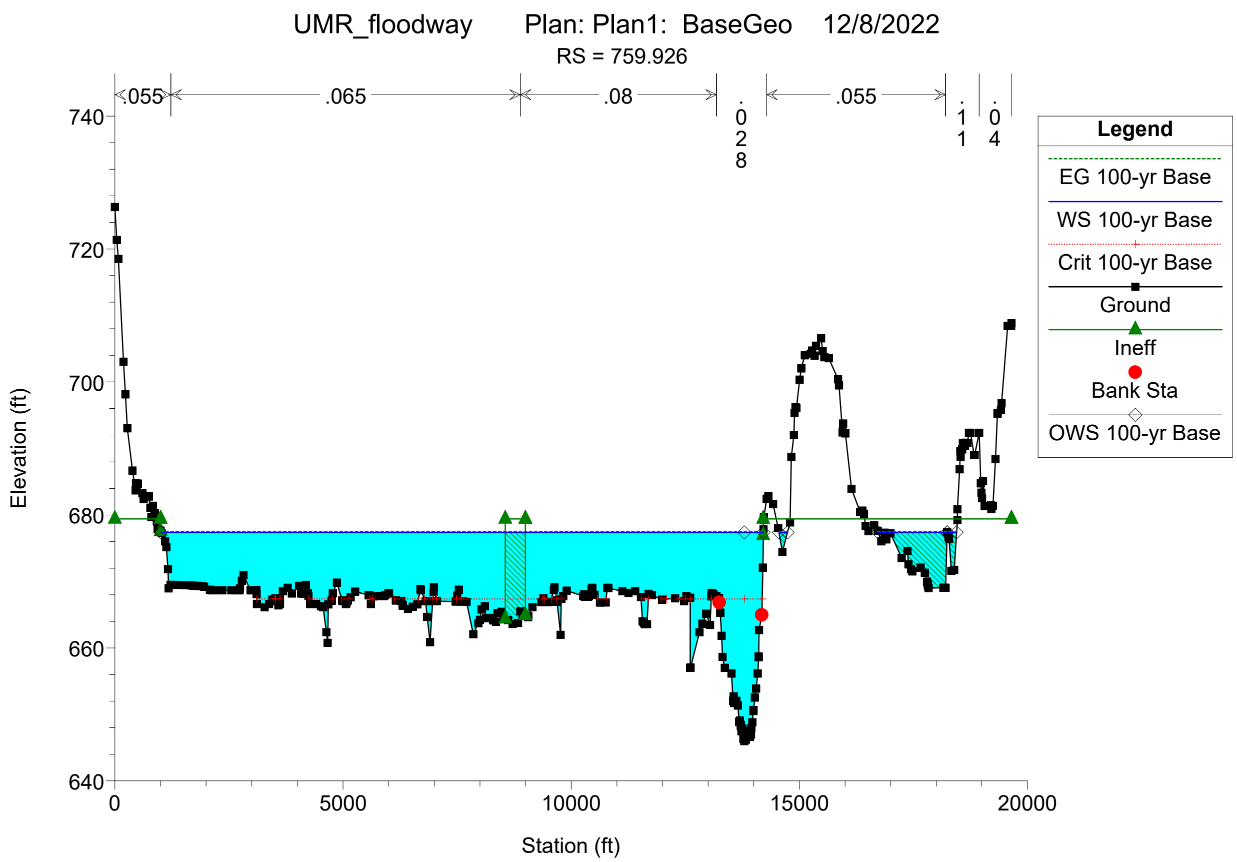

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 760.400
.08
.08
.08
.11
.055
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

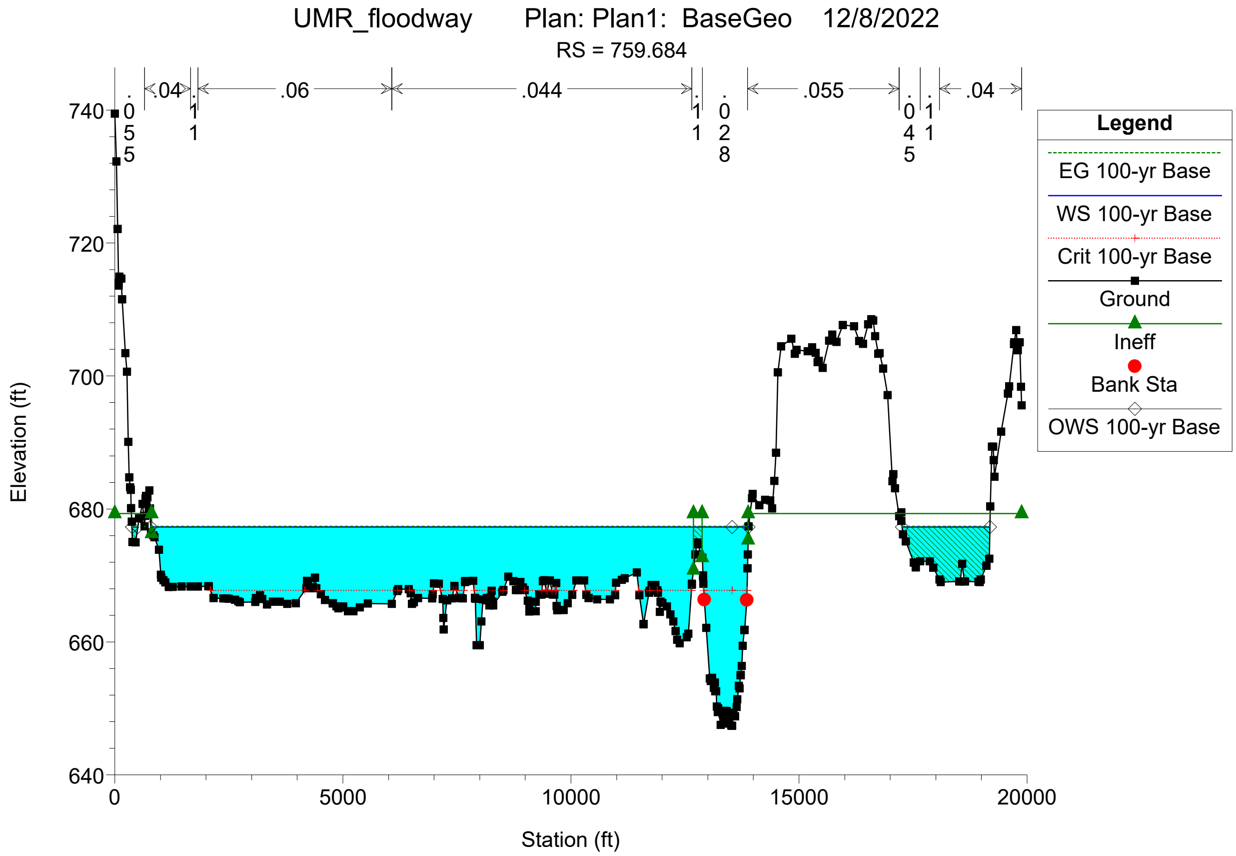

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 760.216
.11
.11
.028
.11
.11
.05
.028
.055
.05
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

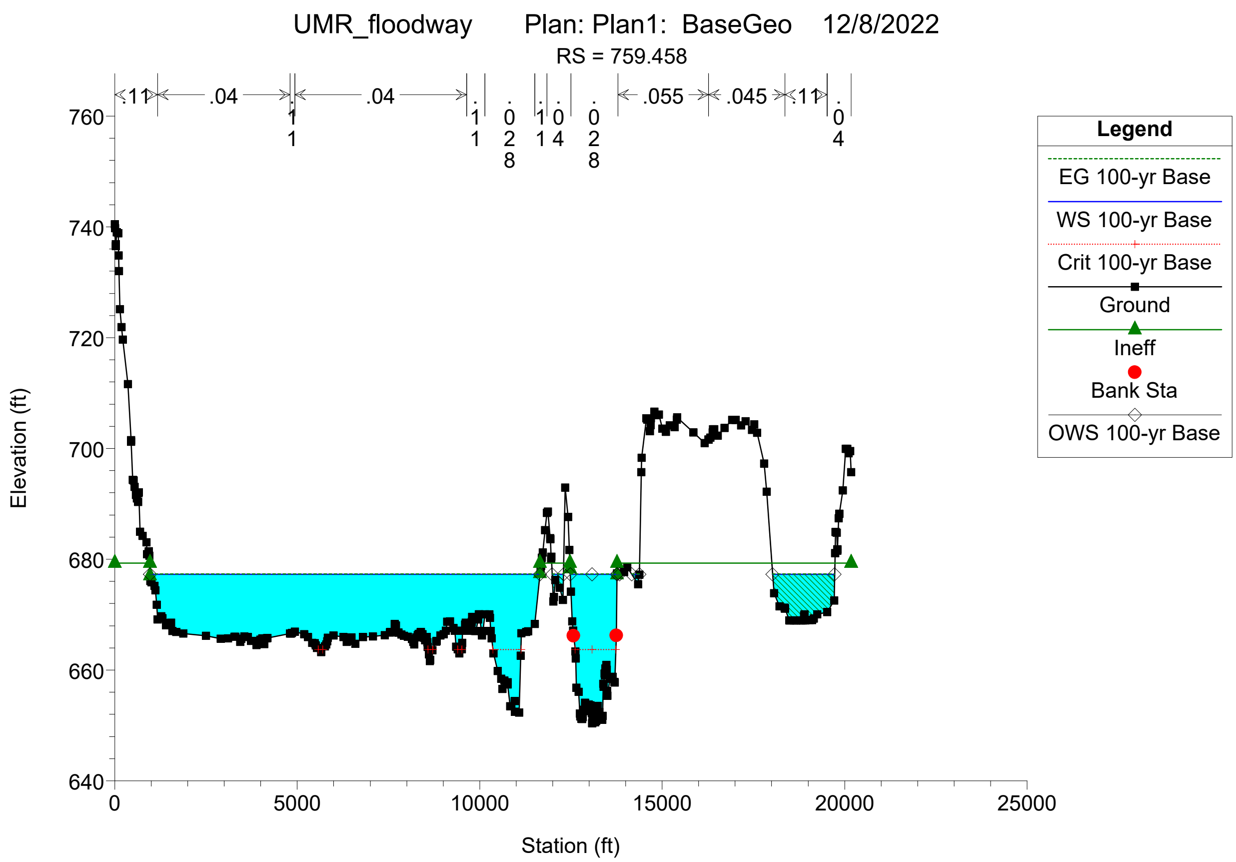

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 760.2 BR Effective flow limits are used to model bridge opening. Bridge
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta

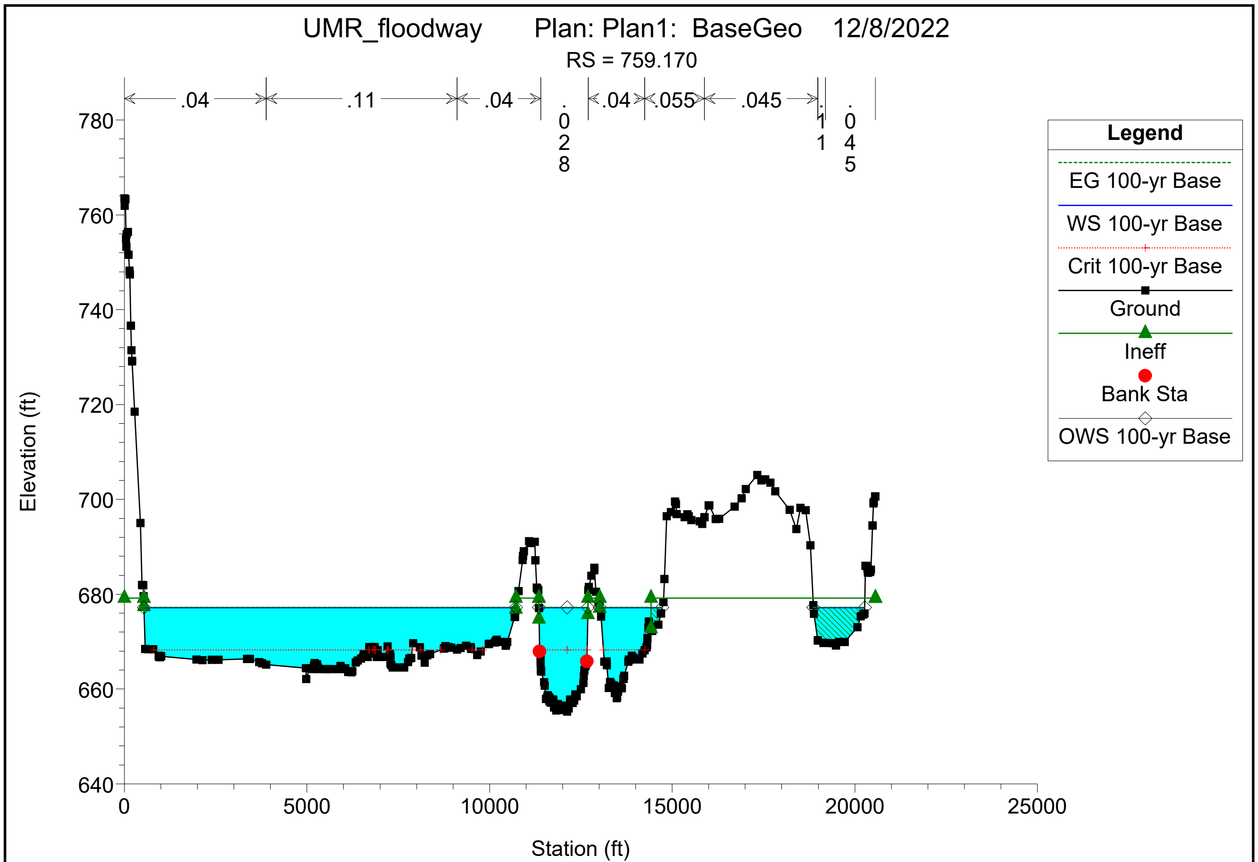

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 760.2 BR Effective flow limits are used to model bridge opening. Bridge
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta

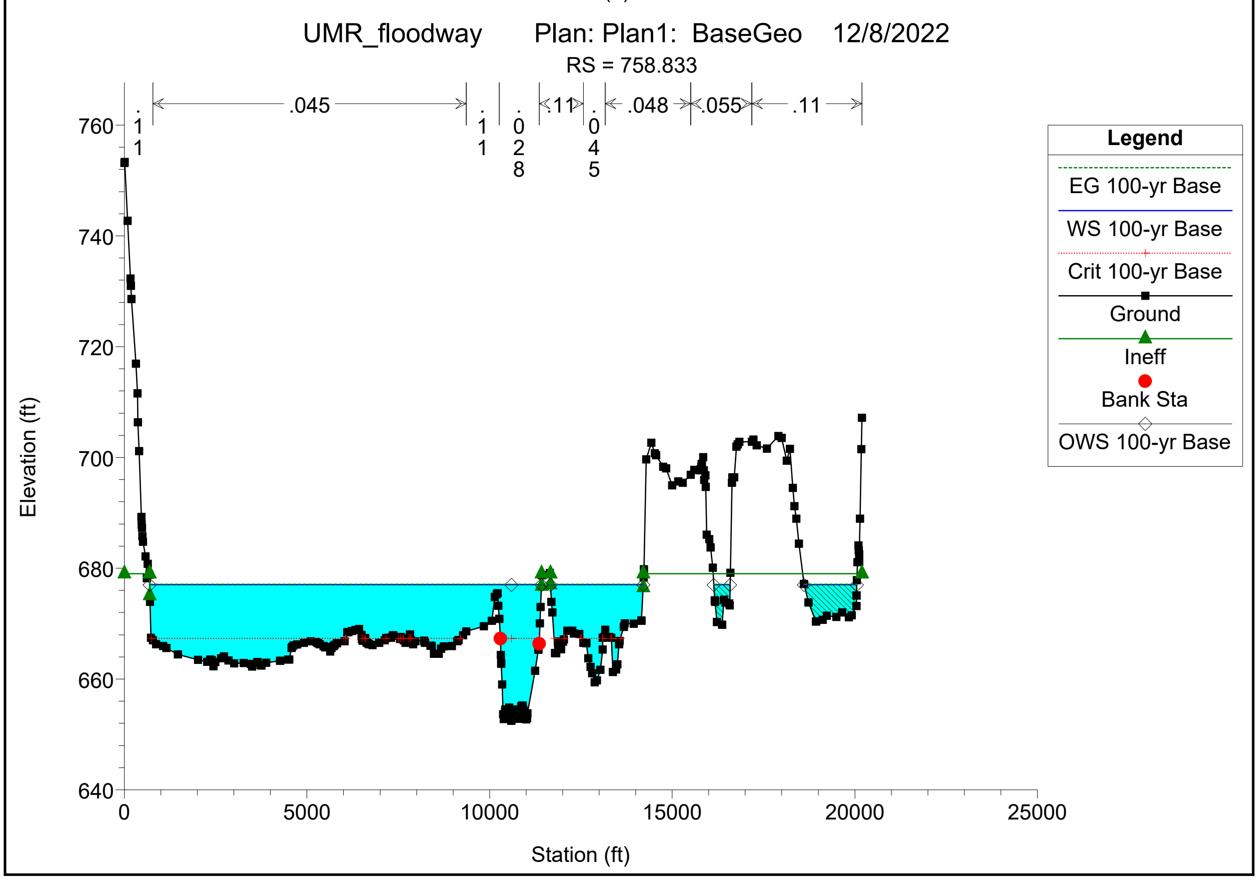

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 760.181
.055 .11 .04 .03 .04 .11 .04 .11 .028 .055 .11 .04
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

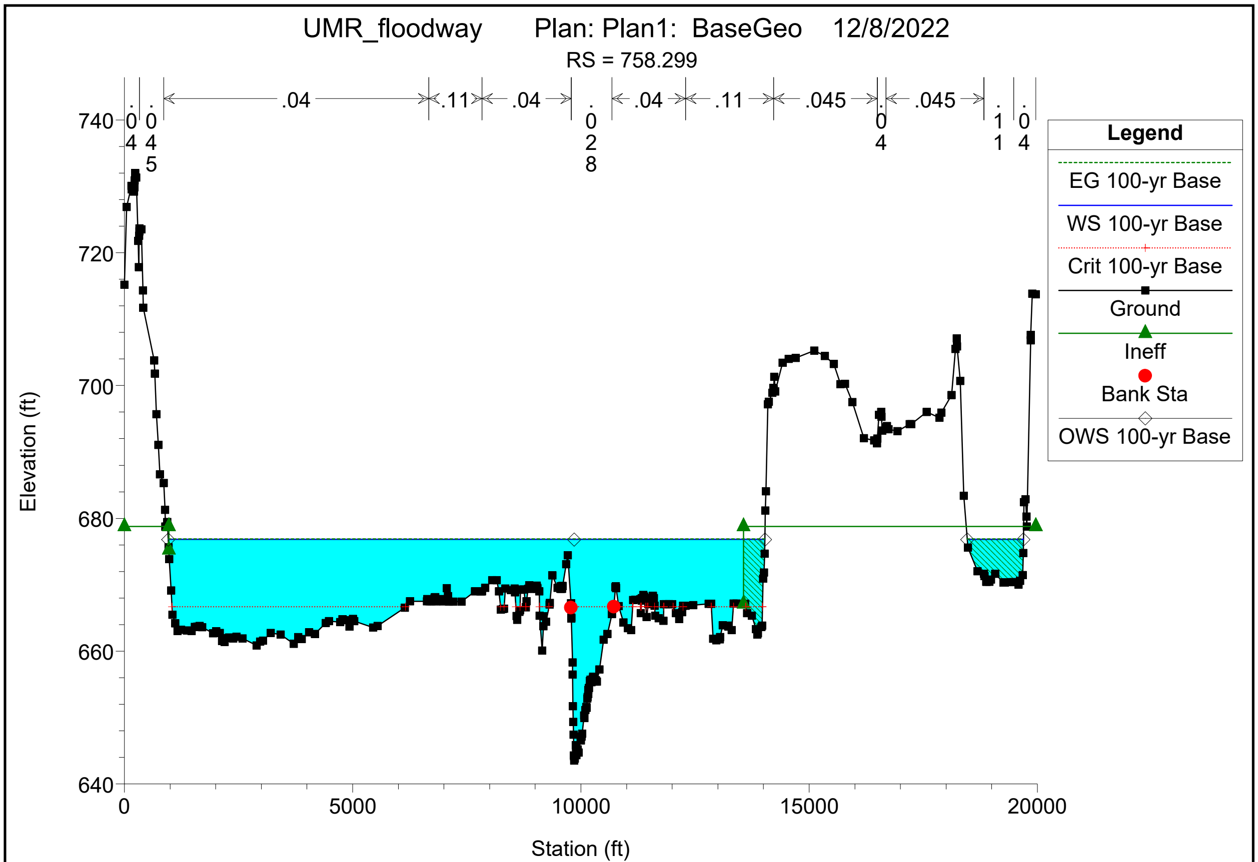

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 759.926
.055 .065 .08 .028 .055 .11 .04
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

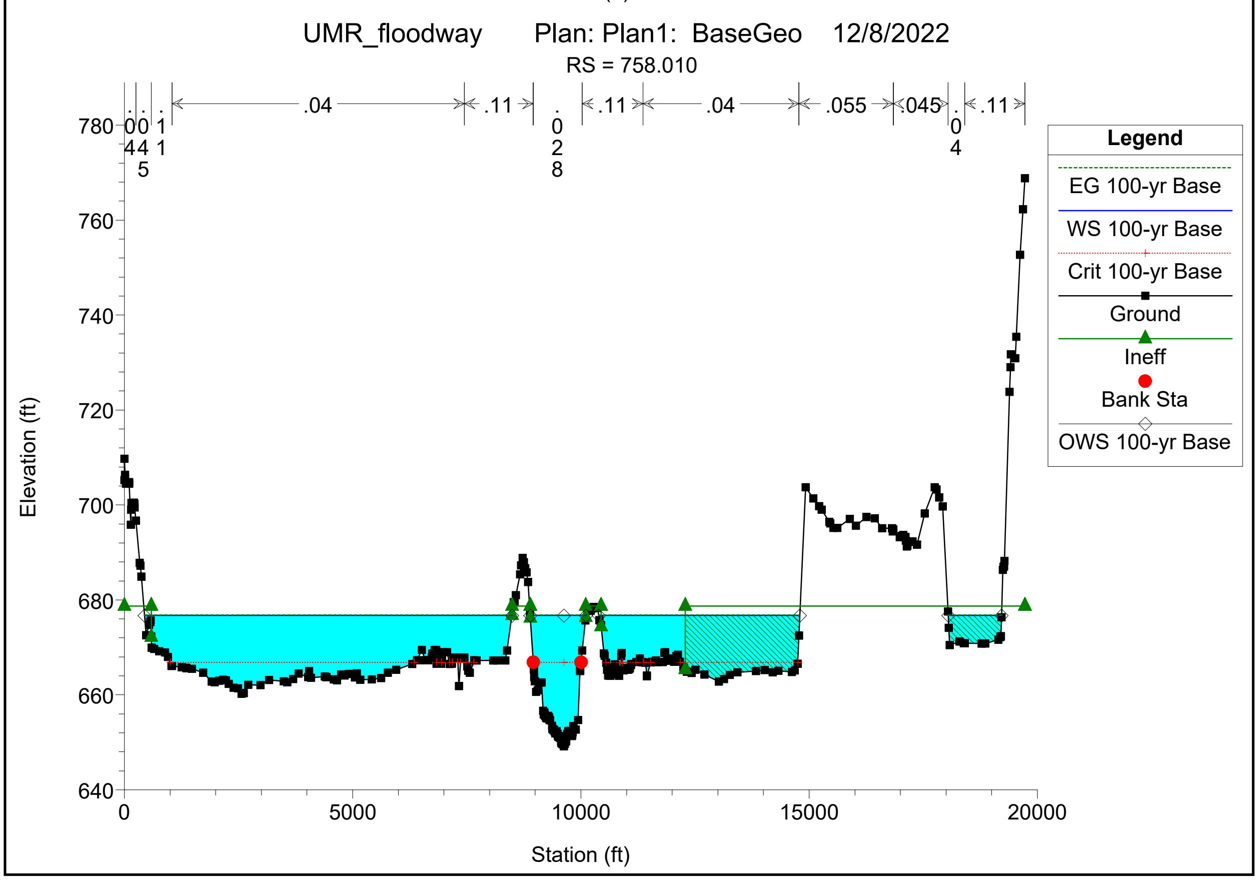

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 759.684
.055
.04
.11
.06
.044
.11
.028
.055
.045
.11
.04
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

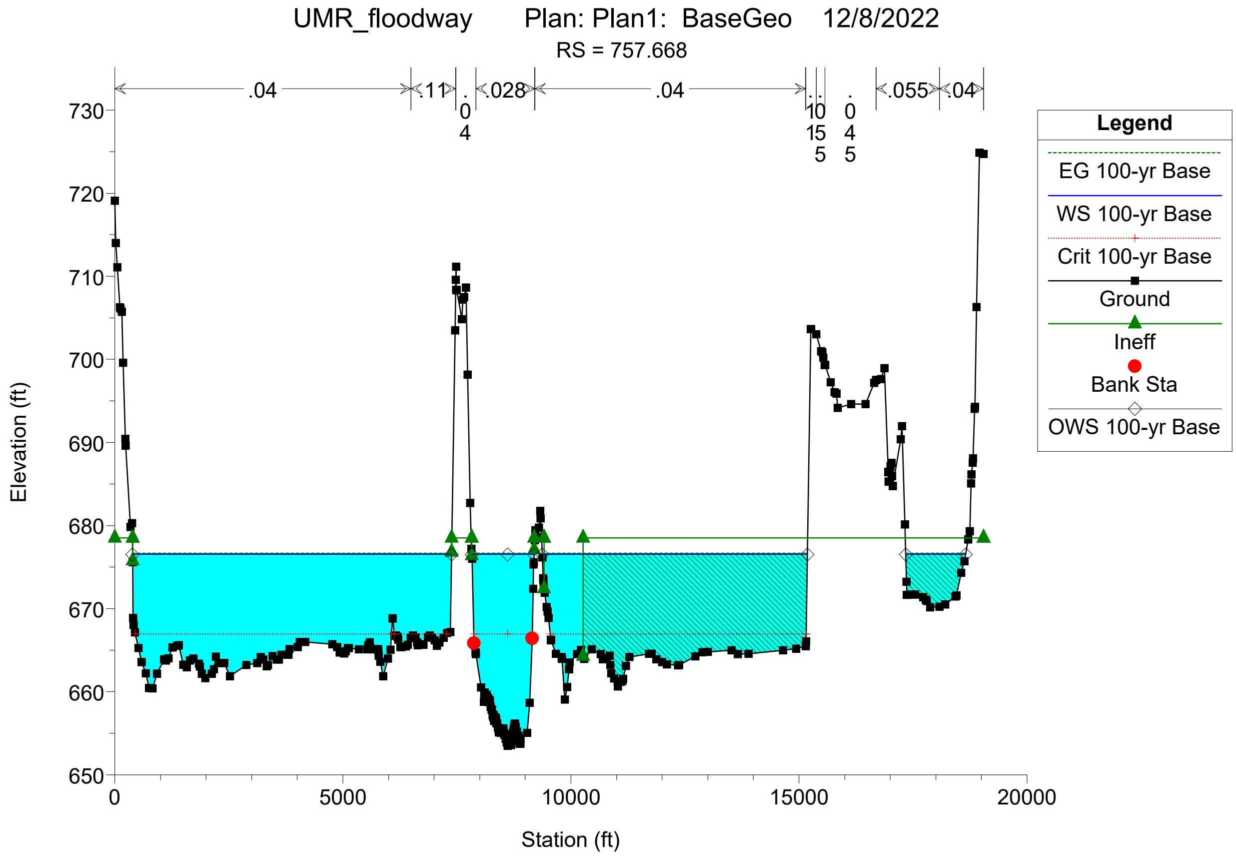

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 759.458
.11
.04
.11
.04
.11
.028
.11
.04
.028
.055
.045
.11
.04
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base


UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 759.170
.04
.11
.04
.028
.04
.055
.045
.11
.045
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

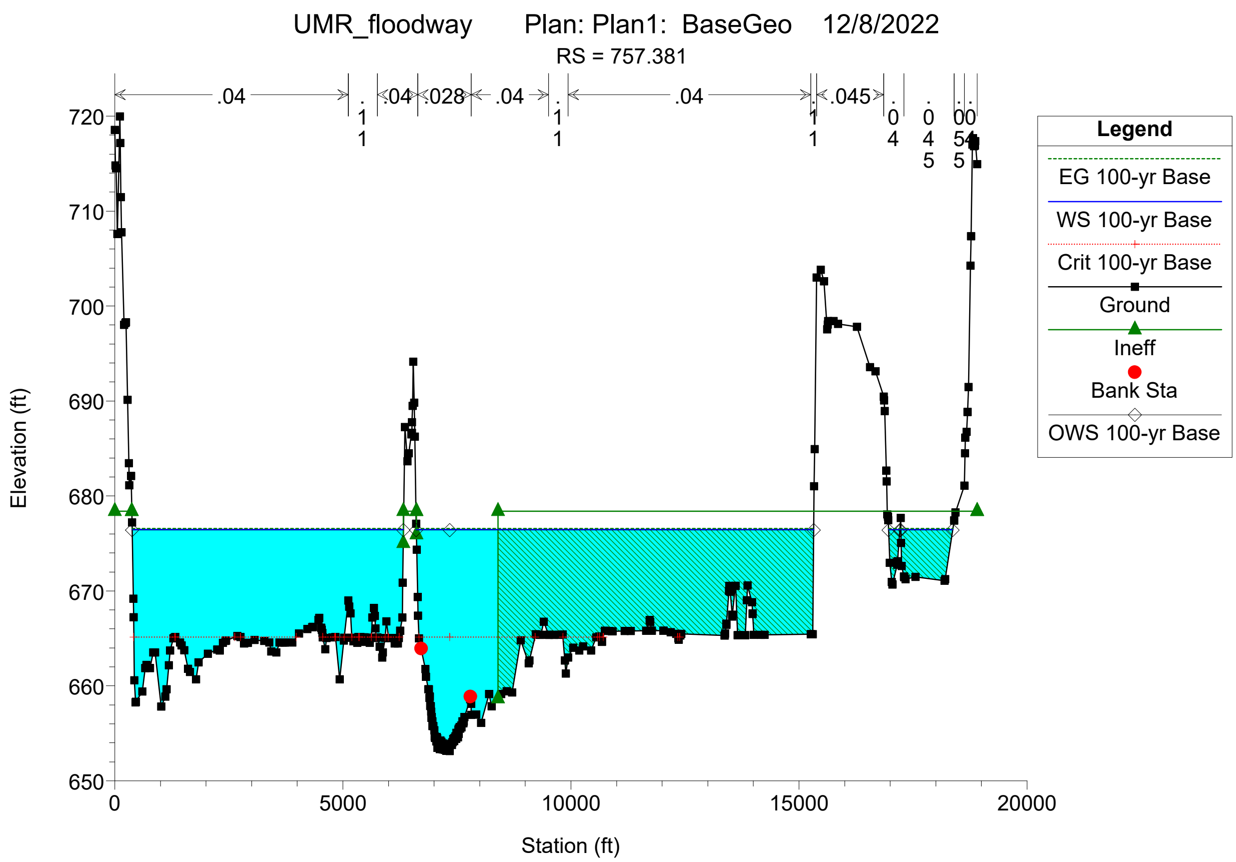

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 758.833
.11
.045
.11
.028
.11
.045
.048
.055
.11
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)


UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 758.299
.04
.11
.04
.04
.11
.045
.045
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

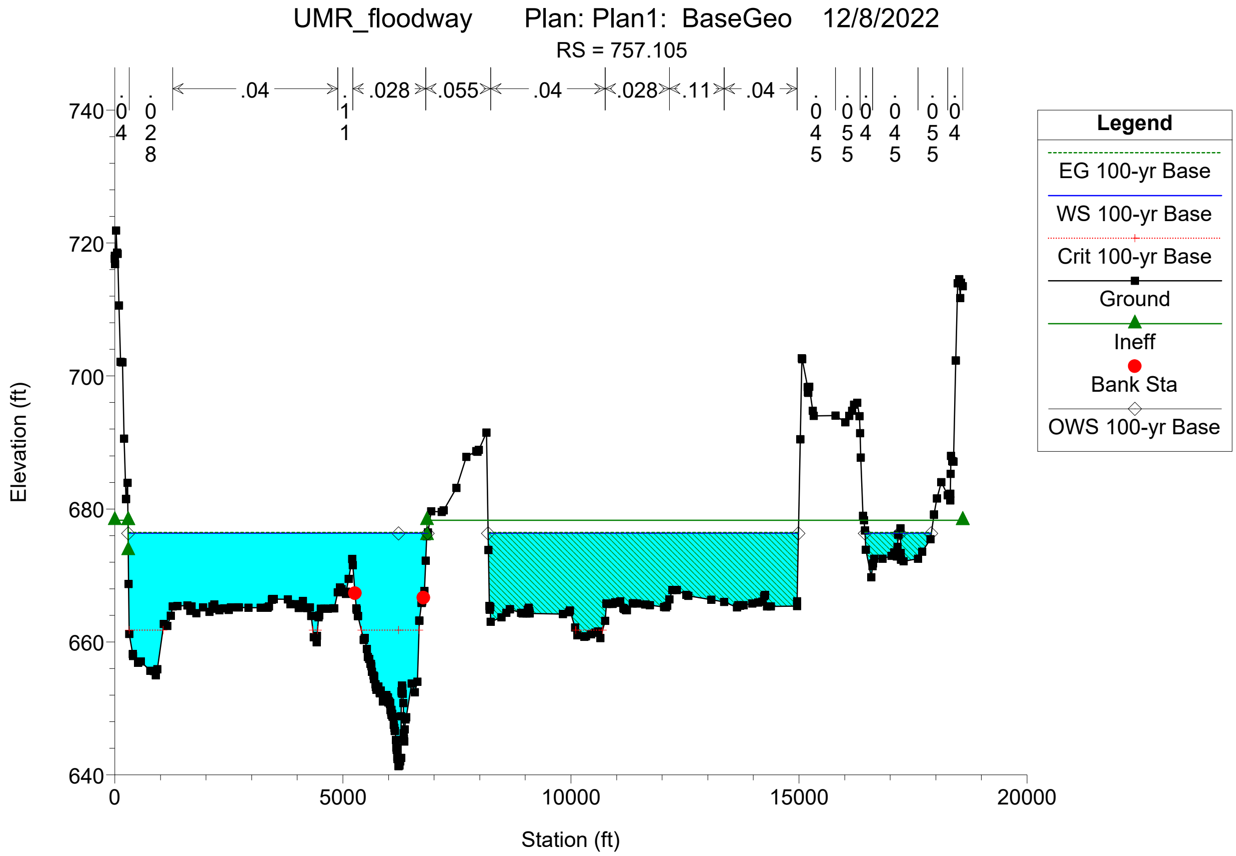

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 758.010
.04
.11
.11
.04
.055
.045
.11
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base



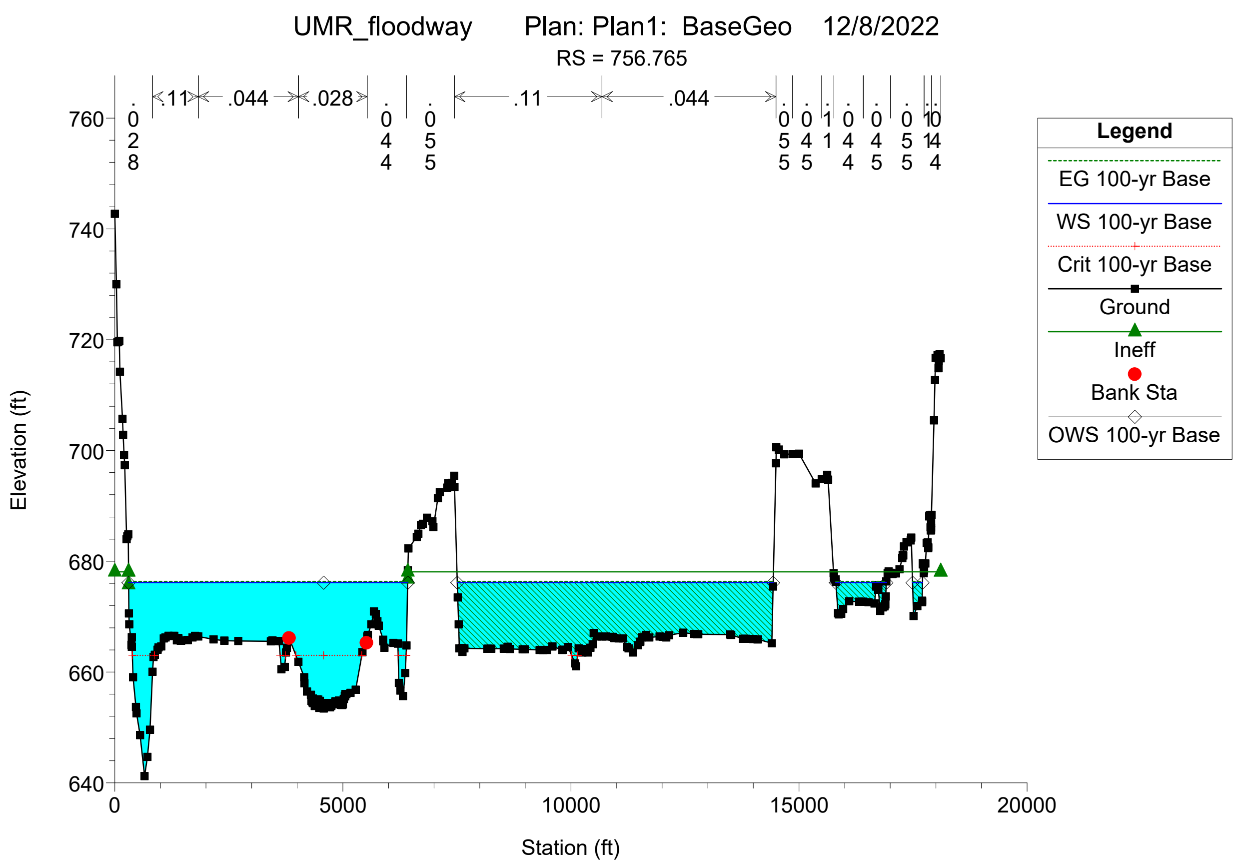
UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 757.668
.04
.11
.028
.04
.055
.04
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)



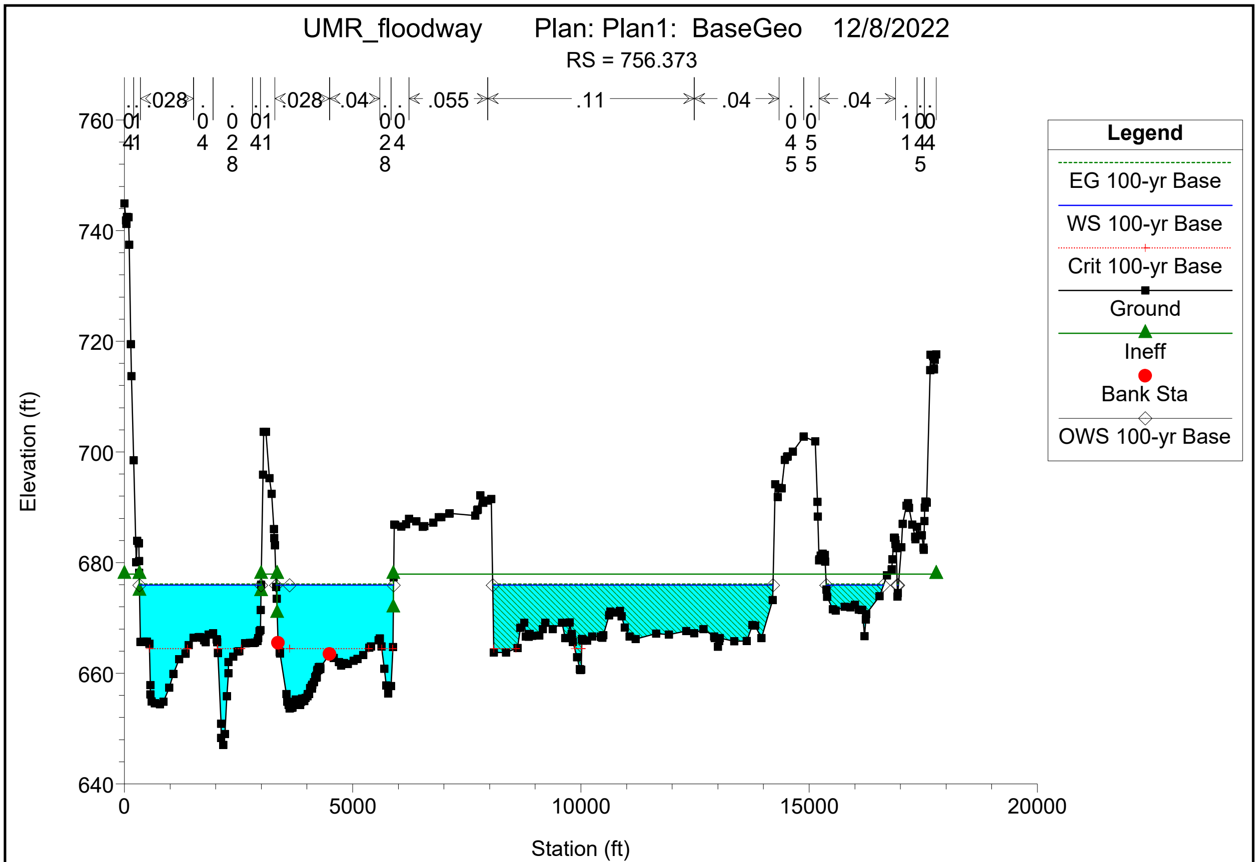
UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 757.381
.04
.04
.028
.04
.04
.045
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)



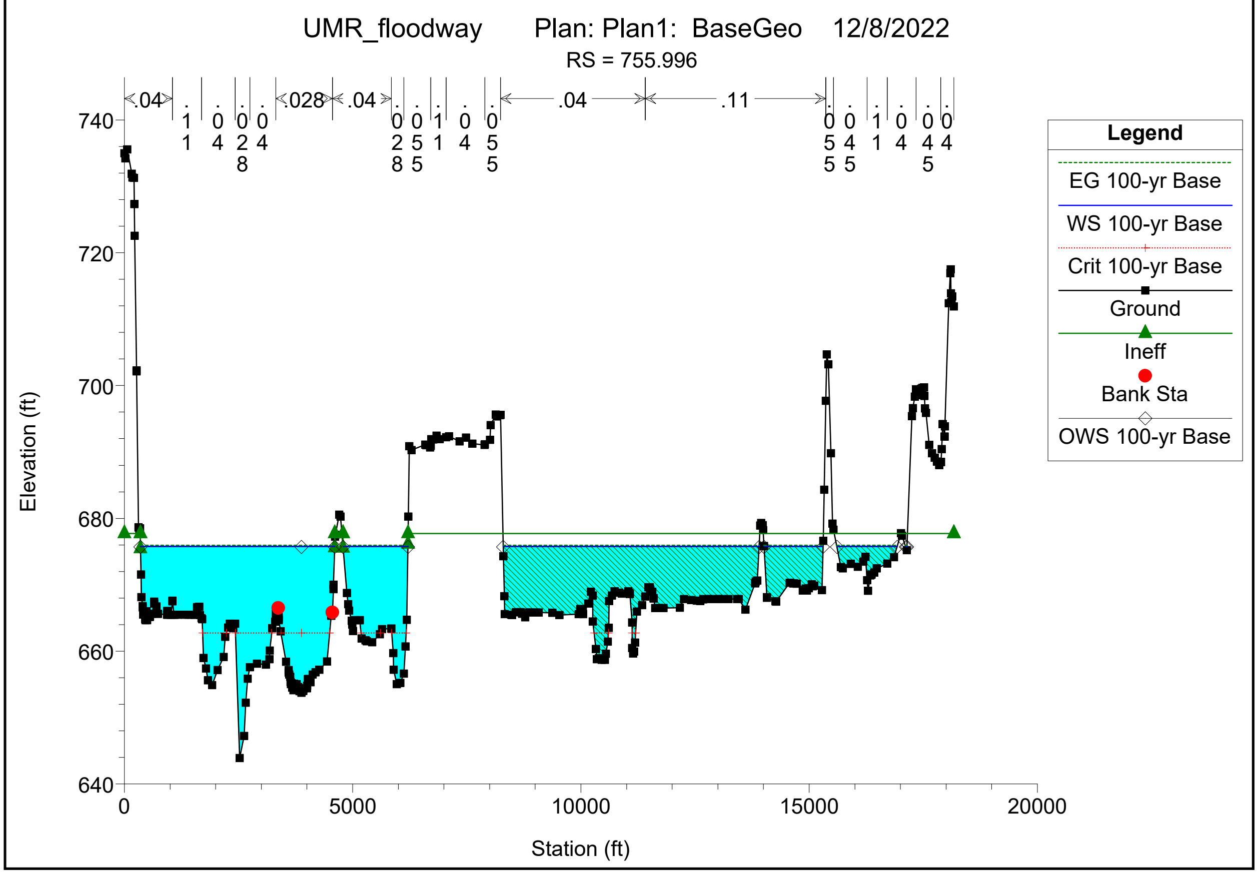
UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 757.105
.04
.028
.055
.04
.028
.11
.04
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base



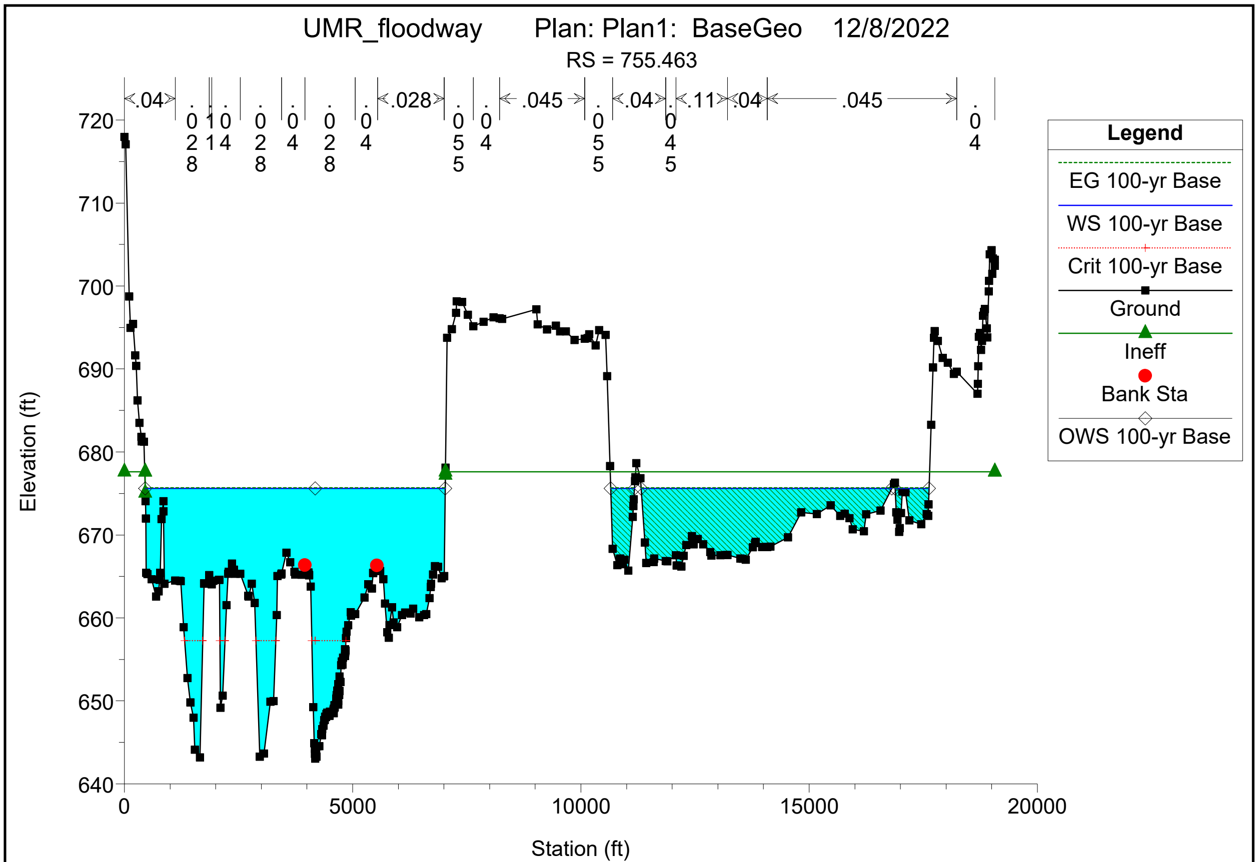
UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 756.765
.11
.044
.028
.11
.044
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

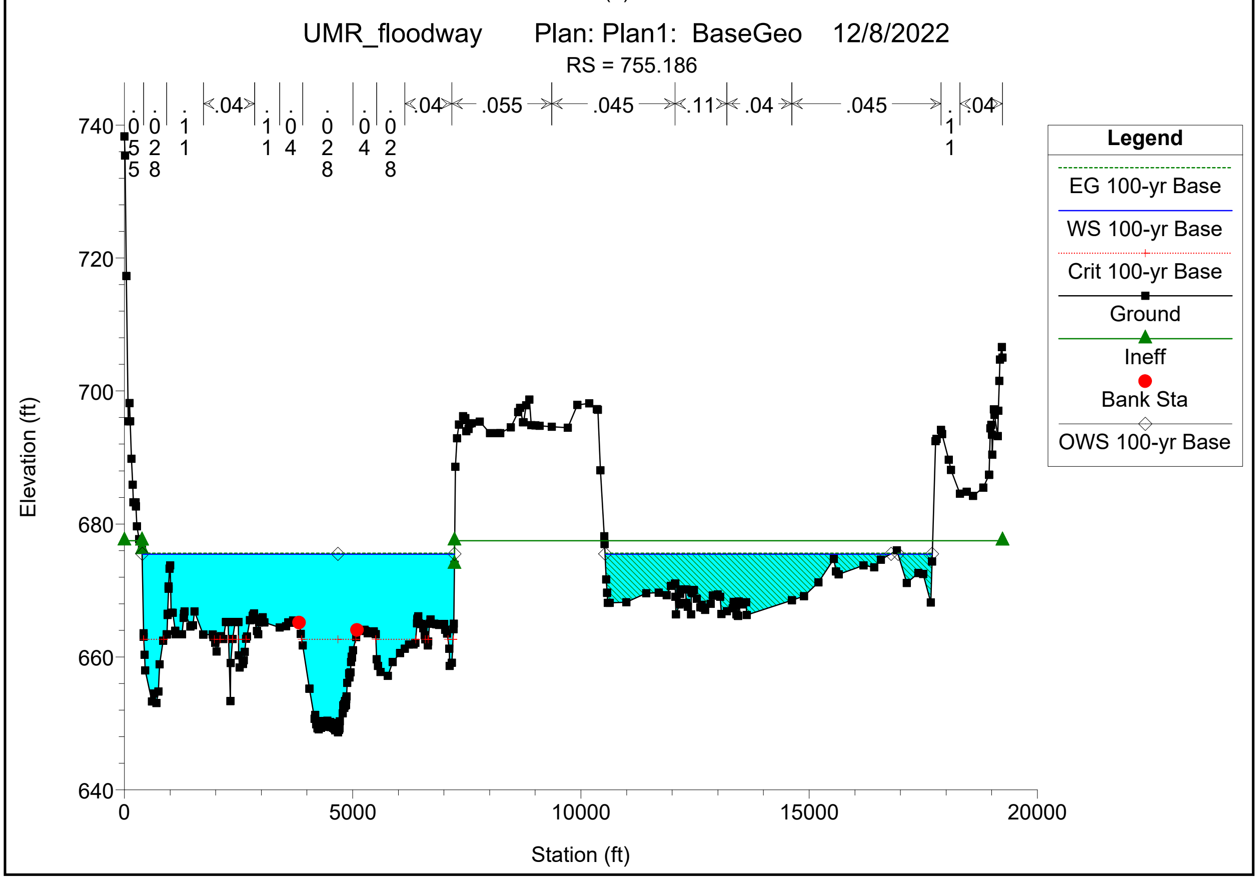


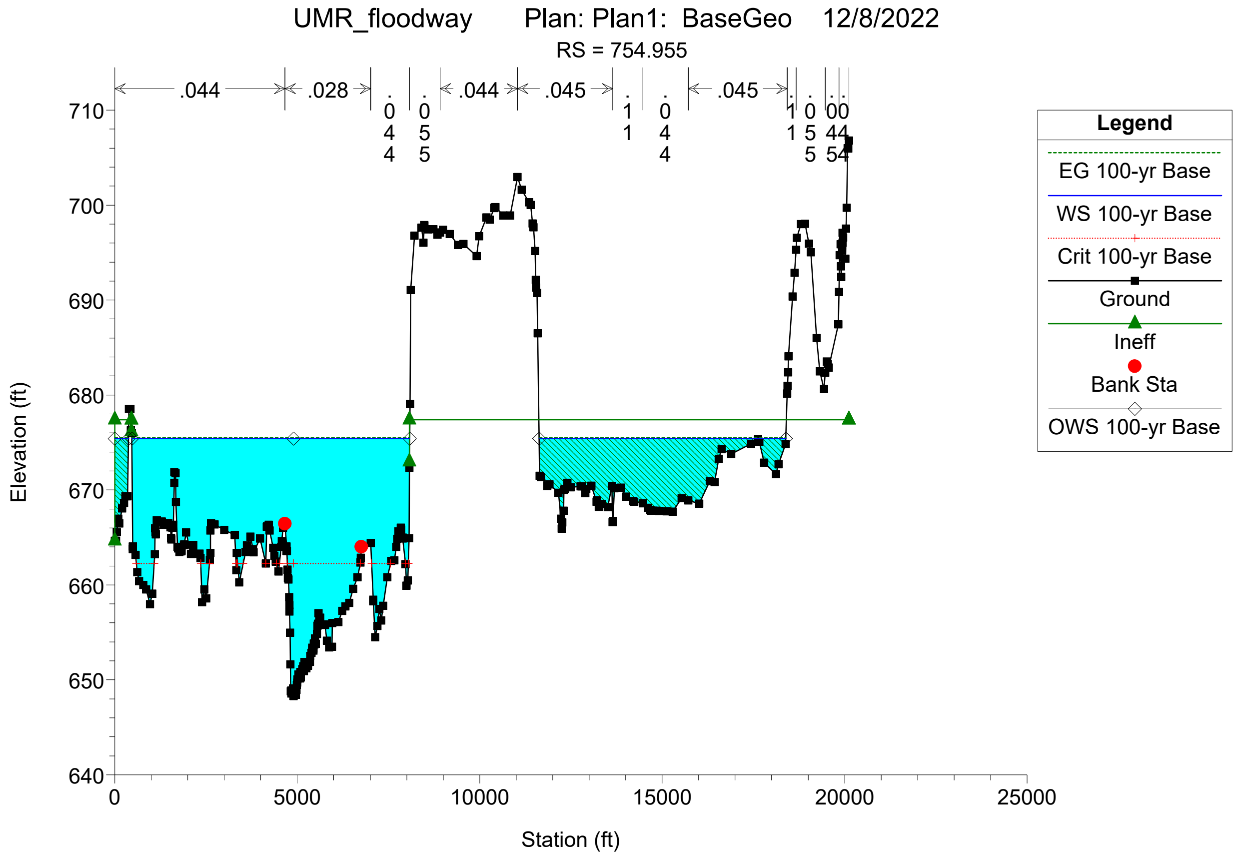
UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 756.373
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base



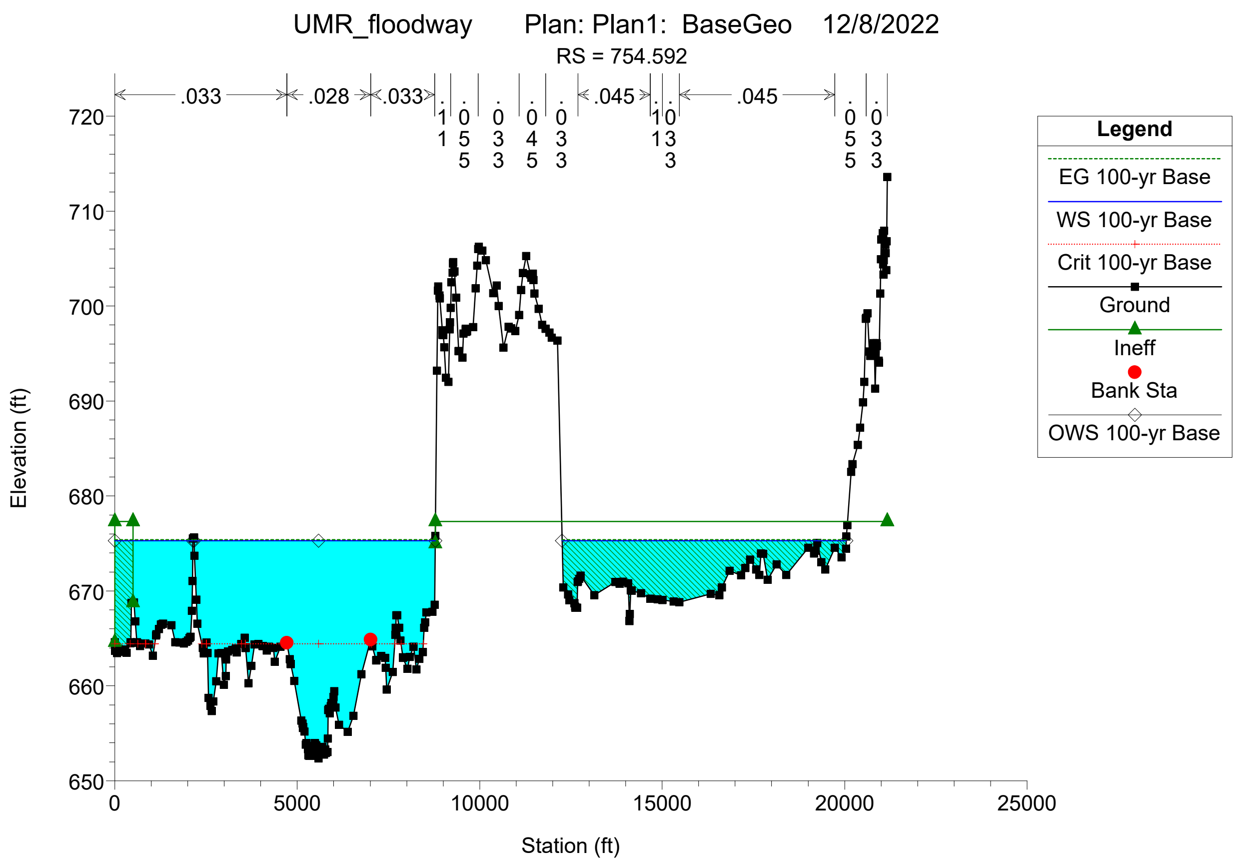
UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 755.996
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base


UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 755.463
.04
.028
.045
.04
.11
.04
.045
Elevation (ft)
Station (ft)
720
710
700
690
680
670
660
650
640
0
5000
10000
15000
20000
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

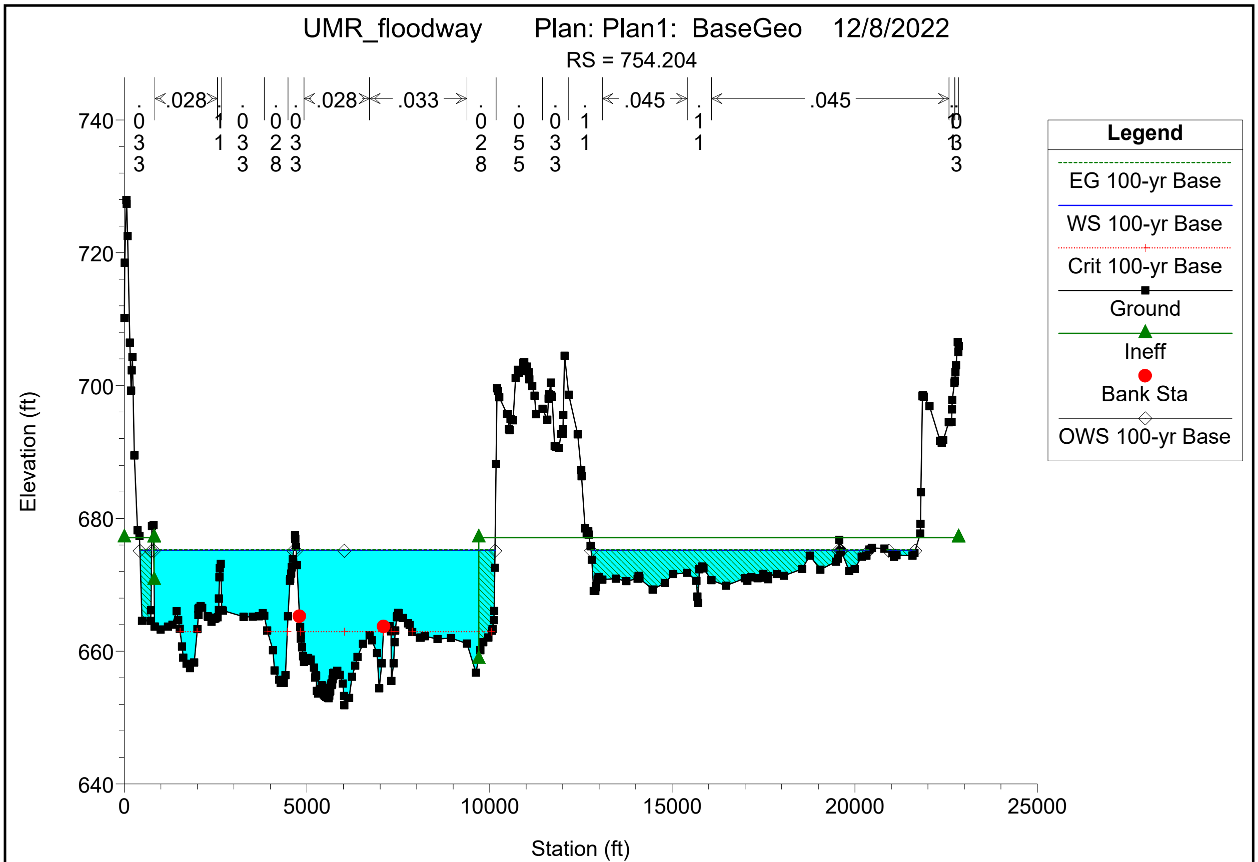

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 755.186
.04
.04
.055
.045
.11
.04
.045
.04
Elevation (ft)
Station (ft)
740
720
700
680
660
640
0
5000
10000
15000
20000
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

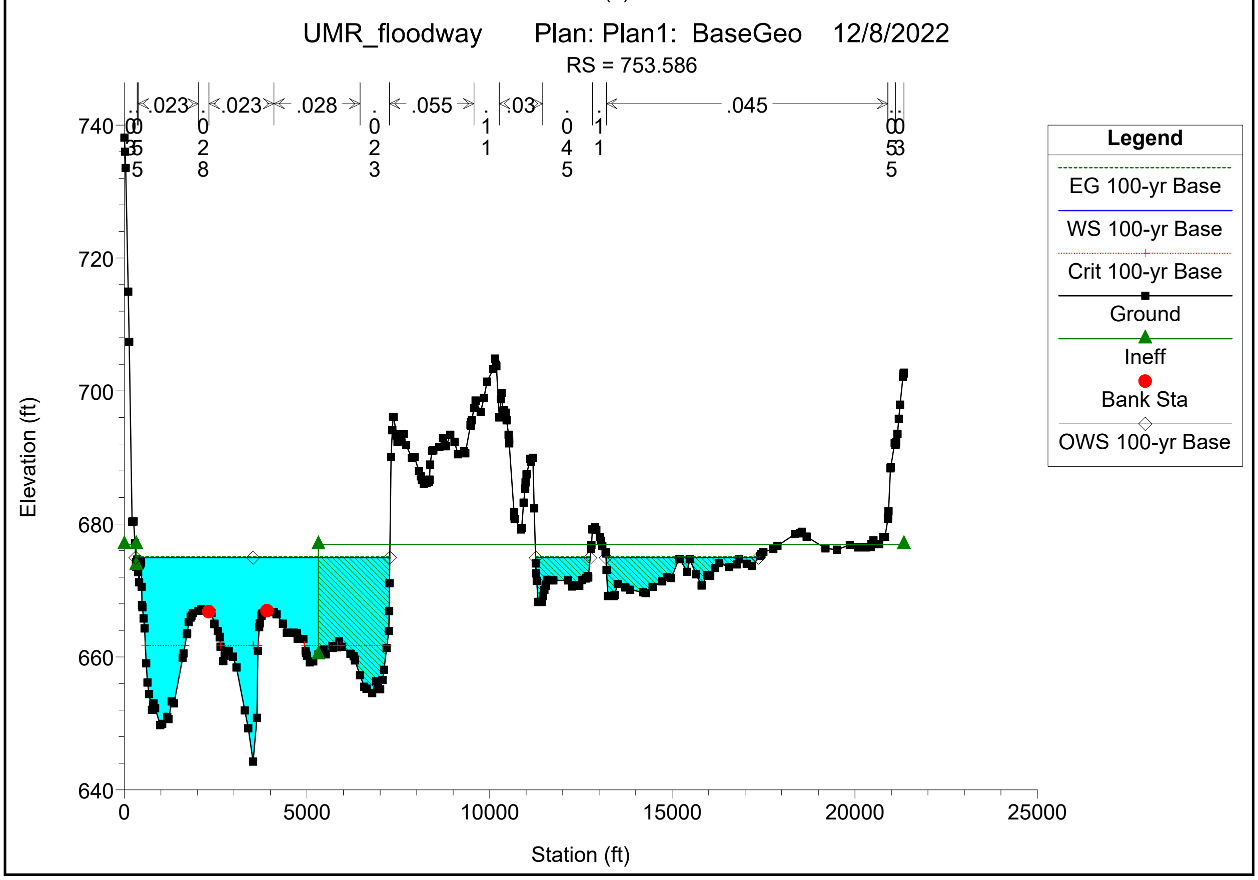


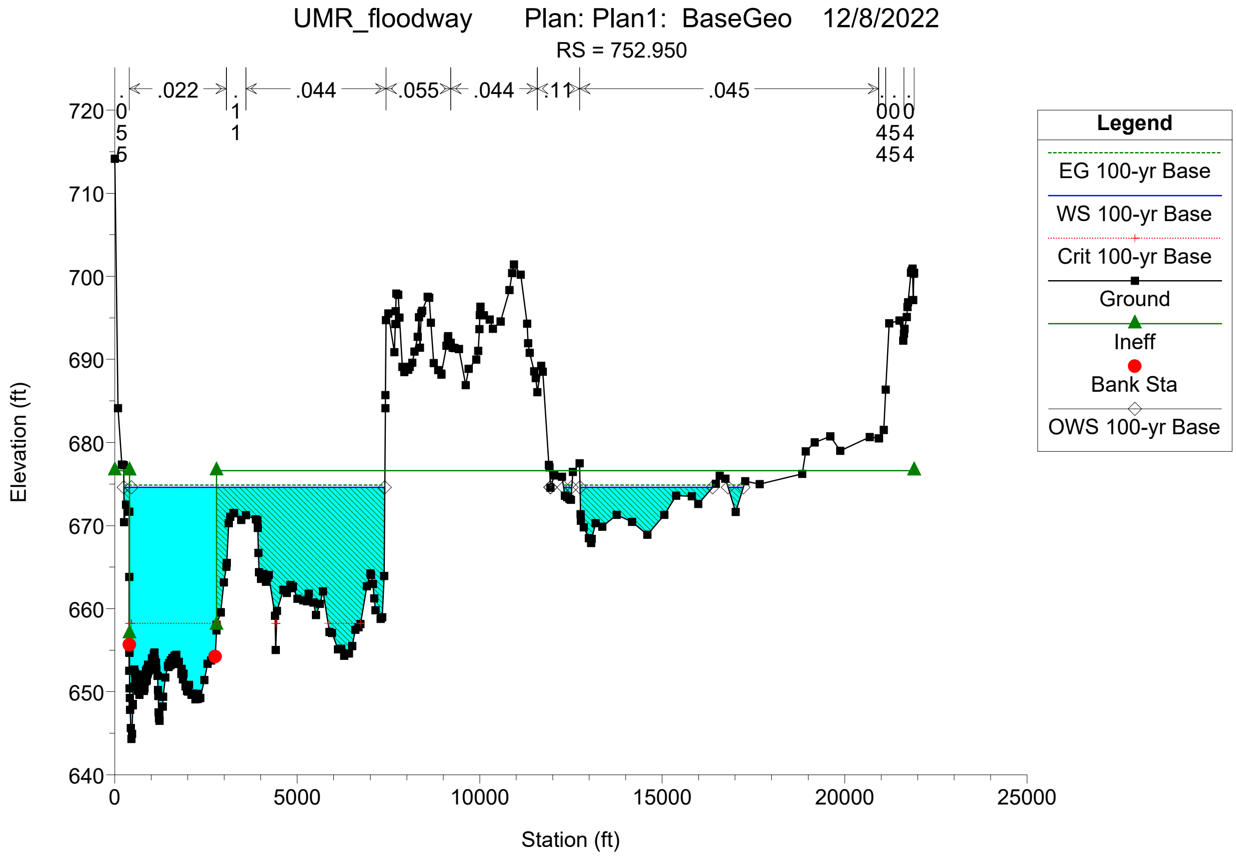
UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 754.955
.044
.028
.044
.045
.045
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

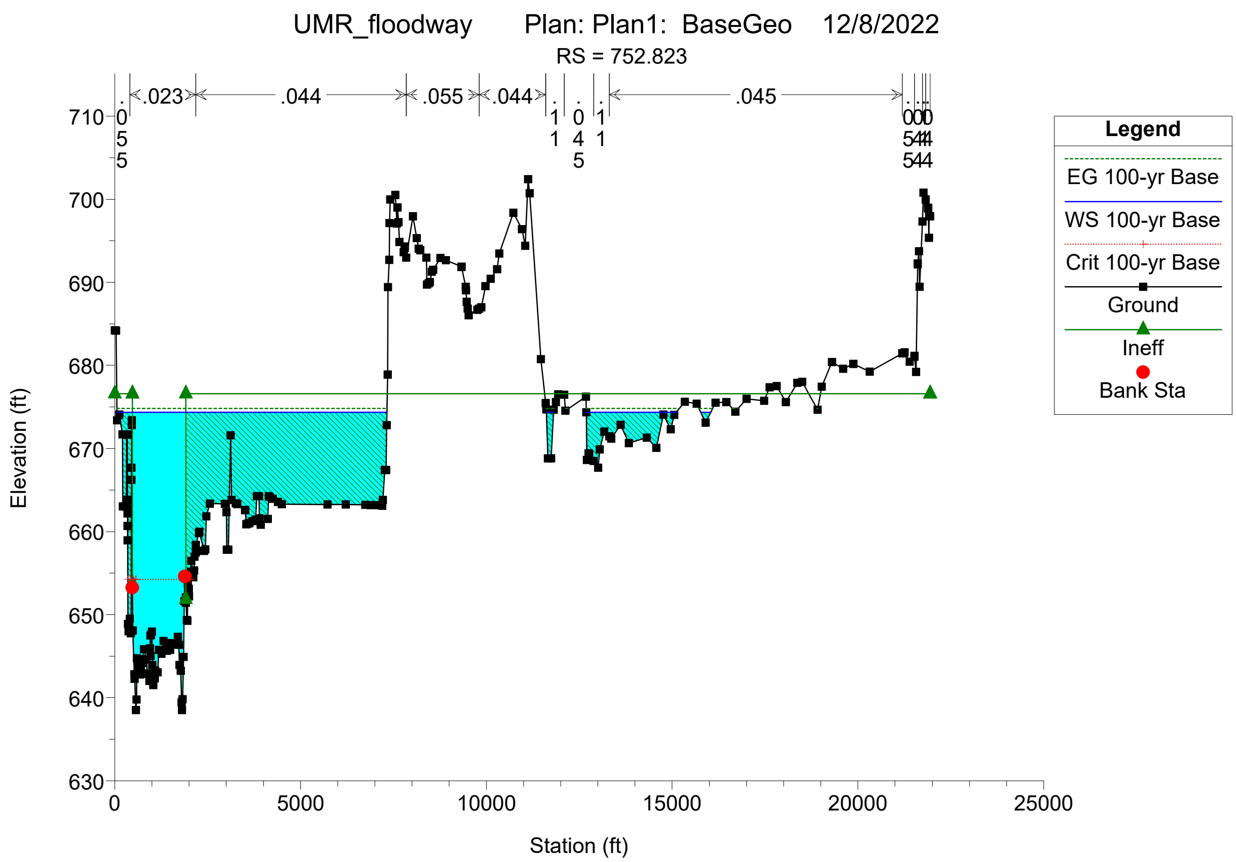


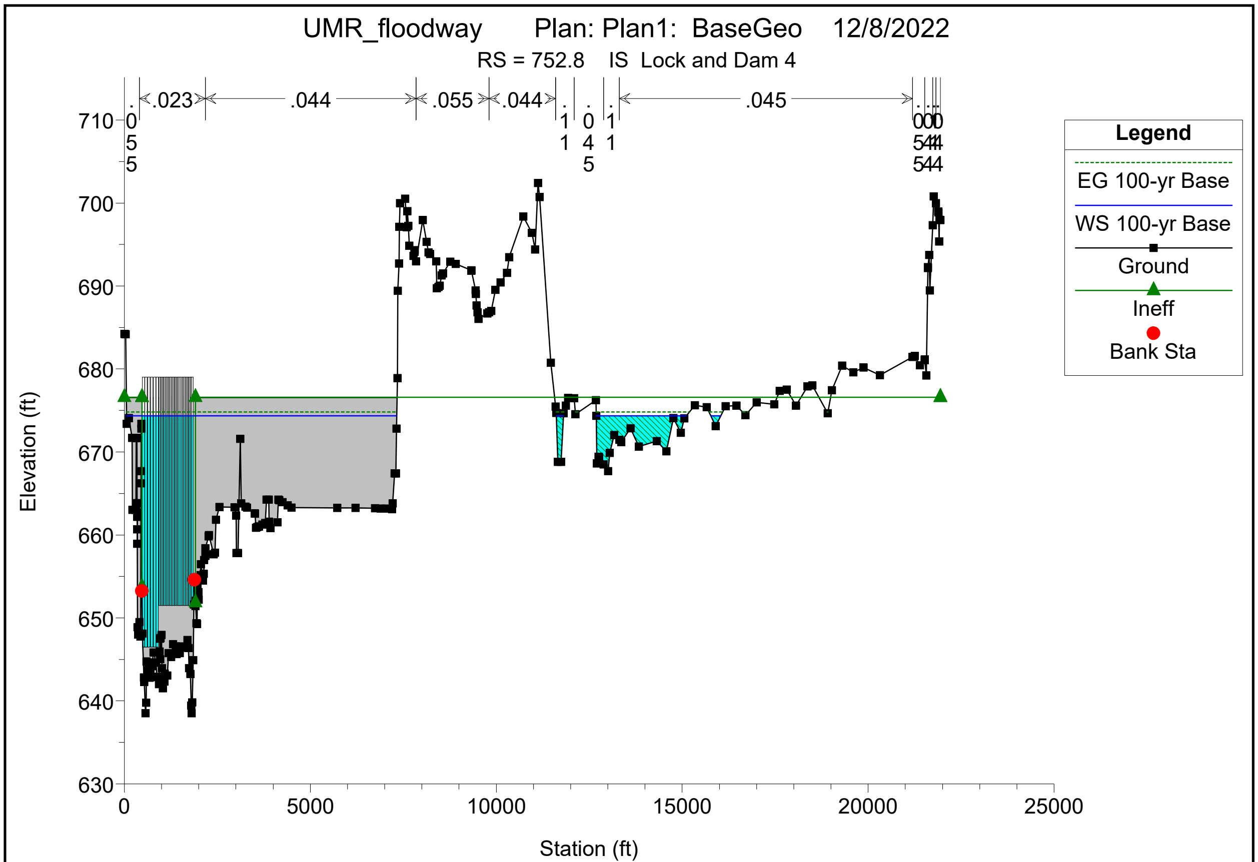
UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 754.592
.033
.028
.033
.045
.045
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)


UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 754.204
.028
.028
.033
.045
.045
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)
640
660
680
700
720
740
0
5000
10000
15000
20000
25000

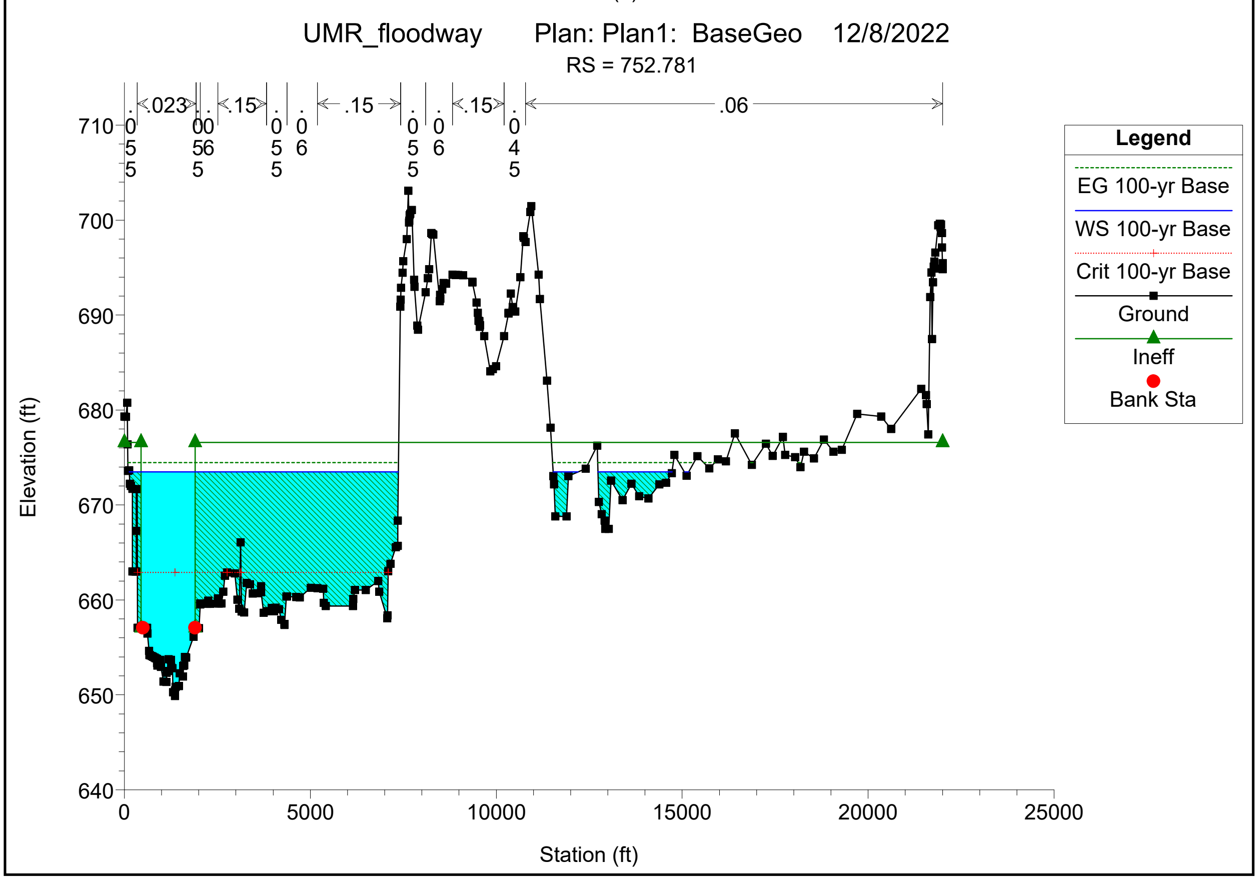

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 753.586
.023
.023
.028
.055
.03
.045
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)
640
660
680
700
720
740
0
5000
10000
15000
20000
25000


UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 752.950
.022
.044
.055
.044
.11
.045
Elevation (ft)
720
710
700
690
680
670
660
650
640
0
5000
10000
15000
20000
25000
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

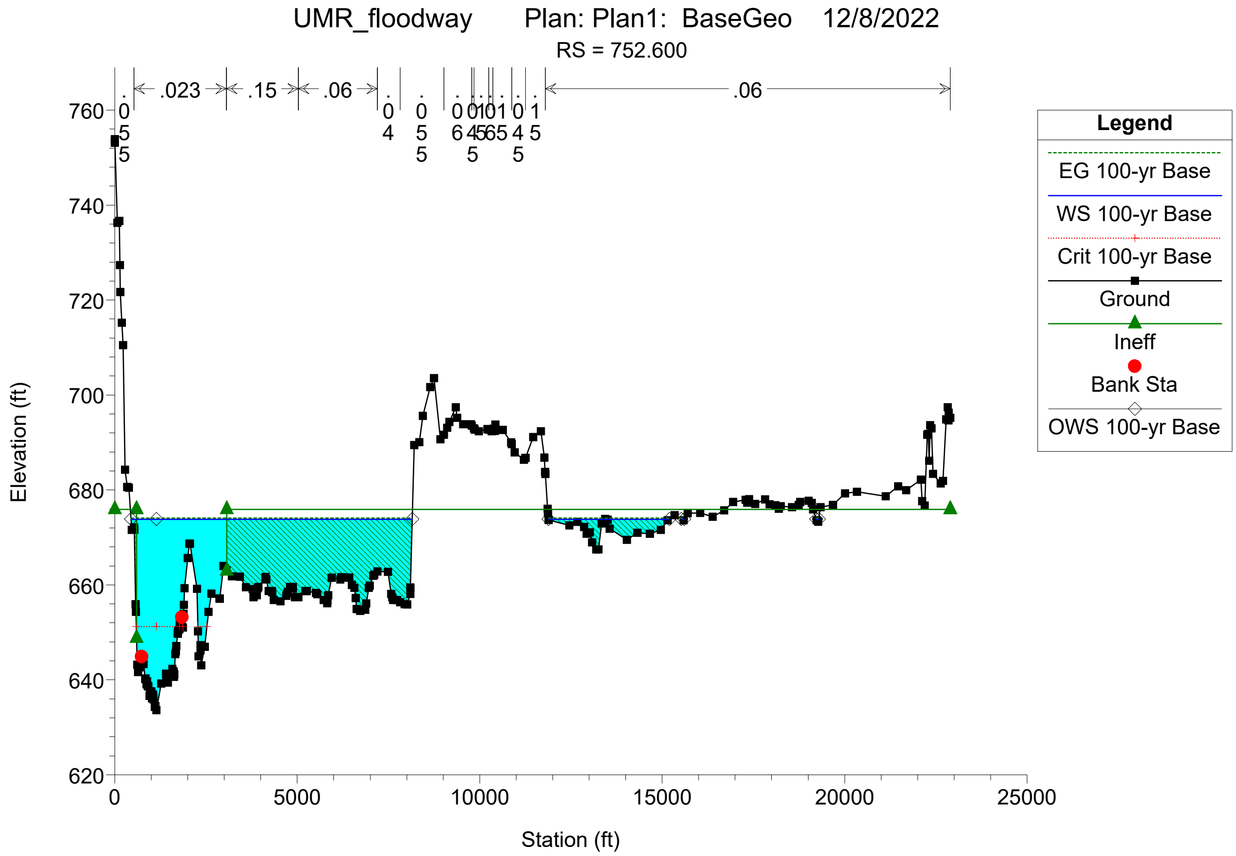

UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 752.823
.023
.044
.055
.044
.045
Elevation (ft)
710
700
690
680
670
660
650
640
630
0
5000
10000
15000
20000
25000
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta

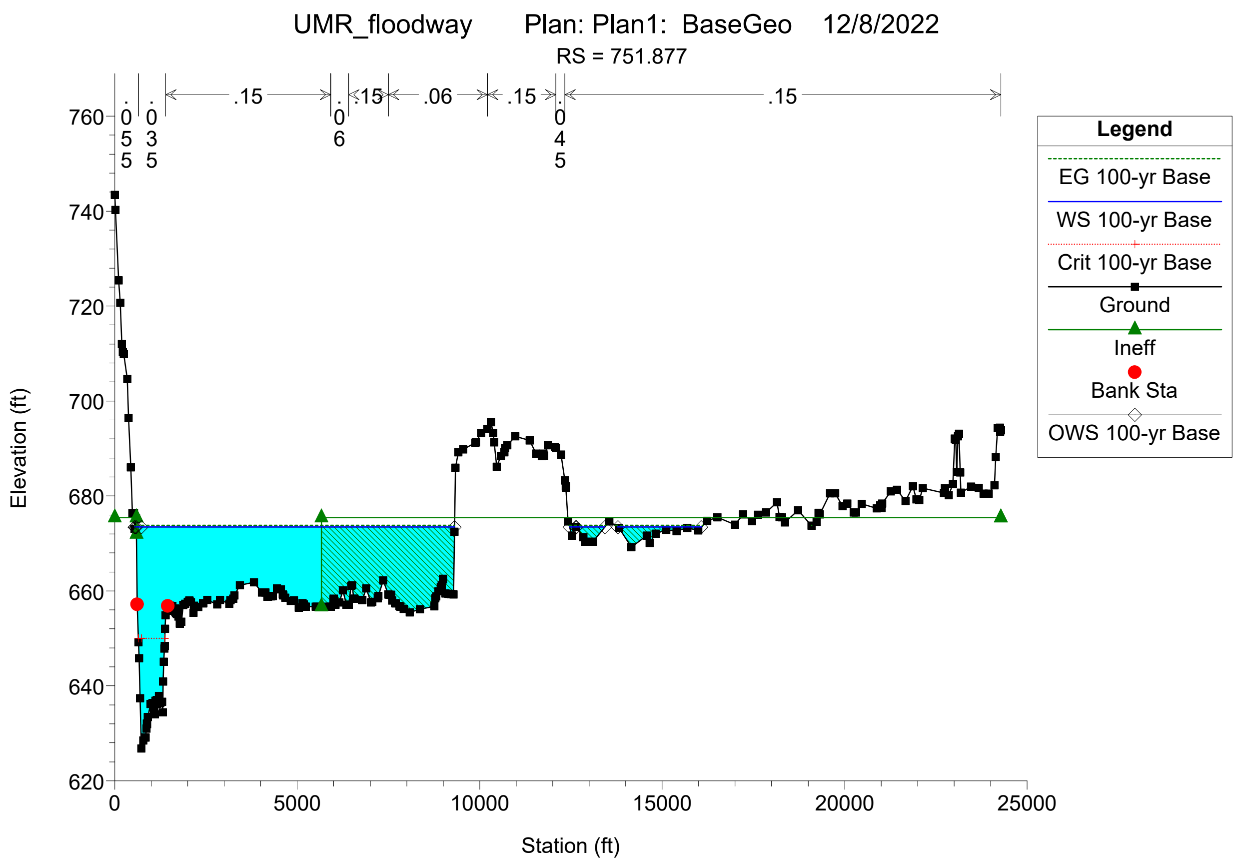


UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 752.8 IS Lock and Dam 4
.023
.044
.055
.044
.045
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Ground
Ineff
Bank Sta



UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 752.781
.023
.15
.15
.15
.06
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta


UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 752.600
.023
.15
.06
.06
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base


UMR_floodway Plan: Plan1: BaseGeo 12/8/2022
RS = 751.877
.15
.15
.06
.15
.15
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

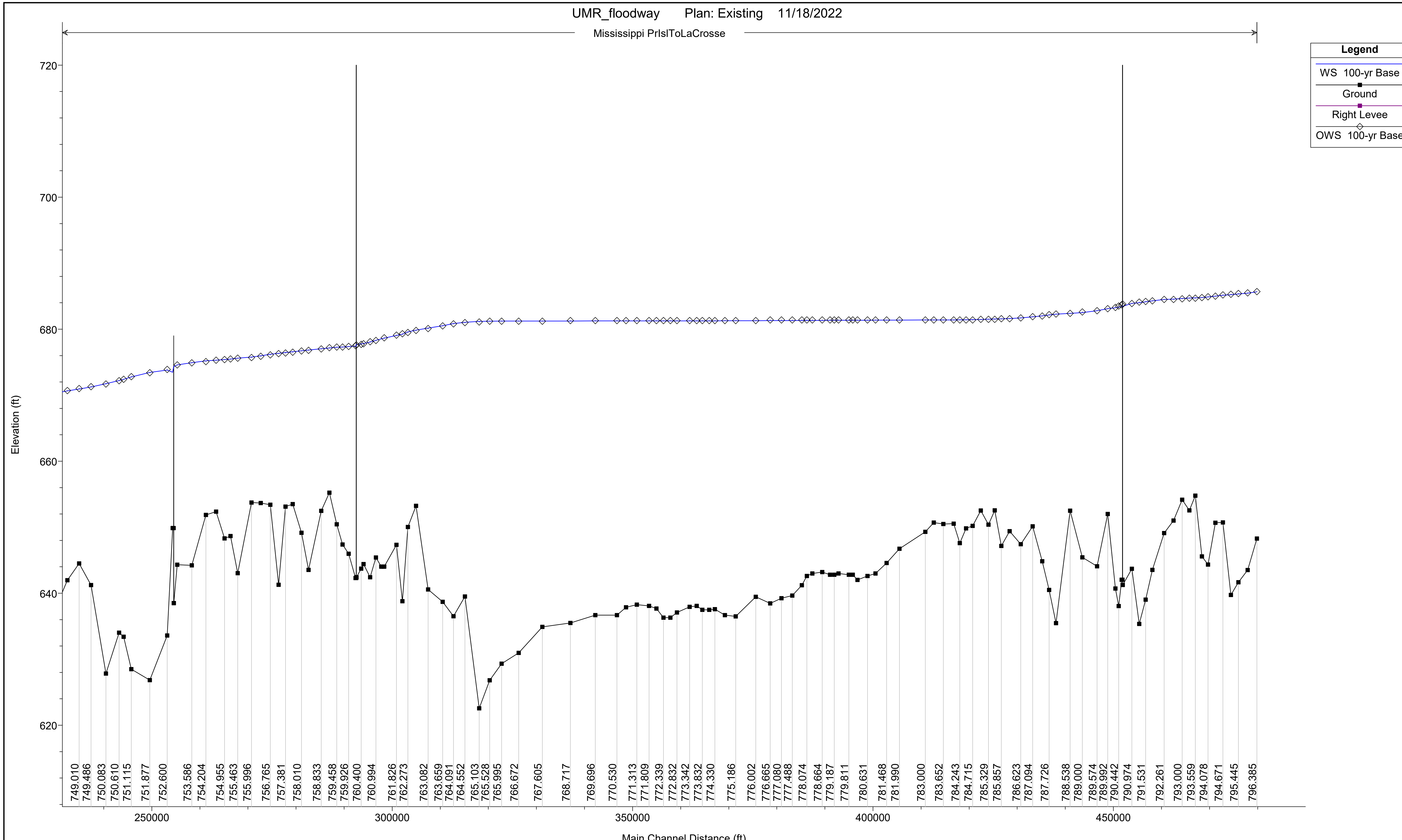
Appendix D:
Existing Condition HEC-RAS

HEC-RAS Plan: Existing Locations: User Defined   Profile: 100-yr Base

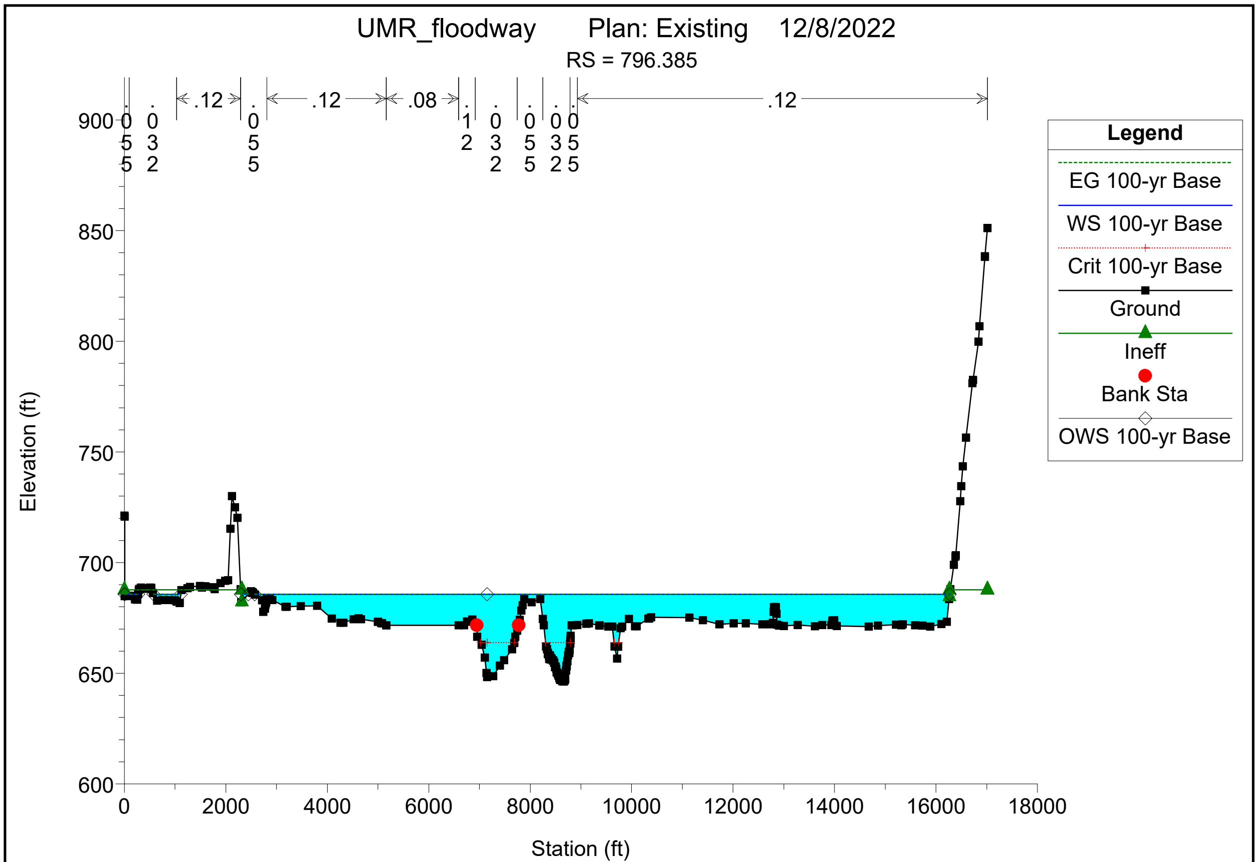
River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Mississippi	PrIslToLaCrosse	796.385	100-yr Base	192930.00	648.28	685.67	663.85	685.73	0.000046	2.92	187512.80	14649.85	0.10
Mississippi	PrIslToLaCrosse	796.000	100-yr Base	192930.00	643.51	685.46	660.87	685.59	0.000056	3.75	175721.50	13735.36	0.11
Mississippi	PrIslToLaCrosse	795.445	100-yr Base	192930.00	641.65	685.35	663.22	685.47	0.000062	3.82	183954.60	19506.62	0.12
Mississippi	PrIslToLaCrosse	795.000	100-yr Base	192930.00	639.73	685.23	663.51	685.37	0.000071	4.09	174128.90	14198.10	0.12
Mississippi	PrIslToLaCrosse	794.671	100-yr Base	196287.00	650.73	685.15	665.78	685.25	0.000080	3.57	186379.30	14193.75	0.11
Mississippi	PrIslToLaCrosse	794.379	100-yr Base	196231.00	650.68	685.01	667.96	685.14	0.000082	3.79	166520.40	13249.94	0.13
Mississippi	PrIslToLaCrosse	794.078	100-yr Base	196276.00	644.35	684.90	665.58	685.04	0.000082	3.95	159732.60	12555.03	0.13
Mississippi	PrIslToLaCrosse	793.829	100-yr Base	196321.00	645.57	684.80	666.01	684.93	0.000079	3.98	158481.50	12273.37	0.13
Mississippi	PrIslToLaCrosse	793.559	100-yr Base	196366.00	654.79	684.75	667.42	684.82	0.000051	2.92	170989.90	11794.28	0.10
Mississippi	PrIslToLaCrosse	793.302	100-yr Base	196412.00	652.56	684.72	668.29	684.76	0.000037	2.43	173937.90	11833.16	0.08
Mississippi	PrIslToLaCrosse	793.000	100-yr Base	196355.00	654.16	684.65	668.44	684.70	0.000048	2.79	173326.00	11766.46	0.10
Mississippi	PrIslToLaCrosse	792.640	100-yr Base	196445.00	651.01	684.56	667.14	684.62	0.000046	2.93	168560.30	11179.77	0.10
Mississippi	PrIslToLaCrosse	792.261	100-yr Base	196491.00	649.10	684.50	666.99	684.56	0.000051	3.04	165318.70	12153.91	0.10
Mississippi	PrIslToLaCrosse	791.792	100-yr Base	196479.00	643.53	684.30	665.27	684.45	0.000077	4.08	87112.88	6932.10	0.13
Mississippi	PrIslToLaCrosse	791.531	100-yr Base	196524.00	639.03	684.16	664.97	684.35	0.000092	4.54	73096.38	5474.90	0.14
Mississippi	PrIslToLaCrosse	791.273	100-yr Base	196570.00	635.36	684.01	665.67	684.25	0.000118	5.25	70295.23	5513.48	0.16
Mississippi	PrIslToLaCrosse	790.974	100-yr Base	196615.00	643.70	683.91	665.49	684.14	0.000121	4.89	67782.63	6017.48	0.16
Mississippi	PrIslToLaCrosse	790.604	100-yr Base	196558.00	641.25	683.47	665.90	683.91	0.000183	6.26	42257.64	8472.94	0.20
Mississippi	PrIslToLaCrosse	790.6		Bridge									
Mississippi	PrIslToLaCrosse	790.563	100-yr Base	196558.00	642.03	683.45	665.98	683.86	0.000178	6.14	44252.83	8452.31	0.19
Mississippi	PrIslToLaCrosse	790.442	100-yr Base	196604.00	638.05	683.35	660.85	683.55	0.000087	4.76	103666.30	7528.14	0.14
Mississippi	PrIslToLaCrosse	790.302	100-yr Base	196604.00	640.72	683.24	663.03	683.41	0.000087	4.44	102729.30	6408.90	0.14
Mississippi	PrIslToLaCrosse	789.992	100-yr Base	196649.00	652.00	683.11	668.86	683.23	0.000111	3.78	102166.70	6271.34	0.13
Mississippi	PrIslToLaCrosse	789.574	100-yr Base	196739.00	644.09	682.80	668.35	682.96	0.000116	4.51	92365.86	6593.66	0.15
Mississippi	PrIslToLaCrosse	789.000	100-yr Base	196728.00	645.43	682.52	666.57	682.64	0.000084	3.72	117063.10	7798.16	0.13
Mississippi	PrIslToLaCrosse	788.538	100-yr Base	196819.00	652.50	682.40	662.57	682.46	0.000045	2.76	133146.70	8108.44	0.09
Mississippi	PrIslToLaCrosse	787.988	100-yr Base	196807.00	635.48	682.27	667.70	682.33	0.000059	2.99	117557.60	7465.79	0.10
Mississippi	PrIslToLaCrosse	787.726	100-yr Base	196852.00	640.50	682.15	666.21	682.24	0.000067	3.47	106920.10	7360.28	0.11
Mississippi	PrIslToLaCrosse	787.466	100-yr Base	196898.00	644.85	682.01	664.20	682.08	0.000058	3.21	114450.20	7641.68	0.11
Mississippi	PrIslToLaCrosse	787.094	100-yr Base	196943.00	650.12	681.86	665.34	681.95	0.000069	3.42	122751.90	7668.48	0.12
Mississippi	PrIslToLaCrosse	786.623	100-yr Base	196932.00	647.42	681.71	666.85	681.80	0.000070	3.48	124728.40	8330.47	0.12
Mississippi	PrIslToLaCrosse	786.191	100-yr Base	197022.00	649.40	681.61	667.63	681.65	0.000045	2.69	153382.20	9456.08	0.09
Mississippi	PrIslToLaCrosse	785.857	100-yr Base	197068.00	647.16	681.56	667.79	681.59	0.000022	2.05	166677.60	11945.81	0.07
Mississippi	PrIslToLaCrosse	785.584	100-yr Base	197011.00	652.56	681.54	666.97	681.56	0.000015	1.41	177578.50	11191.62	0.05
Mississippi	PrIslToLaCrosse	785.329	100-yr Base	197056.00	650.40	681.51	666.22	681.54	0.000014	1.46	166693.60	10502.10	0.05
Mississippi	PrIslToLaCrosse	785.017	100-yr Base	197102.00	652.52	681.48	666.06	681.51	0.000017	1.59	148236.50	9162.83	0.06
Mississippi	PrIslToLaCrosse	784.715	100-yr Base	197147.00	650.20	681.45	665.65	681.48	0.000018	1.63	138918.60	8268.53	0.06
Mississippi	PrIslToLaCrosse	784.471	100-yr Base	197090.00	649.82	681.43	664.44	681.46	0.000013	1.42	157319.90	8355.13	0.05
Mississippi	PrIslToLaCrosse	784.243	100-yr Base	197136.00	647.59	681.42	664.87	681.44	0.000013	1.49	152575.20	8071.91	0.05
Mississippi	PrIslToLaCrosse	784.020	100-yr Base	197181.00	650.53	681.41	663.18	681.43	0.000009	1.20	179984.70	8796.41	0.04
Mississippi	PrIslToLaCrosse	783.652	100-yr Base	197226.00	650.49	681.40	660.33	681.41	0.000005	0.91	217800.50	9686.13	0.03
Mississippi	PrIslToLaCrosse	783.304	100-yr Base	197170.00	650.69	681.39	658.55	681.41	0.000004	0.88	232304.10	9984.62	0.03
Mississippi	PrIslToLaCrosse	783.000	100-yr Base	197215.00	649.31	681.39	656.78	681.40	0.000003	0.73	271884.80	10415.20	0.02
Mississippi	PrIslToLaCrosse	781.990	100-yr Base	197294.00	646.75	681.38	653.65	681.38	0.000002	0.62	335800.30	11492.00	0.02
Mississippi	PrIslToLaCrosse	781.468	100-yr Base	197385.00	644.58	681.37	652.63	681.38	0.000002	0.61	350813.30	11860.57	0.02
Mississippi	PrIslToLaCrosse	780.984	100-yr Base	197476.00	643.00	681.37	651.11	681.37	0.000002	0.70	317119.40	11414.77	0.02
Mississippi	PrIslToLaCrosse	780.631	100-yr Base	197419.00	642.60	681.36	650.23	681.37	0.000003	0.84	277049.30	13165.86	0.03
Mississippi	PrIslToLaCrosse	780.191	100-yr Base	197510.00	642.01	681.35	649.67	681.36	0.000003	0.83	273253.40	11036.70	0.03
Mississippi	PrIslToLaCrosse	779.984	100-yr Base	198626.00	642.80	681.35	649.94	681.36	0.000002	0.74	292670.10	10639.55	0.02
Mississippi	PrIslToLaCrosse	779.811	100-yr Base	198615.00	642.80	681.35	649.88	681.36	0.000002	0.66	317437.60	10485.81	0.02
Mississippi	PrIslToLaCrosse	779.388	100-yr Base	198832.00	643.00	681.35	649.80	681.35	0.000002	0.67	307774.70	9928.39	0.02
Mississippi	PrIslToLaCrosse	779.187	100-yr Base	198866.00	642.80	681.34	649.46	681.35	0.000002	0.71	293484.80	12154.13	0.02
Mississippi	PrIslToLaCrosse	779.000	100-yr Base	198900.00	642.80	681.34	649.02	681.35	0.000002	0.70	288101.60	8854.01	0.02
Mississippi	PrIslToLaCrosse	778.664	100-yr Base	199026.00	643.20	681.34	649.19	681.35	0.000002	0.73	278740.20	8443.37	0.02
Mississippi	PrIslToLaCrosse	778.290	100-yr Base	199152.00	643.00	681.33	648.85	681.34	0.000003	0.85	252807.80	8401.98	0.02
Mississippi	PrIslToLaCrosse	778.074	100-yr Base	199186.00	642.60	681.32	648.04	681.34	0.000003	0.96	227552.10	8275.67	0.03
Mississippi	PrIslToLaCrosse	777.875	100-yr Base	199232.00	641.22	681.32	647.37	681.33	0.000003	0.94	228905.80	8214.85	0.03
Mississippi	PrIslToLaCrosse	777.488	100-yr Base	199232.00	639.64	681.31	646.63	681.32	0.000005	1.18	200751.20	8529.87	0.03
Mississippi	PrIslToLaCrosse	777.080	100-yr Base	199232.00	639.25	681.30	646.05	681.31	0.000003	0.93	239403.50	8219.75	0.03
Mississippi	PrIslToLaCrosse	776.665	100-yr Base	199232.00	638.46	681.30	645.03	681.31	0.000003	0.87	235152.40	6741.74	0.02
Mississippi	PrIslToLaCrosse	776.002	100-yr Base	199232.00	639.45	681.29	644.60	681.30	0.000002	0.82	256235.60	7015.01	0.02
Mississippi	PrIslToLaCrosse	775.186	100-yr Base	199232.00	636.49	681.28	644.23	681.29	0.000002	0.75	285457.40	8317.79	0.02
Mississippi	PrIslToLaCrosse	774.739	100-yr Base	199232.00	636.68	681.27	644.14	681.28	0.000003	0.81	261953.40	8224.20	0.02
Mississippi	PrIslToLaCrosse	774.330	100-yr Base	199232.00	637.58	681.26	644.78	681.28	0.000003	1.02	217234.50	8547.67	0.03
Mississippi	PrIslToLaCrosse	774.110	100-yr Base	199232.00	637.48	681.26	643.30	681.27	0.000002	0.74	294421.40	9495.68	0.02
Mississippi	PrIslToLaCrosse	773.832	100-yr Base	199232.00	637.48	681.26	642.91	681.27	0.000001	0.64	328697.10	9883.54	0.02
Mississippi	PrIslToLaCrosse	773.623	100-yr Base	199232.00	638.07	681.26	642.94	681.27	0.000001	0.57	366709.50	10392.43	0.02
Mississippi	PrIslToLaCrosse	773.342	100-yr Base	199232.00	637.94	681.26	643.11	681.27	0.000001	0.56	370021.20	10624.26	0.02
Mississippi	PrIslToLaCrosse	772.832	100-yr Base	199232.00	637.08	681.26	643.38	681.26	0.000001	0.66	313775.90	9562.56	0.02
Mississippi	PrIslToLaCrosse	772.560	100-yr Base	199232.00	636.29	681.25	642.39	681.26	0.000001	0.58	355921.40	10877.79	0.02
Mississippi	PrIslToLaCrosse	772.339	100-yr Base	199232.00	636.29	681.25	642.02	681.26	0.000001	0.50	412621.00	11546.52	0.01
Mississippi	PrIslToLaCrosse	772.092	100-yr Base	199232.00	637.67	681.25	642.09	681.26	0.000001	0.46	452789.70	11919.25	0.01
Mississippi	PrIslToLaCrosse	771.809	100-yr Base	199232.00	638.07	681.25	642.33	681.26	0.000001	0.44	476764.30	13982.90	0.01
Mississippi	PrIslToLaCrosse	771.313	100-yr Base	199232.00	638.26	681.25	642.68	681.25	0.000001	0.42	495981.10	13716.06	0.01
Mississippi	PrIslToLaCrosse	770.876	100-yr Base	199232.00	637.87	681.25	642.56	681.25	0.000001	0.45	476078.70	14553.42	0.01
Mississippi	PrIslToLaCrosse	770.530	100-yr Base	199232.00	636.69	681.25	642.40	681.25	0.000001	0.45	472040.40	13811.46	0.01
Mississippi	PrIslToLaCrosse	769.696	100-yr Base	199232.00	636.69	681.25	642.80	681.25	0.000001	0.45	482299.50	14291.96	0.01
Mississippi	PrIslToLaCrosse	768.717	100-yr Base	199232.00	635.50	681.24	642.85	681.24	0.000001	0.49	434805.70	11581.13	0.01
Mississippi	PrIslToLaCrosse	767.605	100-yr Base	199232.00	634.91	681.24	642.08	681.24	0.000001	0.51	409794.50	10764.52	0.01
Mississippi	PrIslToLaCrosse	766.672	100-yr Base	199232.00	630.97	681.23	640.45	681.23	0.000001	0.60	358428.30	9429.36	0.02
Mississippi	PrIslToLaCrosse	765.995	100-yr Base	199232.00	629.32	681.22	638.79	681.23	0.000001	0.74	313698.80	8697.42	0.02
Mississippi	PrIslToLaCrosse	765.528	100-yr Base	199232.00	626.80	681.22	637.59	681.22	0.000002	0.91	273702.70	8769.84	0.02
Mississippi	PrIslToLaCrosse	765.103	100-yr Base	199232.00	622.56	681.18	634.06	681.22	0.000006	1.68	215072.50	9096.51	0.04
Mississippi	PrIslToLaCrosse	764.552	100-yr Base	199232.00	639.50	681.05	660.87	681.17	0.000078	3.34	113281.40	8823.91	0.11
Mississippi	PrIslToLaCrosse	764.091	100-yr Base	199232.00	636.52	680.85	659.34	680.98	0.000079	3.26	123758.00	10520.26	0.11
Mississippi	PrIslToLaCrosse	763.659	100-yr Base	199232.00	638.70	680.53	661.86	680.75	0.000124	4.43	103969.10	11188.49	0.15
Mississippi	PrIslToLaCrosse	763.082	100-yr Base	229611.00	640.57	680.16	663.96	680.37	0.000124	4.73	106135.30	11722.95	0.16

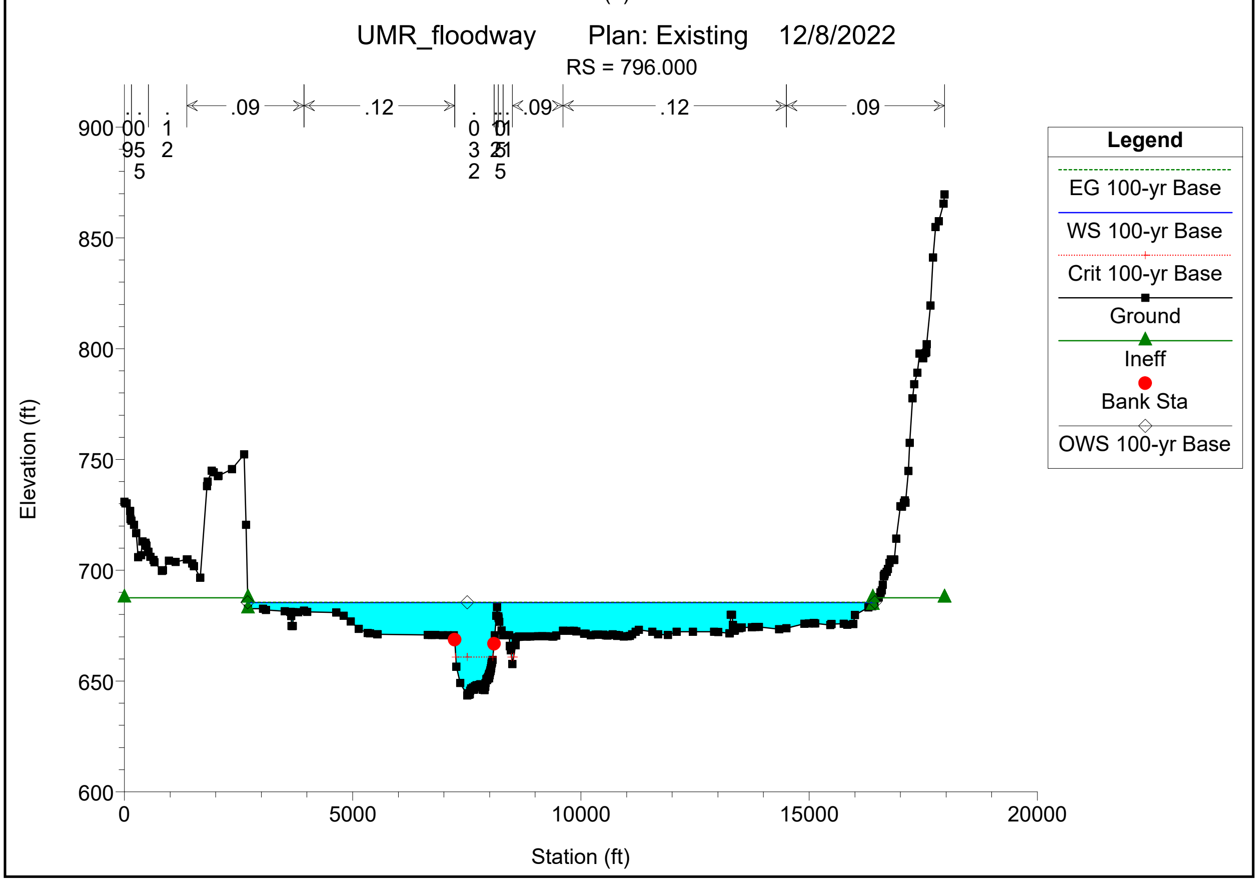
HEC-RAS Plan: Existing Locations: User Defined Profile: 100-yr Base (Continued)

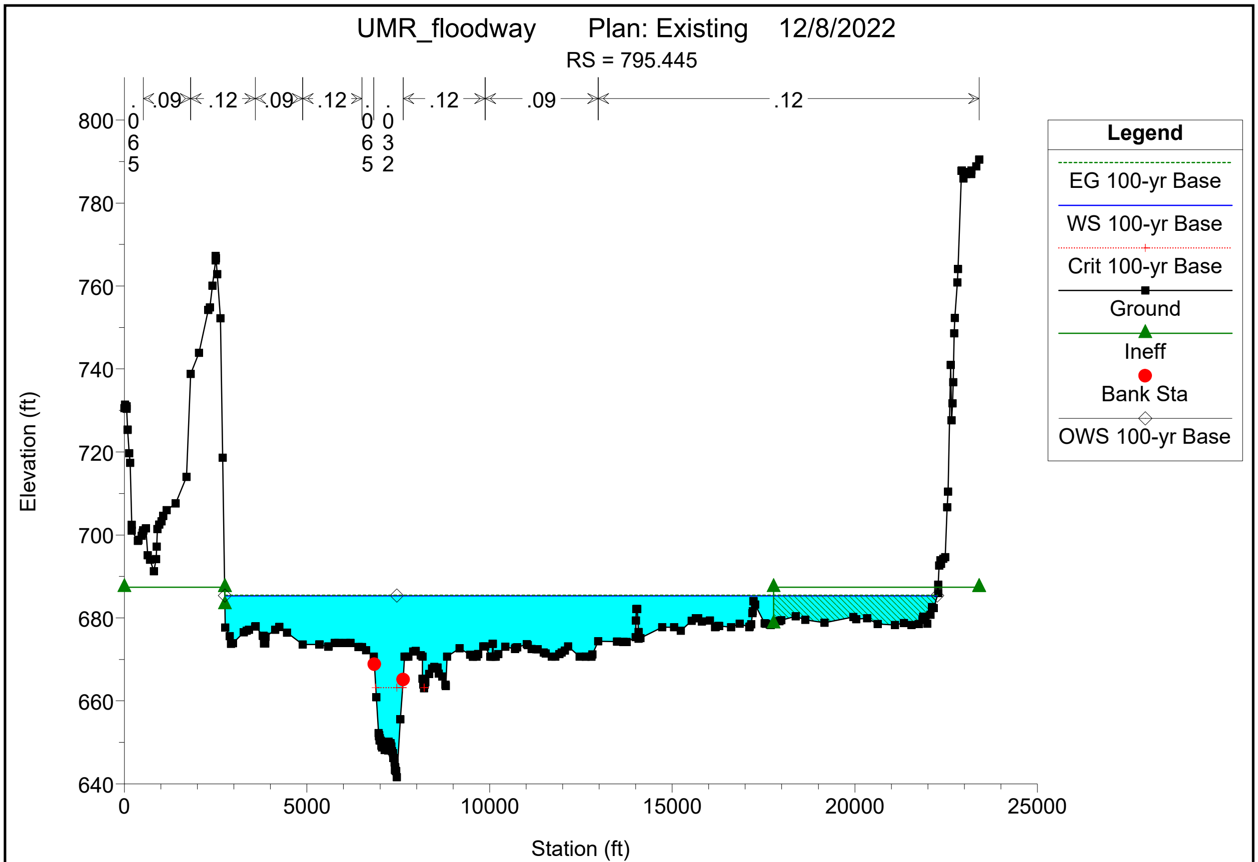
River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Mississippi	PrIslToLaCrosse	762.578	100-yr Base	229611.00	653.24	679.85	665.76	680.05	0.000143	4.52	129186.00	13484.81	0.16
Mississippi	PrIslToLaCrosse	762.273	100-yr Base	229611.00	650.04	679.59	666.97	679.75	0.000236	4.40	127108.10	14423.34	0.16
Mississippi	PrIslToLaCrosse	762.062	100-yr Base	229611.00	638.79	679.25	664.97	679.51	0.000169	5.42	122939.80	14803.86	0.18
Mississippi	PrIslToLaCrosse	761.826	100-yr Base	229611.00	647.34	679.04	665.46	679.30	0.000170	5.44	136150.20	15237.21	0.18
Mississippi	PrIslToLaCrosse	761.327	100-yr Base	229611.00	644.03	678.65	664.10	678.88	0.000157	4.81	134679.80	16334.60	0.17
Mississippi	PrIslToLaCrosse	760.994	100-yr Base	229611.00	645.42	678.30	664.70	678.57	0.000179	5.14	134245.60	17374.84	0.19
Mississippi	PrIslToLaCrosse	760.759	100-yr Base	229611.00	642.41	678.05	663.34	678.34	0.000178	5.47	142371.60	15918.74	0.19
Mississippi	PrIslToLaCrosse	760.495	100-yr Base	229611.00	644.41	677.82	662.94	678.10	0.000170	5.50	141621.90	15728.67	0.18
Mississippi	PrIslToLaCrosse	760.400	100-yr Base	229611.00	643.73	677.77	665.31	678.00	0.000173	5.25	122586.30	15909.14	0.18
Mississippi	PrIslToLaCrosse	760.216	100-yr Base	229611.00	642.43	677.69	664.11	677.87	0.000079	4.02	70217.59	15434.44	0.14
Mississippi	PrIslToLaCrosse	760.2		Bridge									
Mississippi	PrIslToLaCrosse	760.181	100-yr Base	229611.00	642.30	677.42	666.65	677.82	0.000185	6.20	54347.52	15557.62	0.22
Mississippi	PrIslToLaCrosse	759.926	100-yr Base	229611.00	645.99	677.37	667.35	677.53	0.000113	4.66	140750.90	15098.92	0.17
Mississippi	PrIslToLaCrosse	759.684	100-yr Base	229611.00	647.38	677.31	667.75	677.39	0.000066	3.61	147763.40	15160.14	0.13
Mississippi	PrIslToLaCrosse	759.458	100-yr Base	229611.00	650.43	677.26	663.72	677.31	0.000041	2.67	148451.40	14237.99	0.10
Mississippi	PrIslToLaCrosse	759.170	100-yr Base	229611.00	655.22	677.15	668.29	677.23	0.000090	3.51	147218.40	14647.94	0.14
Mississippi	PrIslToLaCrosse	758.833	100-yr Base	229611.00	652.49	677.03	667.37	677.09	0.000060	3.13	155104.20	15160.93	0.12
Mississippi	PrIslToLaCrosse	758.299	100-yr Base	229611.00	643.54	676.85	666.70	676.91	0.000057	3.01	152263.80	14301.85	0.11
Mississippi	PrIslToLaCrosse	758.010	100-yr Base	229611.00	649.15	676.72	666.84	676.80	0.000068	3.39	133920.50	14848.46	0.13
Mississippi	PrIslToLaCrosse	757.668	100-yr Base	229611.00	653.51	676.59	666.97	676.68	0.000073	3.26	119497.60	15488.71	0.13
Mississippi	PrIslToLaCrosse	757.381	100-yr Base	229611.00	653.12	676.47	665.14	676.57	0.000080	3.53	107455.30	16049.33	0.14
Mississippi	PrIslToLaCrosse	757.105	100-yr Base	229611.00	641.29	676.35	661.79	676.47	0.000067	3.43	94481.04	14793.31	0.13
Mississippi	PrIslToLaCrosse	756.765	100-yr Base	229611.00	653.40	676.20	663.00	676.34	0.000098	3.67	86410.75	14366.27	0.15
Mississippi	PrIslToLaCrosse	756.373	100-yr Base	229611.00	653.66	675.97	664.47	676.13	0.000104	3.70	75525.72	12656.26	0.15
Mississippi	PrIslToLaCrosse	755.996	100-yr Base	229611.00	653.73	675.79	662.73	675.92	0.000099	3.68	84299.00	13938.42	0.15
Mississippi	PrIslToLaCrosse	755.463	100-yr Base	229611.00	643.03	675.60	657.27	675.68	0.000045	2.55	104051.30	13327.38	0.10
Mississippi	PrIslToLaCrosse	755.186	100-yr Base	229611.00	648.65	675.47	662.62	675.59	0.000077	3.61	97485.73	13844.89	0.14
Mississippi	PrIslToLaCrosse	754.955	100-yr Base	229611.00	648.31	675.40	662.26	675.50	0.000065	3.15	108445.30	14745.09	0.12
Mississippi	PrIslToLaCrosse	754.592	100-yr Base	229611.00	652.36	675.30	664.44	675.38	0.000058	2.77	108146.10	16529.92	0.12
Mississippi	PrIslToLaCrosse	754.204	100-yr Base	231280.00	651.87	675.21	662.92	675.27	0.000042	2.31	120203.60	17923.70	0.10
Mississippi	PrIslToLaCrosse	753.586	100-yr Base	231280.00	644.22	674.92	661.74	675.09	0.000072	3.50	71972.00	12640.25	0.15
Mississippi	PrIslToLaCrosse	752.950	100-yr Base	231280.00	644.31	674.60	658.21	674.87	0.000059	4.21	55018.50	11437.57	0.15
Mississippi	PrIslToLaCrosse	752.823	100-yr Base	231280.00	638.50	674.34	654.22	674.80	0.000080	5.49	42262.00	10128.84	0.18
Mississippi	PrIslToLaCrosse	752.8		Inl Struct									
Mississippi	PrIslToLaCrosse	752.781	100-yr Base	231280.00	649.88	673.48	662.91	674.47	0.000286	8.03	28904.10	10012.96	0.32
Mississippi	PrIslToLaCrosse	752.600	100-yr Base	231280.00	633.59	673.81	651.22	674.06	0.000044	4.37	60690.73	11106.44	0.13
Mississippi	PrIslToLaCrosse	751.877	100-yr Base	231280.00	626.83	673.45	650.02	673.80	0.000274	5.56	94419.30	11983.71	0.16

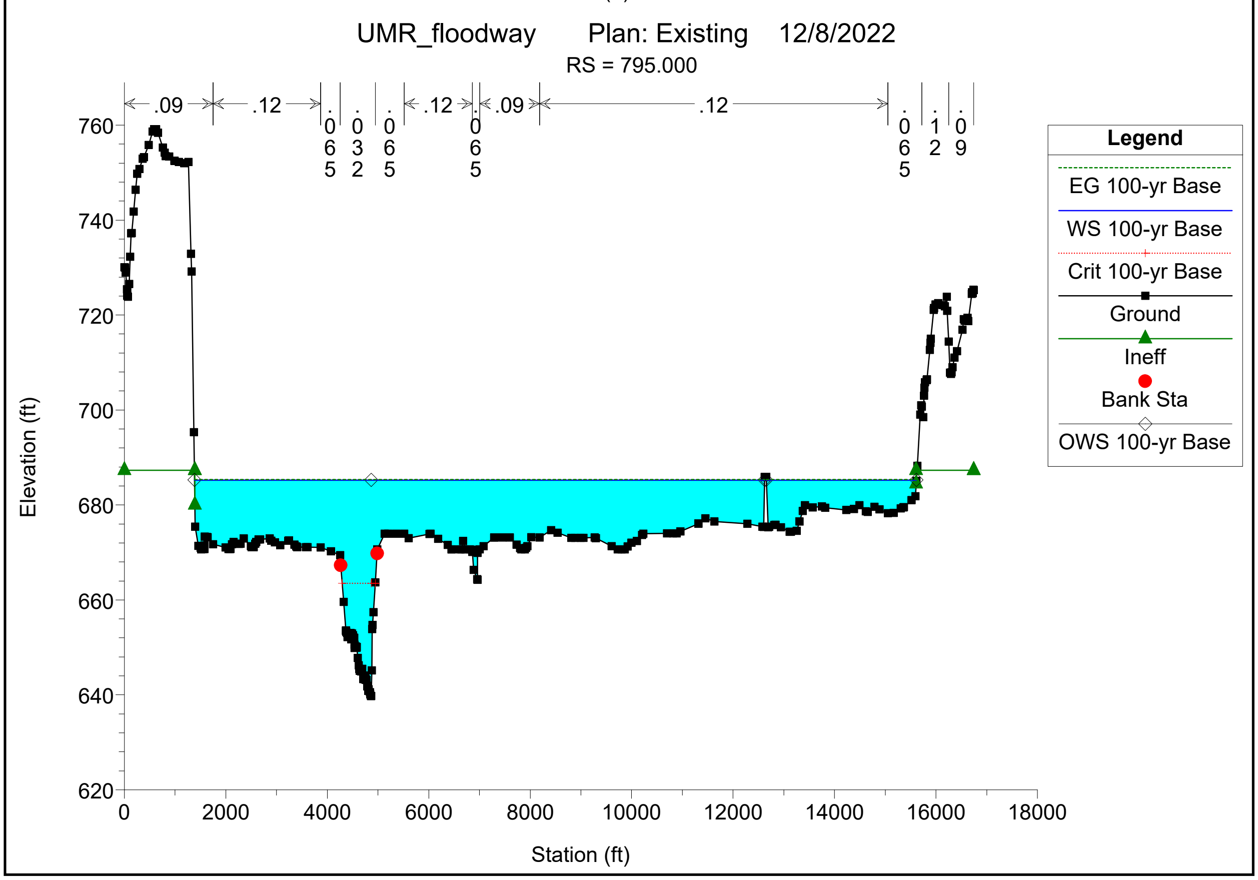


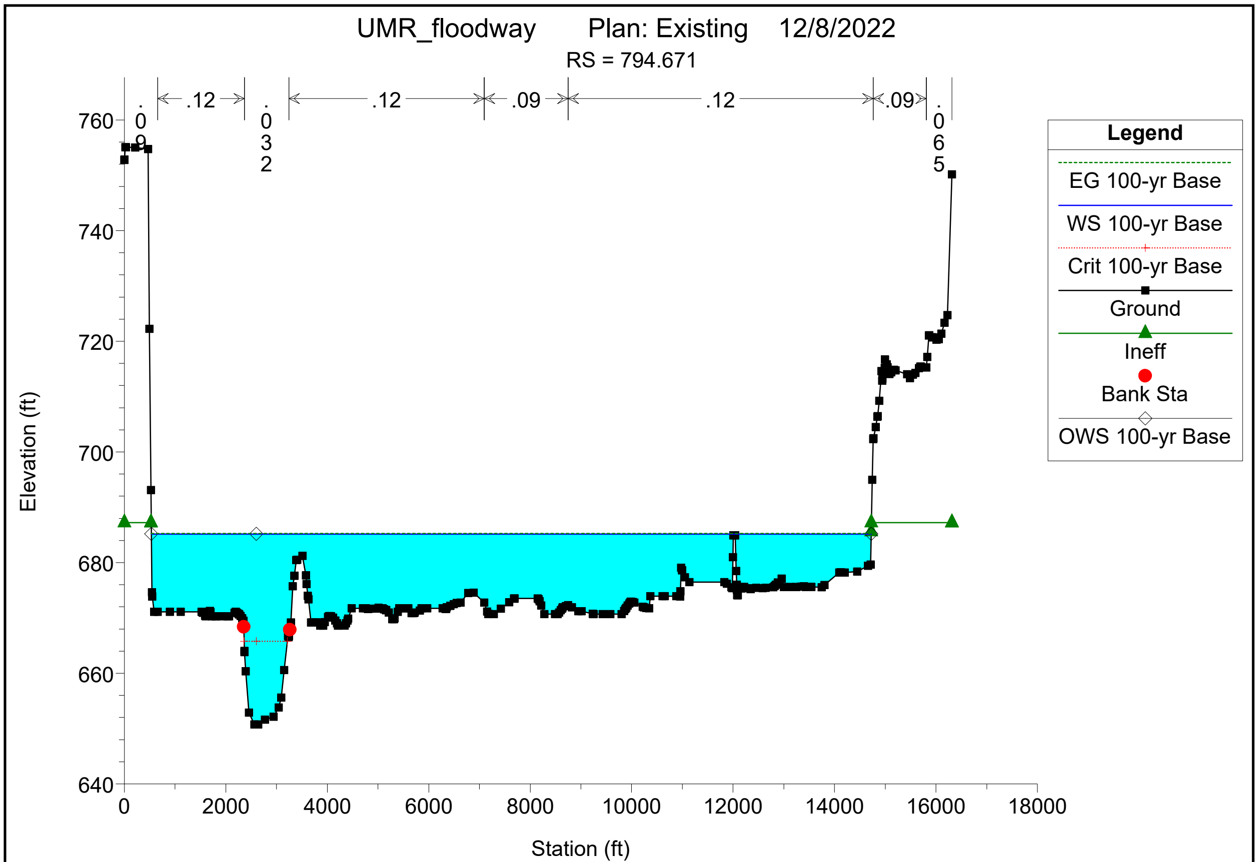
UMR_floodway Plan: Existing 11/18/2022
Mississippi PrIslToLaCrosse
Legend
WS 100-yr Base
Ground
Right Levee
OWS 100-yr Base
Elevation (ft)
Main Channel Distance (ft)
720
700
680
660
640
620
250000
300000
350000
400000
450000

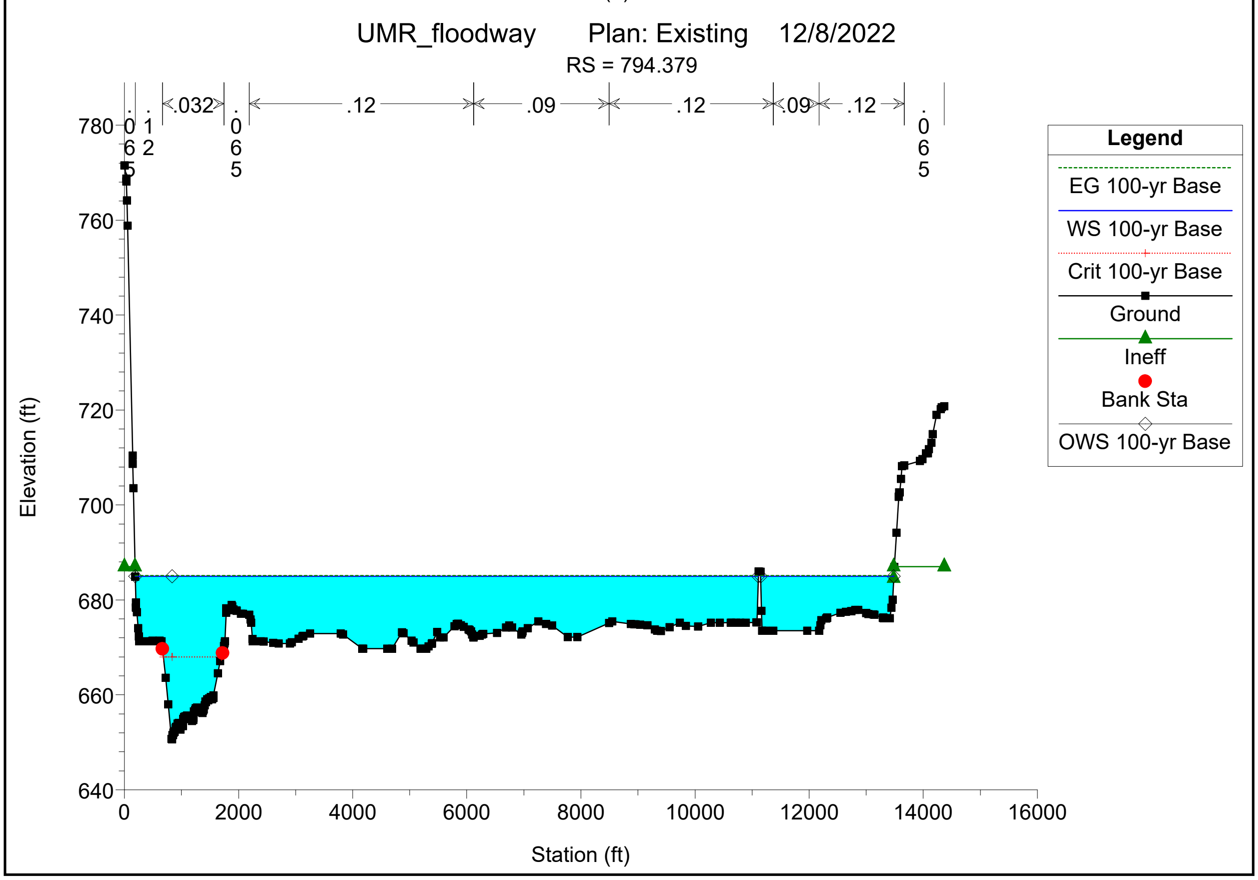

UMR_floodway Plan: Existing 12/8/2022
RS = 796.385
.12
.12
.08
.12
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)
900
850
800
750
700
650
600
0
2000
4000
6000
8000
10000
12000
14000
16000
18000

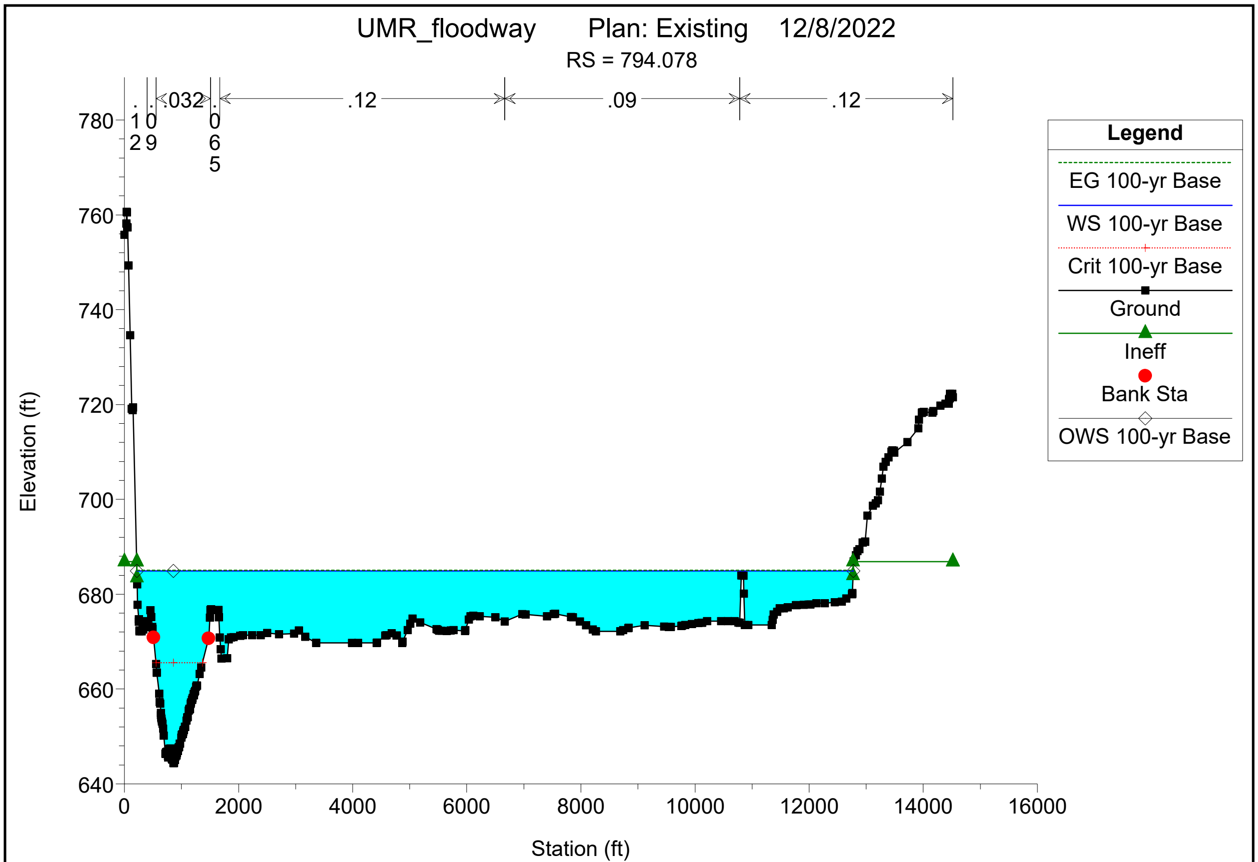

UMR_floodway Plan: Existing 12/8/2022
RS = 796.000
.09
.12
.09
.12
.09
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)
900
850
800
750
700
650
600
0
5000
10000
15000
20000

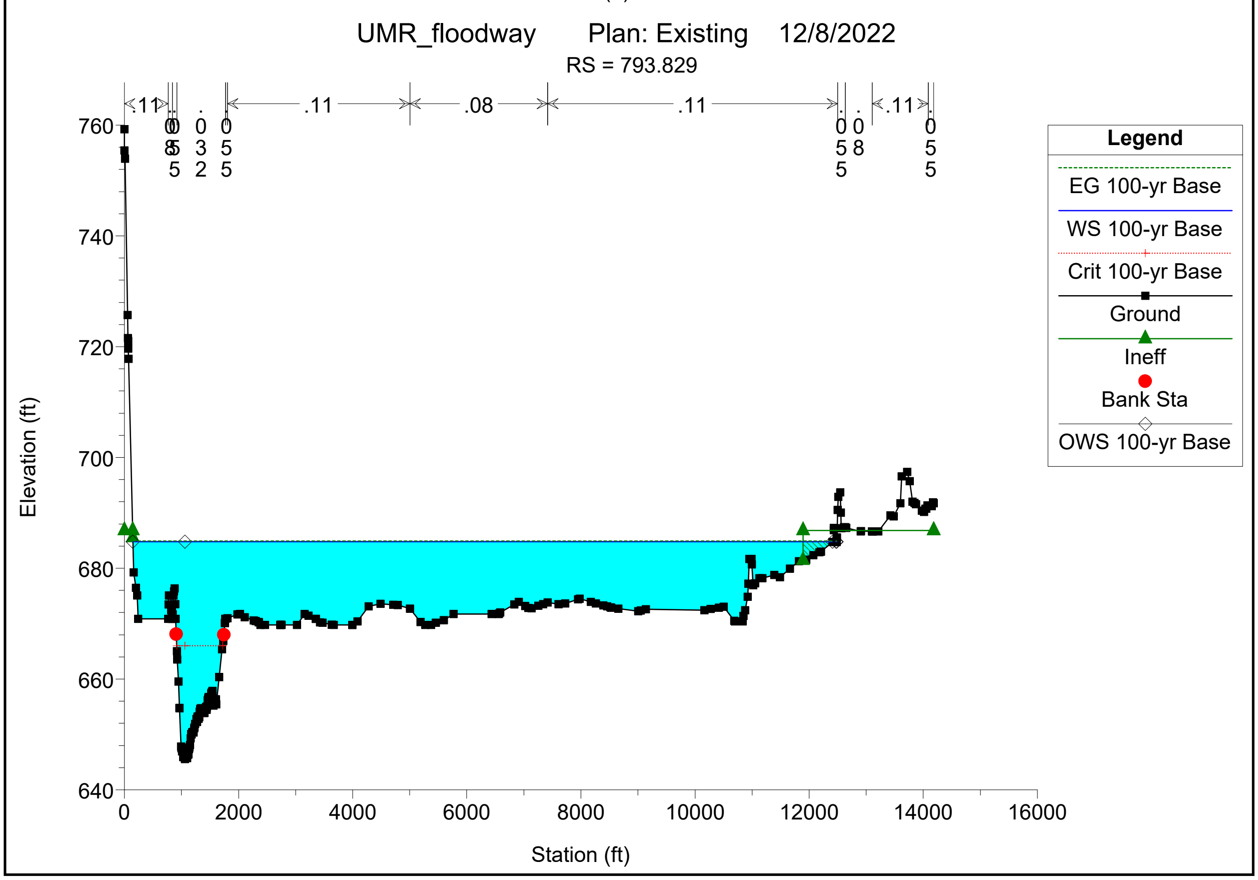

UMR_floodway Plan: Existing 12/8/2022
RS = 795.445
.065
.09
.12
.09
.12
.065
.032
.12
.09
.12
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

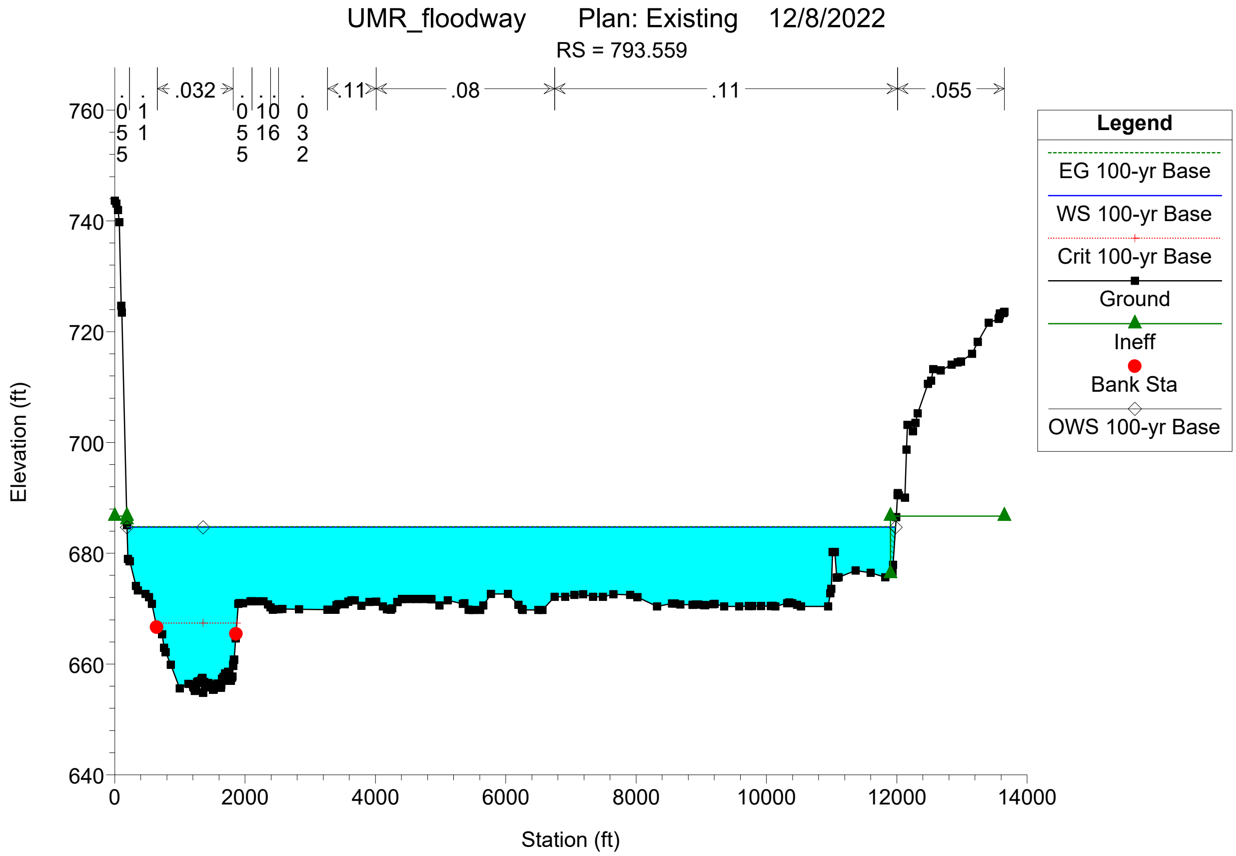

UMR_floodway Plan: Existing 12/8/2022
RS = 795.000
.09
.12
.065
.032
.065
.12
.065
.09
.12
.065
.12
.09
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

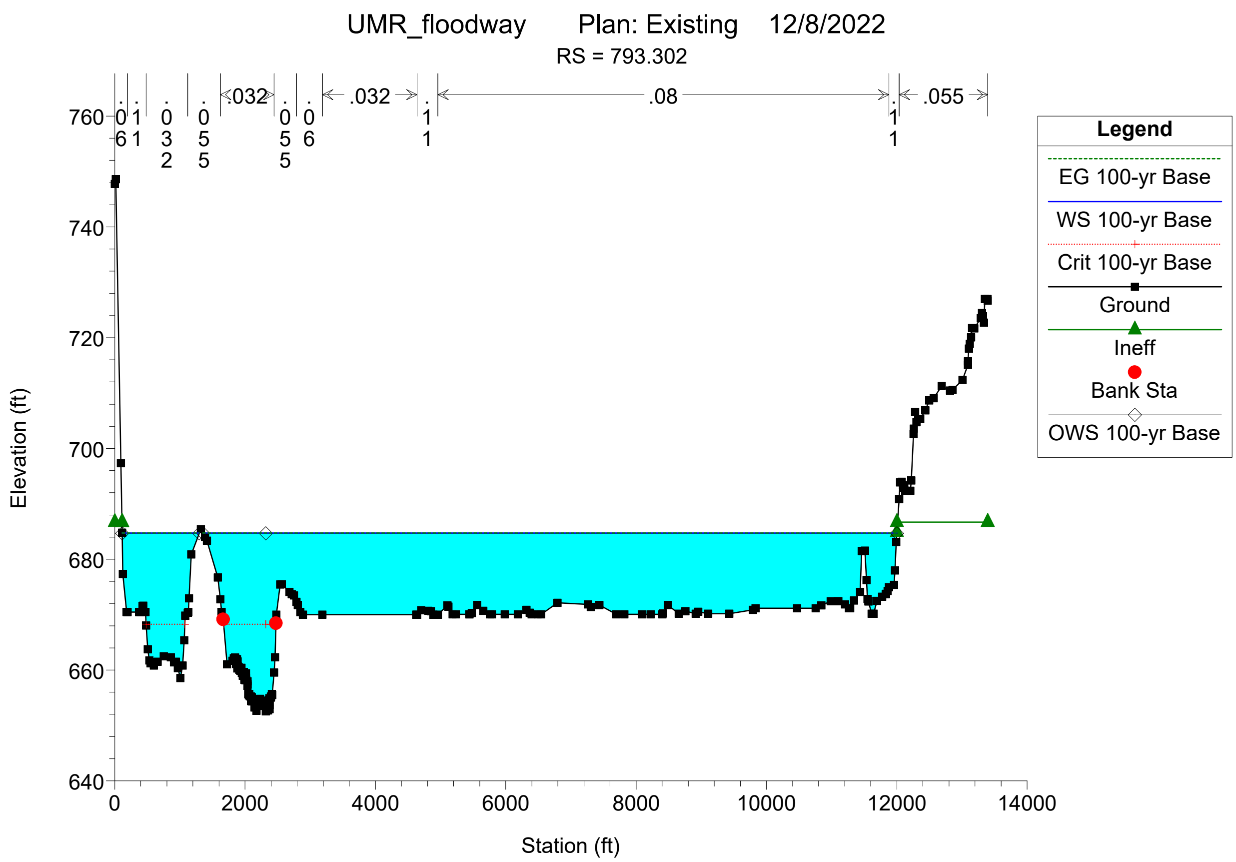

UMR_floodway Plan: Existing 12/8/2022
RS = 794.671
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

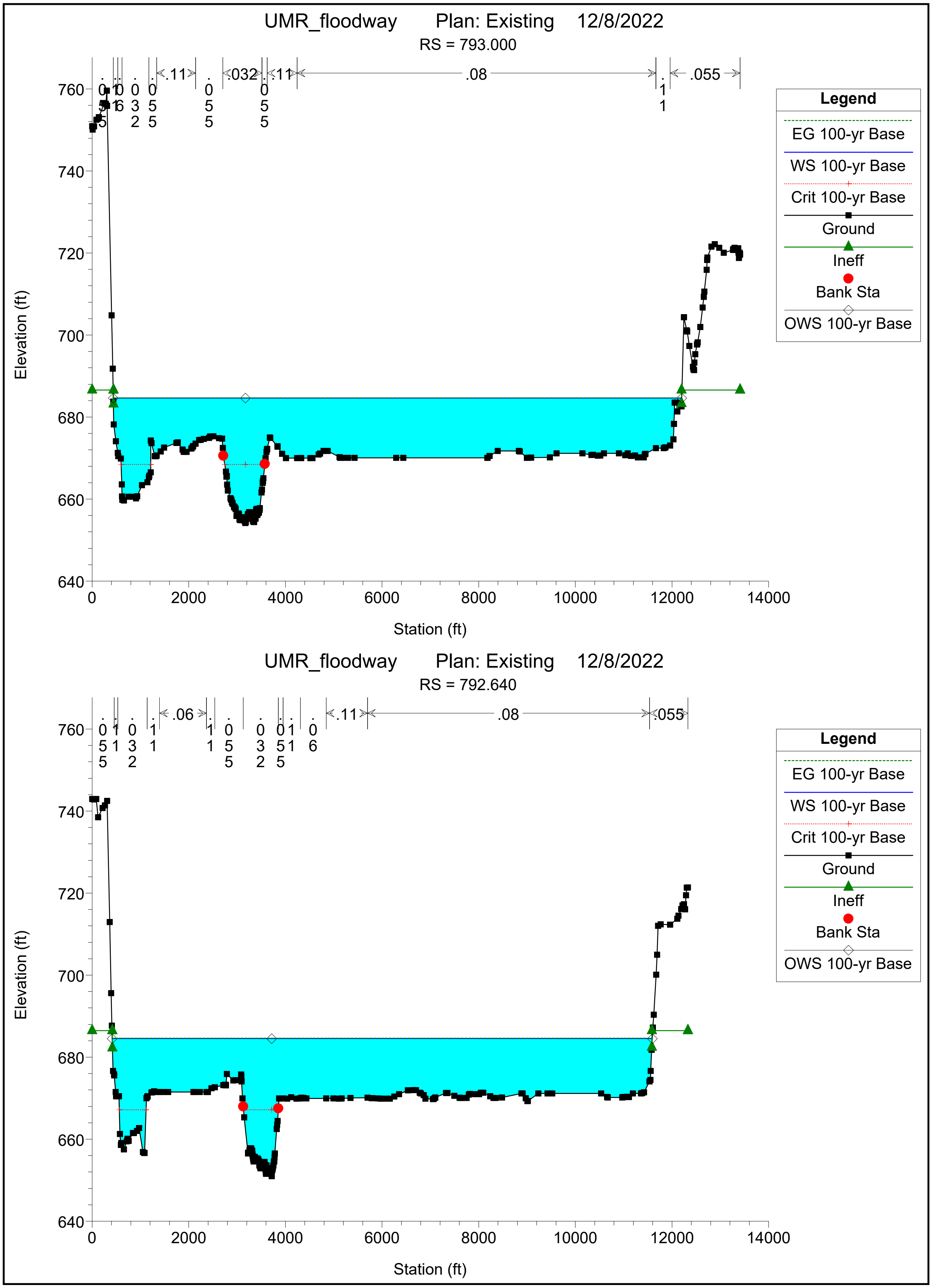

UMR_floodway Plan: Existing 12/8/2022
RS = 794.379
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

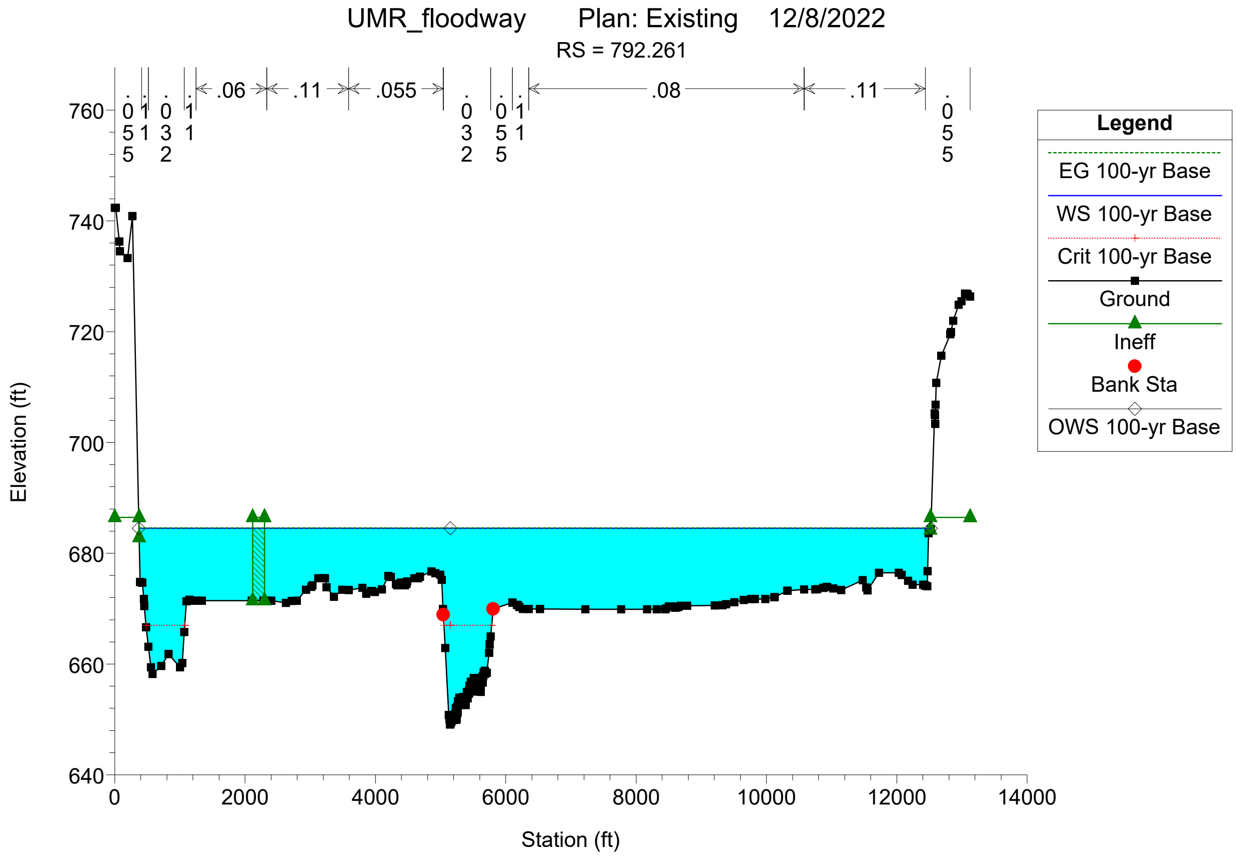

UMR_floodway Plan: Existing 12/8/2022
RS = 794.078
.12
.09
.12
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

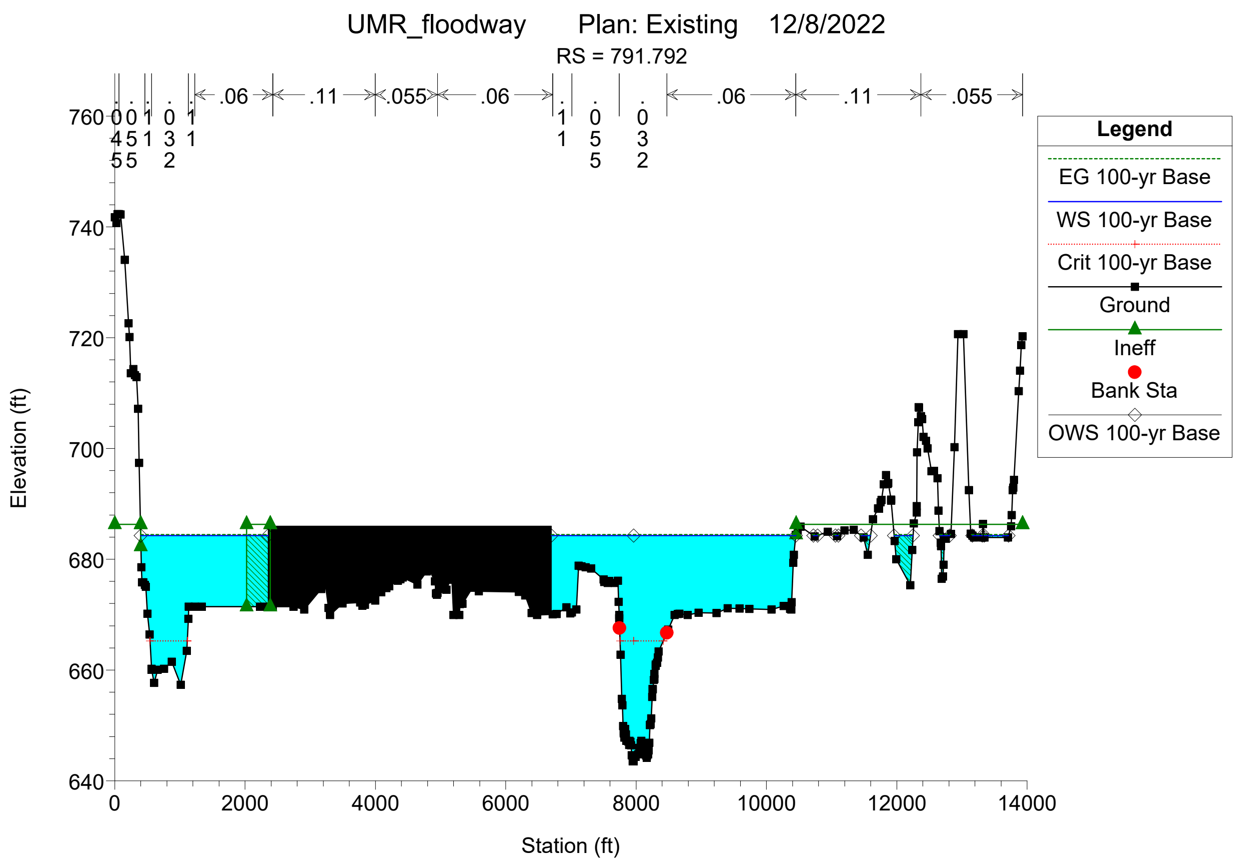

UMR_floodway Plan: Existing 12/8/2022
RS = 793.829
.11
.08
.11
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

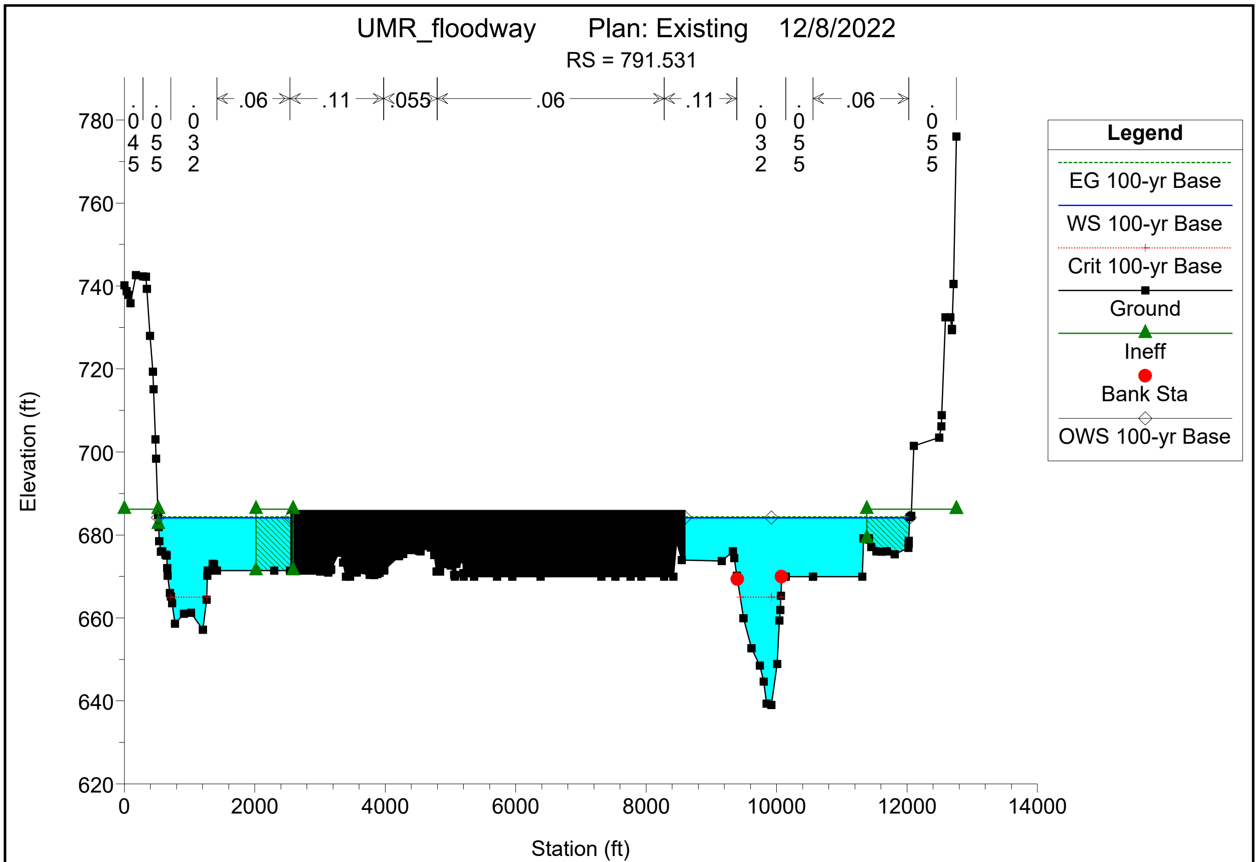

UMR_floodway Plan: Existing 12/8/2022
RS = 793.559
.032
.11
.08
.11
.055
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)


UMR_floodway Plan: Existing 12/8/2022
RS = 793.302
.032
.032
.08
.055
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

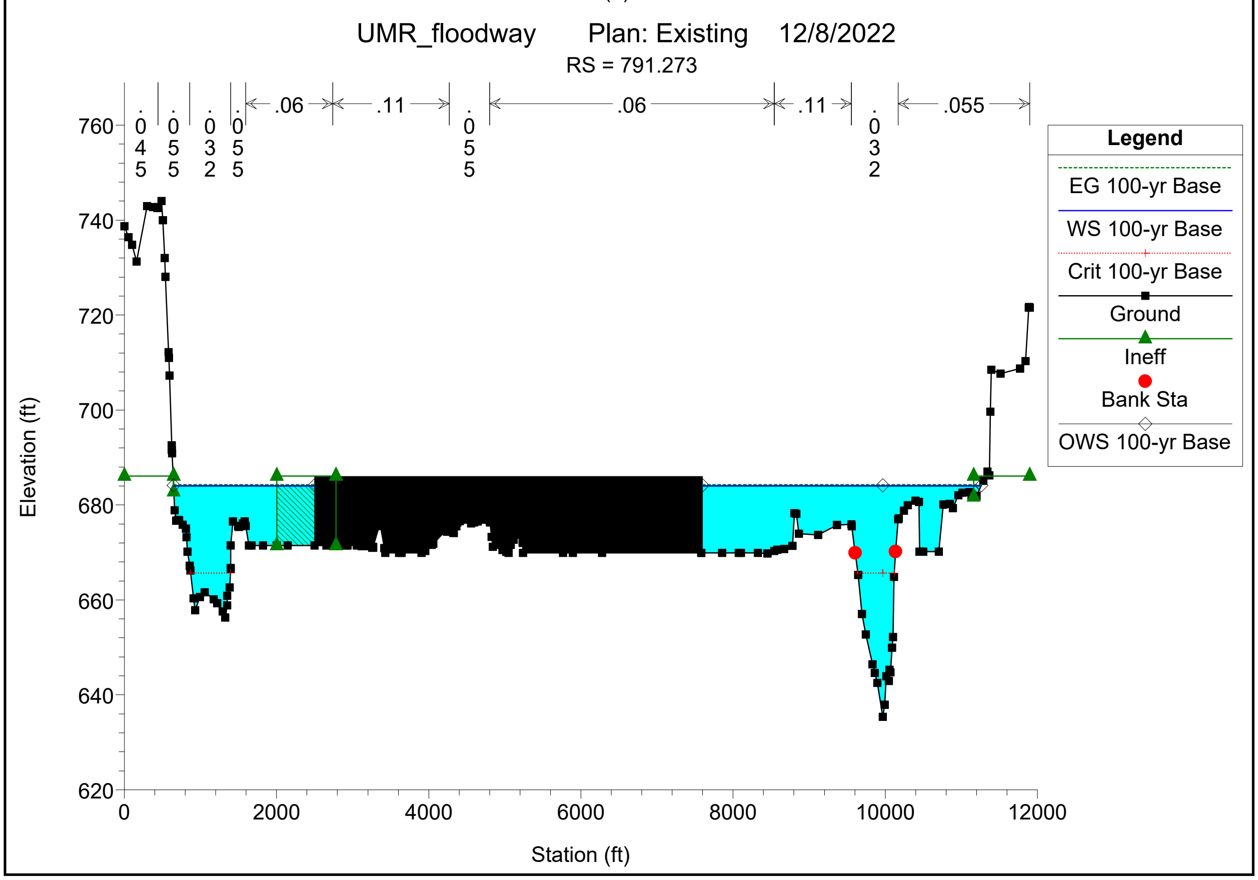

UMR_floodway Plan: Existing 12/8/2022
RS = 793.000
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
.11
.032
.11
.08
.055
UMR_floodway Plan: Existing 12/8/2022
RS = 792.640
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
.06
.11
.08
.055


UMR_floodway Plan: Existing 12/8/2022
RS = 792.261
.06
.11
.055
.08
.11
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

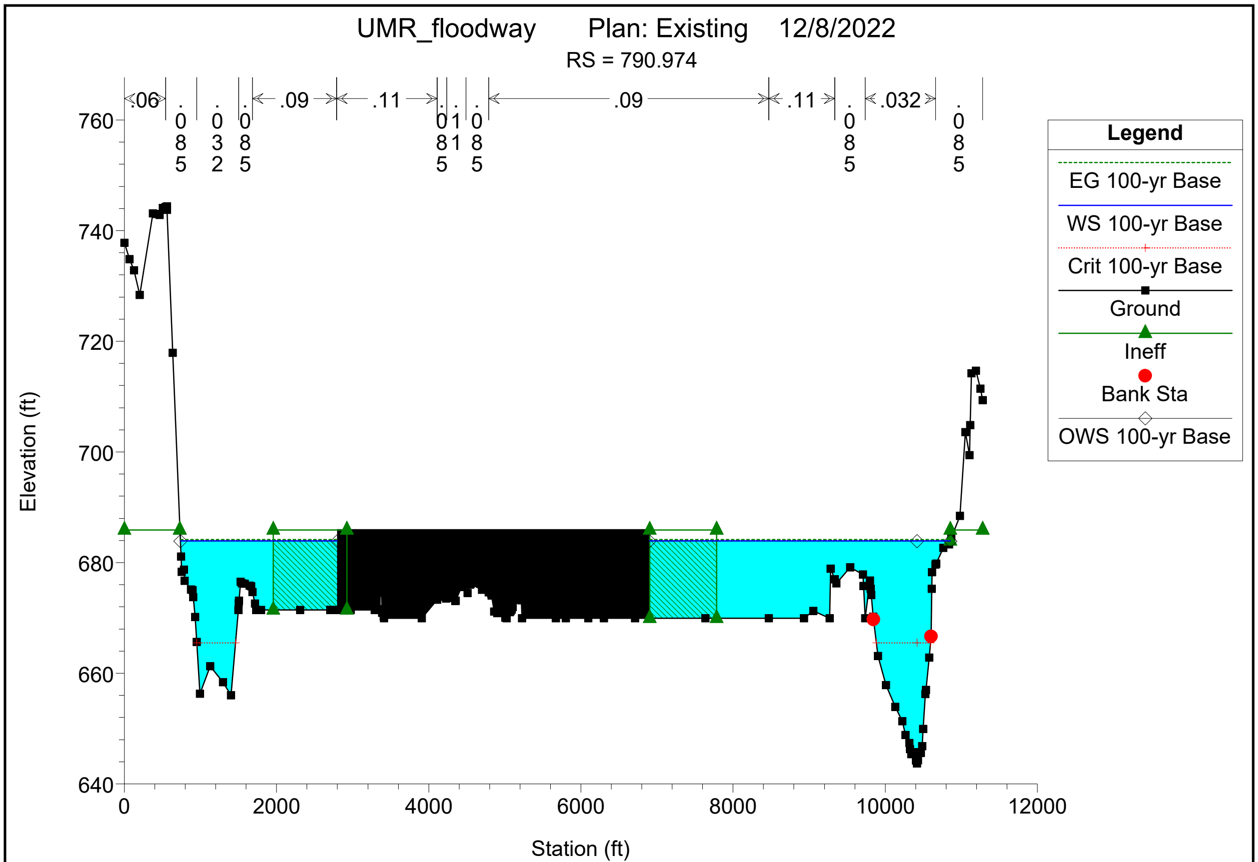

UMR_floodway Plan: Existing 12/8/2022
RS = 791.792
.06
.11
.055
.06
.06
.11
.055
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

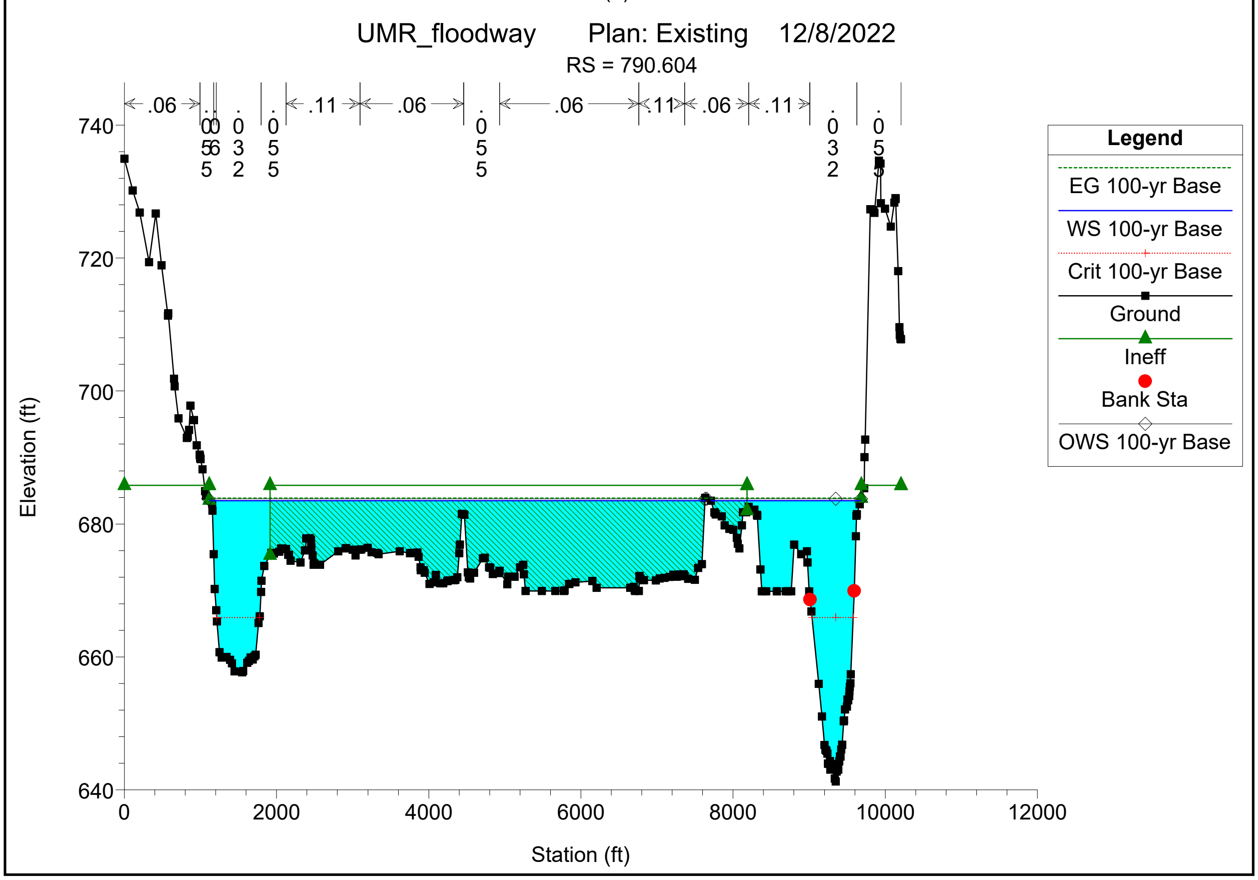


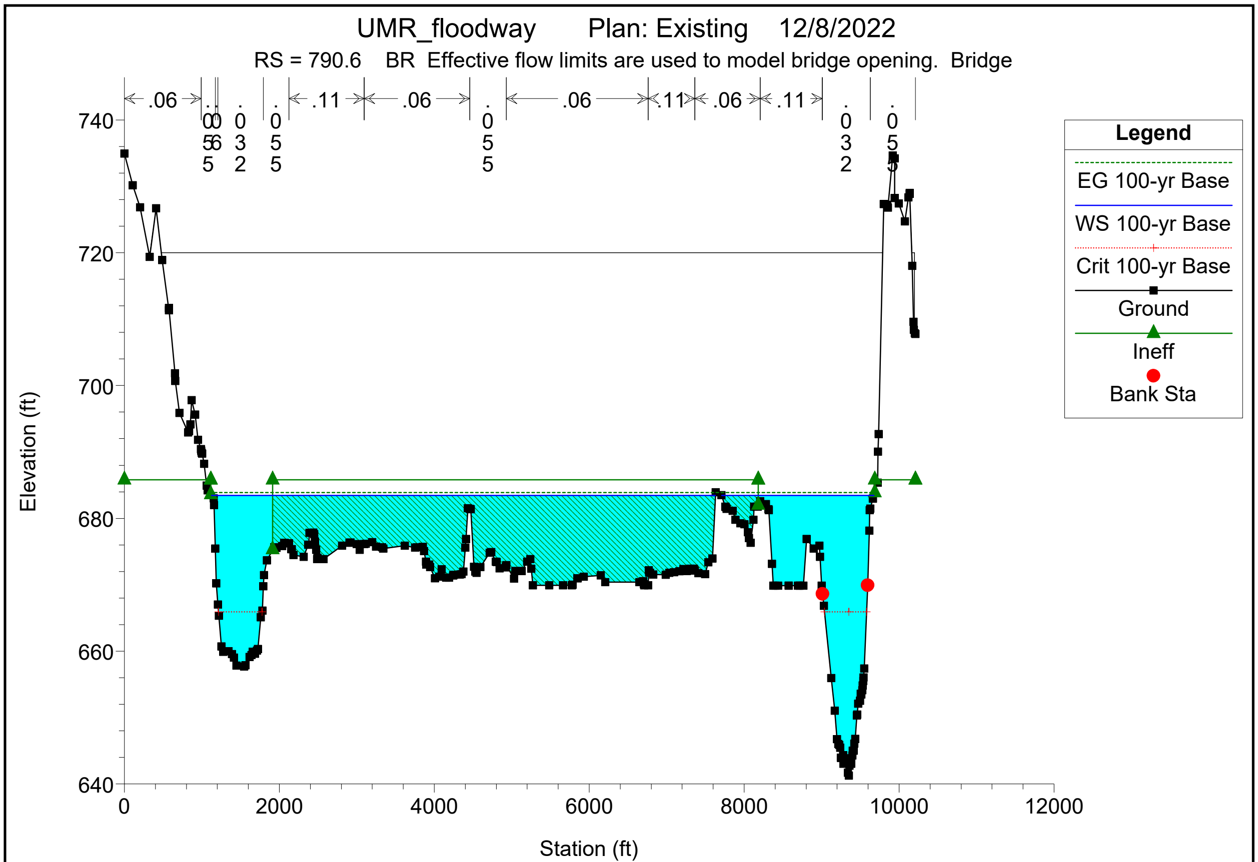
UMR_floodway Plan: Existing 12/8/2022
RS = 791.531
.06
.11
.055
.06
.11
.06
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base



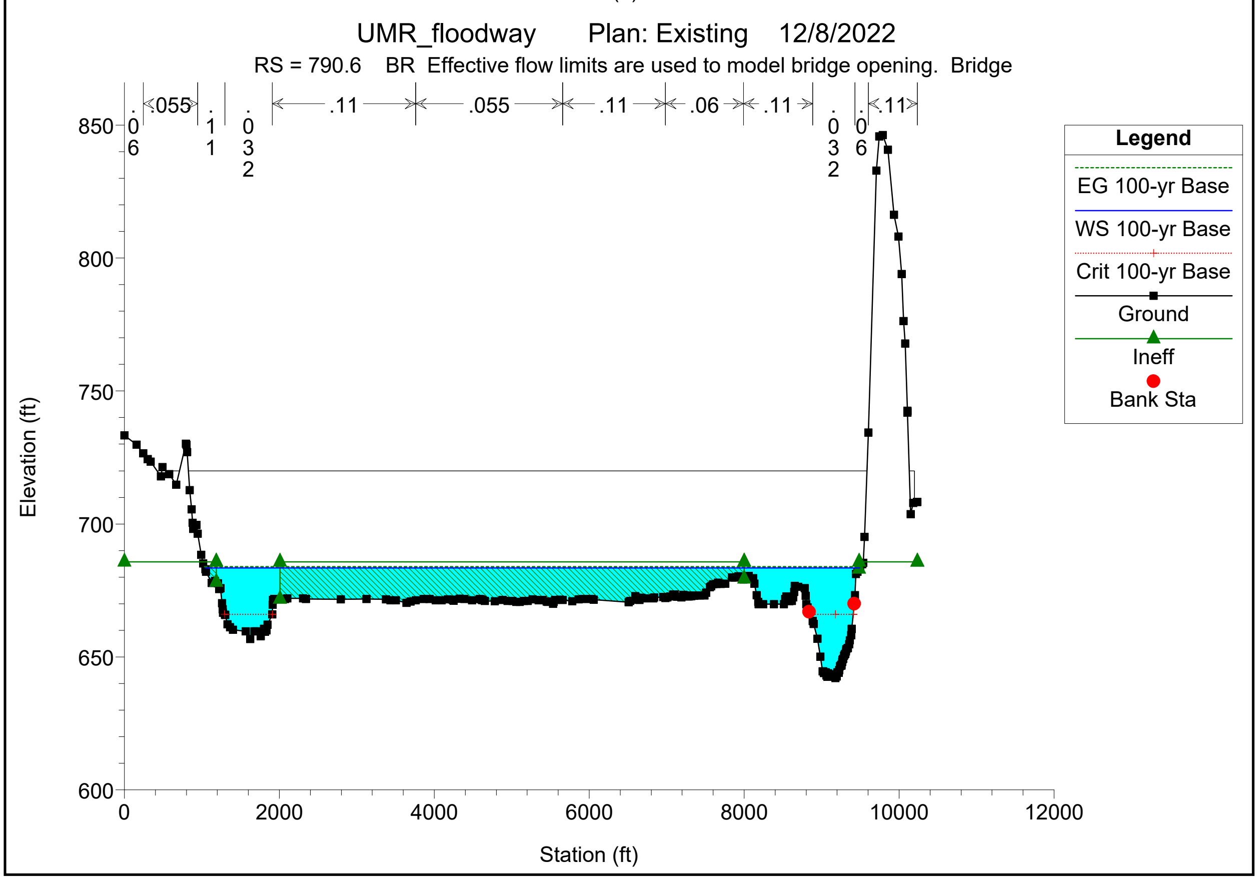
UMR_floodway Plan: Existing 12/8/2022
RS = 791.273
.06
.11
.06
.11
.055
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base


UMR_floodway Plan: Existing 12/8/2022
RS = 790.974
.06
.09
.11
.09
.11
.032
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

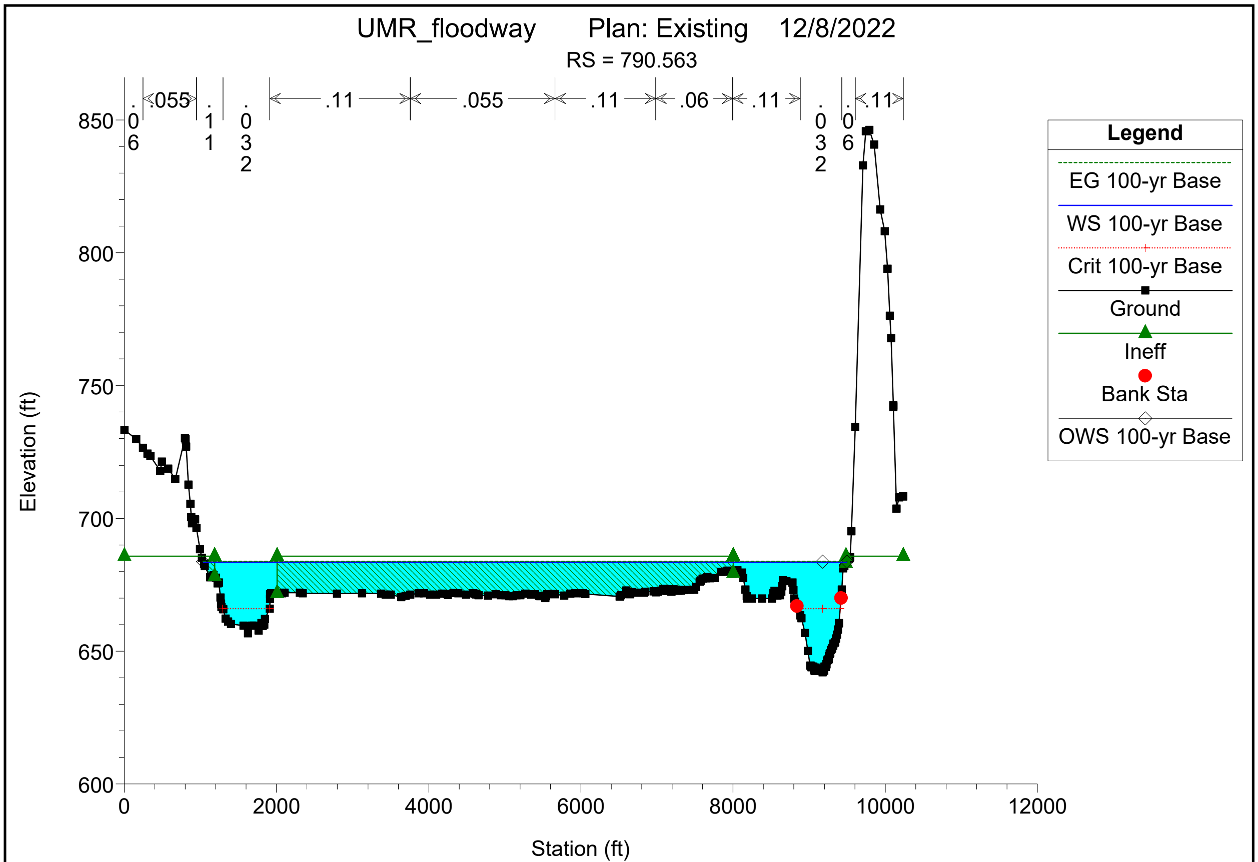

UMR_floodway Plan: Existing 12/8/2022
RS = 790.604
.06
.11
.06
.06
.11
.06
.11
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base



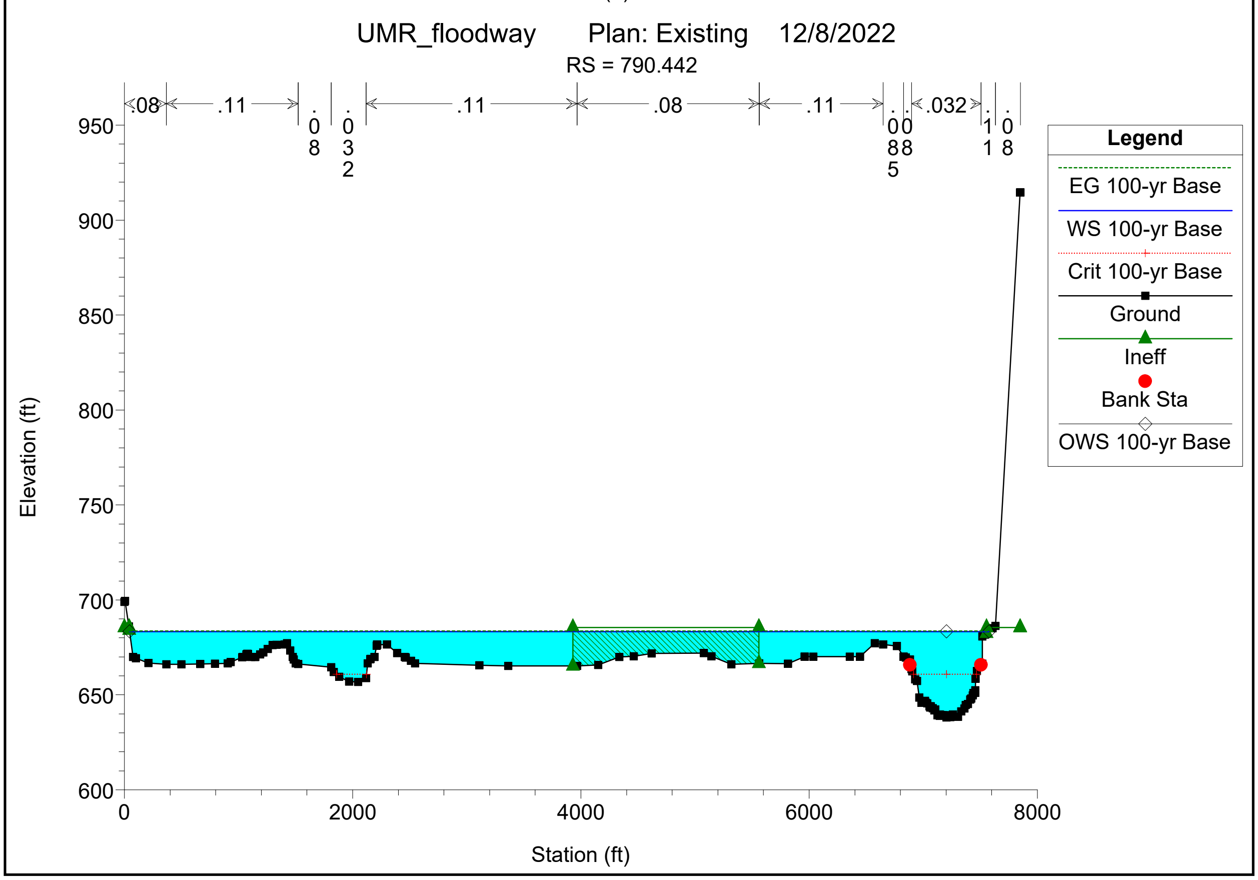
UMR_floodway Plan: Existing 12/8/2022
RS = 790.6 BR Effective flow limits are used to model bridge opening. Bridge
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta



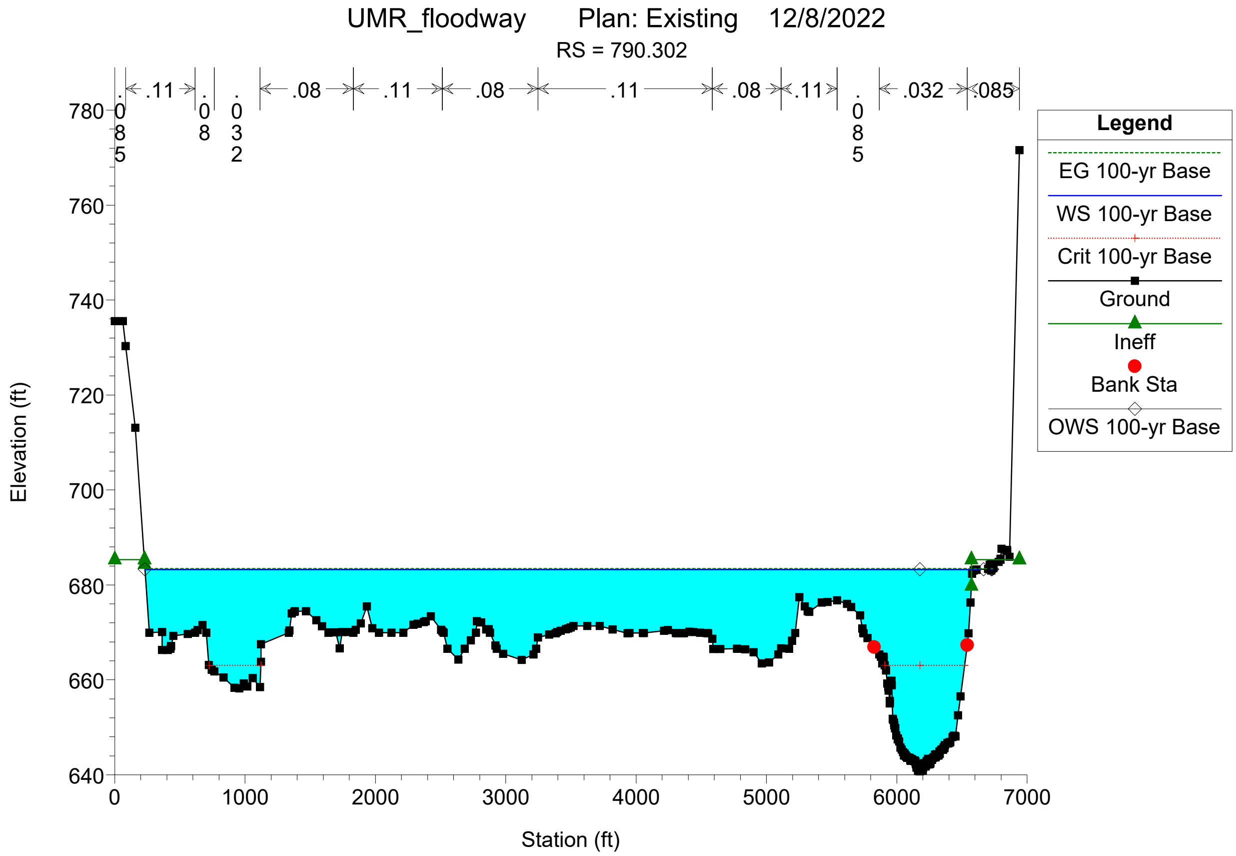
UMR_floodway Plan: Existing 12/8/2022
RS = 790.6 BR Effective flow limits are used to model bridge opening. Bridge
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta

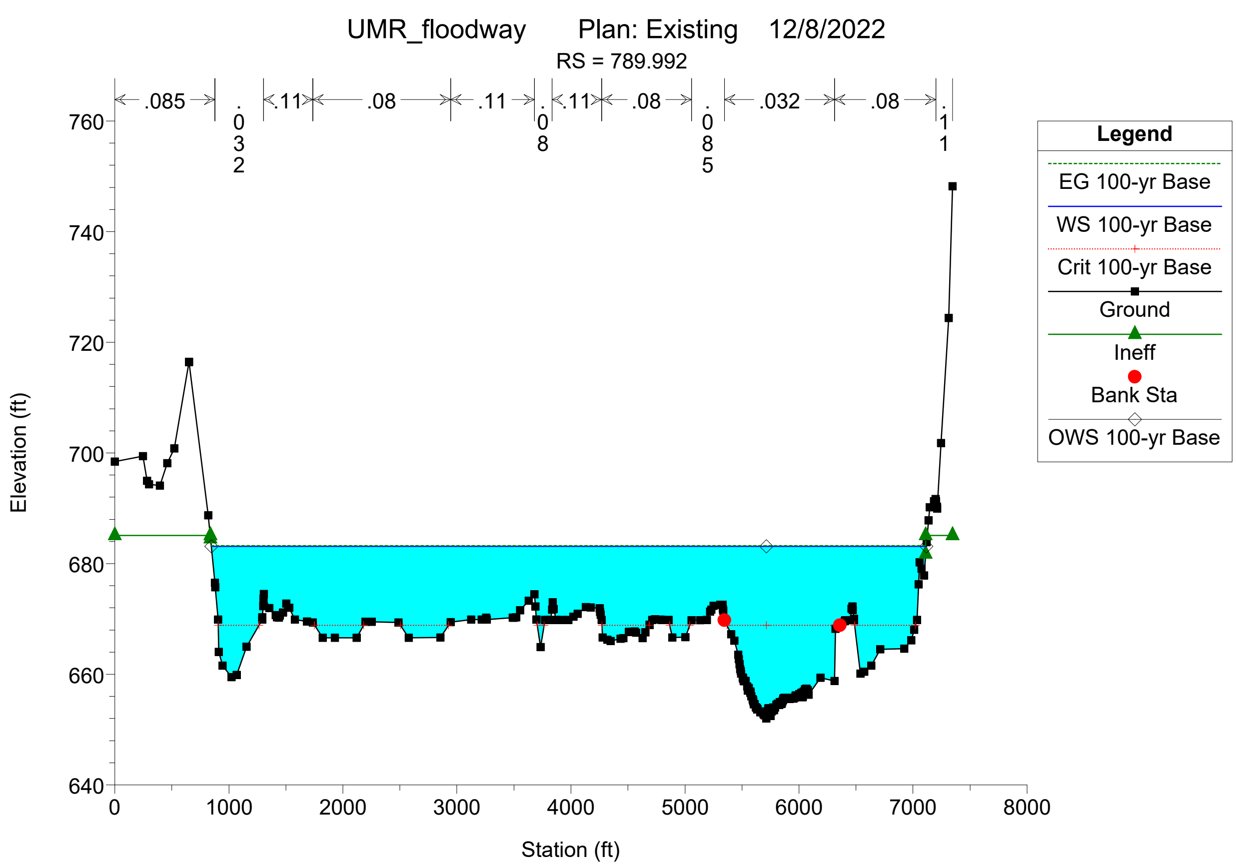


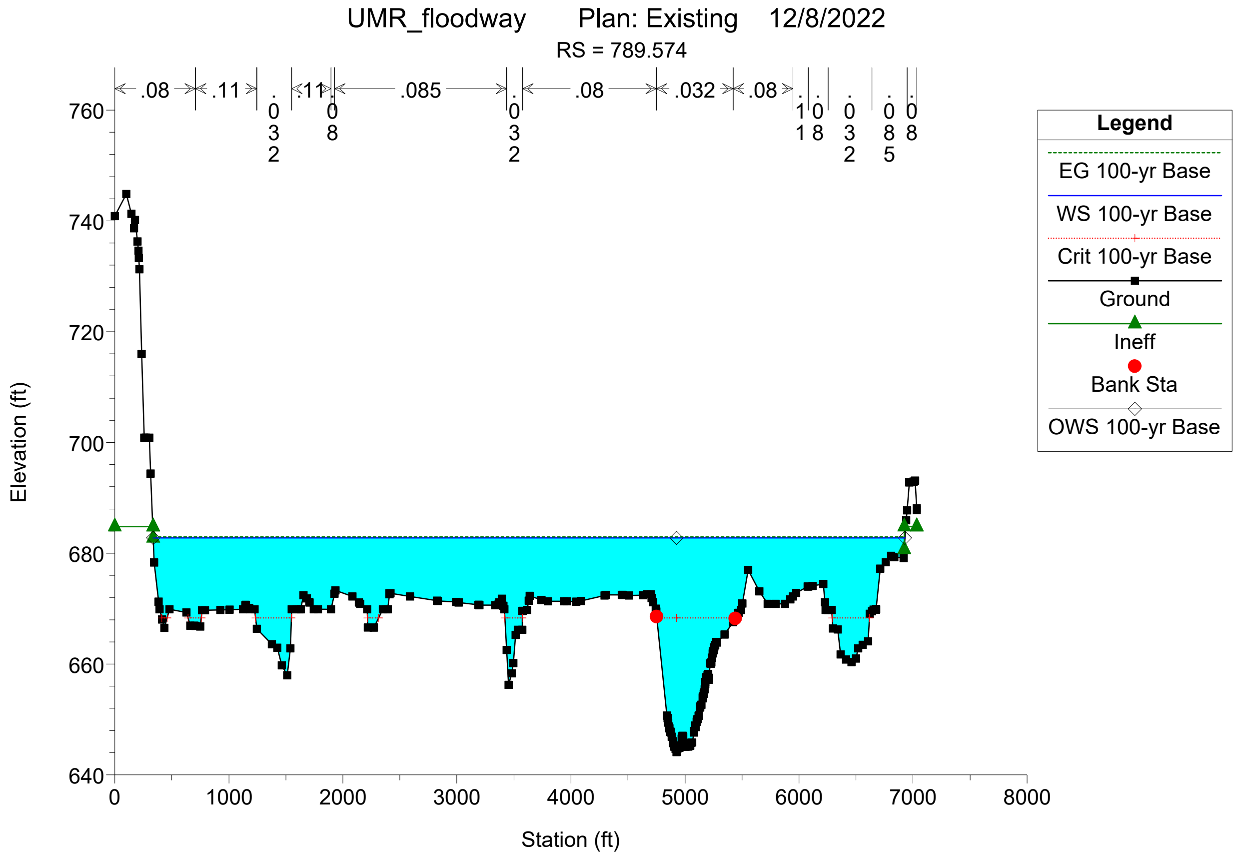
UMR_floodway Plan: Existing 12/8/2022
RS = 790.563
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

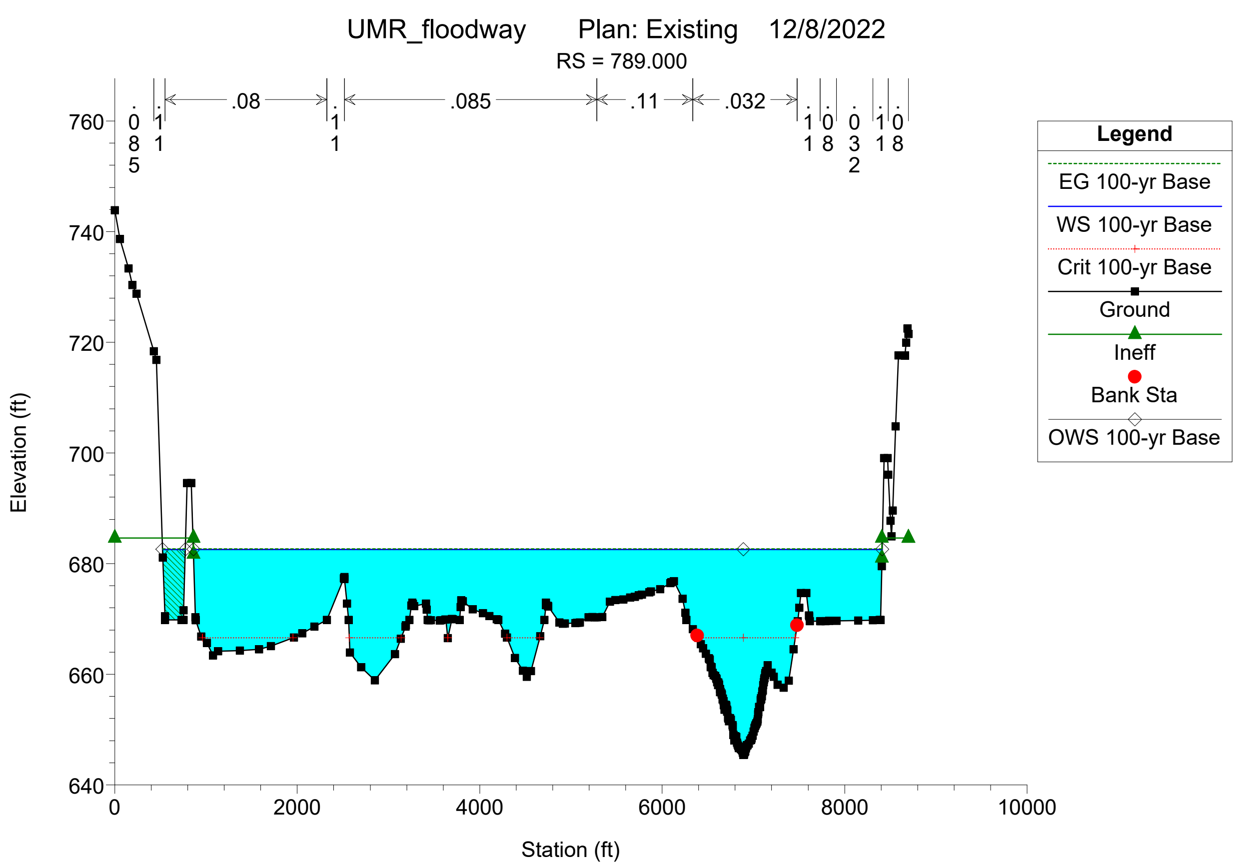


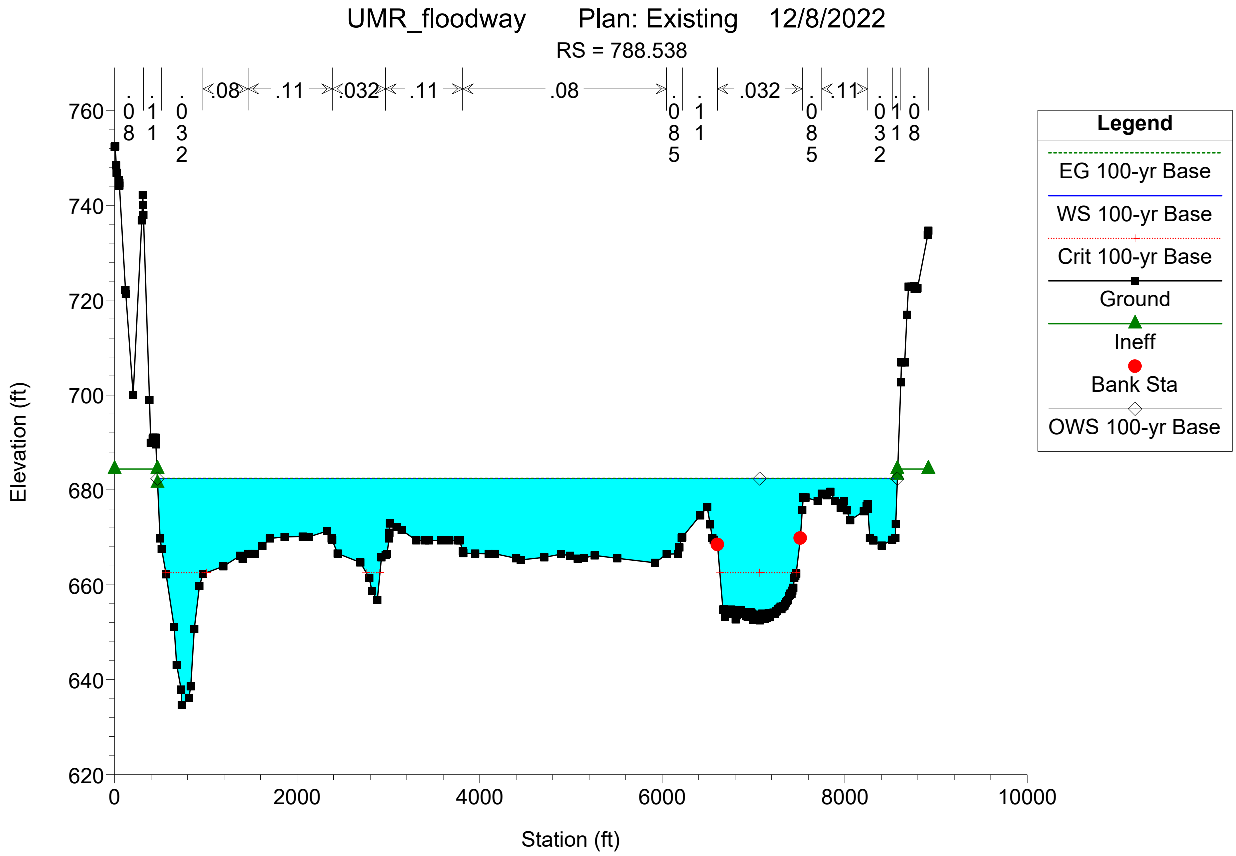
UMR_floodway Plan: Existing 12/8/2022
RS = 790.442
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)


UMR_floodway Plan: Existing 12/8/2022
RS = 790.302
.085
.11
.08
.032
.08
.11
.08
.11
.08
.11
.085
.032
.085
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)
780
760
740
720
700
680
660
640
0
1000
2000
3000
4000
5000
6000
7000

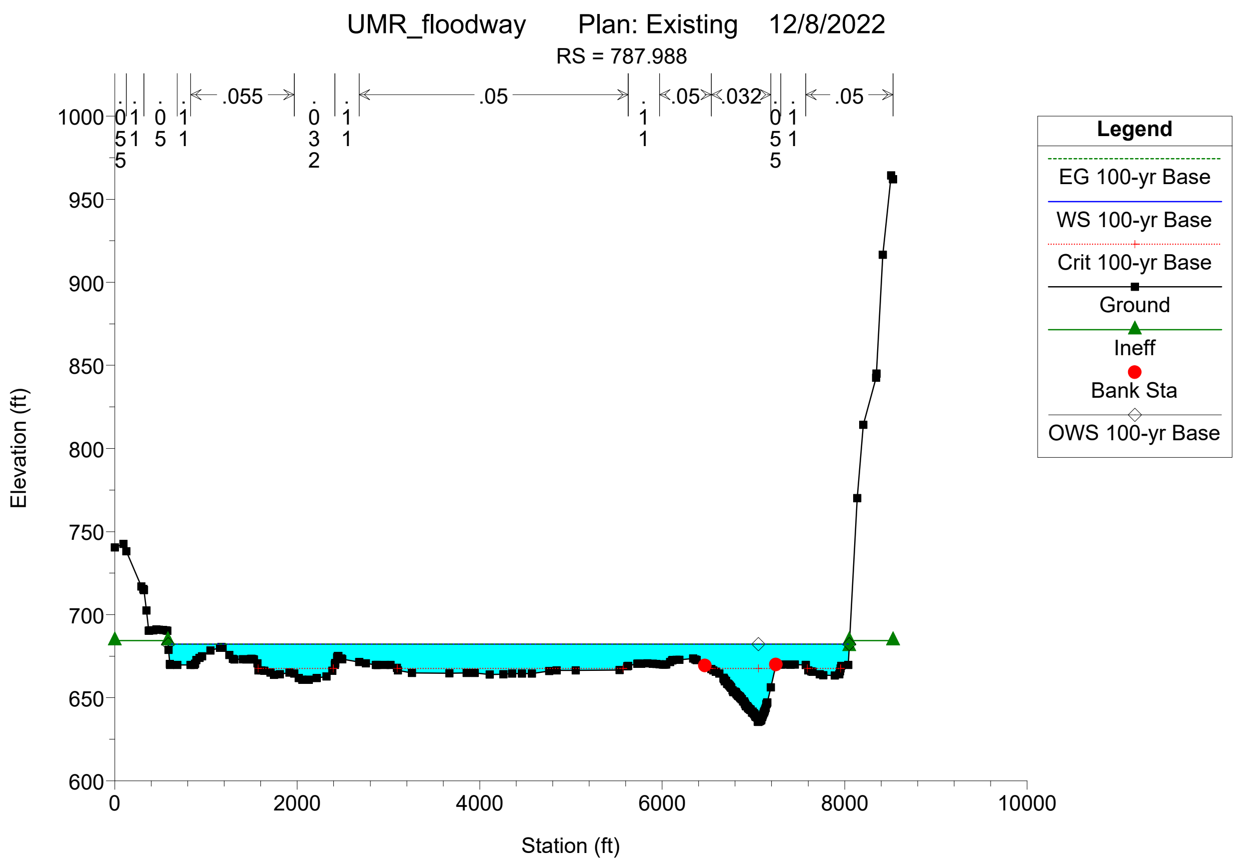

UMR_floodway Plan: Existing 12/8/2022
RS = 789.992
.085
.032
.11
.08
.11
.08
.11
.08
.085
.032
.08
.11
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)
760
740
720
700
680
660
640
0
1000
2000
3000
4000
5000
6000
7000
8000


UMR_floodway Plan: Existing 12/8/2022
RS = 789.574
.08
.11
.032
.11
.08
.085
.032
.08
.032
.08
.1
.08
.1
.08
.032
.085
.08
Elevation (ft)
Station (ft)
640
660
680
700
720
740
760
0
1000
2000
3000
4000
5000
6000
7000
8000
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

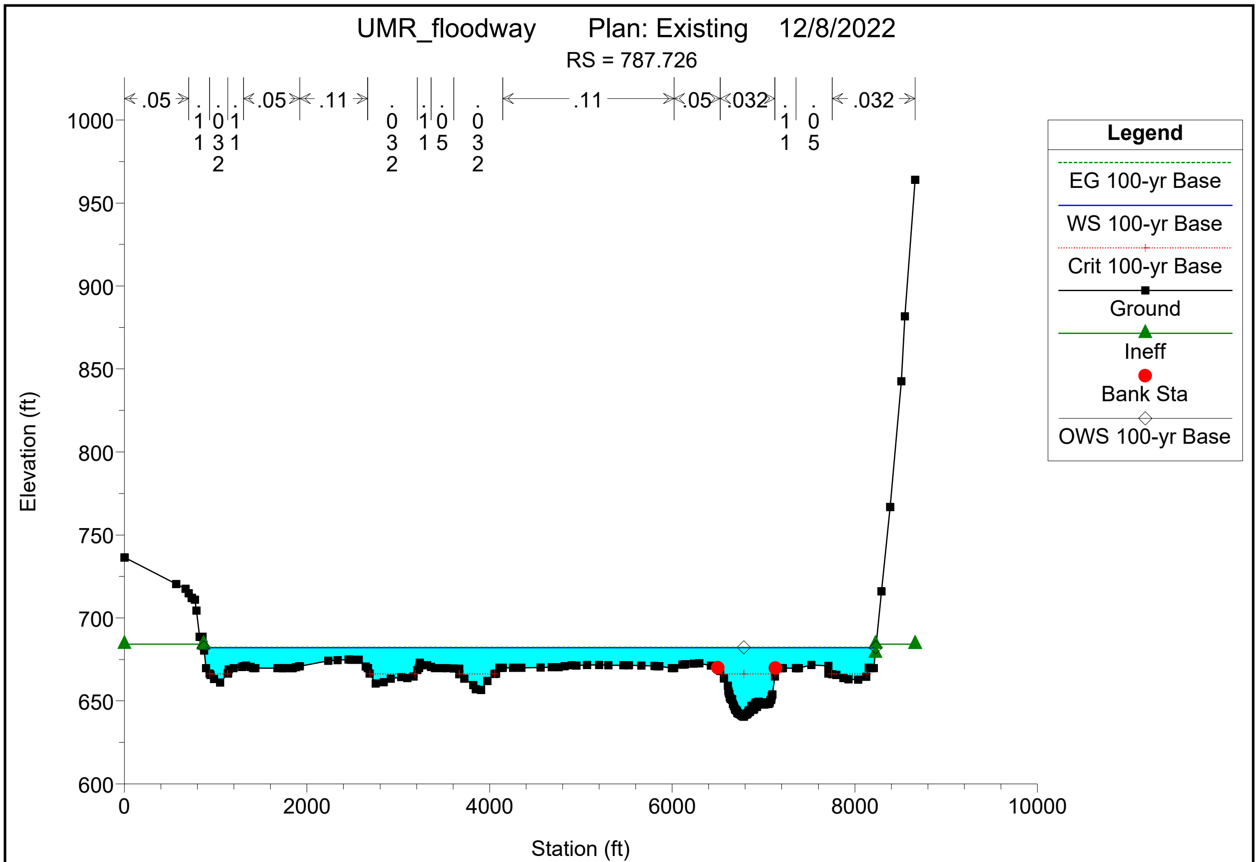

UMR_floodway Plan: Existing 12/8/2022
RS = 789.000
.085
.11
.08
.11
.085
.11
.032
.1
.08
.032
.1
.08
Elevation (ft)
Station (ft)
640
660
680
700
720
740
760
0
2000
4000
6000
8000
10000
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

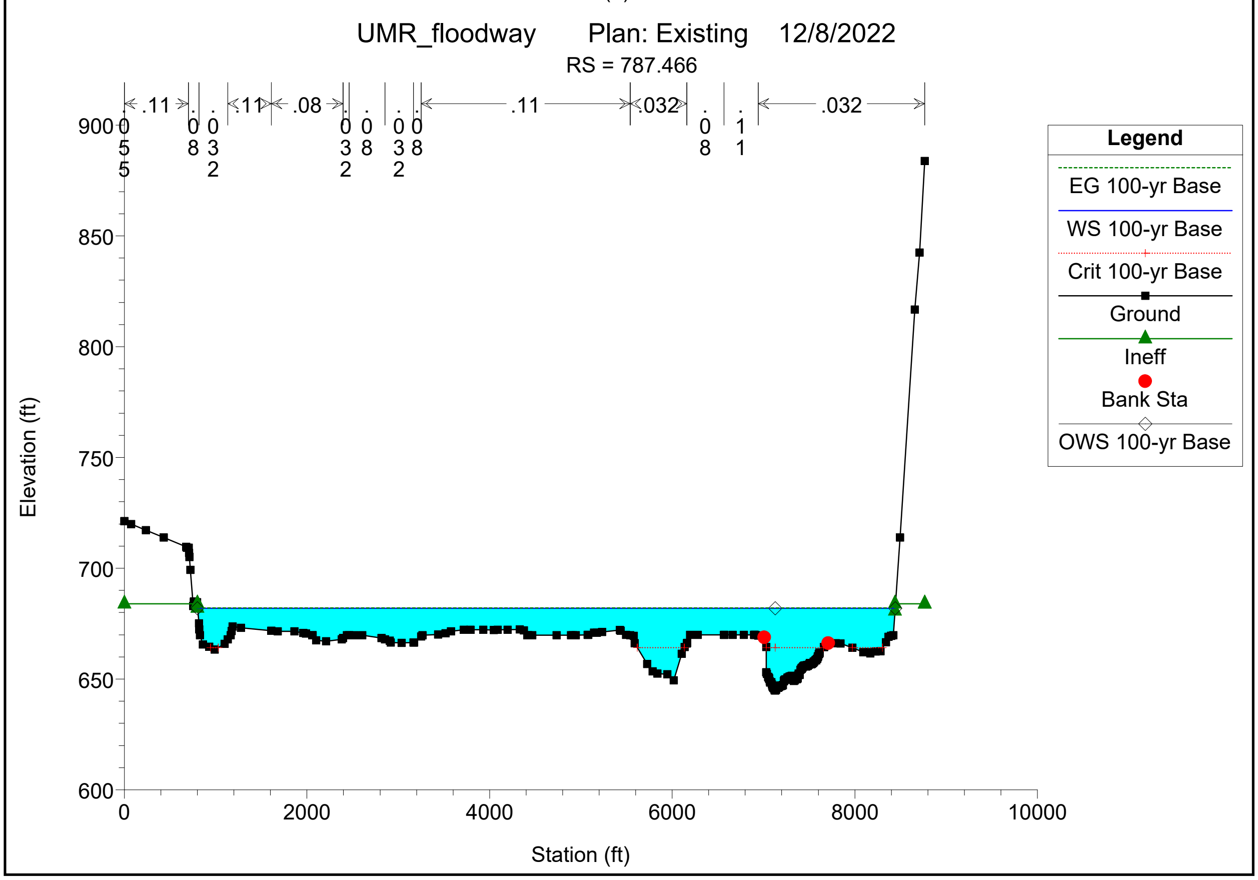


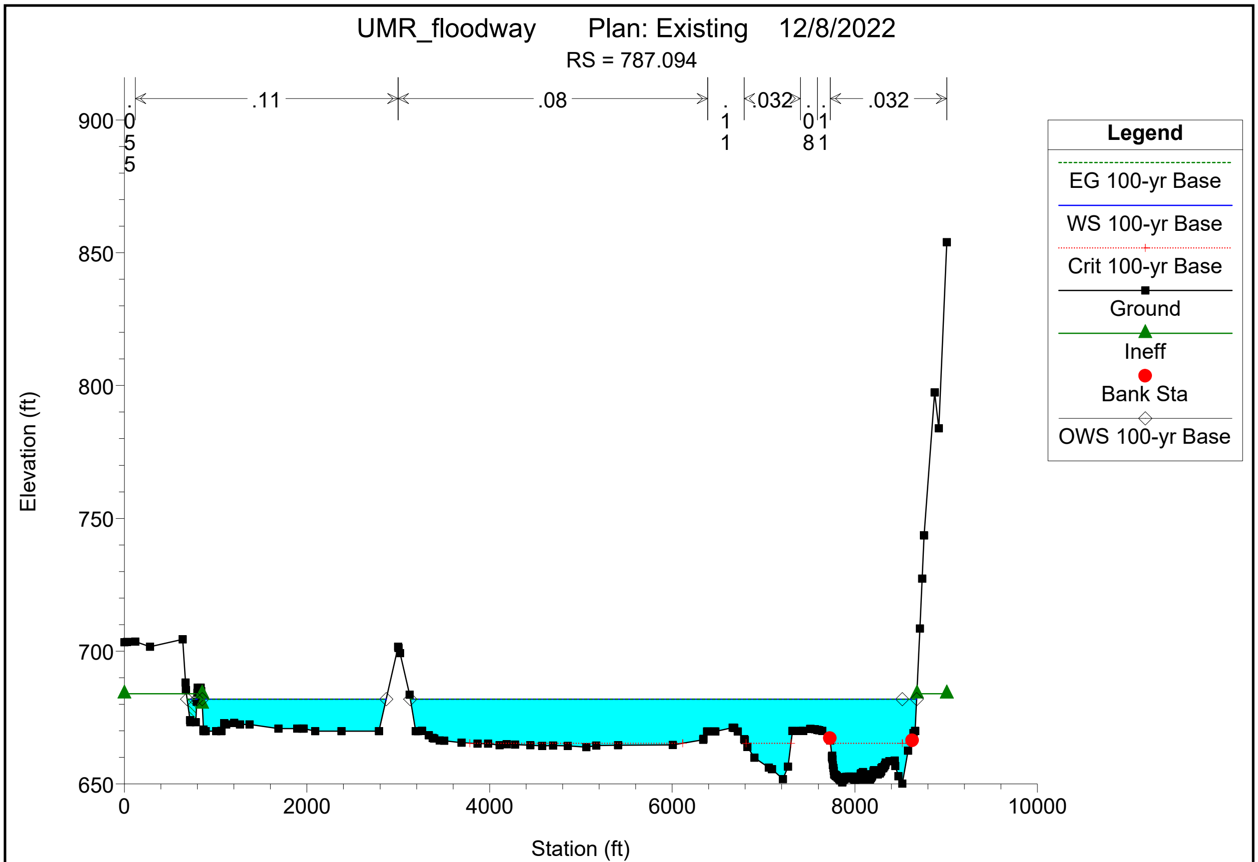
UMR_floodway Plan: Existing 12/8/2022
RS = 788.538
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

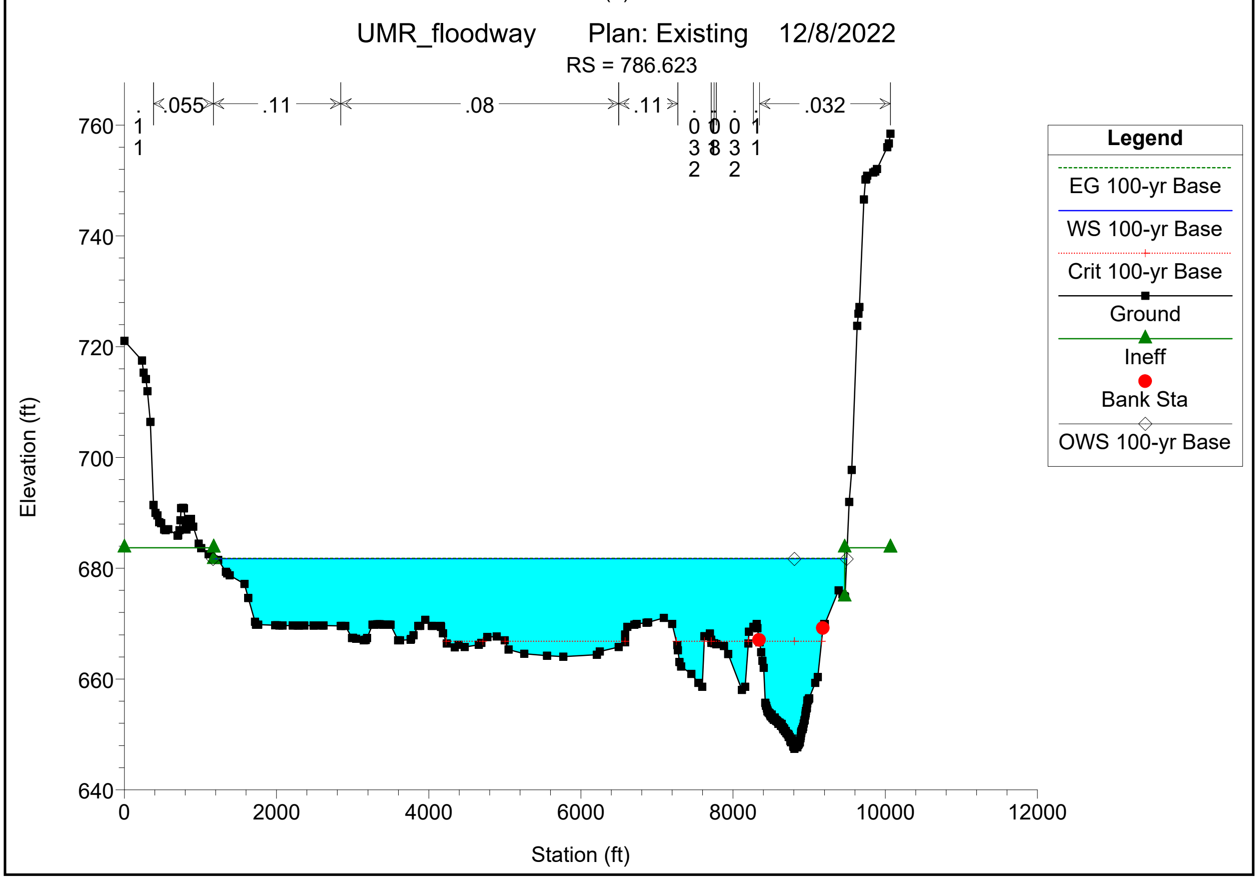


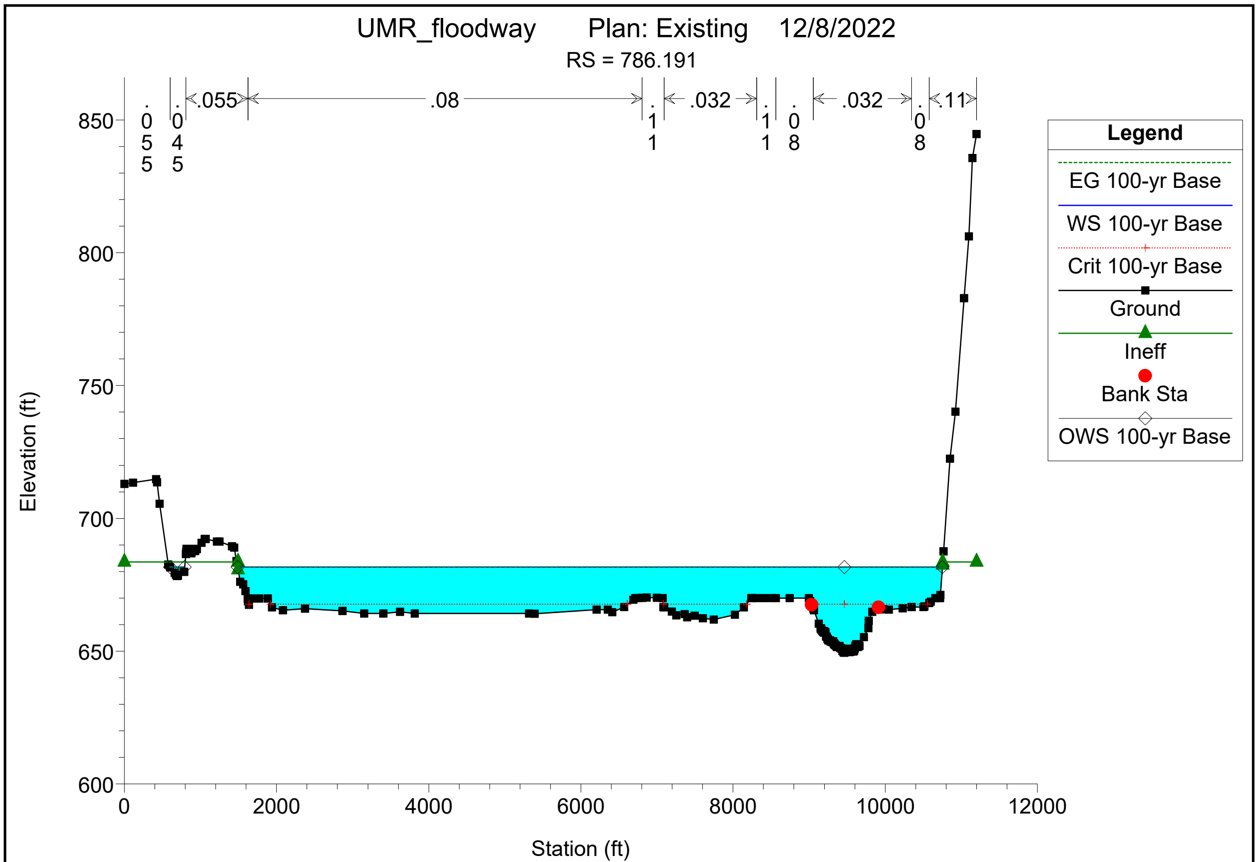
UMR_floodway Plan: Existing 12/8/2022
RS = 787.988
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

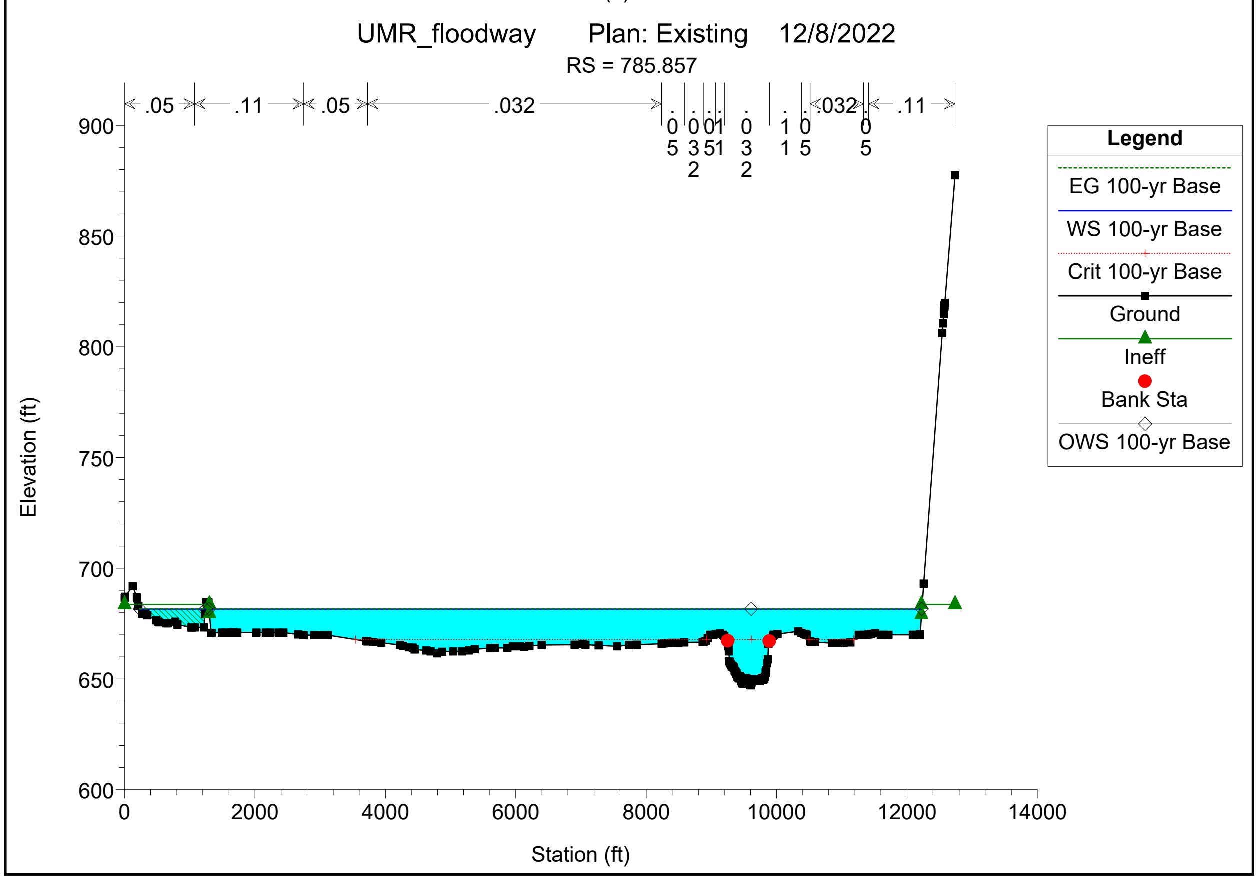

UMR_floodway Plan: Existing 12/8/2022
RS = 787.726
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

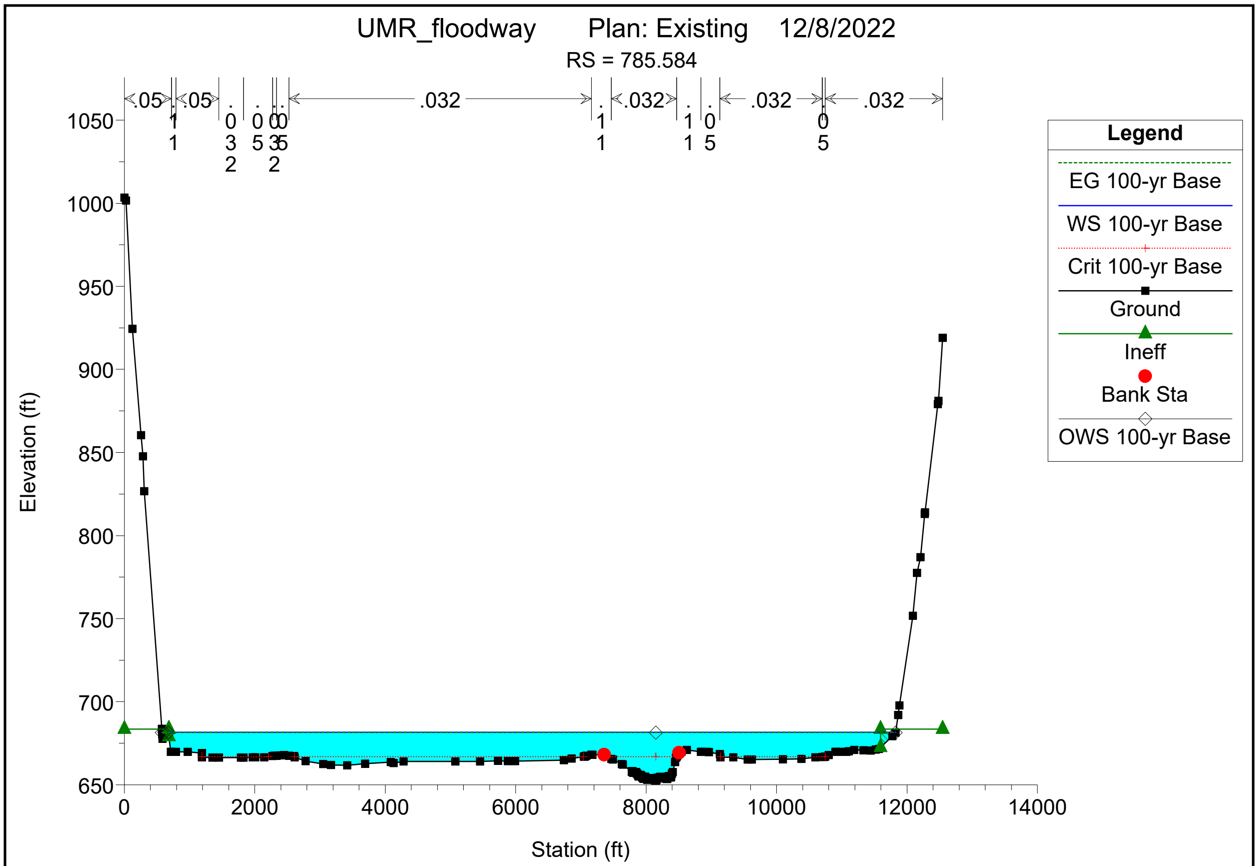

UMR_floodway Plan: Existing 12/8/2022
RS = 787.466
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

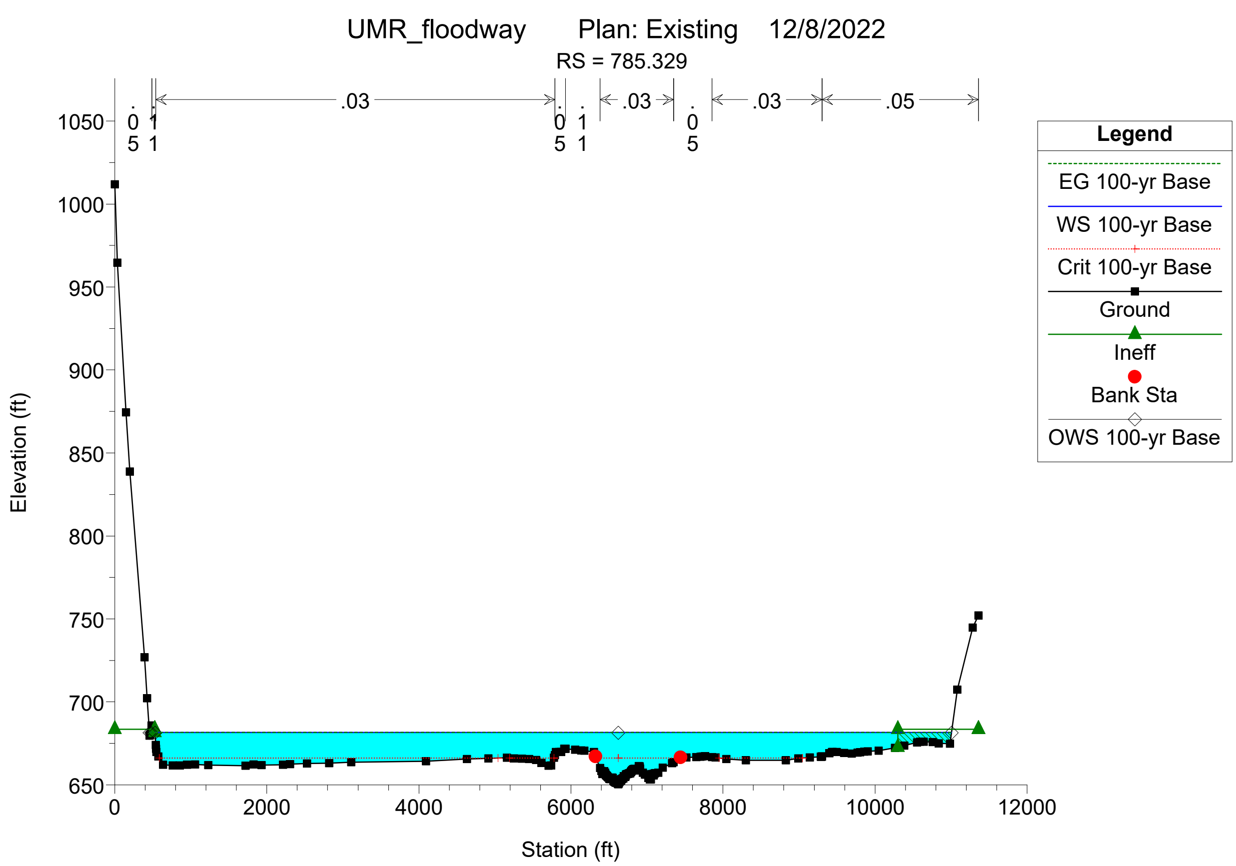

UMR_floodway Plan: Existing 12/8/2022
RS = 787.094
.11
.08
.032
.032
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

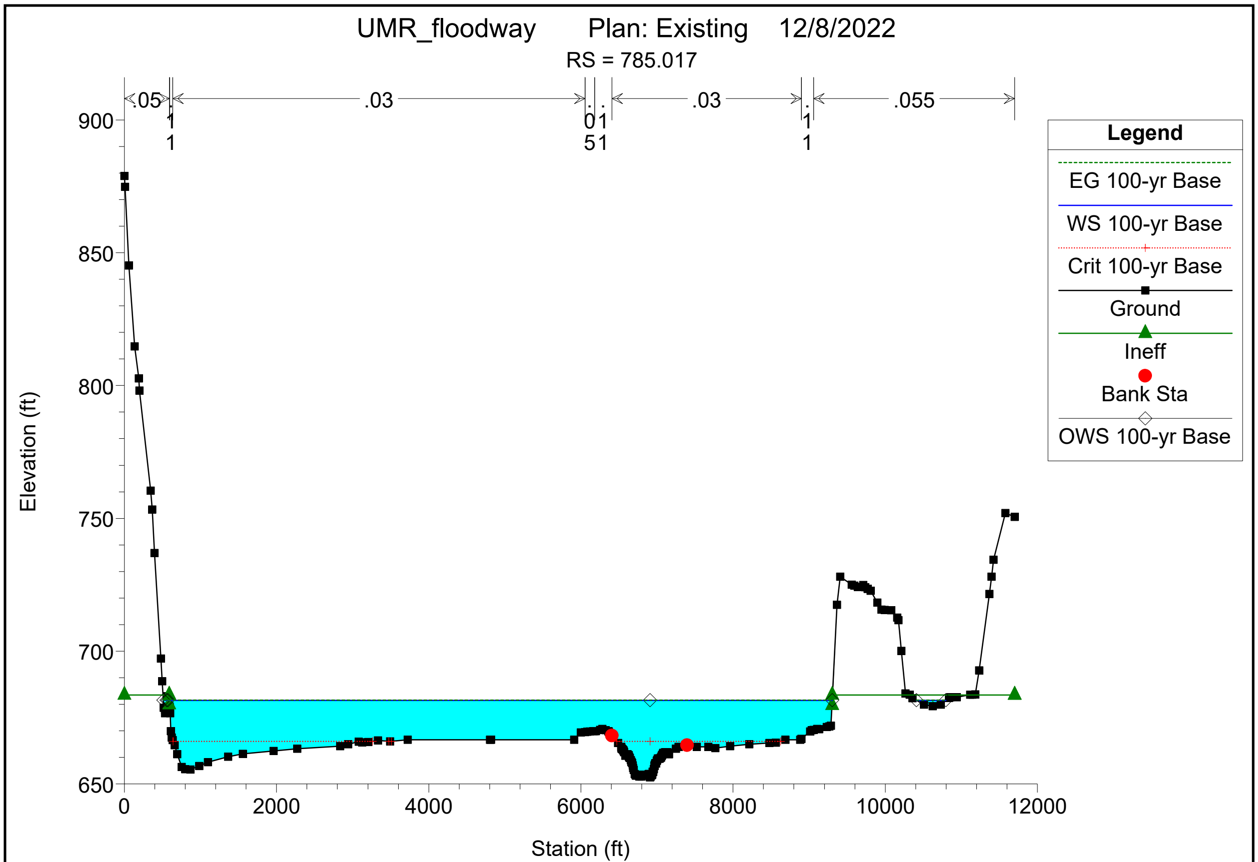

UMR_floodway Plan: Existing 12/8/2022
RS = 786.623
.055
.11
.08
.11
.032
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base


UMR_floodway Plan: Existing 12/8/2022
RS = 786.191
.055
.08
.032
.032
.11
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

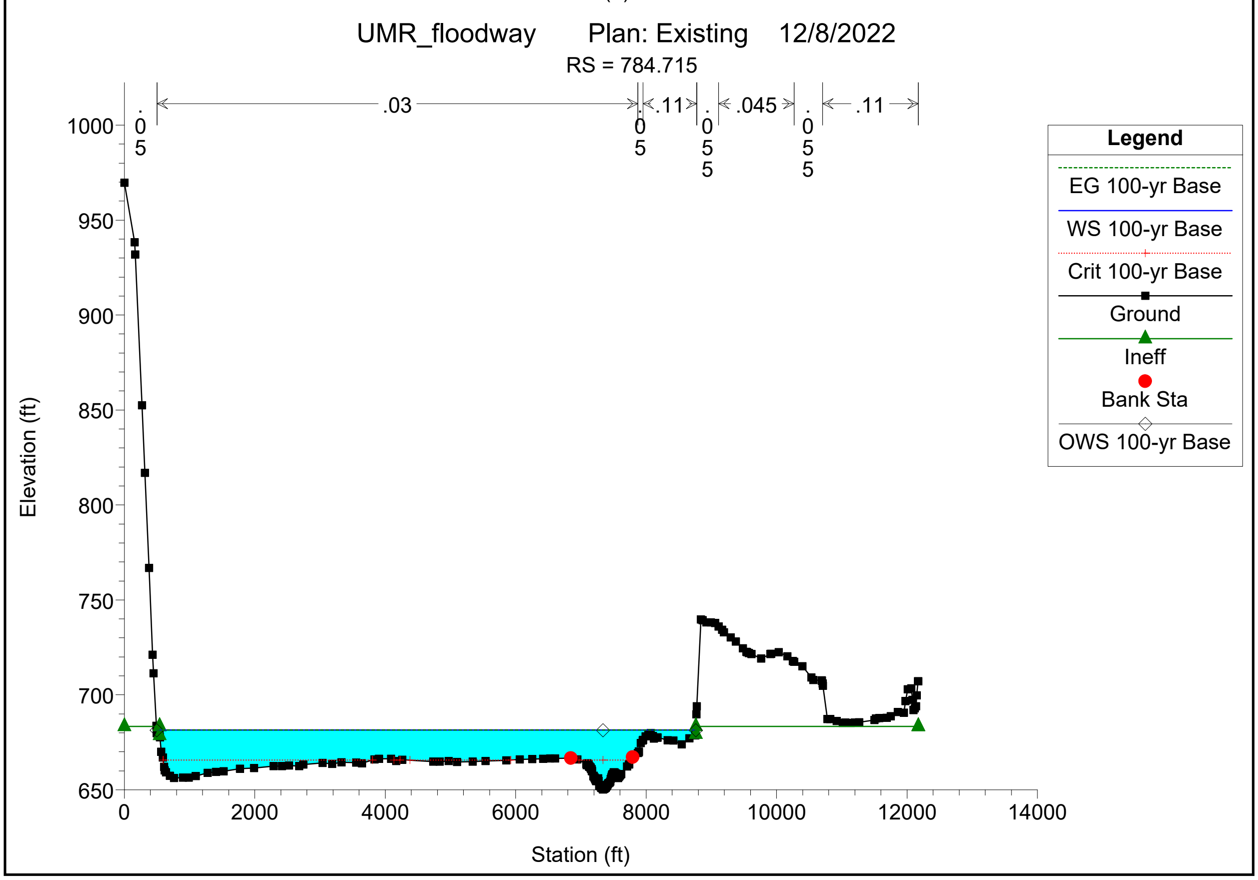

UMR_floodway Plan: Existing 12/8/2022
RS = 785.857
.05
.11
.05
.032
.032
.11
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base


UMR_floodway Plan: Existing 12/8/2022
RS = 785.584
.05
.05
.032
.032
.032
.032
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

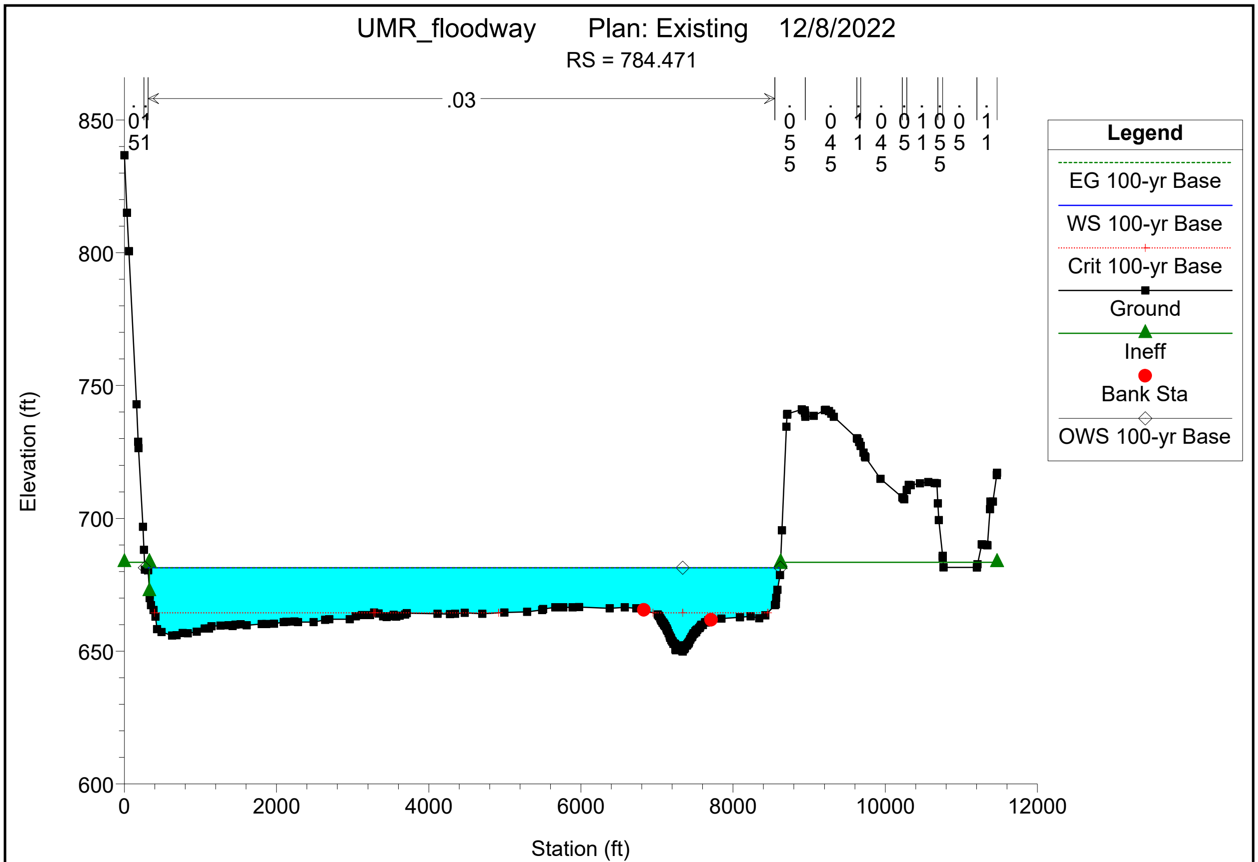

UMR_floodway Plan: Existing 12/8/2022
RS = 785.329
.03
.03
.03
.05
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base



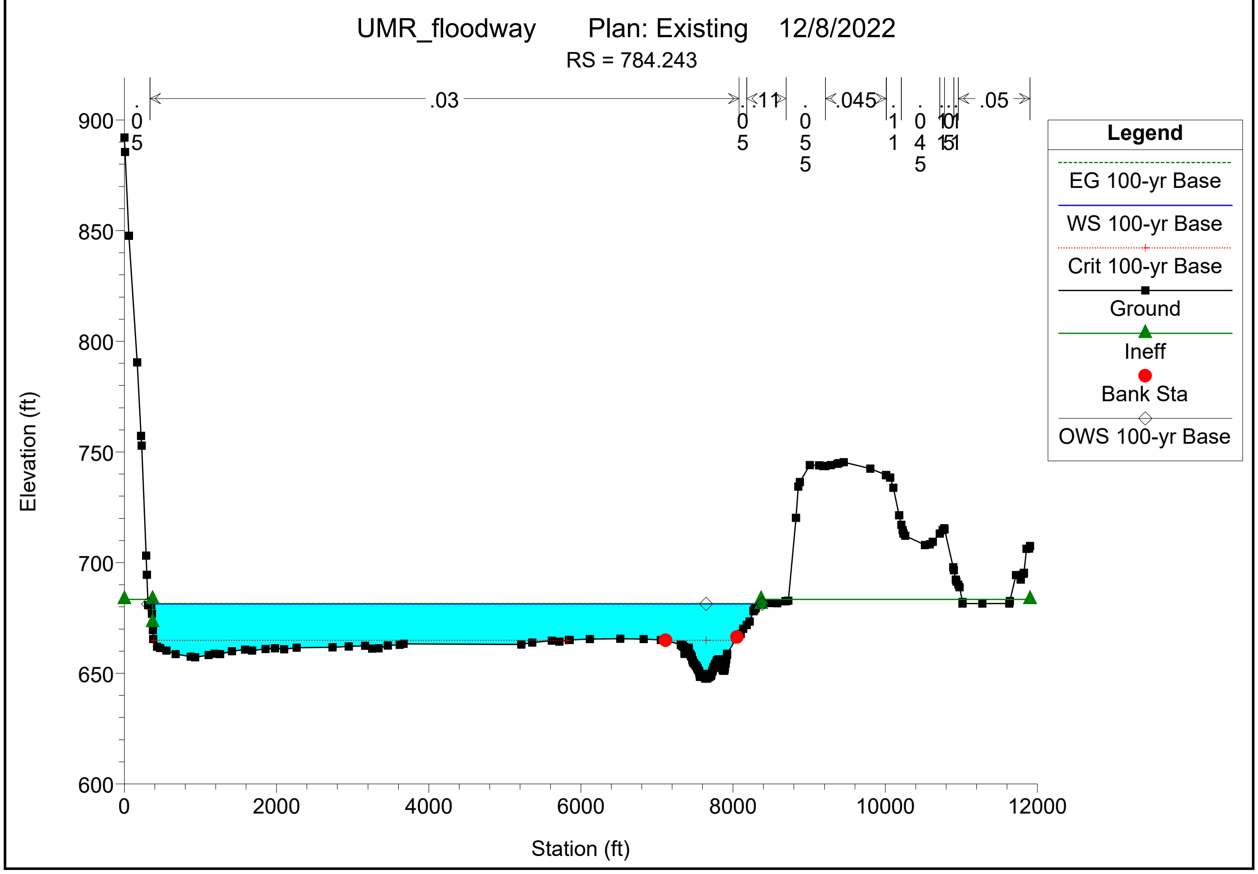
UMR_floodway Plan: Existing 12/8/2022
RS = 785.017
.05
.03
.03
.055
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base



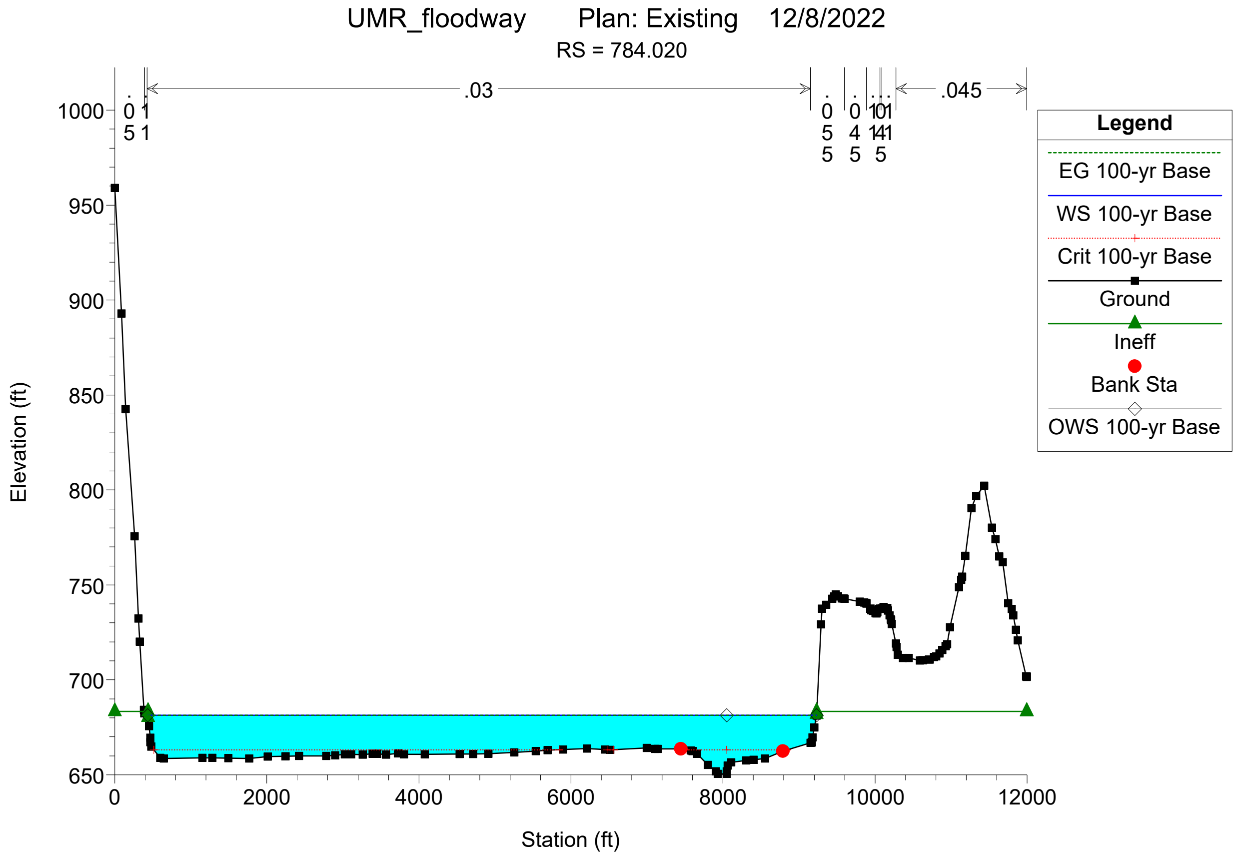
UMR_floodway Plan: Existing 12/8/2022
RS = 784.715
.03
.11
.045
.11
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

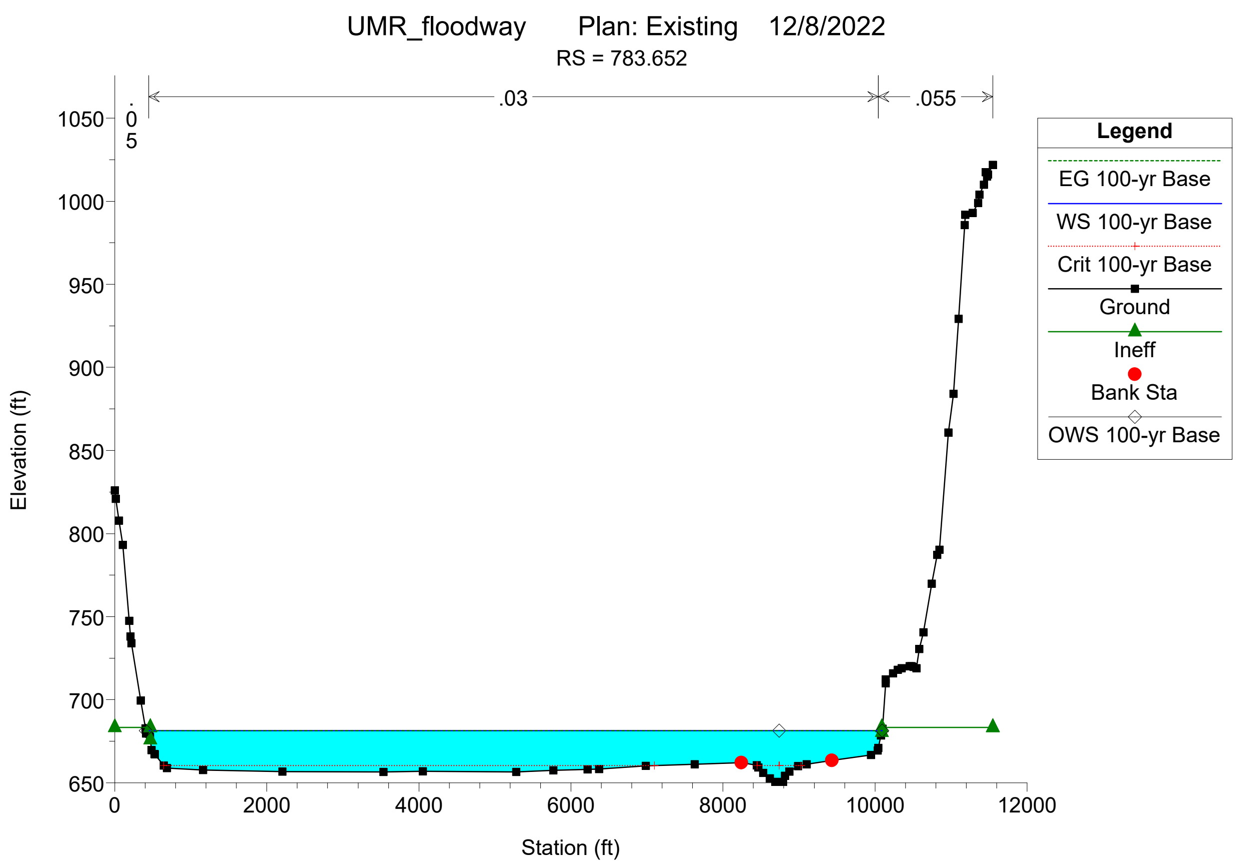


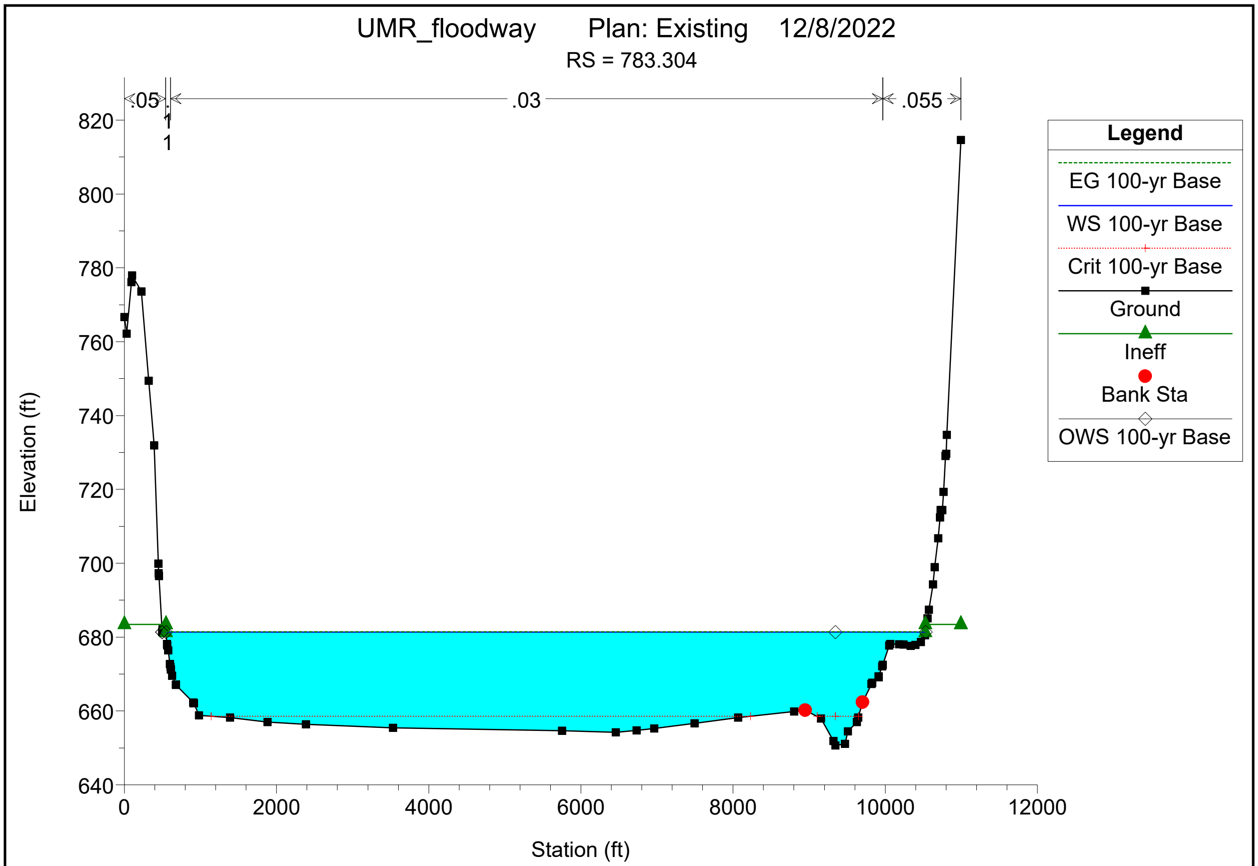
UMR_floodway Plan: Existing 12/8/2022
RS = 784.471
.03
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

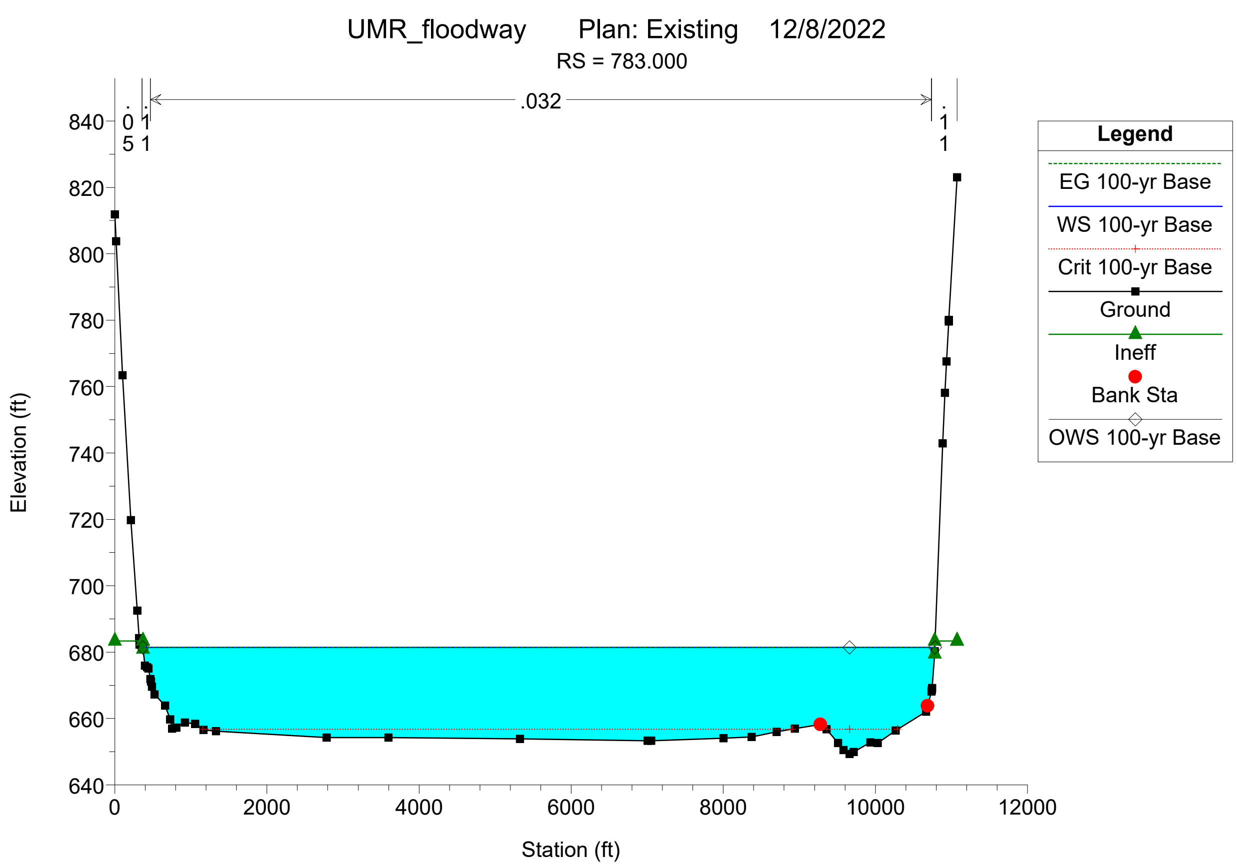


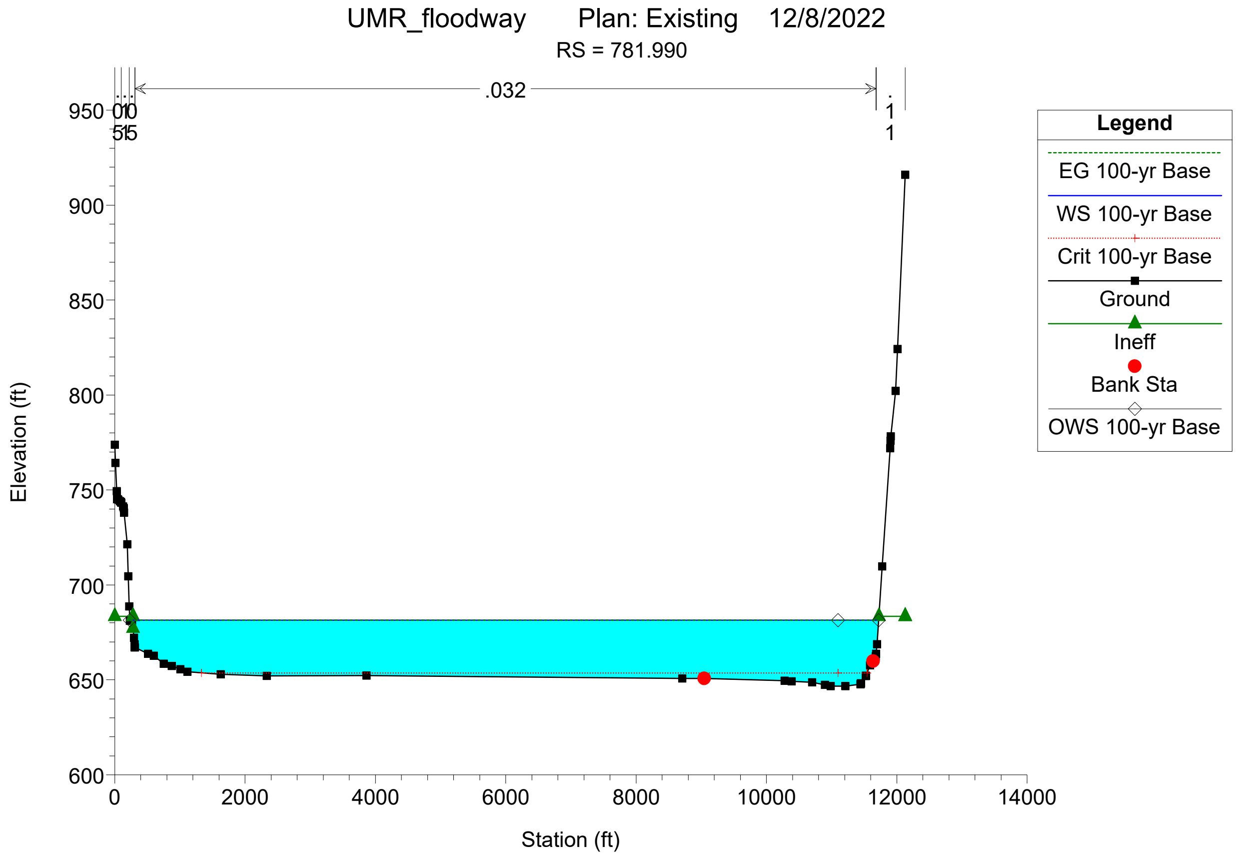
UMR_floodway Plan: Existing 12/8/2022
RS = 784.243
.03
.045
.05
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

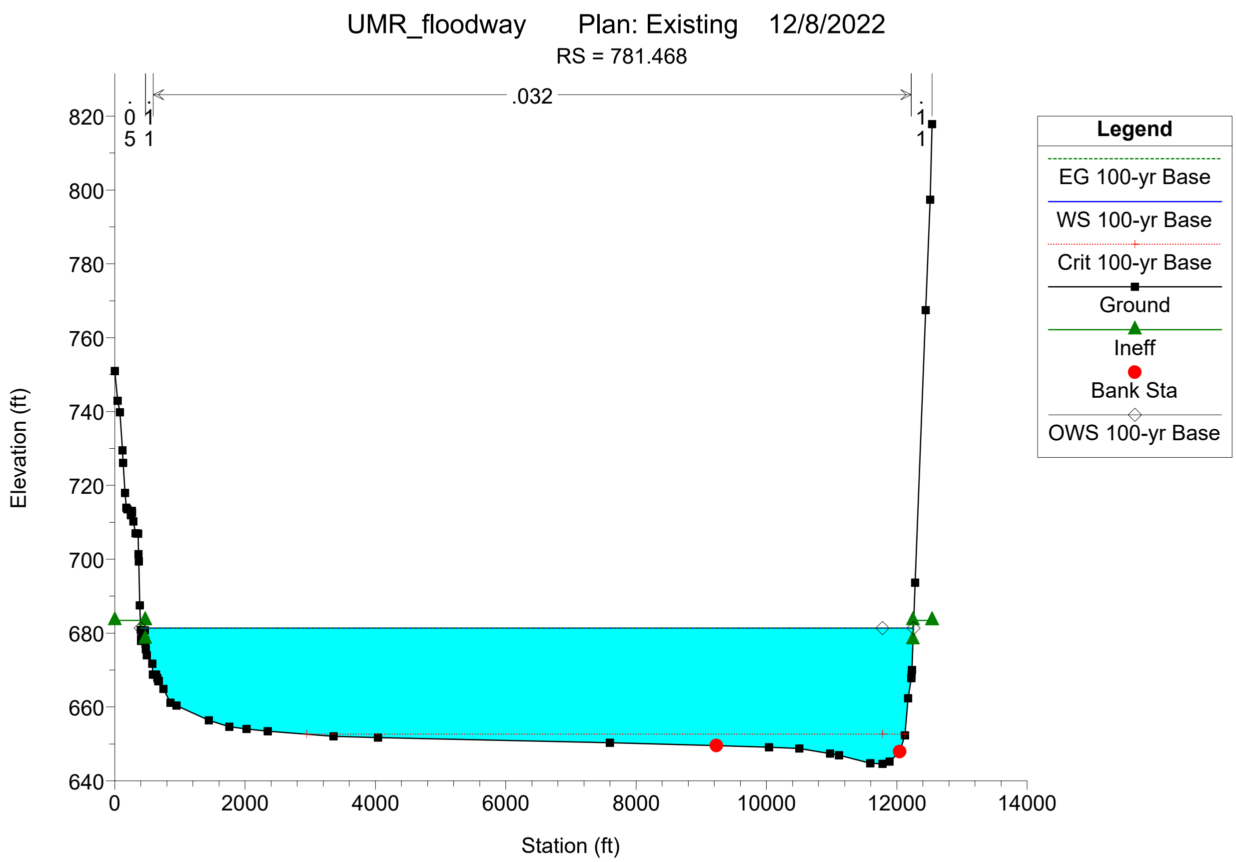

UMR_floodway Plan: Existing 12/8/2022
RS = 784.020
.03
.045
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

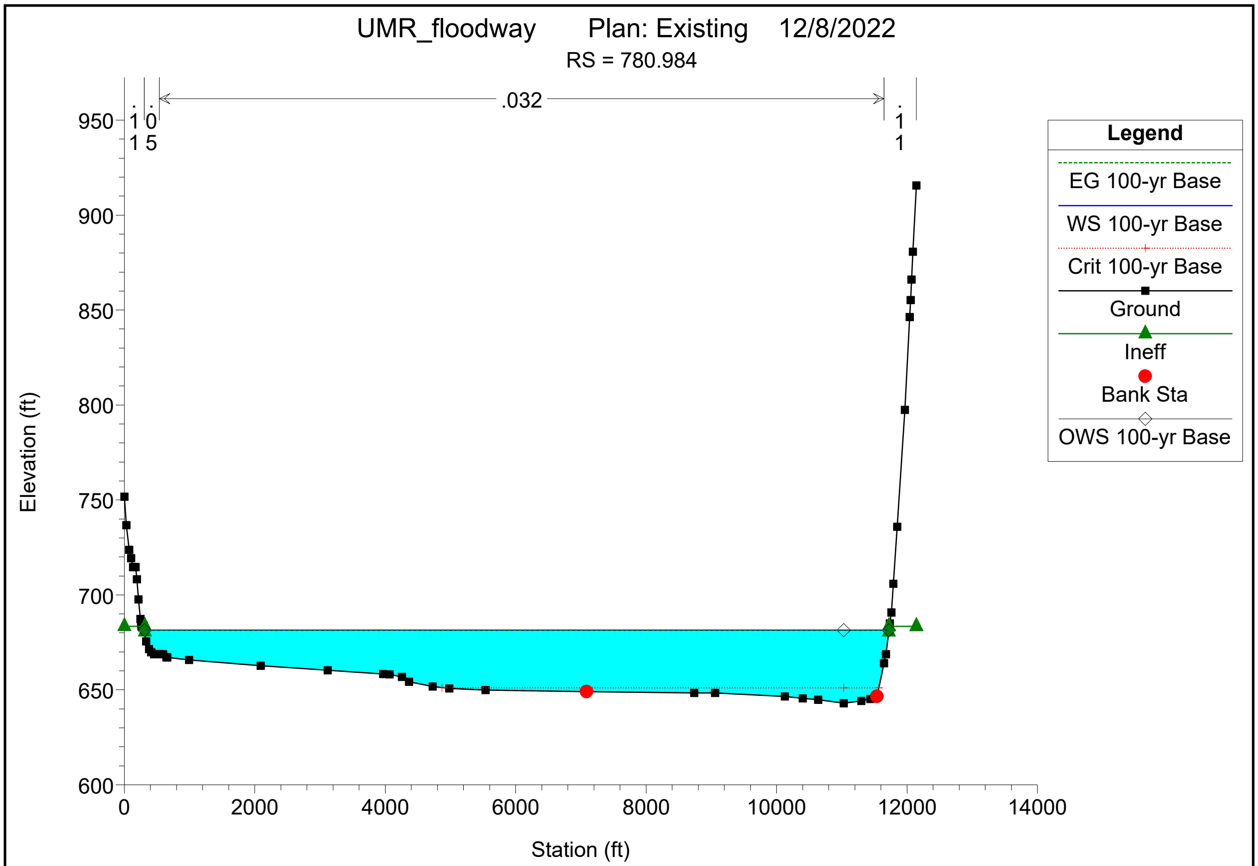

UMR_floodway Plan: Existing 12/8/2022
RS = 783.652
.03
.055
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)


UMR_floodway Plan: Existing 12/8/2022
RS = 783.304
.05
.03
.055
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

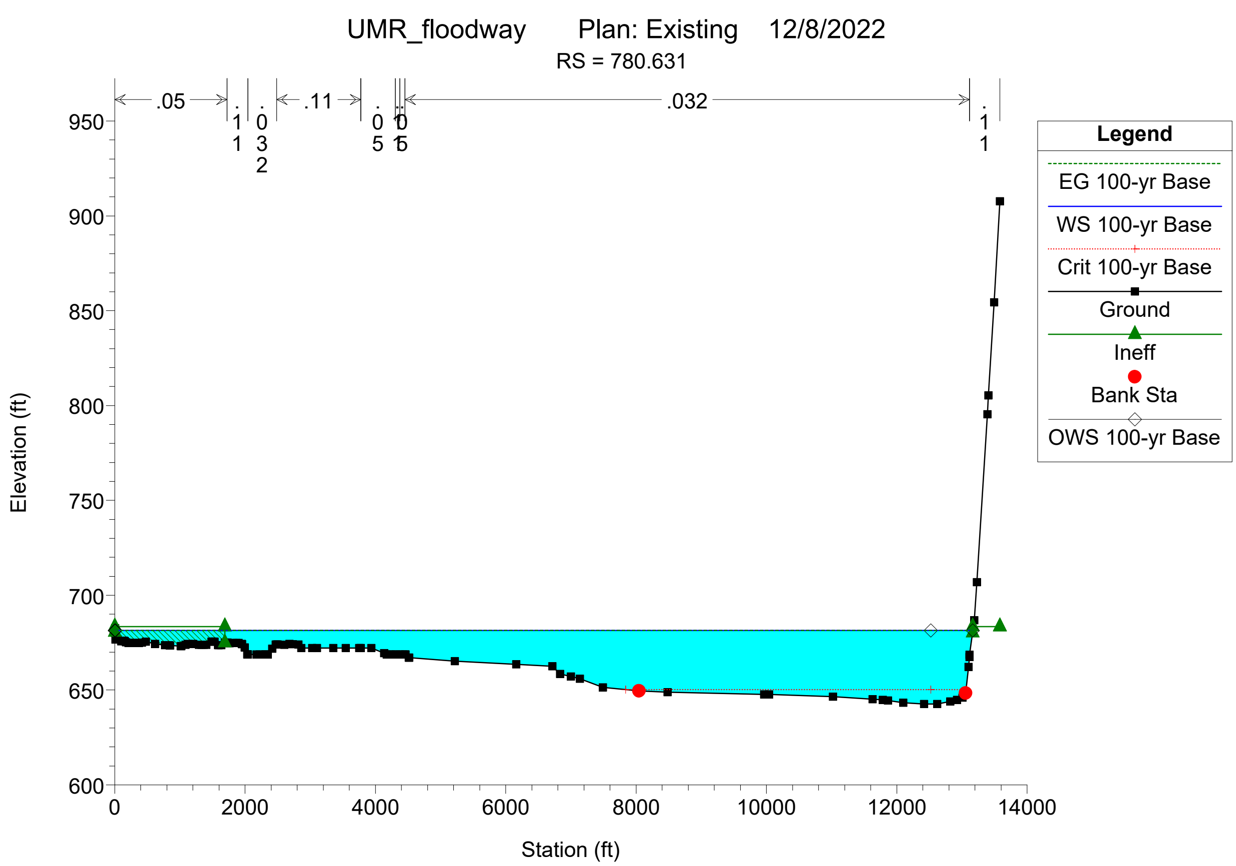

UMR_floodway Plan: Existing 12/8/2022
RS = 783.000
.032
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)


UMR_floodway Plan: Existing 12/8/2022
RS = 781.990
.032
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

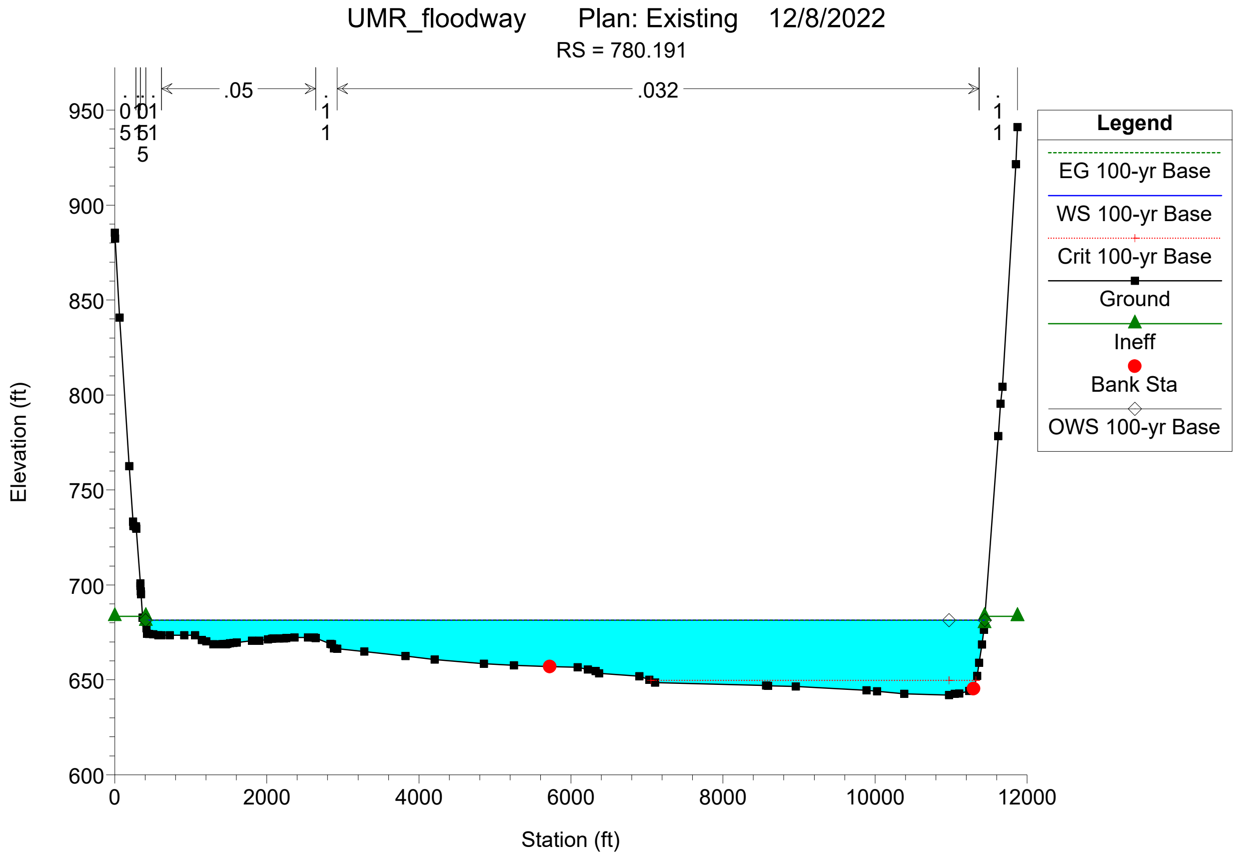

UMR_floodway Plan: Existing 12/8/2022
RS = 781.468
.032
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

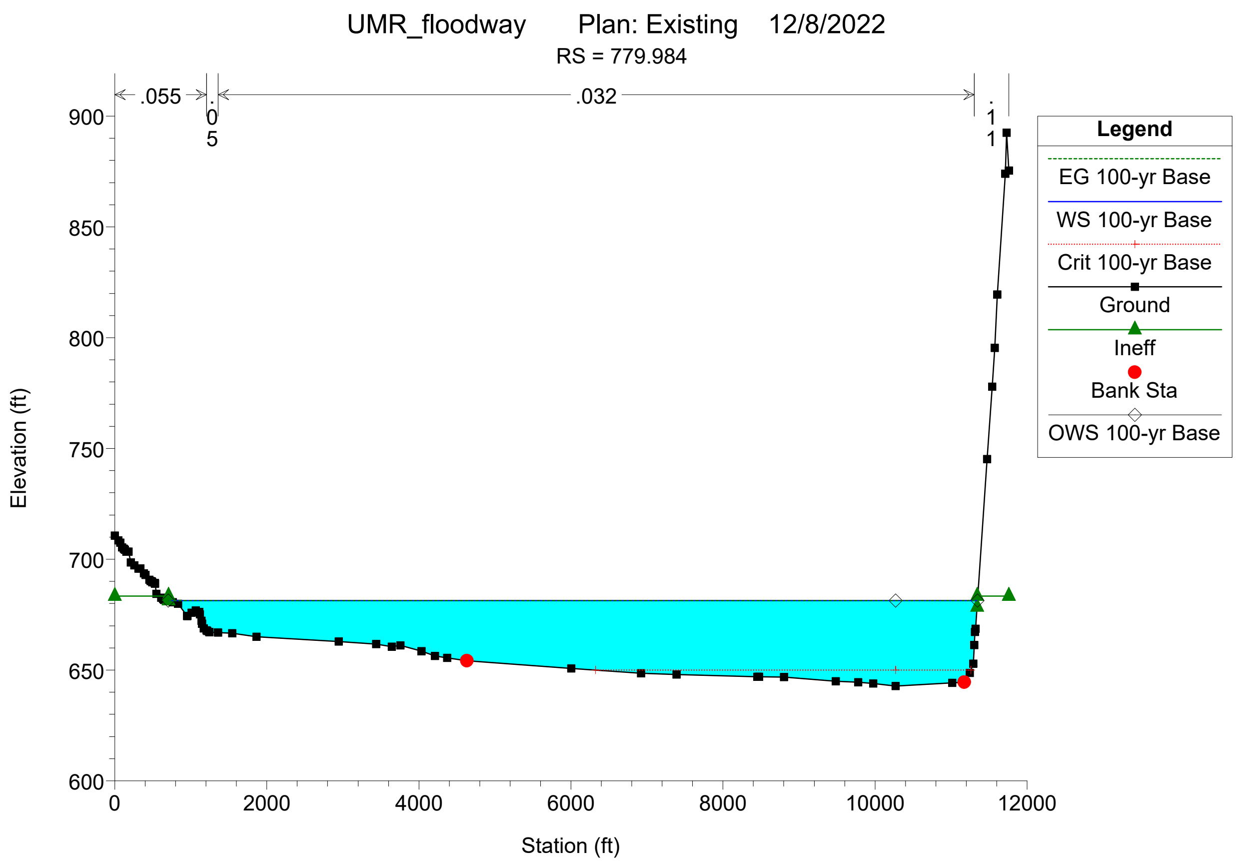


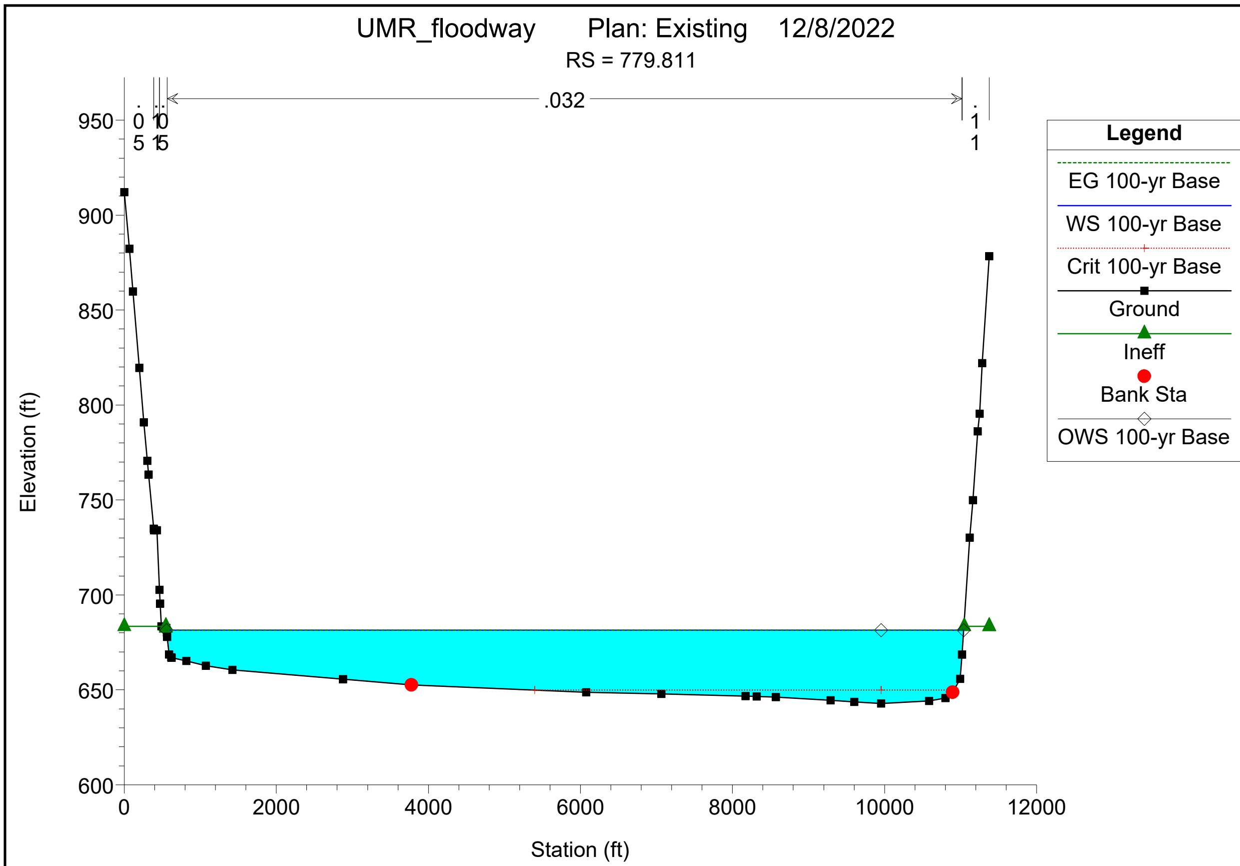
UMR_floodway Plan: Existing 12/8/2022
RS = 780.984
.032
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

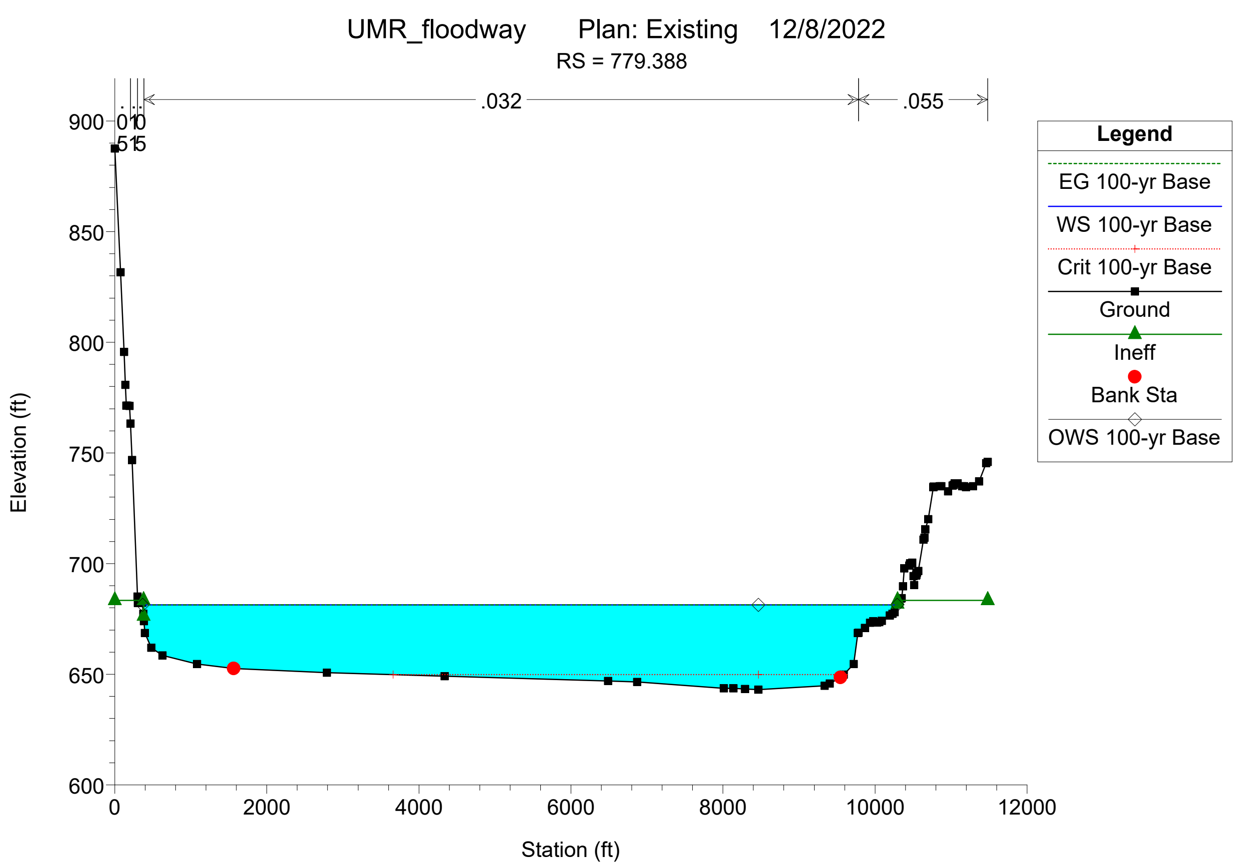


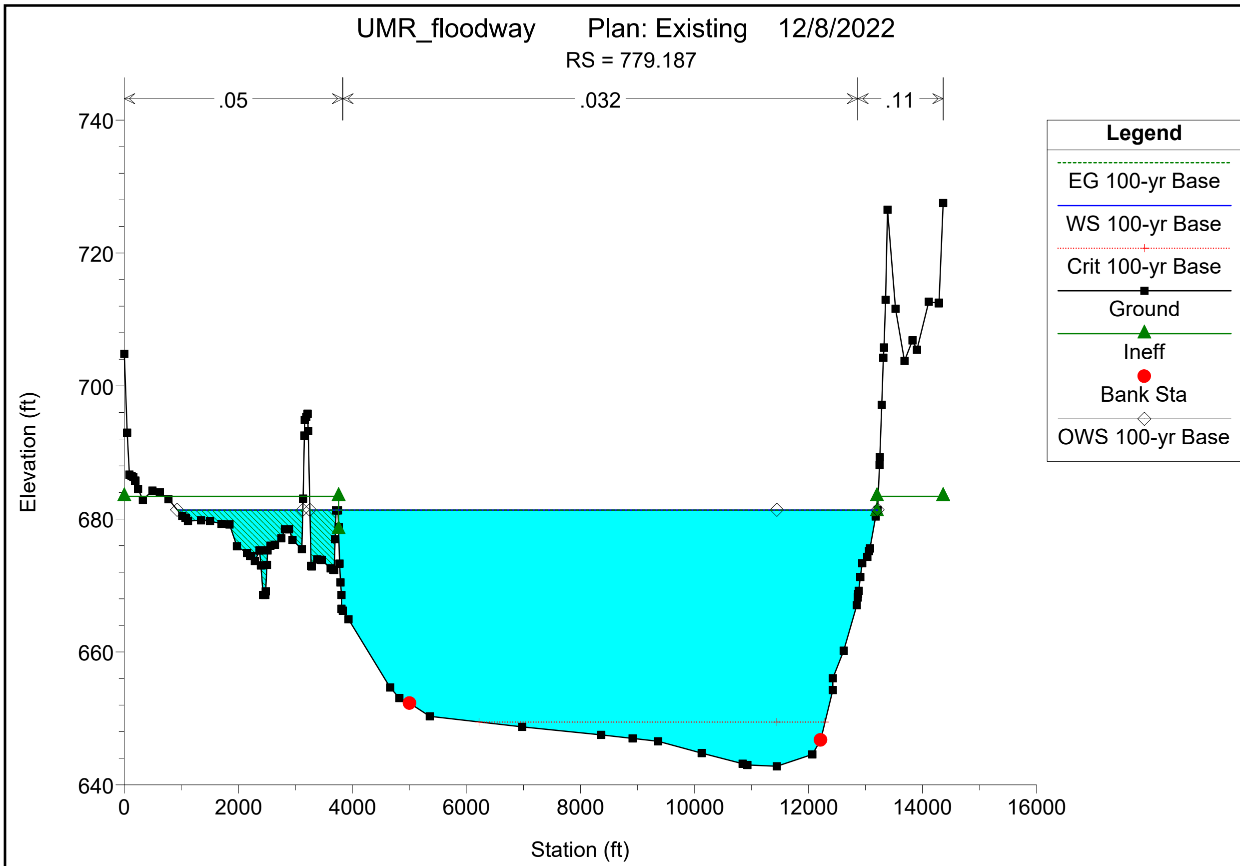
UMR_floodway Plan: Existing 12/8/2022
RS = 780.631
.05
.11
.032
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)


UMR_floodway Plan: Existing 12/8/2022
RS = 780.191
.05
.032
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

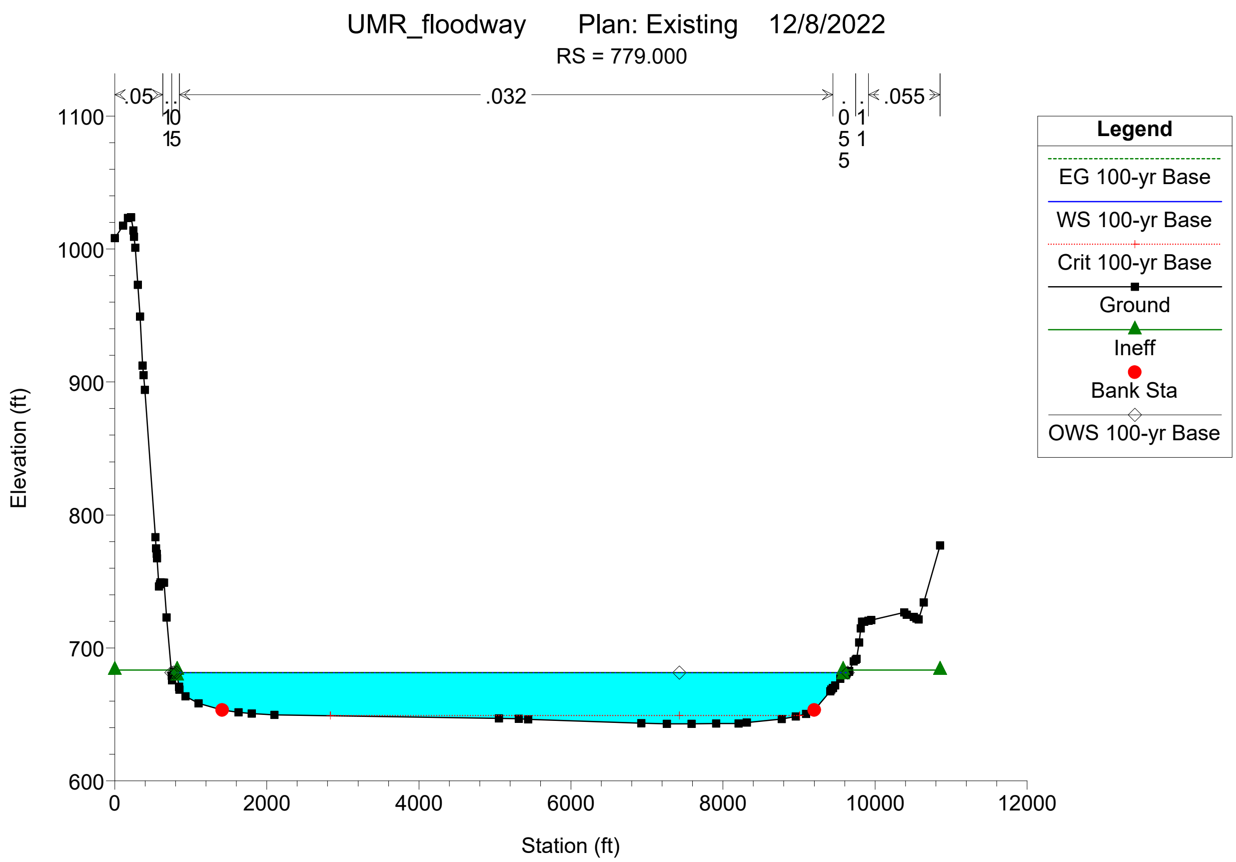

UMR_floodway Plan: Existing 12/8/2022
RS = 779.984
.055
.032
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)


UMR_floodway Plan: Existing 12/8/2022
RS = 779.811
.032
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

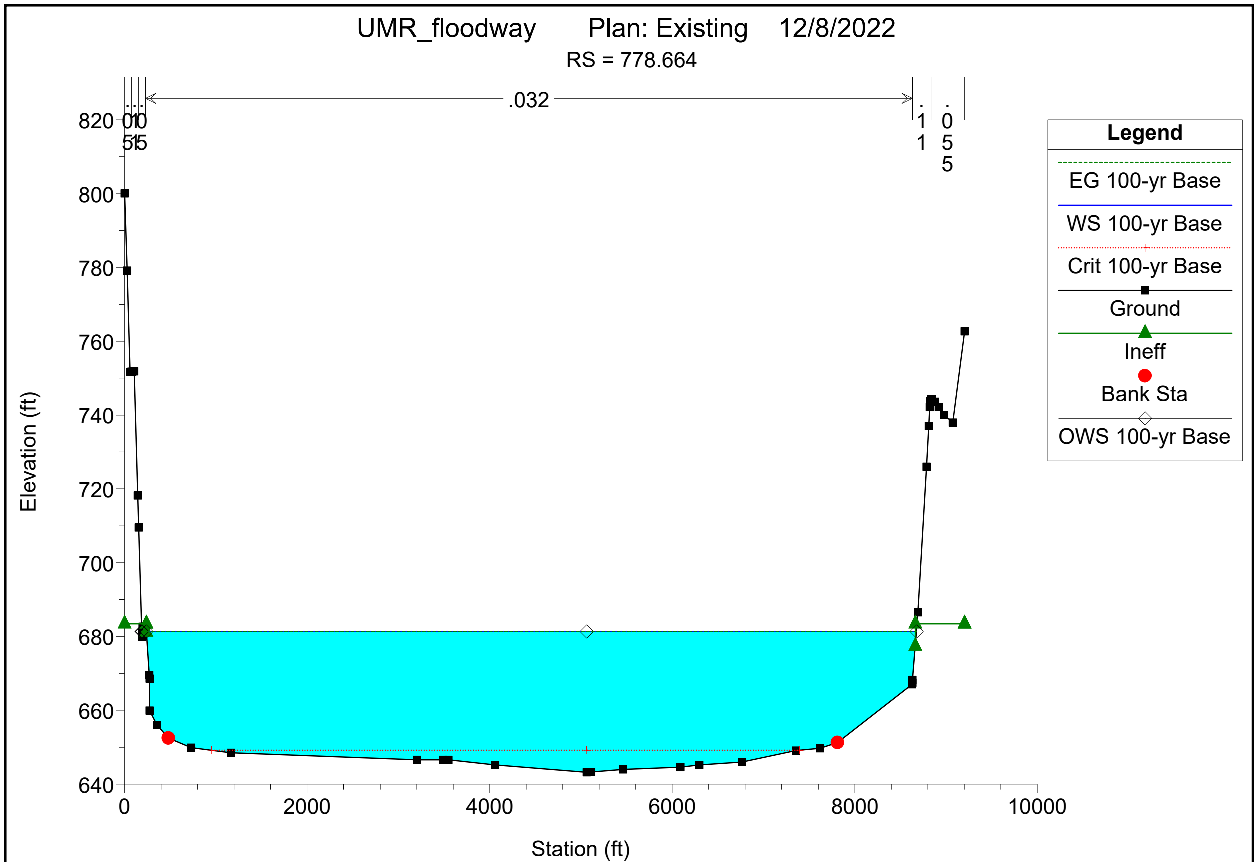

UMR_floodway Plan: Existing 12/8/2022
RS = 779.388
.032
.055
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base



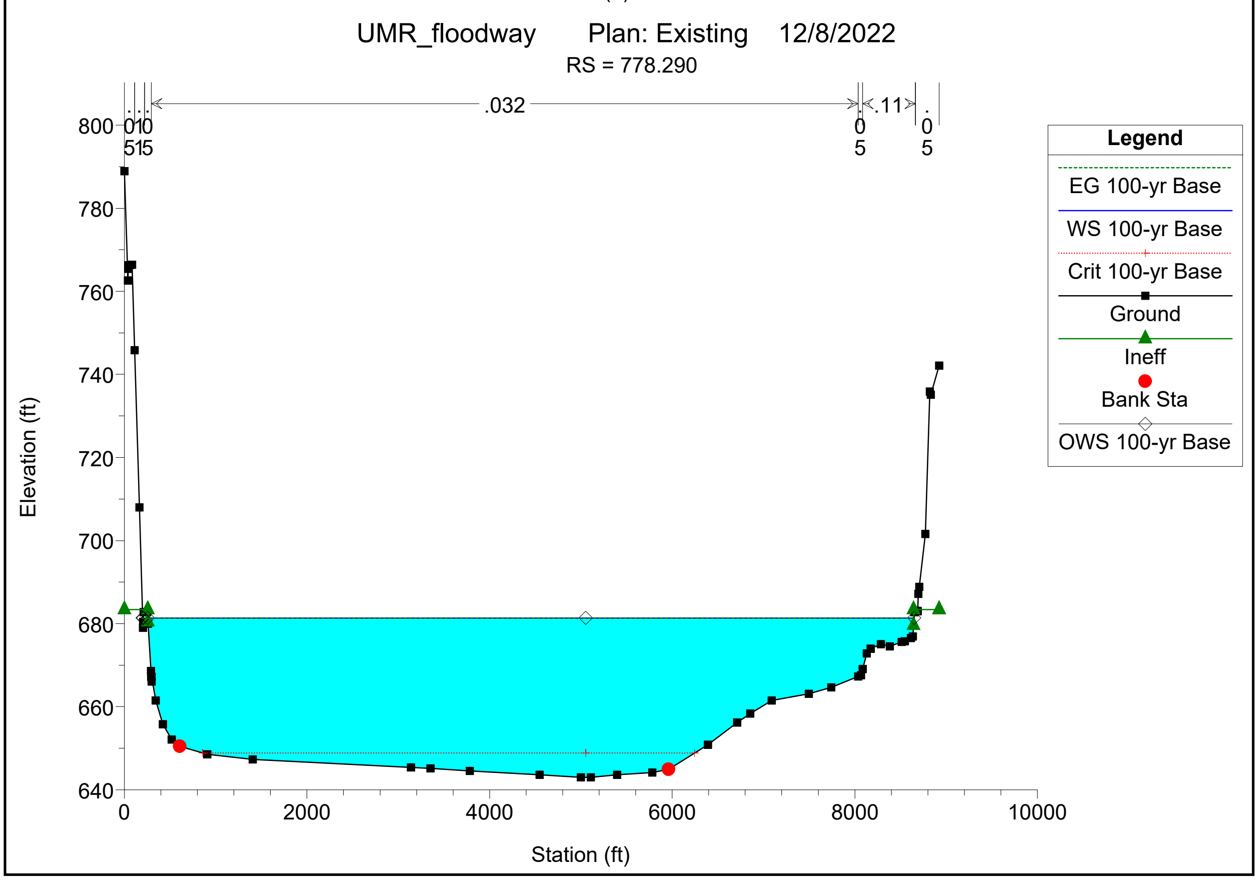
UMR_floodway Plan: Existing 12/8/2022
RS = 779.187
.05
.032
.11
Elevation (ft)
740
720
700
680
660
640
Station (ft)
0
2000
4000
6000
8000
10000
12000
14000
16000
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base



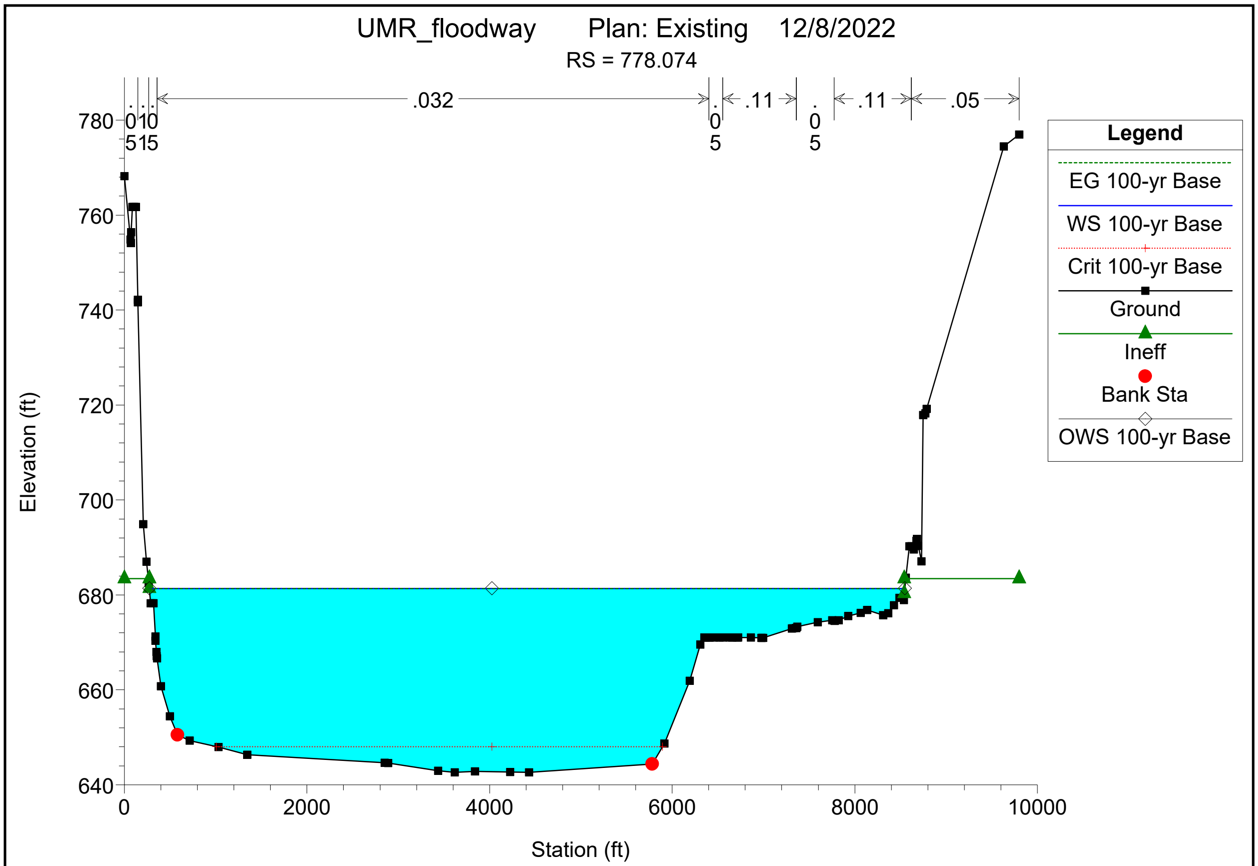
UMR_floodway Plan: Existing 12/8/2022
RS = 779.000
.05
.032
.055
Elevation (ft)
1100
1000
900
800
700
600
Station (ft)
0
2000
4000
6000
8000
10000
12000
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

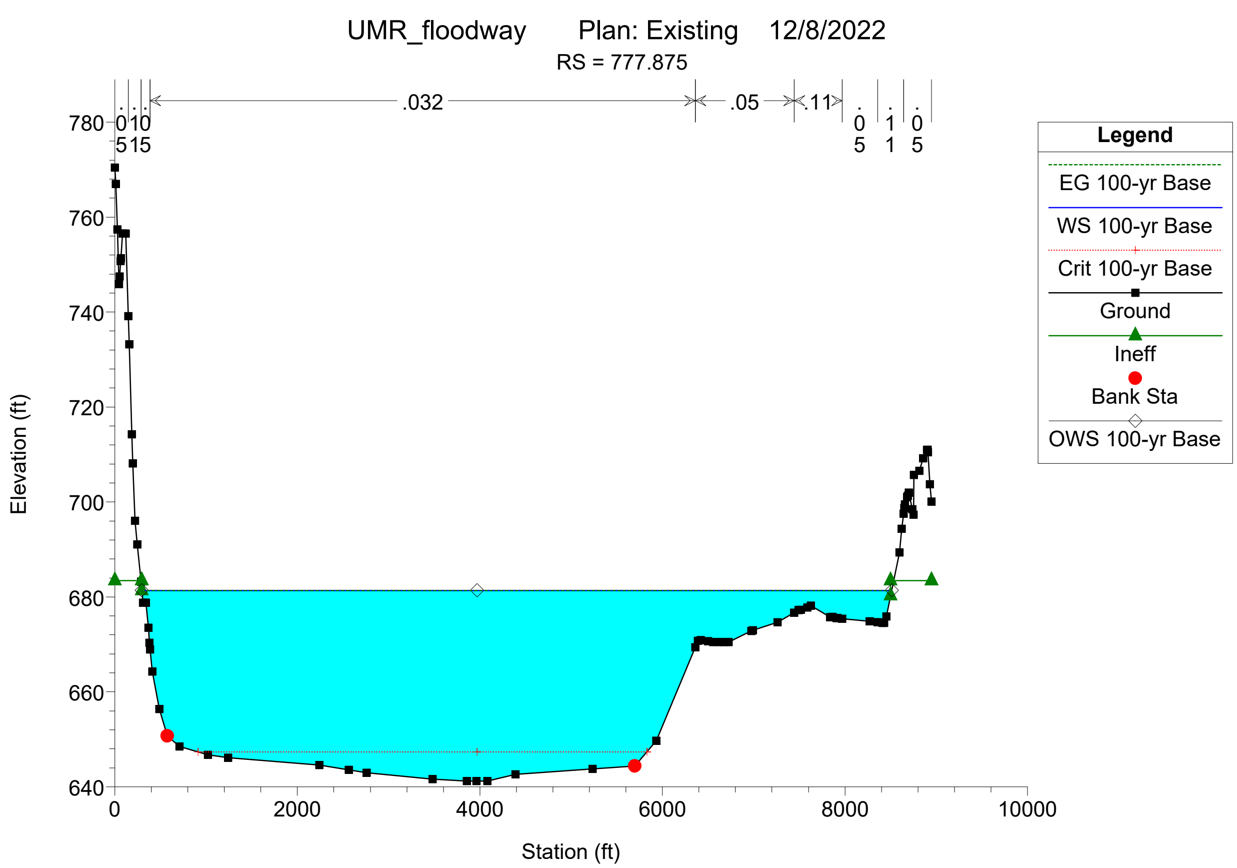


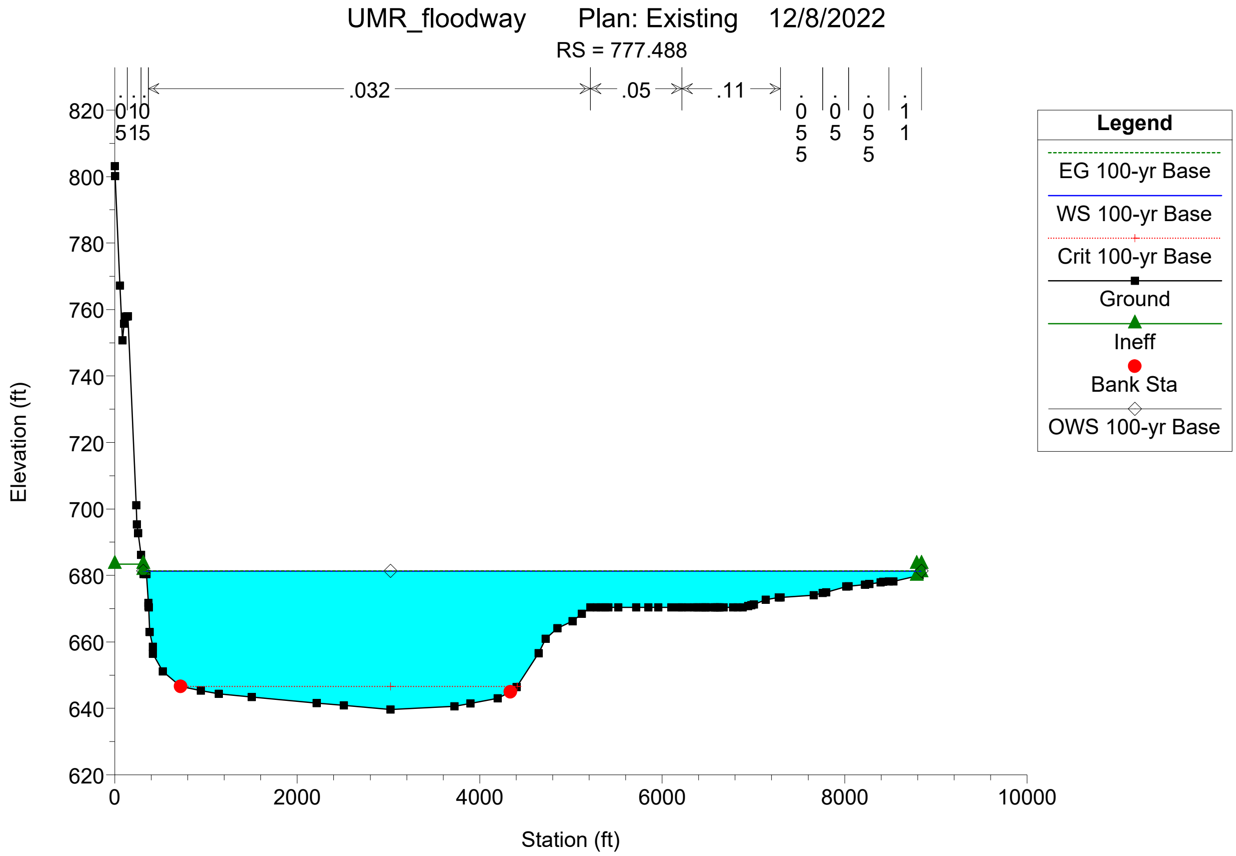
UMR_floodway Plan: Existing 12/8/2022
RS = 778.664
.032
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)



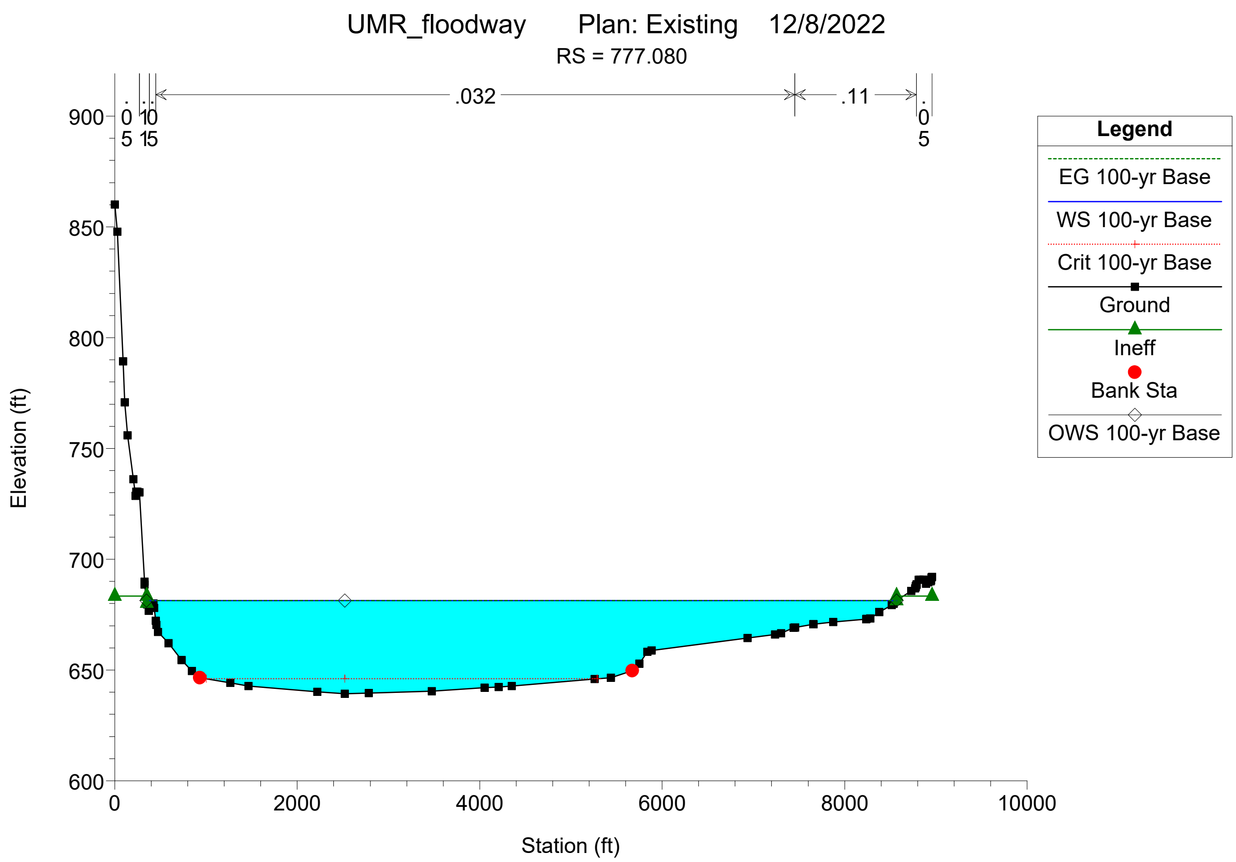
UMR_floodway Plan: Existing 12/8/2022
RS = 778.290
.032
.11
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)


UMR_floodway Plan: Existing 12/8/2022
RS = 778.074
.032
.11
.11
.05
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

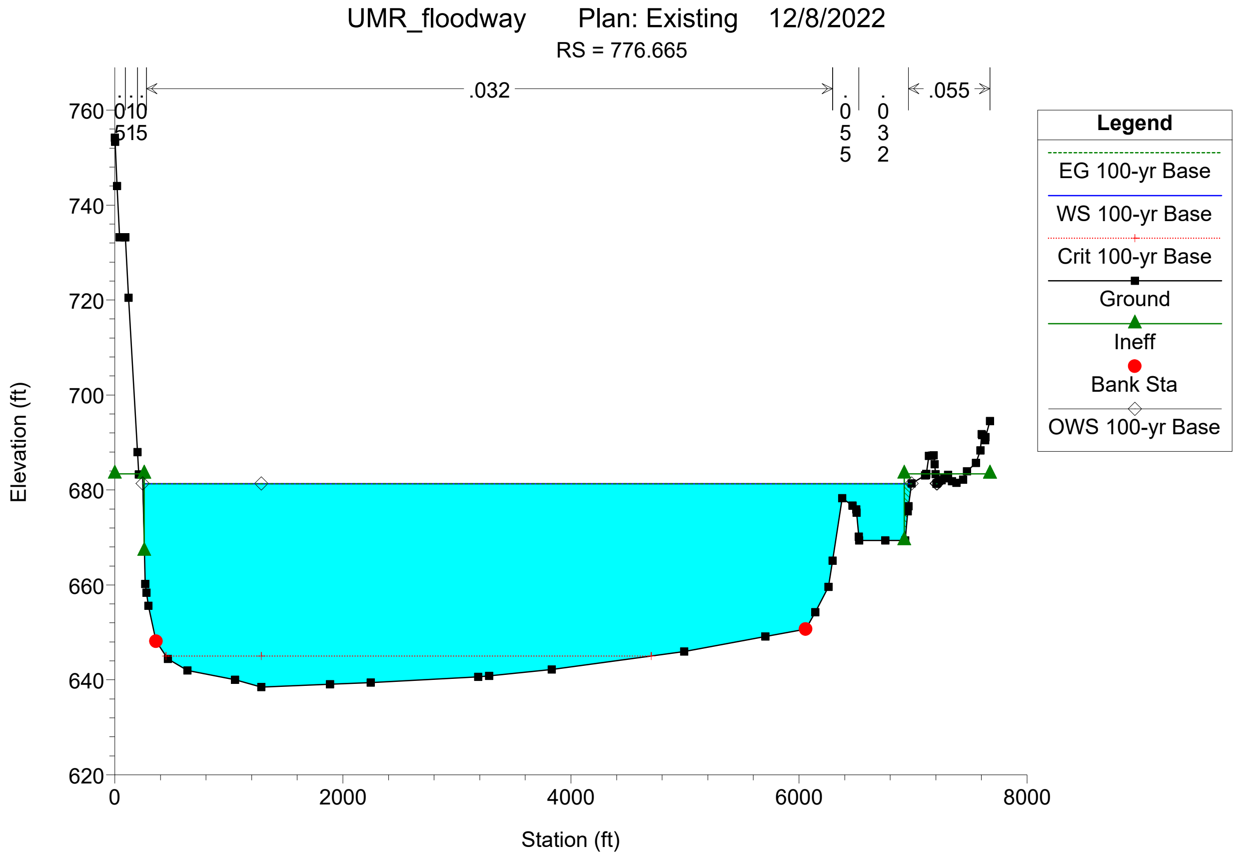

UMR_floodway Plan: Existing 12/8/2022
RS = 777.875
.032
.05
.11
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

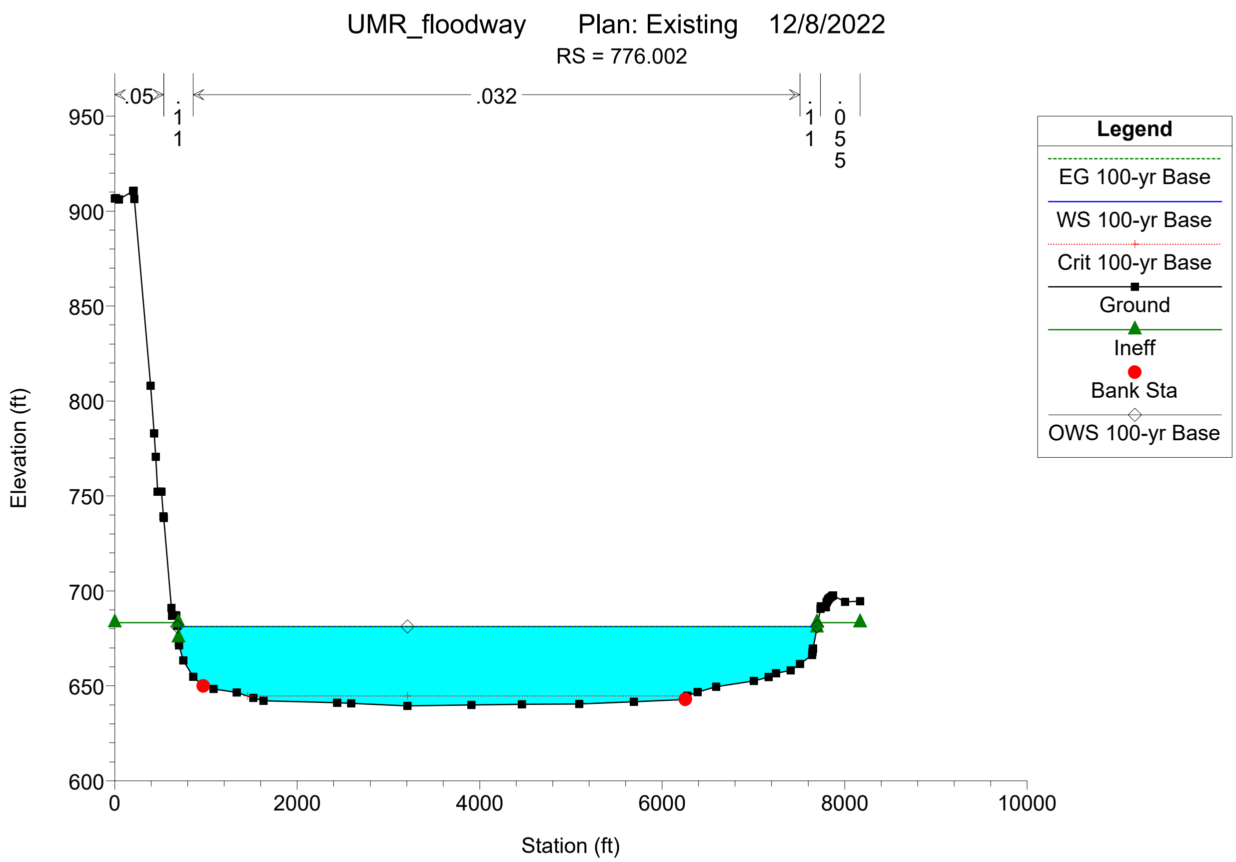


UMR_floodway Plan: Existing 12/8/2022
RS = 777.488
.032
.05
.11
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

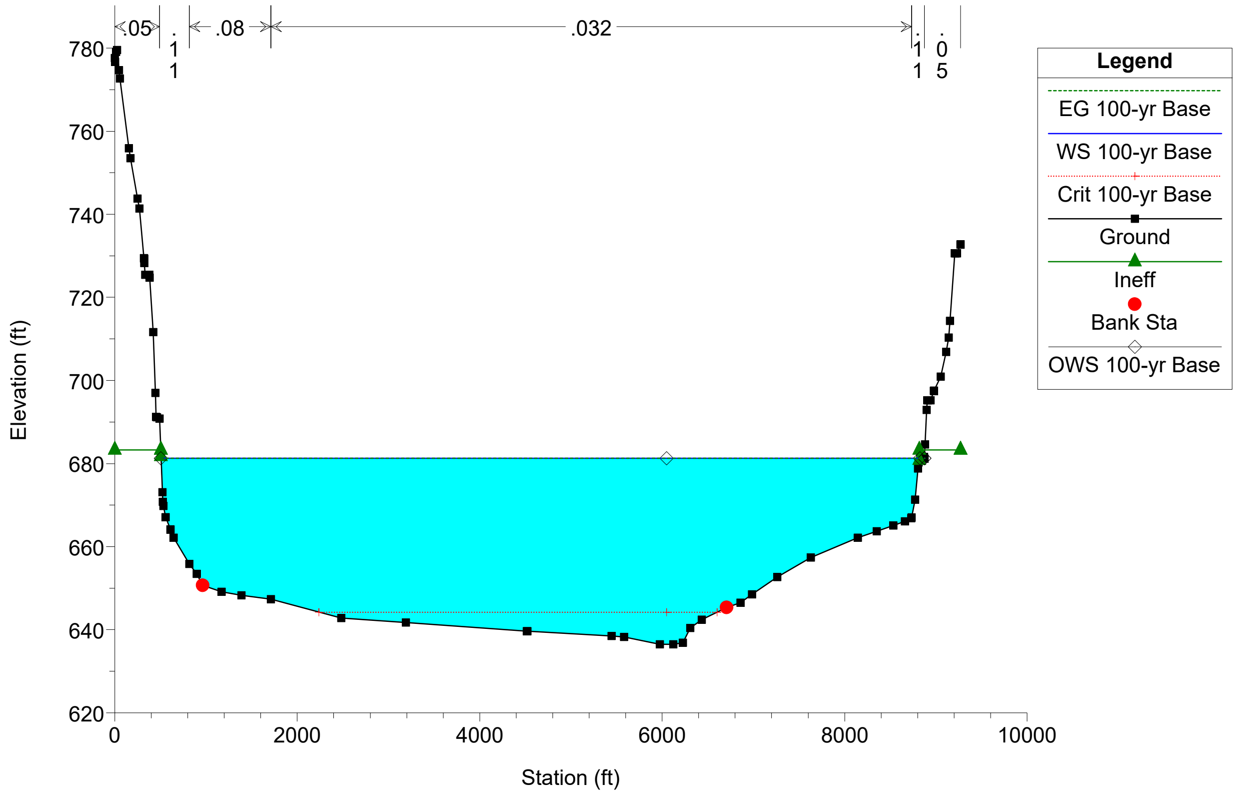


UMR_floodway Plan: Existing 12/8/2022
RS = 777.080
.032
.11
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

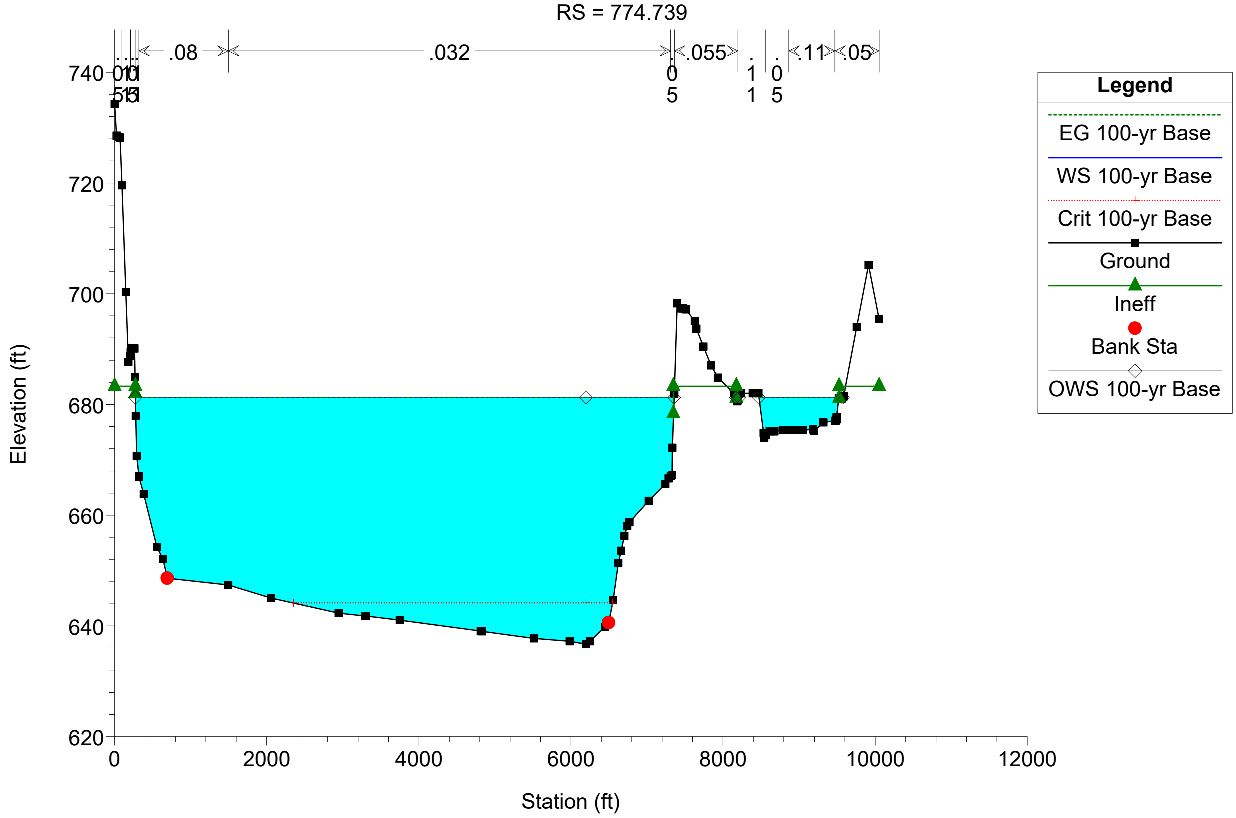

UMR_floodway Plan: Existing 12/8/2022
RS = 776.665
.032
.055
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

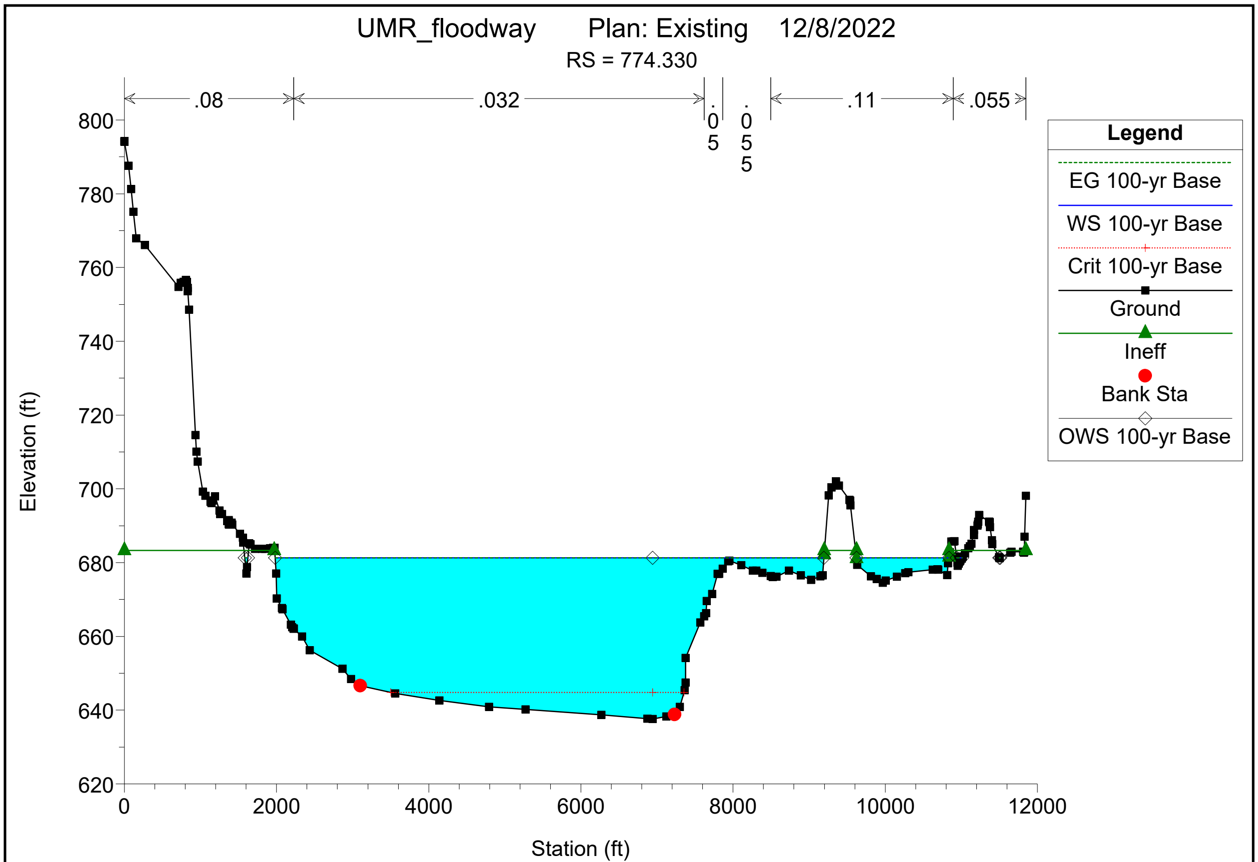

UMR_floodway Plan: Existing 12/8/2022
RS = 776.002
.05
.032
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

UMR_floodway Plan: Existing 12/8/2022
RS = 775.186

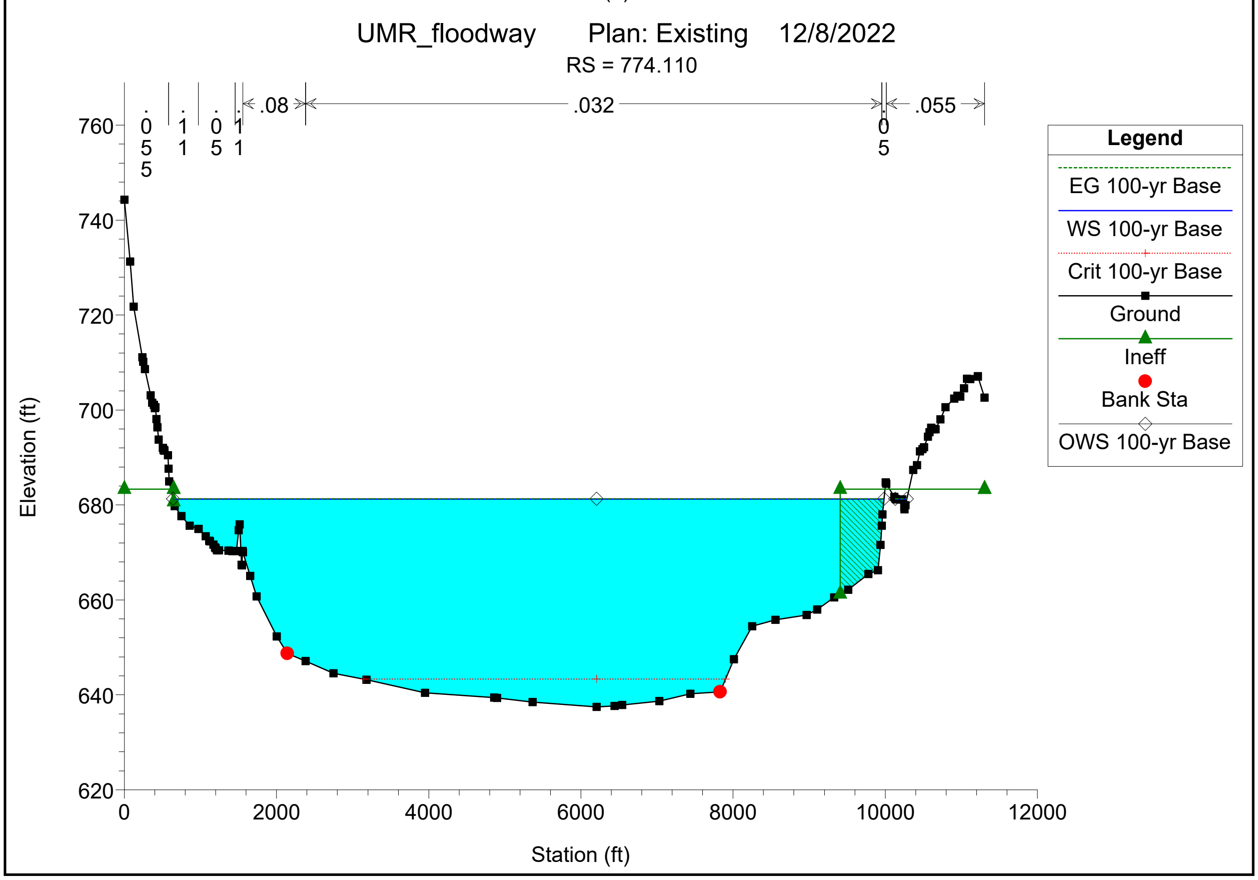


UMR_floodway Plan: Existing 12/8/2022
RS = 774.739

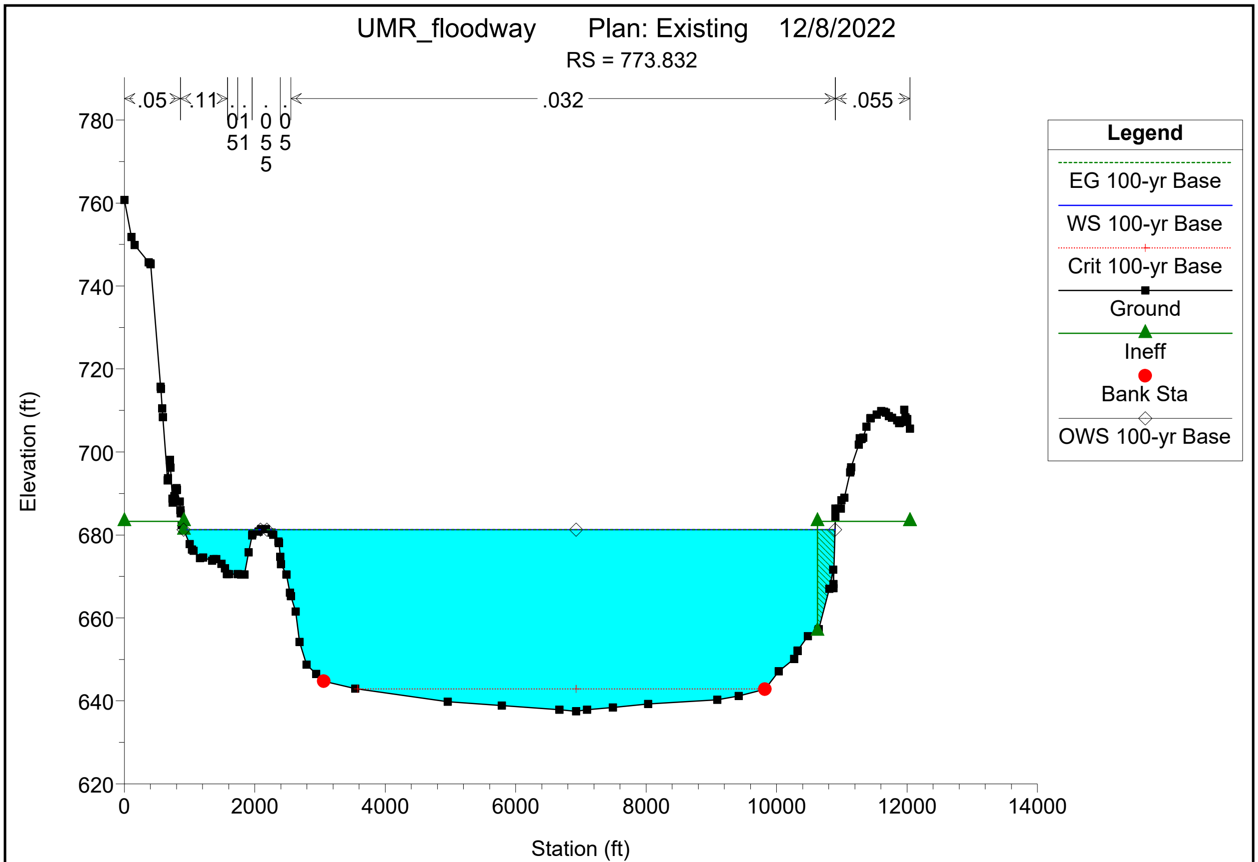


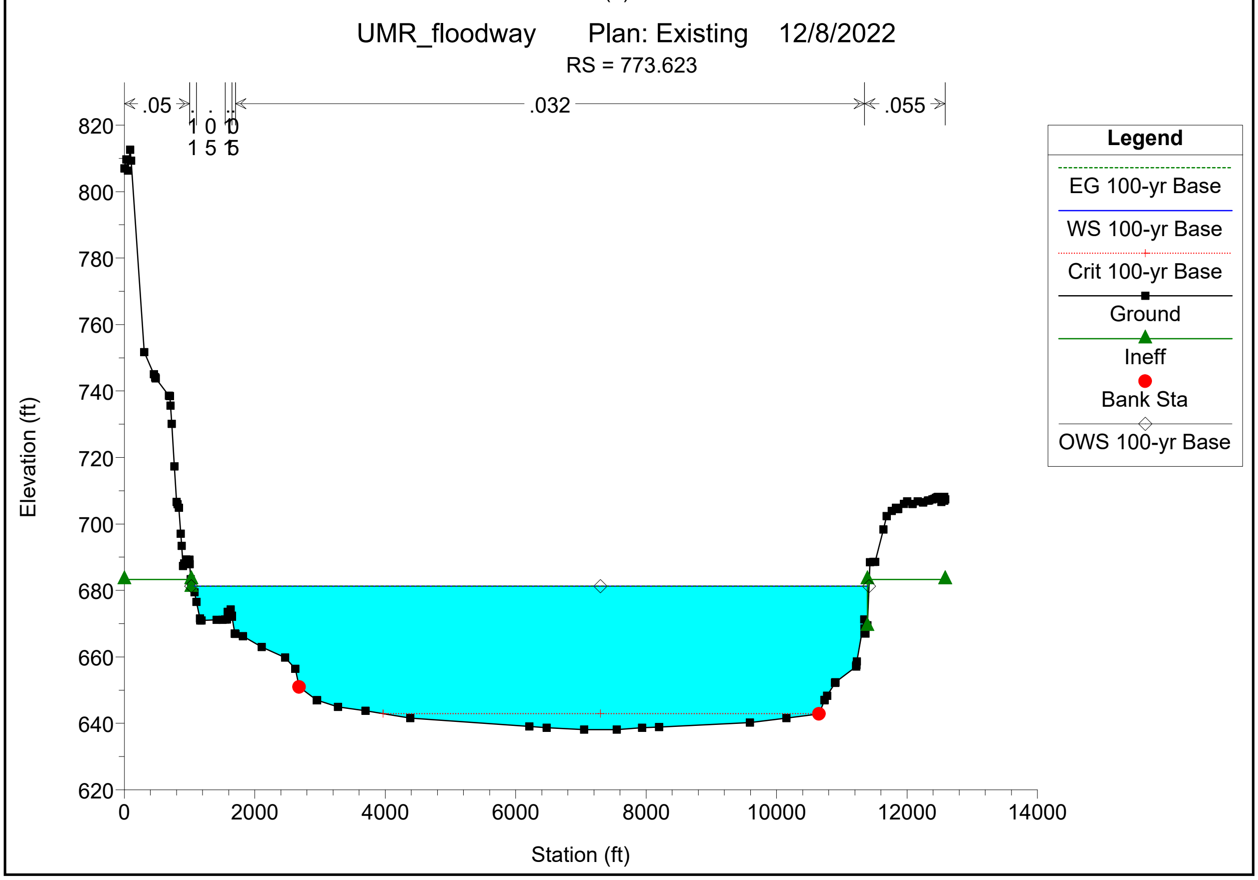


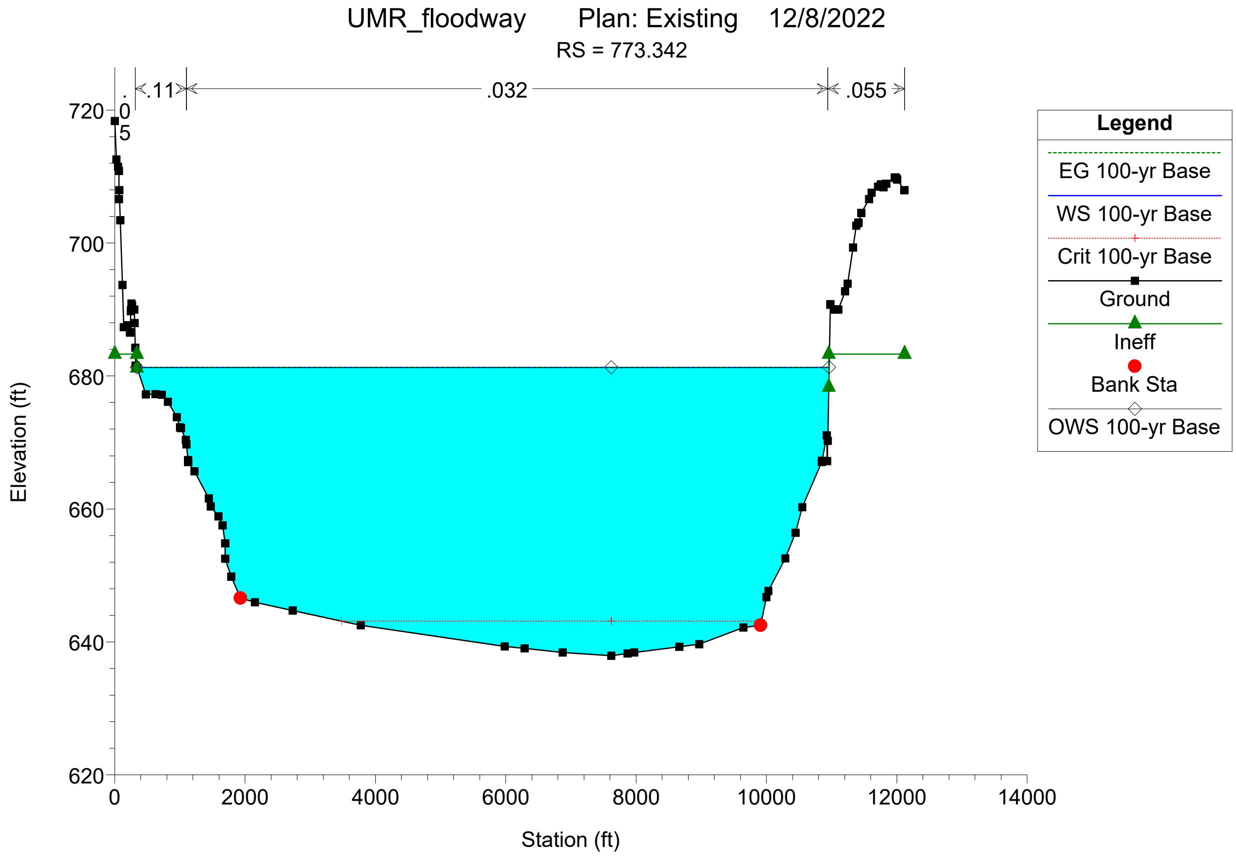
UMR_floodway Plan: Existing 12/8/2022
RS = 774.330
.08
.032
.11
.055
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

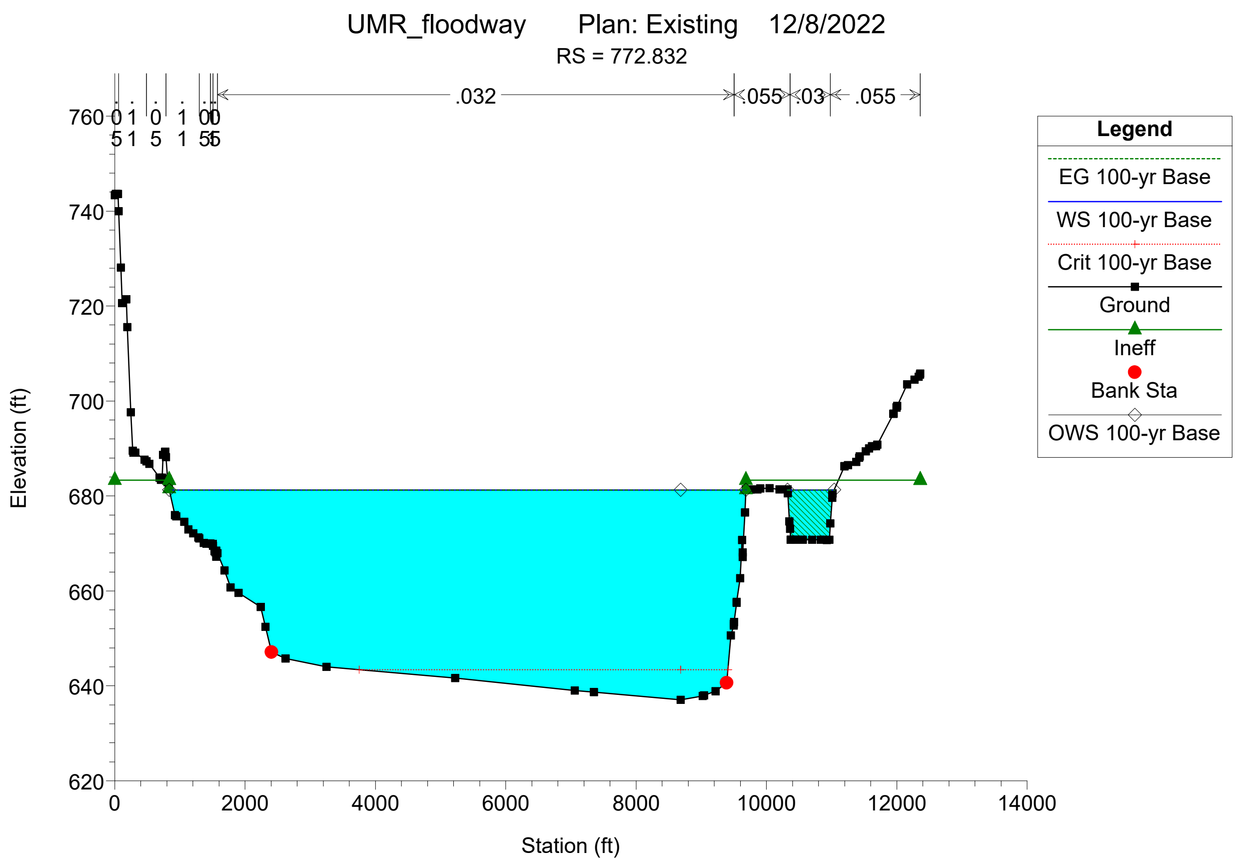


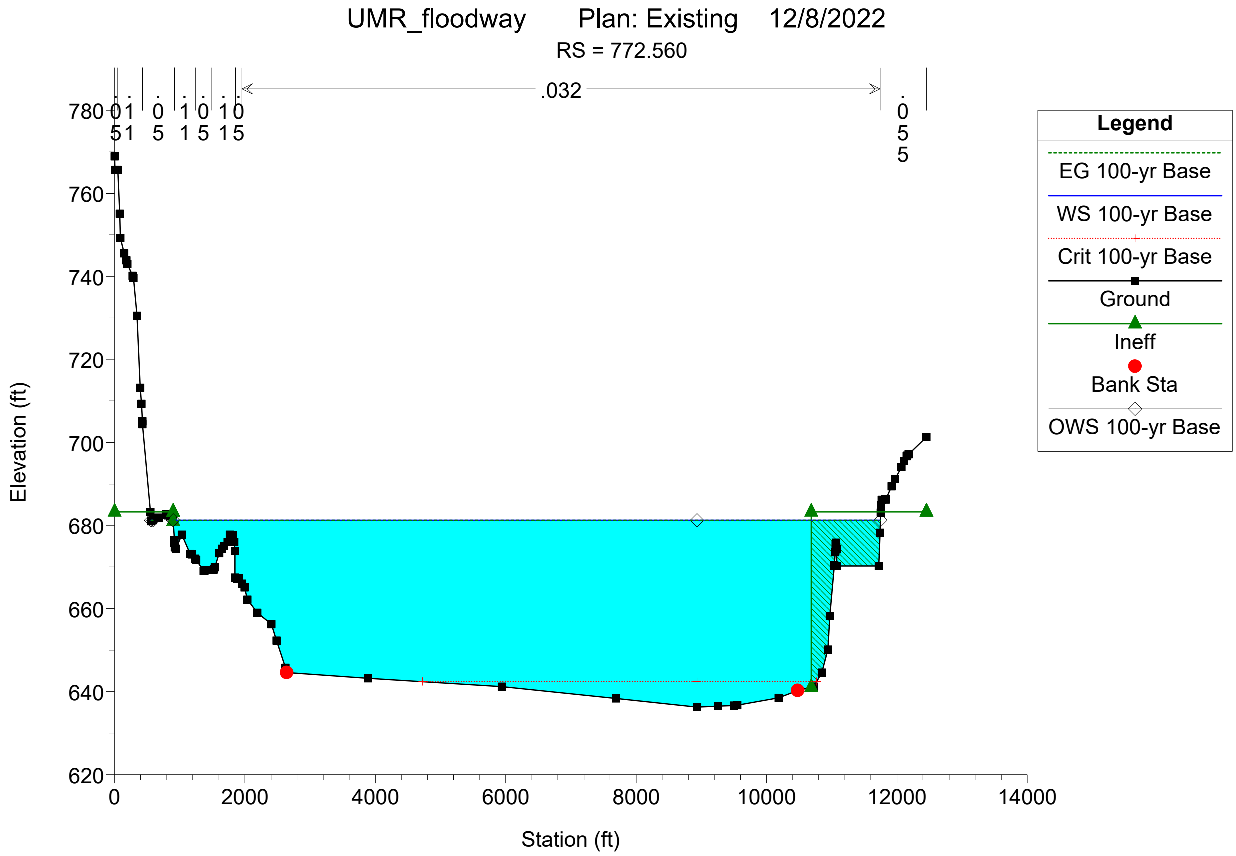
UMR_floodway Plan: Existing 12/8/2022
RS = 774.110
.08
.032
.055
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base


UMR_floodway Plan: Existing 12/8/2022
RS = 773.832
.05
.11
.032
.055
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

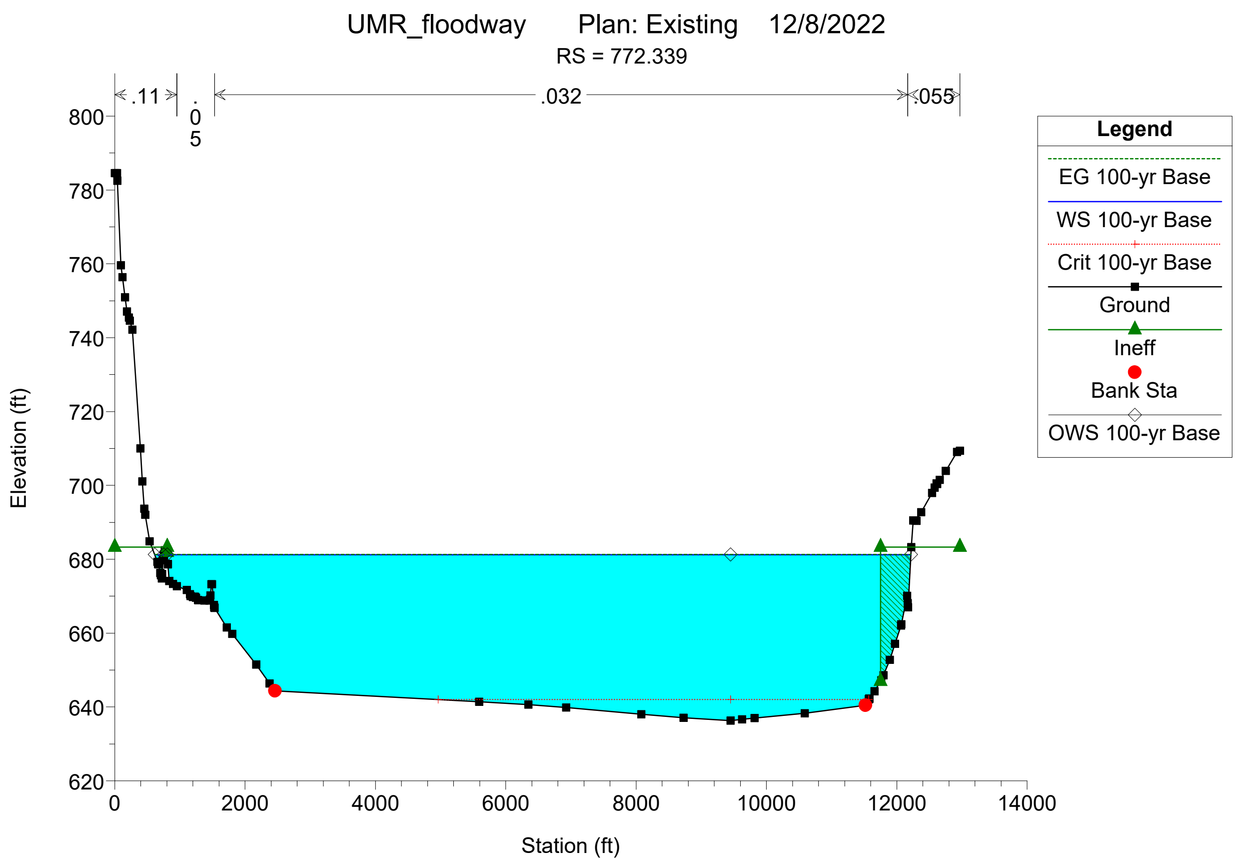

UMR_floodway Plan: Existing 12/8/2022
RS = 773.623
.05
.032
.055
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)


UMR_floodway Plan: Existing 12/8/2022
RS = 773.342
.11
.032
.055
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

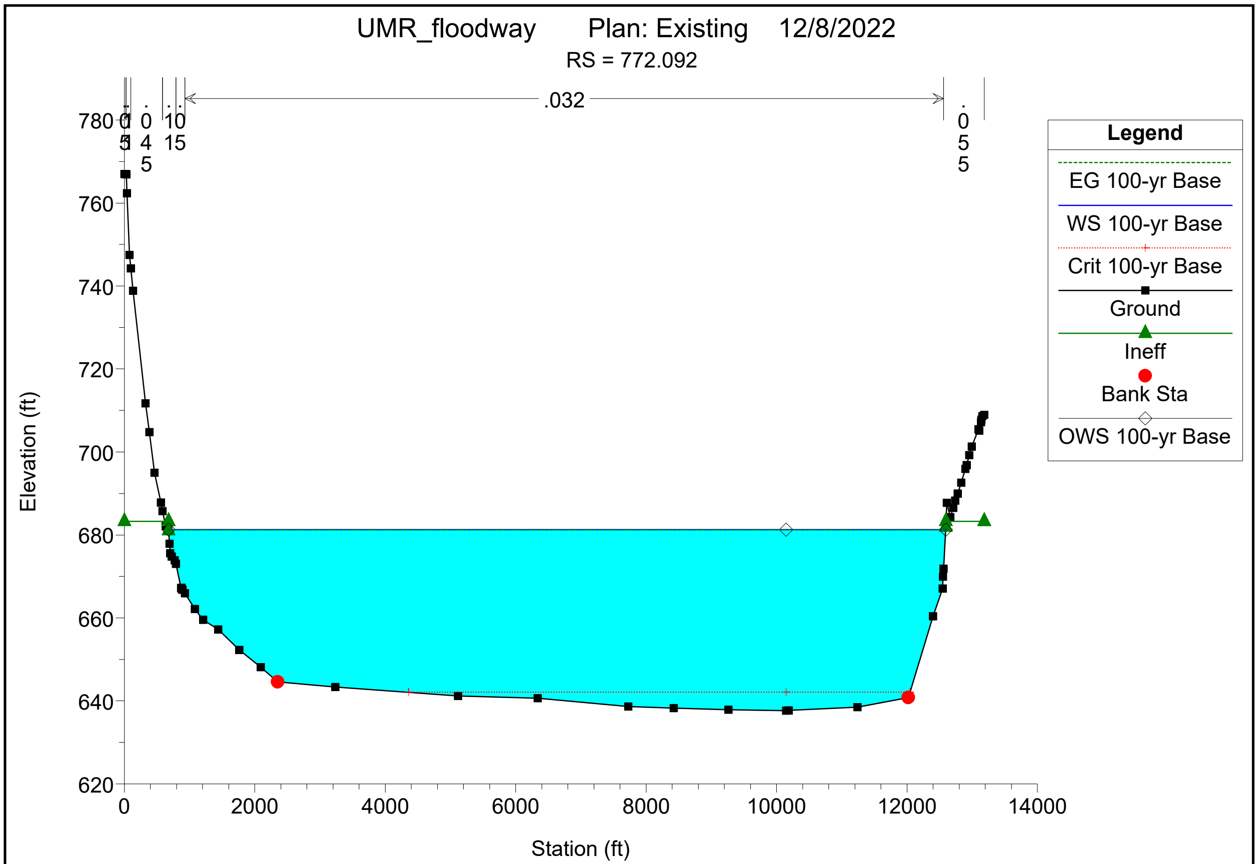

UMR_floodway Plan: Existing 12/8/2022
RS = 772.832
.032
.055
.03
.055
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

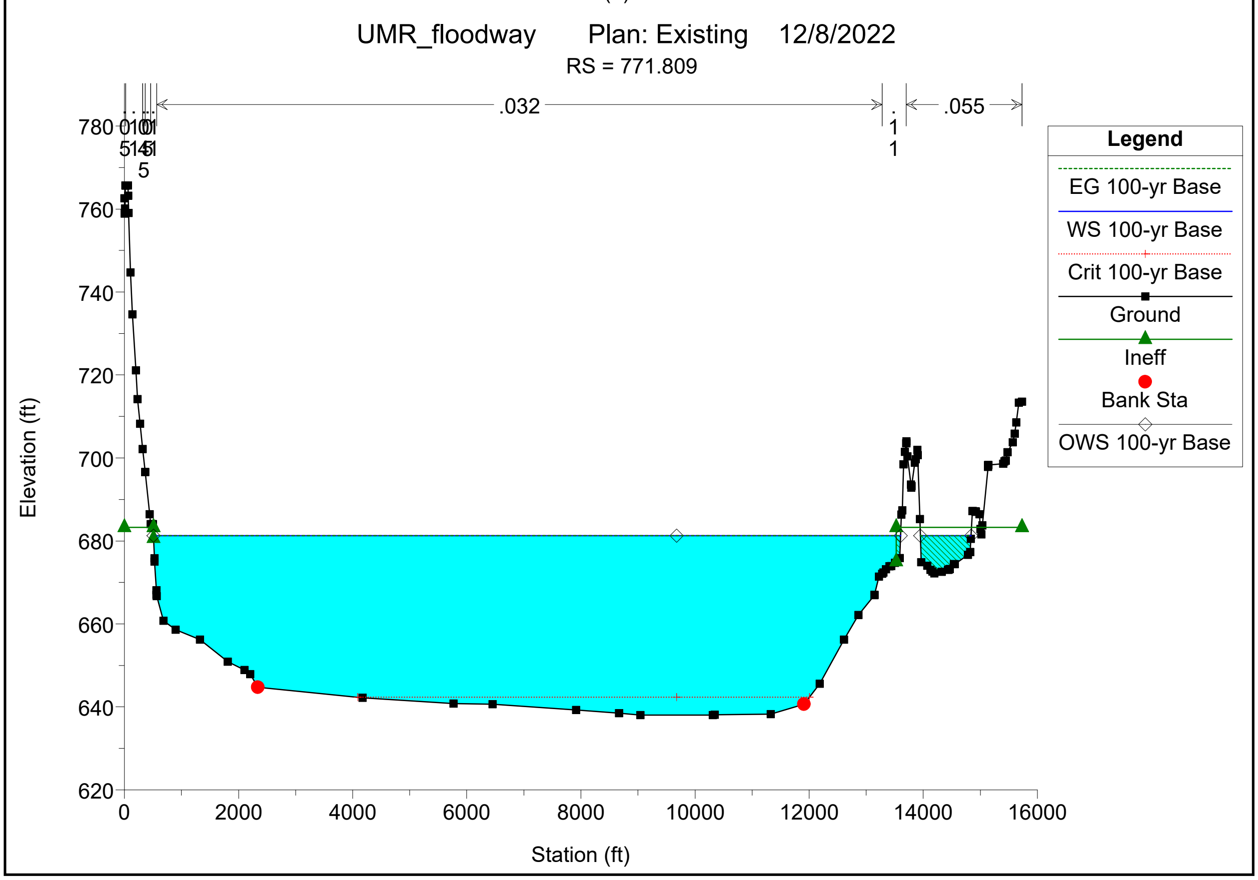


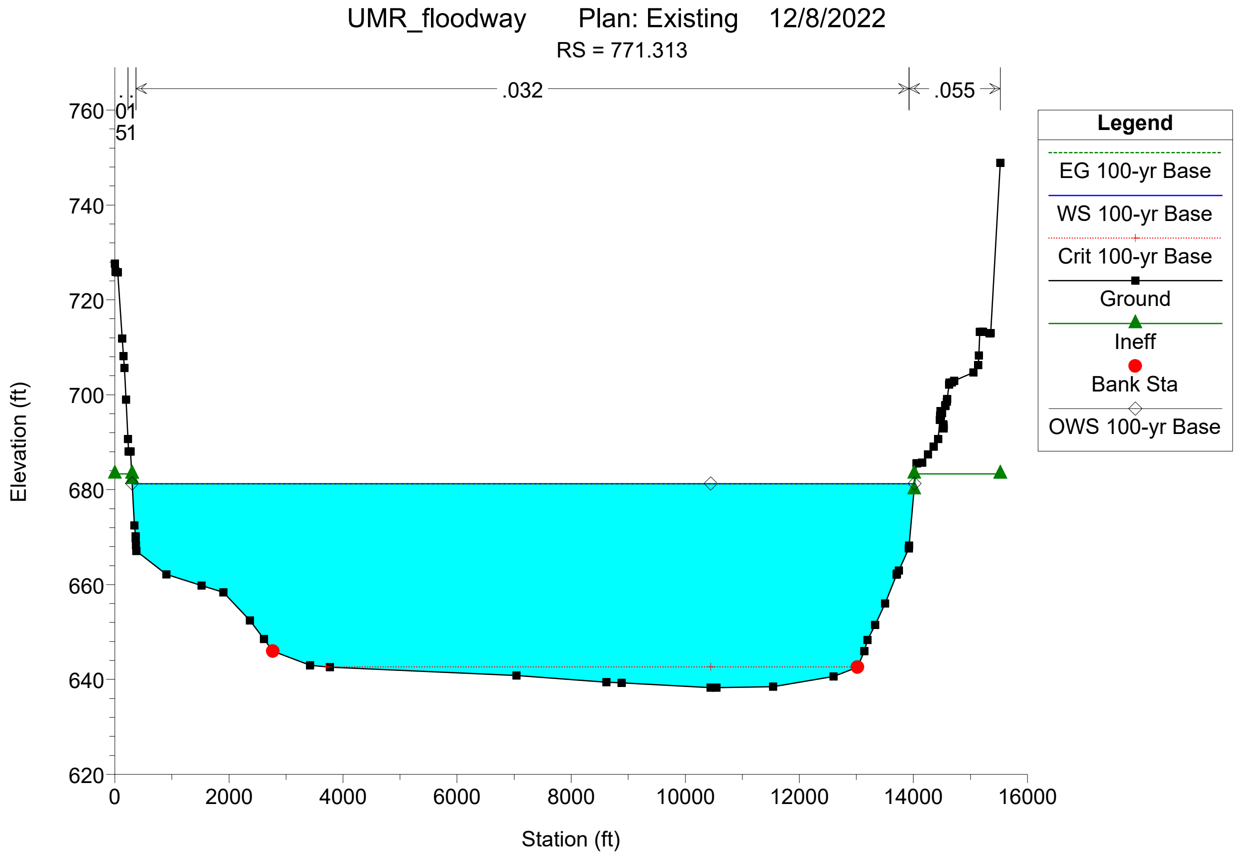
UMR_floodway Plan: Existing 12/8/2022
RS = 772.560
.032
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)



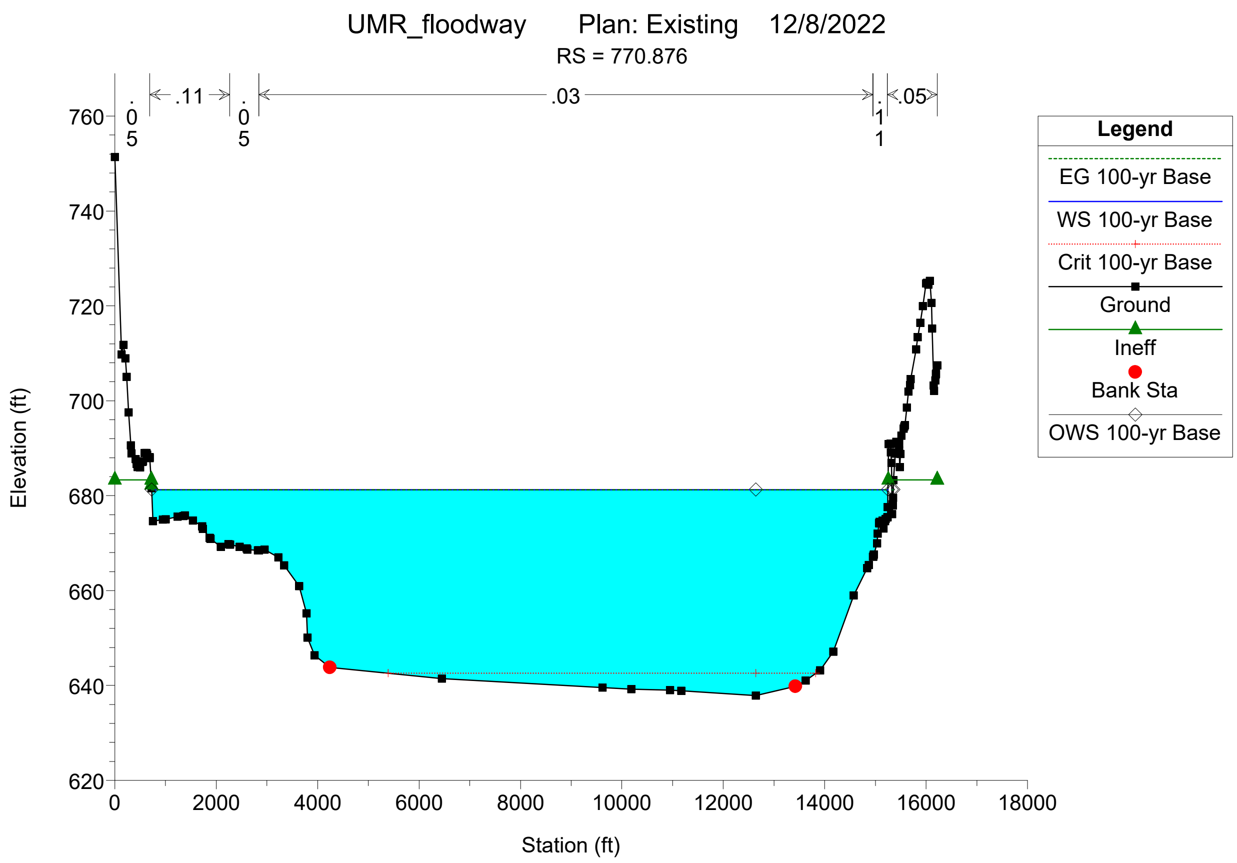
UMR_floodway Plan: Existing 12/8/2022
RS = 772.339
.11
.032
.055
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)


UMR_floodway Plan: Existing 12/8/2022
RS = 772.092
.032
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

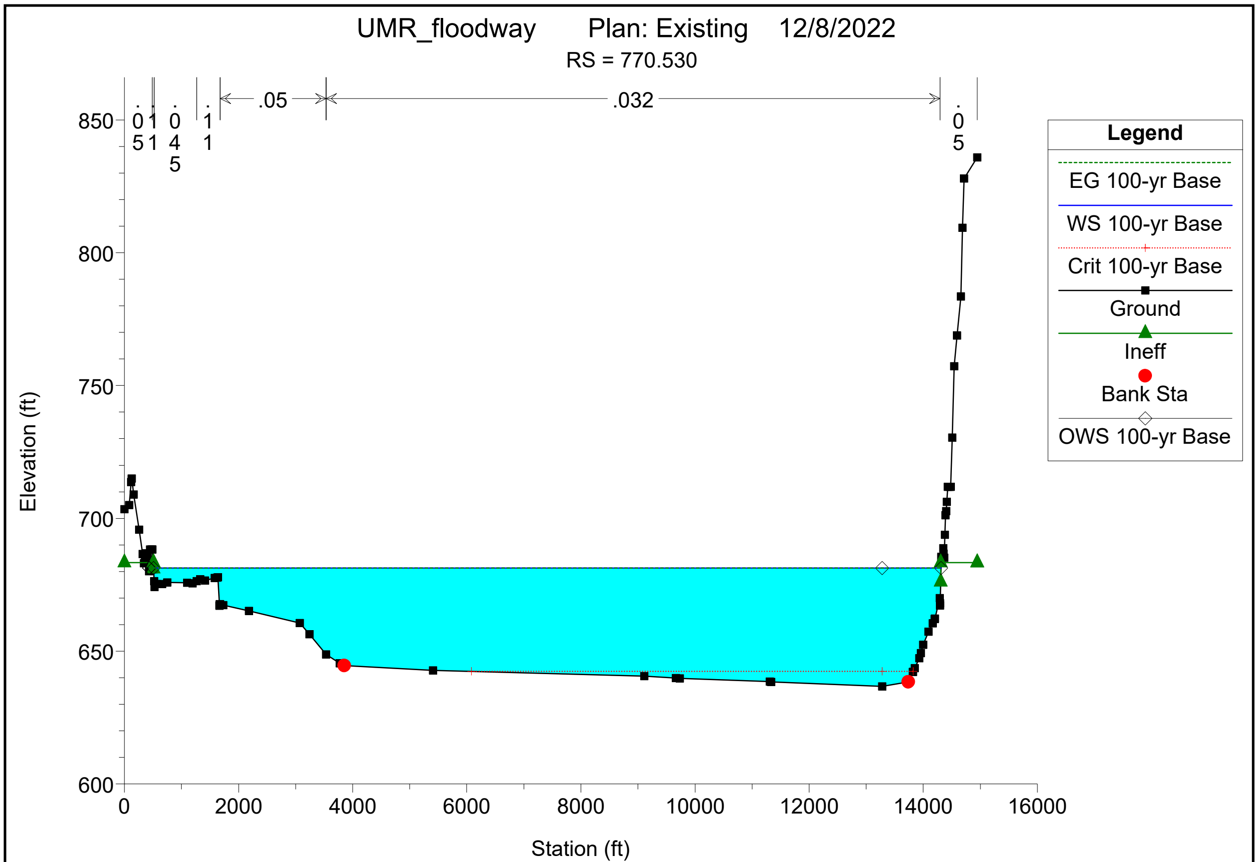

UMR_floodway Plan: Existing 12/8/2022
RS = 771.809
.032
.055
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

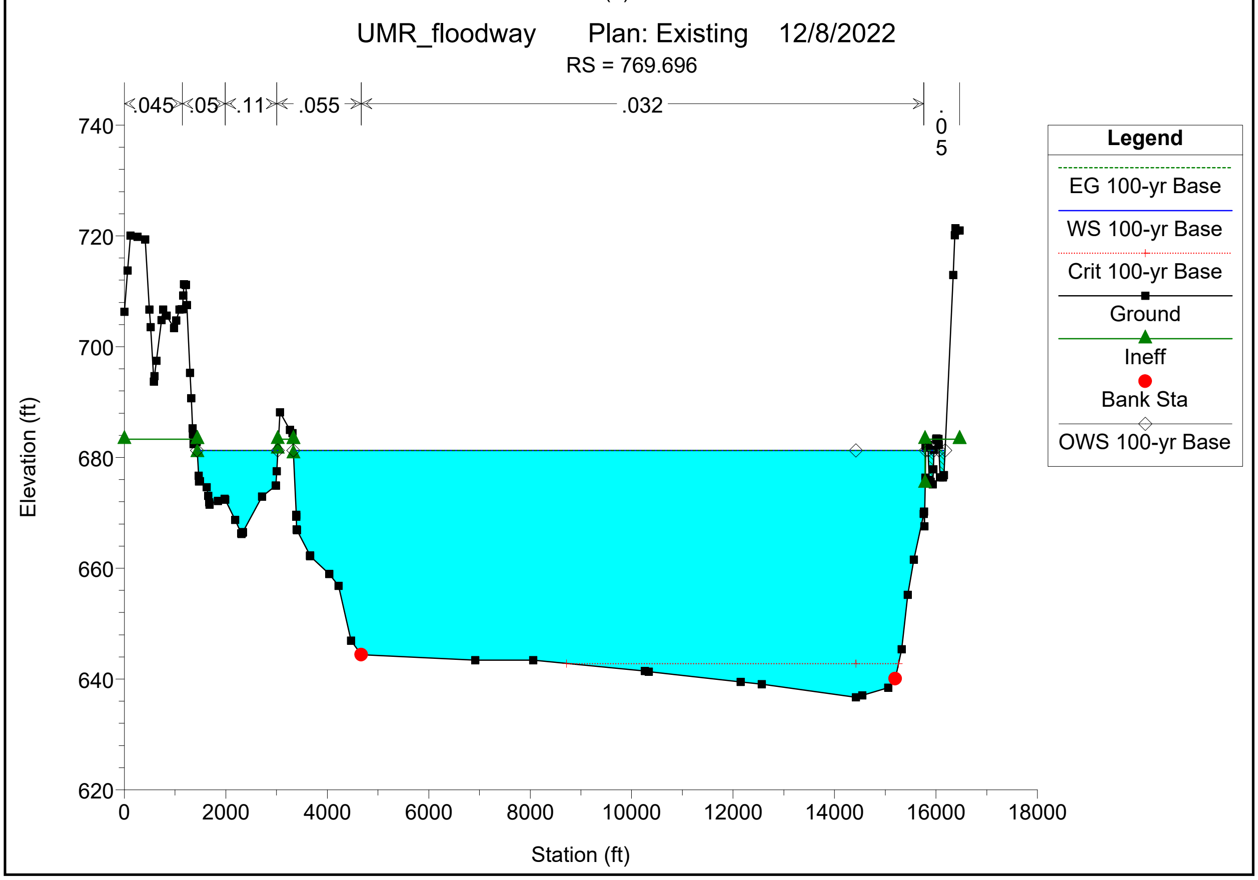


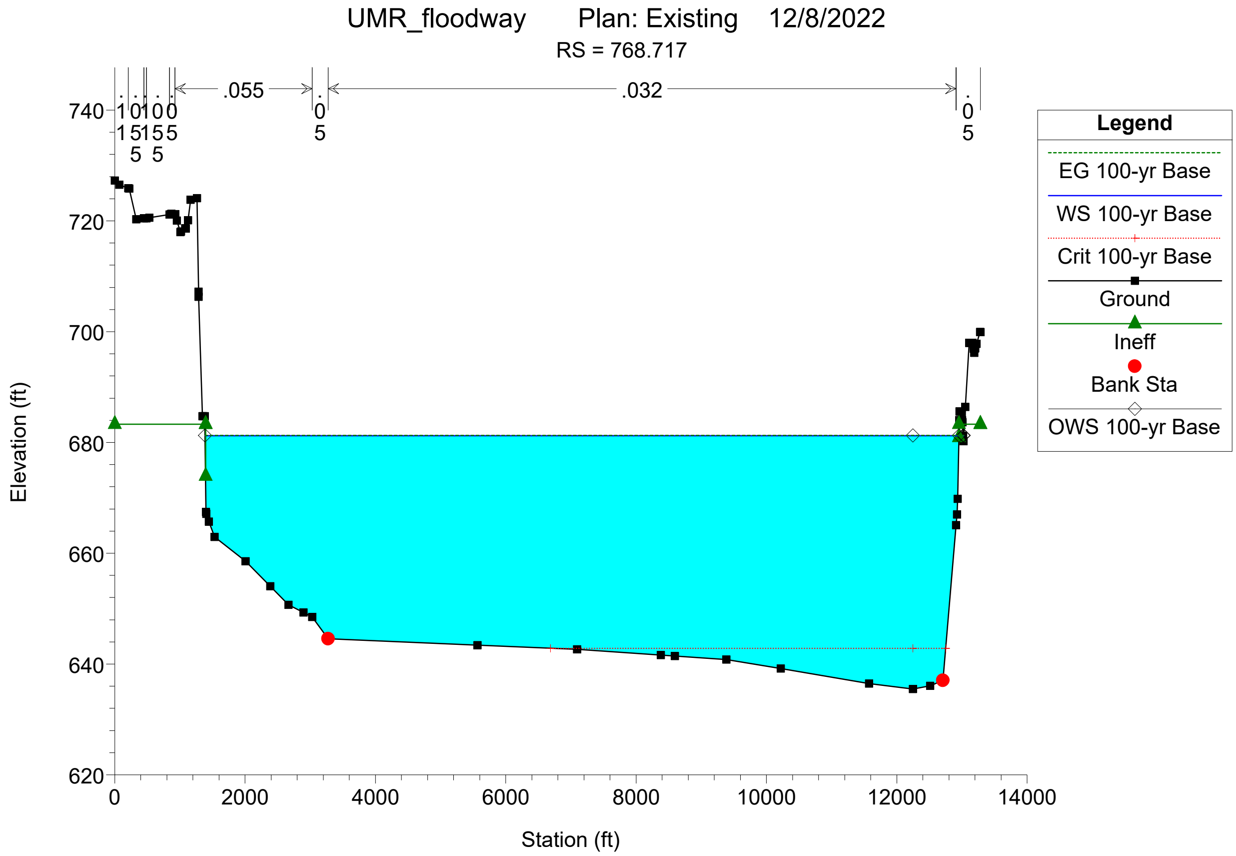
UMR_floodway Plan: Existing 12/8/2022
RS = 771.313
.032
.055
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)



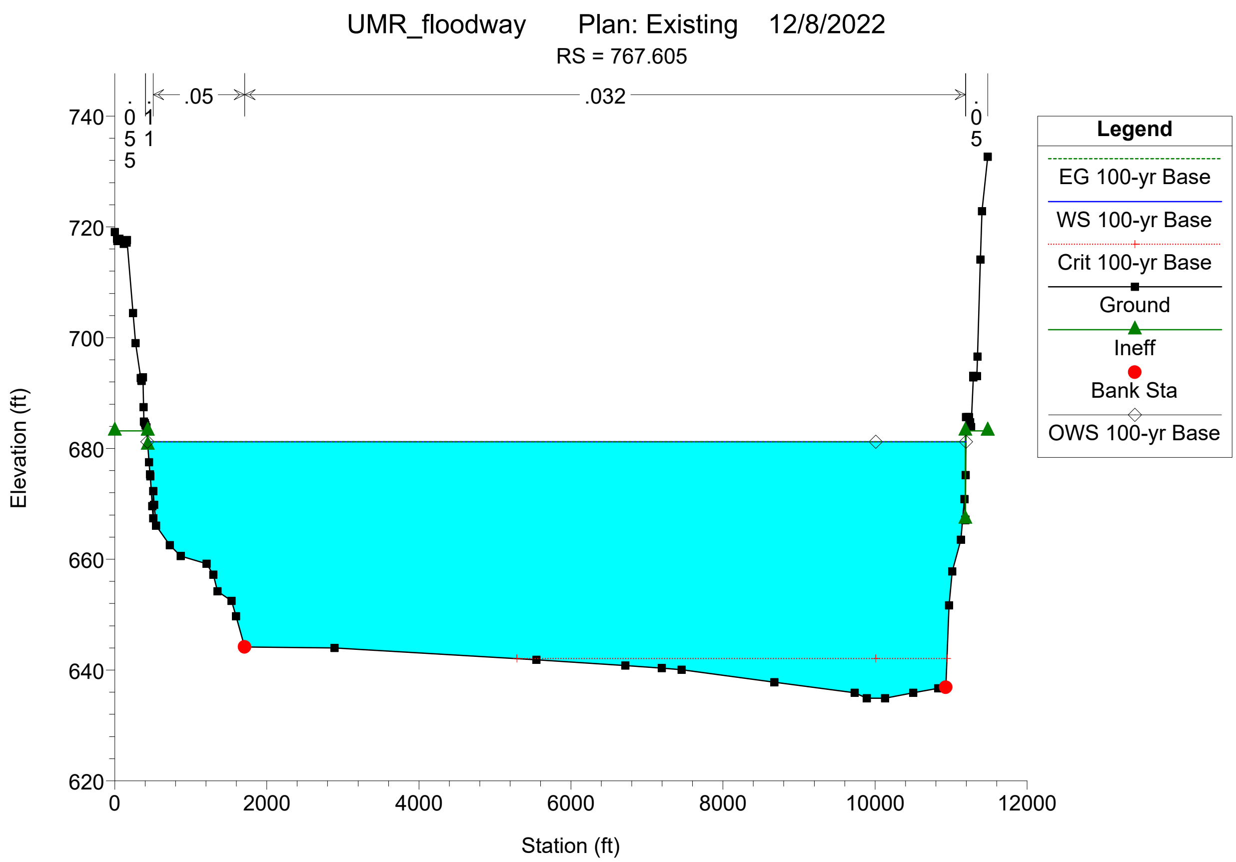
UMR_floodway Plan: Existing 12/8/2022
RS = 770.876
.11
.03
.05
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)


UMR_floodway Plan: Existing 12/8/2022
RS = 770.530
.05
.032
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

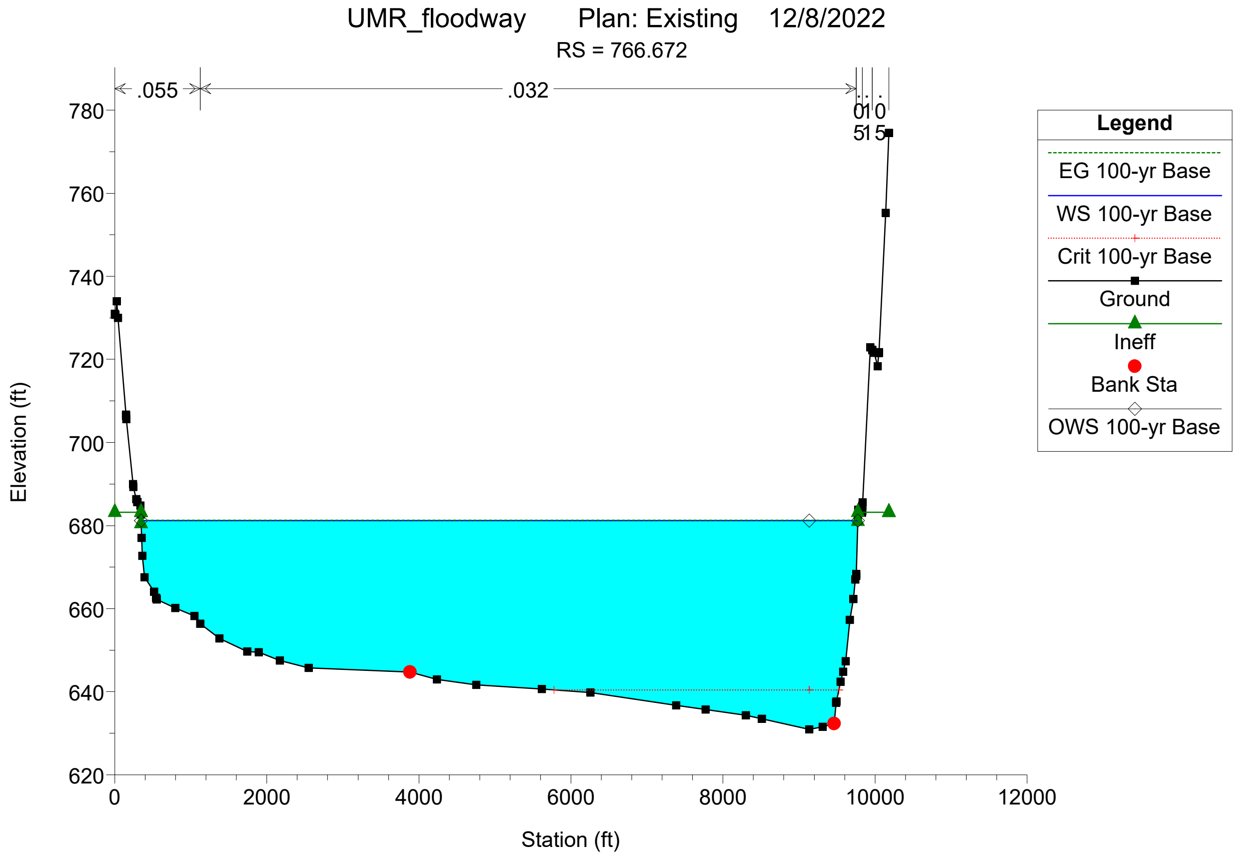

UMR_floodway Plan: Existing 12/8/2022
RS = 769.696
.045
.05
.11
.055
.032
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

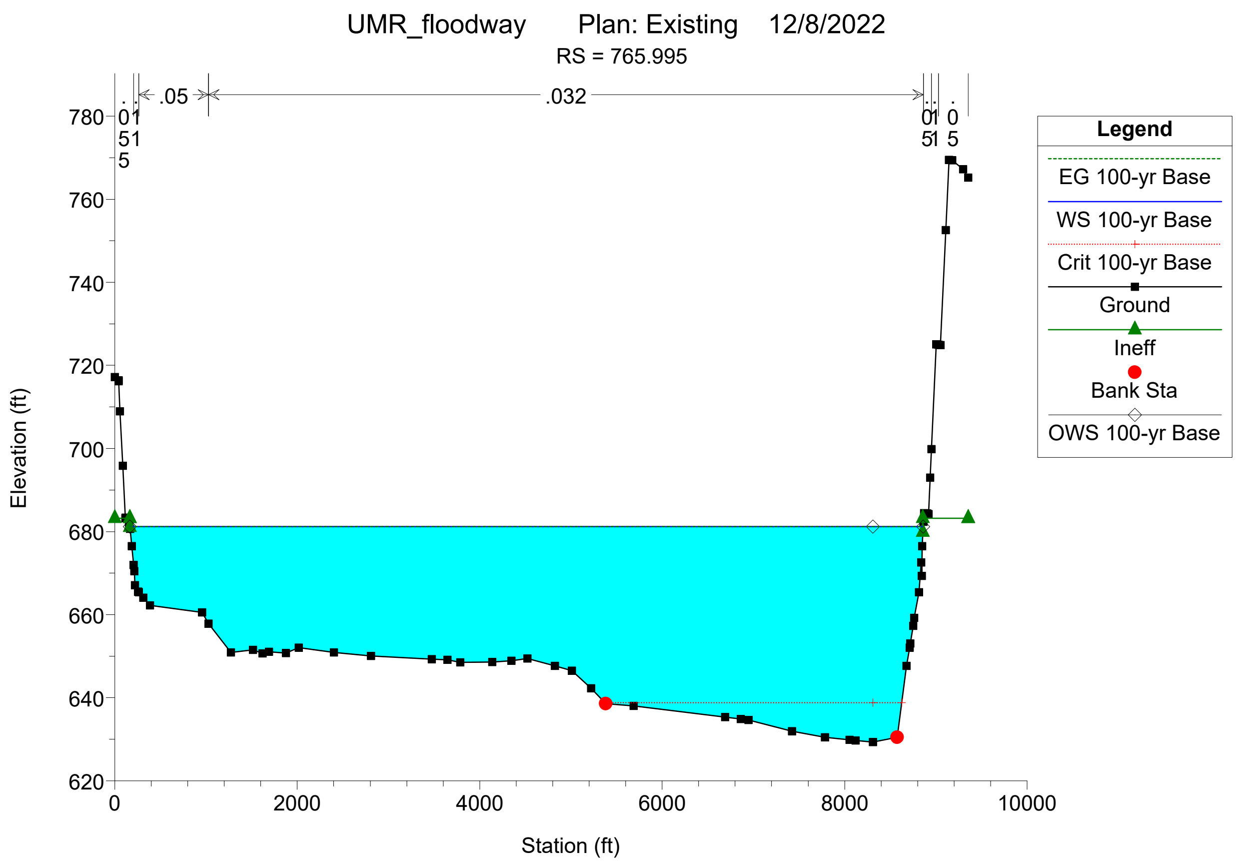


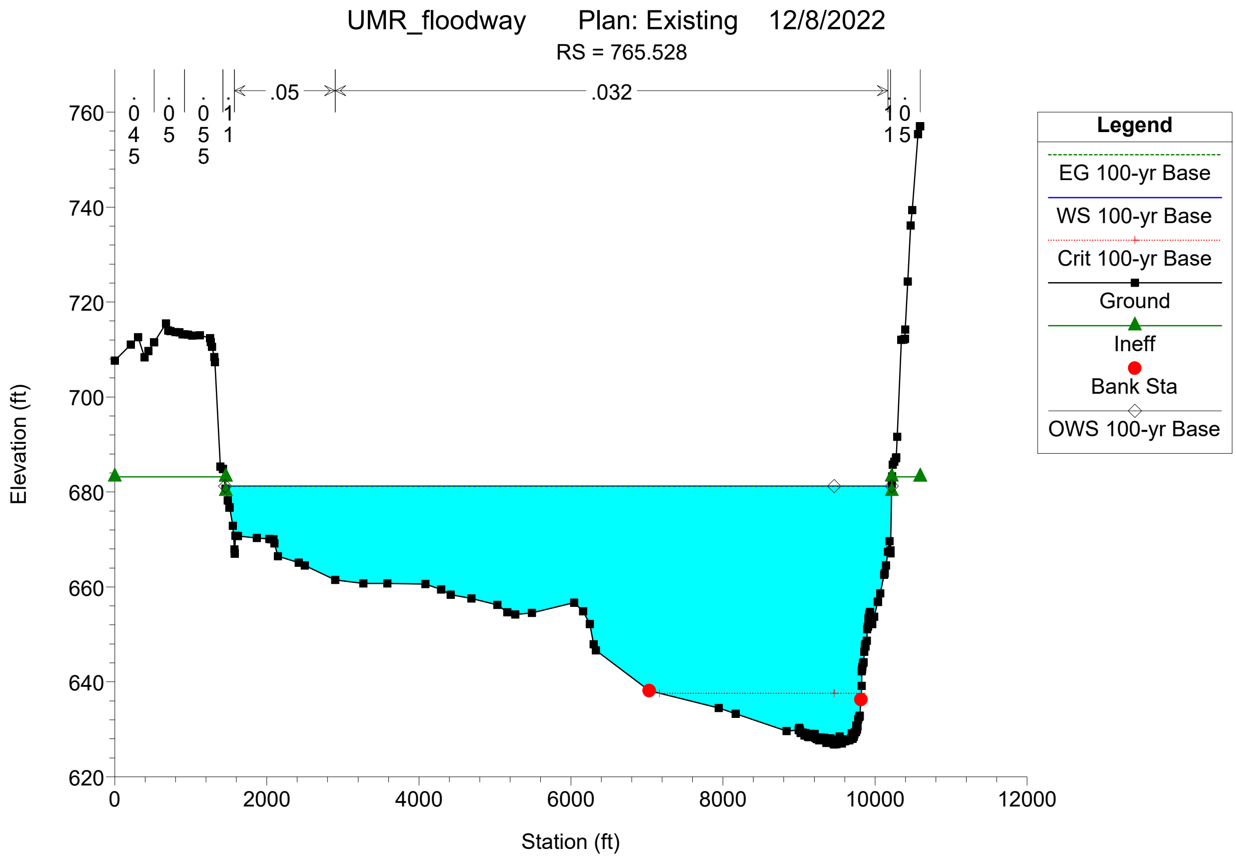
UMR_floodway Plan: Existing 12/8/2022
RS = 768.717
.055
.032
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

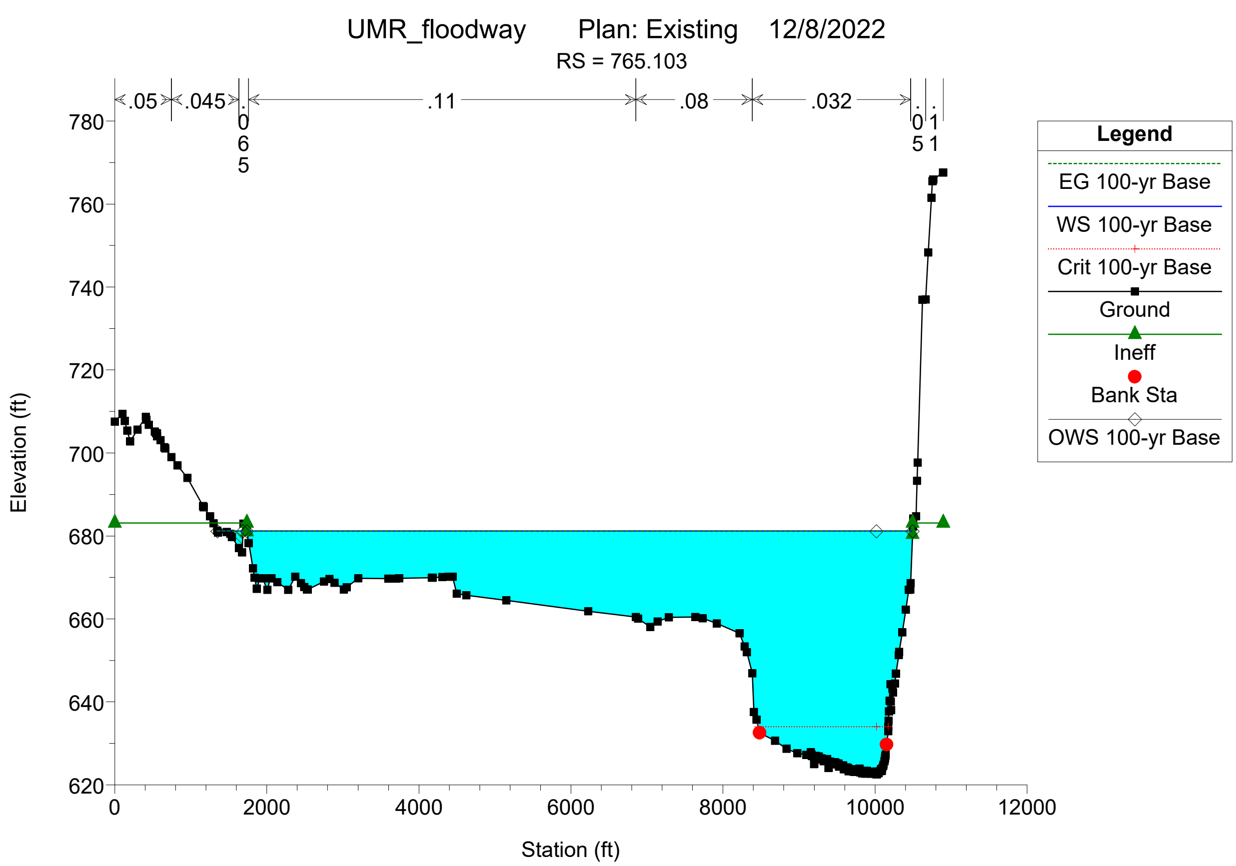


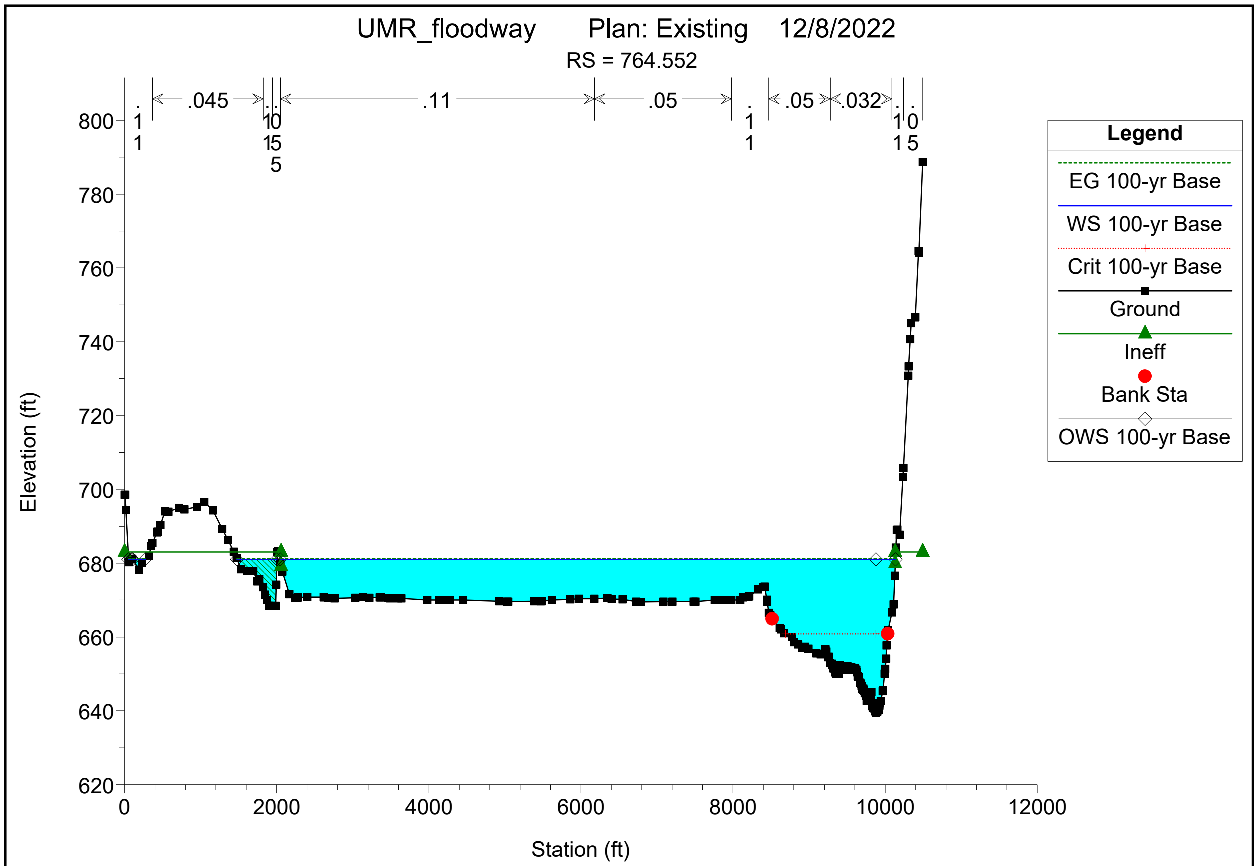
UMR_floodway Plan: Existing 12/8/2022
RS = 767.605
.05
.032
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base


UMR_floodway Plan: Existing 12/8/2022
RS = 766.672
.055
.032
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

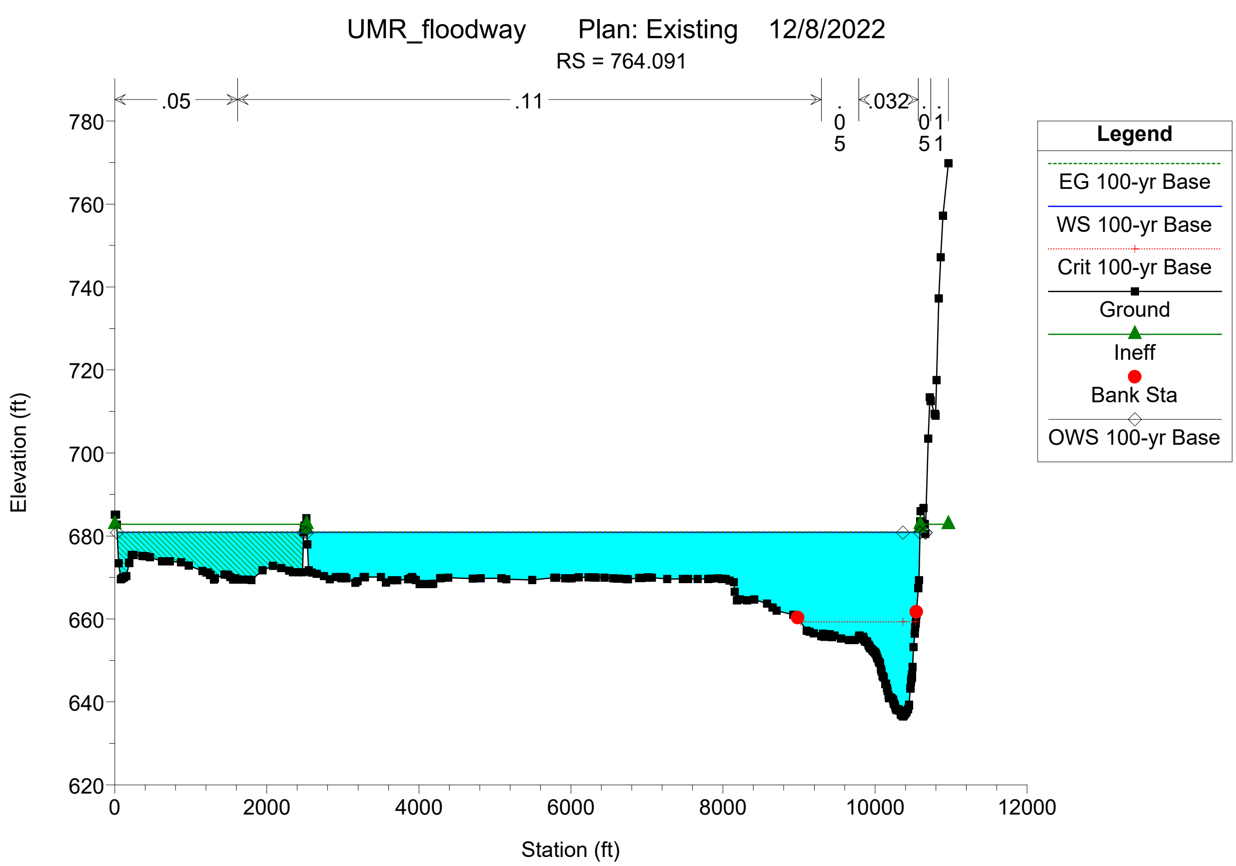

UMR_floodway Plan: Existing 12/8/2022
RS = 765.995
.05
.032
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base


UMR_floodway Plan: Existing 12/8/2022
RS = 765.528
.045
.05
.055
.1
.05
.032
.1
.05
Elevation (ft)
Station (ft)
620
640
660
680
700
720
740
760
0
2000
4000
6000
8000
10000
12000
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

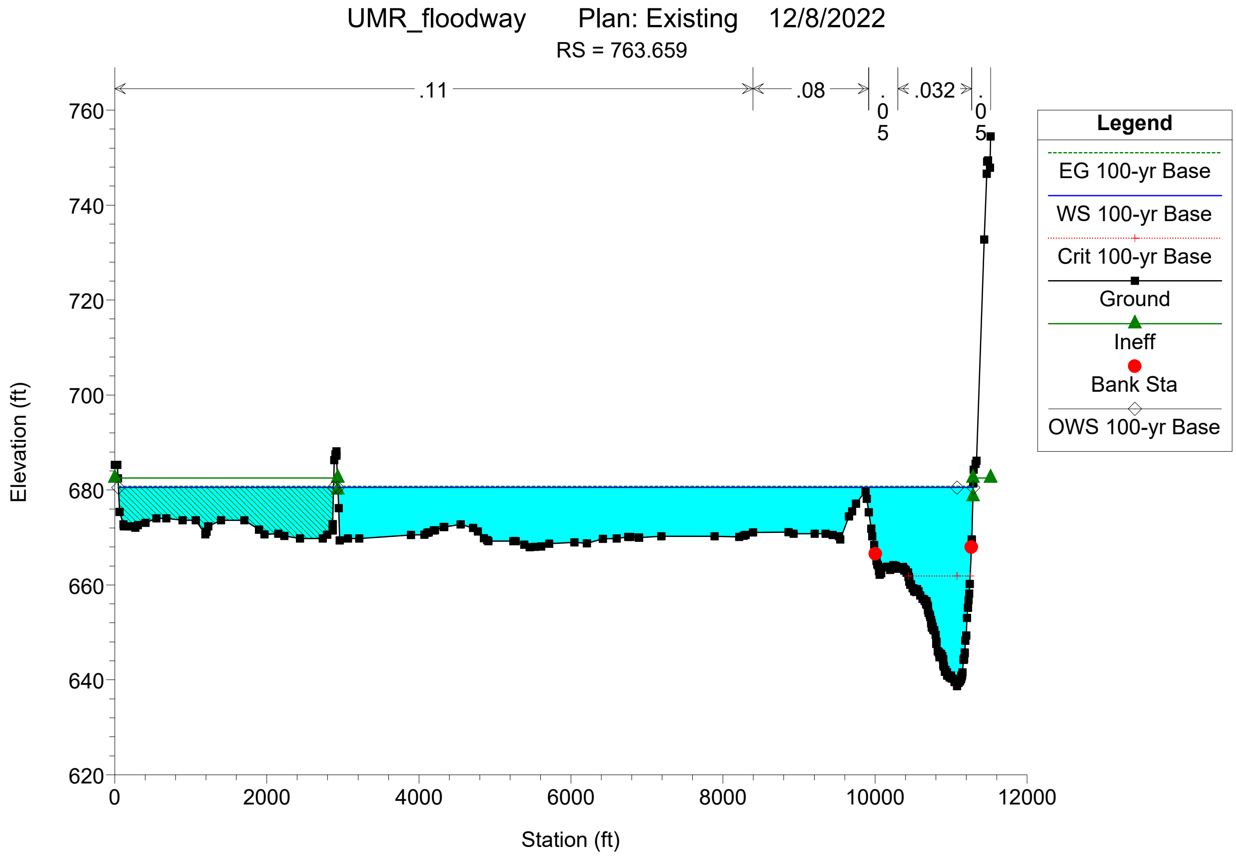

UMR_floodway Plan: Existing 12/8/2022
RS = 765.103
.05
.045
.065
.11
.08
.032
.05
.11
Elevation (ft)
Station (ft)
620
640
660
680
700
720
740
760
780
0
2000
4000
6000
8000
10000
12000
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base



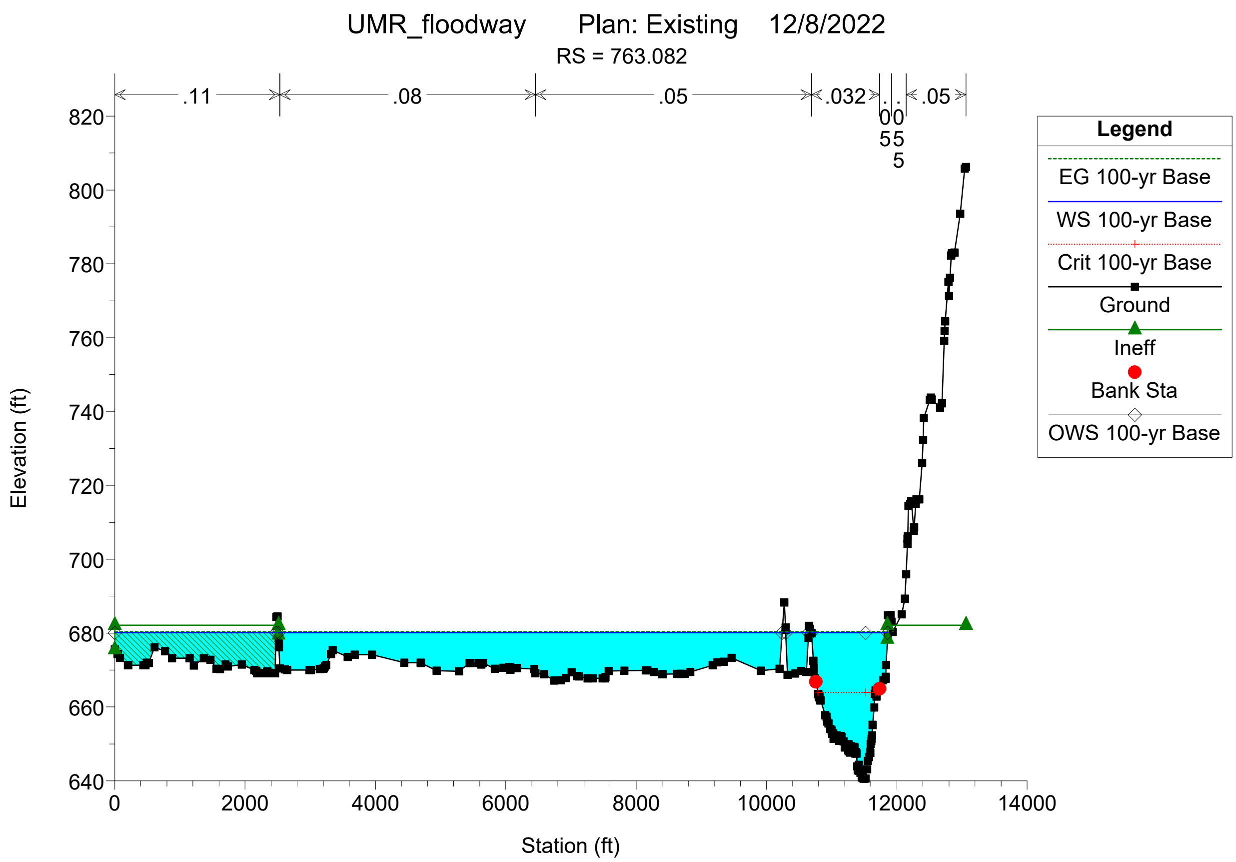
UMR_floodway Plan: Existing 12/8/2022
RS = 764.552
.045
.11
.05
.05
.032
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base



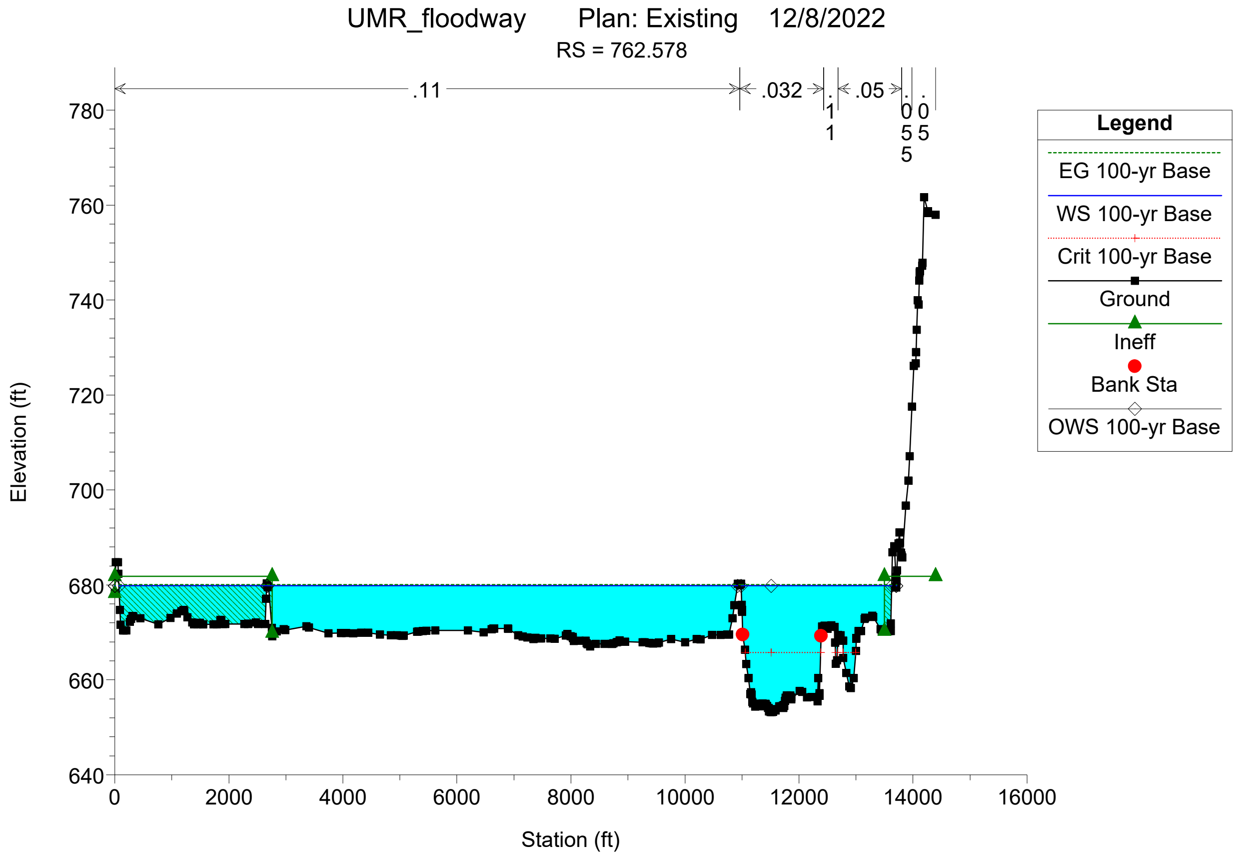
UMR_floodway Plan: Existing 12/8/2022
RS = 764.091
.05
.11
.032
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

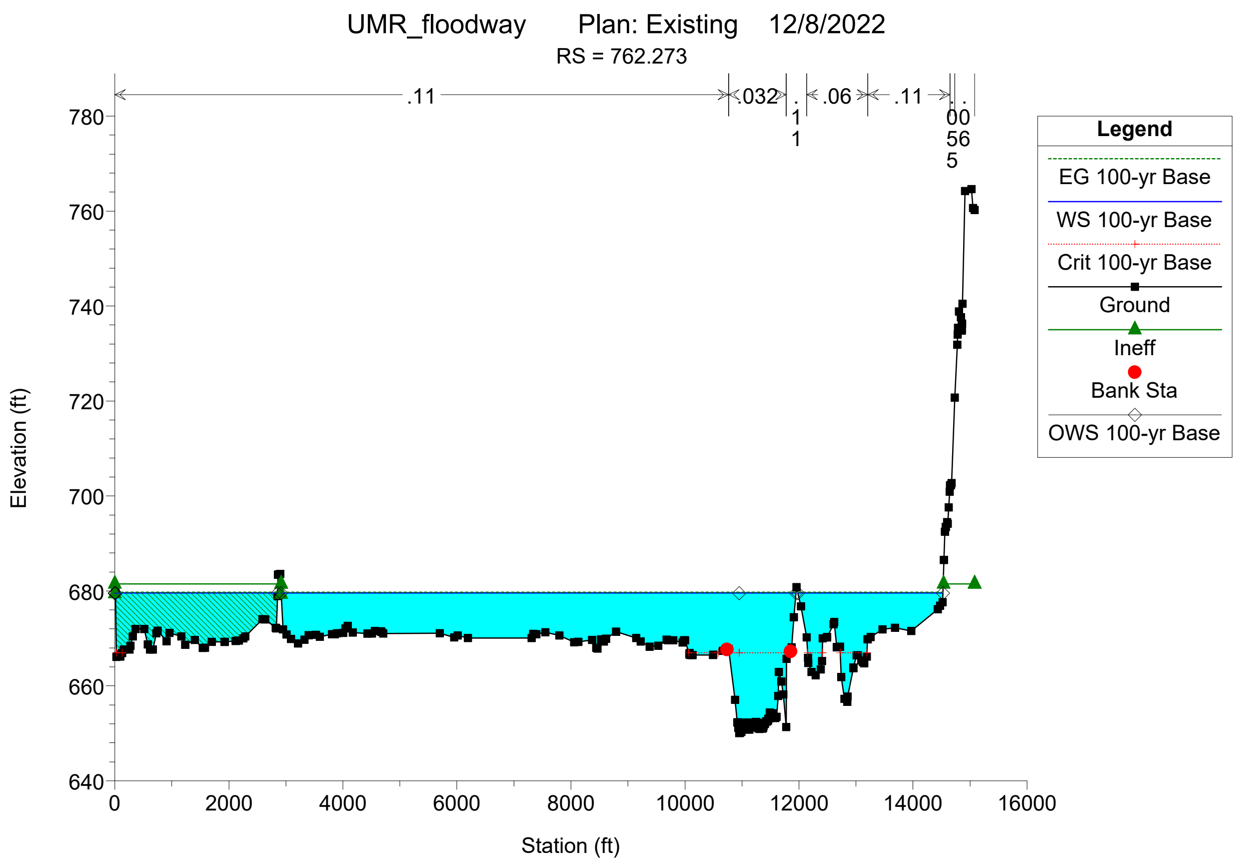


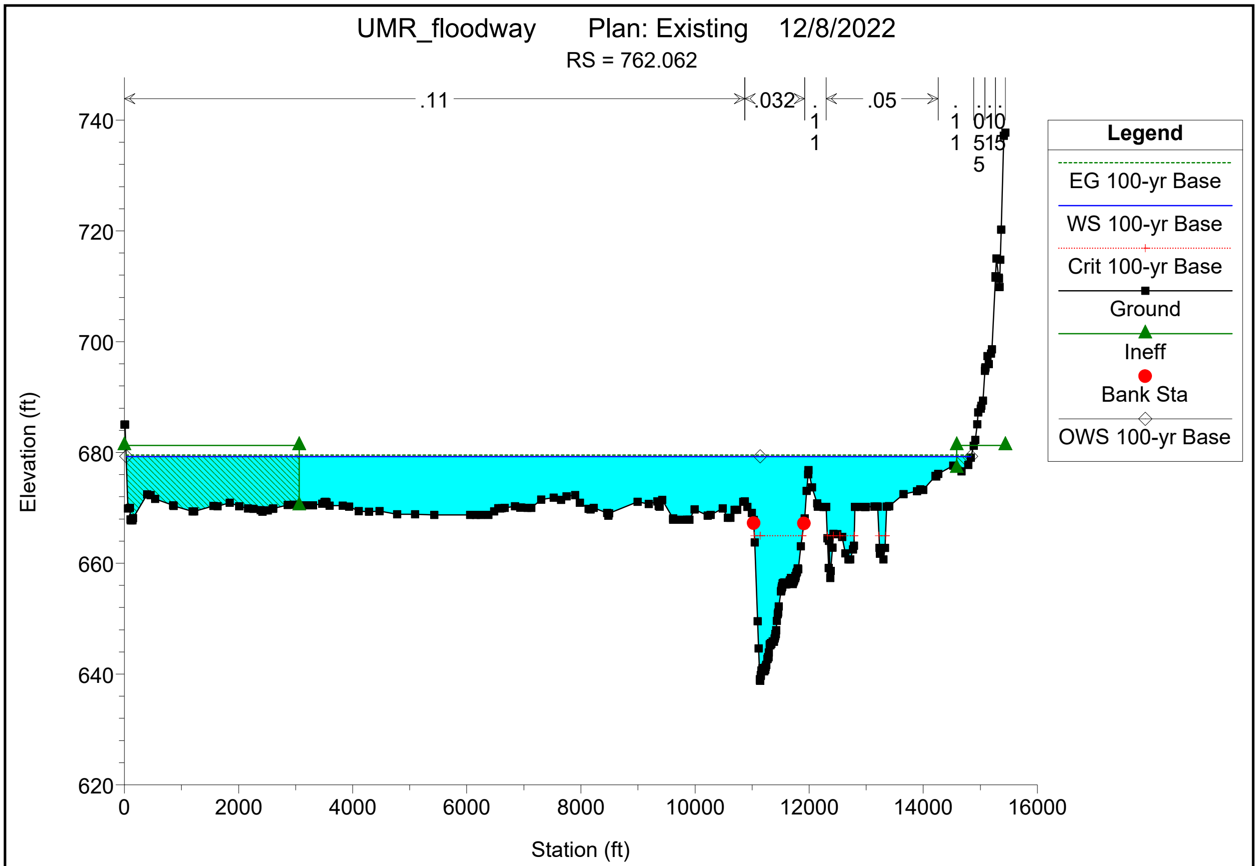
UMR_floodway Plan: Existing 12/8/2022
RS = 763.659
.11
.08
.032
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)



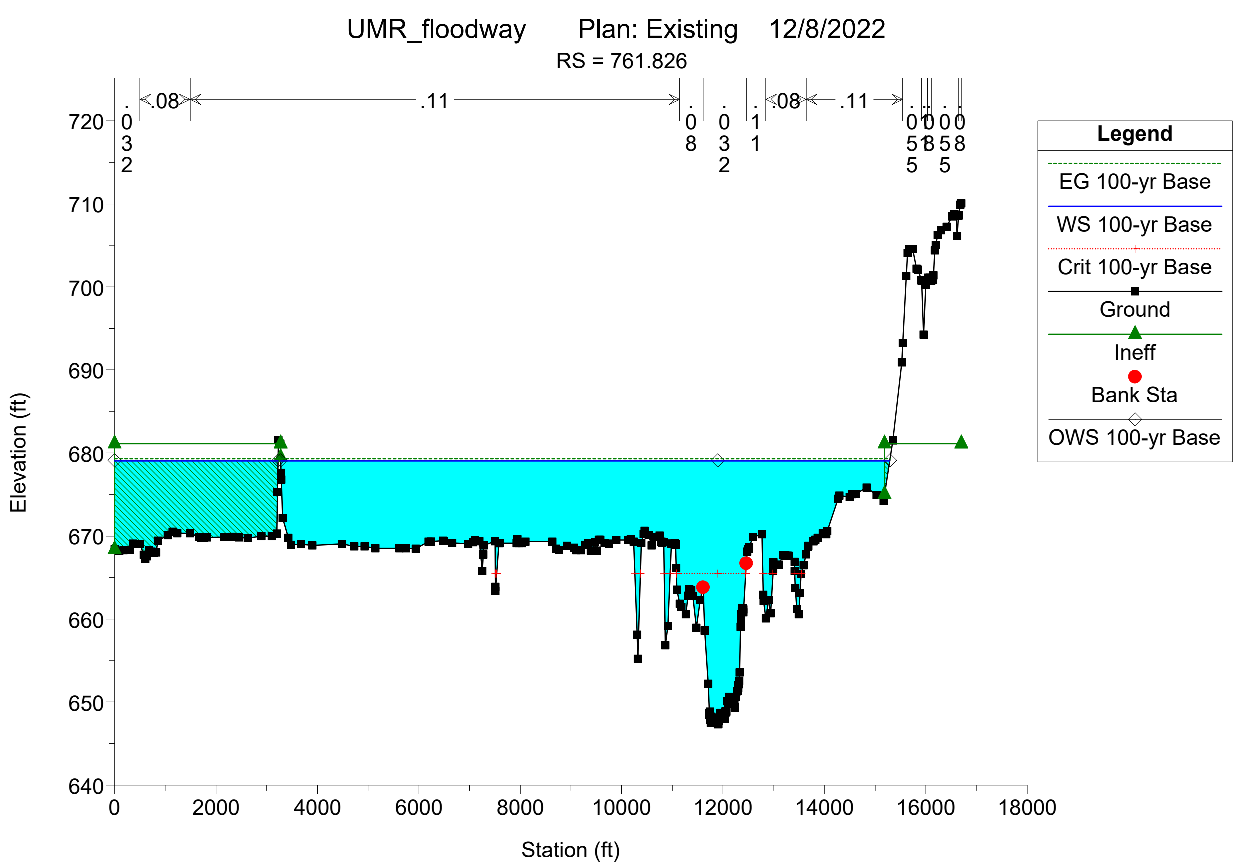
UMR_floodway Plan: Existing 12/8/2022
RS = 763.082
.11
.08
.05
.032
.05
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)


UMR_floodway Plan: Existing 12/8/2022
RS = 762.578
.11
.032
.05
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)
640
660
680
700
720
740
760
780
0
2000
4000
6000
8000
10000
12000
14000
16000

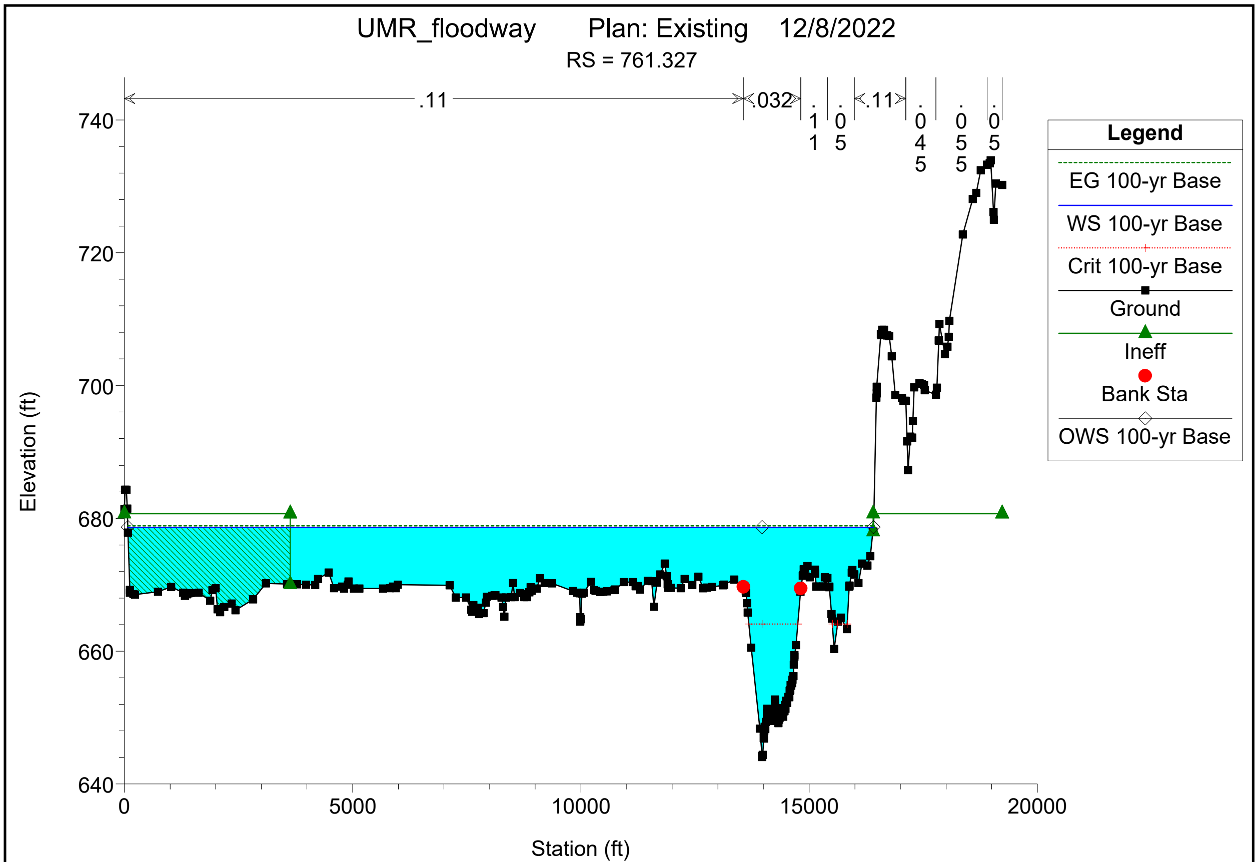

UMR_floodway Plan: Existing 12/8/2022
RS = 762.273
.11
.032
.06
.11
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)
640
660
680
700
720
740
760
780
0
2000
4000
6000
8000
10000
12000
14000
16000

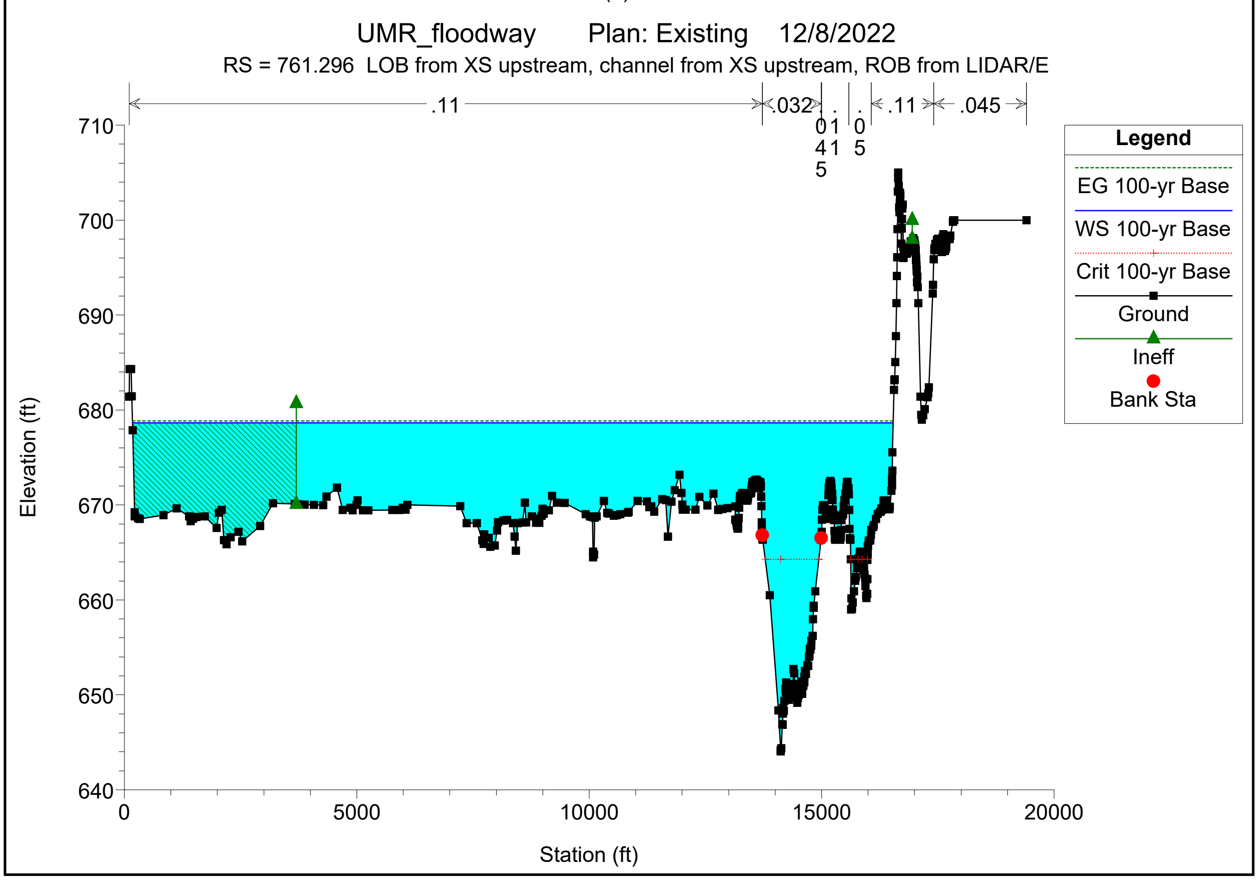


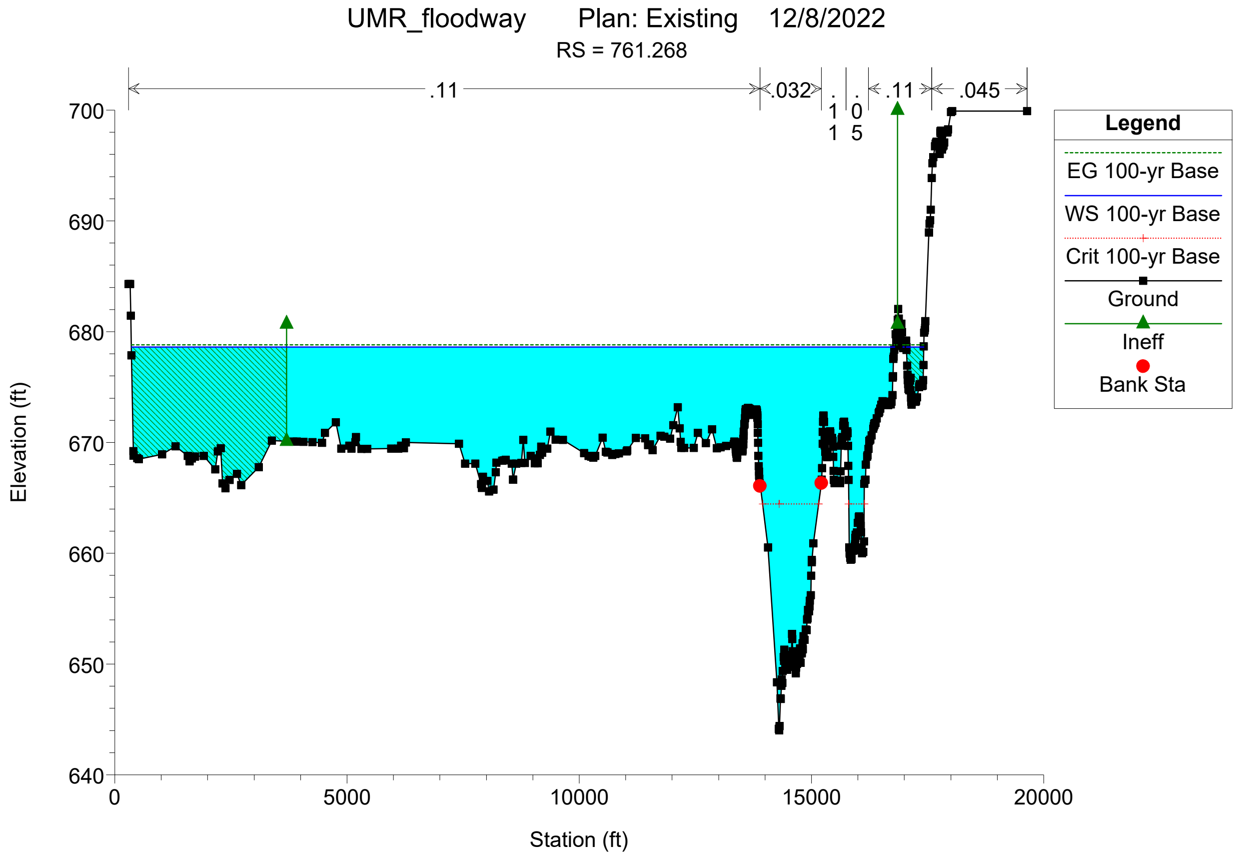
UMR_floodway Plan: Existing 12/8/2022
RS = 762.062
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

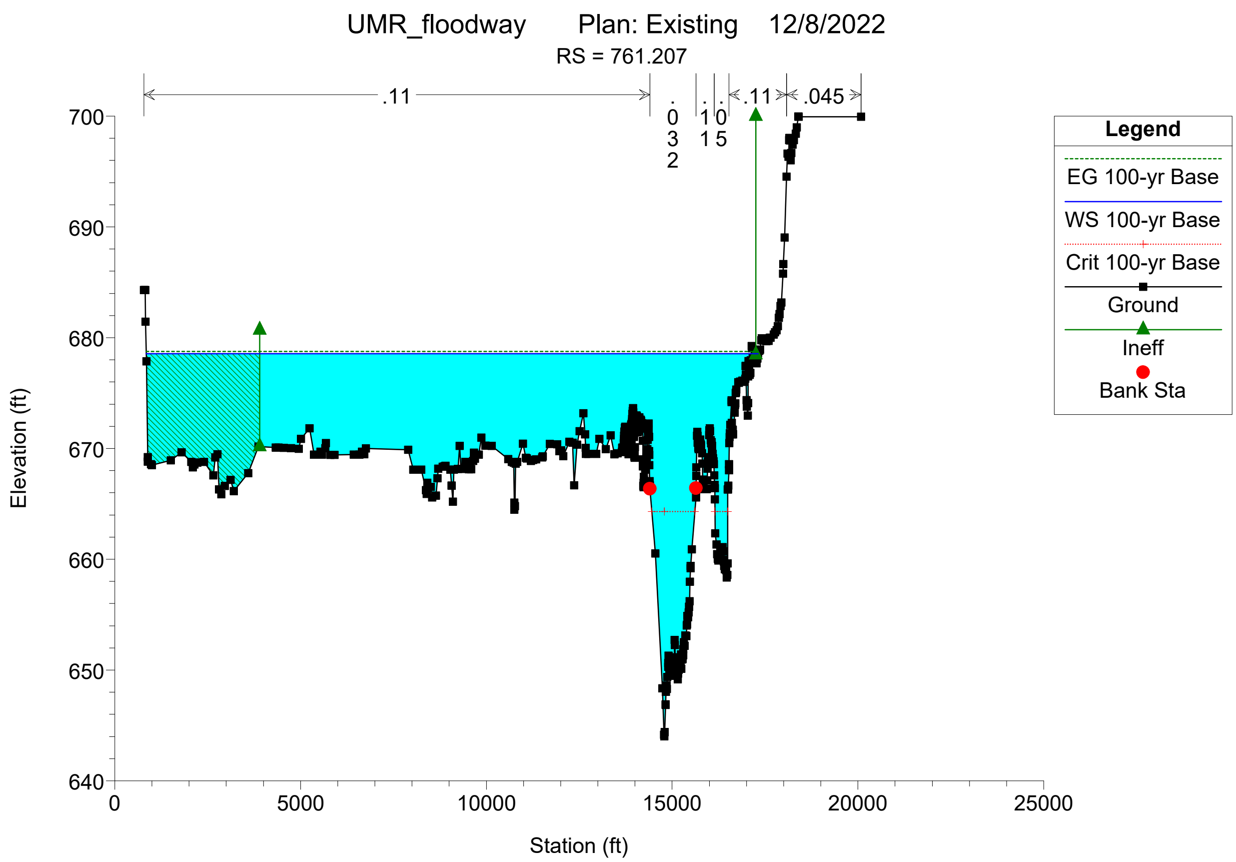


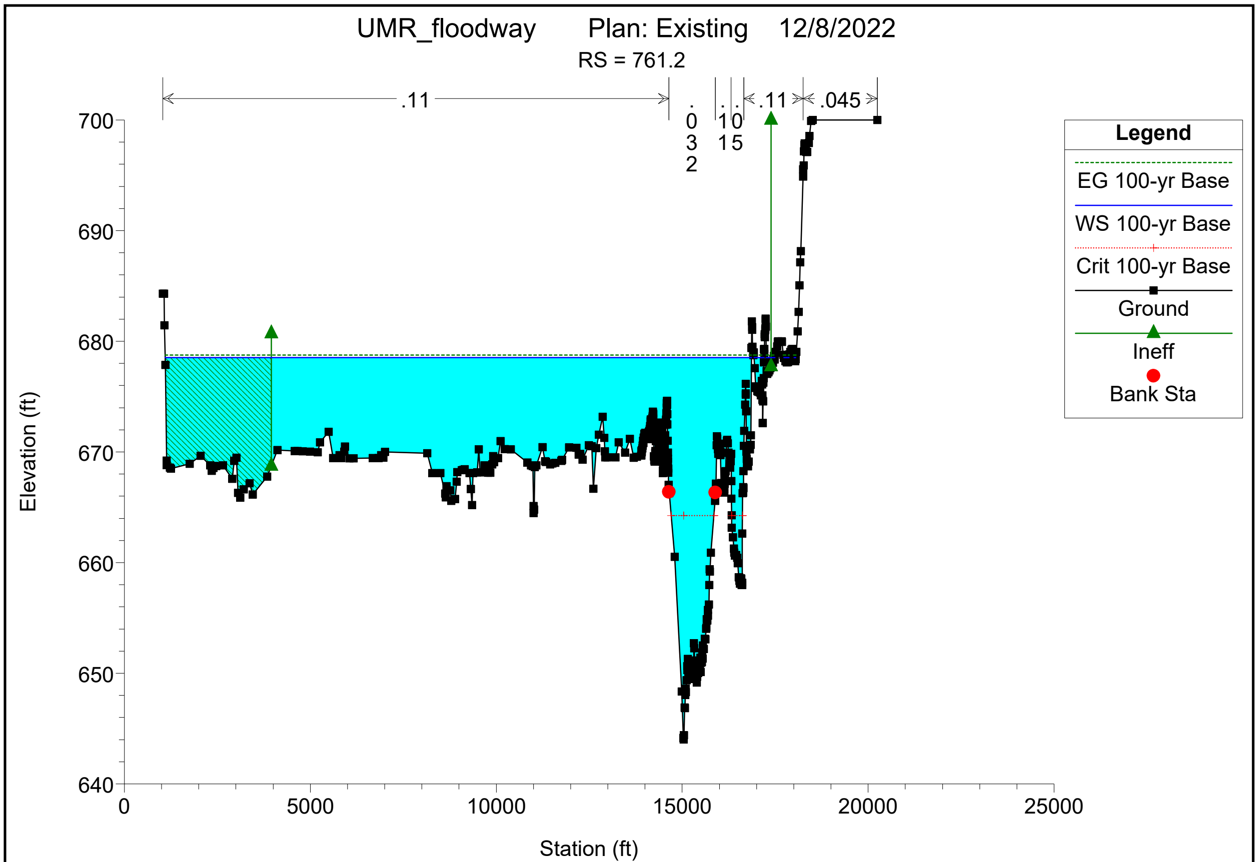
UMR_floodway Plan: Existing 12/8/2022
RS = 761.826
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)


UMR_floodway Plan: Existing 12/8/2022
RS = 761.327
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

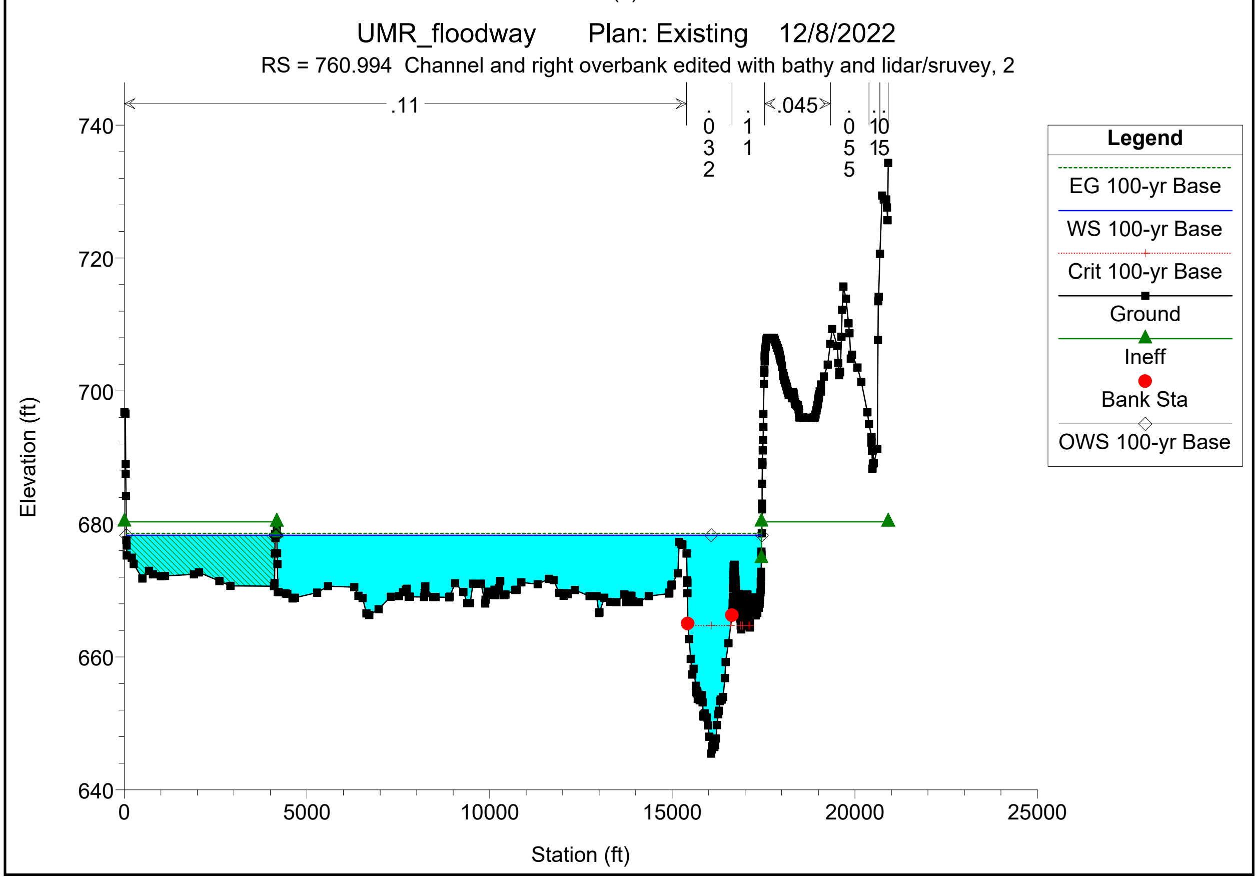

UMR_floodway Plan: Existing 12/8/2022
RS = 761.296 LOB from XS upstream, channel from XS upstream, ROB from LIDAR/E
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta


UMR_floodway Plan: Existing 12/8/2022
RS = 761.268
.11
.032
.11
.045
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta

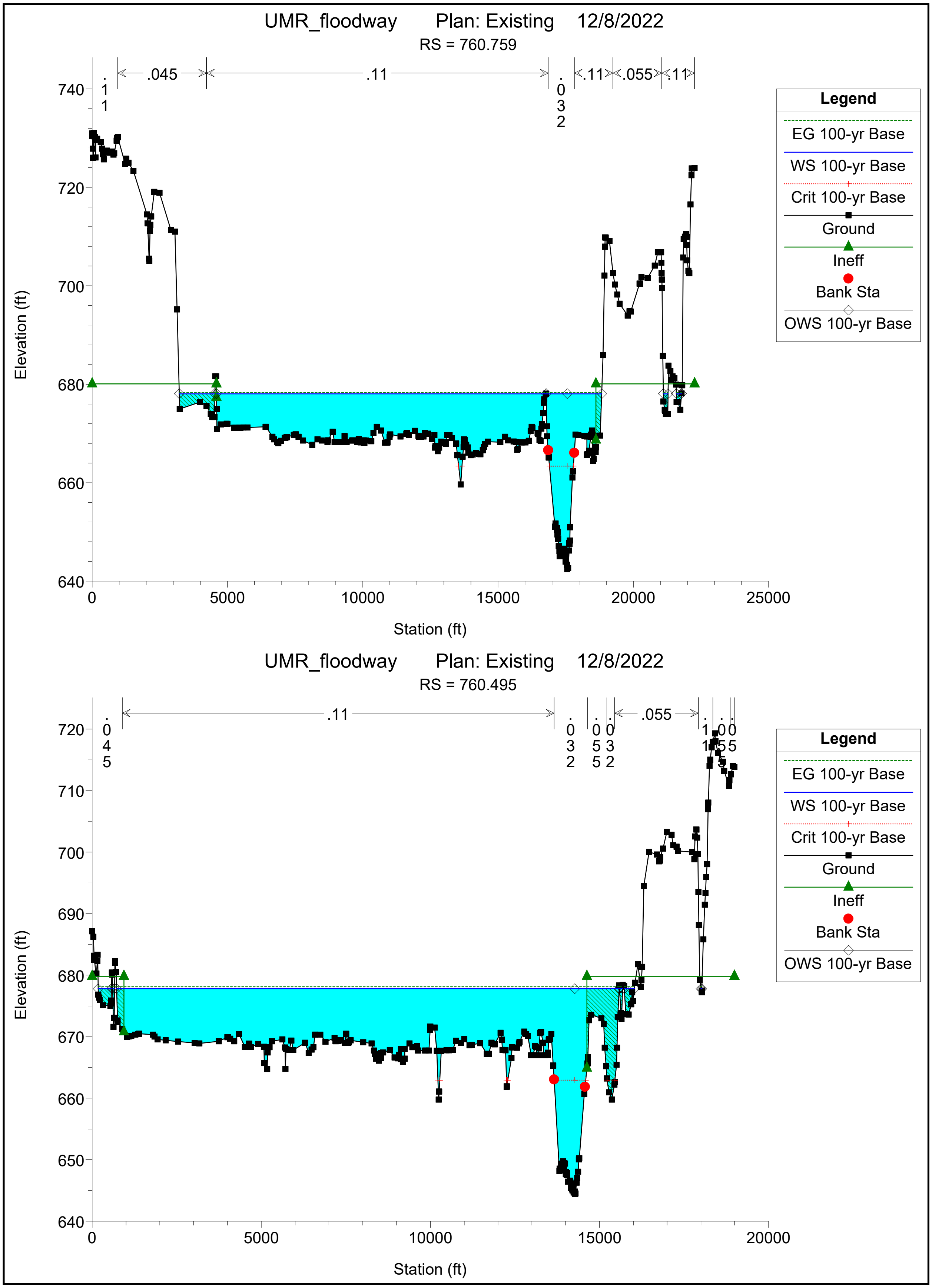

UMR_floodway Plan: Existing 12/8/2022
RS = 761.207
.11
.11
.045
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta



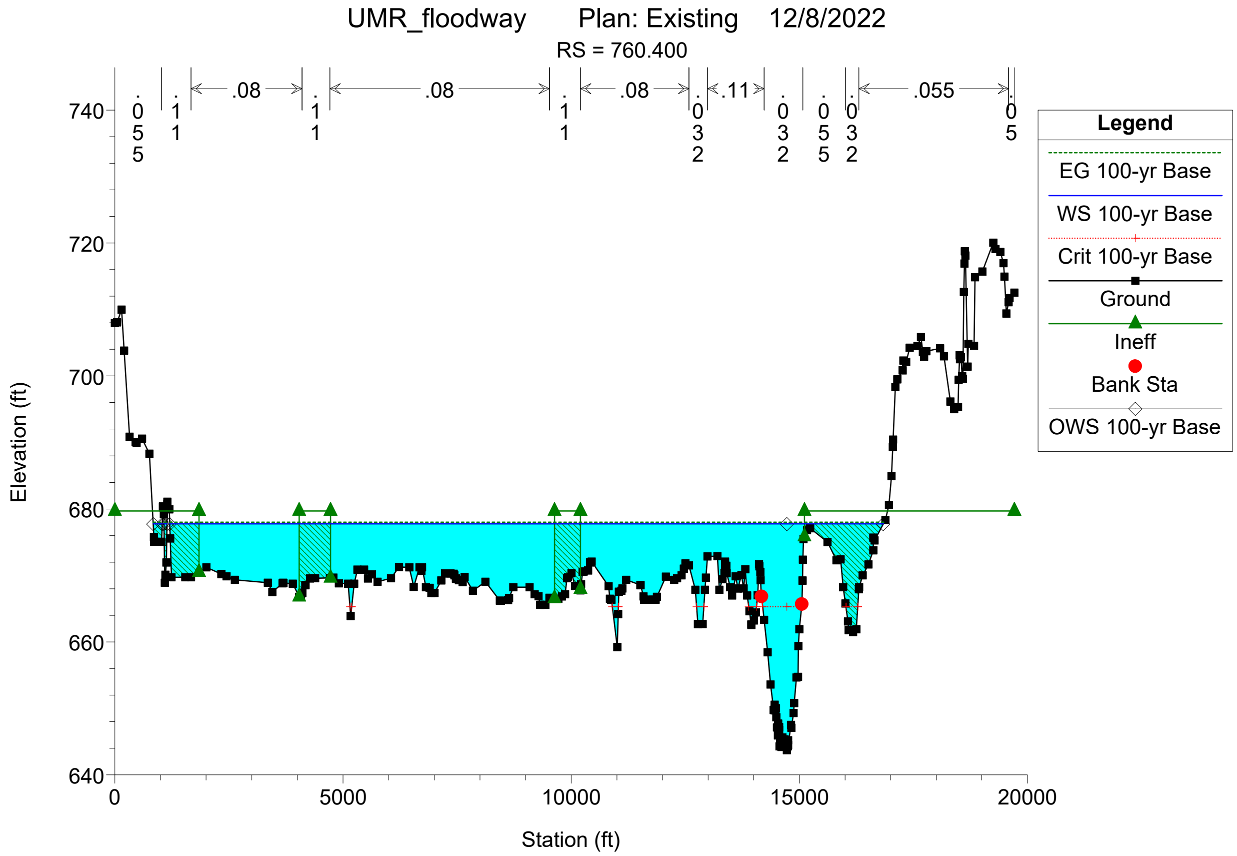
UMR_floodway Plan: Existing 12/8/2022
RS = 761.2
.11
.032
.10
.15
.11
.045
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
700
690
680
670
660
650
640
0
5000
10000
15000
20000
25000

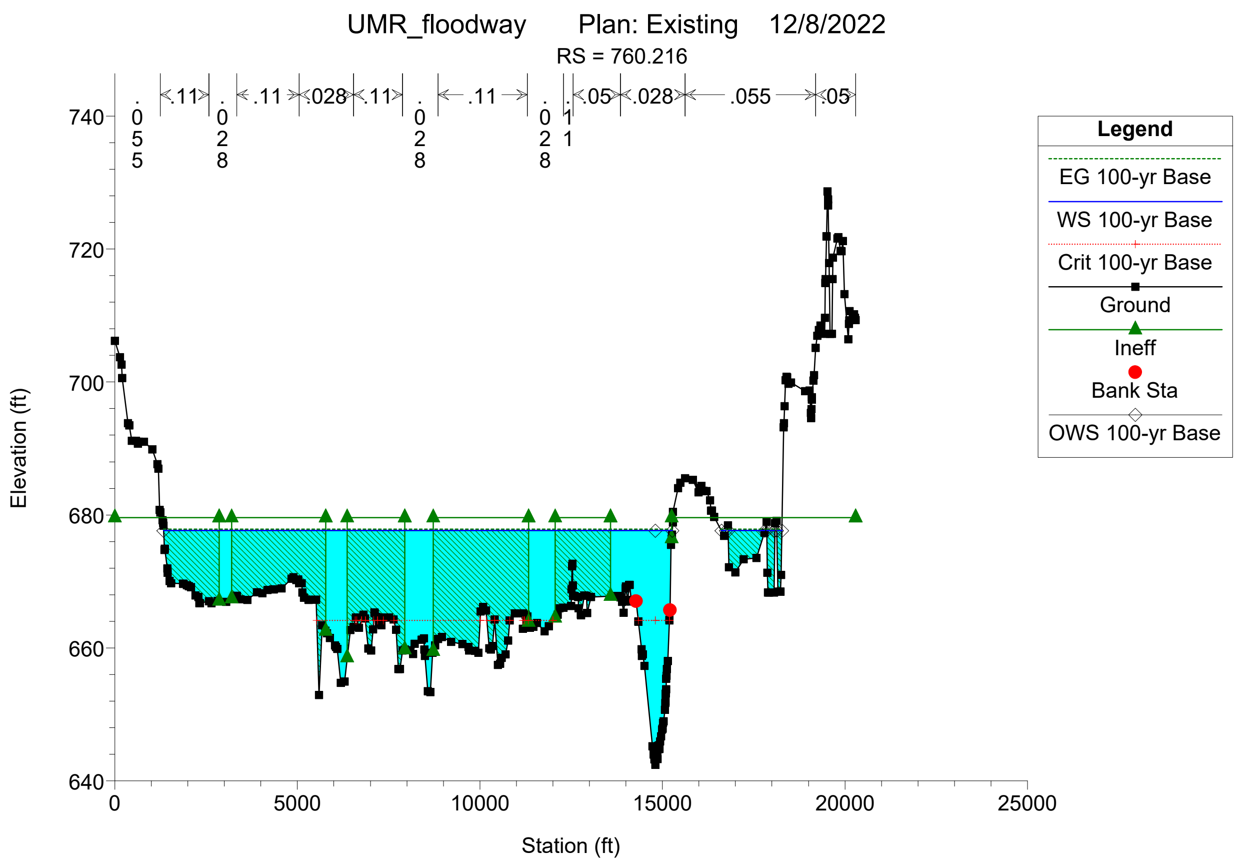


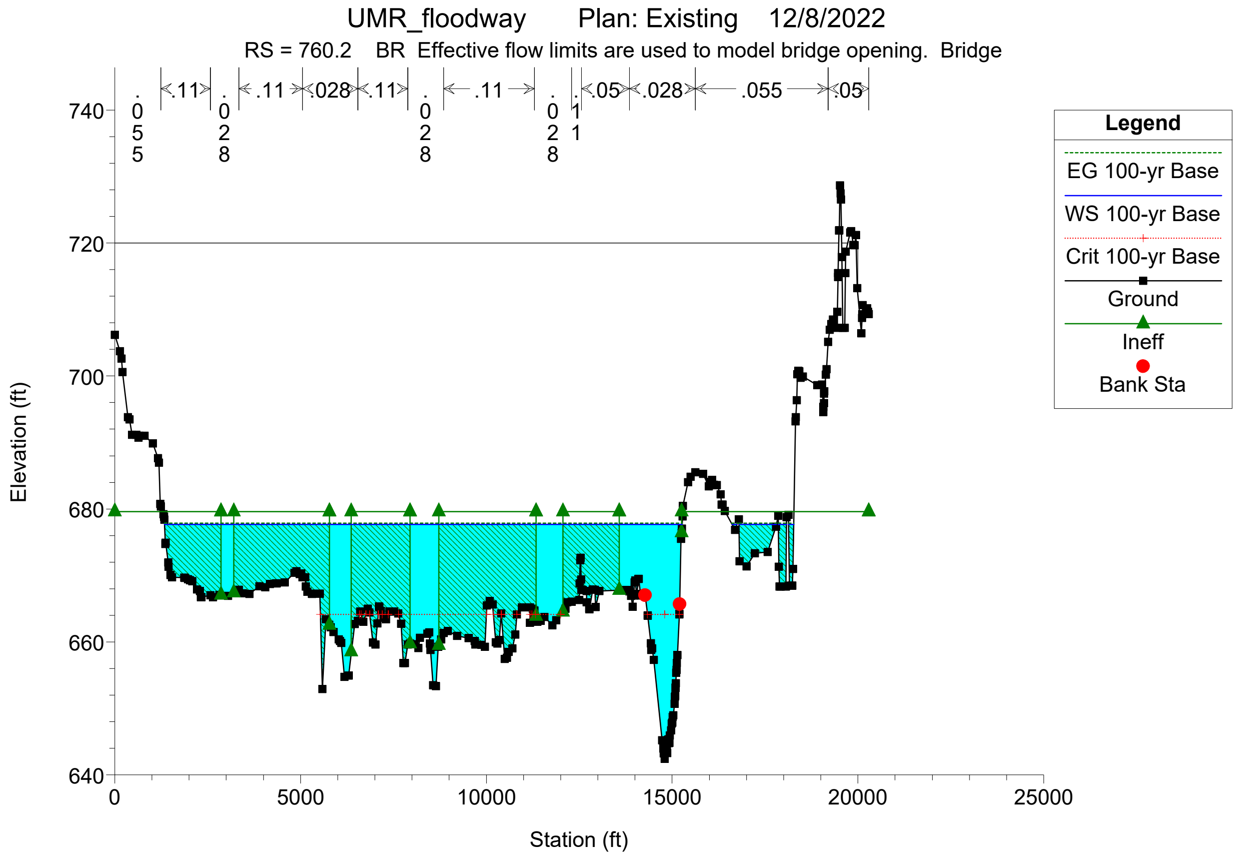
UMR_floodway Plan: Existing 12/8/2022
RS = 760.994 Channel and right overbank edited with bathy and lidar/sruvey, 2
.11
.032
.11
.045
.055
.10
.15
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)
740
720
700
680
660
640
0
5000
10000
15000
20000
25000



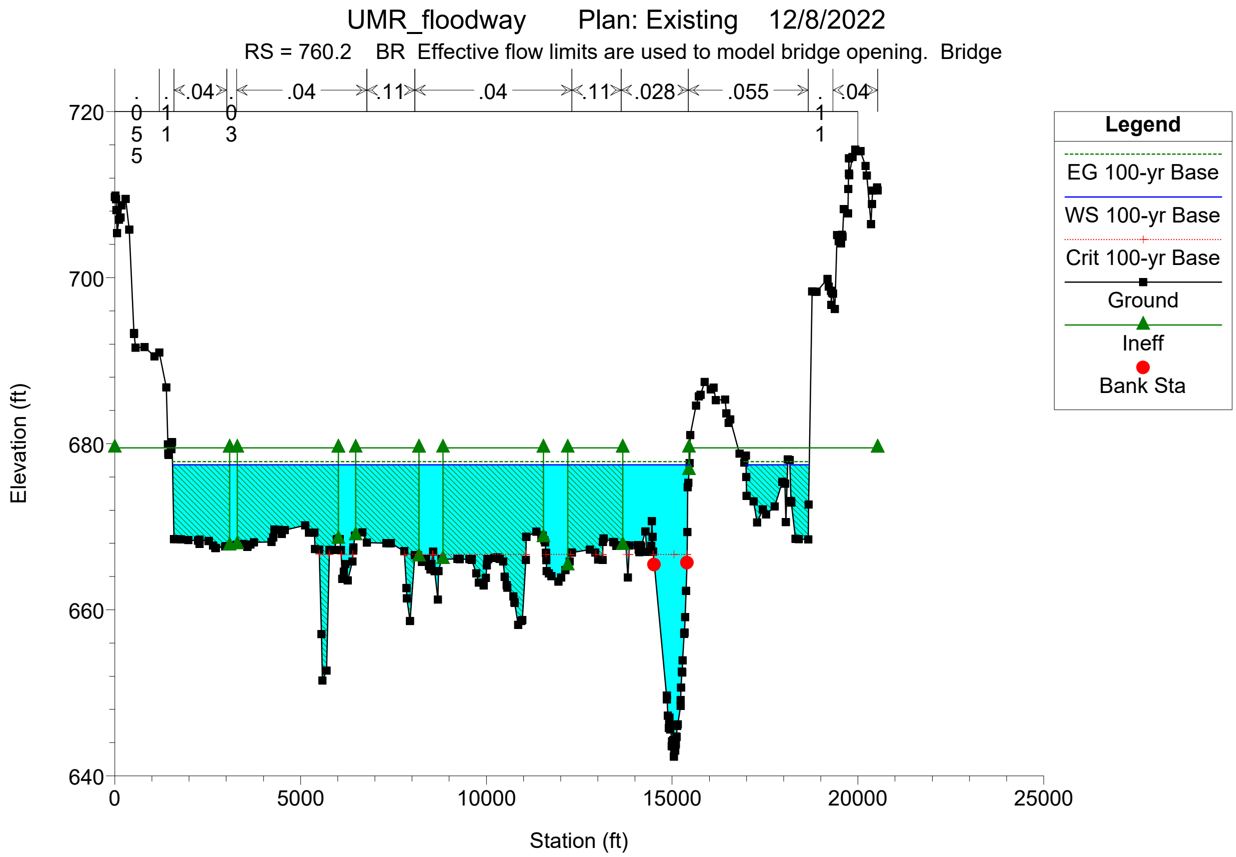
UMR_floodway Plan: Existing 12/8/2022
RS = 760.759
.045
.11
.11
.055
.11
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)
UMR_floodway Plan: Existing 12/8/2022
RS = 760.495
.11
.055
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)


UMR_floodway Plan: Existing 12/8/2022
RS = 760.400
.08
.08
.08
.11
.055
Elevation (ft)
Station (ft)
740
720
700
680
660
640
0
5000
10000
15000
20000
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

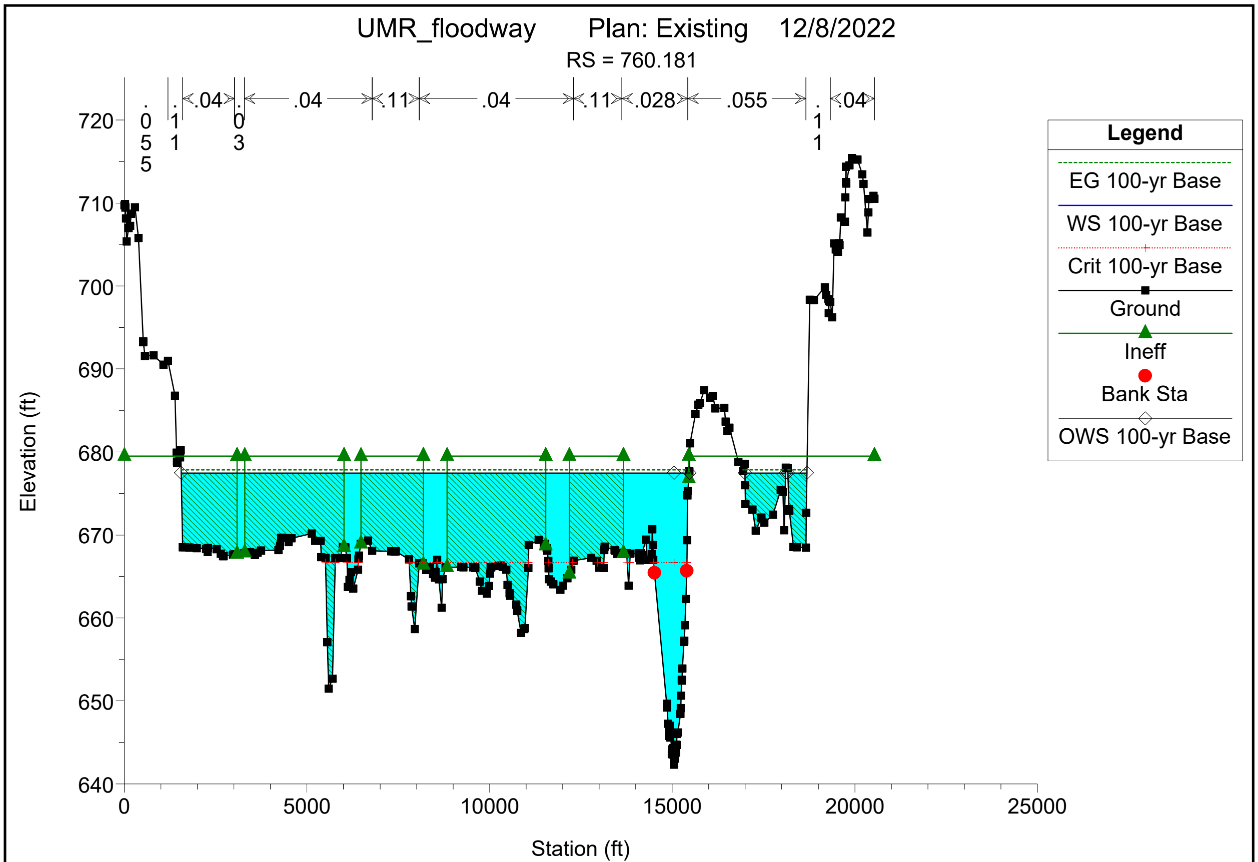

UMR_floodway Plan: Existing 12/8/2022
RS = 760.216
.11
.11
.028
.11
.11
.05
.028
.055
.05
Elevation (ft)
Station (ft)
740
720
700
680
660
640
0
5000
10000
15000
20000
25000
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base



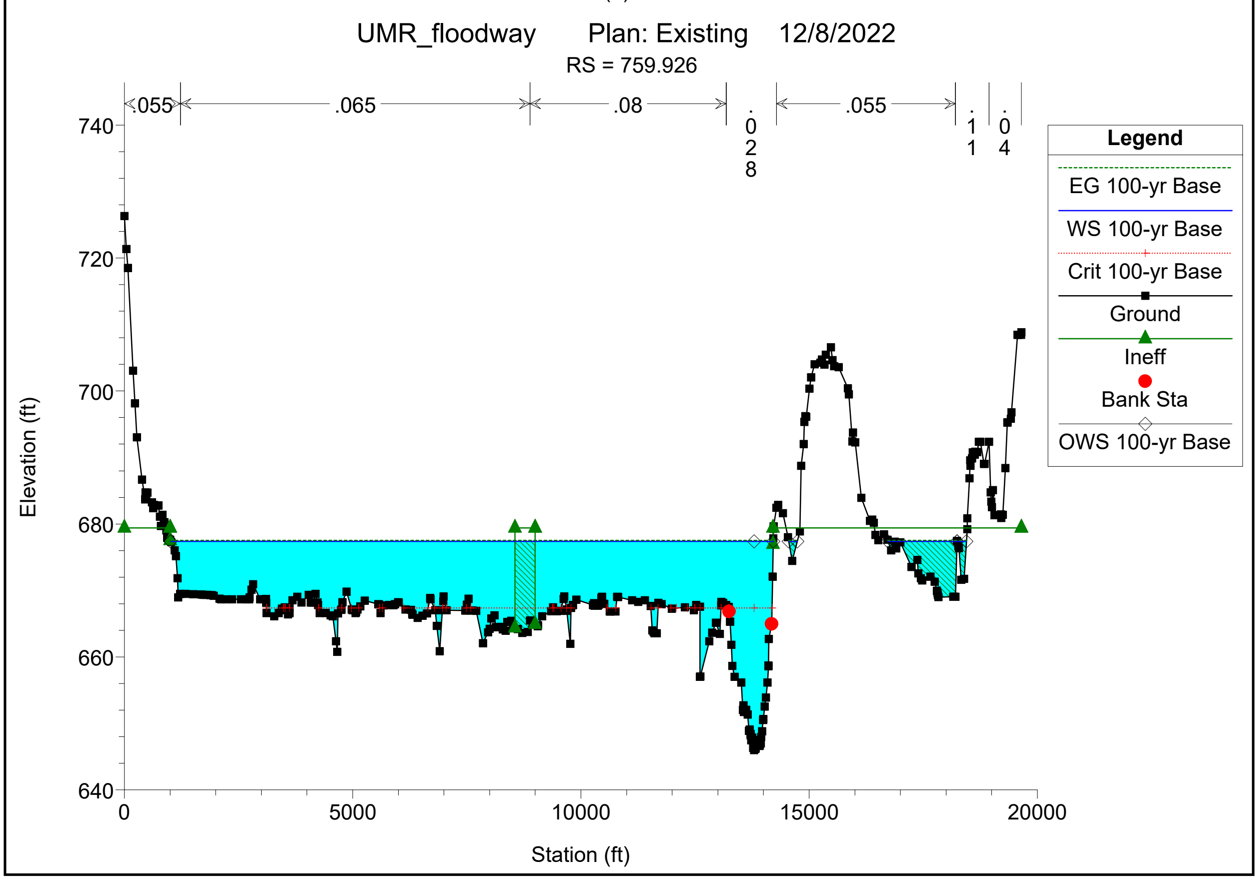
UMR_floodway Plan: Existing 12/8/2022
RS = 760.2 BR Effective flow limits are used to model bridge opening. Bridge
.11
.11
.028
.11
.11
.05
.028
.055
.05
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)



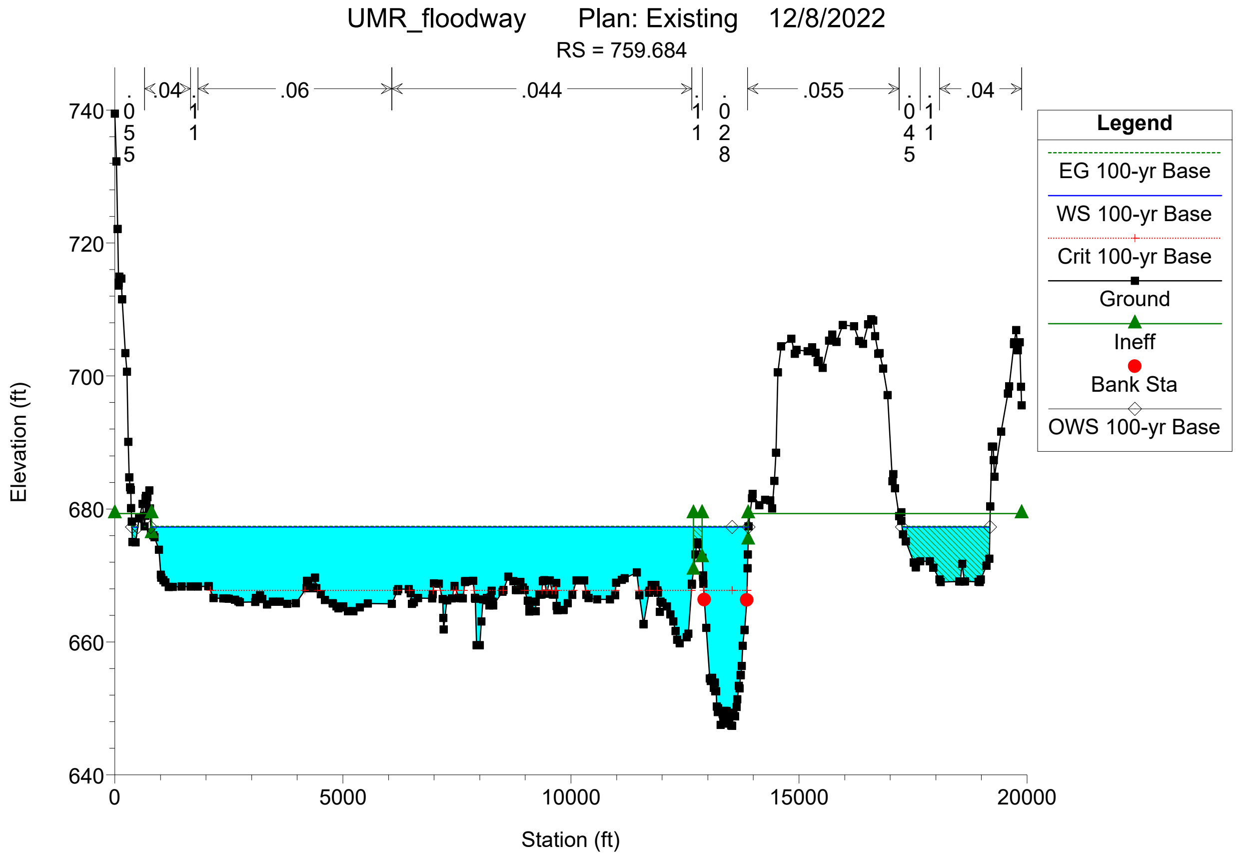
UMR_floodway Plan: Existing 12/8/2022
RS = 760.2 BR Effective flow limits are used to model bridge opening. Bridge
.04
.04
.11
.04
.11
.028
.055
.04
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)



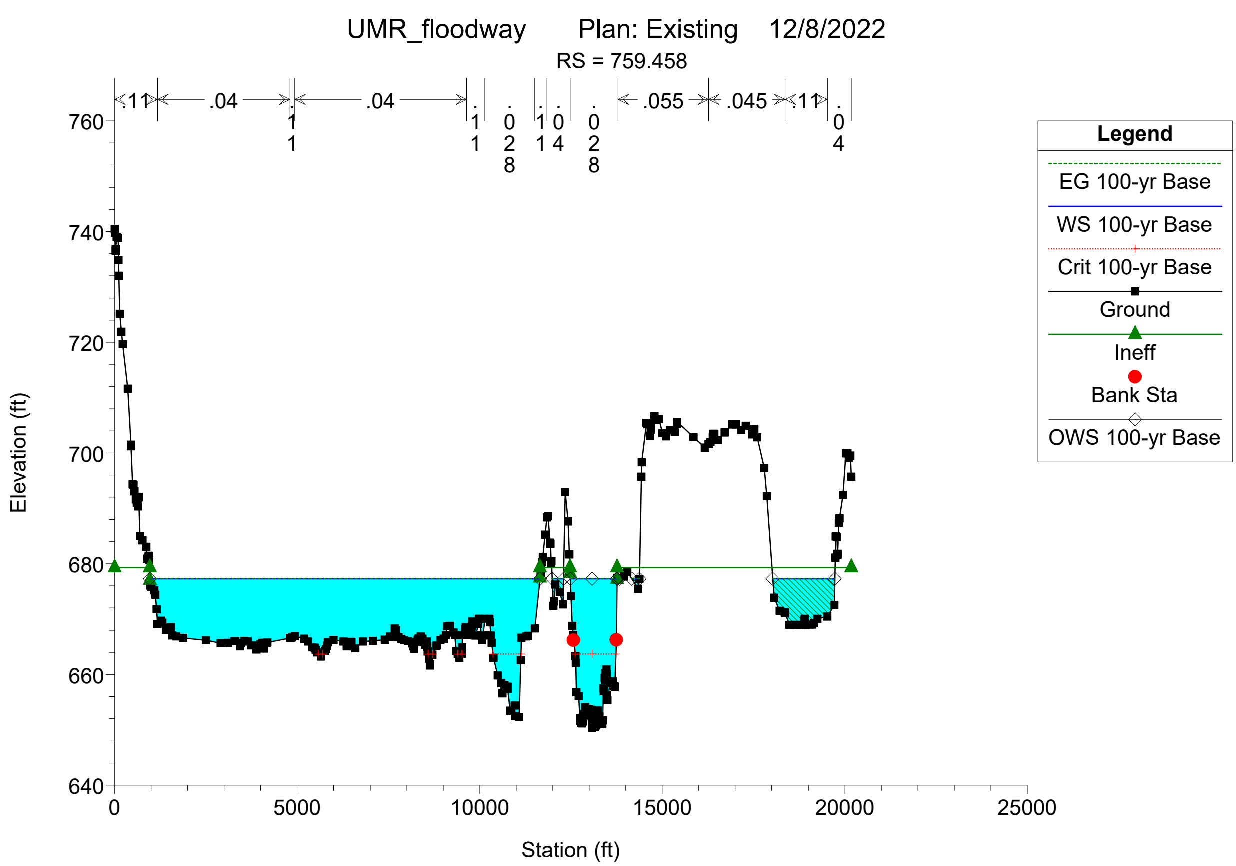
UMR_floodway Plan: Existing 12/8/2022
RS = 760.181
.04
.04
.11
.04
.11
.028
.055
.04
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base



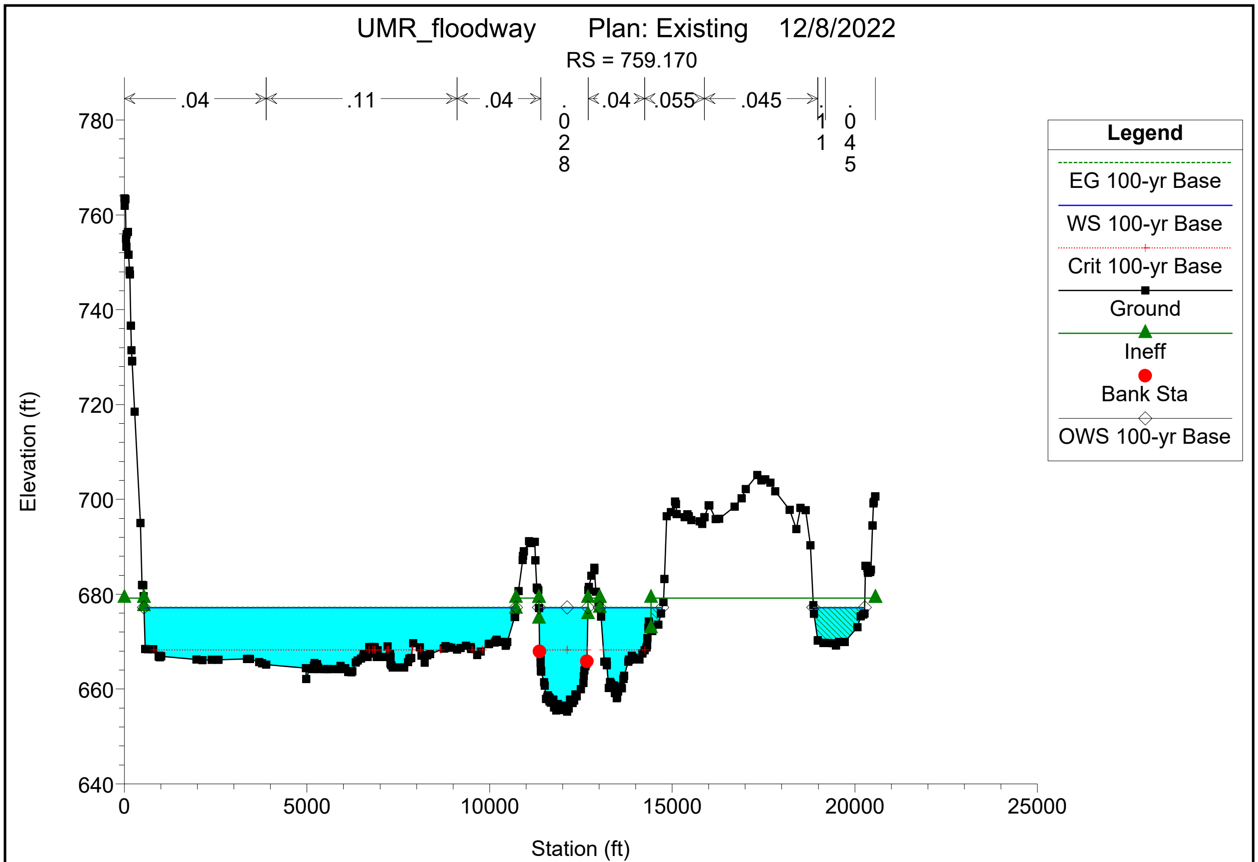
UMR_floodway Plan: Existing 12/8/2022
RS = 759.926
.055
.065
.08
.055
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

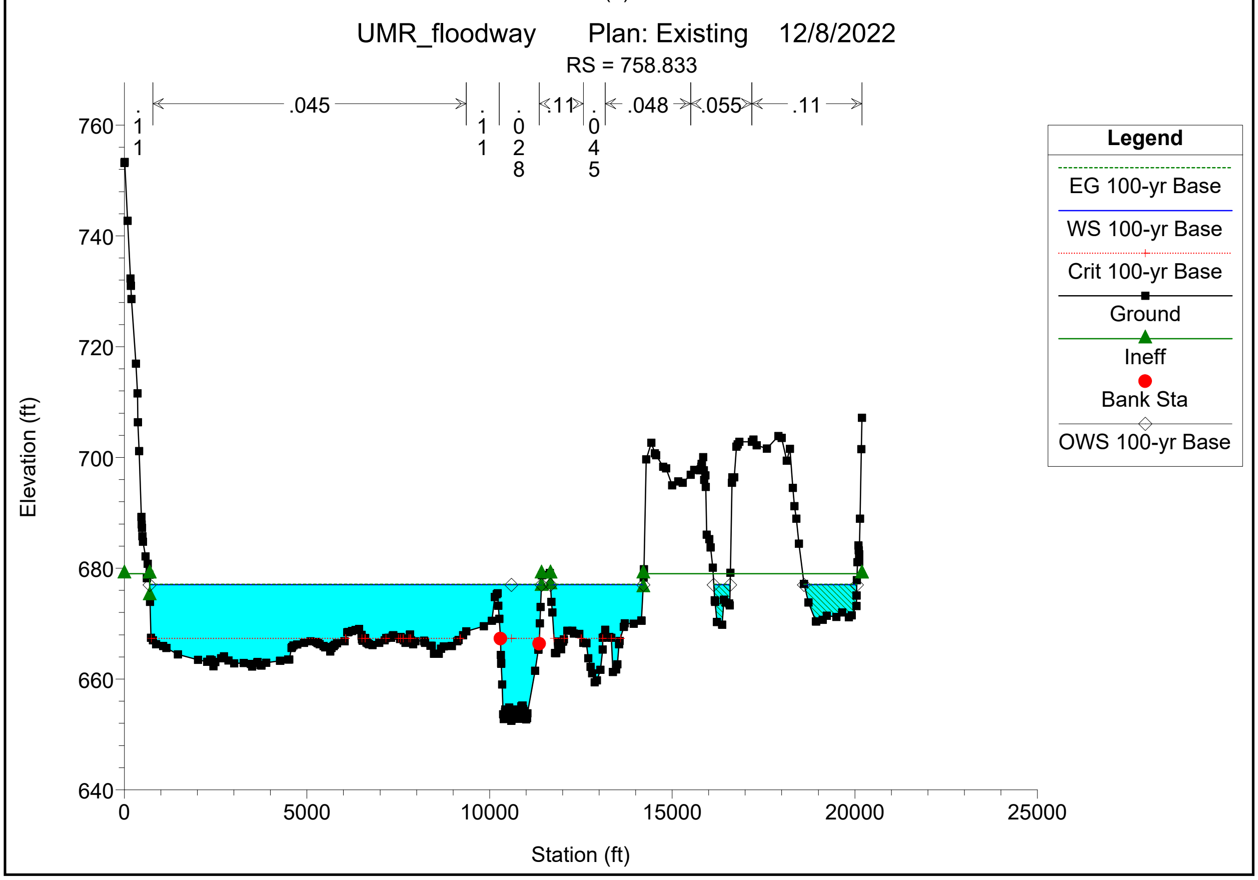


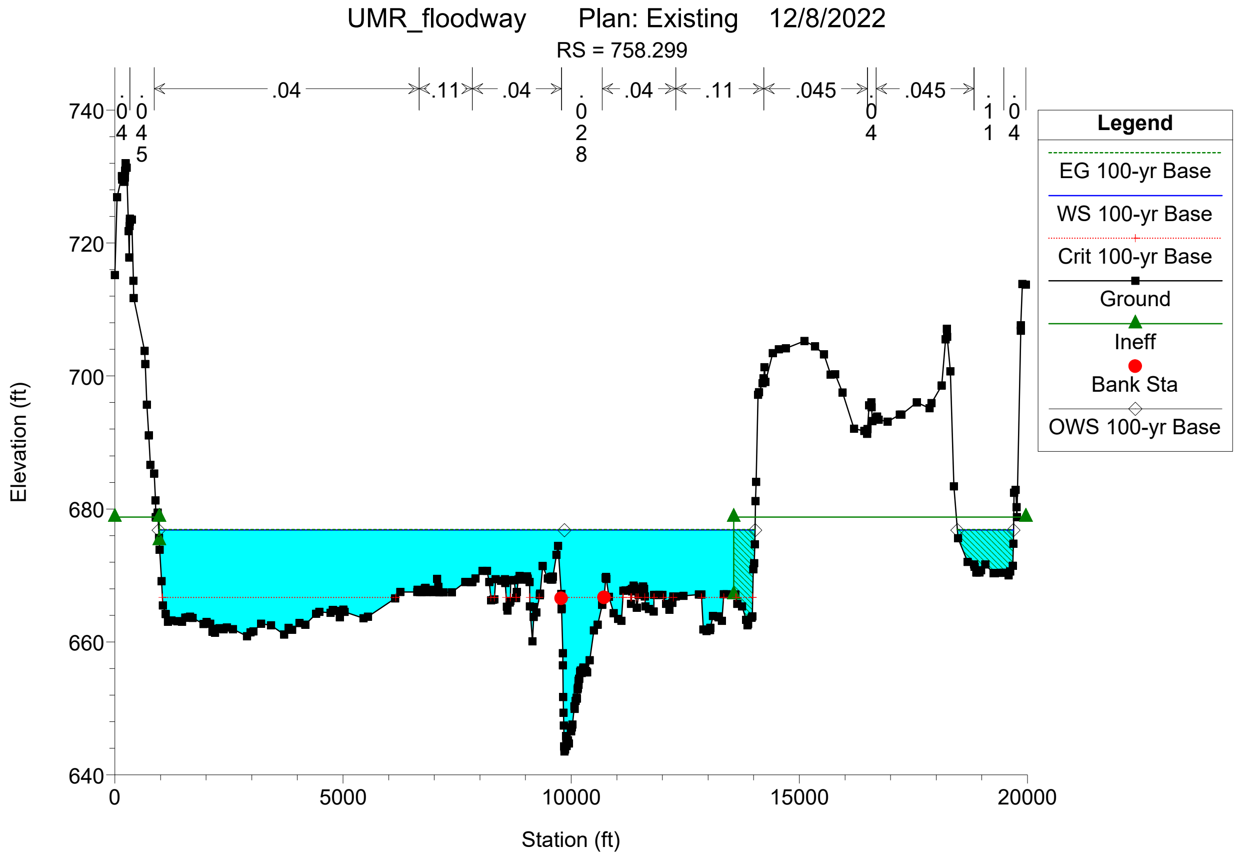
UMR_floodway Plan: Existing 12/8/2022
RS = 759.684
.04
.06
.044
.055
.04
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

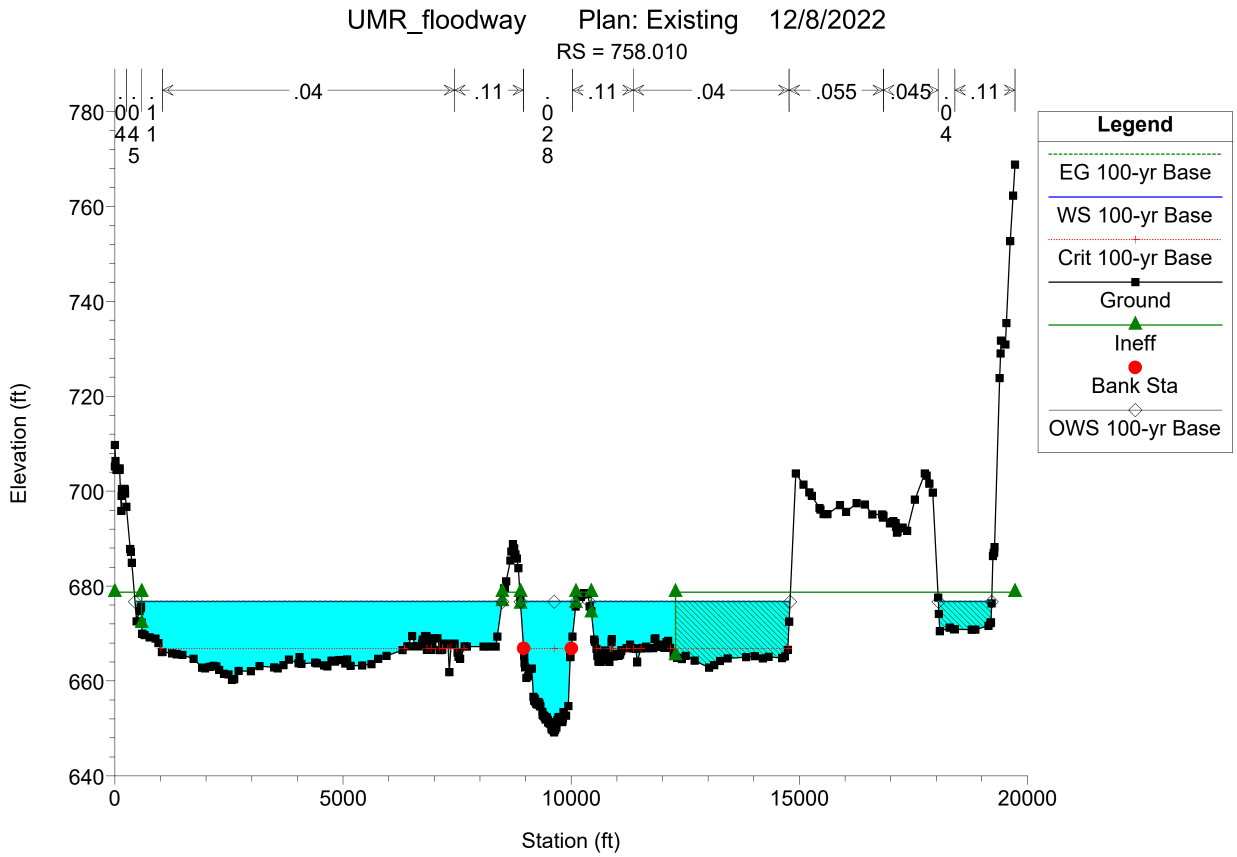


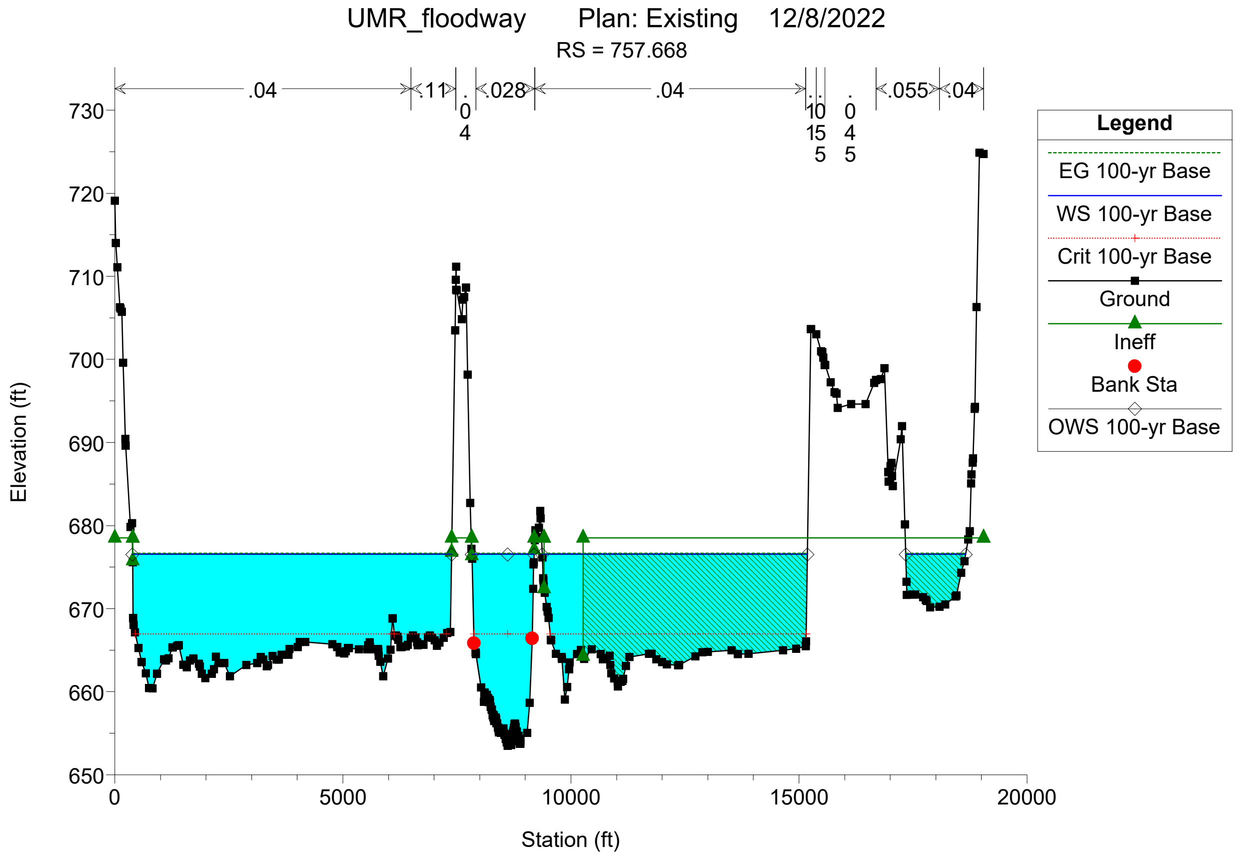
UMR_floodway Plan: Existing 12/8/2022
RS = 759.458
.04
.04
.055
.045
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

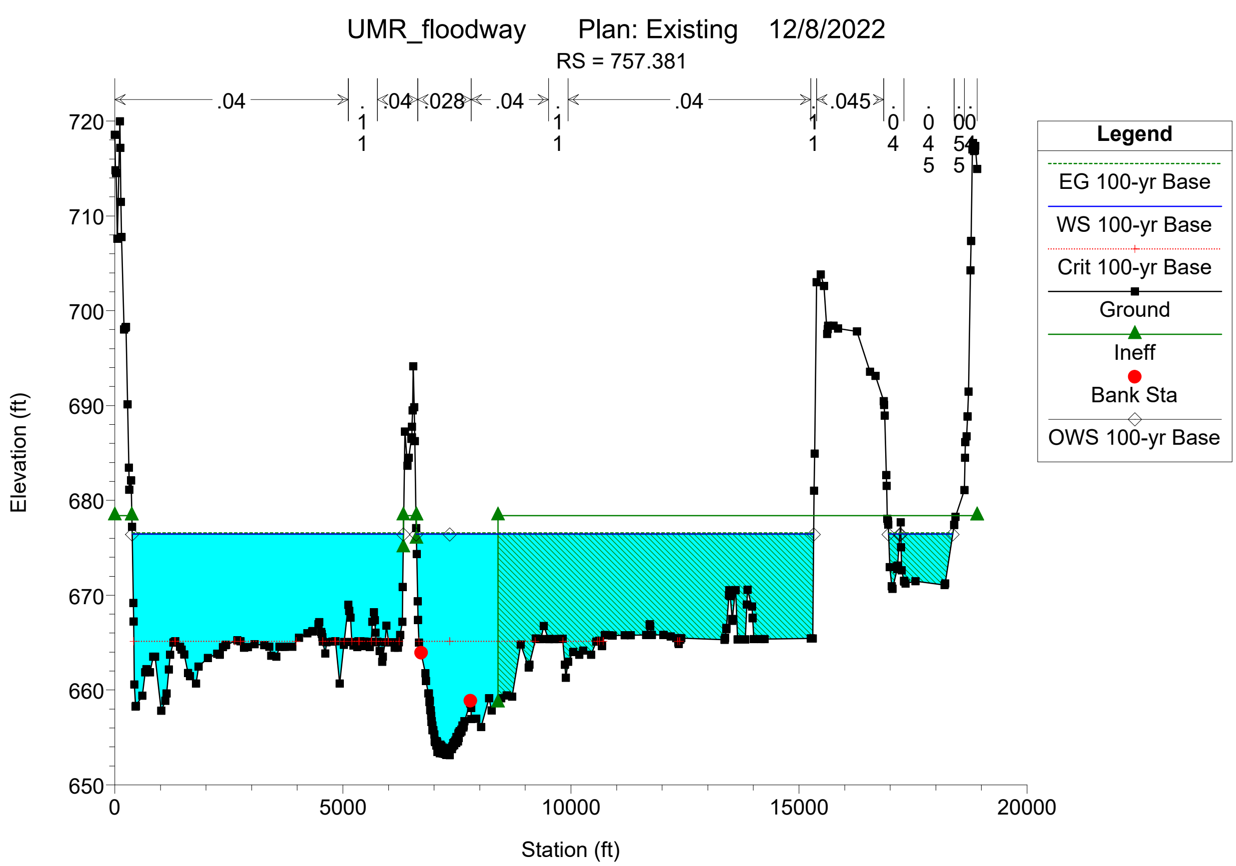

UMR_floodway Plan: Existing 12/8/2022
RS = 759.170
.04
.11
.04
.028
.04
.055
.045
.11
.045
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

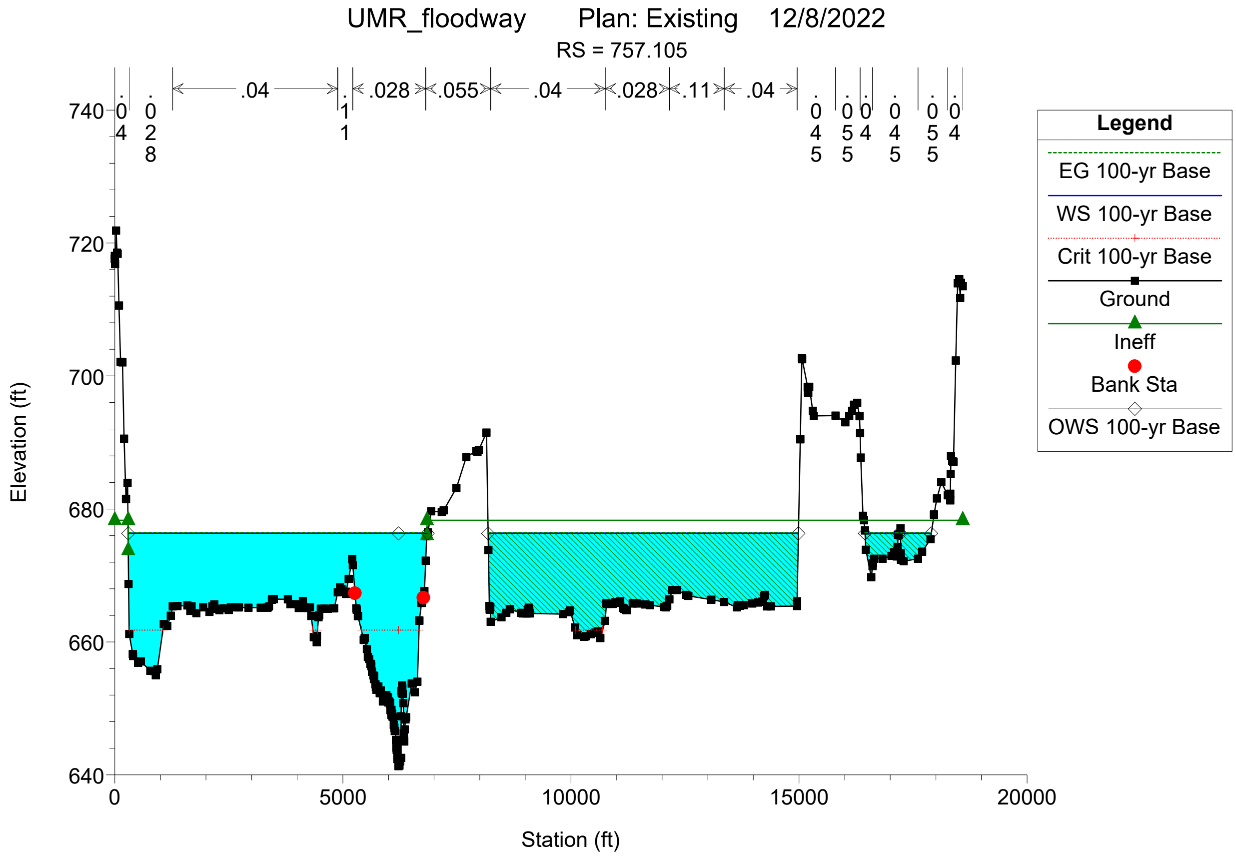

UMR_floodway Plan: Existing 12/8/2022
RS = 758.833
.11
.045
.11
.028
.11
.045
.048
.055
.11
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

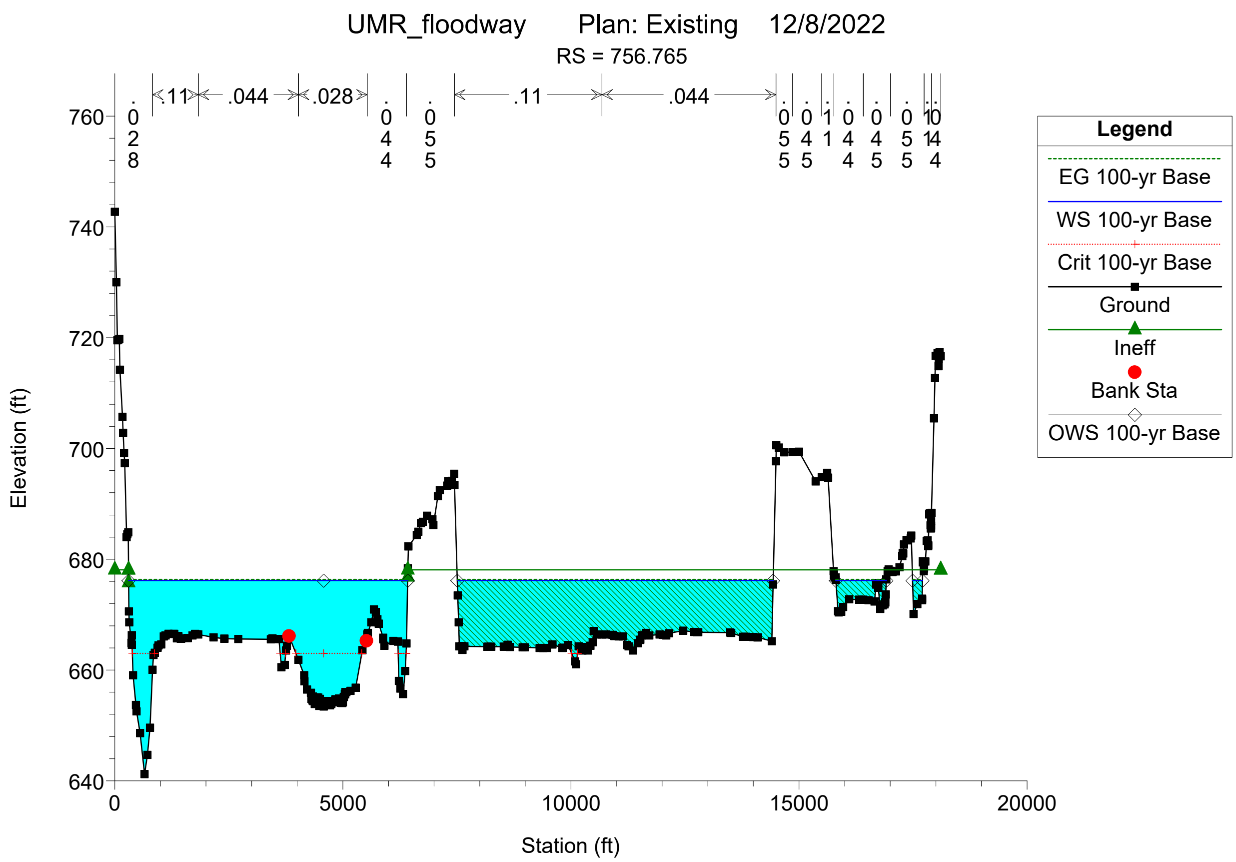

UMR_floodway Plan: Existing 12/8/2022
RS = 758.299
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

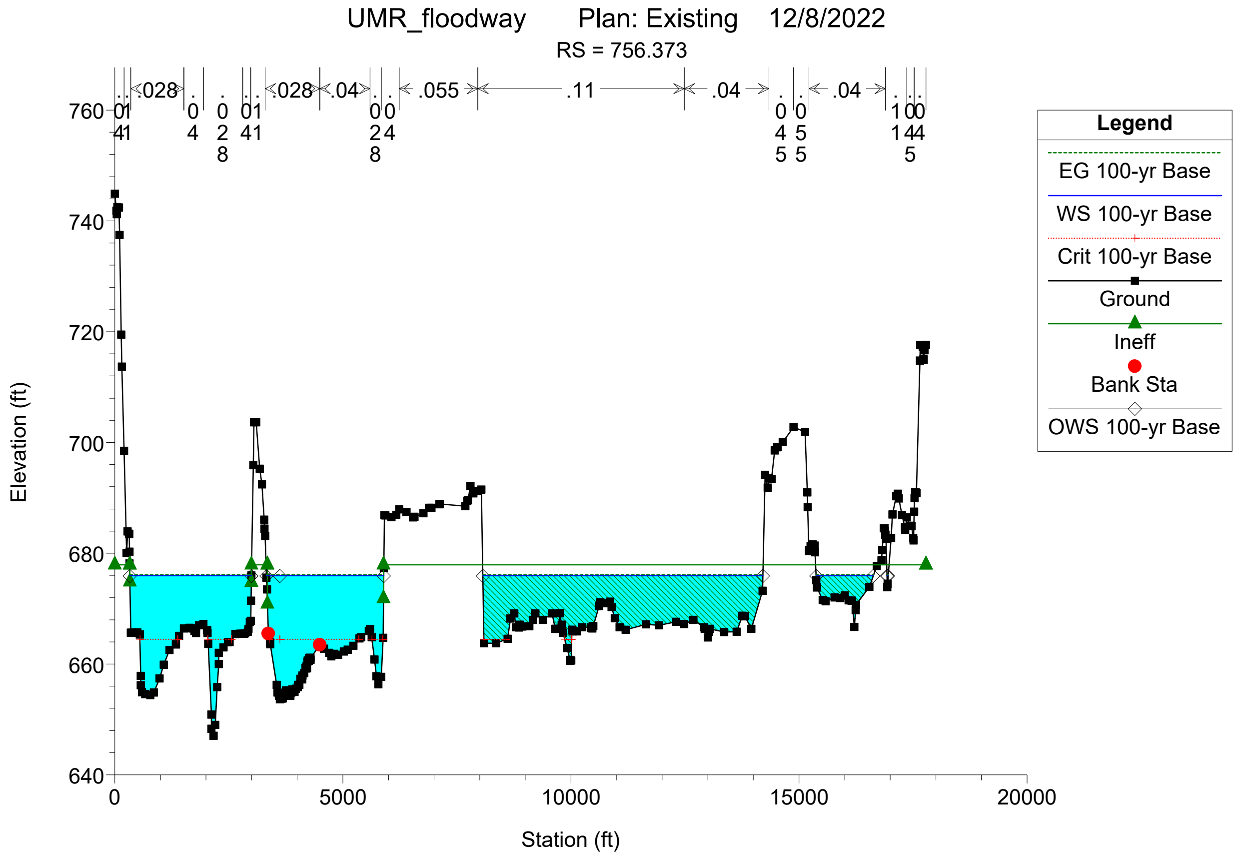

UMR_floodway Plan: Existing 12/8/2022
RS = 758.010
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)


UMR_floodway Plan: Existing 12/8/2022
RS = 757.668
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

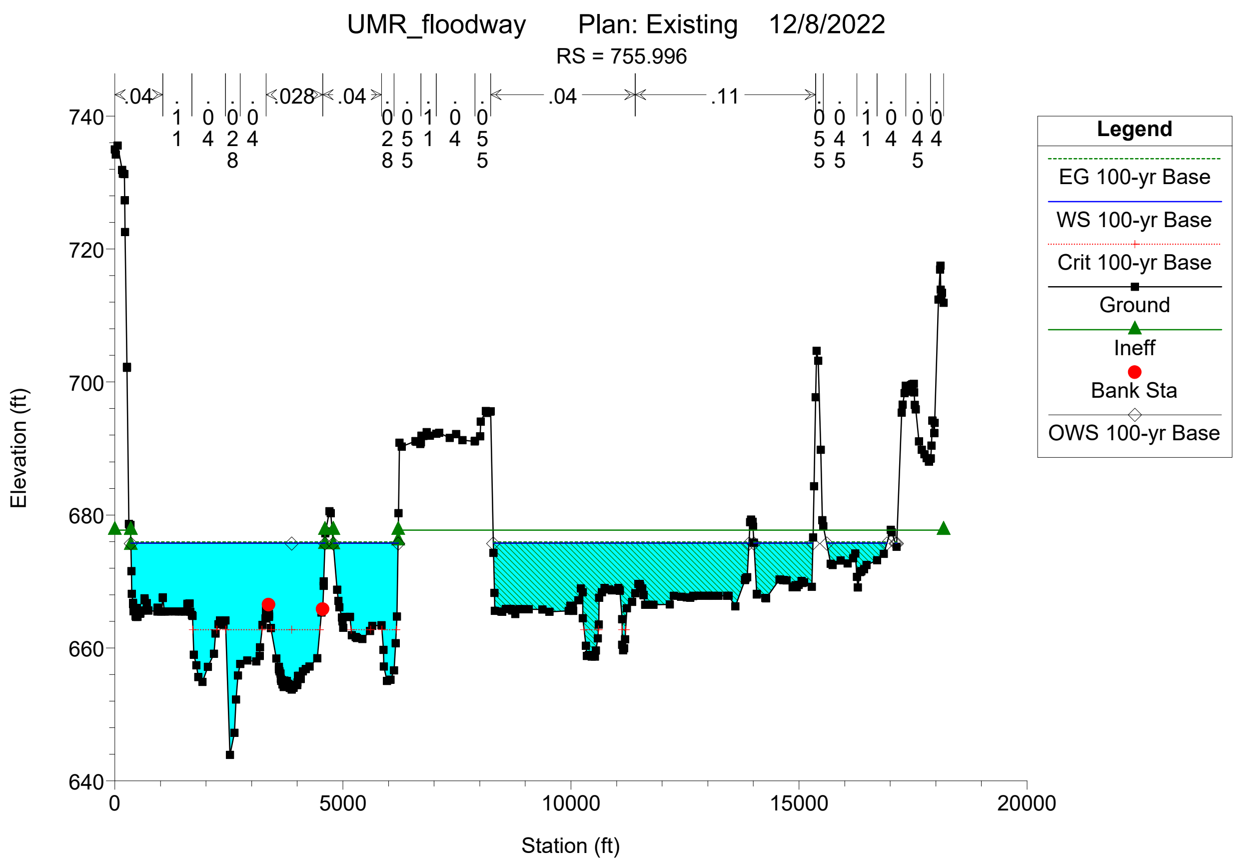

UMR_floodway Plan: Existing 12/8/2022
RS = 757.381
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)


UMR_floodway Plan: Existing 12/8/2022
RS = 757.105
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

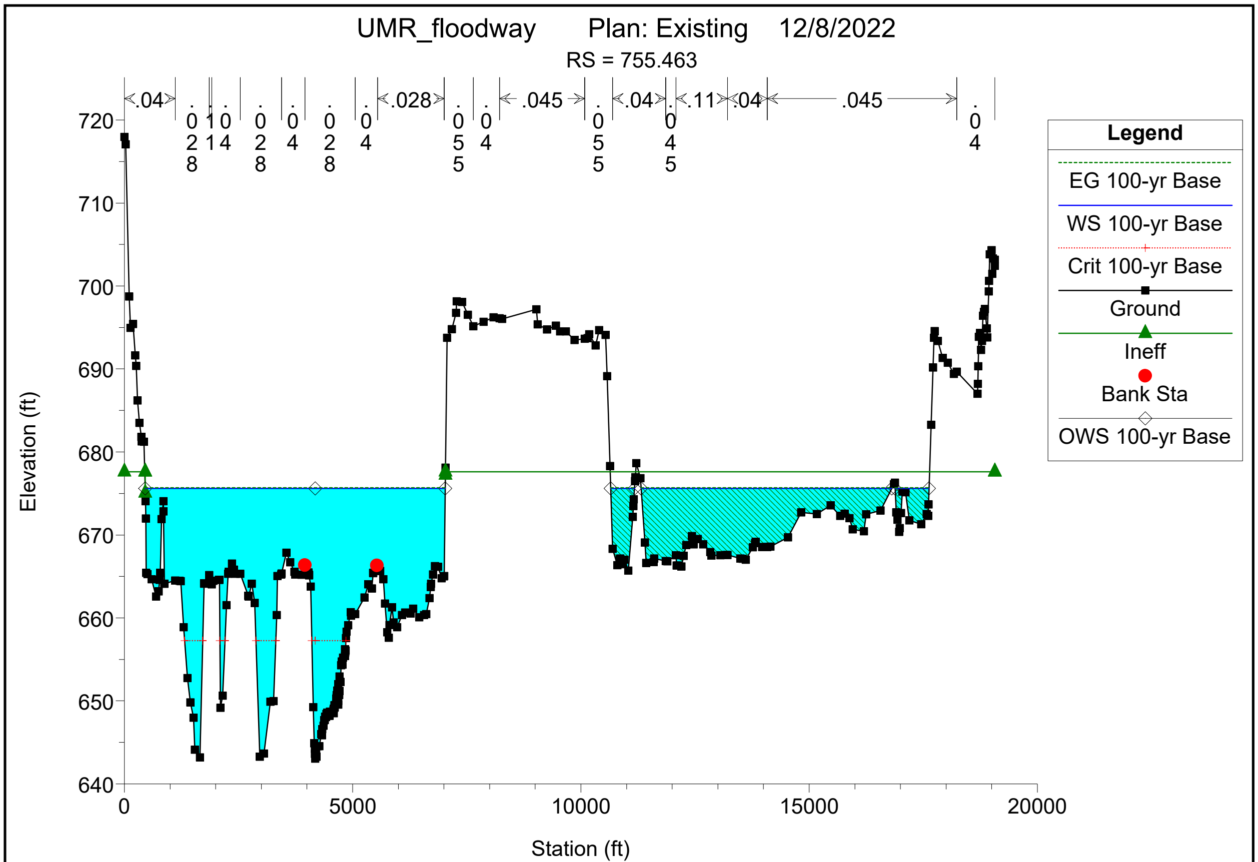

UMR_floodway Plan: Existing 12/8/2022
RS = 756.765
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

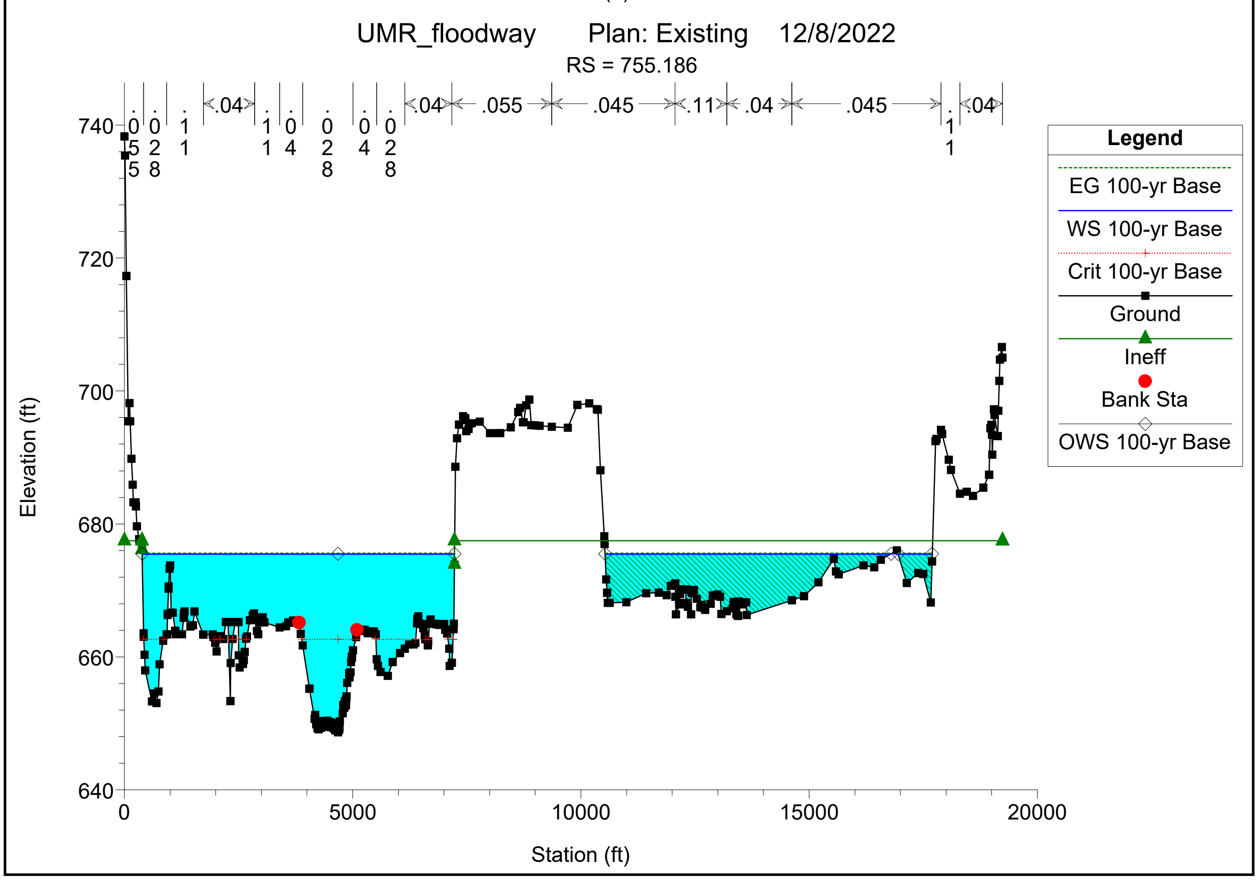


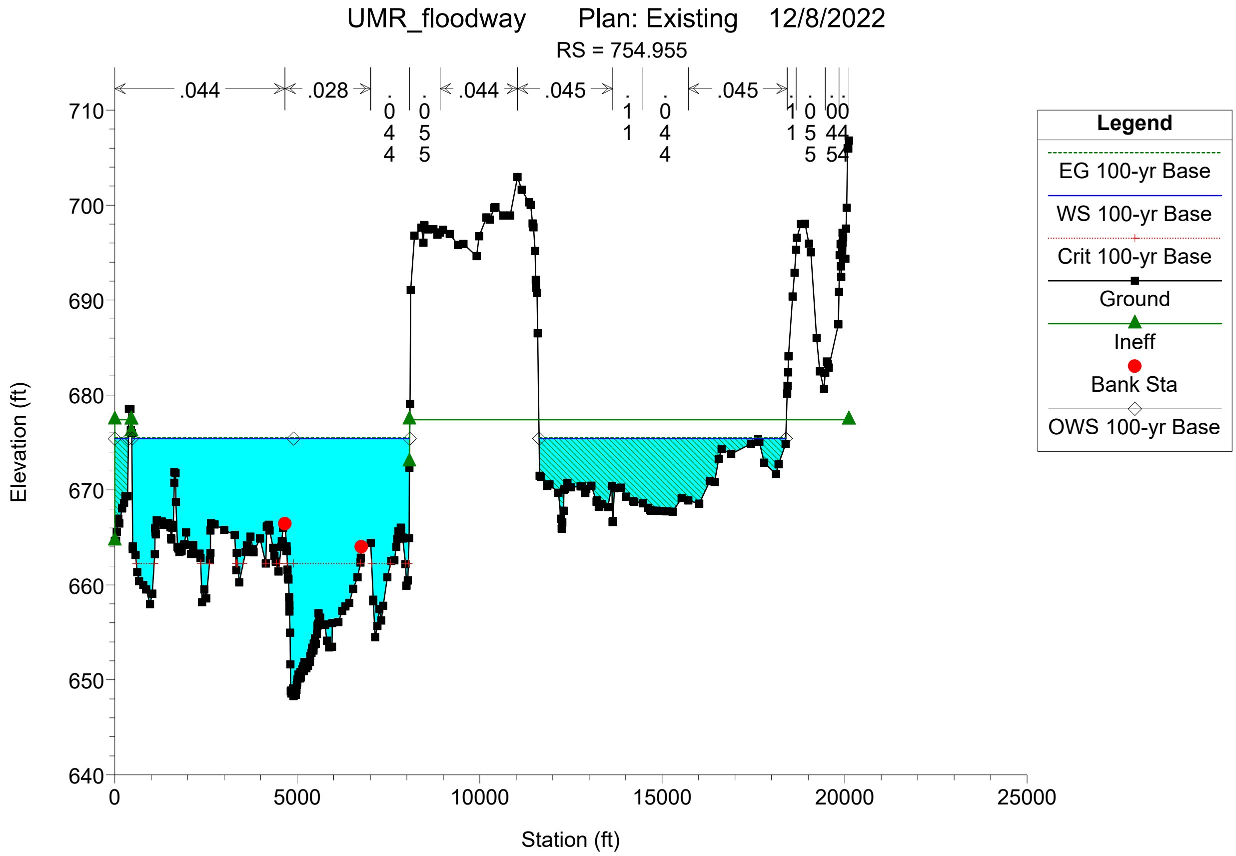
UMR_floodway Plan: Existing 12/8/2022
RS = 756.373
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

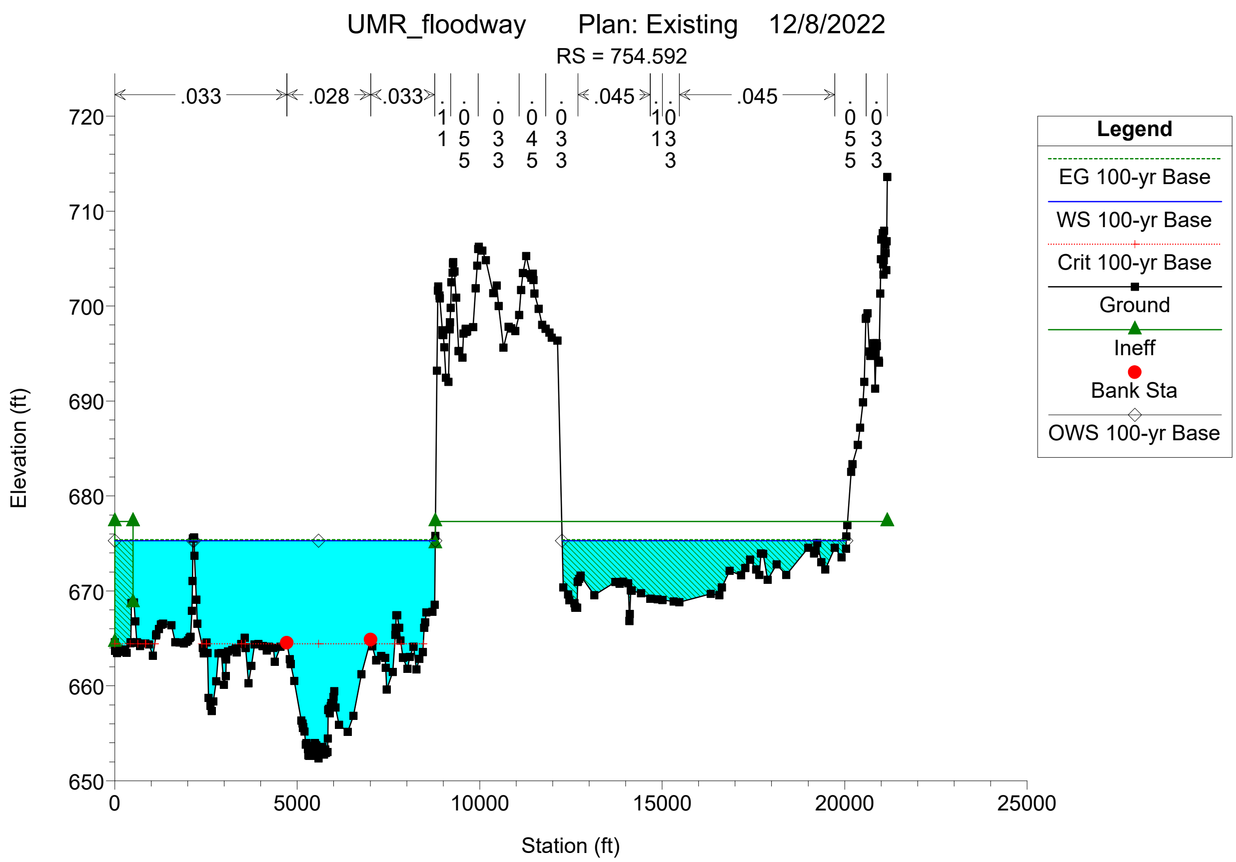


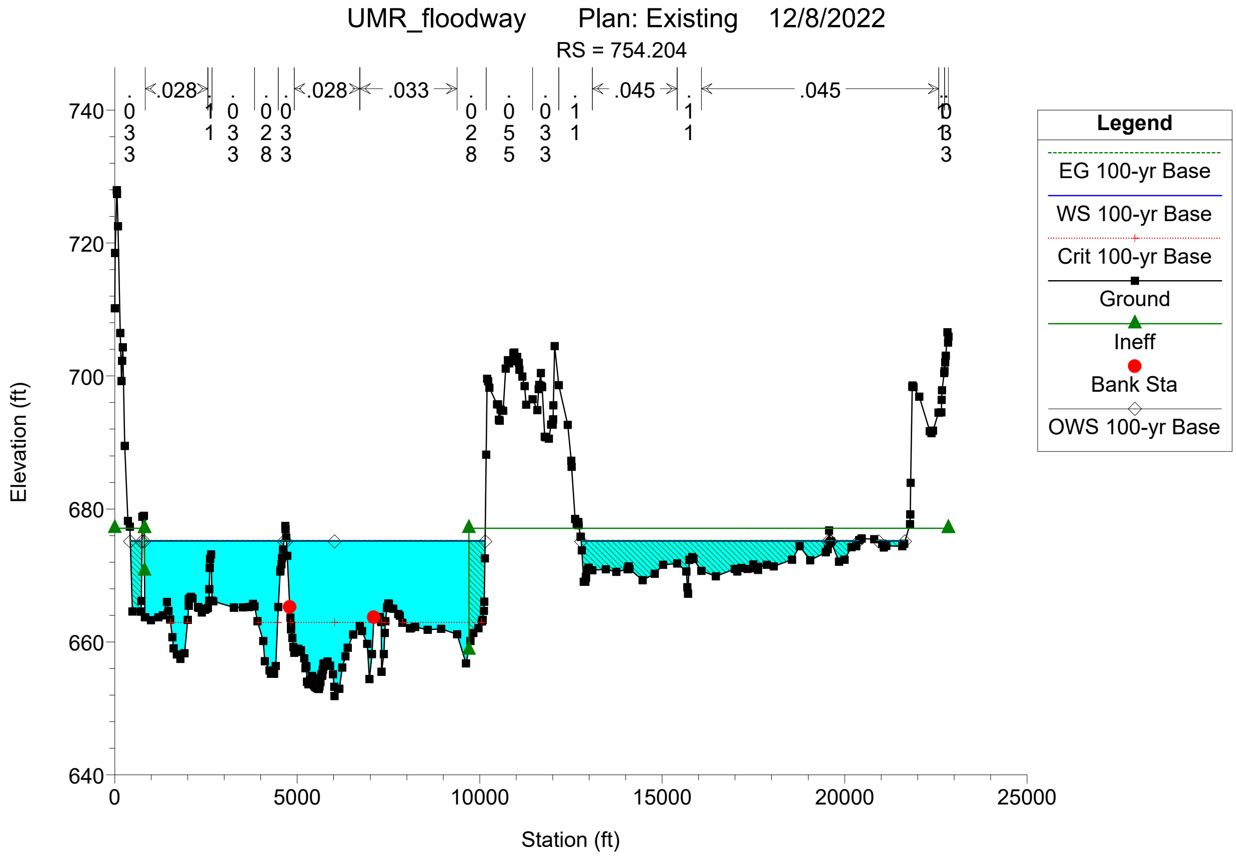
UMR_floodway Plan: Existing 12/8/2022
RS = 755.996
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base


UMR_floodway Plan: Existing 12/8/2022
RS = 755.463
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

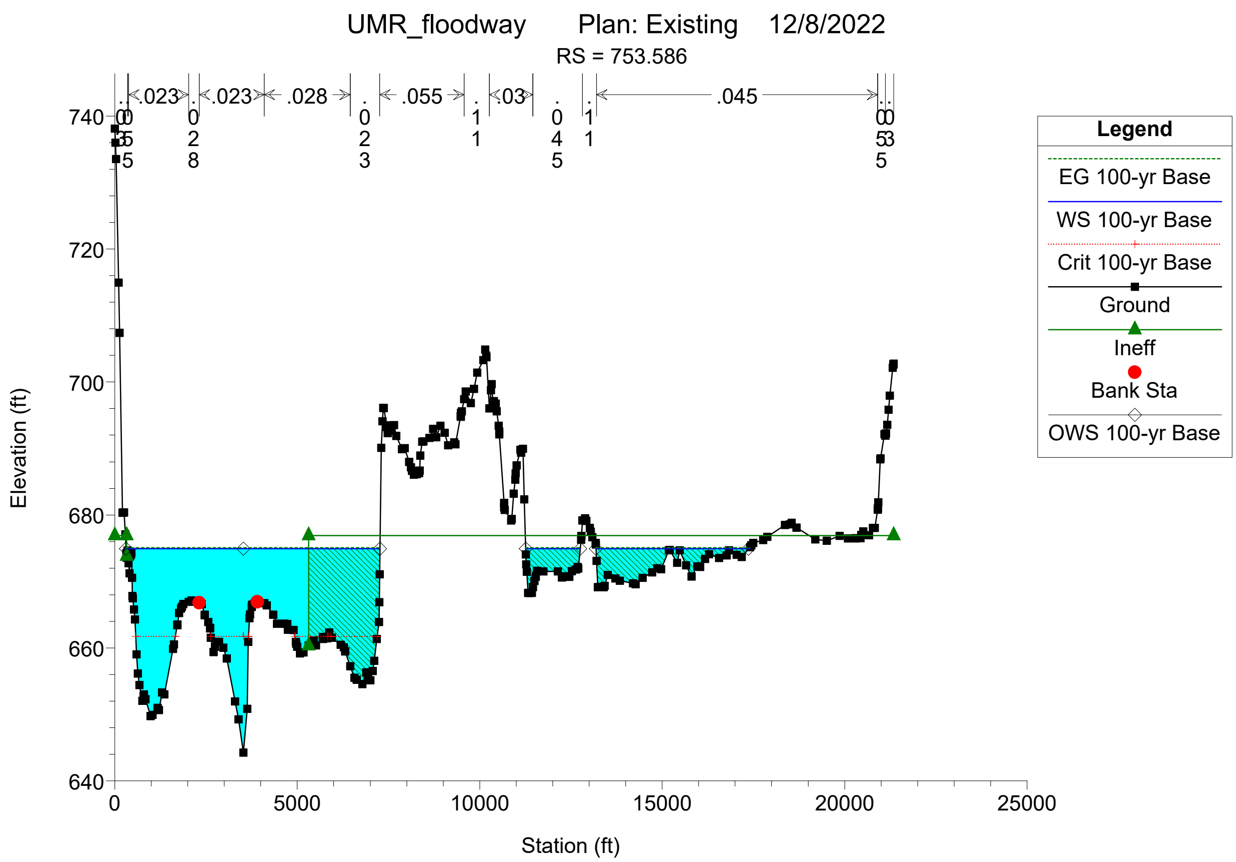

UMR_floodway Plan: Existing 12/8/2022
RS = 755.186
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)


UMR_floodway Plan: Existing 12/8/2022
RS = 754.955
.044
.028
.044
.045
.045
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

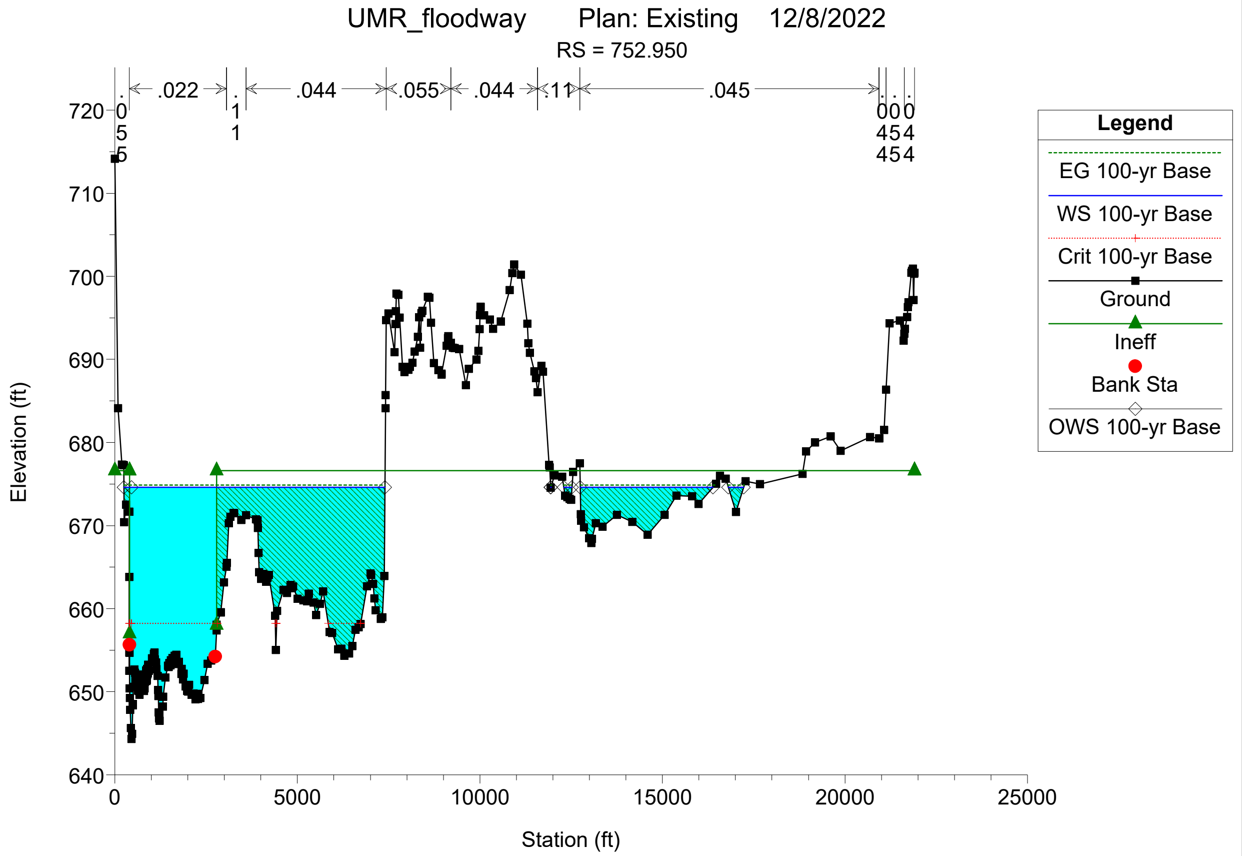

UMR_floodway Plan: Existing 12/8/2022
RS = 754.592
.033
.028
.033
.045
.045
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

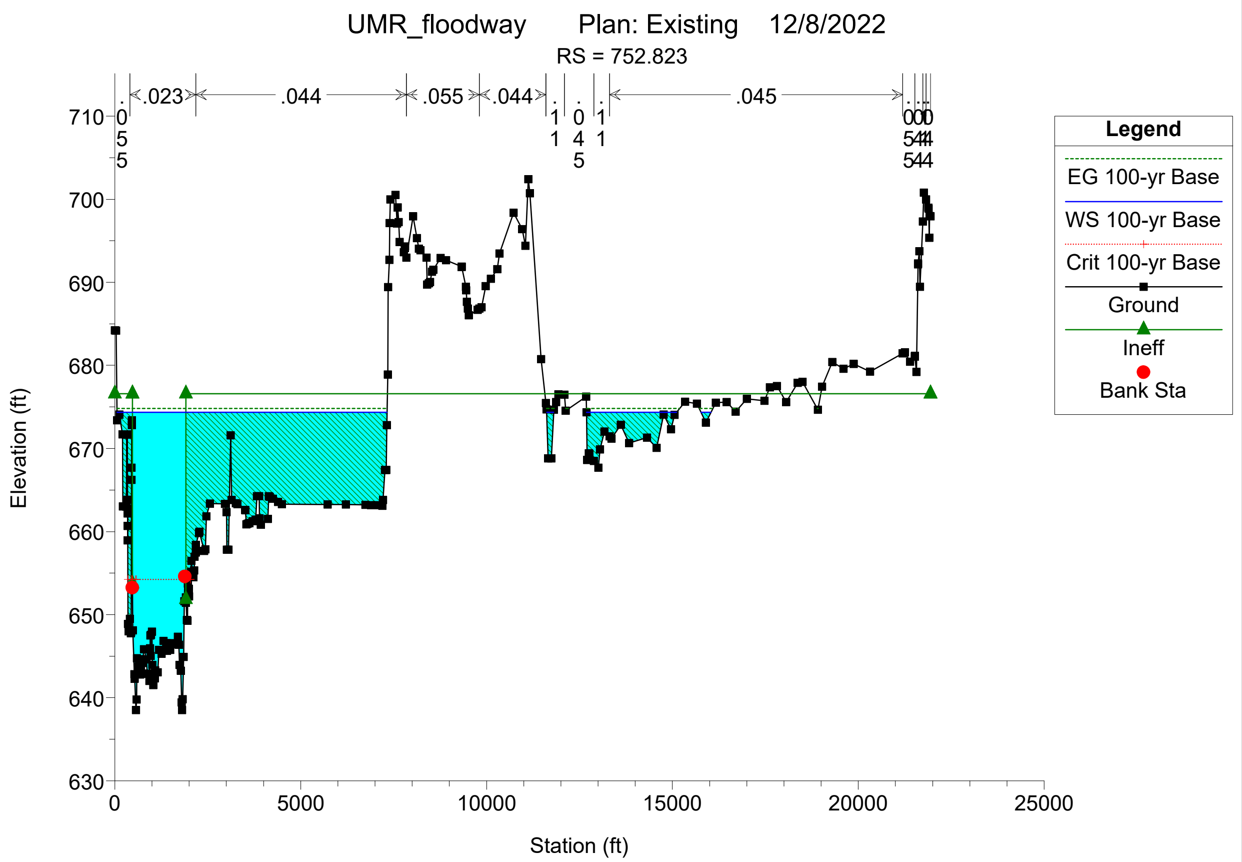


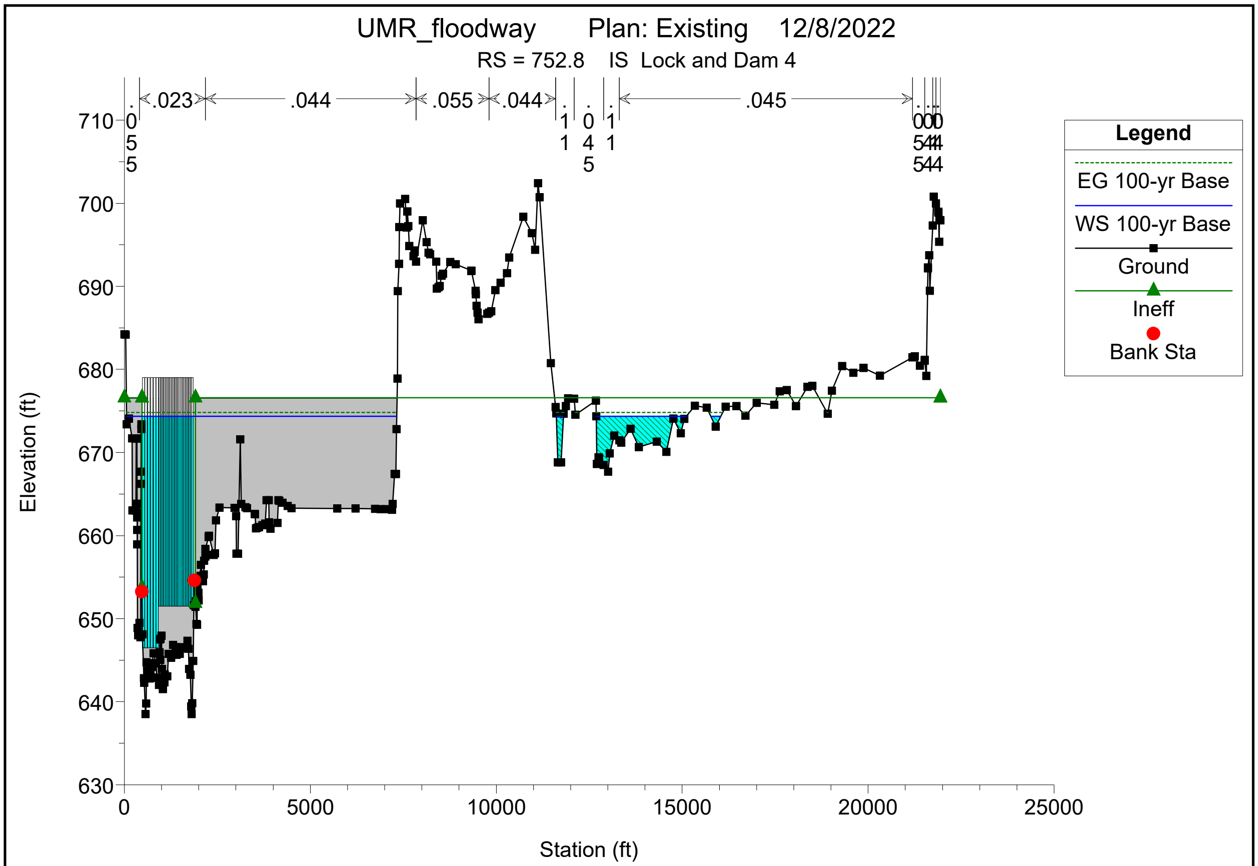
UMR_floodway Plan: Existing 12/8/2022
RS = 754.204
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base



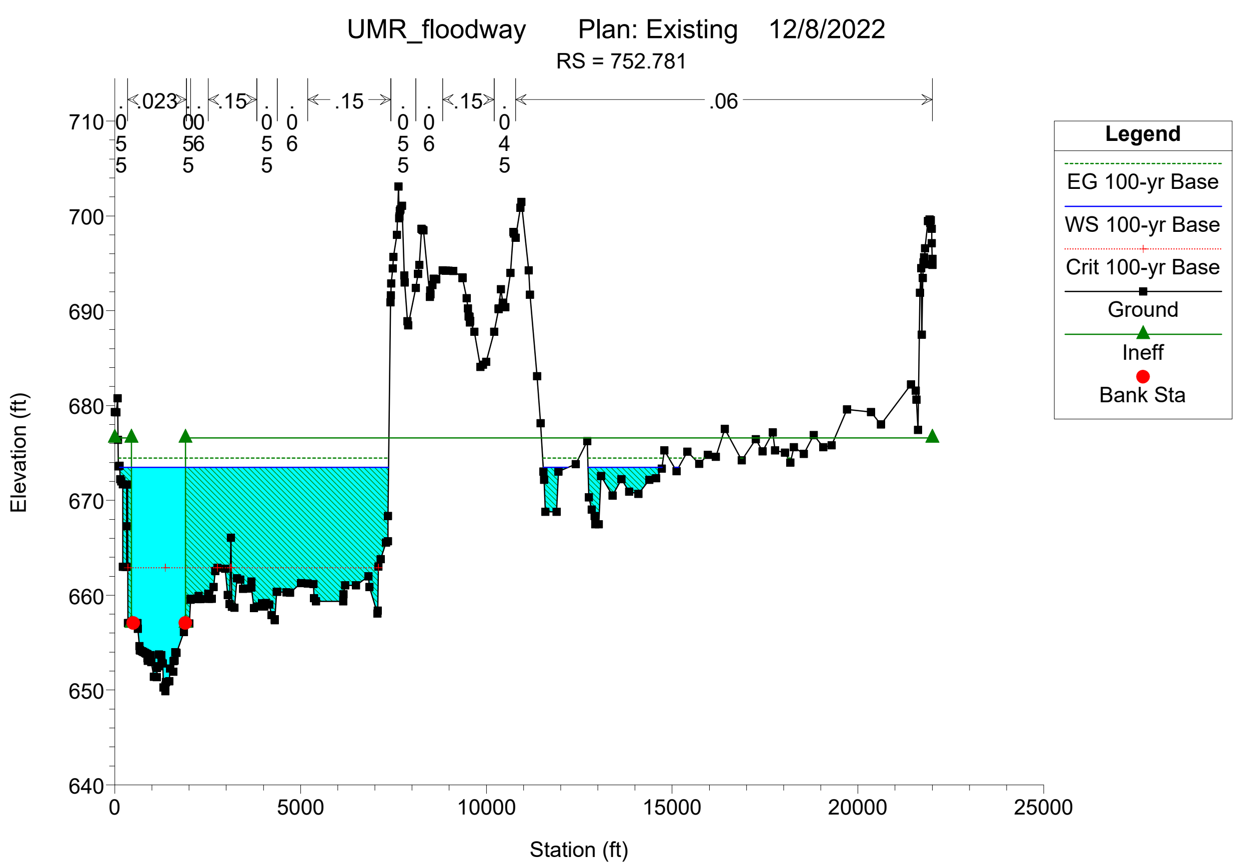
UMR_floodway Plan: Existing 12/8/2022
RS = 753.586
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base


UMR_floodway Plan: Existing 12/8/2022
RS = 752.950
.022
.044
.055
.044
.11
.045
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

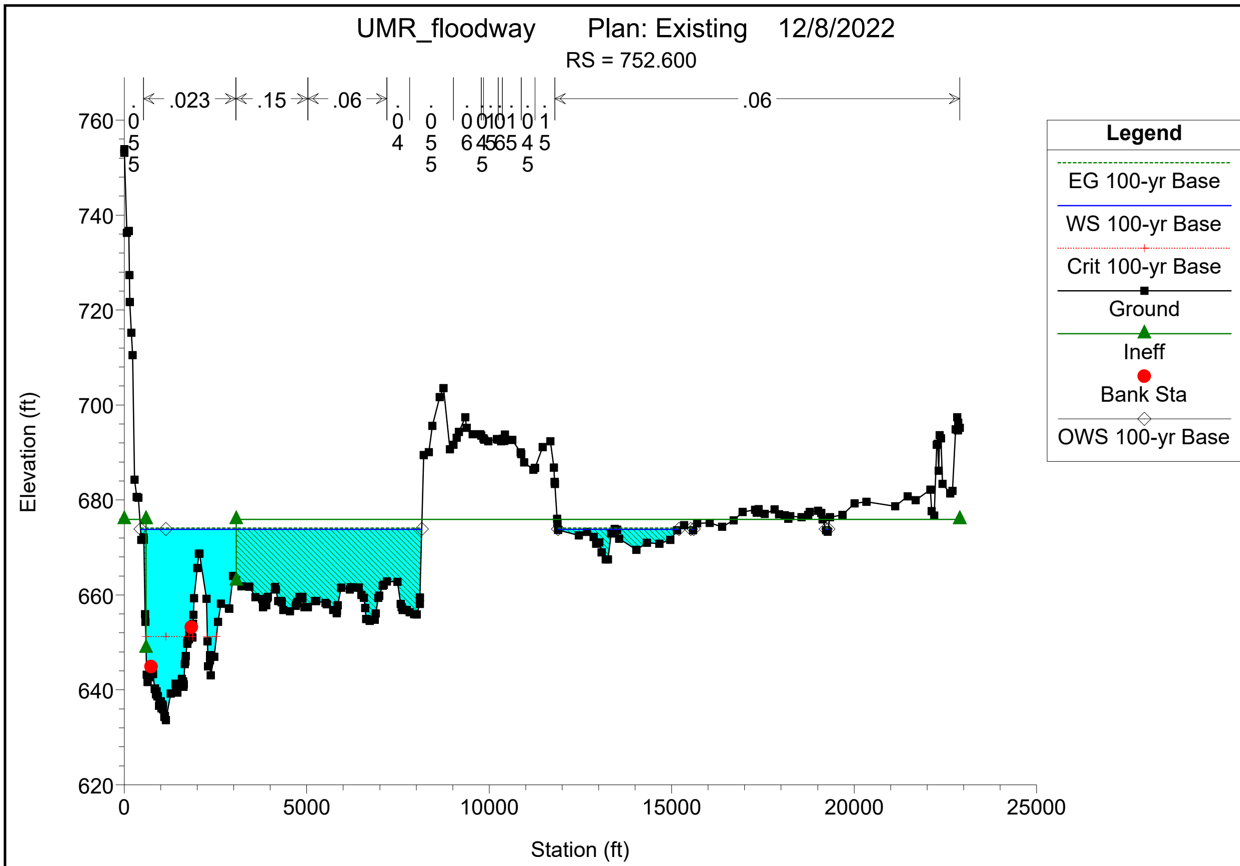

UMR_floodway Plan: Existing 12/8/2022
RS = 752.823
.023
.044
.055
.044
.045
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta

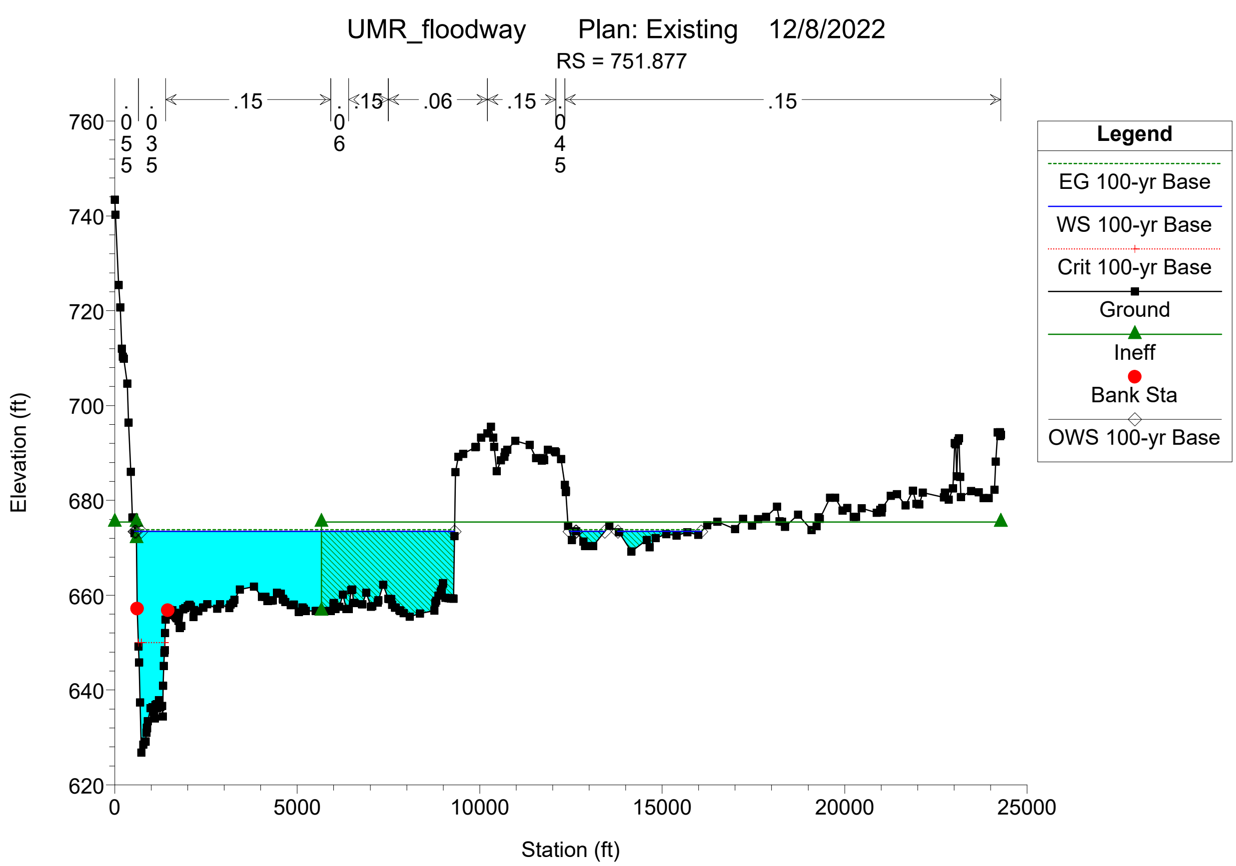


UMR_floodway Plan: Existing 12/8/2022
RS = 752.8 IS Lock and Dam 4
.023
.044
.055
.044
.045
Legend
EG 100-yr Base
WS 100-yr Base
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)



UMR_floodway Plan: Existing 12/8/2022
RS = 752.781
.023
.15
.15
.15
.06
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


UMR_floodway Plan: Existing 12/8/2022
RS = 752.600
.023
.15
.06
.06
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)


UMR_floodway Plan: Existing 12/8/2022
RS = 751.877
.15
.15
.06
.15
.15
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

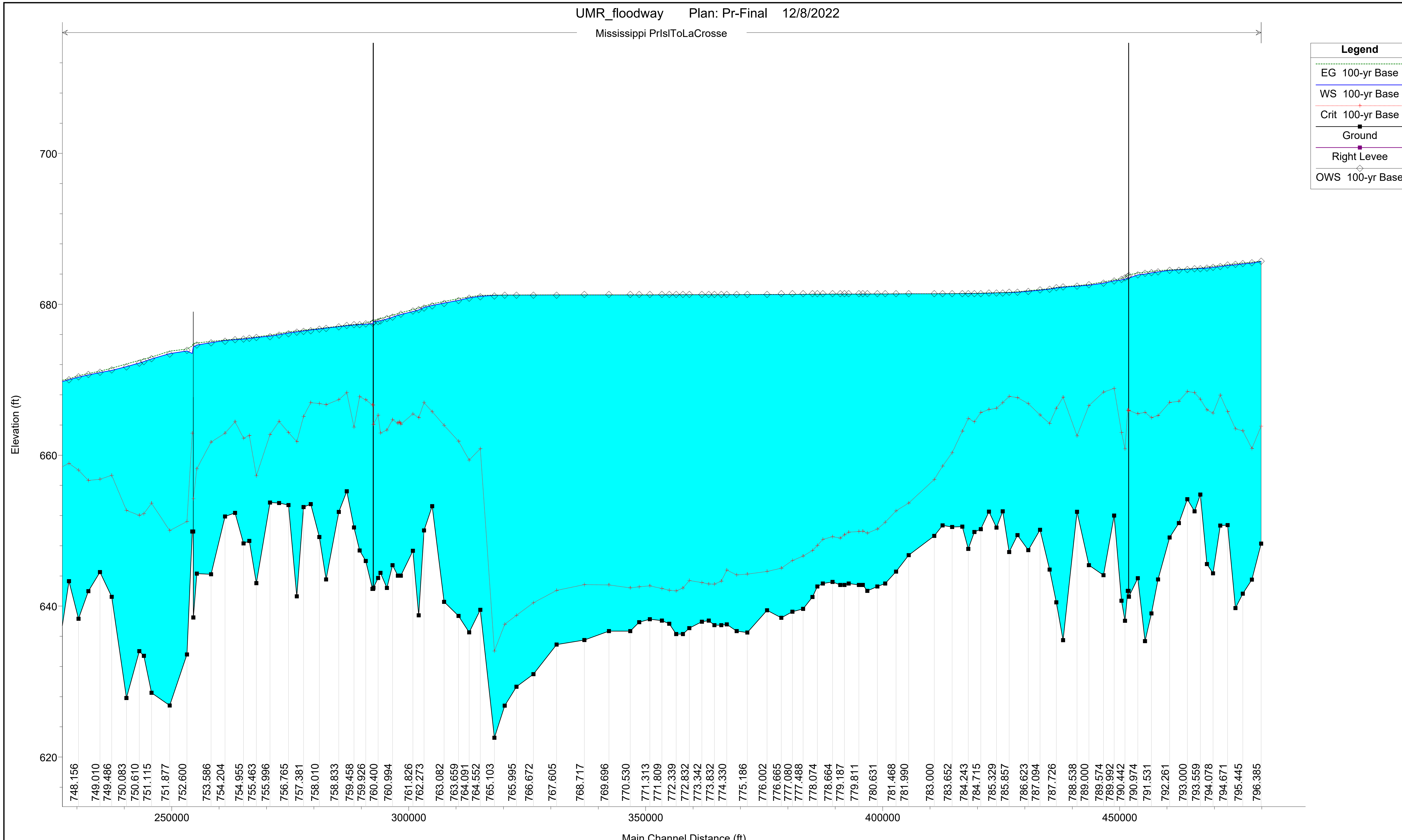
Appendix E:
Proposed Condition HEC-RAS

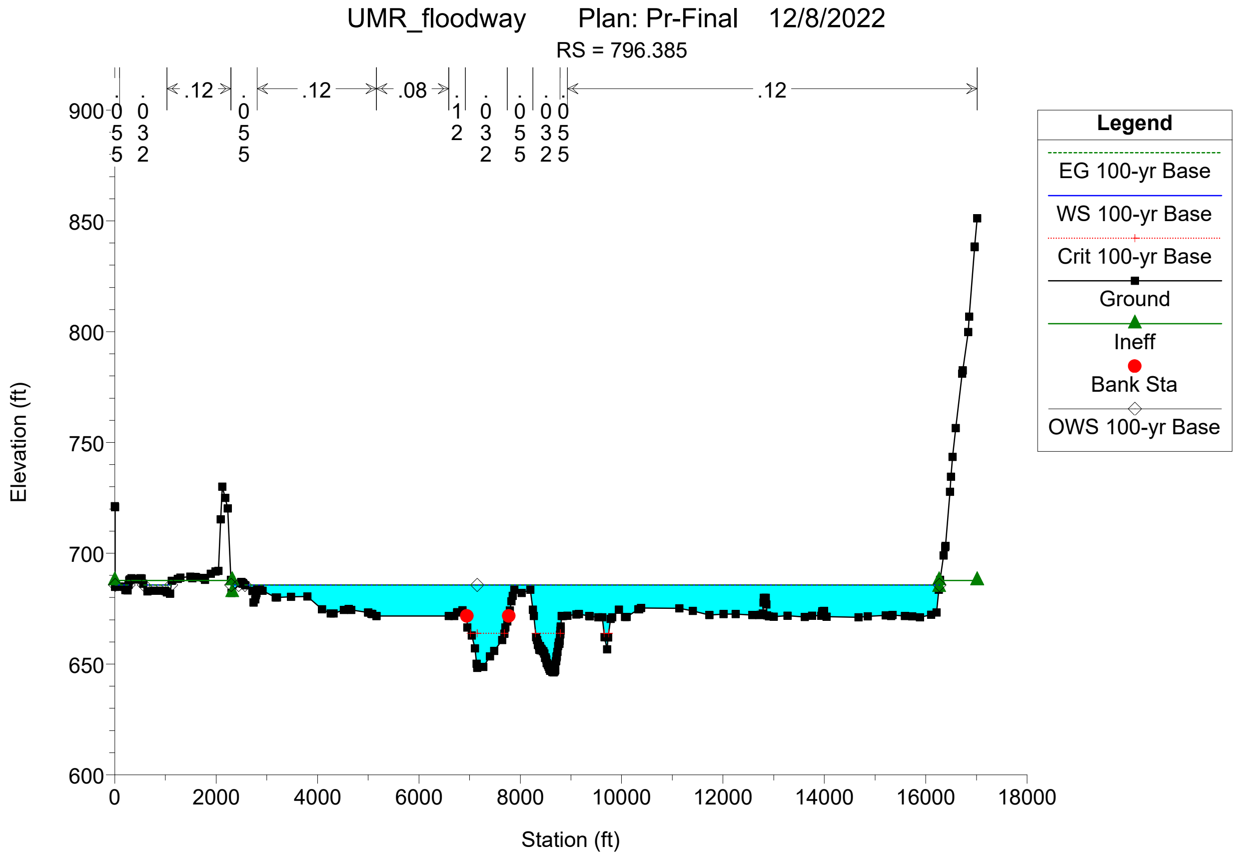
HEC-RAS Plan: Pr-Final Locations: User Defined   Profile: 100-yr Base

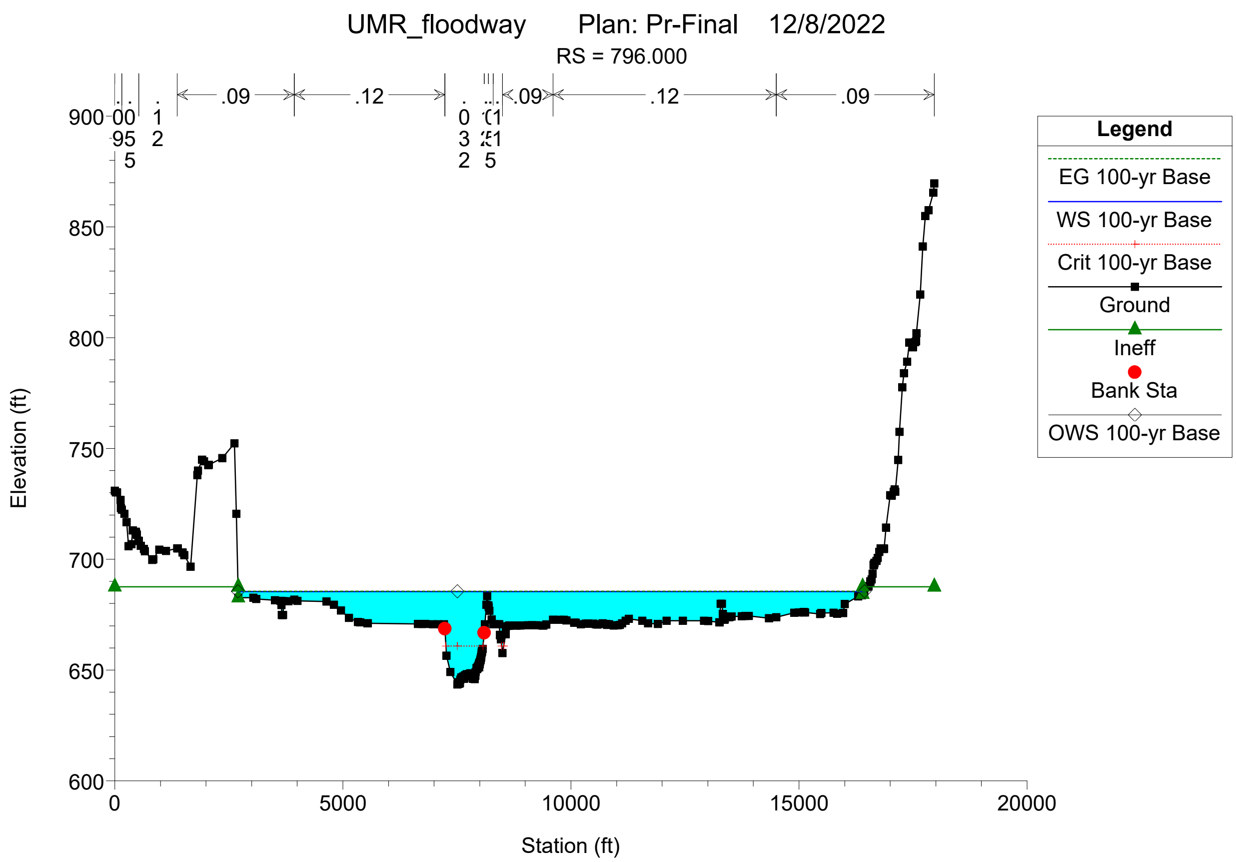
River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Mississippi	PrIslToLaCrosse	796.385	100-yr Base	192930.00	648.28	685.6722	663.85	685.73	0.000046	2.92	187512.80	14649.85	0.10
Mississippi	PrIslToLaCrosse	796.000	100-yr Base	192930.00	643.51	685.4578	660.87	685.59	0.000056	3.75	175721.50	13735.36	0.11
Mississippi	PrIslToLaCrosse	795.445	100-yr Base	192930.00	641.65	685.3458	663.22	685.47	0.000062	3.82	183954.60	19506.62	0.12
Mississippi	PrIslToLaCrosse	795.000	100-yr Base	192930.00	639.73	685.2301	663.51	685.37	0.000071	4.09	174128.90	14198.10	0.12
Mississippi	PrIslToLaCrosse	794.671	100-yr Base	196287.00	650.73	685.1453	665.78	685.25	0.000080	3.57	186379.30	14193.75	0.11
Mississippi	PrIslToLaCrosse	794.379	100-yr Base	196231.00	650.68	685.0093	667.96	685.14	0.000082	3.79	166520.40	13249.94	0.13
Mississippi	PrIslToLaCrosse	794.078	100-yr Base	196276.00	644.35	684.8959	665.58	685.04	0.000082	3.95	159732.60	12555.03	0.13
Mississippi	PrIslToLaCrosse	793.829	100-yr Base	196321.00	645.57	684.8000	666.01	684.93	0.000079	3.98	158481.50	12273.37	0.13
Mississippi	PrIslToLaCrosse	793.559	100-yr Base	196366.00	654.79	684.7501	667.42	684.82	0.000051	2.92	170989.90	11794.28	0.10
Mississippi	PrIslToLaCrosse	793.302	100-yr Base	196412.00	652.56	684.7176	668.29	684.76	0.000037	2.43	173937.90	11833.16	0.08
Mississippi	PrIslToLaCrosse	793.000	100-yr Base	196355.00	654.16	684.6478	668.44	684.70	0.000048	2.79	173326.00	11766.46	0.10
Mississippi	PrIslToLaCrosse	792.640	100-yr Base	196445.00	651.01	684.5644	667.14	684.62	0.000046	2.93	168560.30	11179.77	0.10
Mississippi	PrIslToLaCrosse	792.261	100-yr Base	196491.00	649.10	684.5012	666.99	684.56	0.000051	3.04	165318.70	12153.91	0.10
Mississippi	PrIslToLaCrosse	791.792	100-yr Base	196479.00	643.53	684.3033	665.27	684.45	0.000077	4.08	87112.88	6932.10	0.13
Mississippi	PrIslToLaCrosse	791.531	100-yr Base	196524.00	639.03	684.1603	664.97	684.35	0.000092	4.54	73096.38	5474.90	0.14
Mississippi	PrIslToLaCrosse	791.273	100-yr Base	196570.00	635.36	684.0085	665.67	684.25	0.000118	5.25	70295.23	5513.48	0.16
Mississippi	PrIslToLaCrosse	790.974	100-yr Base	196615.00	643.70	683.9065	665.49	684.14	0.000121	4.89	67782.63	6017.48	0.16
Mississippi	PrIslToLaCrosse	790.604	100-yr Base	196558.00	641.25	683.4734	665.90	683.91	0.000183	6.26	42257.64	8472.94	0.20
Mississippi	PrIslToLaCrosse	790.6		Bridge									
Mississippi	PrIslToLaCrosse	790.563	100-yr Base	196558.00	642.03	683.4482	665.98	683.86	0.000178	6.14	44252.83	8452.31	0.19
Mississippi	PrIslToLaCrosse	790.442	100-yr Base	196604.00	638.05	683.3463	660.85	683.55	0.000087	4.76	103666.30	7528.14	0.14
Mississippi	PrIslToLaCrosse	790.302	100-yr Base	196604.00	640.72	683.2388	663.03	683.41	0.000087	4.44	102729.30	6408.90	0.14
Mississippi	PrIslToLaCrosse	789.992	100-yr Base	196649.00	652.00	683.1122	668.86	683.23	0.000111	3.78	102166.70	6271.34	0.13
Mississippi	PrIslToLaCrosse	789.574	100-yr Base	196739.00	644.09	682.7988	668.35	682.96	0.000116	4.51	92365.86	6593.66	0.15
Mississippi	PrIslToLaCrosse	789.000	100-yr Base	196728.00	645.43	682.5208	666.57	682.64	0.000084	3.72	117063.10	7798.16	0.13
Mississippi	PrIslToLaCrosse	788.538	100-yr Base	196819.00	652.50	682.4036	662.57	682.46	0.000045	2.76	133146.70	8108.44	0.09
Mississippi	PrIslToLaCrosse	787.988	100-yr Base	196807.00	635.48	682.2679	667.70	682.33	0.000059	2.99	117557.60	7465.79	0.10
Mississippi	PrIslToLaCrosse	787.726	100-yr Base	196852.00	640.50	682.1490	666.21	682.24	0.000067	3.47	106920.10	7360.28	0.11
Mississippi	PrIslToLaCrosse	787.466	100-yr Base	196898.00	644.85	682.0060	664.20	682.08	0.000058	3.21	114450.20	7641.68	0.11
Mississippi	PrIslToLaCrosse	787.094	100-yr Base	196943.00	650.12	681.8635	665.34	681.95	0.000069	3.42	122751.90	7668.48	0.12
Mississippi	PrIslToLaCrosse	786.623	100-yr Base	196932.00	647.42	681.7122	666.85	681.80	0.000070	3.48	124728.40	8330.47	0.12
Mississippi	PrIslToLaCrosse	786.191	100-yr Base	197022.00	649.40	681.6062	667.63	681.65	0.000045	2.69	153382.20	9456.08	0.09
Mississippi	PrIslToLaCrosse	785.857	100-yr Base	197068.00	647.16	681.5588	667.79	681.59	0.000022	2.05	166677.60	11945.81	0.07
Mississippi	PrIslToLaCrosse	785.584	100-yr Base	197011.00	652.56	681.5380	666.97	681.56	0.000015	1.41	177578.50	11191.62	0.05
Mississippi	PrIslToLaCrosse	785.329	100-yr Base	197056.00	650.40	681.5134	666.22	681.54	0.000014	1.46	166693.60	10502.10	0.05
Mississippi	PrIslToLaCrosse	785.017	100-yr Base	197102.00	652.52	681.4806	666.06	681.51	0.000017	1.59	148236.50	9162.83	0.06
Mississippi	PrIslToLaCrosse	784.715	100-yr Base	197147.00	650.20	681.4459	665.65	681.48	0.000018	1.63	138918.60	8268.53	0.06
Mississippi	PrIslToLaCrosse	784.471	100-yr Base	197090.00	649.82	681.4325	664.44	681.46	0.000013	1.42	157319.90	8355.13	0.05
Mississippi	PrIslToLaCrosse	784.243	100-yr Base	197136.00	647.59	681.4158	664.87	681.44	0.000013	1.49	152575.20	8071.91	0.05
Mississippi	PrIslToLaCrosse	784.020	100-yr Base	197181.00	650.53	681.4091	663.18	681.43	0.000009	1.20	179984.70	8796.41	0.04
Mississippi	PrIslToLaCrosse	783.652	100-yr Base	197226.00	650.49	681.4010	660.33	681.41	0.000005	0.91	217800.50	9686.13	0.03
Mississippi	PrIslToLaCrosse	783.304	100-yr Base	197170.00	650.69	681.3939	658.55	681.41	0.000004	0.88	232304.10	9984.62	0.03
Mississippi	PrIslToLaCrosse	783.000	100-yr Base	197215.00	649.31	681.3906	656.78	681.40	0.000003	0.73	271884.80	10415.20	0.02
Mississippi	PrIslToLaCrosse	781.990	100-yr Base	197294.00	646.75	681.3793	653.65	681.38	0.000002	0.62	335800.30	11492.00	0.02
Mississippi	PrIslToLaCrosse	781.468	100-yr Base	197385.00	644.58	681.3748	652.63	681.38	0.000002	0.61	350813.30	11860.57	0.02
Mississippi	PrIslToLaCrosse	780.984	100-yr Base	197476.00	643.00	681.3683	651.11	681.37	0.000002	0.70	317119.40	11414.77	0.02
Mississippi	PrIslToLaCrosse	780.631	100-yr Base	197419.00	642.60	681.3605	650.23	681.37	0.000003	0.84	277049.30	13165.86	0.03
Mississippi	PrIslToLaCrosse	780.191	100-yr Base	197510.00	642.01	681.3538	649.67	681.36	0.000003	0.83	273253.40	11036.70	0.03
Mississippi	PrIslToLaCrosse	779.984	100-yr Base	198626.00	642.80	681.3521	649.94	681.36	0.000002	0.74	292670.10	10639.55	0.02
Mississippi	PrIslToLaCrosse	779.811	100-yr Base	198615.00	642.80	681.3512	649.88	681.36	0.000002	0.66	317437.60	10485.81	0.02
Mississippi	PrIslToLaCrosse	779.388	100-yr Base	198832.00	643.00	681.3467	649.80	681.35	0.000002	0.67	307774.70	9928.39	0.02
Mississippi	PrIslToLaCrosse	779.187	100-yr Base	198866.00	642.80	681.3441	649.46	681.35	0.000002	0.71	293484.80	12154.13	0.02
Mississippi	PrIslToLaCrosse	779.000	100-yr Base	198900.00	642.80	681.3420	649.02	681.35	0.000002	0.70	288101.60	8854.01	0.02
Mississippi	PrIslToLaCrosse	778.664	100-yr Base	199026.00	643.20	681.3380	649.19	681.35	0.000002	0.73	278740.20	8443.37	0.02
Mississippi	PrIslToLaCrosse	778.290	100-yr Base	199152.00	643.00	681.3306	648.85	681.34	0.000003	0.85	252807.80	8401.98	0.02
Mississippi	PrIslToLaCrosse	778.074	100-yr Base	199186.00	642.60	681.3235	648.04	681.34	0.000003	0.96	227552.10	8275.67	0.03
Mississippi	PrIslToLaCrosse	777.875	100-yr Base	199232.00	641.22	681.3204	647.37	681.33	0.000003	0.94	228905.80	8214.85	0.03
Mississippi	PrIslToLaCrosse	777.488	100-yr Base	199232.00	639.64	681.3054	646.63	681.32	0.000005	1.18	200751.20	8529.87	0.03
Mississippi	PrIslToLaCrosse	777.080	100-yr Base	199232.00	639.25	681.3018	646.05	681.31	0.000003	0.93	239403.50	8219.75	0.03
Mississippi	PrIslToLaCrosse	776.665	100-yr Base	199232.00	638.46	681.2955	645.03	681.31	0.000003	0.87	235152.40	6741.74	0.02
Mississippi	PrIslToLaCrosse	776.002	100-yr Base	199232.00	639.45	681.2891	644.60	681.30	0.000002	0.82	256235.60	7015.01	0.02
Mississippi	PrIslToLaCrosse	775.186	100-yr Base	199232.00	636.49	681.2809	644.23	681.29	0.000002	0.75	285457.40	8317.79	0.02
Mississippi	PrIslToLaCrosse	774.739	100-yr Base	199232.00	636.68	681.2737	644.14	681.28	0.000003	0.81	261953.40	8224.20	0.02
Mississippi	PrIslToLaCrosse	774.330	100-yr Base	199232.00	637.58	681.2620	644.78	681.28	0.000003	1.02	217234.50	8547.67	0.03
Mississippi	PrIslToLaCrosse	774.110	100-yr Base	199232.00	637.48	681.2636	643.30	681.27	0.000002	0.74	294421.40	9495.68	0.02
Mississippi	PrIslToLaCrosse	773.832	100-yr Base	199232.00	637.48	681.2626	642.91	681.27	0.000001	0.64	328697.10	9883.54	0.02
Mississippi	PrIslToLaCrosse	773.623	100-yr Base	199232.00	638.07	681.2620	642.94	681.27	0.000001	0.57	366709.50	10392.43	0.02
Mississippi	PrIslToLaCrosse	773.342	100-yr Base	199232.00	637.94	681.2605	643.11	681.27	0.000001	0.56	370021.20	10624.26	0.02
Mississippi	PrIslToLaCrosse	772.832	100-yr Base	199232.00	637.08	681.2551	643.38	681.26	0.000001	0.66	313775.90	9562.56	0.02
Mississippi	PrIslToLaCrosse	772.560	100-yr Base	199232.00	636.29	681.2545	642.39	681.26	0.000001	0.58	355921.40	10877.79	0.02
Mississippi	PrIslToLaCrosse	772.339	100-yr Base	199232.00	636.29	681.2540	642.02	681.26	0.000001	0.50	412621.00	11546.52	0.01
Mississippi	PrIslToLaCrosse	772.092	100-yr Base	199232.00	637.67	681.2534	642.09	681.26	0.000001	0.46	452789.70	11919.25	0.01
Mississippi	PrIslToLaCrosse	771.809	100-yr Base	199232.00	638.07	681.2526	642.33	681.26	0.000001	0.44	476764.30	13982.90	0.01
Mississippi	PrIslToLaCrosse	771.313	100-yr Base	199232.00	638.26	681.2511	642.68	681.25	0.000001	0.42	495981.10	13716.06	0.01
Mississippi	PrIslToLaCrosse	770.876	100-yr Base	199232.00	637.87	681.2494	642.56	681.25	0.000001	0.45	476078.70	14553.42	0.01
Mississippi	PrIslToLaCrosse	770.530	100-yr Base	199232.00	636.69	681.2482	642.40	681.25	0.000001	0.45	472040.40	13811.46	0.01
Mississippi	PrIslToLaCrosse	769.696	100-yr Base	199232.00	636.69	681.2452	642.80	681.25	0.000001	0.45	482299.50	14291.96	0.01
Mississippi	PrIslToLaCrosse	768.717	100-yr Base	199232.00	635.50	681.2407	642.85	681.24	0.000001	0.49	434805.70	11581.13	0.01
Mississippi	PrIslToLaCrosse	767.605	100-yr Base	199232.00	634.91	681.2355	642.08	681.24	0.000001	0.51	409794.50	10764.52	0.01
Mississippi	PrIslToLaCrosse	766.672	100-yr Base	199232.00	630.97	681.2296	640.45	681.23	0.000001	0.60	358428.30	9429.36	0.02
Mississippi	PrIslToLaCrosse	765.995	100-yr Base	199232.00	629.32	681.2232	638.79	681.23	0.000001	0.74	313698.80	8697.42	0.02
Mississippi	PrIslToLaCrosse	765.528	100-yr Base	199232.00	626.80	681.2151	637.59	681.22	0.000002	0.91	273702.70	8769.84	0.02
Mississippi	PrIslToLaCrosse	765.103	100-yr Base	199232.00	622.56	681.1797	634.06	681.22	0.000006	1.68	215072.50	9096.51	0.04
Mississippi	PrIslToLaCrosse	764.552	100-yr Base	199232.00	639.50	681.0485	660.87	681.17	0.000078	3.34	113281.40	8823.91	0.11
Mississippi	PrIslToLaCrosse	764.091	100-yr Base	199232.00	636.52	680.8549	659.34	680.98	0.000079	3.26	123757.50	10520.26	0.11
Mississippi	PrIslToLaCrosse	763.659	100-yr Base	199232.00	638.70	680.5264	661.86	680.75	0.000124	4.43	103968.60	11188.49	0.15
Mississippi	PrIslToLaCrosse	763.082	100-yr Base	229611.00	640.57	680.1607	663.96	680.37	0.000124	4.73	106134.70	11722.95	0.16

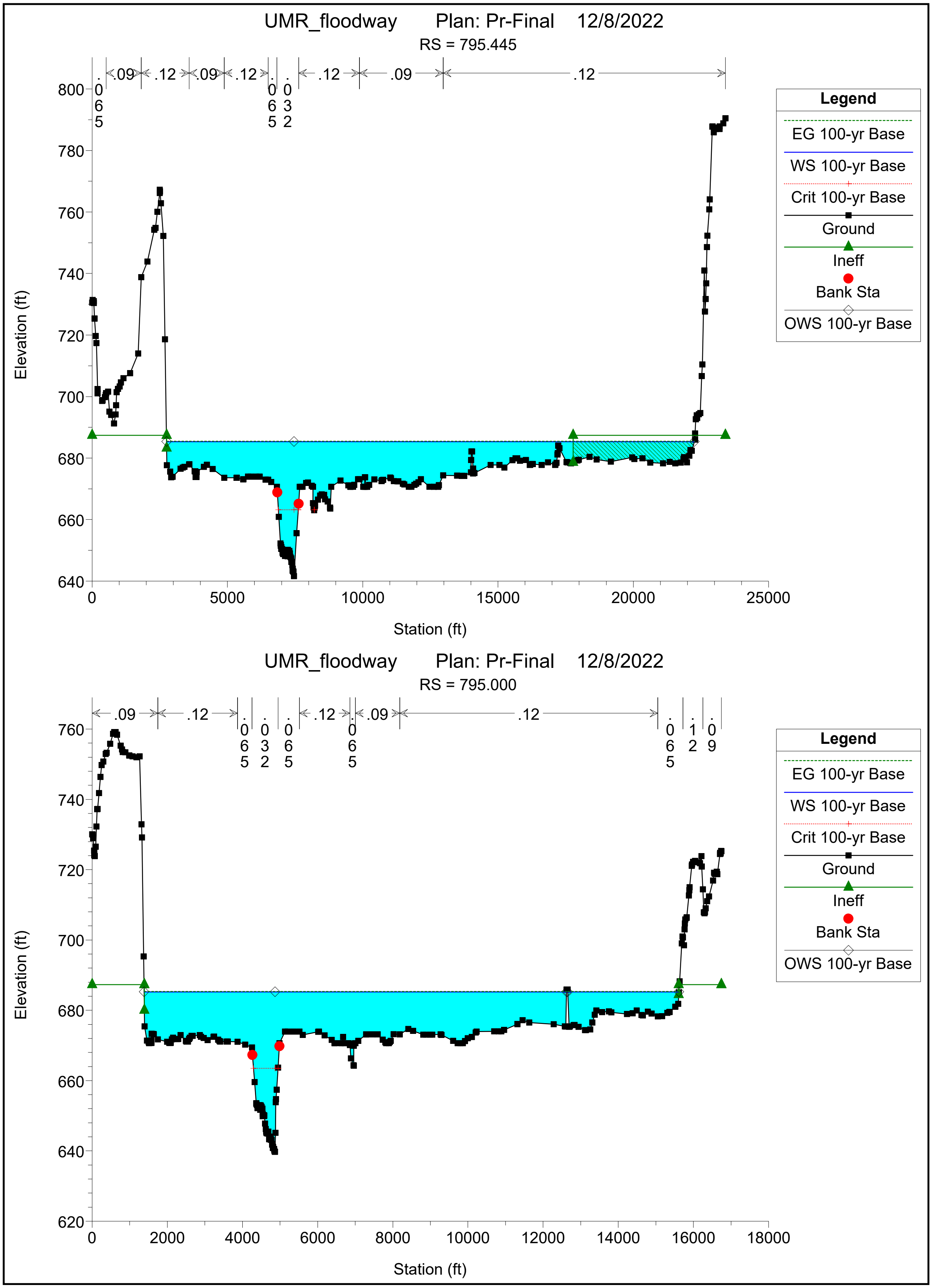
HEC-RAS Plan: Pr-Final Locations: User Defined Profile: 100-yr Base (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Mississippi	PrIslToLaCrosse	762.578	100-yr Base	229611.00	653.24	679.8478	665.76	680.05	0.000143	4.52	129185.30	13484.81	0.16
Mississippi	PrIslToLaCrosse	762.273	100-yr Base	229611.00	650.04	679.5850	666.97	679.75	0.000236	4.40	127106.70	14423.33	0.16
Mississippi	PrIslToLaCrosse	762.062	100-yr Base	229611.00	638.79	679.2454	664.97	679.51	0.000169	5.42	122937.00	14803.85	0.18
Mississippi	PrIslToLaCrosse	761.826	100-yr Base	229611.00	647.34	679.0425	665.46	679.30	0.000170	5.44	136147.20	15237.20	0.18
Mississippi	PrIslToLaCrosse	761.327	100-yr Base	229611.00	644.03	678.6475	664.10	678.88	0.000157	4.81	134676.00	16334.60	0.17
Mississippi	PrIslToLaCrosse	760.994	100-yr Base	229611.00	645.42	678.3035	664.70	678.57	0.000179	5.14	134245.60	17374.84	0.19
Mississippi	PrIslToLaCrosse	760.759	100-yr Base	229611.00	642.41	678.0528	663.34	678.34	0.000178	5.47	142371.60	15918.74	0.19
Mississippi	PrIslToLaCrosse	760.495	100-yr Base	229611.00	644.41	677.8153	662.94	678.10	0.000170	5.50	141621.90	15728.67	0.18
Mississippi	PrIslToLaCrosse	760.400	100-yr Base	229611.00	643.73	677.7733	665.31	678.00	0.000173	5.25	122586.30	15909.14	0.18
Mississippi	PrIslToLaCrosse	760.216	100-yr Base	229611.00	642.43	677.6870	664.11	677.87	0.000079	4.02	70217.59	15434.44	0.14
Mississippi	PrIslToLaCrosse	760.2		Bridge									
Mississippi	PrIslToLaCrosse	760.181	100-yr Base	229611.00	642.30	677.4159	666.65	677.82	0.000185	6.20	54347.52	15557.62	0.22
Mississippi	PrIslToLaCrosse	759.926	100-yr Base	229611.00	645.99	677.3667	667.35	677.53	0.000113	4.66	140750.90	15098.92	0.17
Mississippi	PrIslToLaCrosse	759.684	100-yr Base	229611.00	647.38	677.3054	667.75	677.39	0.000066	3.61	147763.40	15160.14	0.13
Mississippi	PrIslToLaCrosse	759.458	100-yr Base	229611.00	650.43	677.2606	663.72	677.31	0.000041	2.67	148451.40	14237.99	0.10
Mississippi	PrIslToLaCrosse	759.170	100-yr Base	229611.00	655.22	677.1453	668.29	677.23	0.000090	3.51	147218.40	14647.94	0.14
Mississippi	PrIslToLaCrosse	758.833	100-yr Base	229611.00	652.49	677.0261	667.37	677.09	0.000060	3.13	155104.20	15160.93	0.12
Mississippi	PrIslToLaCrosse	758.299	100-yr Base	229611.00	643.54	676.8544	666.70	676.91	0.000057	3.01	152263.80	14301.85	0.11
Mississippi	PrIslToLaCrosse	758.010	100-yr Base	229611.00	649.15	676.7234	666.84	676.80	0.000068	3.39	133920.50	14848.46	0.13
Mississippi	PrIslToLaCrosse	757.668	100-yr Base	229611.00	653.51	676.5935	666.97	676.68	0.000073	3.26	119497.60	15488.71	0.13
Mississippi	PrIslToLaCrosse	757.381	100-yr Base	229611.00	653.12	676.4689	665.14	676.57	0.000080	3.53	107455.30	16049.33	0.14
Mississippi	PrIslToLaCrosse	757.105	100-yr Base	229611.00	641.29	676.3539	661.79	676.47	0.000067	3.43	94481.04	14793.31	0.13
Mississippi	PrIslToLaCrosse	756.765	100-yr Base	229611.00	653.40	676.1973	663.00	676.34	0.000098	3.67	86410.75	14366.27	0.15
Mississippi	PrIslToLaCrosse	756.373	100-yr Base	229611.00	653.66	675.9711	664.47	676.13	0.000104	3.70	75525.72	12656.26	0.15
Mississippi	PrIslToLaCrosse	755.996	100-yr Base	229611.00	653.73	675.7877	662.73	675.92	0.000099	3.68	84299.00	13938.42	0.15
Mississippi	PrIslToLaCrosse	755.463	100-yr Base	229611.00	643.03	675.6042	657.27	675.68	0.000045	2.55	104051.30	13327.38	0.10
Mississippi	PrIslToLaCrosse	755.186	100-yr Base	229611.00	648.65	675.4694	662.62	675.59	0.000077	3.61	97485.73	13844.89	0.14
Mississippi	PrIslToLaCrosse	754.955	100-yr Base	229611.00	648.31	675.3977	662.26	675.50	0.000065	3.15	108445.30	14745.09	0.12
Mississippi	PrIslToLaCrosse	754.592	100-yr Base	229611.00	652.36	675.2984	664.44	675.38	0.000058	2.77	108146.10	16529.92	0.12
Mississippi	PrIslToLaCrosse	754.204	100-yr Base	231280.00	651.87	675.2051	662.92	675.27	0.000042	2.31	120203.60	17923.70	0.10
Mississippi	PrIslToLaCrosse	753.586	100-yr Base	231280.00	644.22	674.9178	661.74	675.09	0.000072	3.50	71972.00	12640.25	0.15
Mississippi	PrIslToLaCrosse	752.950	100-yr Base	231280.00	644.31	674.5962	658.21	674.87	0.000059	4.21	55018.50	11437.57	0.15
Mississippi	PrIslToLaCrosse	752.823	100-yr Base	231280.00	638.50	674.3370	654.22	674.80	0.000080	5.49	42262.00	10128.84	0.18
Mississippi	PrIslToLaCrosse	752.8		Inl Struct									
Mississippi	PrIslToLaCrosse	752.781	100-yr Base	231280.00	649.88	673.4761	662.91	674.47	0.000286	8.03	28904.10	10012.96	0.32
Mississippi	PrIslToLaCrosse	752.600	100-yr Base	231280.00	633.59	673.8111	651.22	674.06	0.000044	4.37	60690.73	11106.44	0.13
Mississippi	PrIslToLaCrosse	751.877	100-yr Base	231280.00	626.83	673.4516	650.02	673.80	0.000274	5.56	94419.30	11983.71	0.16

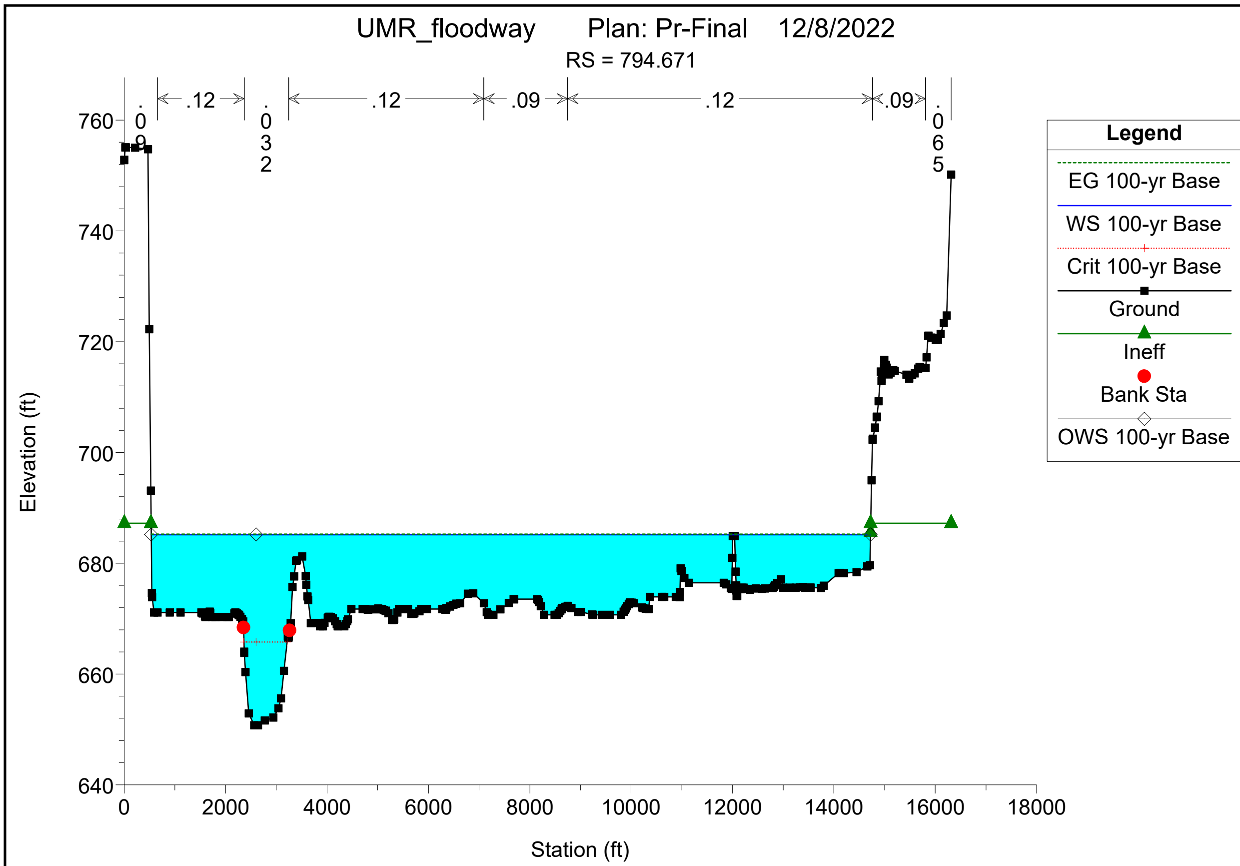

UMR_floodway Plan: Pr-Final 12/8/2022
Mississippi PrIslToLaCrosse
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Right Levee
OWS 100-yr Base
Elevation (ft)
Main Channel Distance (ft)
620
640
660
680
700
250000
300000
350000
400000
450000
748.156
749.010
749.486
750.083
750.610
751.115
751.877
752.600
753.586
754.204
754.955
755.463
755.996
756.765
757.381
758.010
758.833
759.458
759.926
760.400
760.994
761.826
762.273
763.082
763.659
764.091
764.552
765.103
765.995
766.672
767.605
768.717
769.696
770.530
771.313
771.809
772.339
772.832
773.342
773.832
774.330
775.186
776.002
776.665
777.080
777.488
778.074
778.664
779.187
779.811
780.631
781.468
781.990
783.000
783.652
784.243
784.715
785.329
785.857
786.623
787.094
787.726
788.538
789.000
789.574
789.992
790.442
790.974
791.531
792.261
793.000
793.559
794.078
794.671
795.445
796.385


UMR_floodway Plan: Pr-Final 12/8/2022
RS = 796.385
.12
.12
.08
.12
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

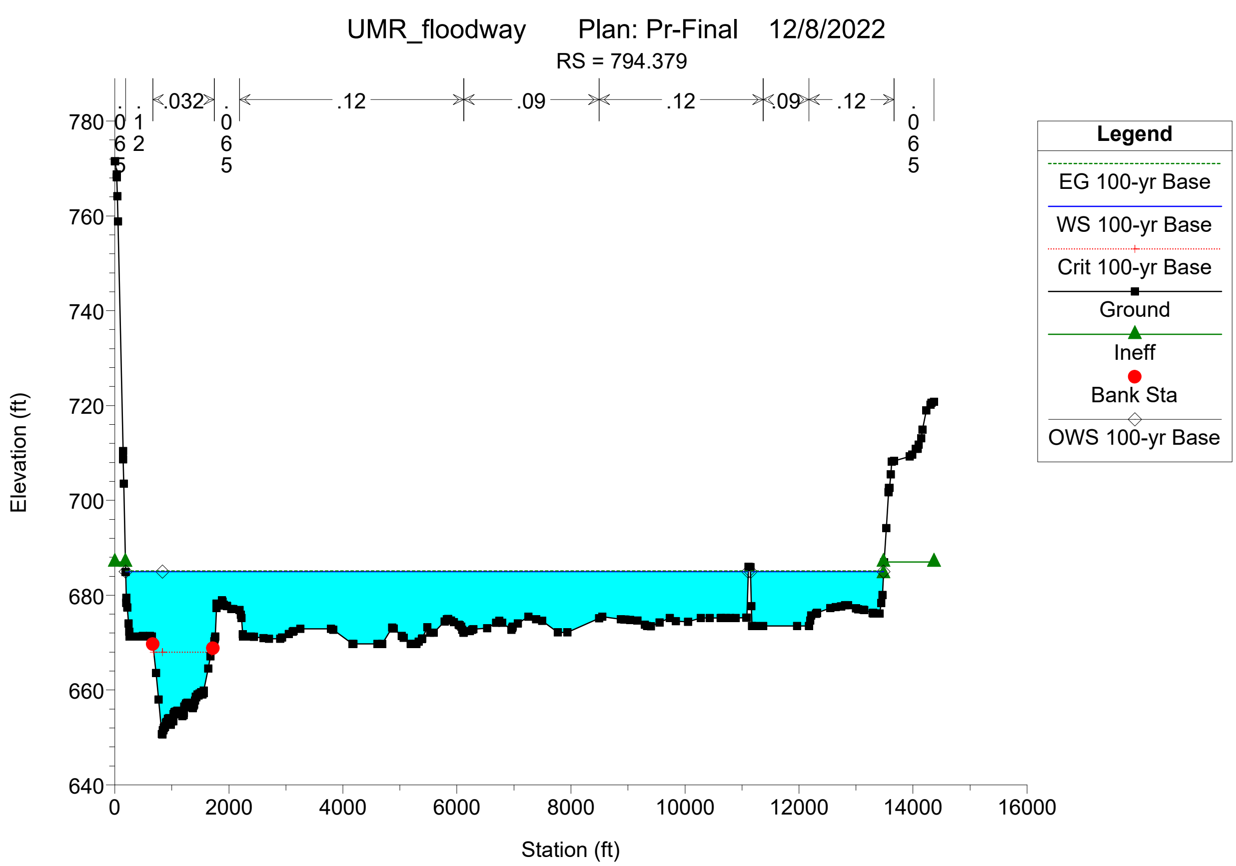

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 796.000
.09
.12
.09
.12
.09
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)



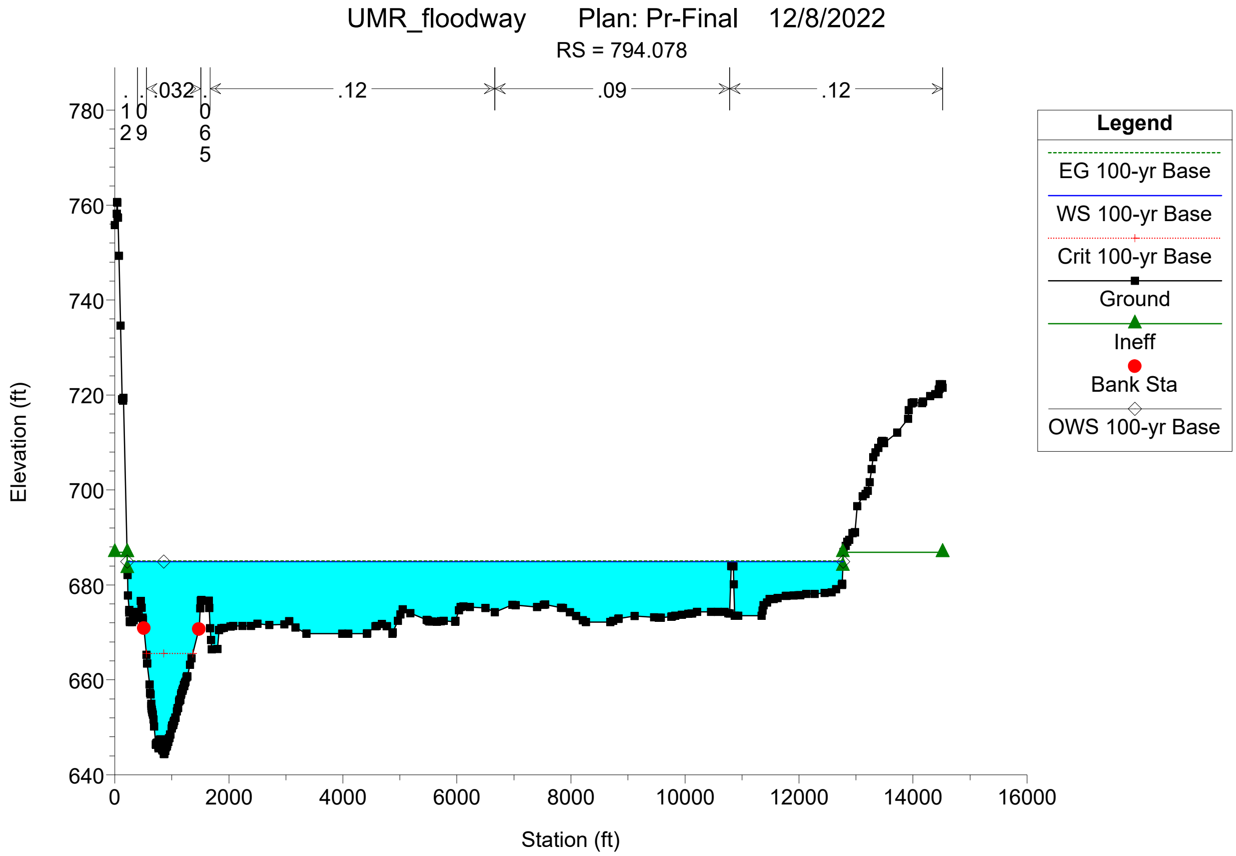
UMR_floodway Plan: Pr-Final 12/8/2022
RS = 795.445
.09 .12 .09 .12 .065 .032 .12 .09 .12
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)
640 660 680 700 720 740 760 780 800
0 5000 10000 15000 20000 25000
UMR_floodway Plan: Pr-Final 12/8/2022
RS = 795.000
.09 .12 .065 .032 .065 .12 .065 .09 .12 .065 .12 .09
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)
620 640 660 680 700 720 740 760
0 2000 4000 6000 8000 10000 12000 14000 16000 18000

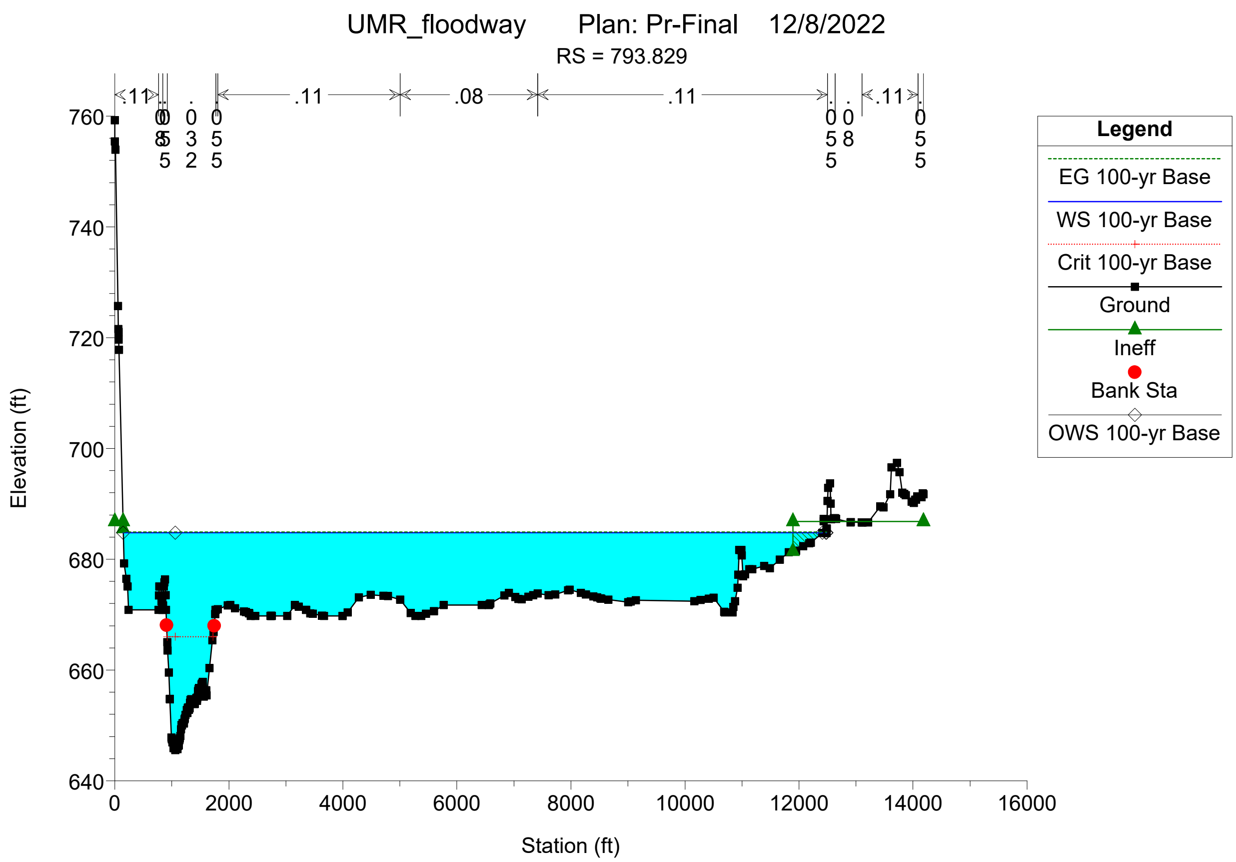


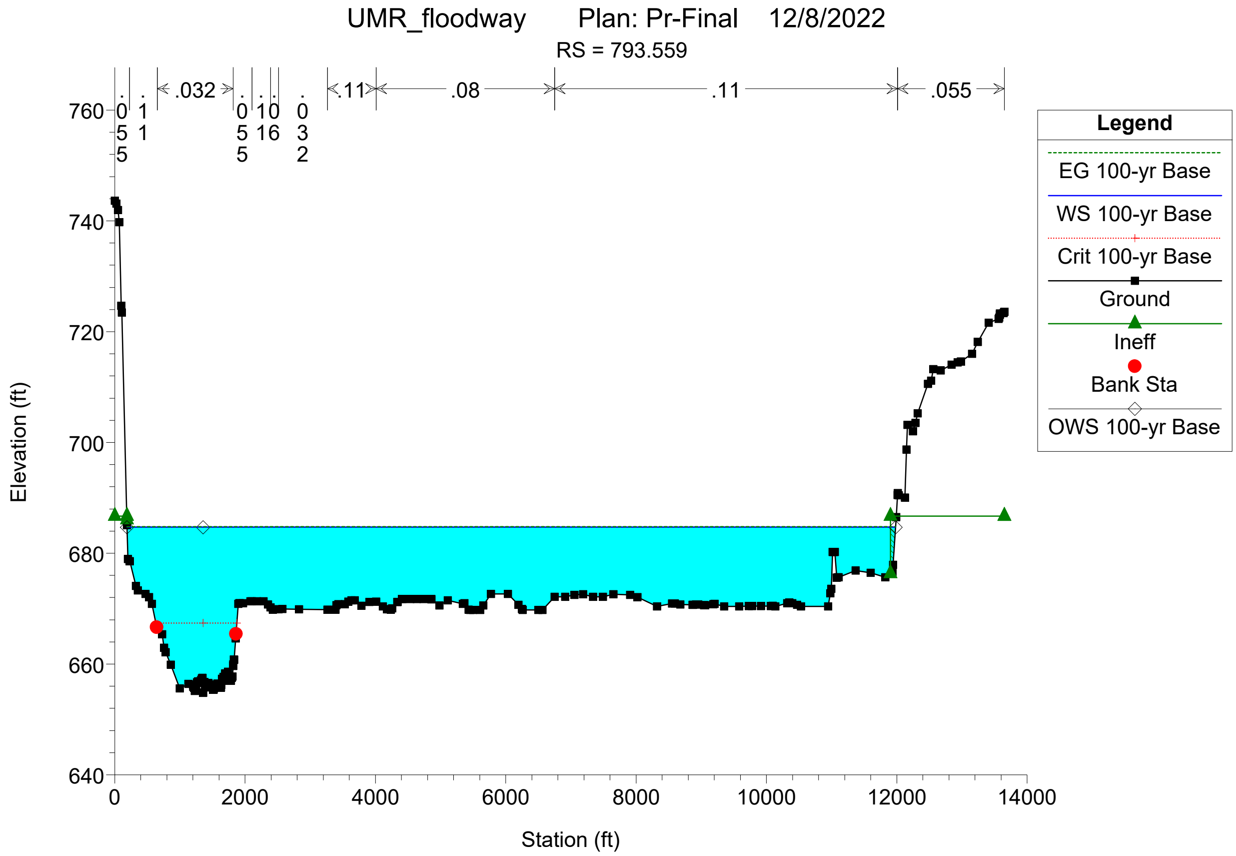
UMR_floodway Plan: Pr-Final 12/8/2022
RS = 794.671
.12
.032
.12
.09
.12
.09
.065
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

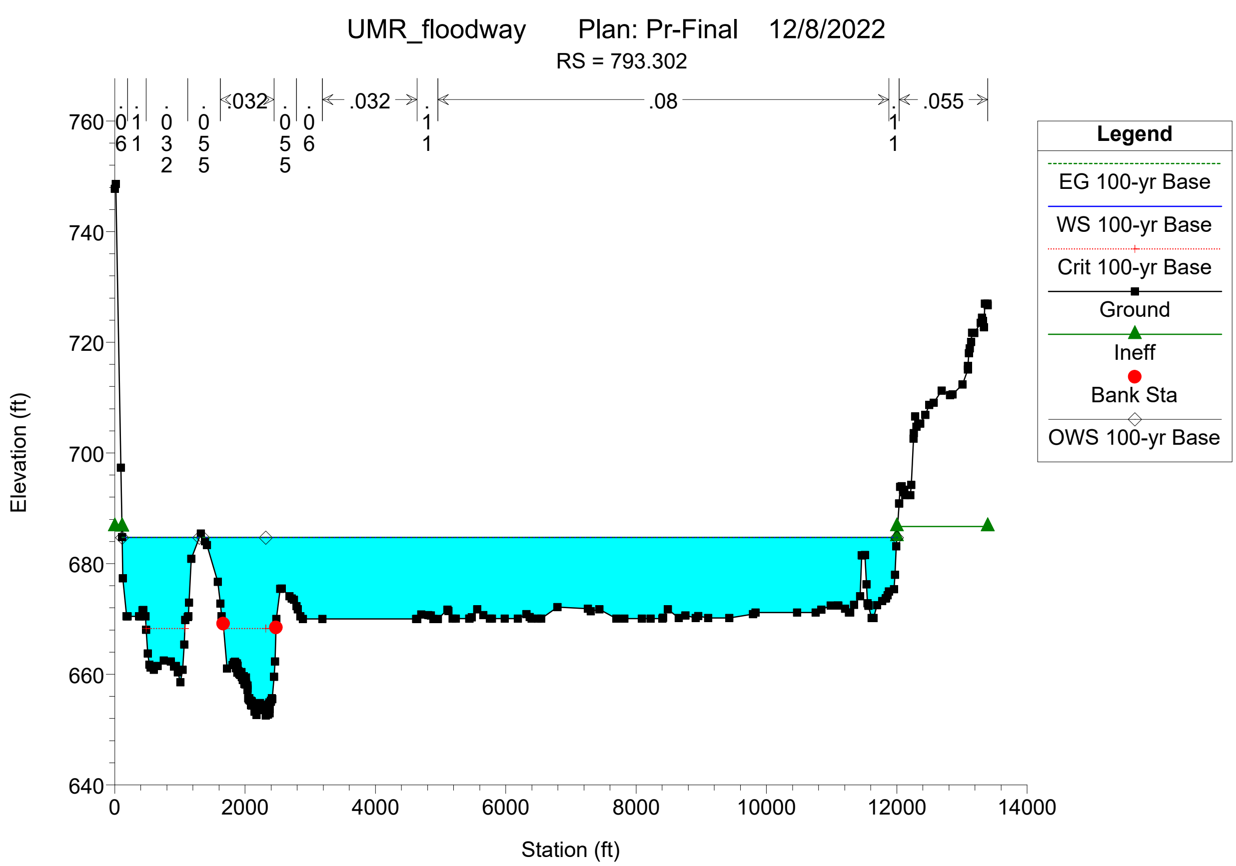


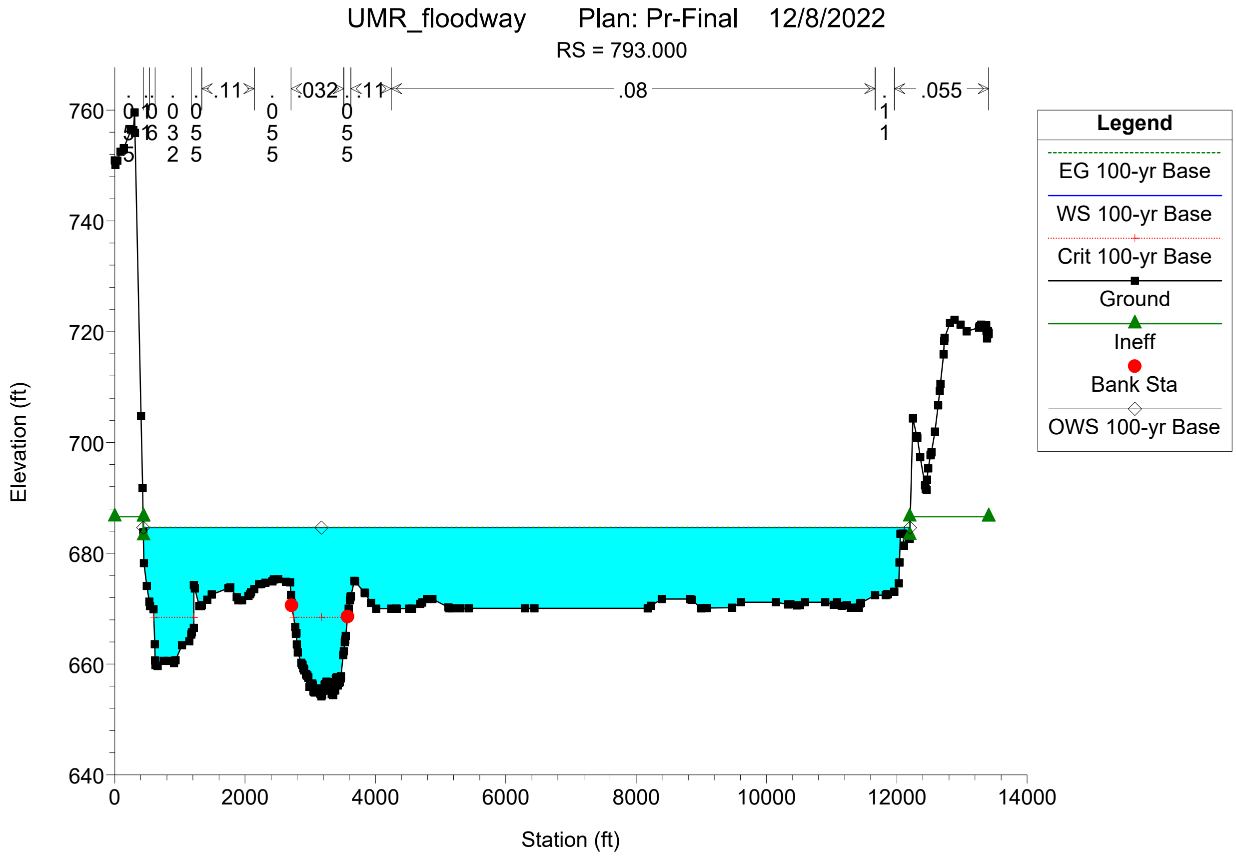
UMR_floodway Plan: Pr-Final 12/8/2022
RS = 794.379
.065
.12
.032
.065
.12
.09
.12
.09
.12
.065
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

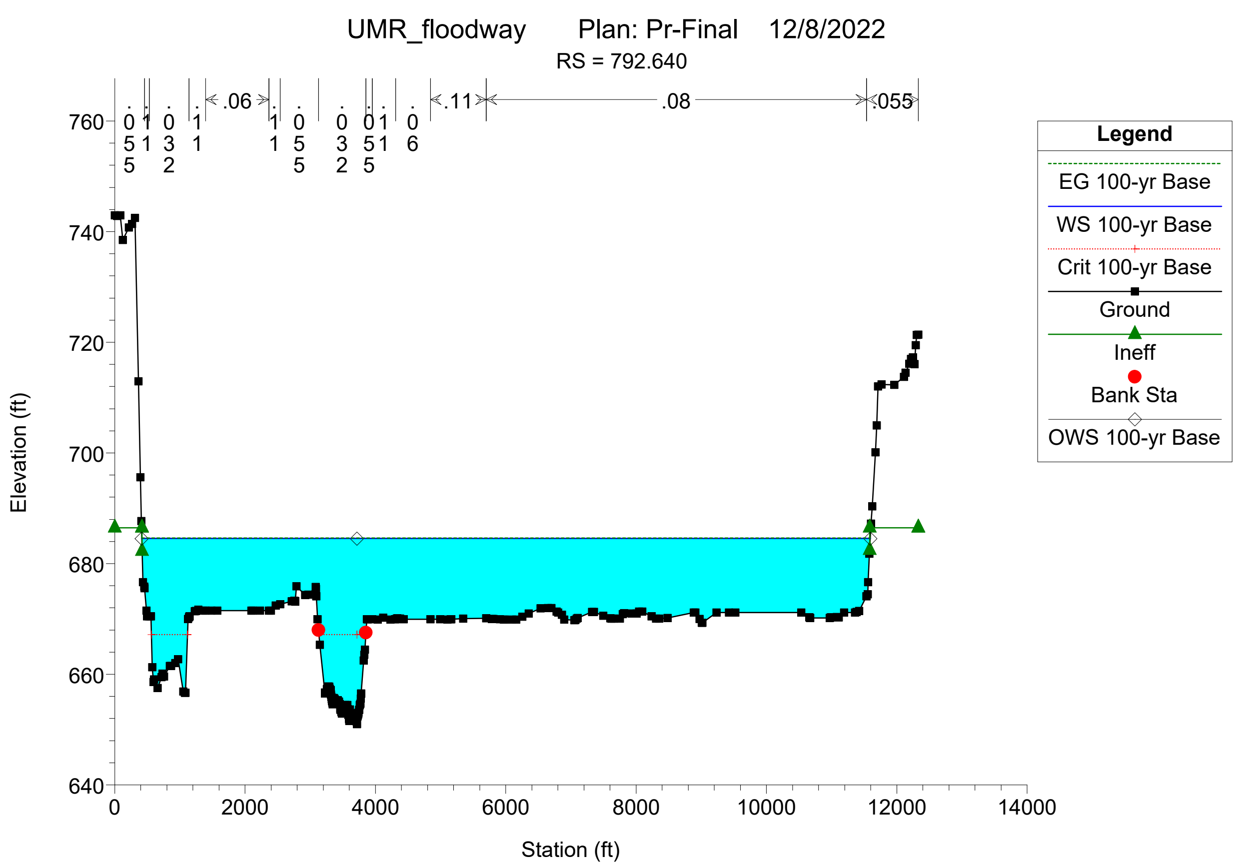

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 794.078
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)
.12
.09
.12
.032

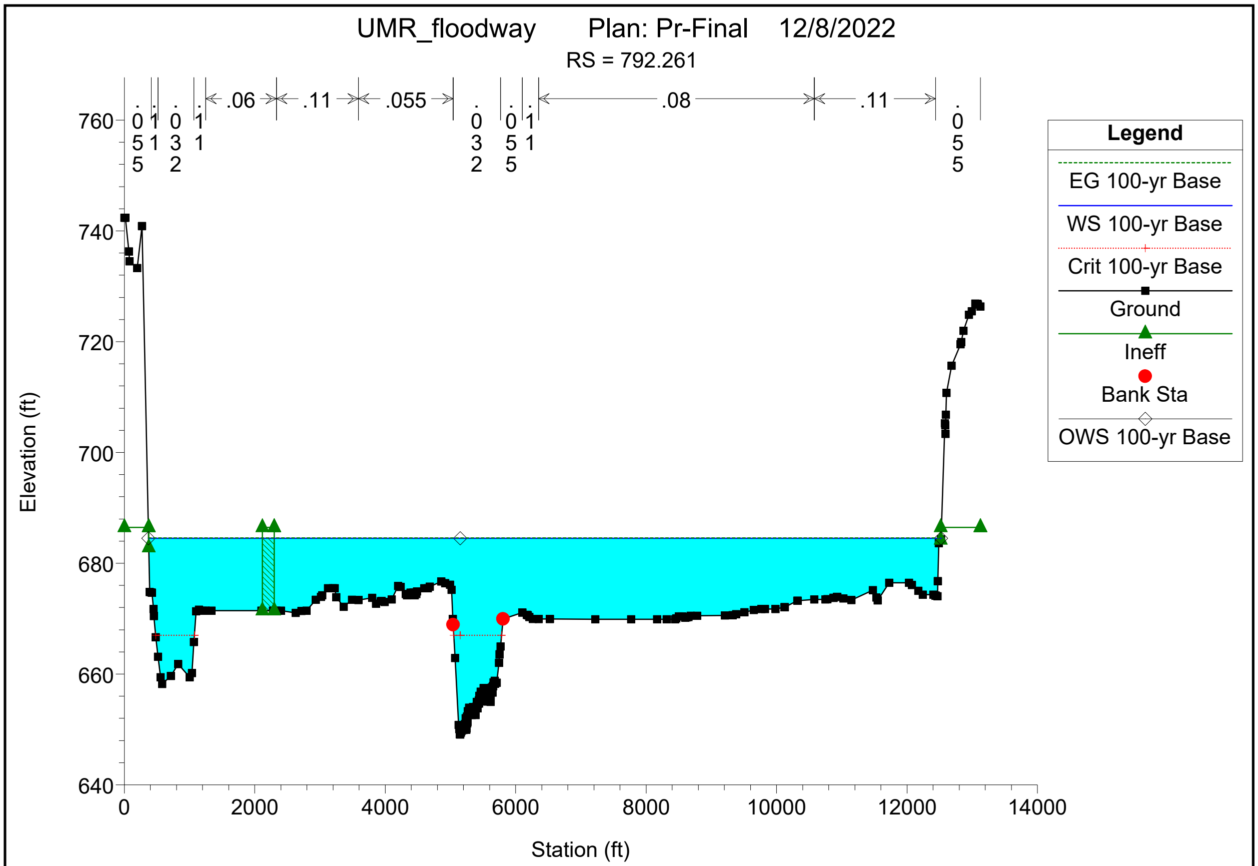

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 793.829
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)
.11
.08
.11
.11

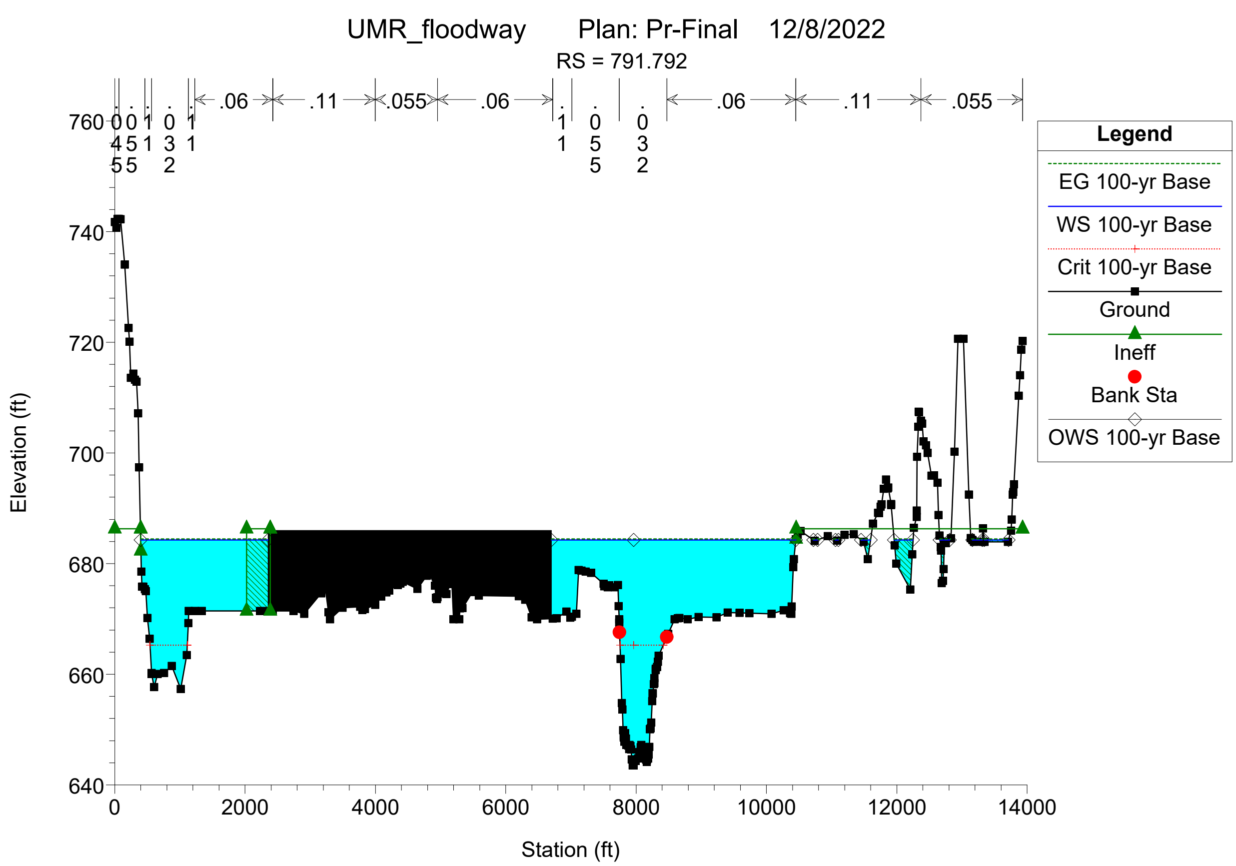

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 793.559
.032
.11
.08
.11
.055
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

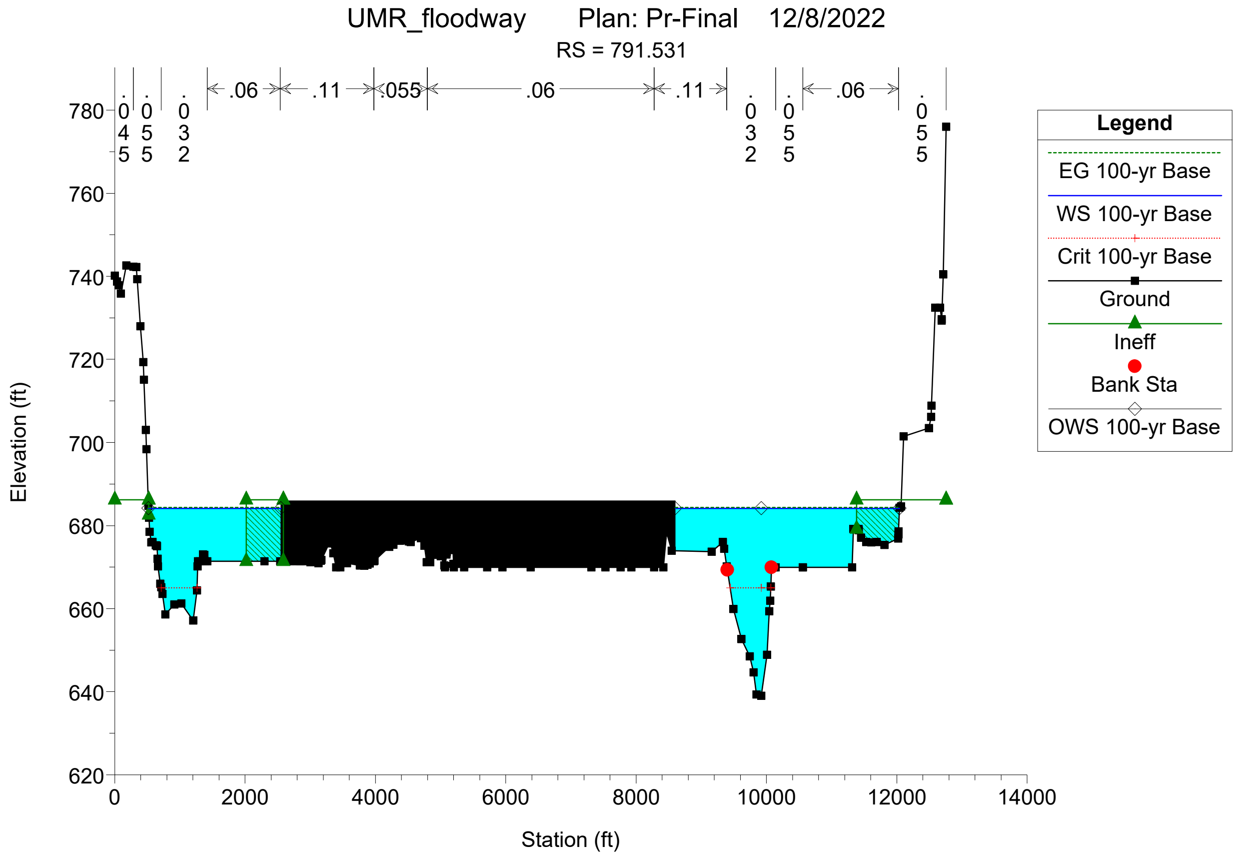

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 793.302
.032
.032
.08
.055
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

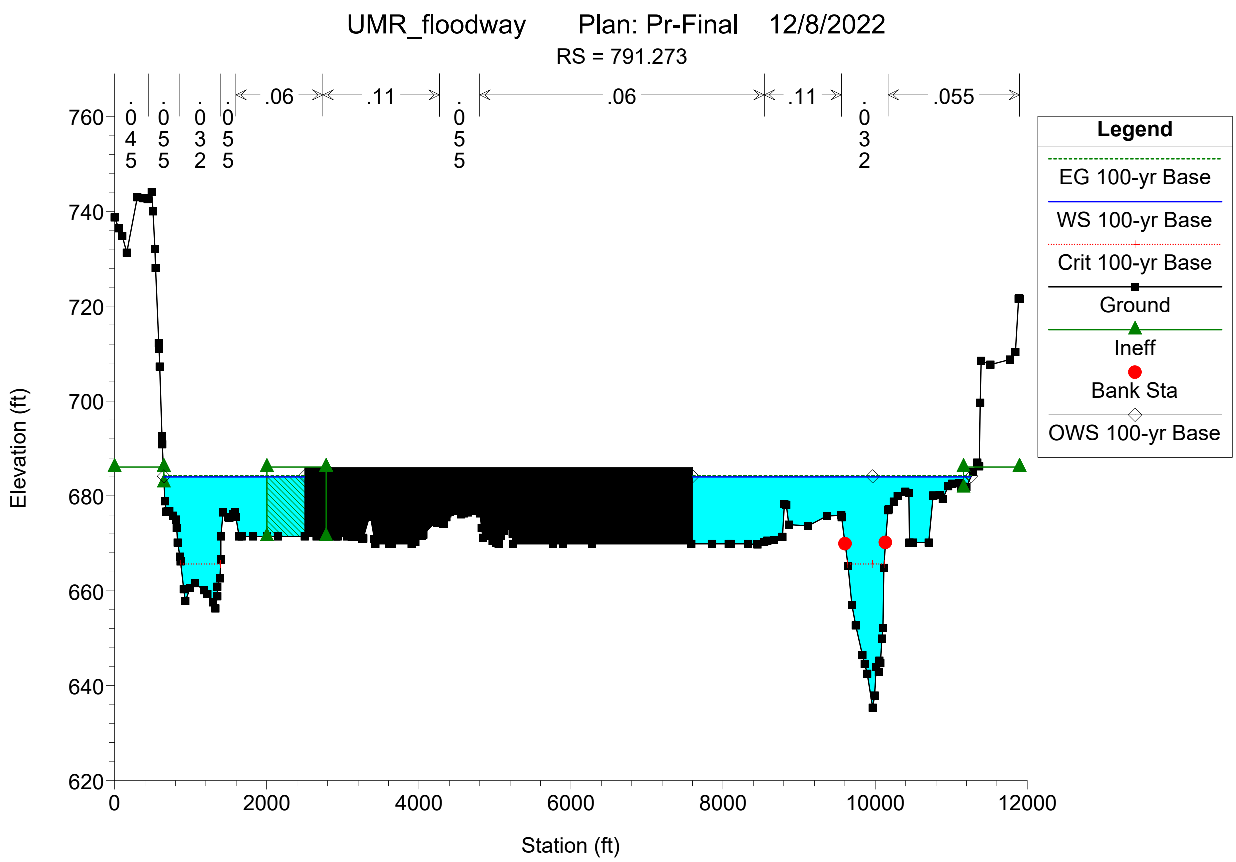

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 793.000
.11
.032
.11
.08
.055
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

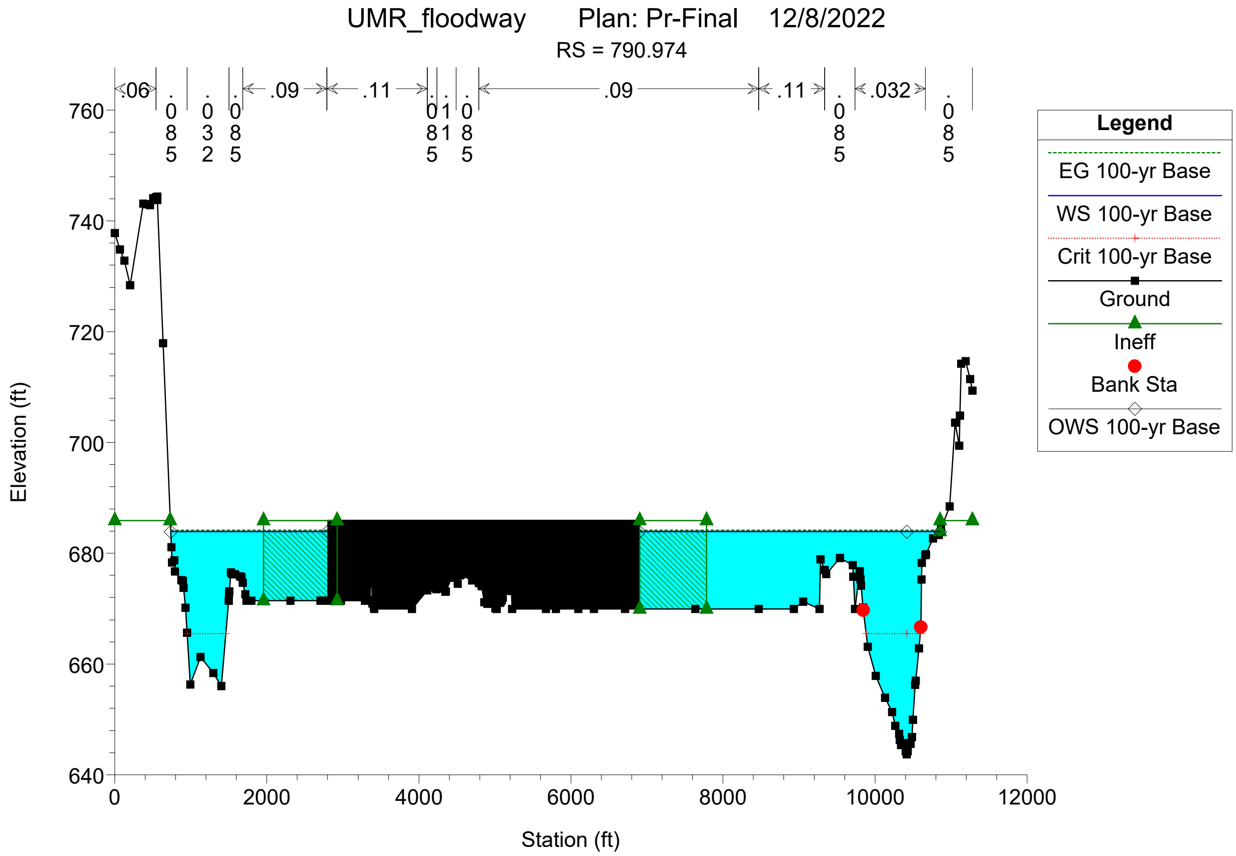

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 792.640
.06
.11
.08
.055
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

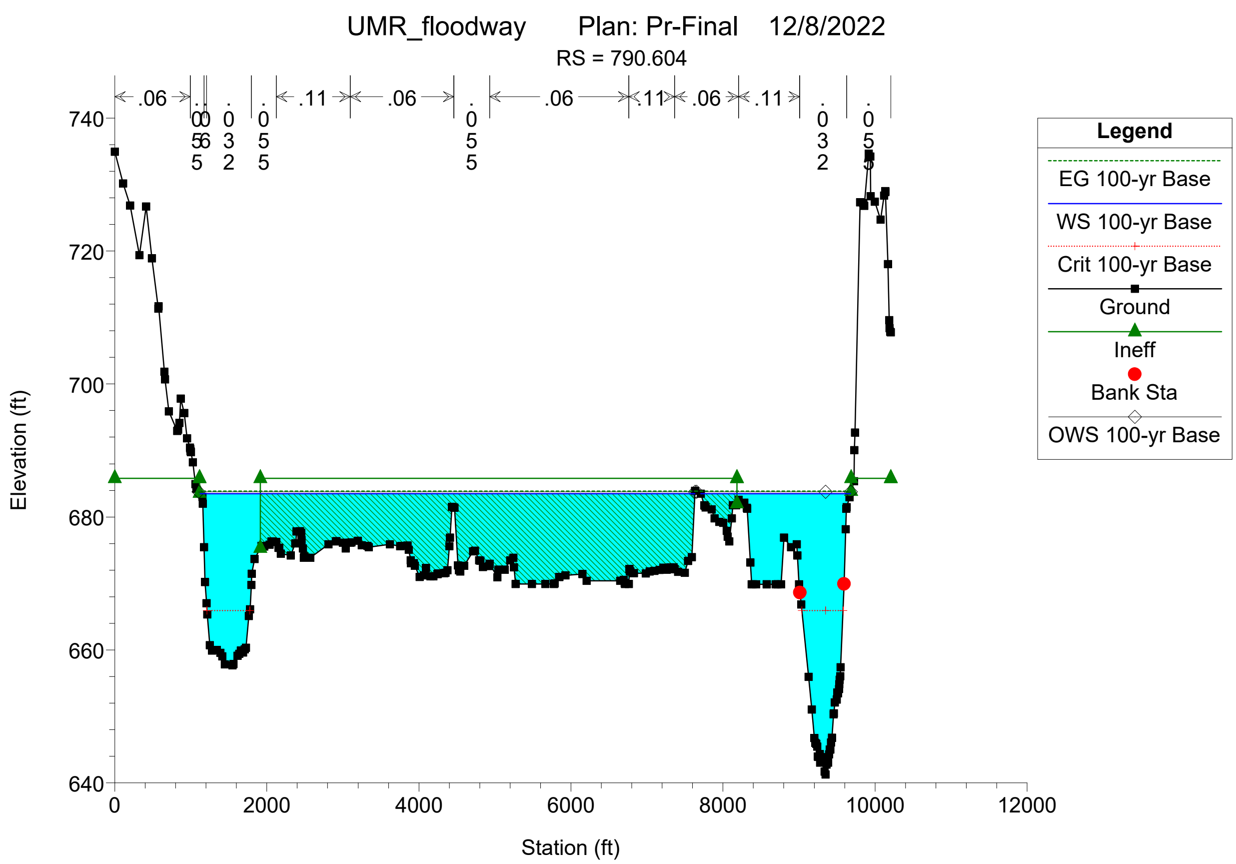

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 792.261
.06
.11
.055
.08
.11
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

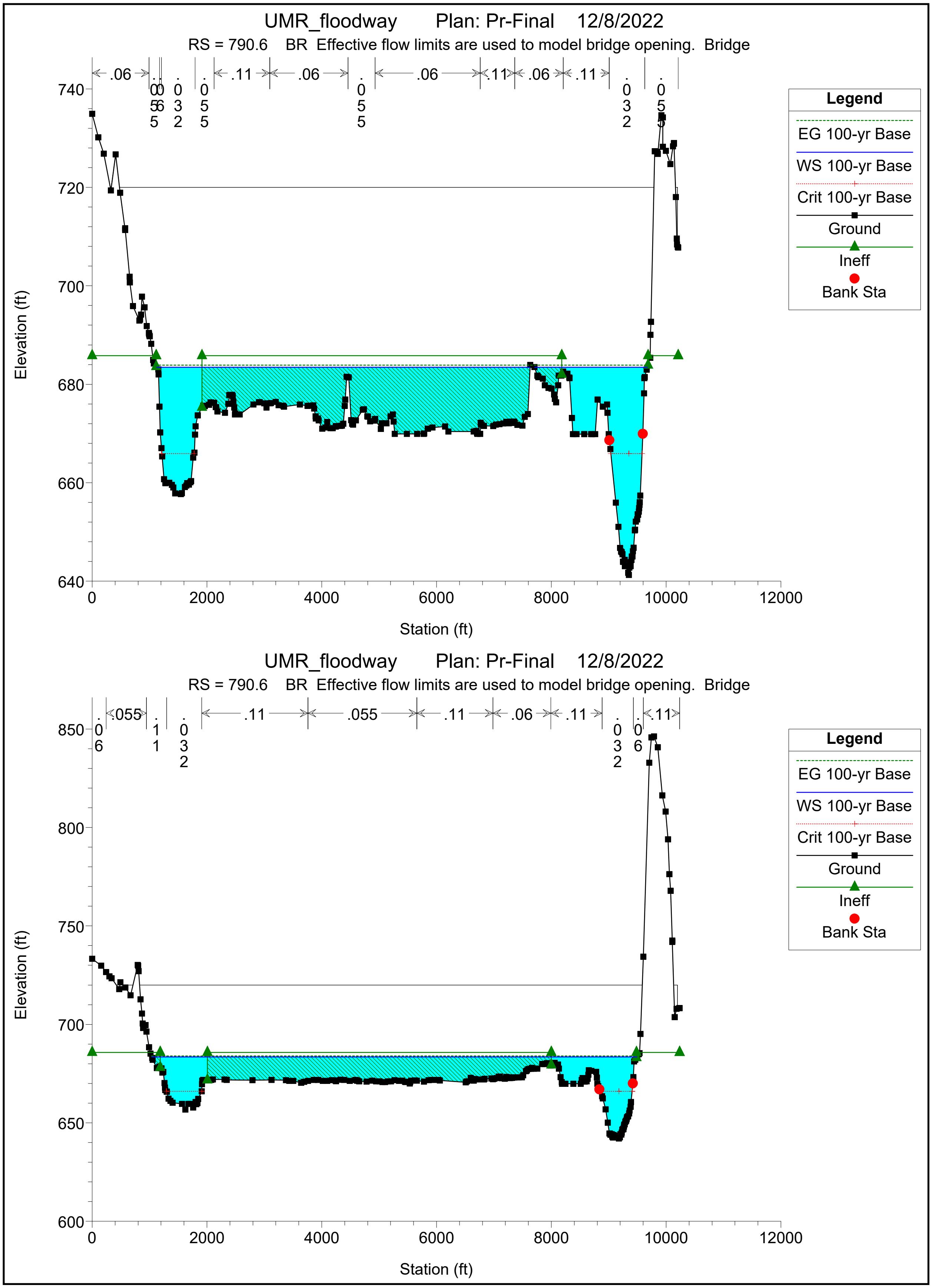

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 791.792
.06
.11
.055
.06
.06
.11
.055
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

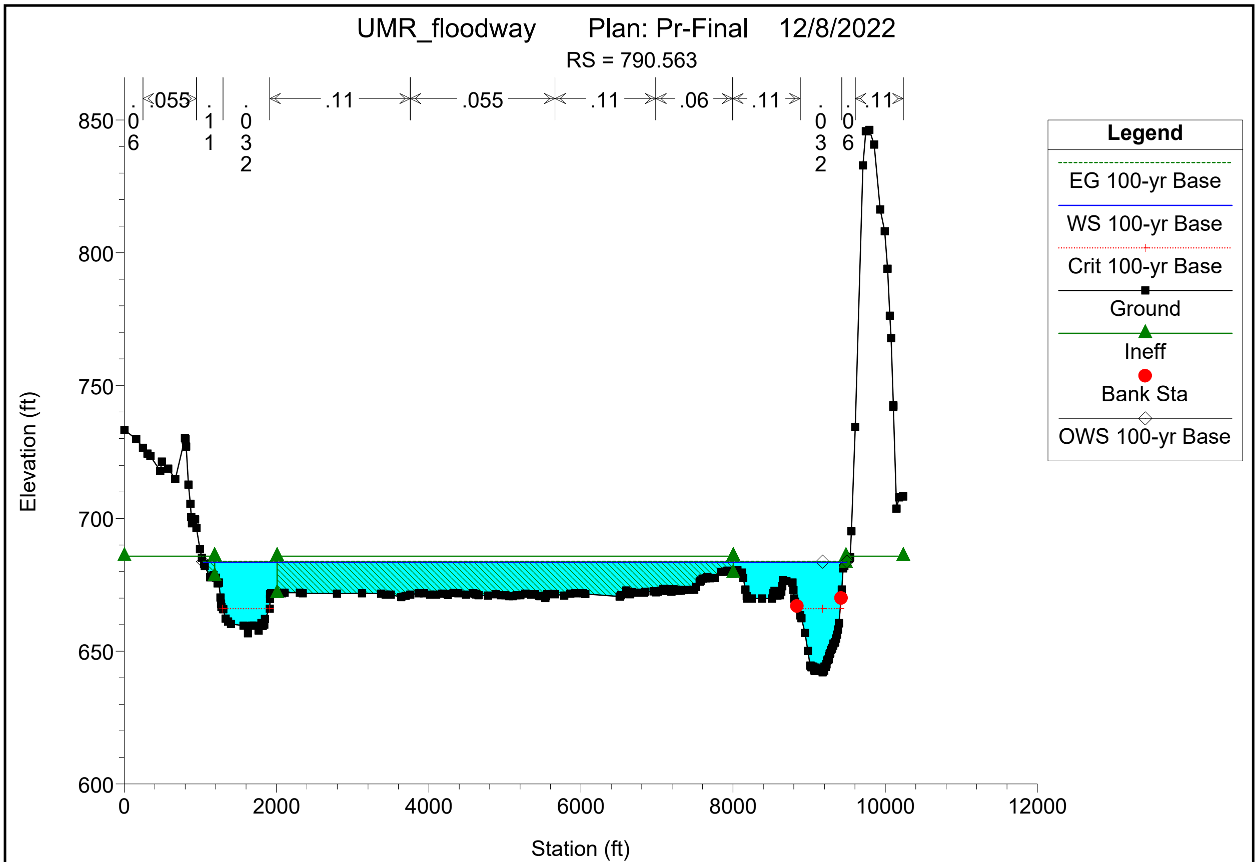

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 791.531
.06
.11
.055
.06
.11
.06
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

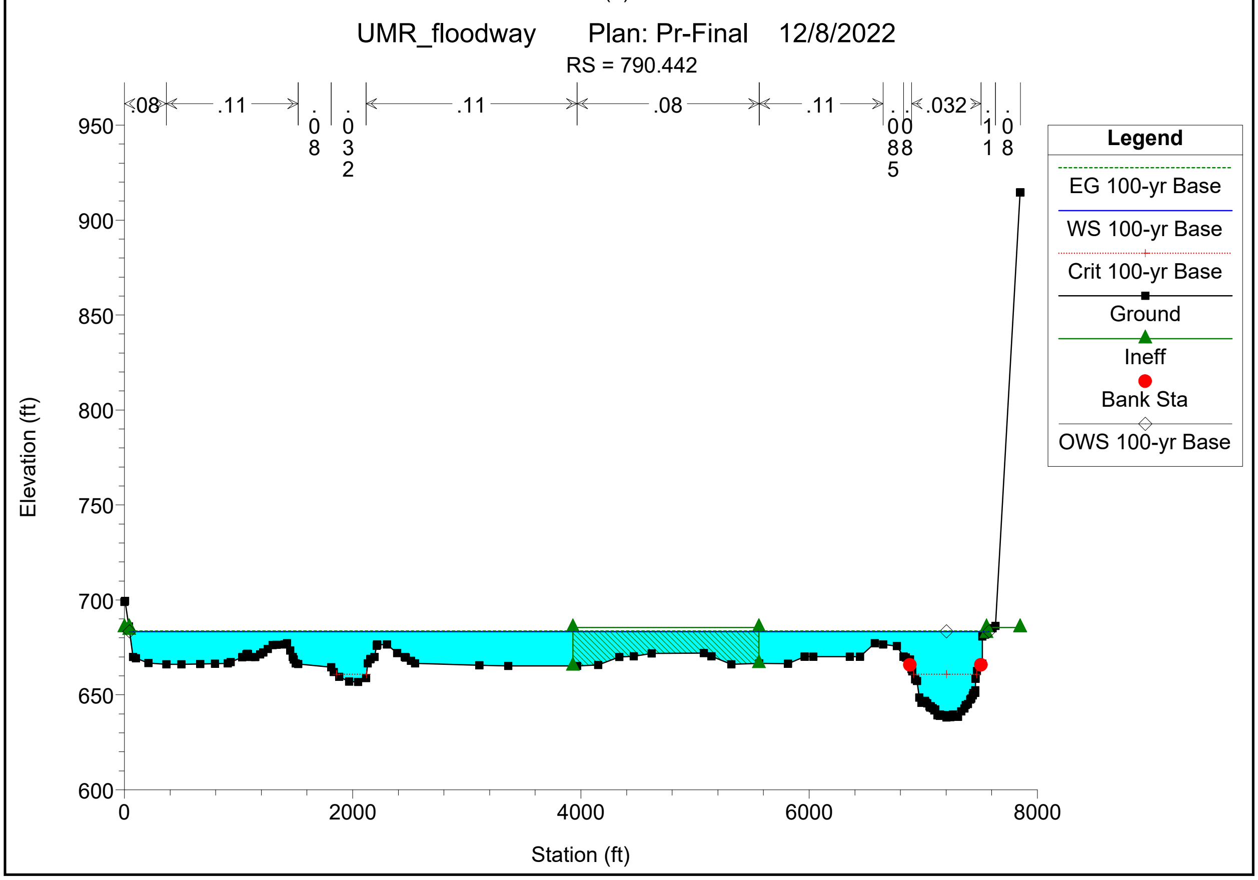

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 791.273
.06
.11
.06
.11
.055
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

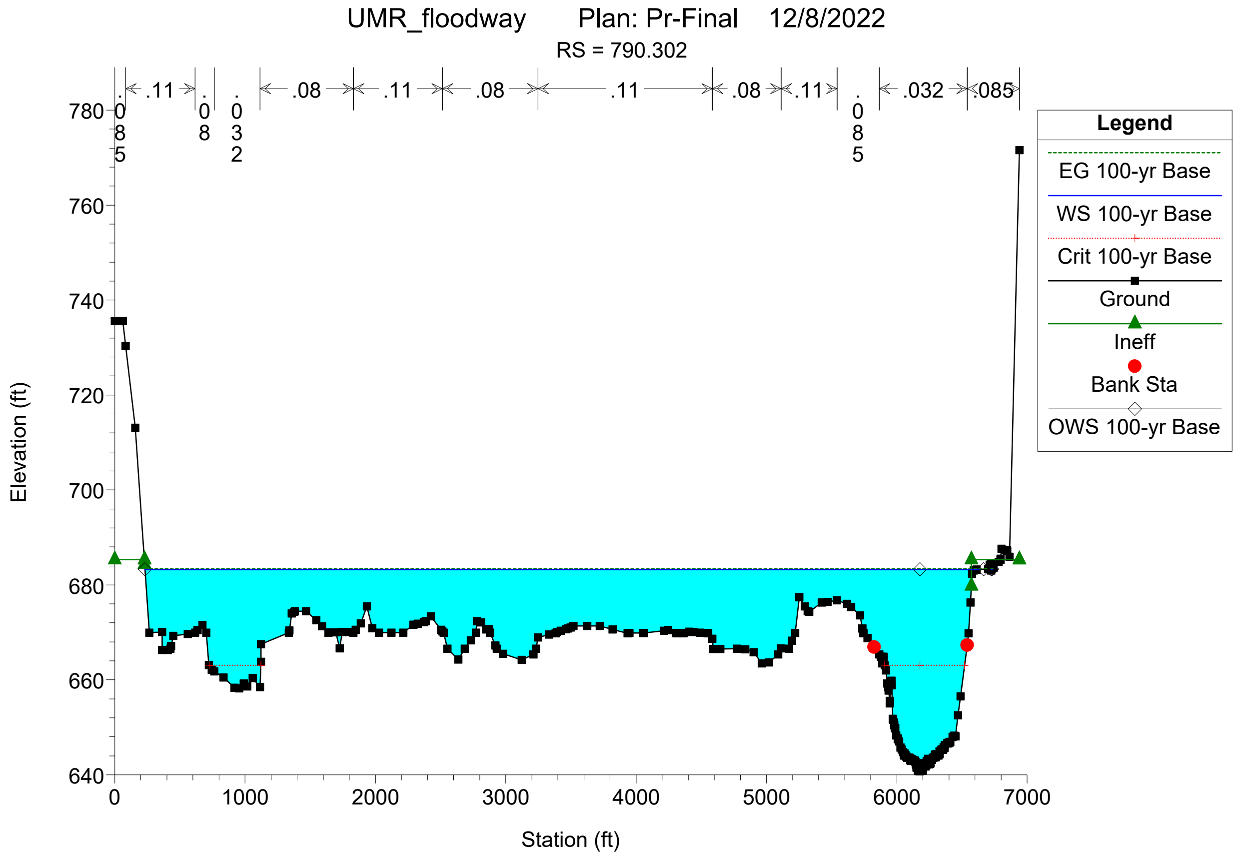

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 790.974
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

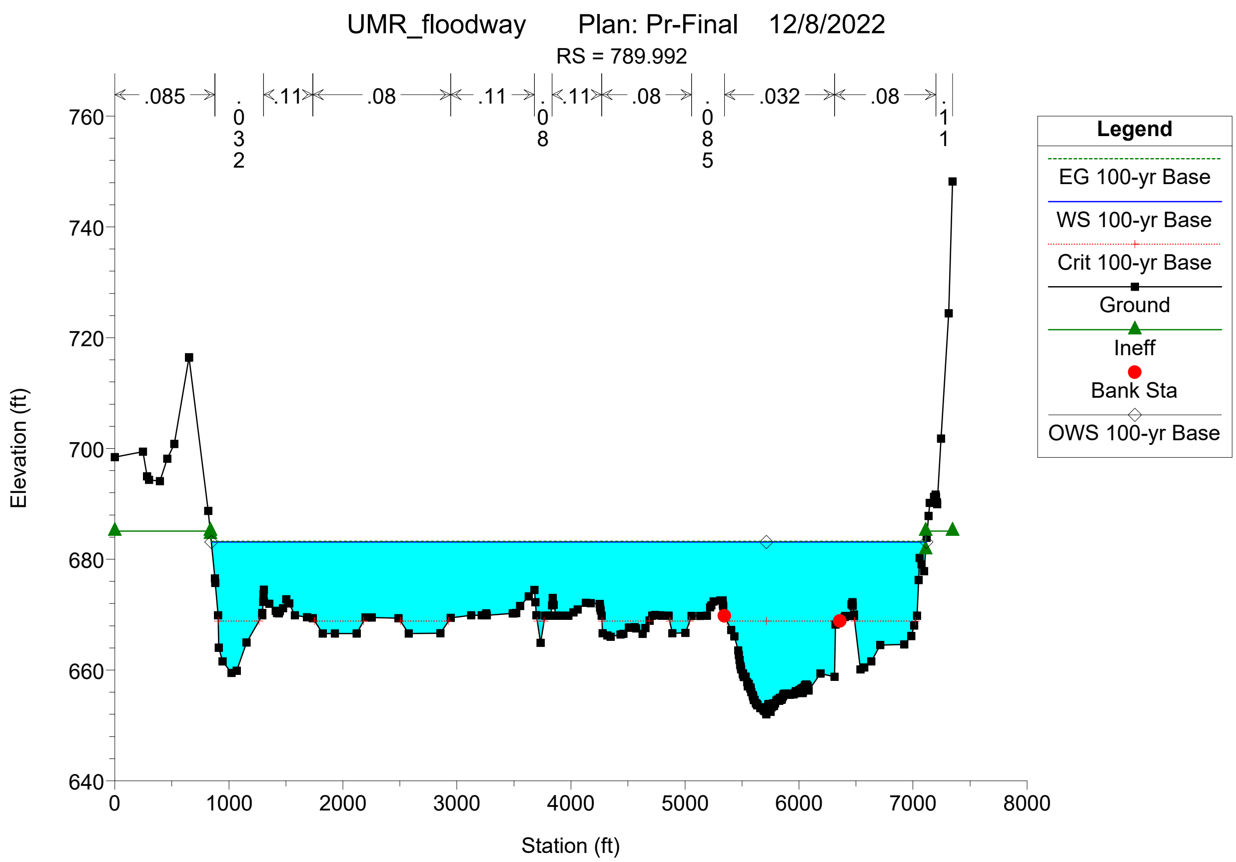

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 790.604
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

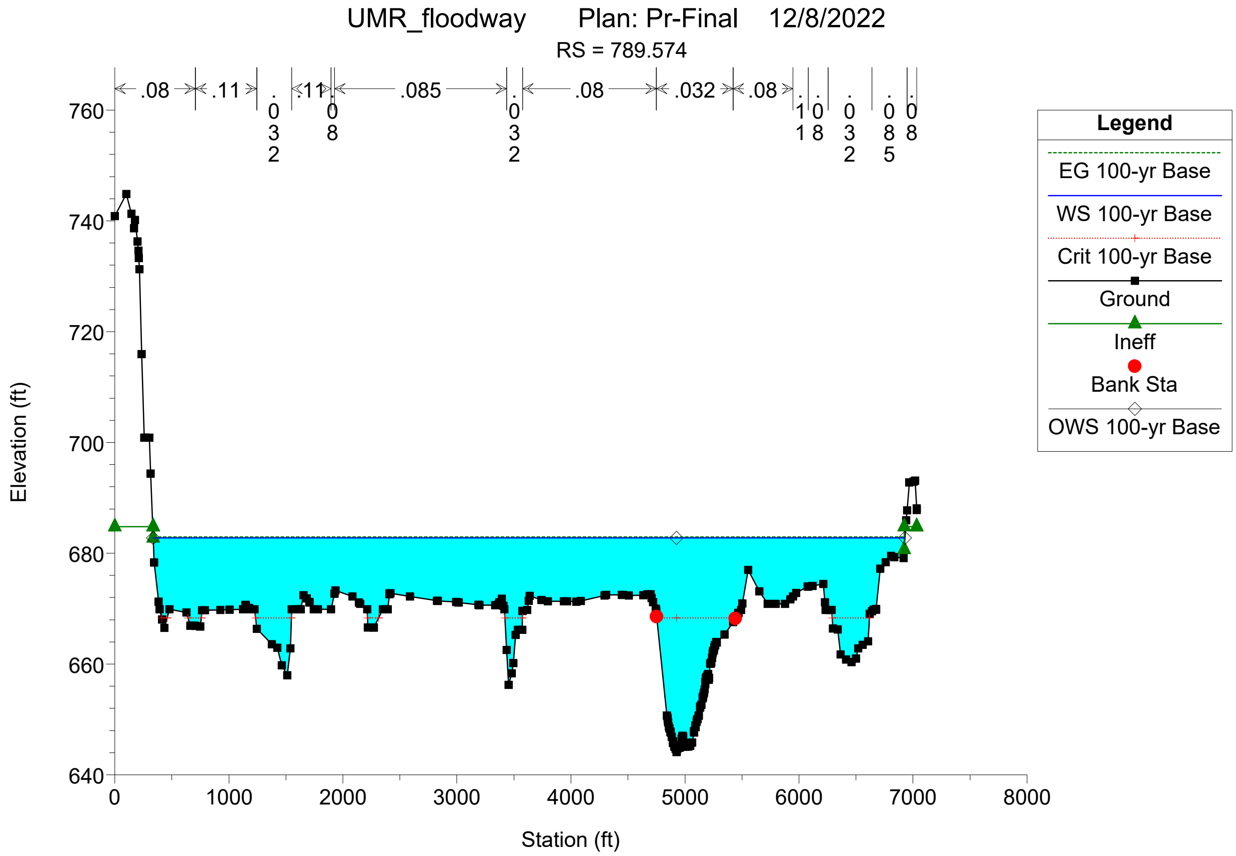

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 790.6 BR Effective flow limits are used to model bridge opening. Bridge
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
UMR_floodway Plan: Pr-Final 12/8/2022
RS = 790.6 BR Effective flow limits are used to model bridge opening. Bridge
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta

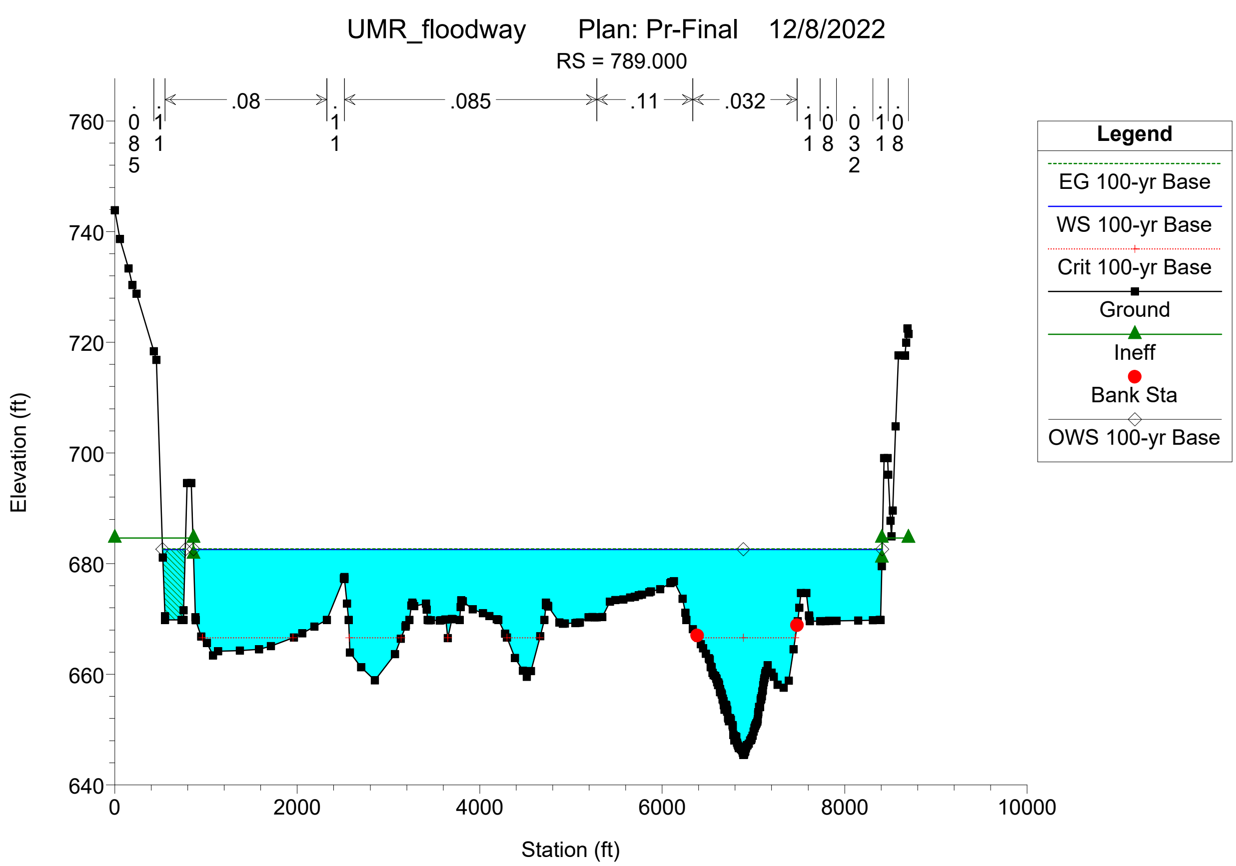

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 790.563
.055
.11
.055
.11
.06
.11
.11
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

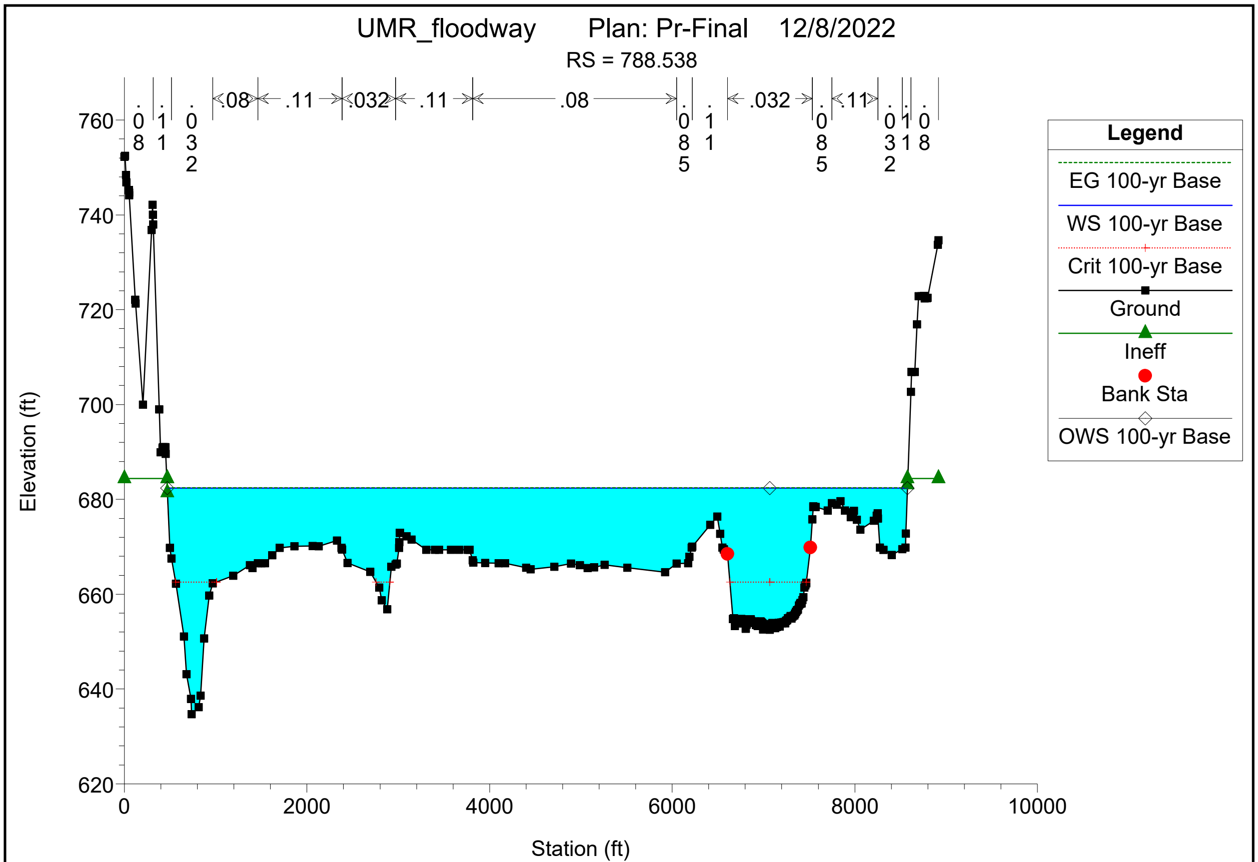

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 790.442
.08
.11
.11
.08
.11
.032
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

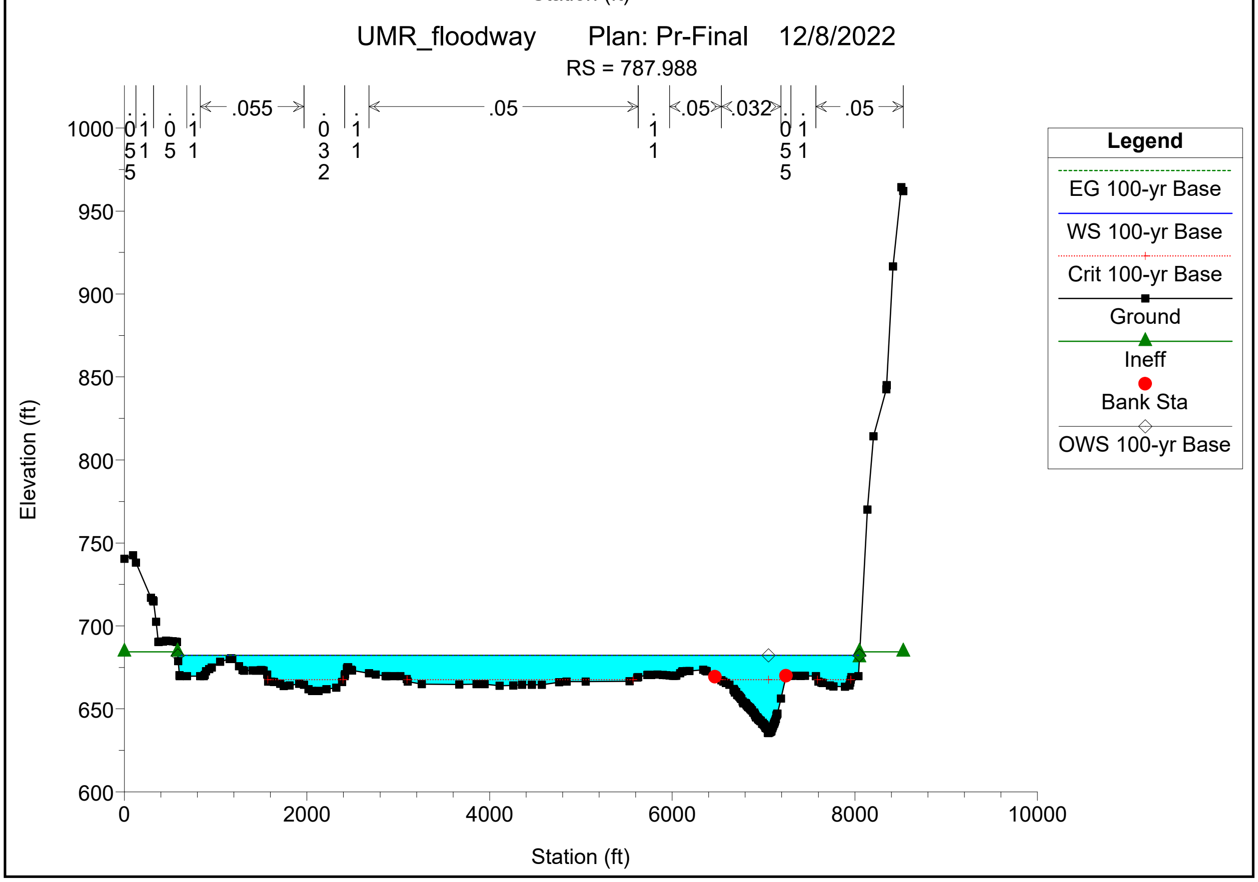

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 790.302
.085 .11 .08 .032 .08 .11 .08 .11 .08 .11 .085 .032 .085
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)
640 660 680 700 720 740 760 780
0 1000 2000 3000 4000 5000 6000 7000

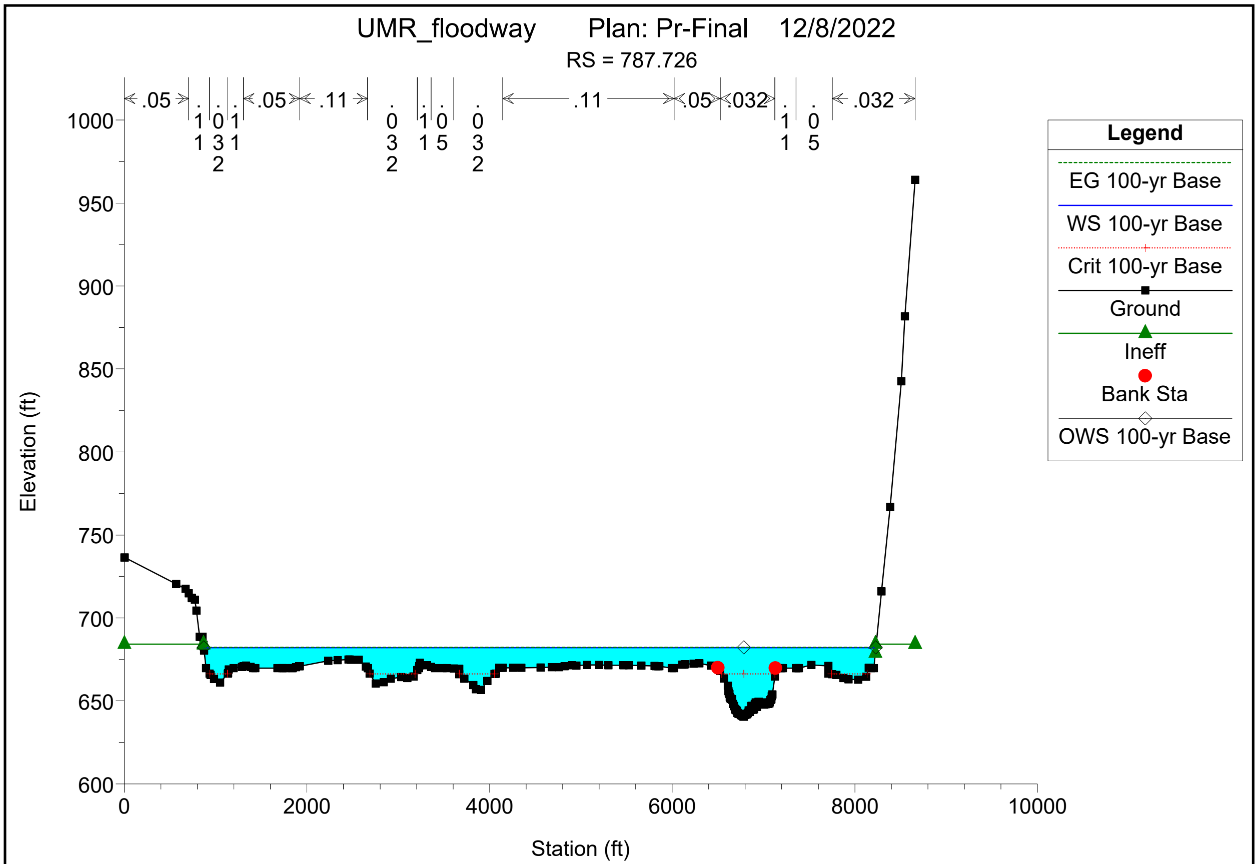

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 789.992
.085 .032 .11 .08 .11 .08 .11 .08 .085 .032 .08 .11
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)
640 660 680 700 720 740 760
0 1000 2000 3000 4000 5000 6000 7000 8000

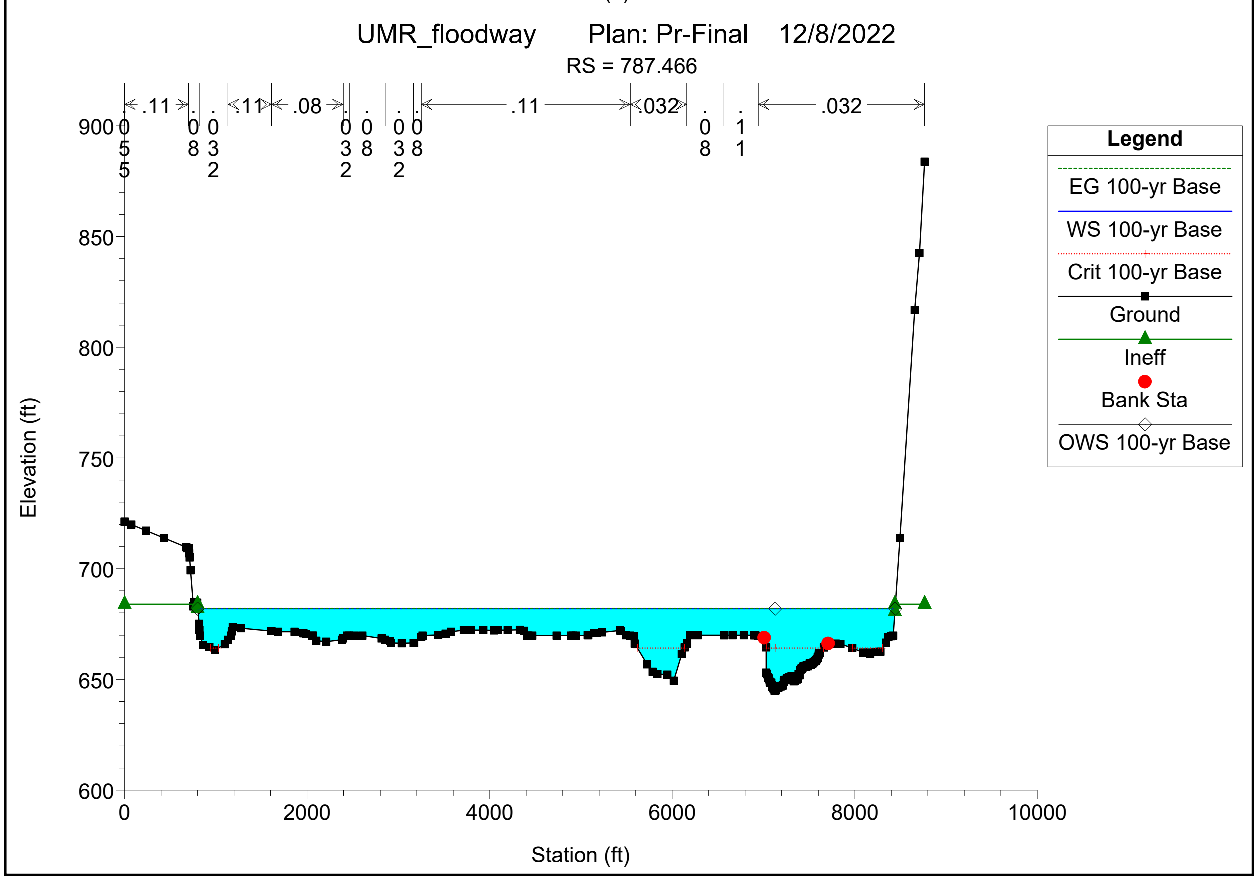

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 789.574
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

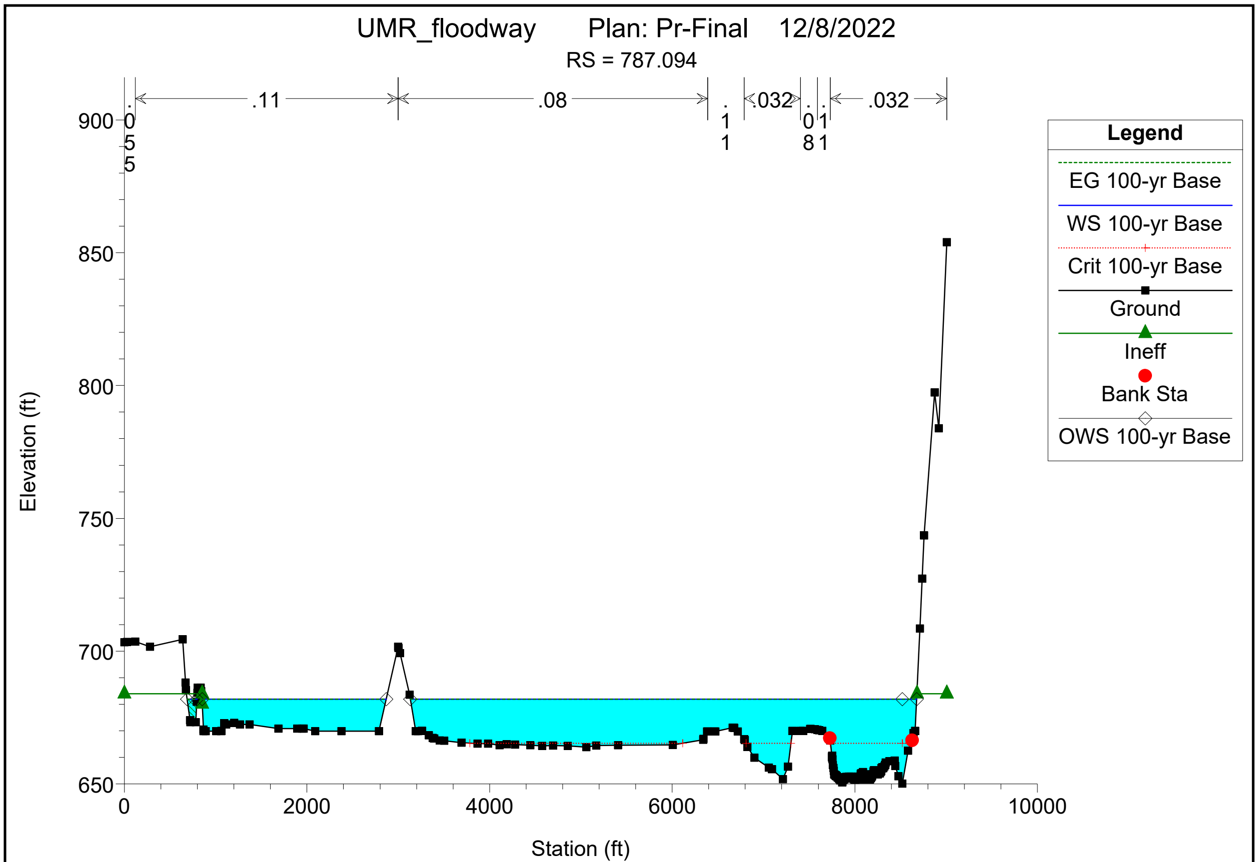

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 789.000
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base


UMR_floodway Plan: Pr-Final 12/8/2022
RS = 788.538
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

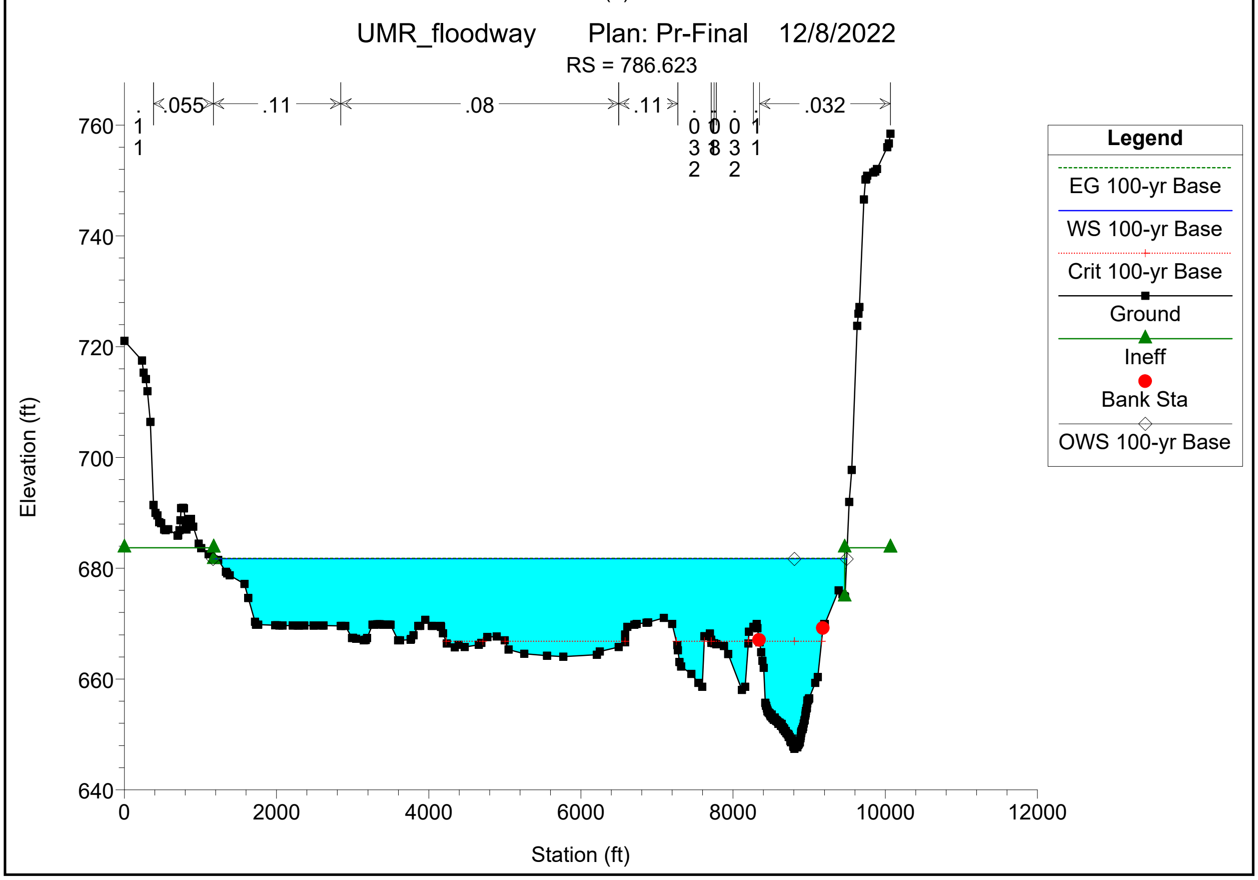

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 787.988
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)


UMR_floodway Plan: Pr-Final 12/8/2022
RS = 787.726
.05
.05
.11
.11
.05
.032
.032
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

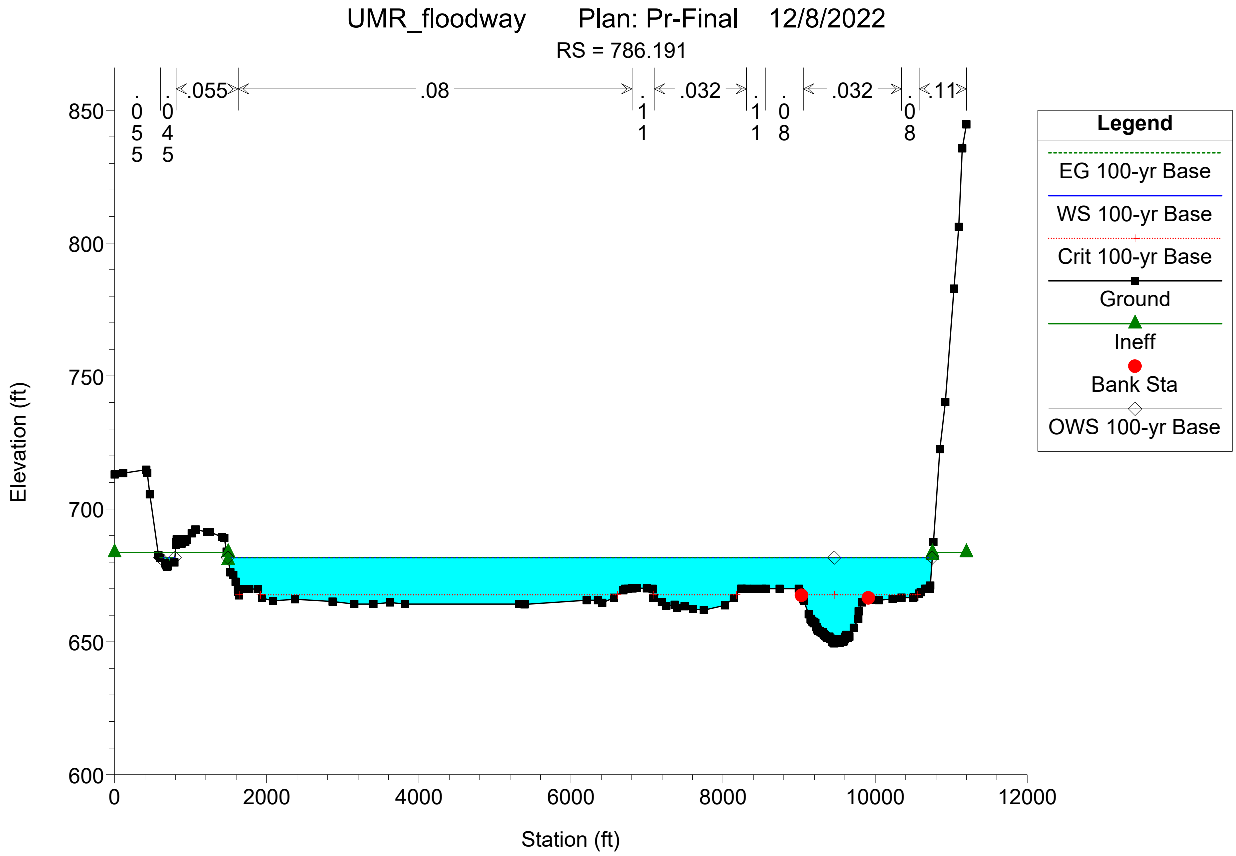

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 787.466
.11
.11
.08
.11
.032
.032
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base



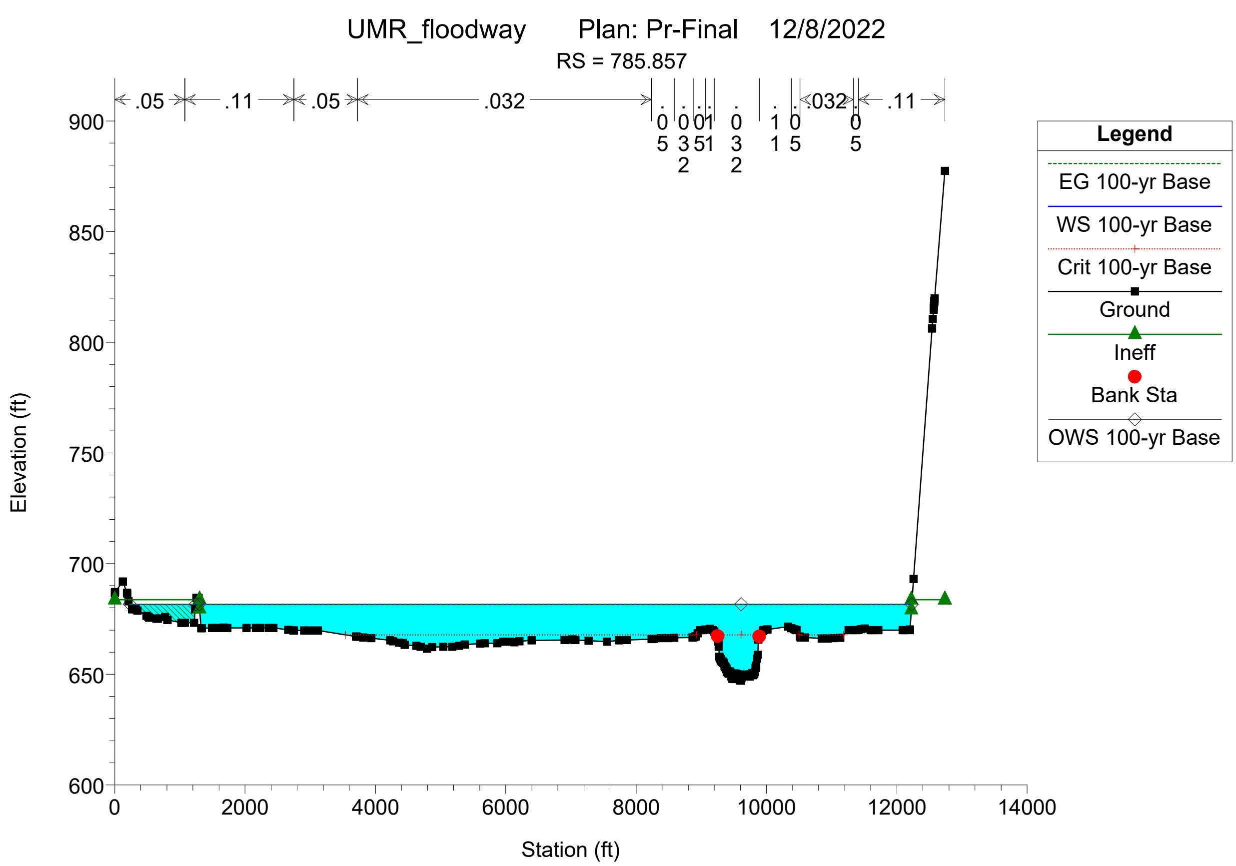
UMR_floodway Plan: Pr-Final 12/8/2022
RS = 787.094
.11
.08
.032
.032
.055
.11
.08
.11
900
850
800
750
700
650
0
2000
4000
6000
8000
10000
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base



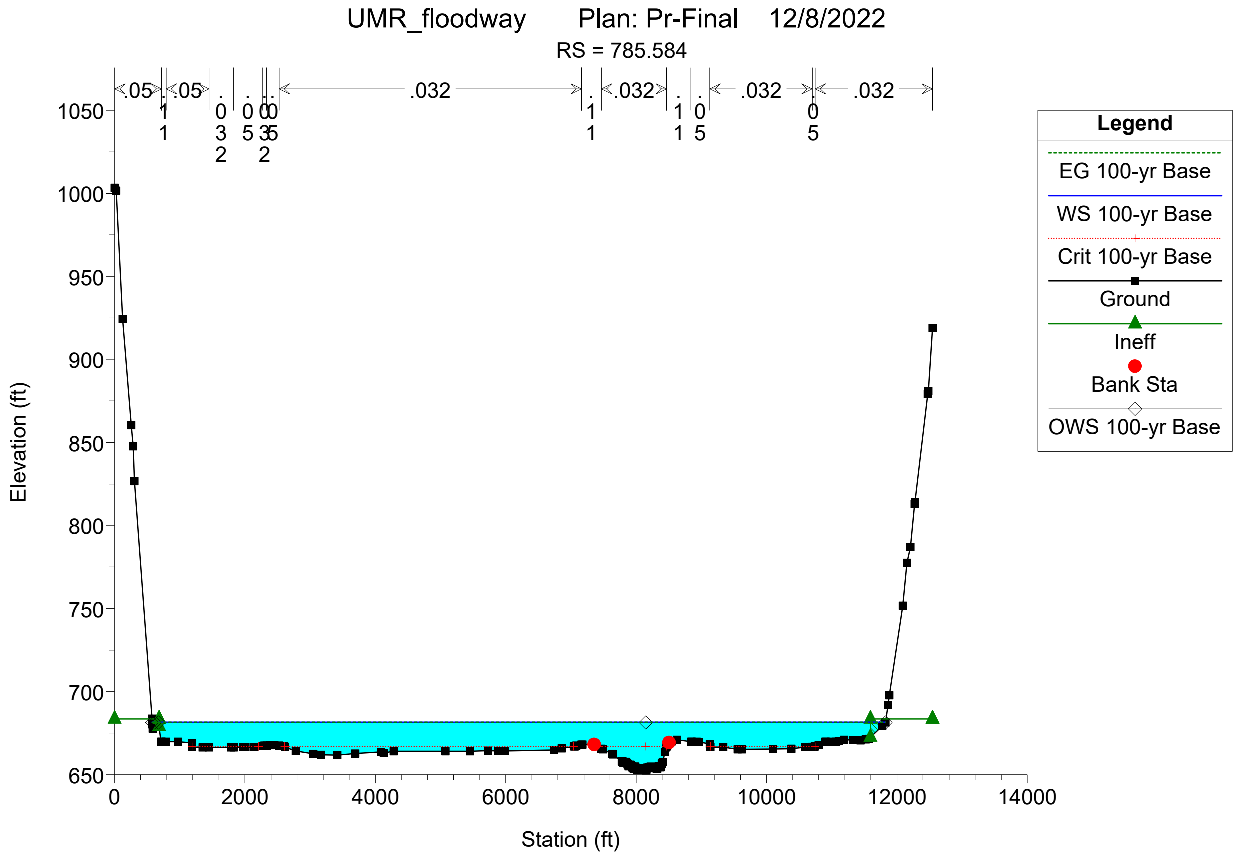
UMR_floodway Plan: Pr-Final 12/8/2022
RS = 786.623
.055
.11
.08
.11
.032
760
740
720
700
680
660
640
0
2000
4000
6000
8000
10000
12000
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

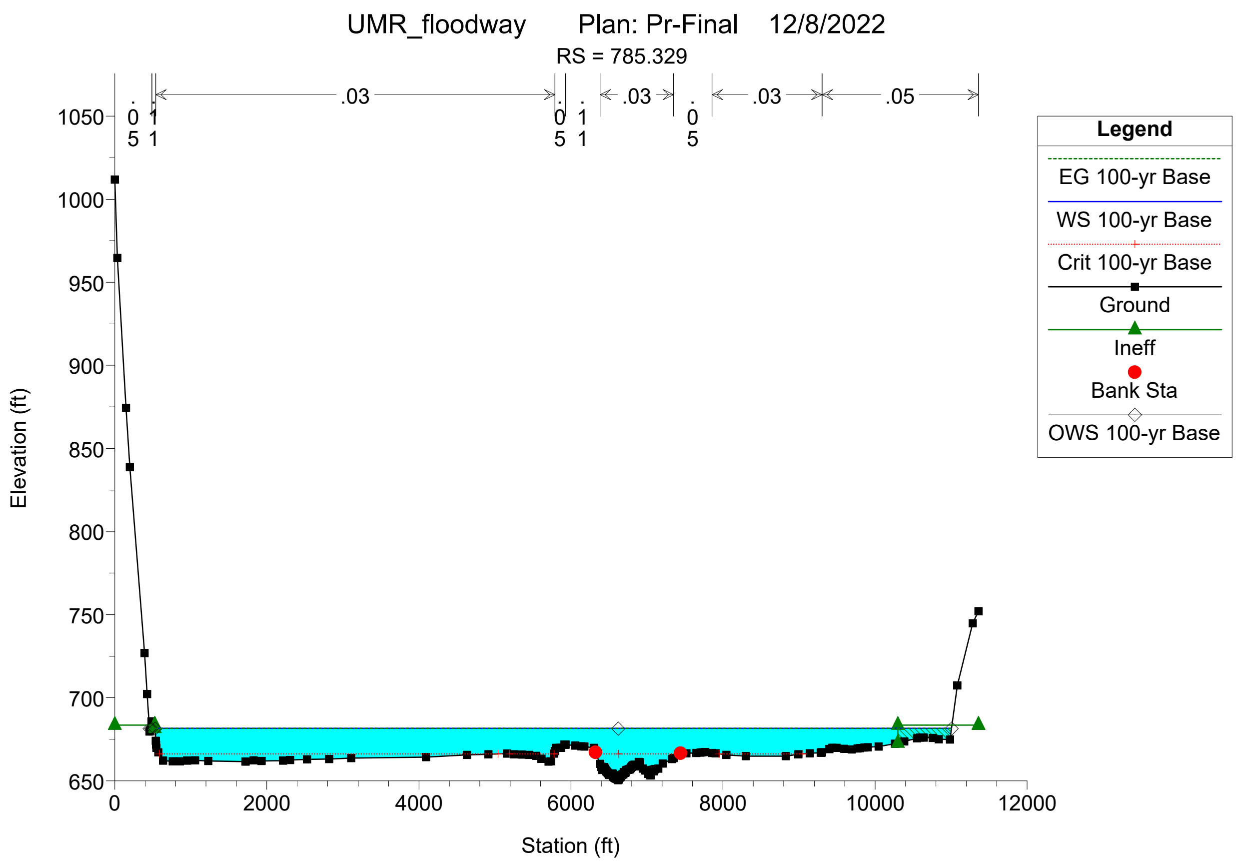


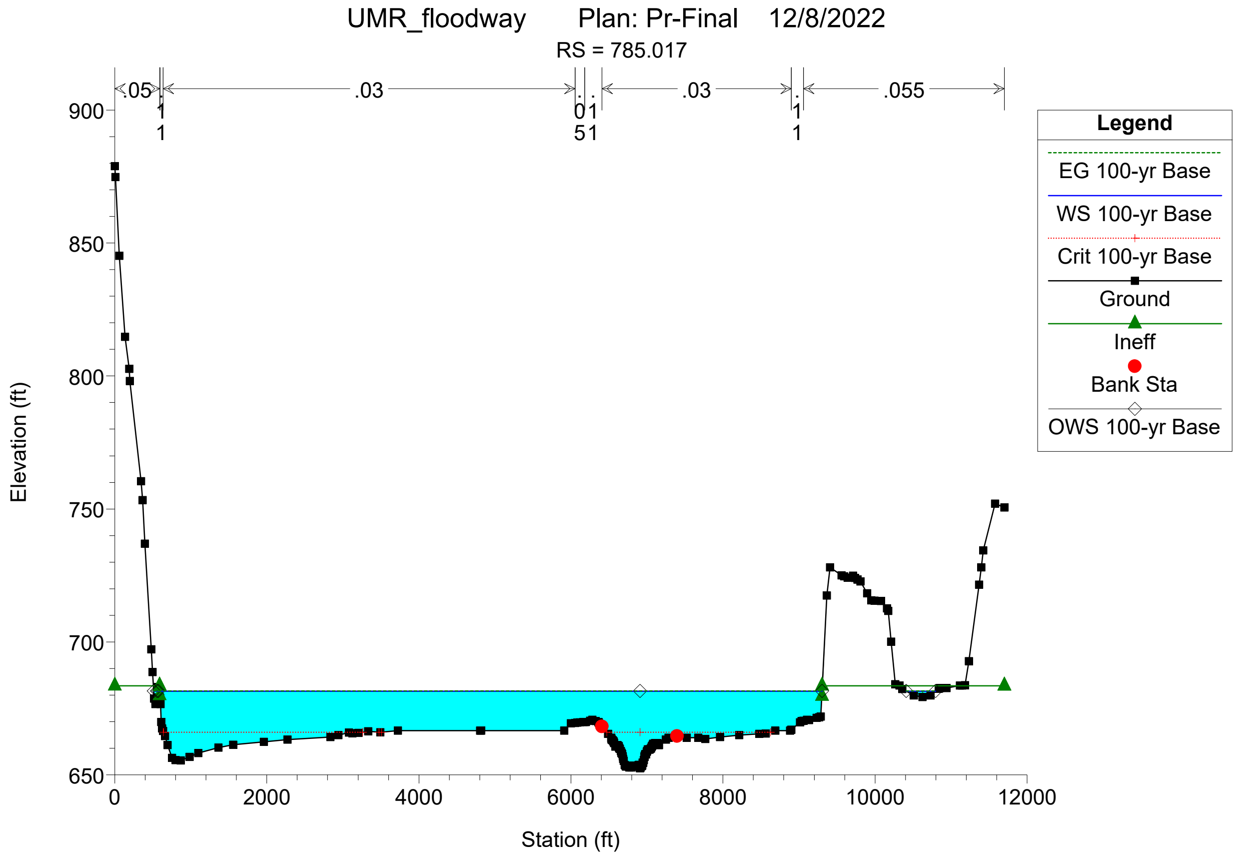
UMR_floodway Plan: Pr-Final 12/8/2022
RS = 786.191
.055
.08
.032
.032
.11
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)
600
650
700
750
800
850
0
2000
4000
6000
8000
10000
12000

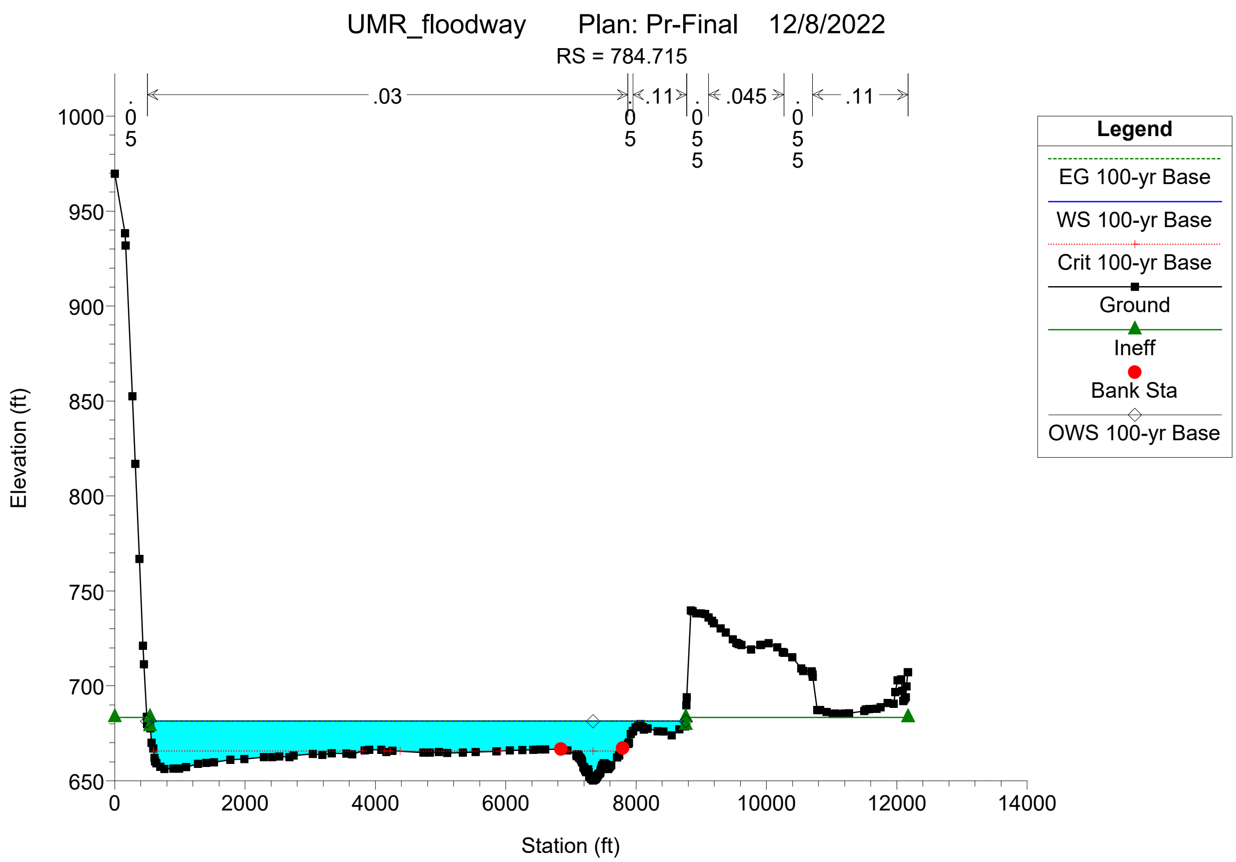


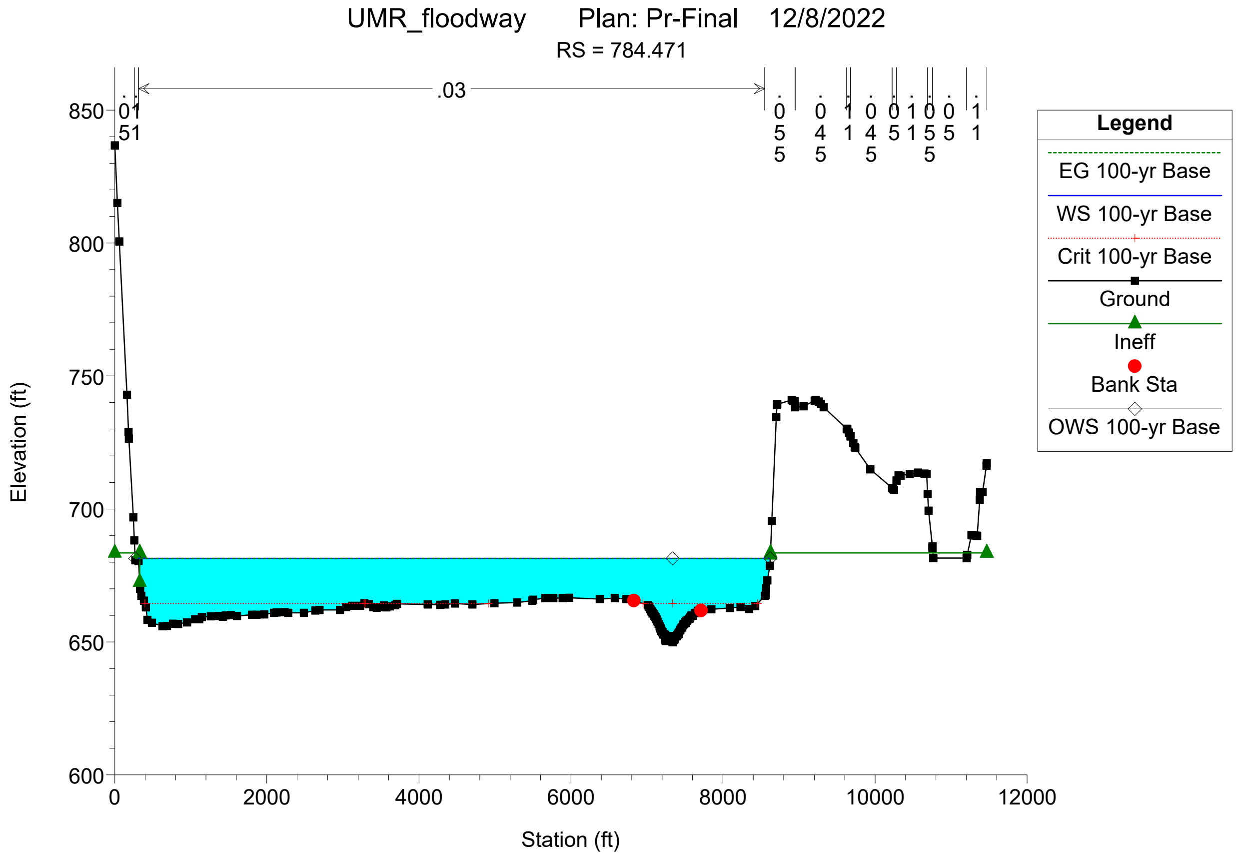
UMR_floodway Plan: Pr-Final 12/8/2022
RS = 785.857
.05
.11
.05
.032
.032
.11
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)
600
650
700
750
800
850
900
0
2000
4000
6000
8000
10000
12000
14000

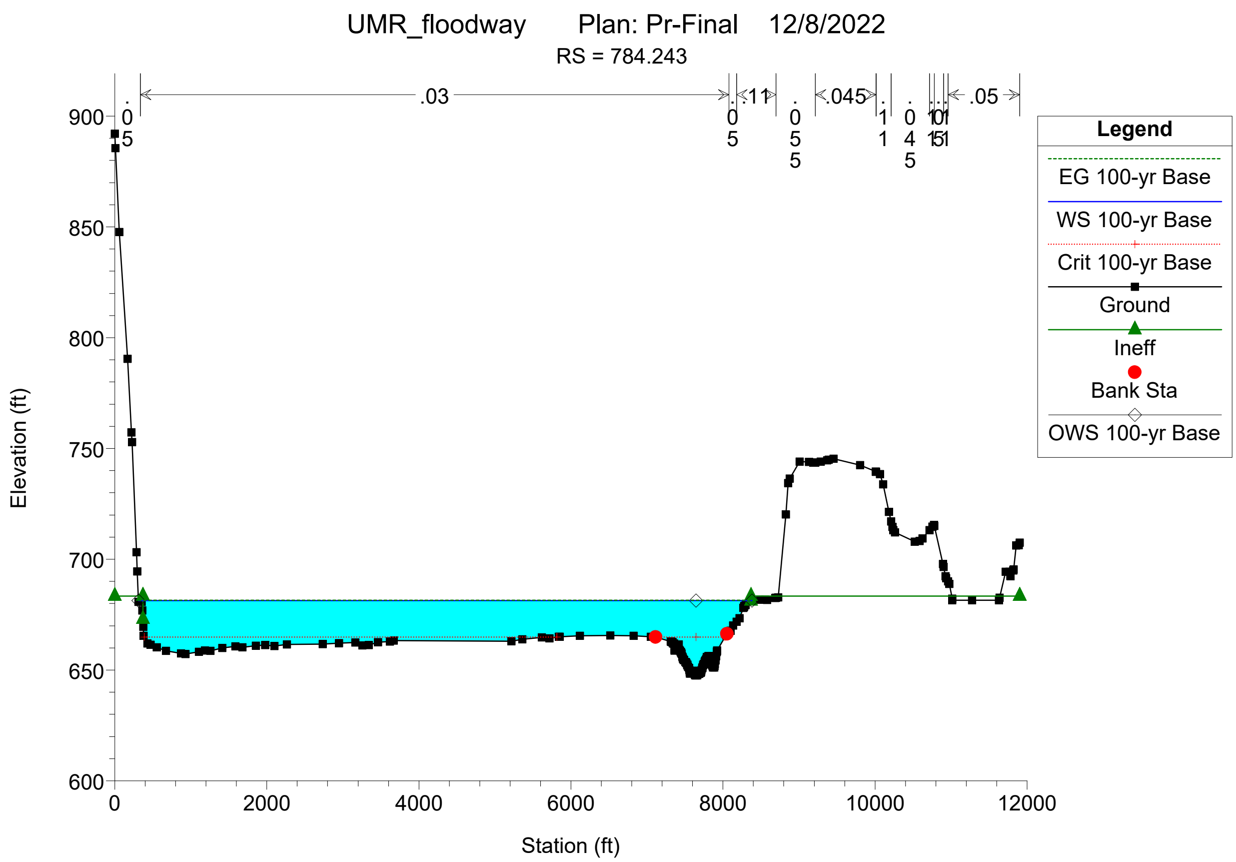

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 785.584
.05
.05
.032
.032
.032
.032
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

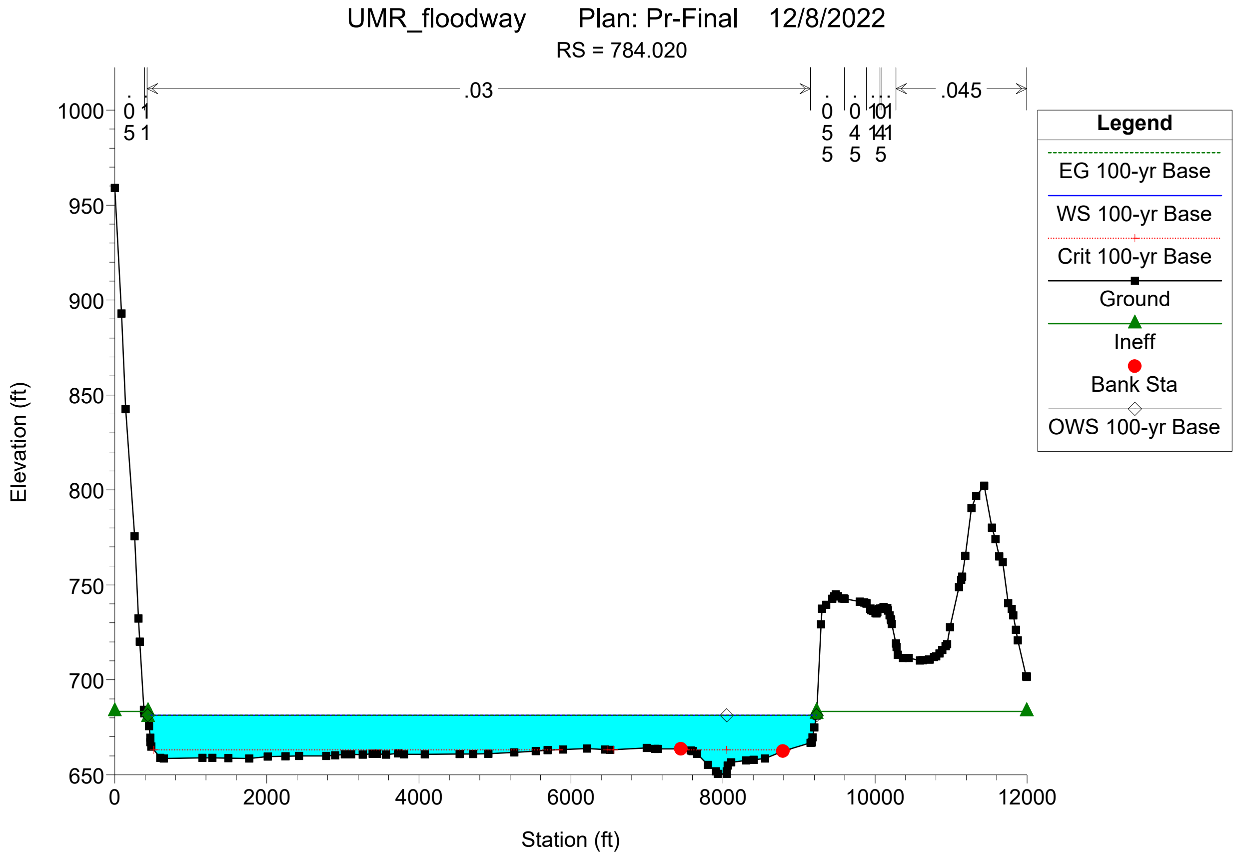

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 785.329
.03
.03
.03
.05
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

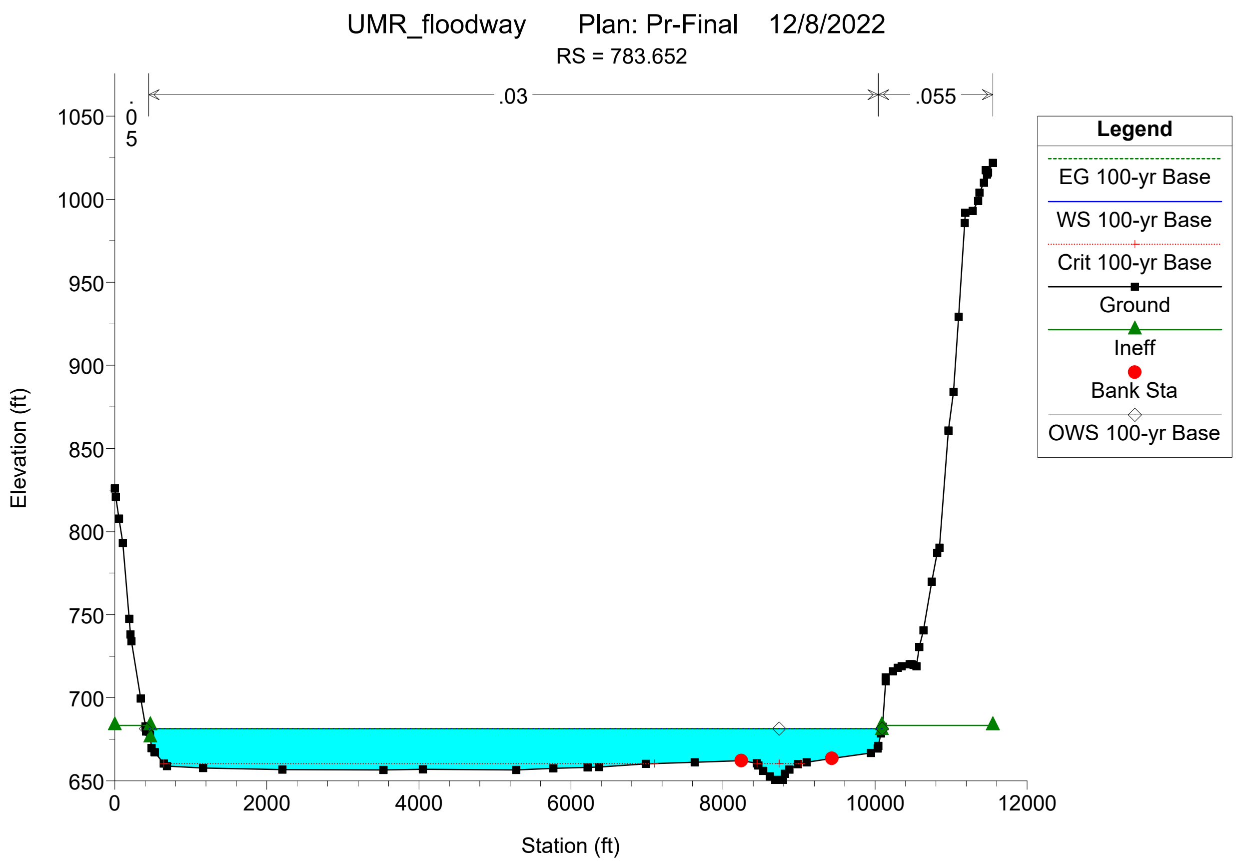

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 785.017
.05
.03
.03
.055
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

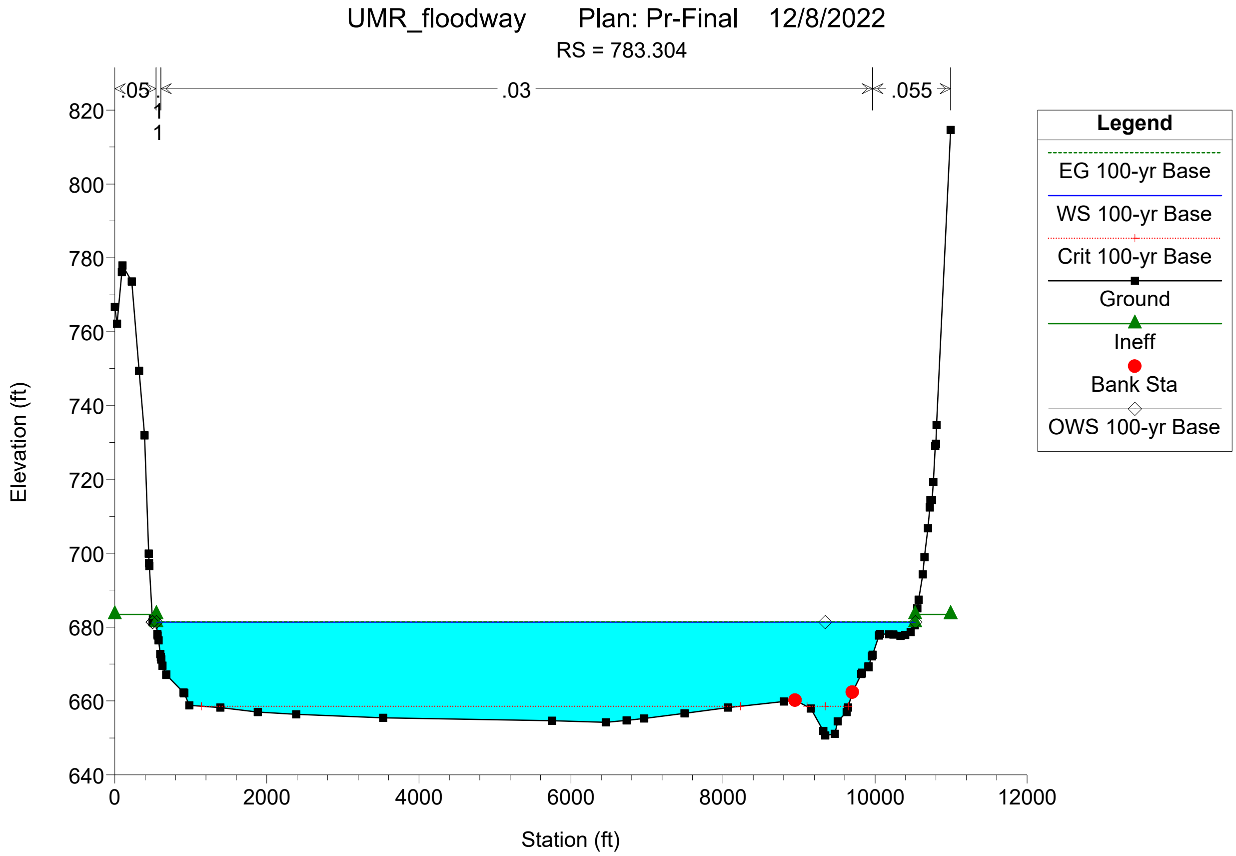

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 784.715
.03
.11
.045
.11
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

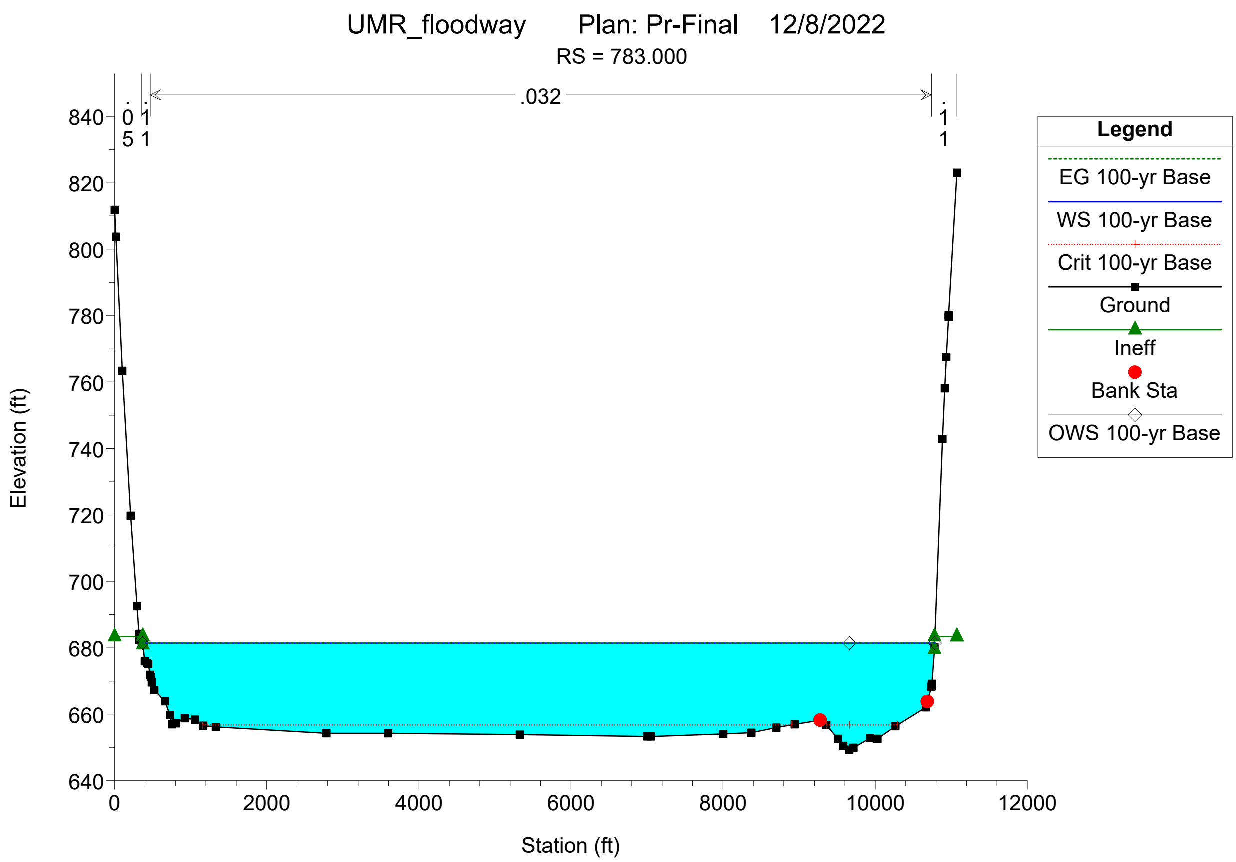

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 784.471
.03
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

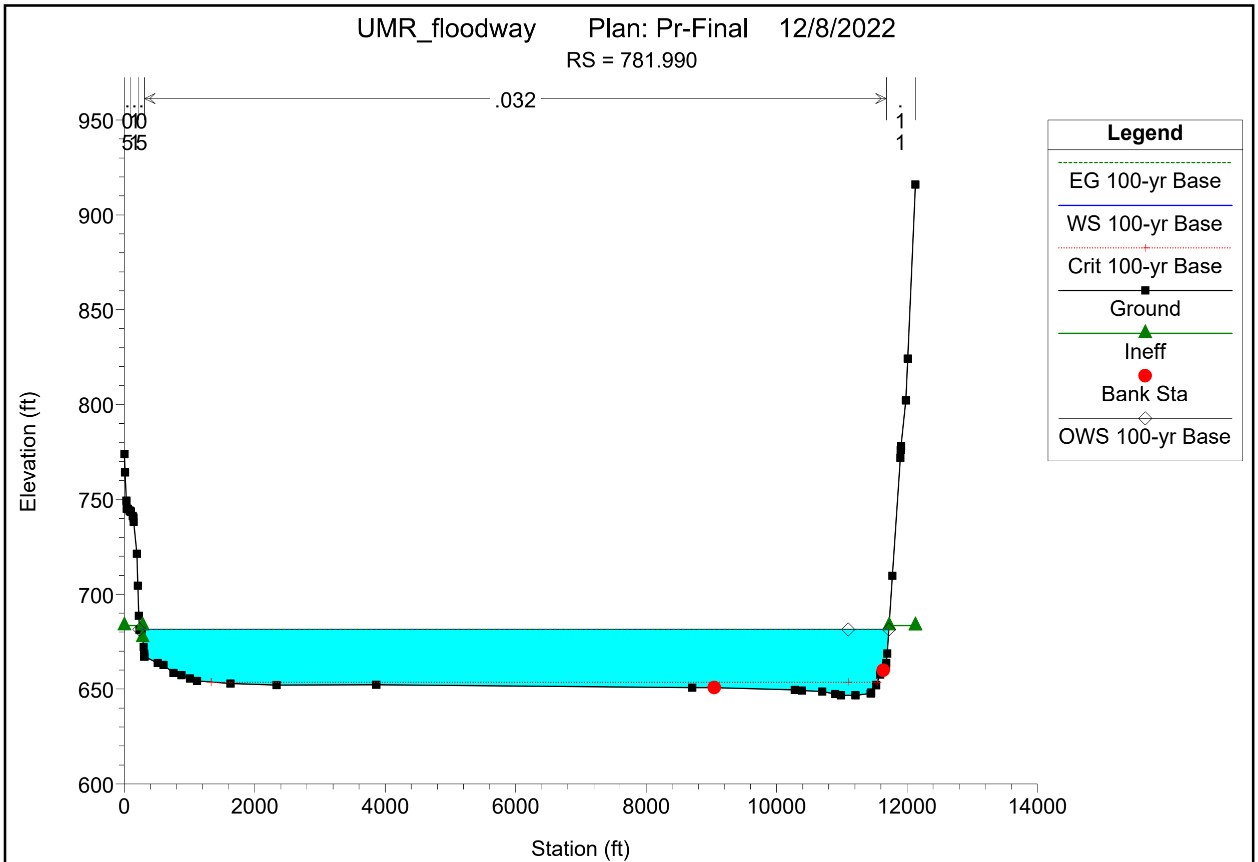

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 784.243
.03
.045
.05
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

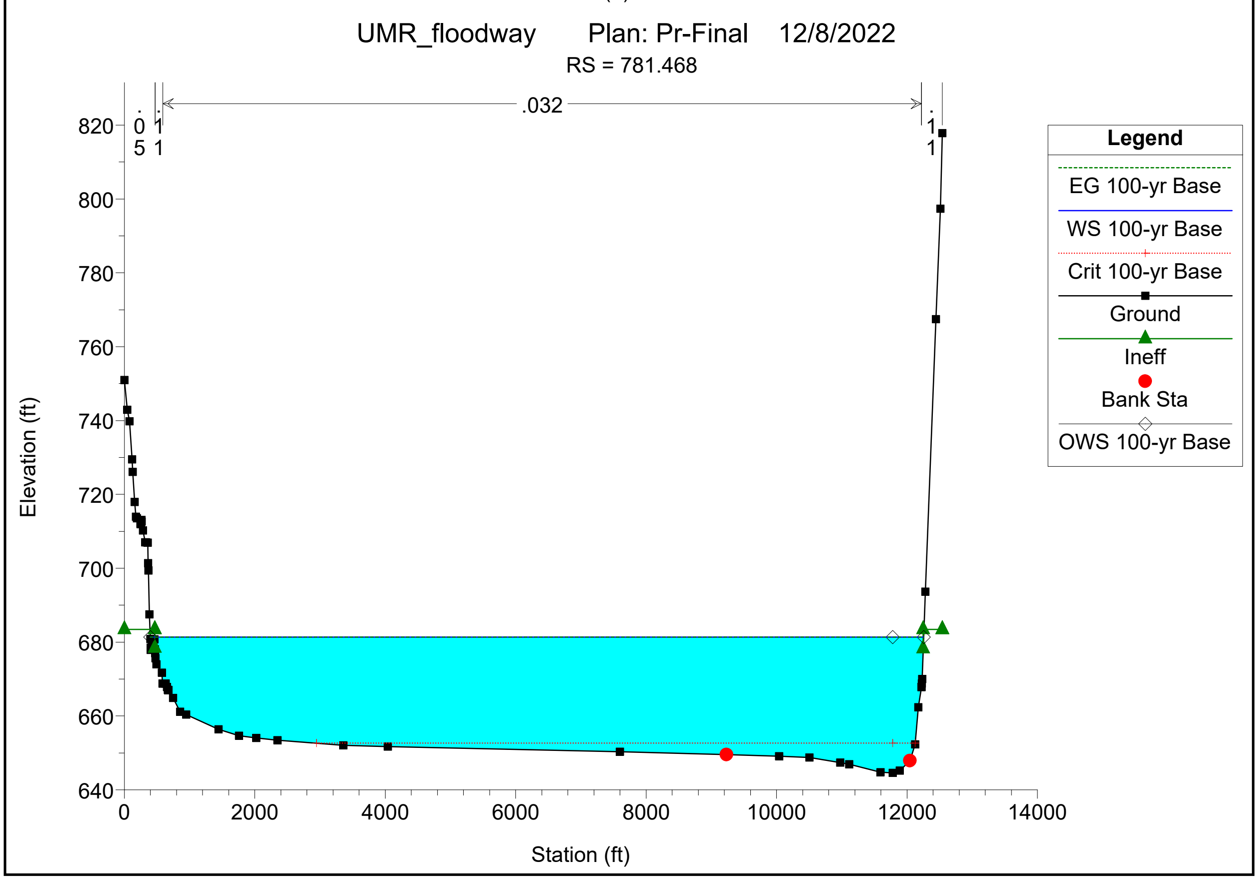

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 784.020
.03
.045
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

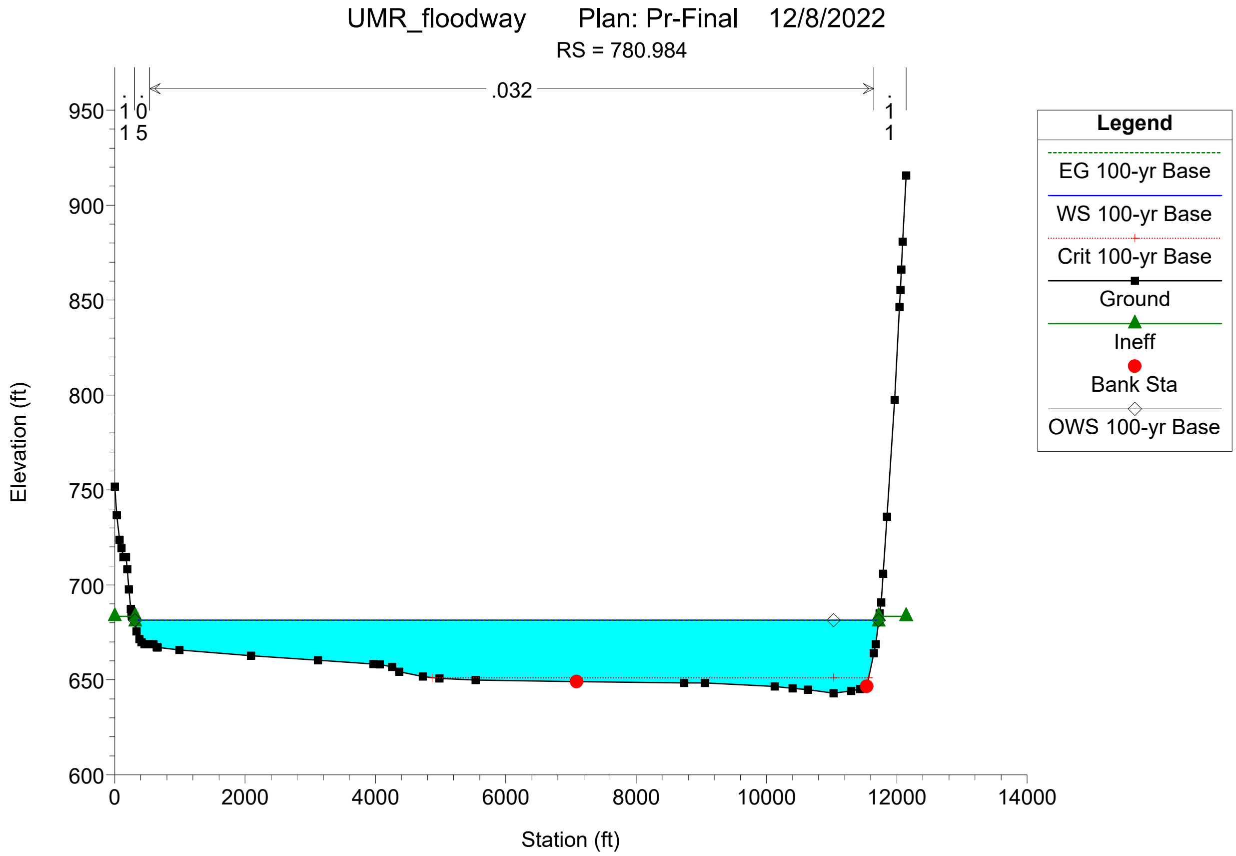

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 783.652
.03
.055
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)


UMR_floodway Plan: Pr-Final 12/8/2022
RS = 783.304
.05
.03
.055
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

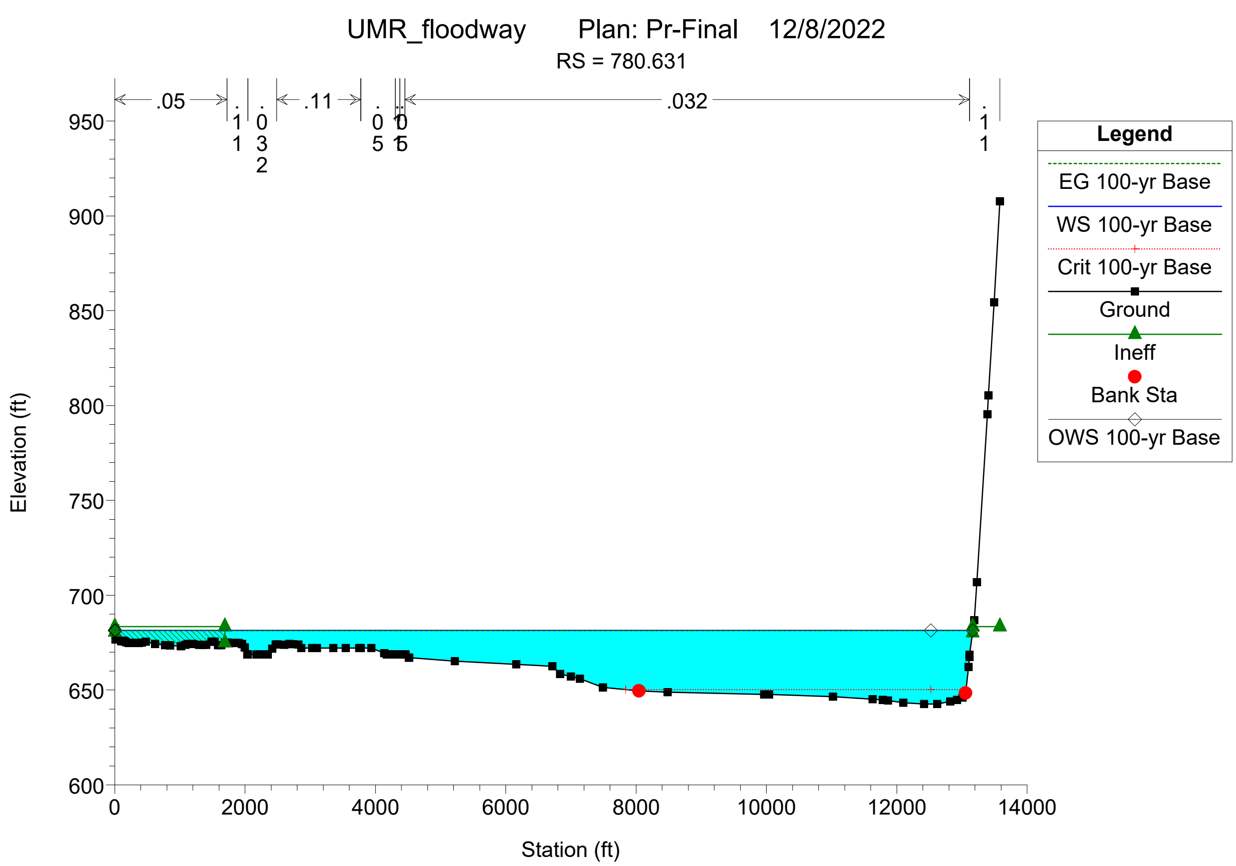

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 783.000
.032
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)


UMR_floodway Plan: Pr-Final 12/8/2022
RS = 781.990
.032
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

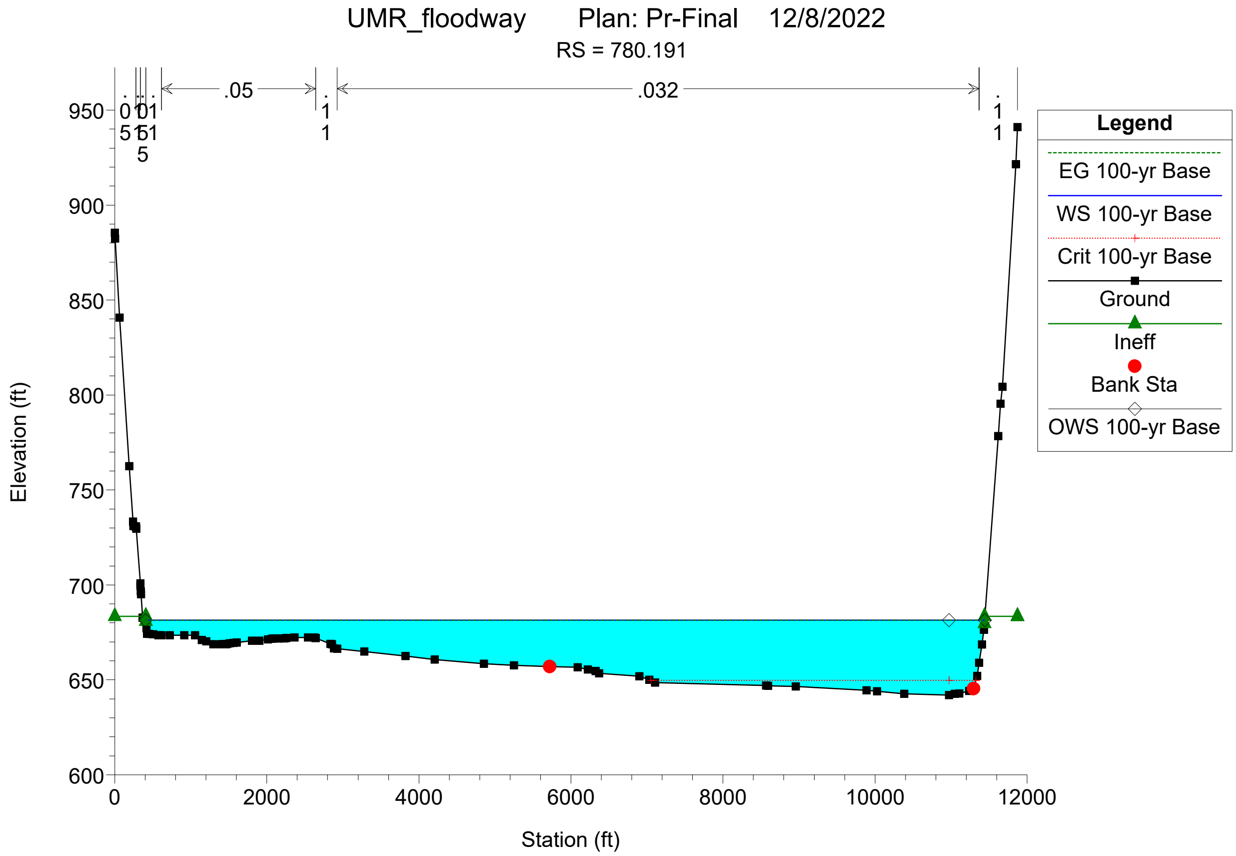

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 781.468
.032
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base



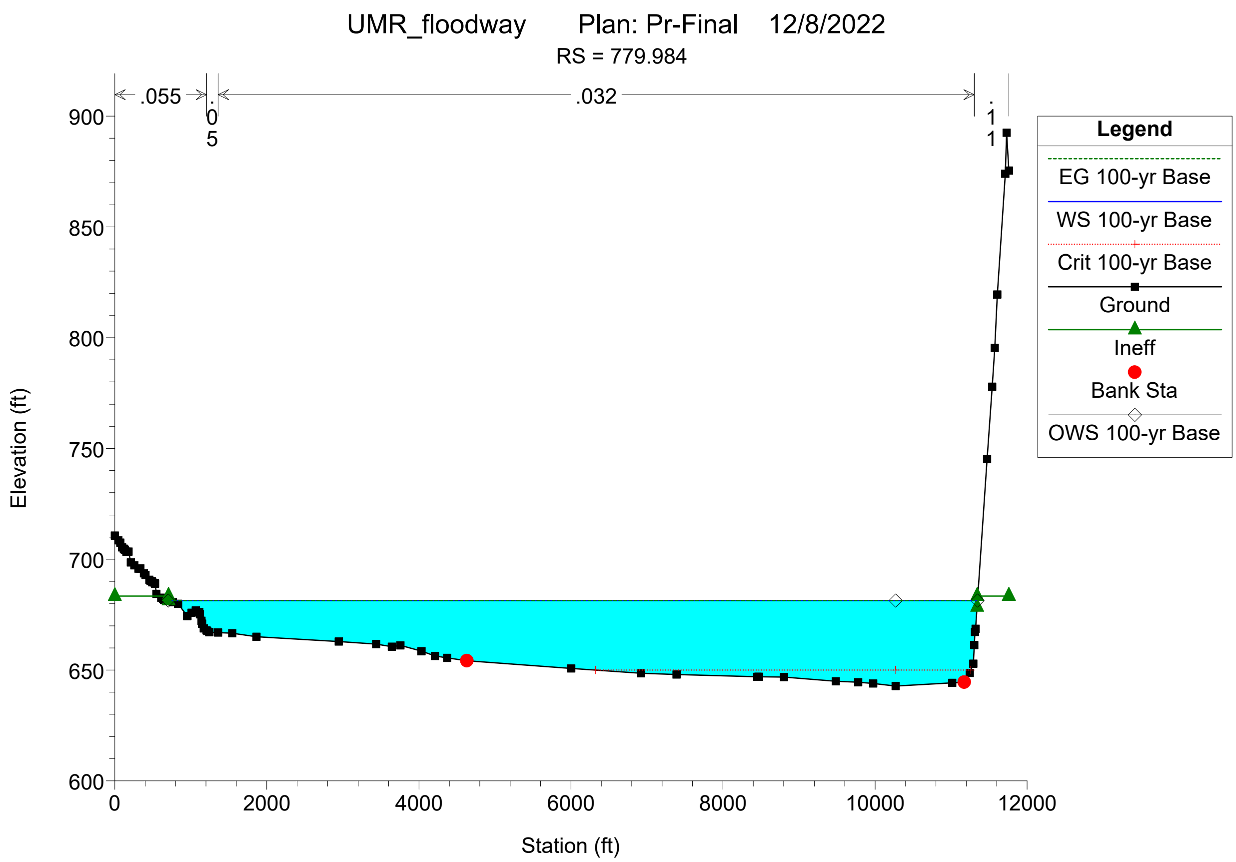
UMR_floodway Plan: Pr-Final 12/8/2022
RS = 780.984
.032
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base



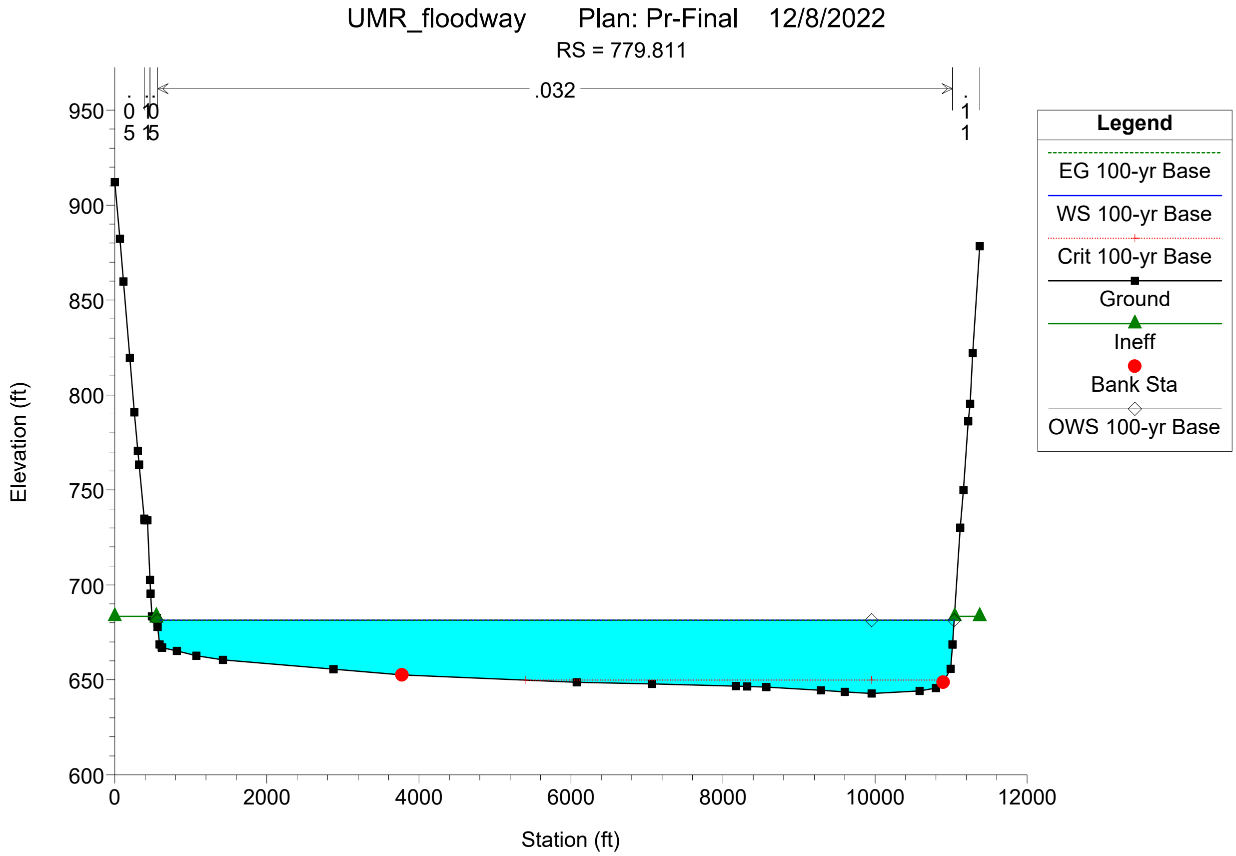
UMR_floodway Plan: Pr-Final 12/8/2022
RS = 780.631
.05
.11
.032
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base



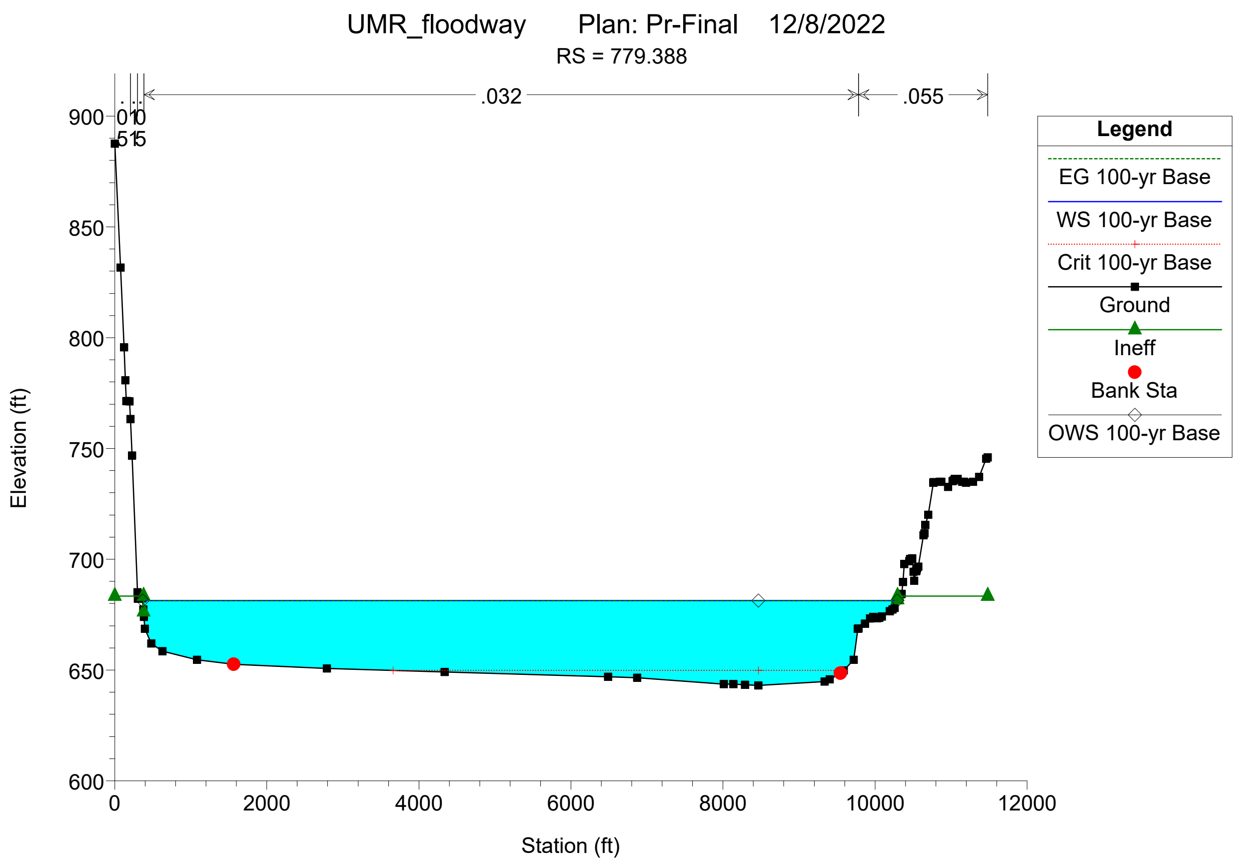
UMR_floodway Plan: Pr-Final 12/8/2022
RS = 780.191
.05
.032
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)



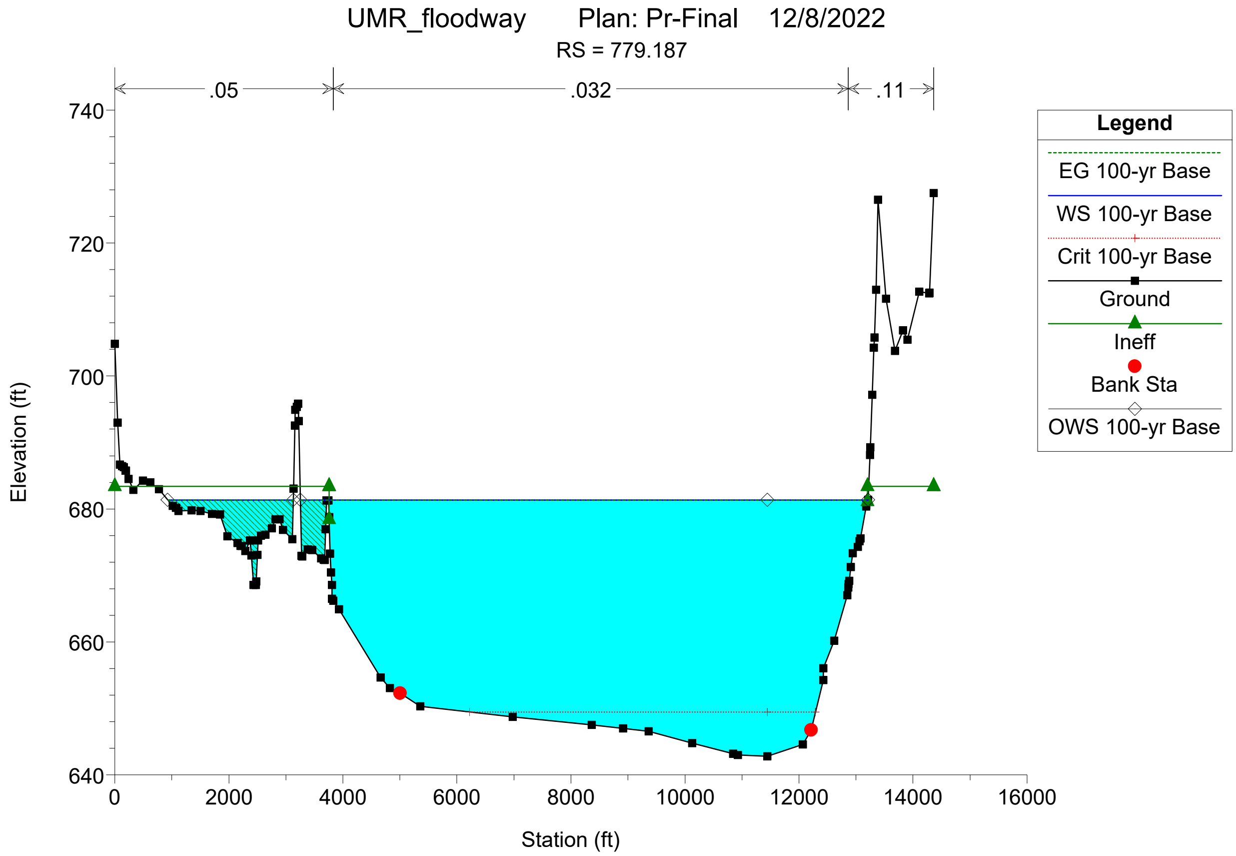
UMR_floodway Plan: Pr-Final 12/8/2022
RS = 779.984
.055
.032
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

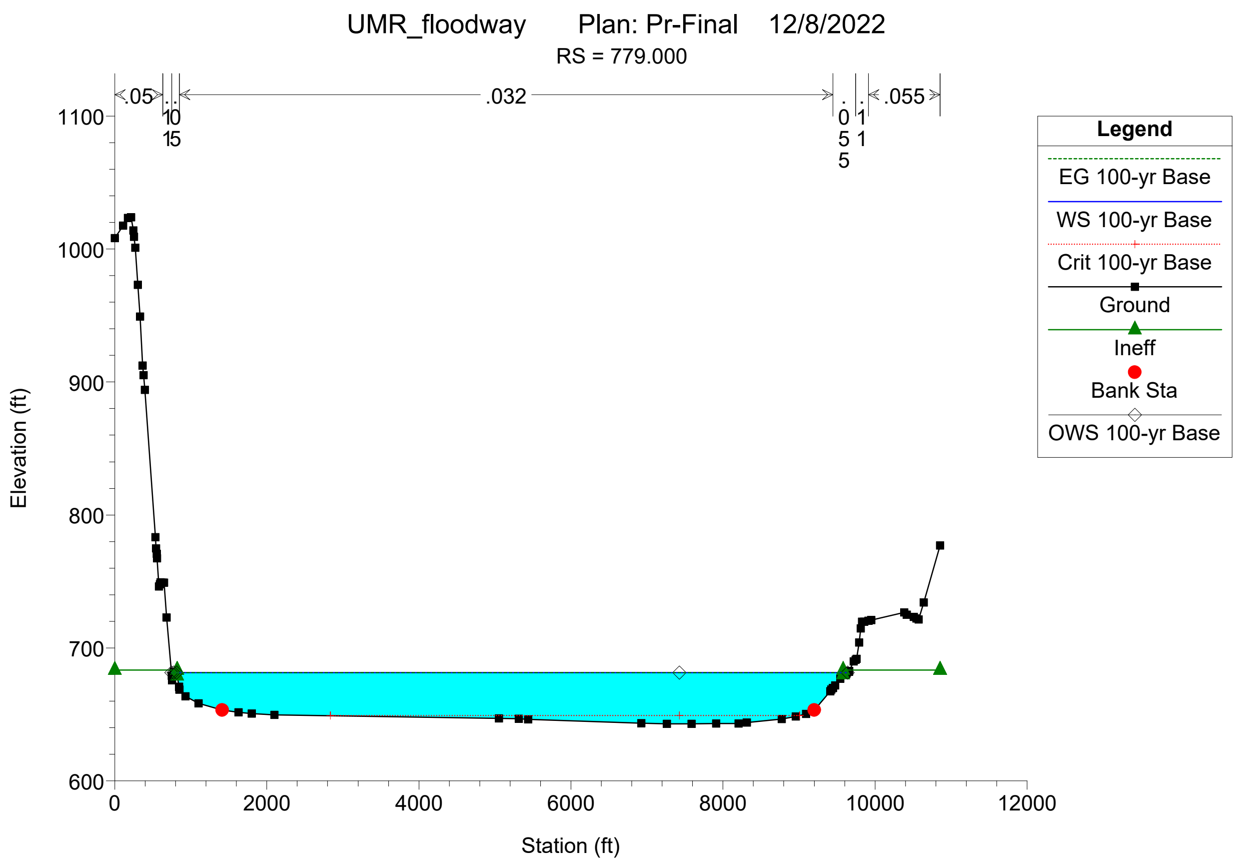


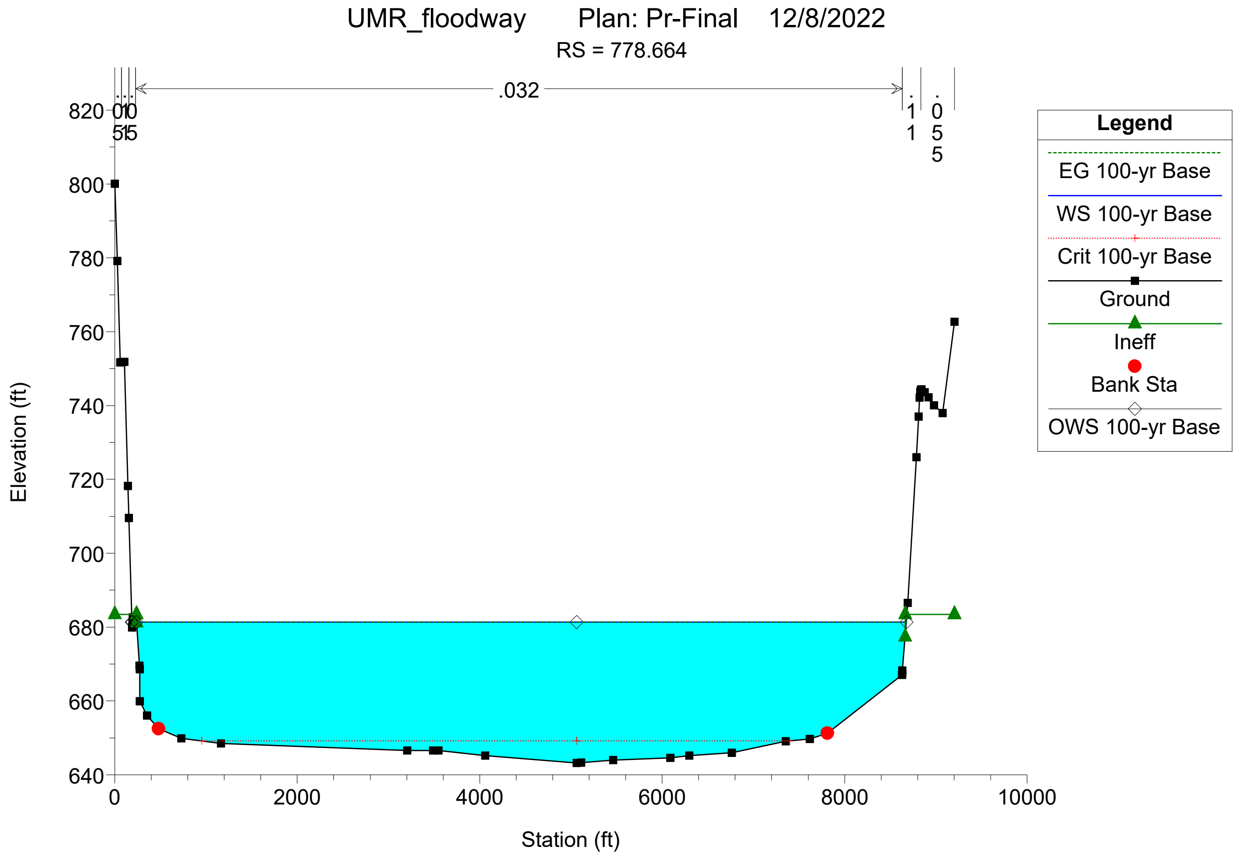
UMR_floodway Plan: Pr-Final 12/8/2022
RS = 779.811
.032
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

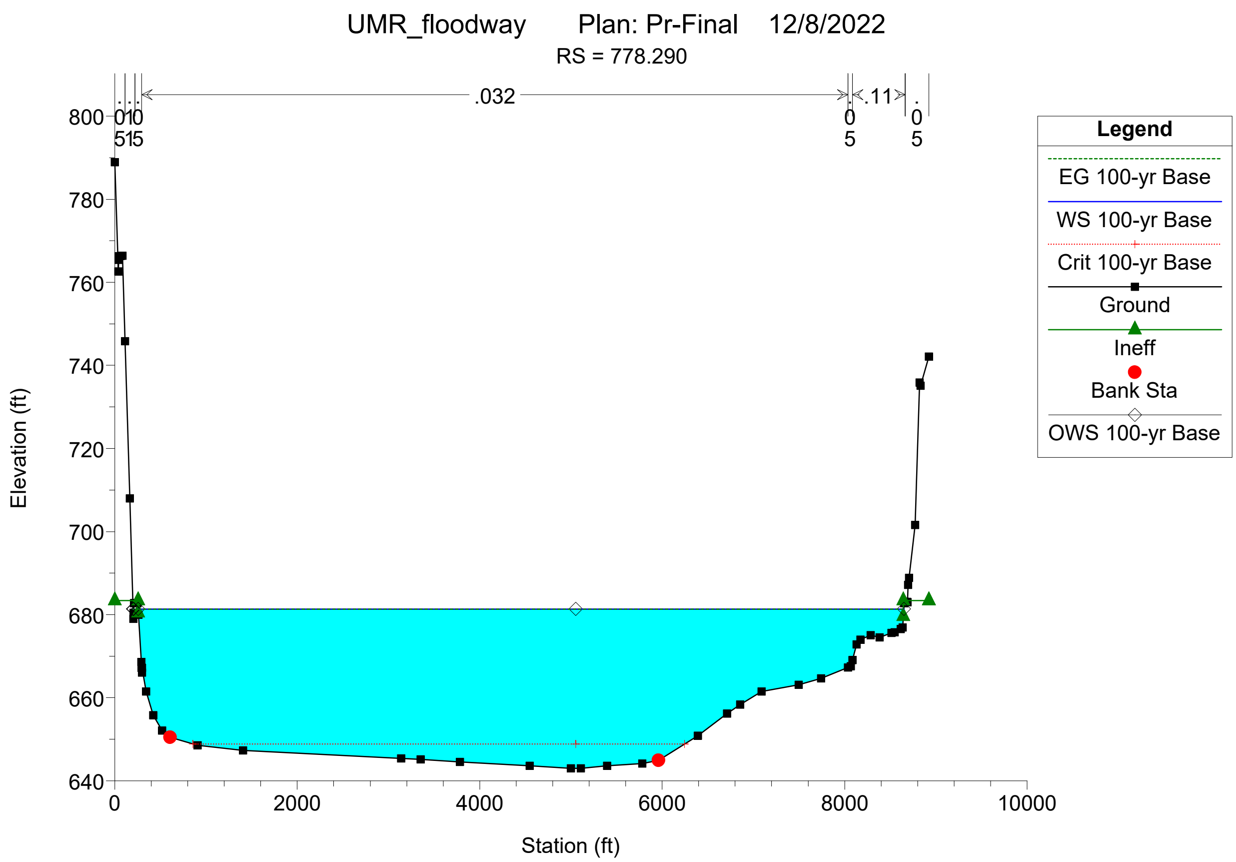


UMR_floodway Plan: Pr-Final 12/8/2022
RS = 779.388
.032
.055
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

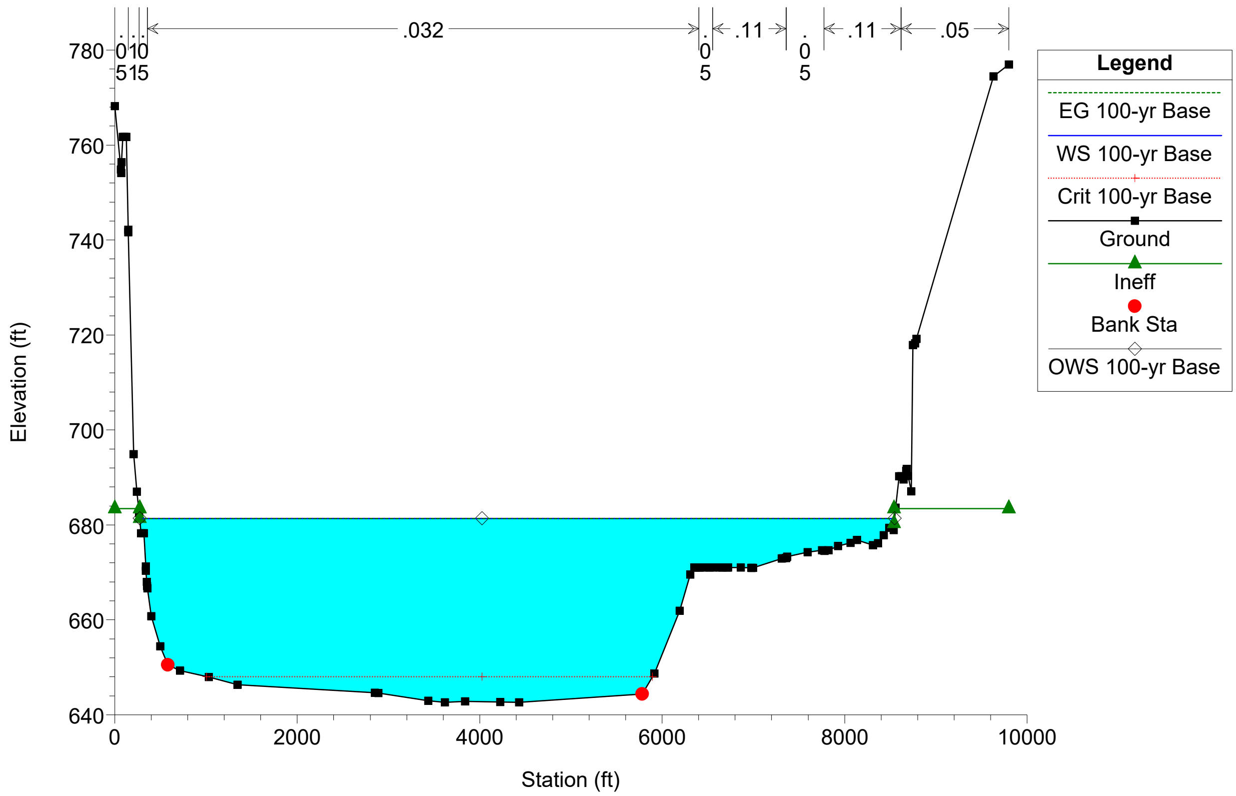

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 779.187
.05
.032
.11
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base


UMR_floodway Plan: Pr-Final 12/8/2022
RS = 779.000
.05
.032
.055
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

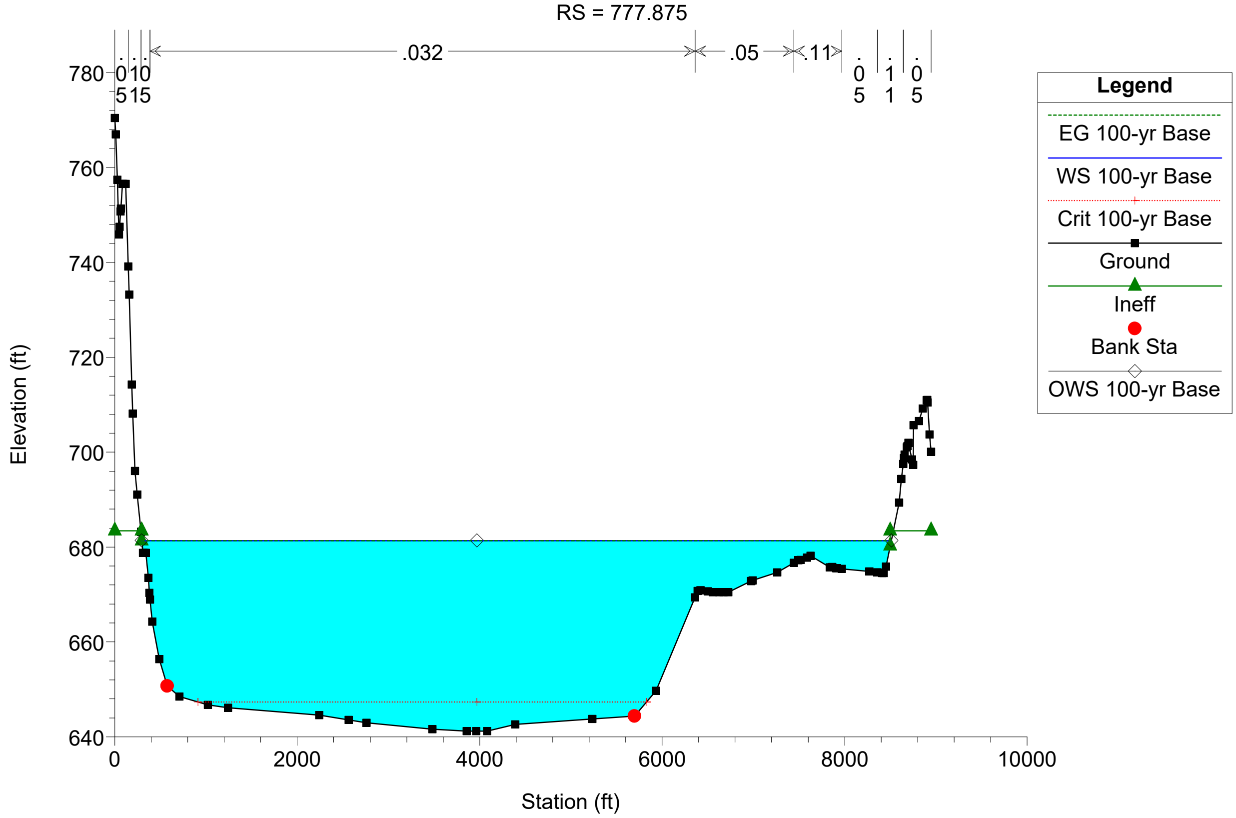

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 778.664
.032
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

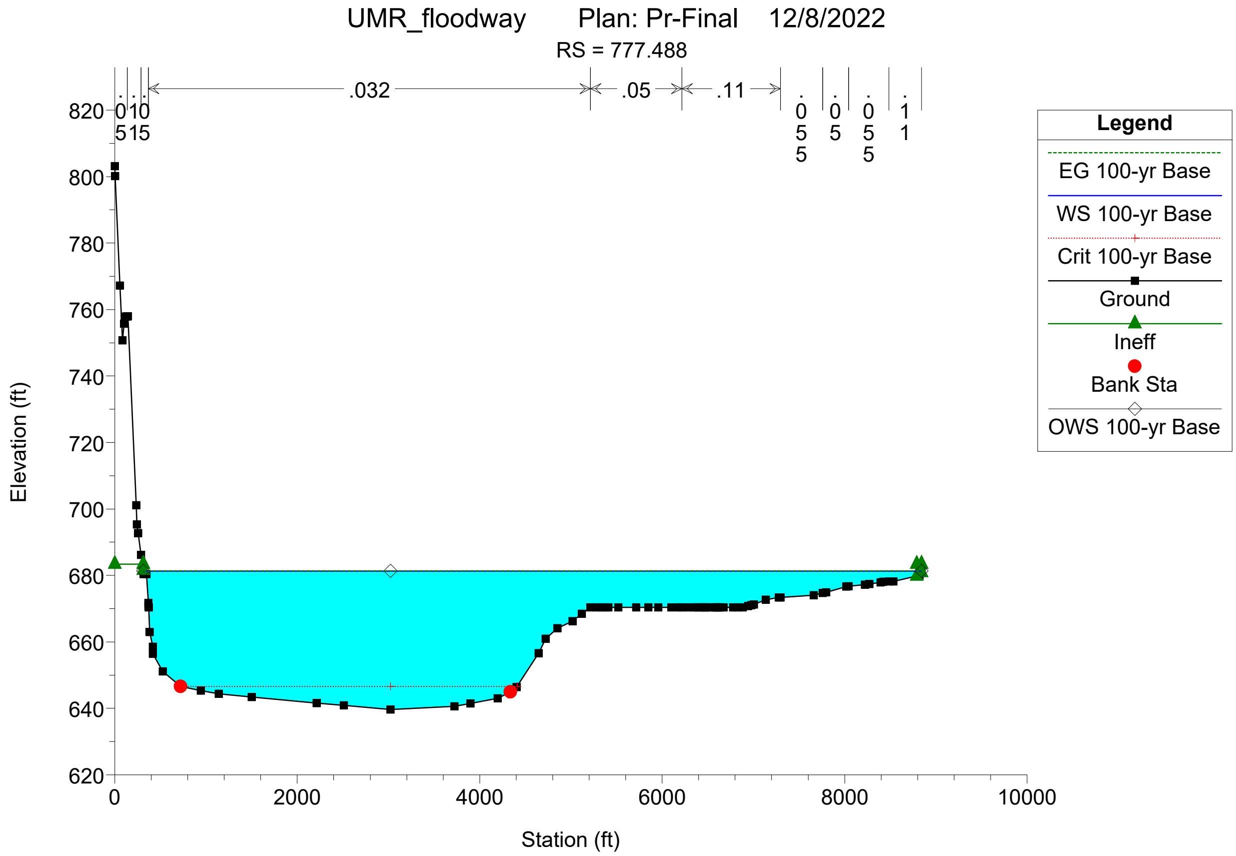

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 778.290
.032
.11
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

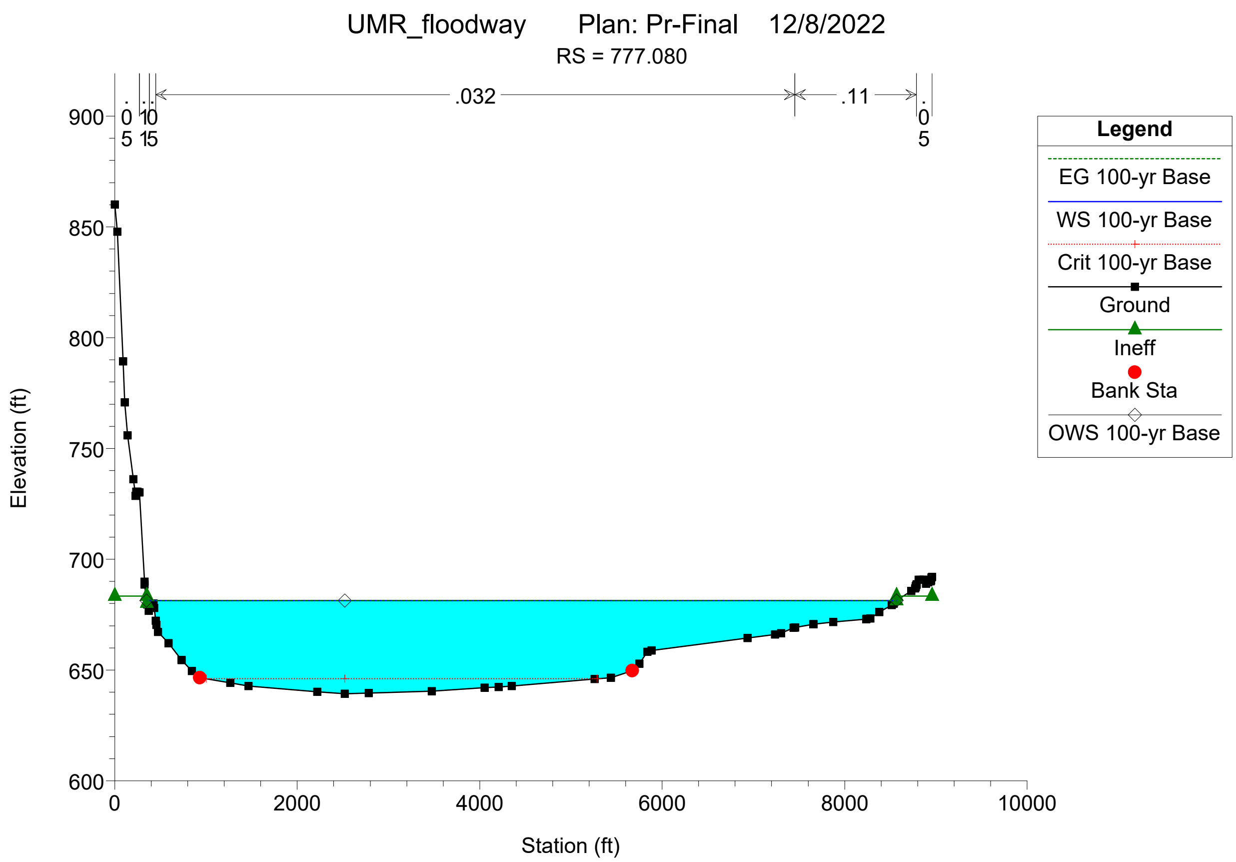
UMR_floodway Plan: Pr-Final 12/8/2022
RS = 778.074

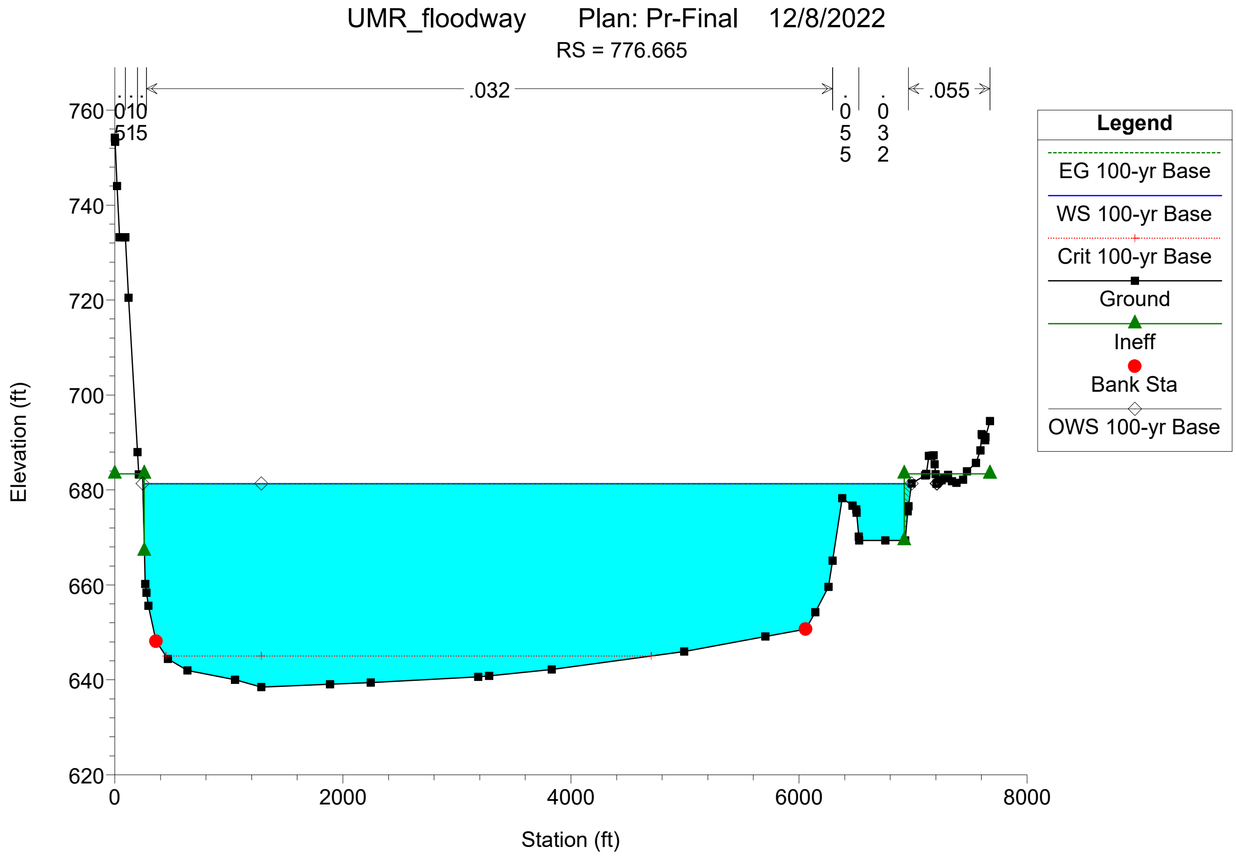


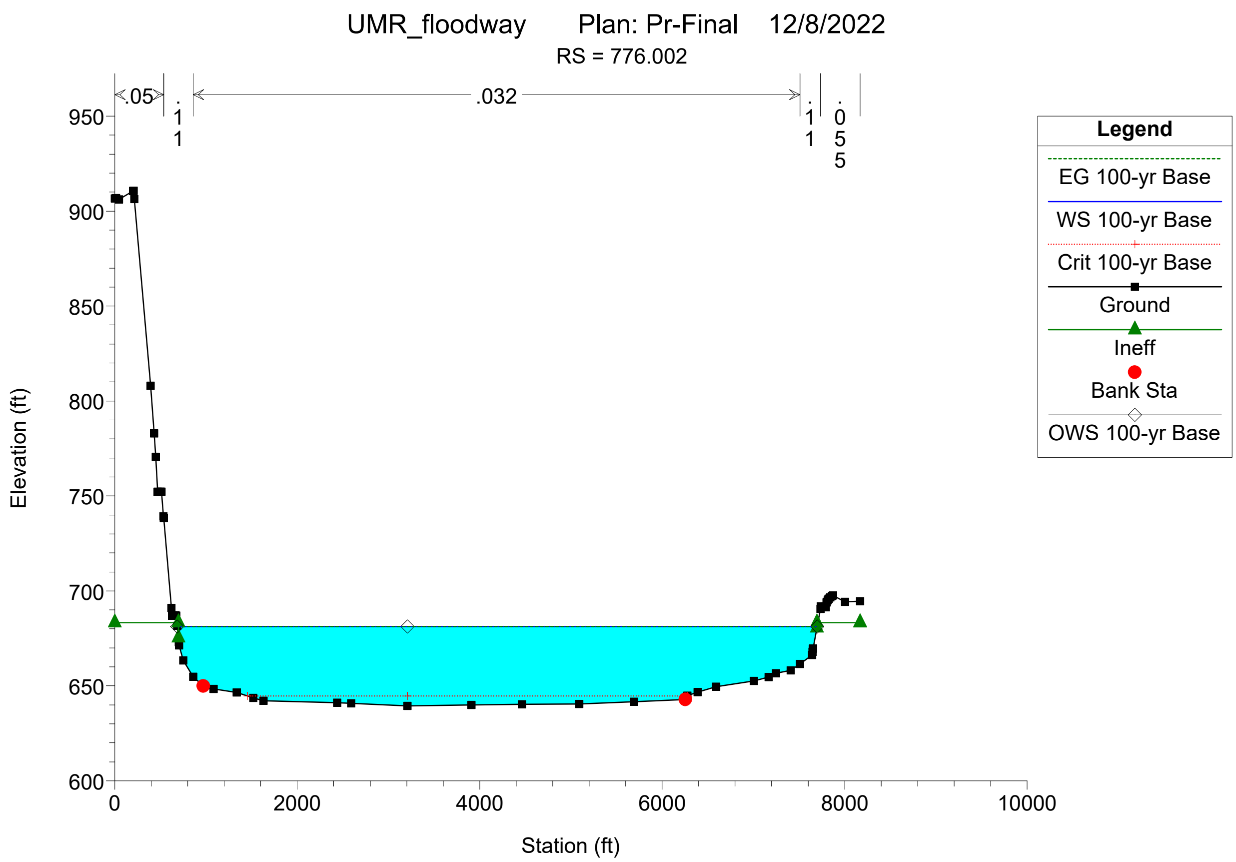
UMR_floodway Plan: Pr-Final 12/8/2022
RS = 777.875

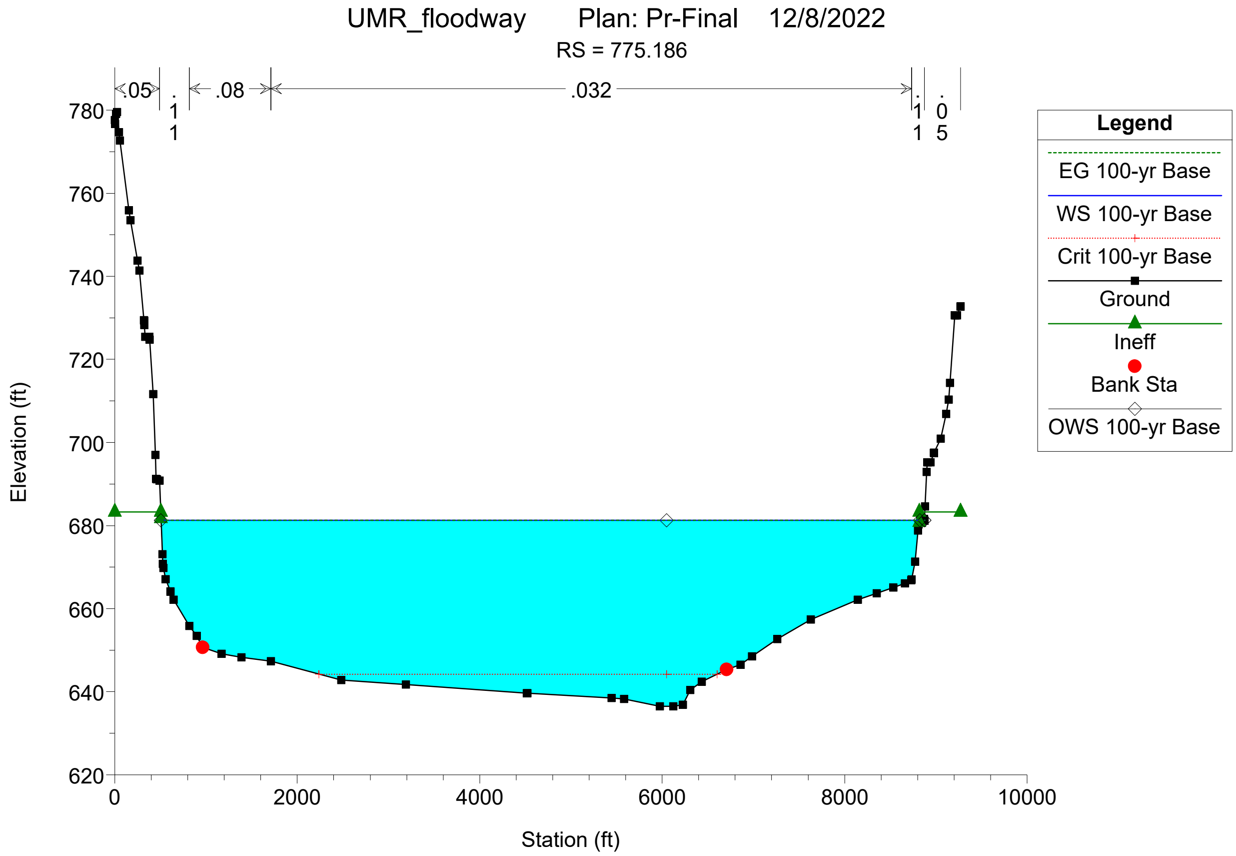


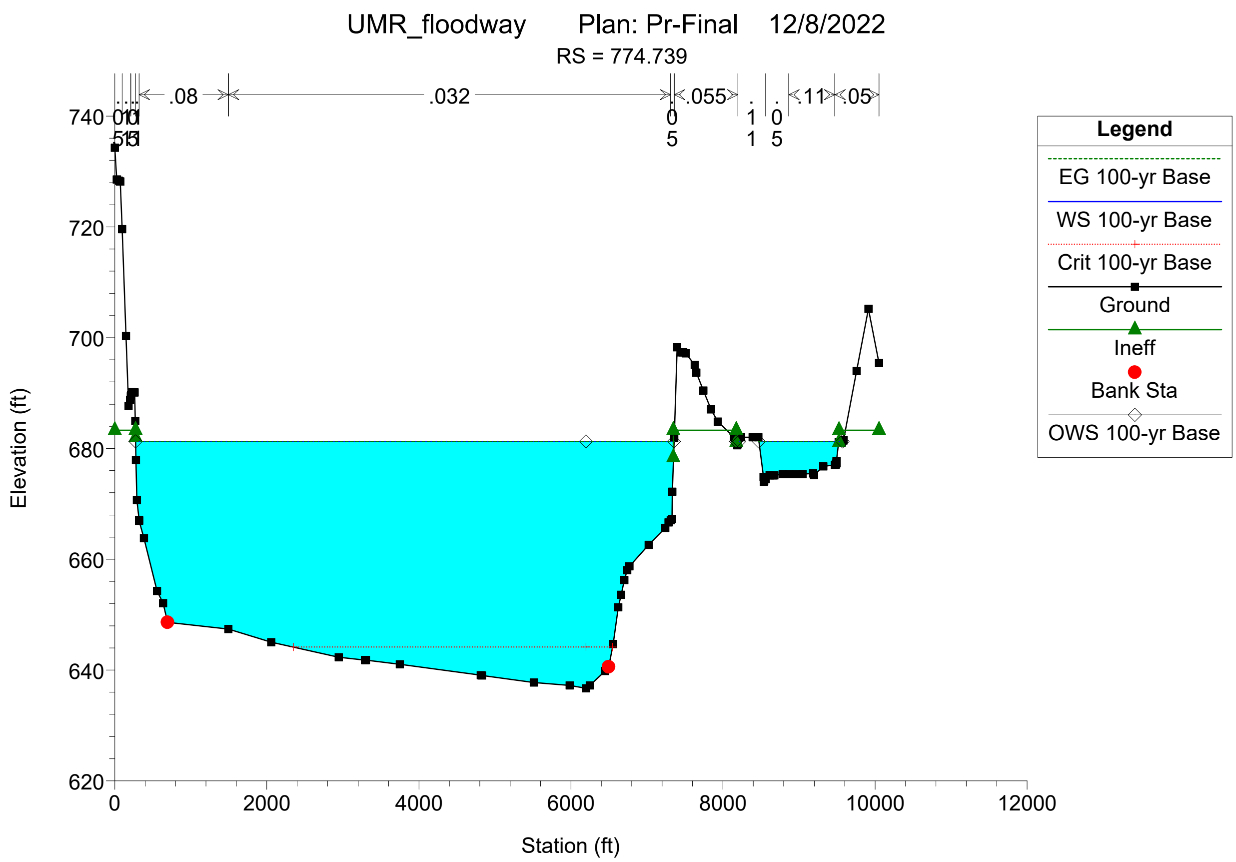

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 777.488
.032
.05
.11
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

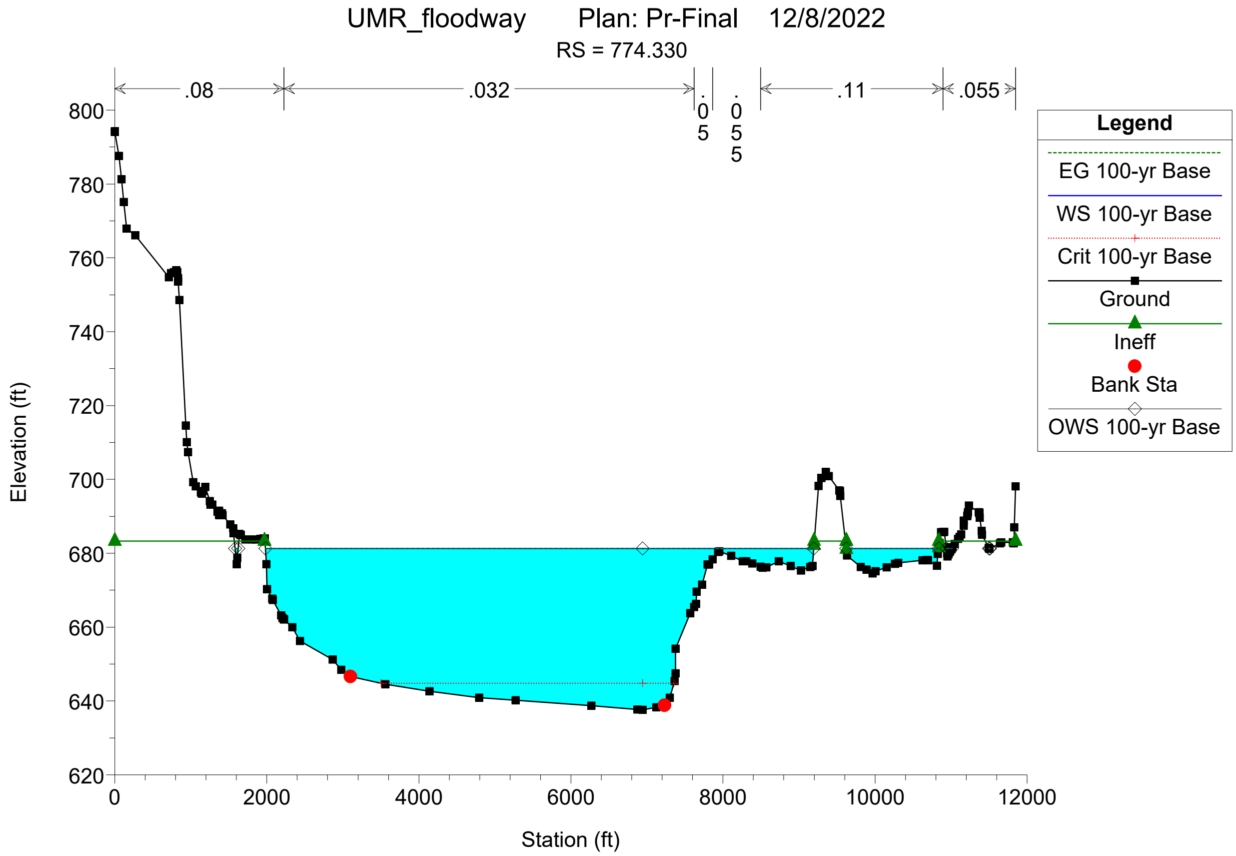

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 777.080
.032
.11
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)


UMR_floodway Plan: Pr-Final 12/8/2022
RS = 776.665
.032
.055
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

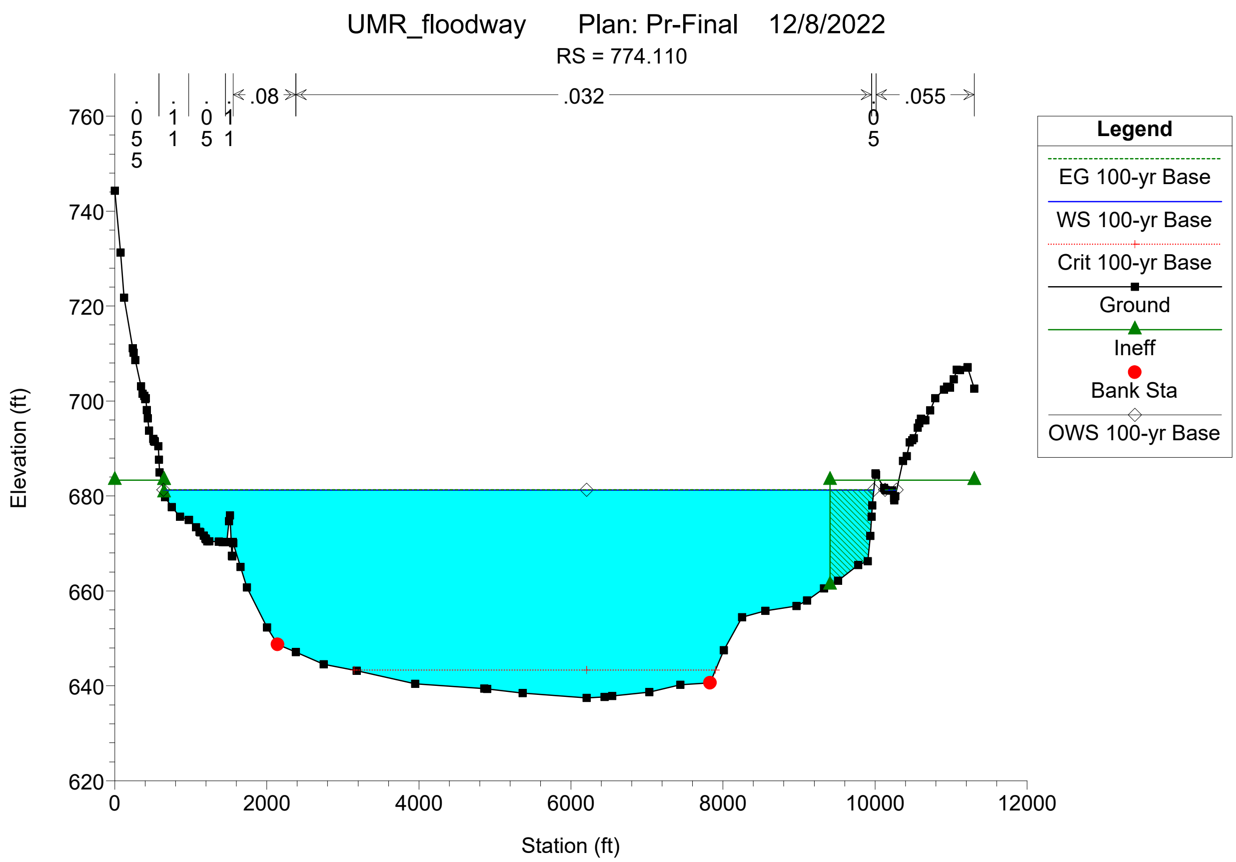

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 776.002
.05
.032
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base


UMR_floodway Plan: Pr-Final 12/8/2022
RS = 775.186
.05
.08
.032
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

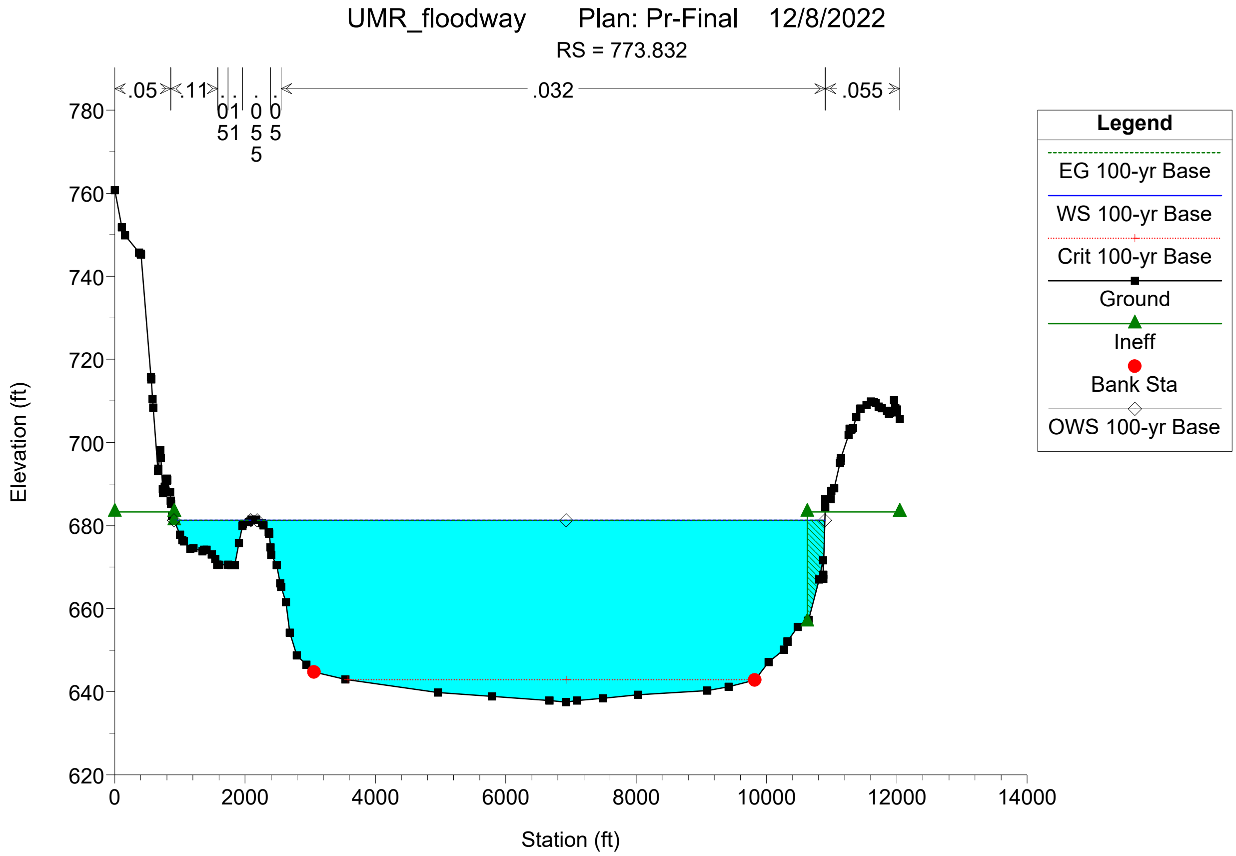

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 774.739
.08
.032
.055
.11
.05
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

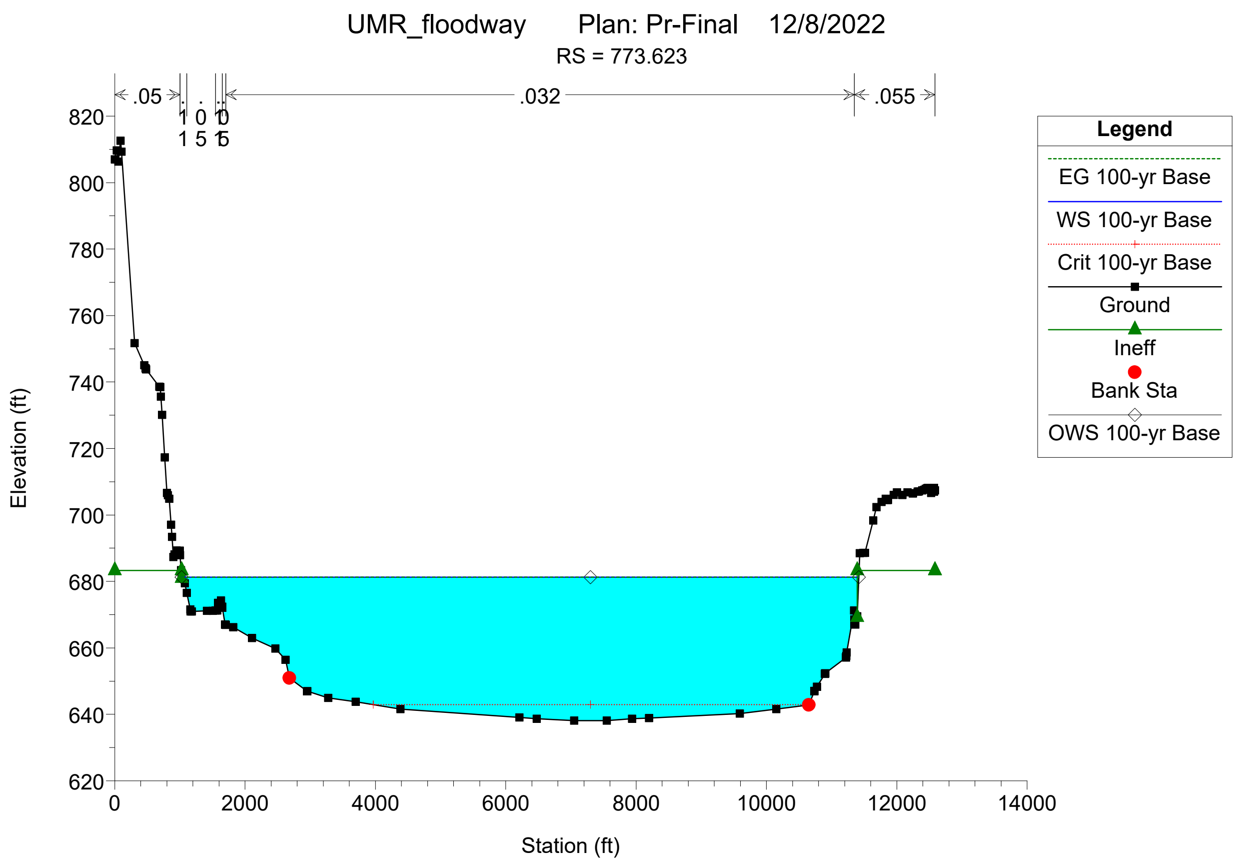


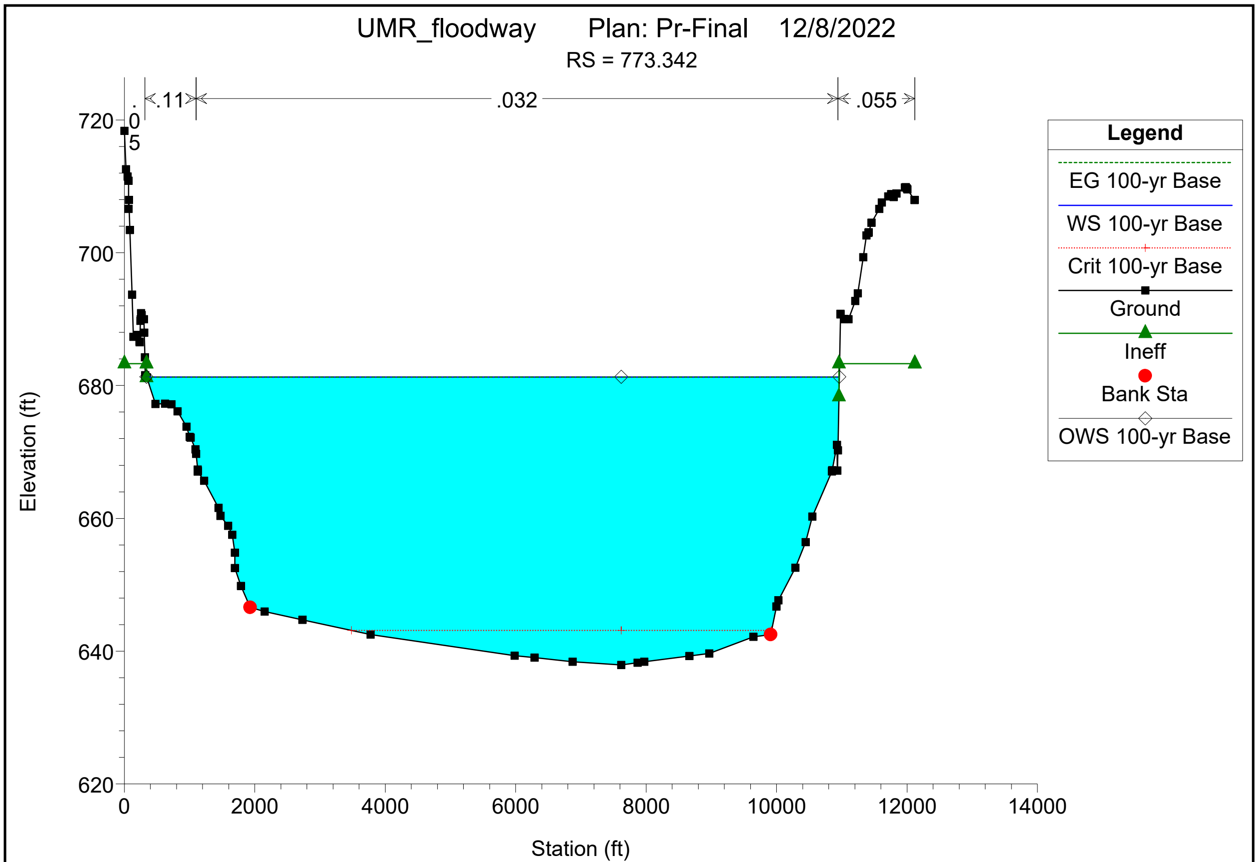
UMR_floodway Plan: Pr-Final 12/8/2022
RS = 774.330
.08
.032
.05
.055
.11
.055
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)



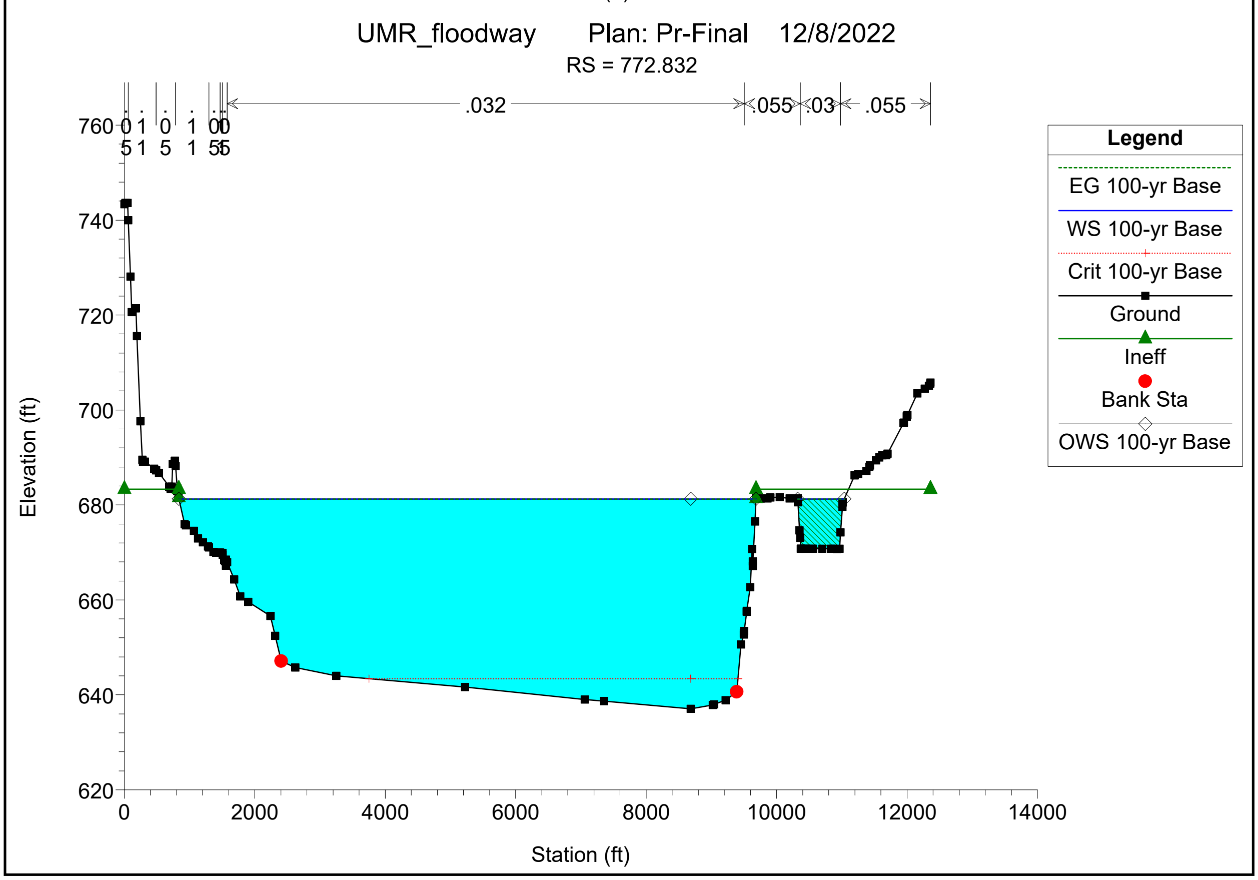
UMR_floodway Plan: Pr-Final 12/8/2022
RS = 774.110
.055
.11
.05
.11
.08
.032
.05
.055
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)


UMR_floodway Plan: Pr-Final 12/8/2022
RS = 773.832
.05
.11
.032
.055
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

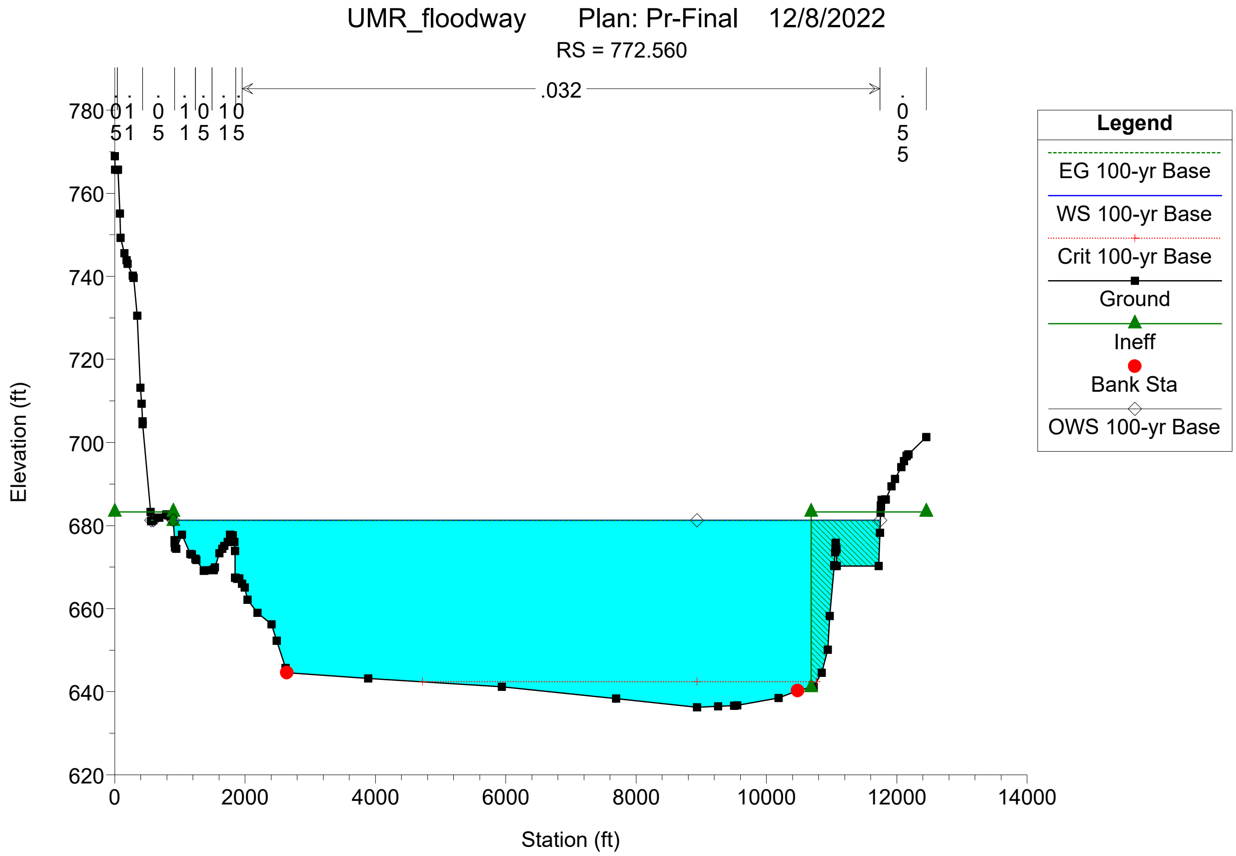

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 773.623
.05
.032
.055
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

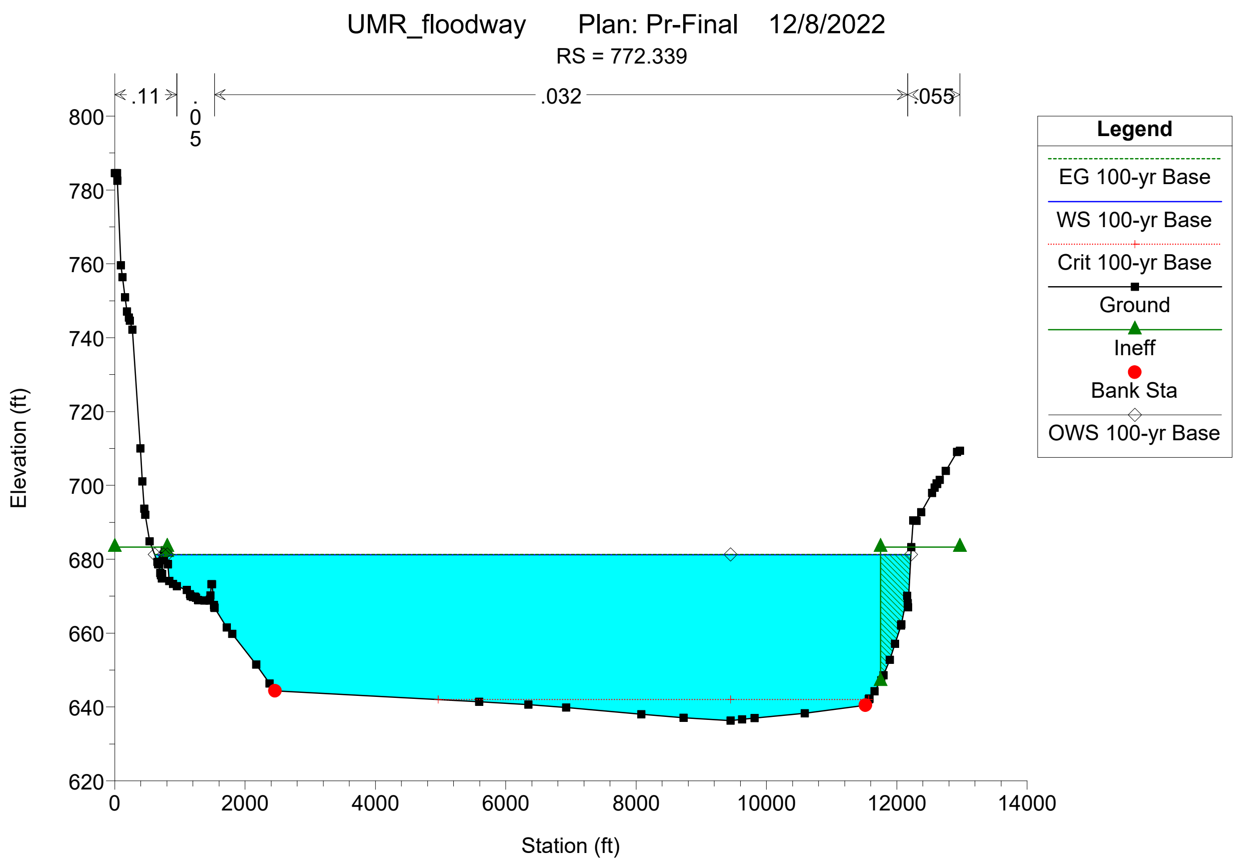


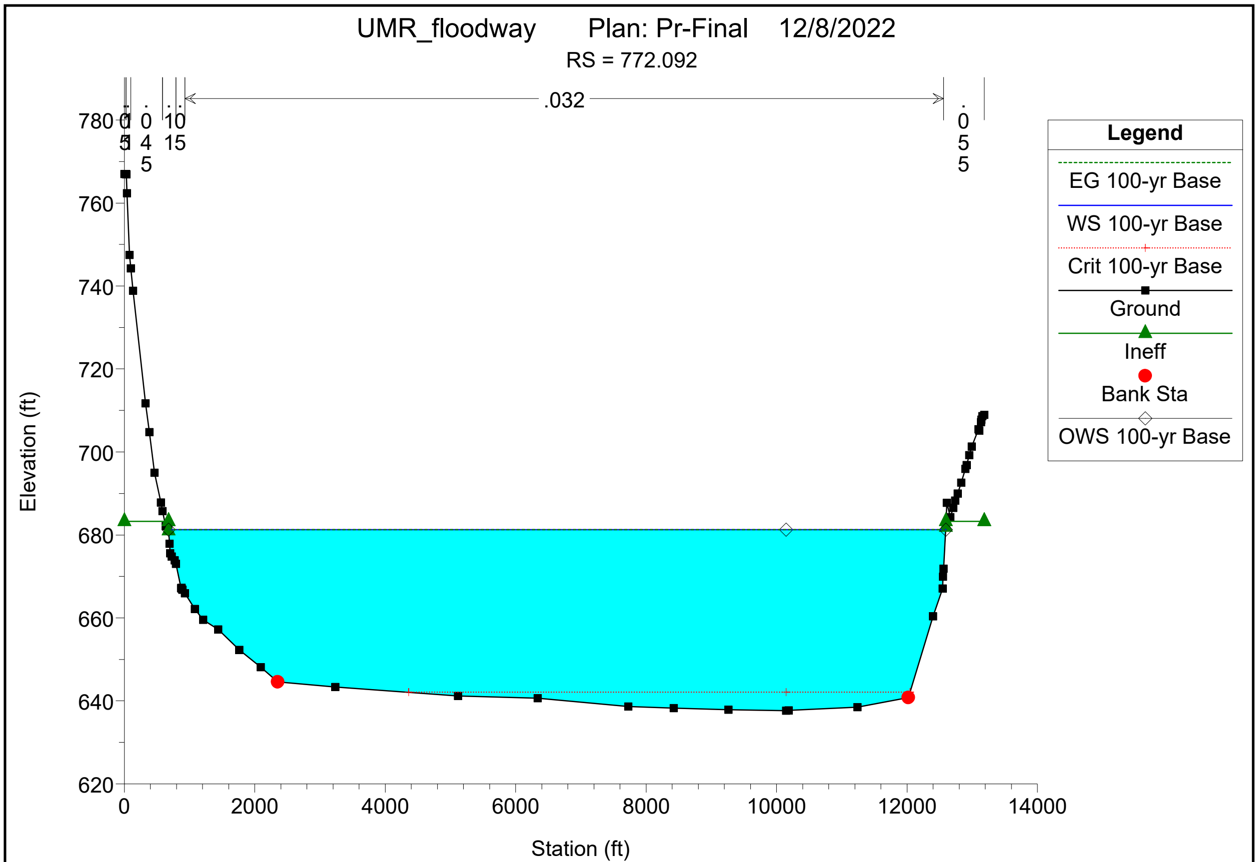
UMR_floodway Plan: Pr-Final 12/8/2022
RS = 773.342
.11
.032
.055
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

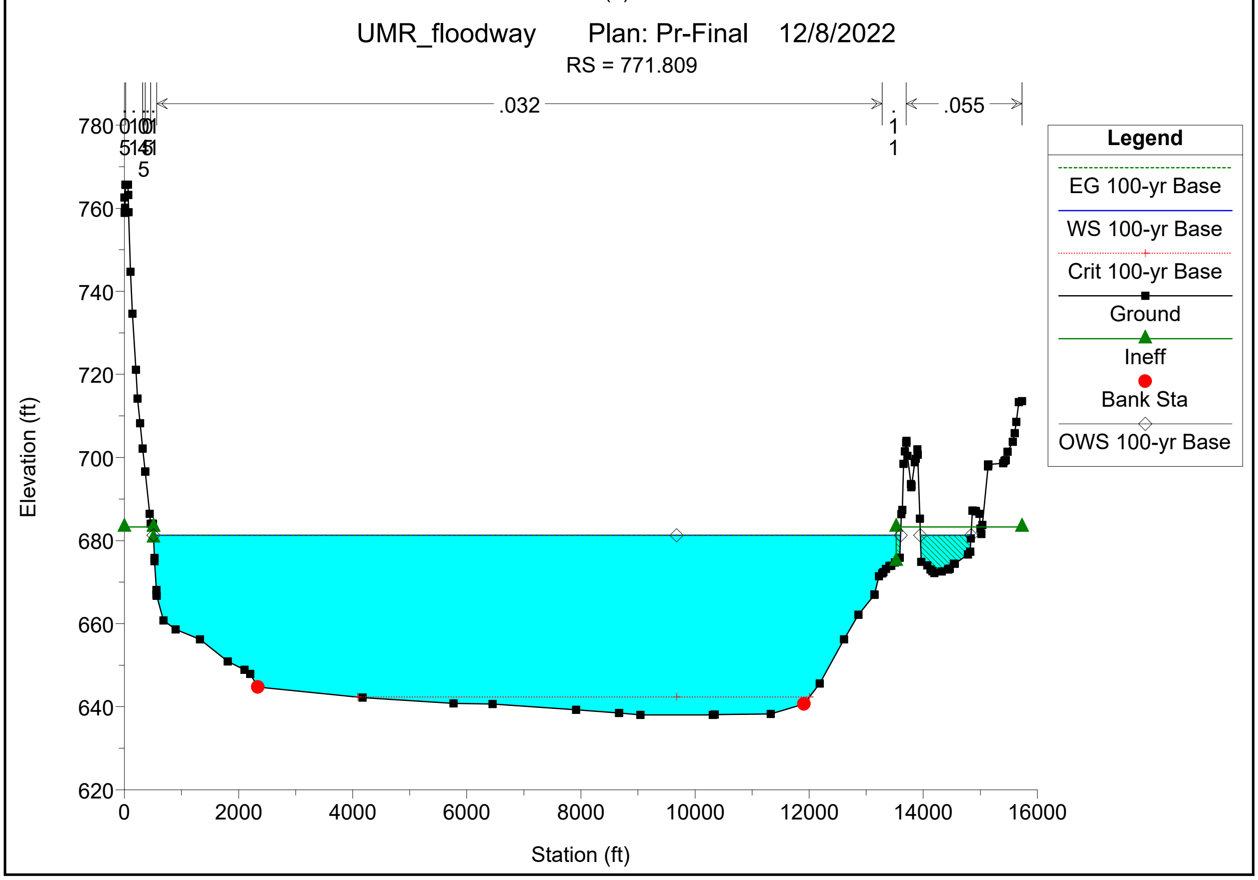


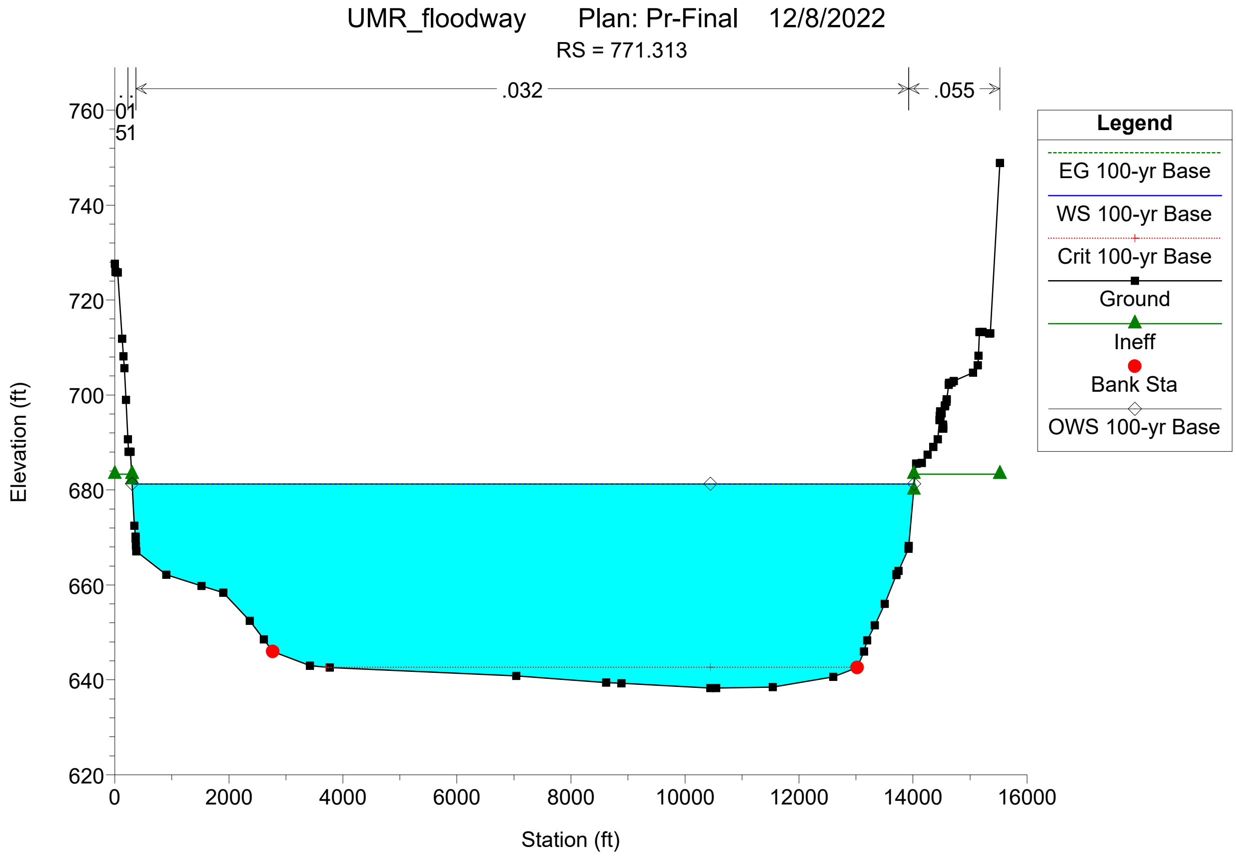
UMR_floodway Plan: Pr-Final 12/8/2022
RS = 772.832
.032
.055
.03
.055
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

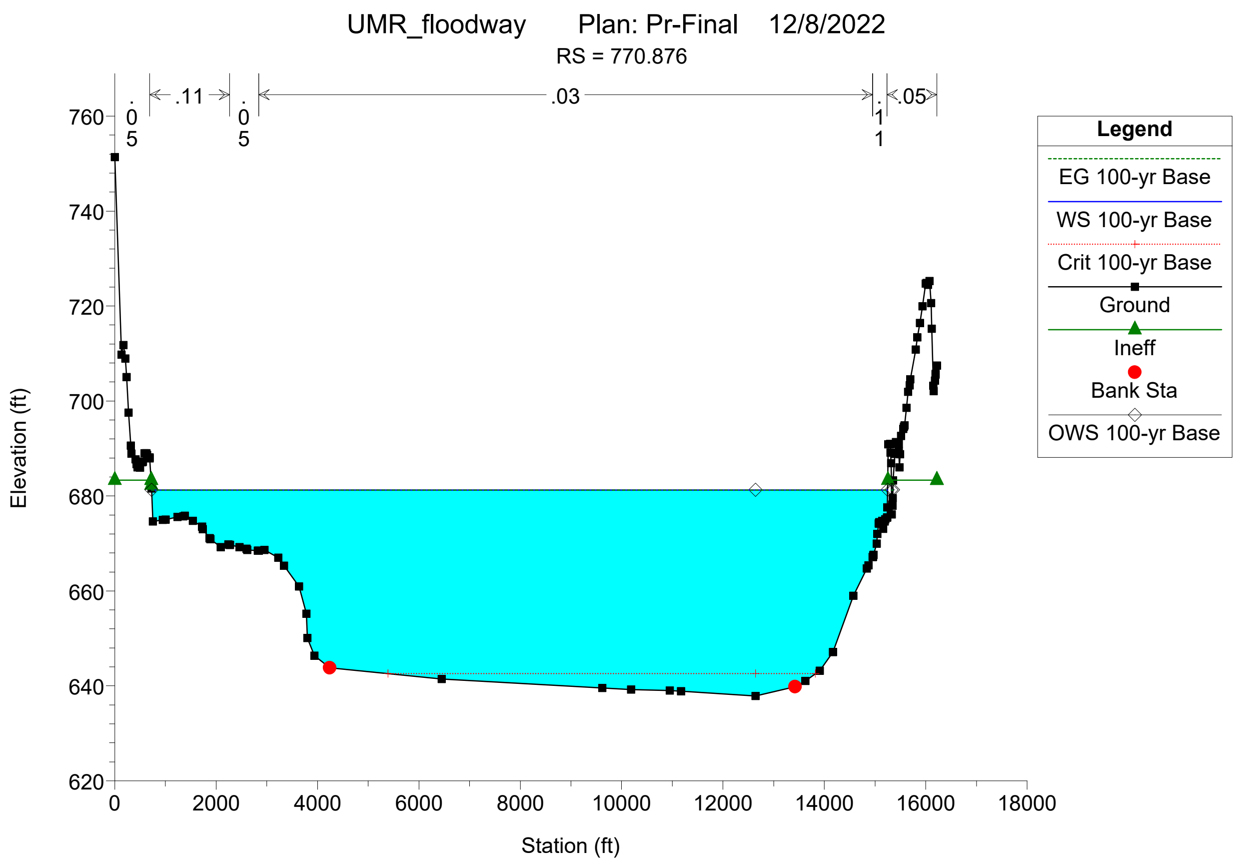

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 772.560
.032
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

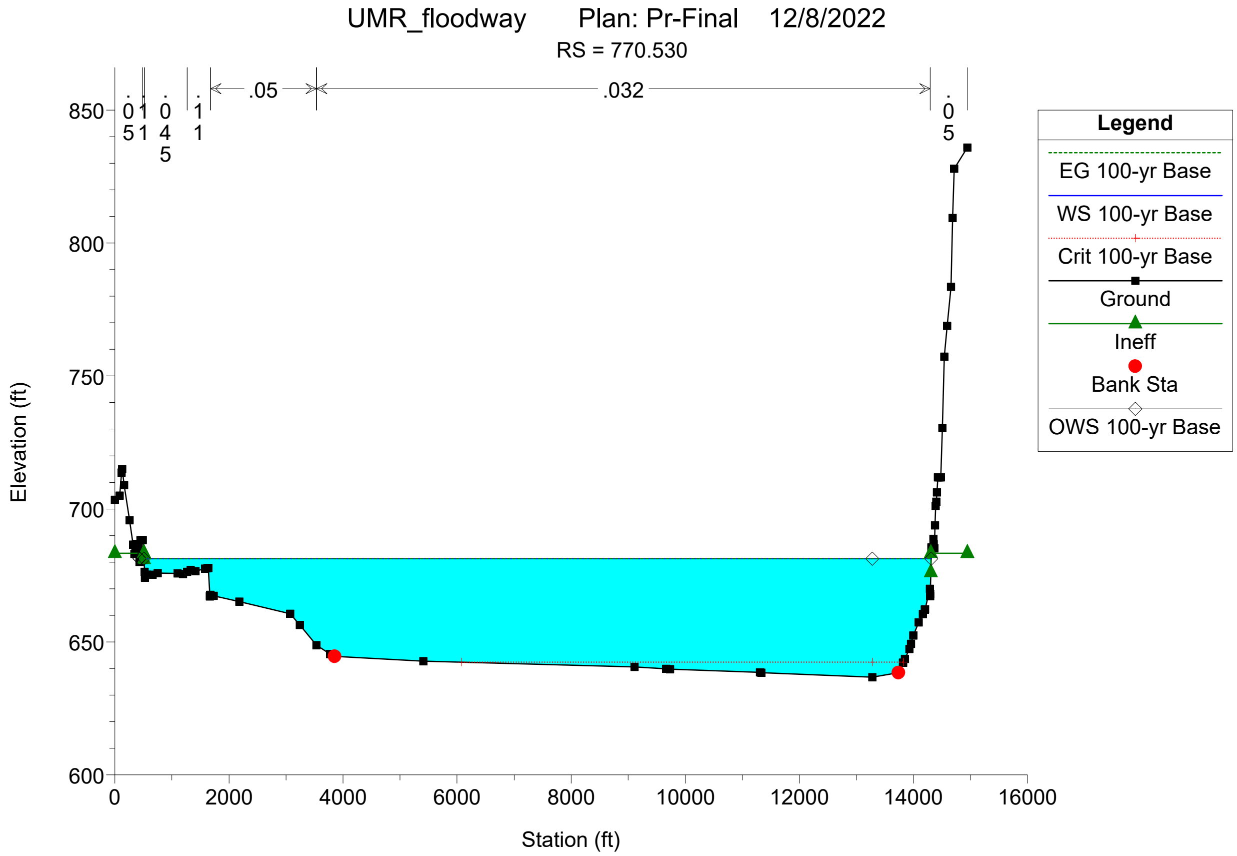

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 772.339
.11
.032
.055
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

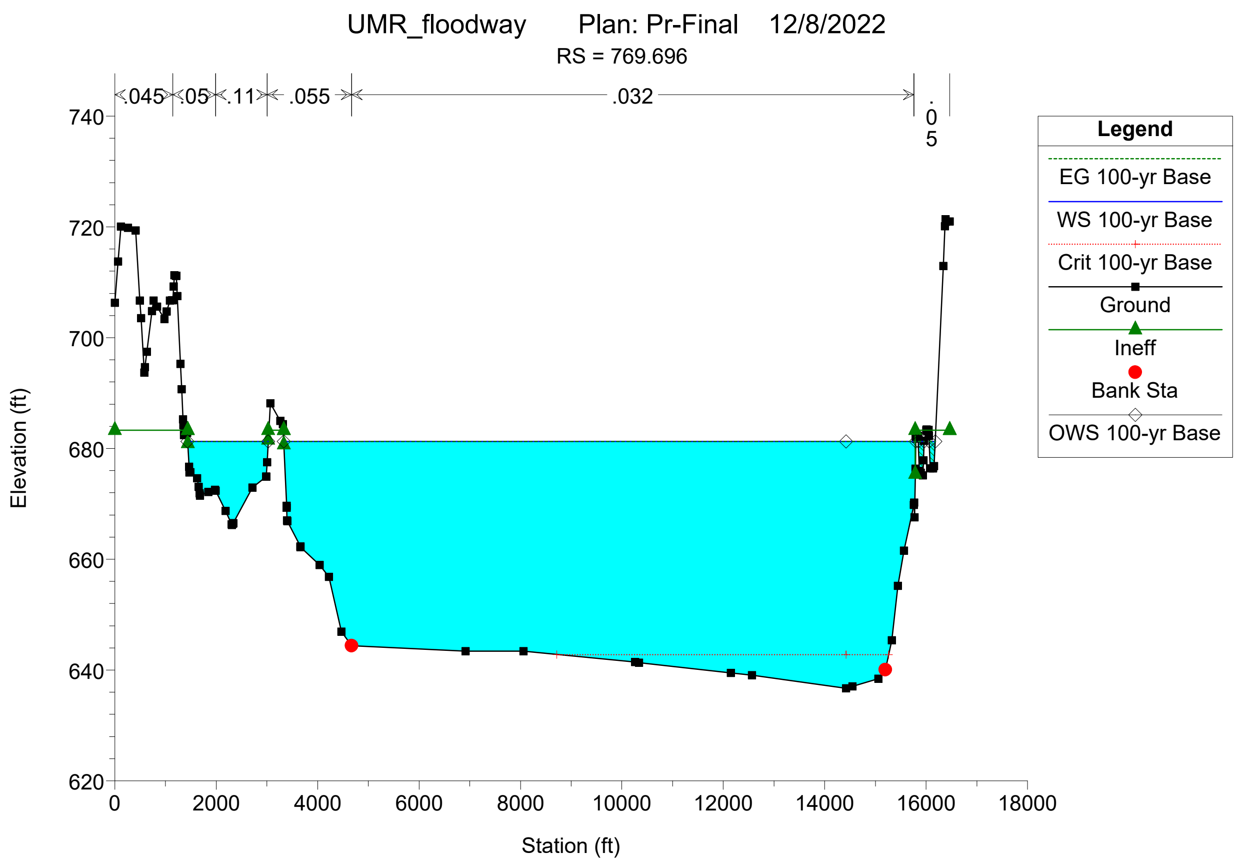

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 772.092
.032
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

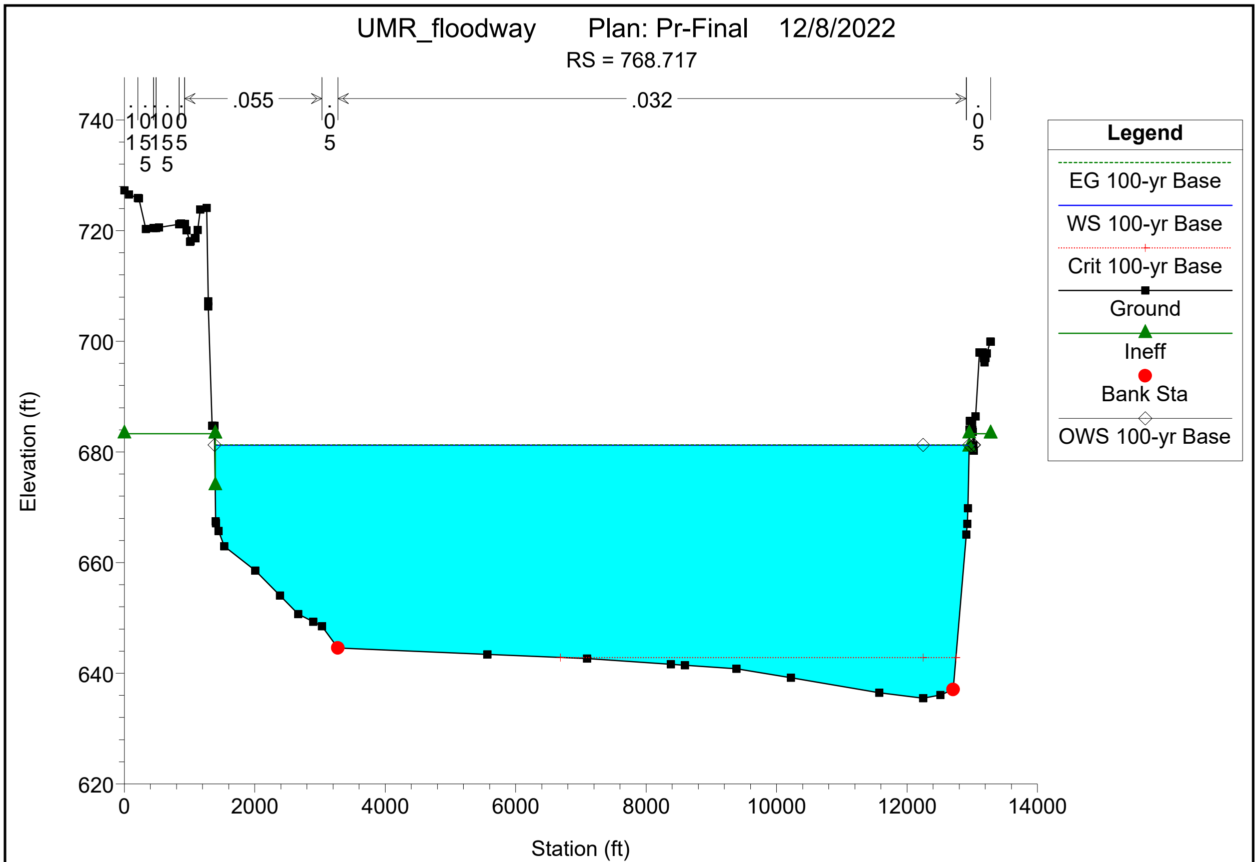

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 771.809
.032
.055
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

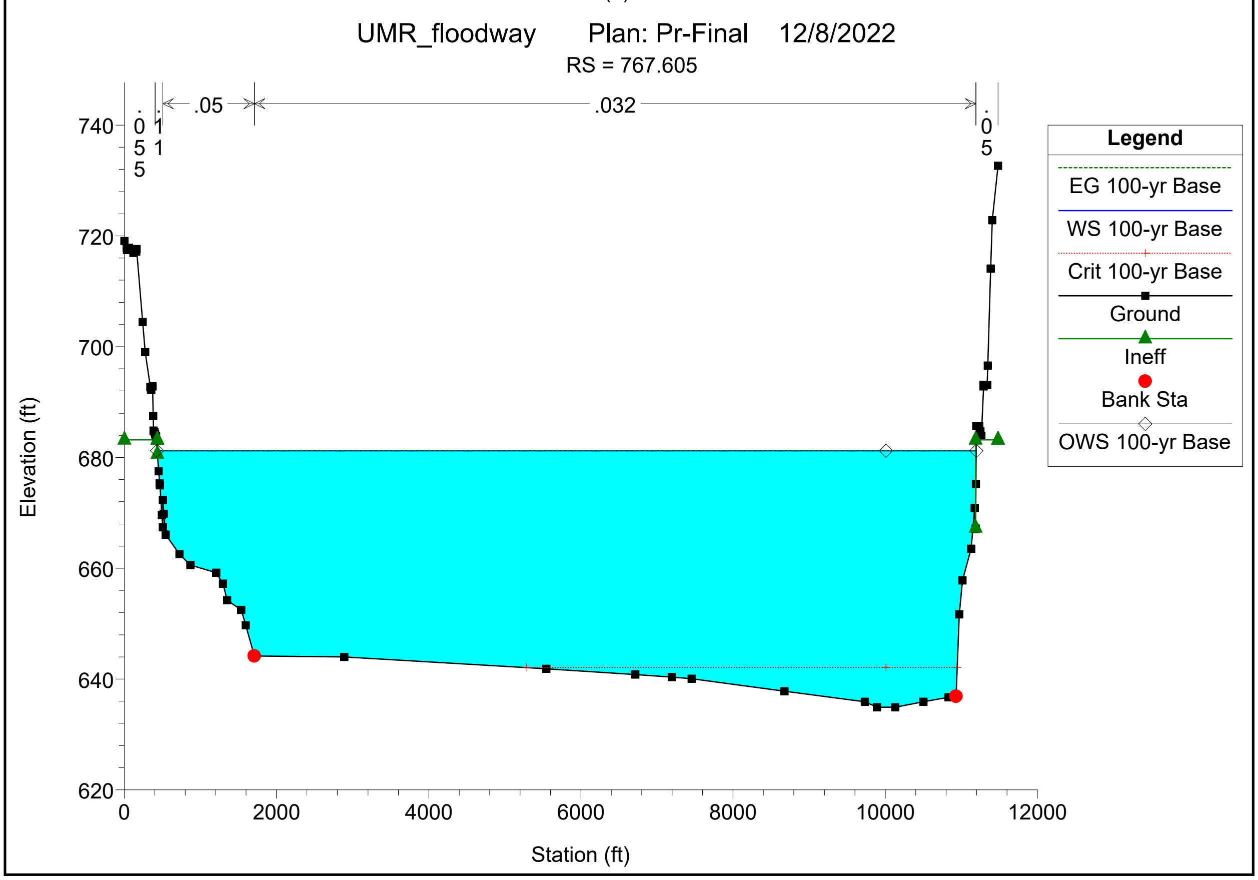

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 771.313
.032
.055
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

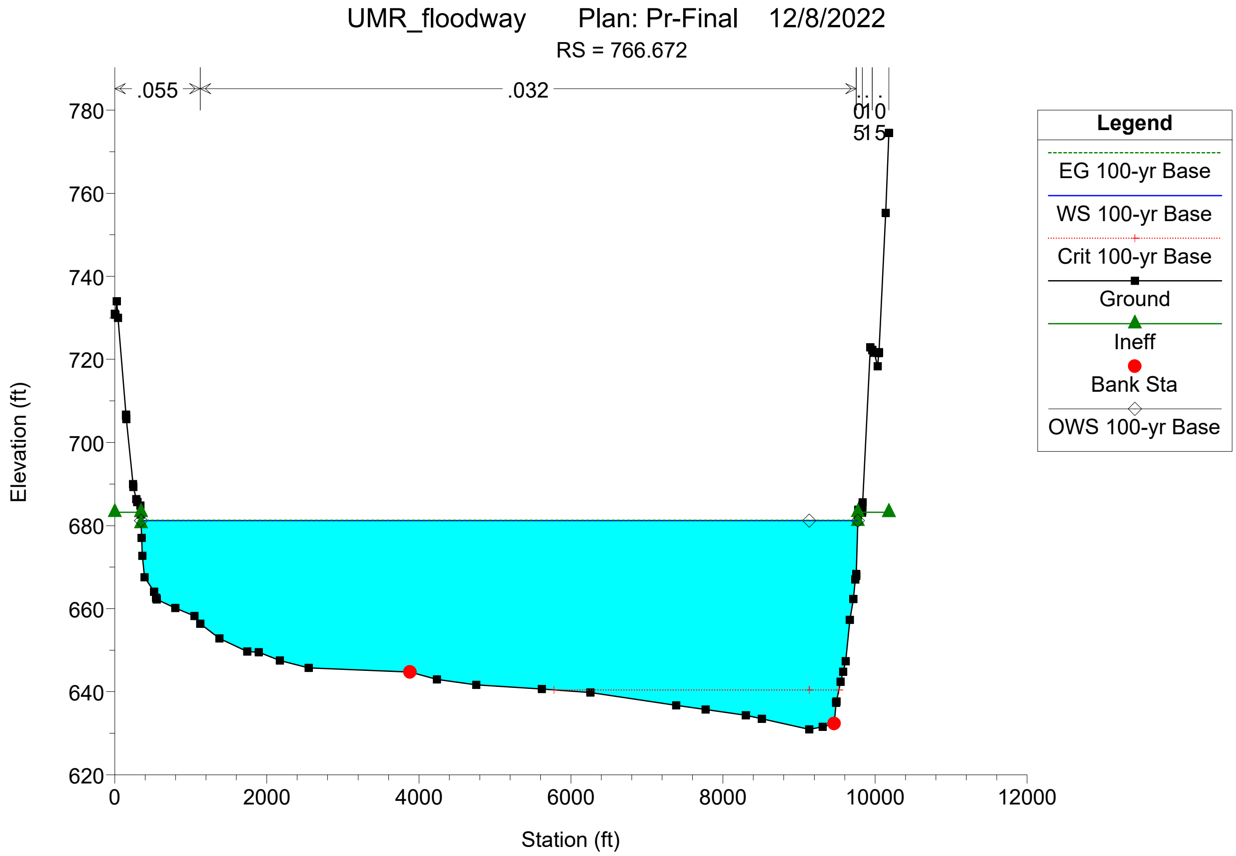

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 770.876
.11
.03
.05
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

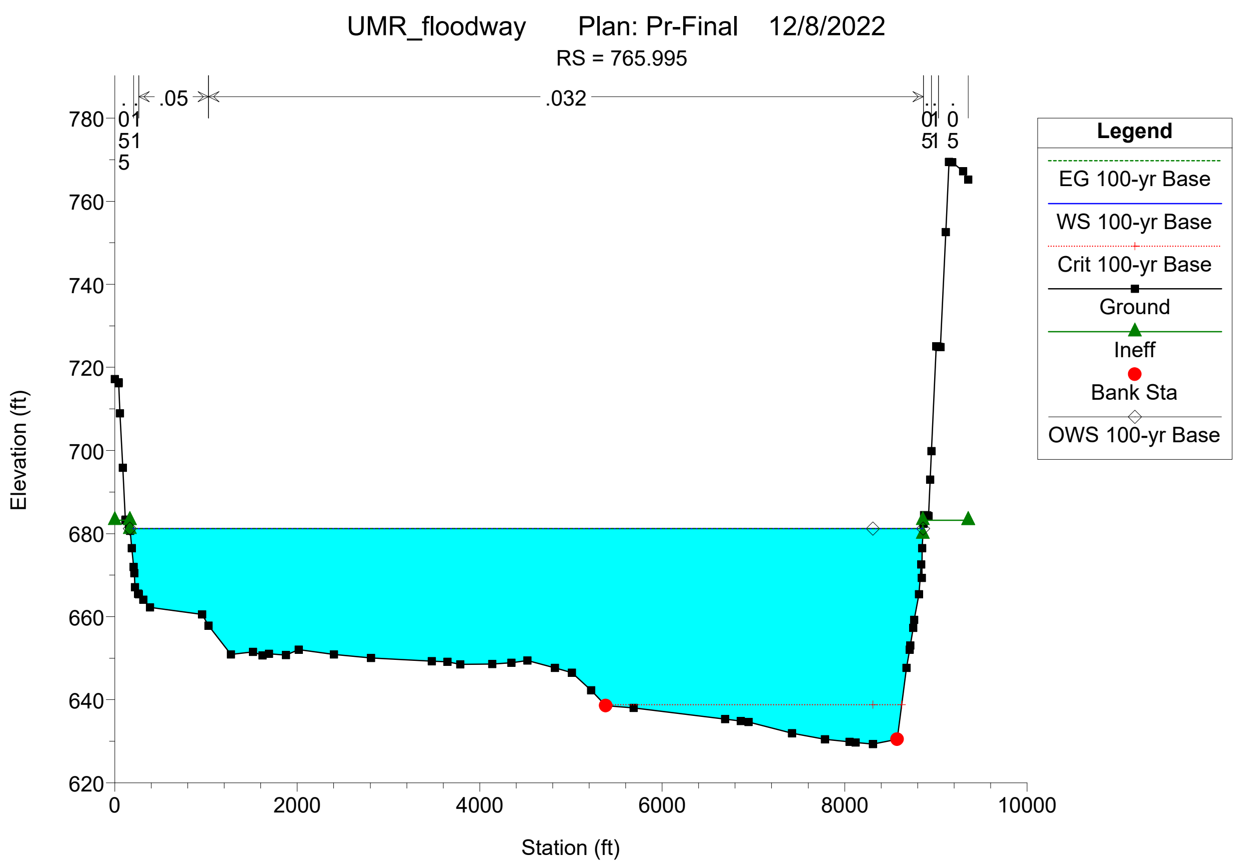

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 770.530
.05
.032
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

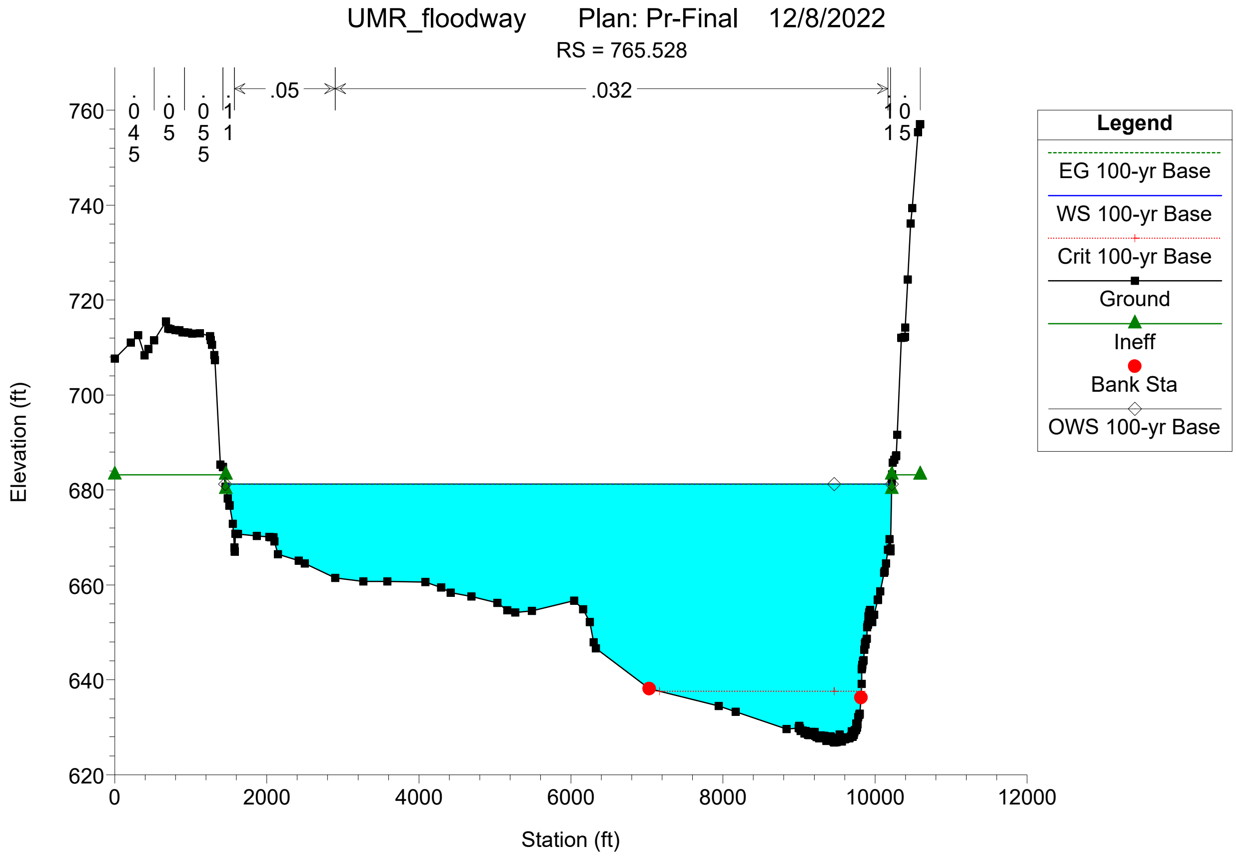

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 769.696
.045
.05
.11
.055
.032
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base


UMR_floodway Plan: Pr-Final 12/8/2022
RS = 768.717
.055
.032
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)
620
640
660
680
700
720
740
0
2000
4000
6000
8000
10000
12000
14000

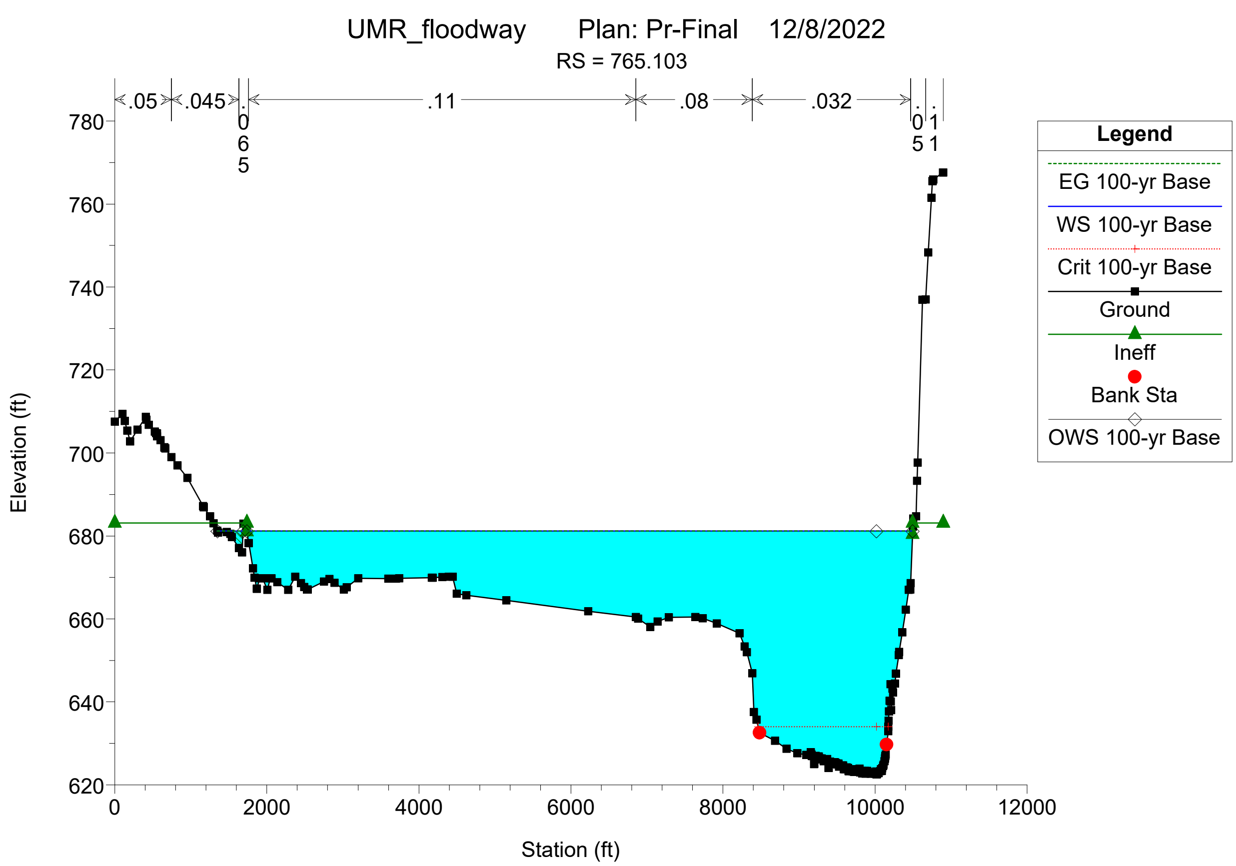

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 767.605
.05
.032
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)
620
640
660
680
700
720
740
0
2000
4000
6000
8000
10000
12000


UMR_floodway Plan: Pr-Final 12/8/2022
RS = 766.672
.055
.032
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

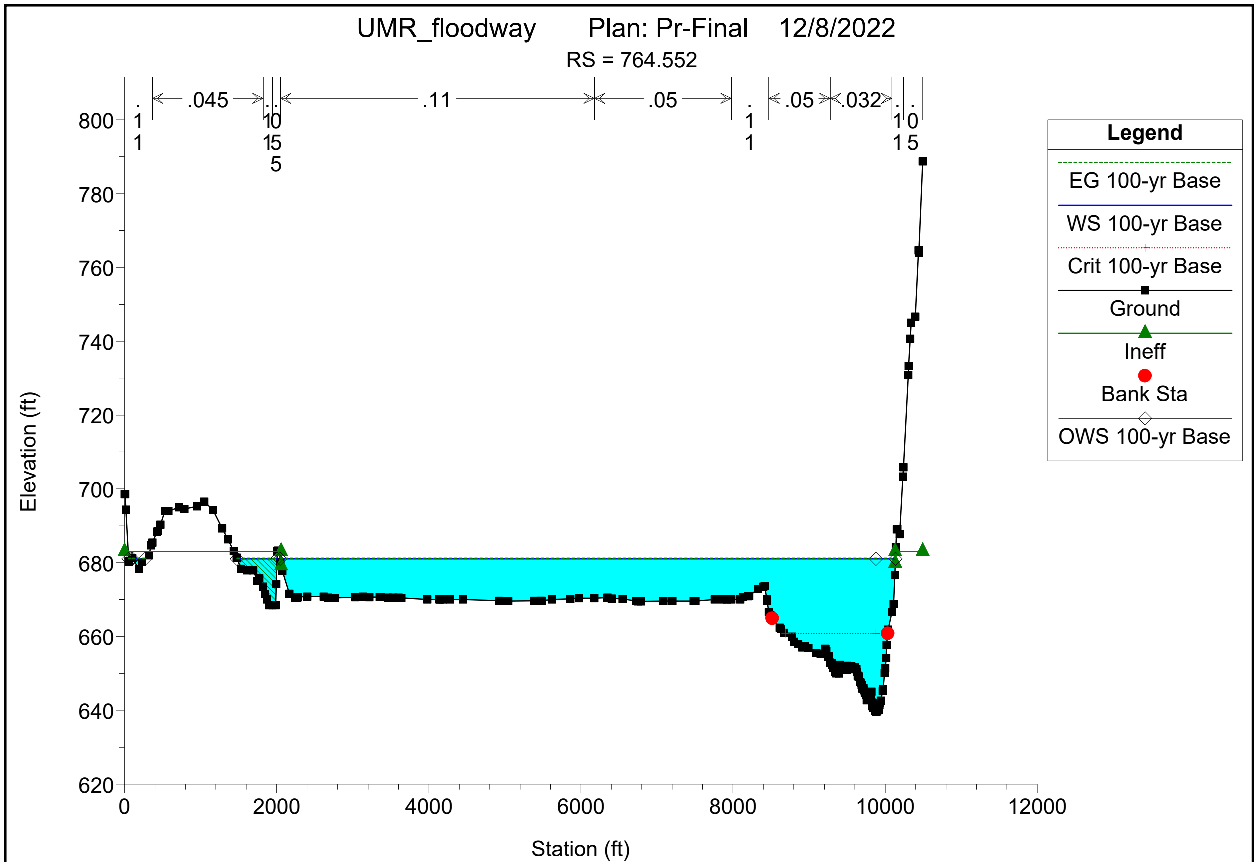

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 765.995
.05
.032
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base



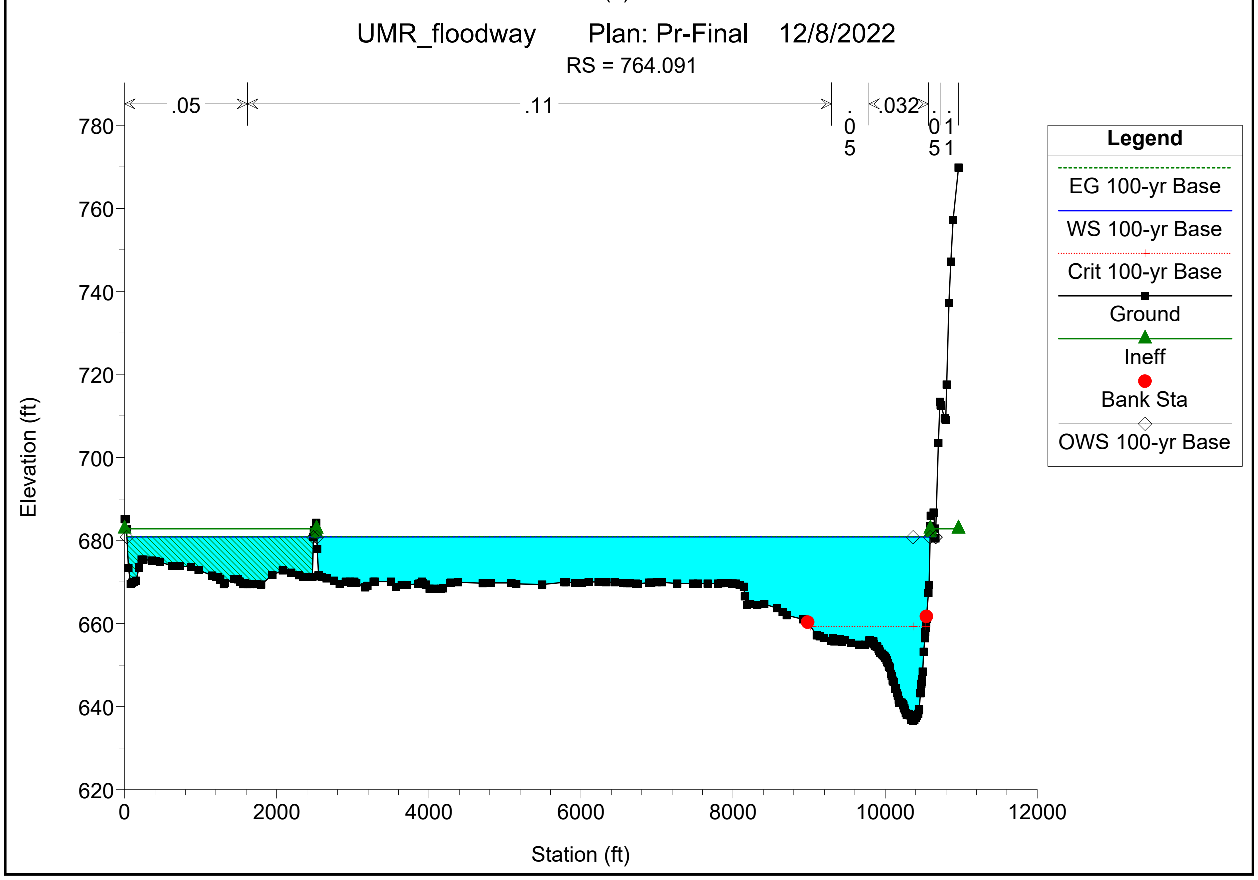
UMR_floodway Plan: Pr-Final 12/8/2022
RS = 765.528
.05
.032
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base



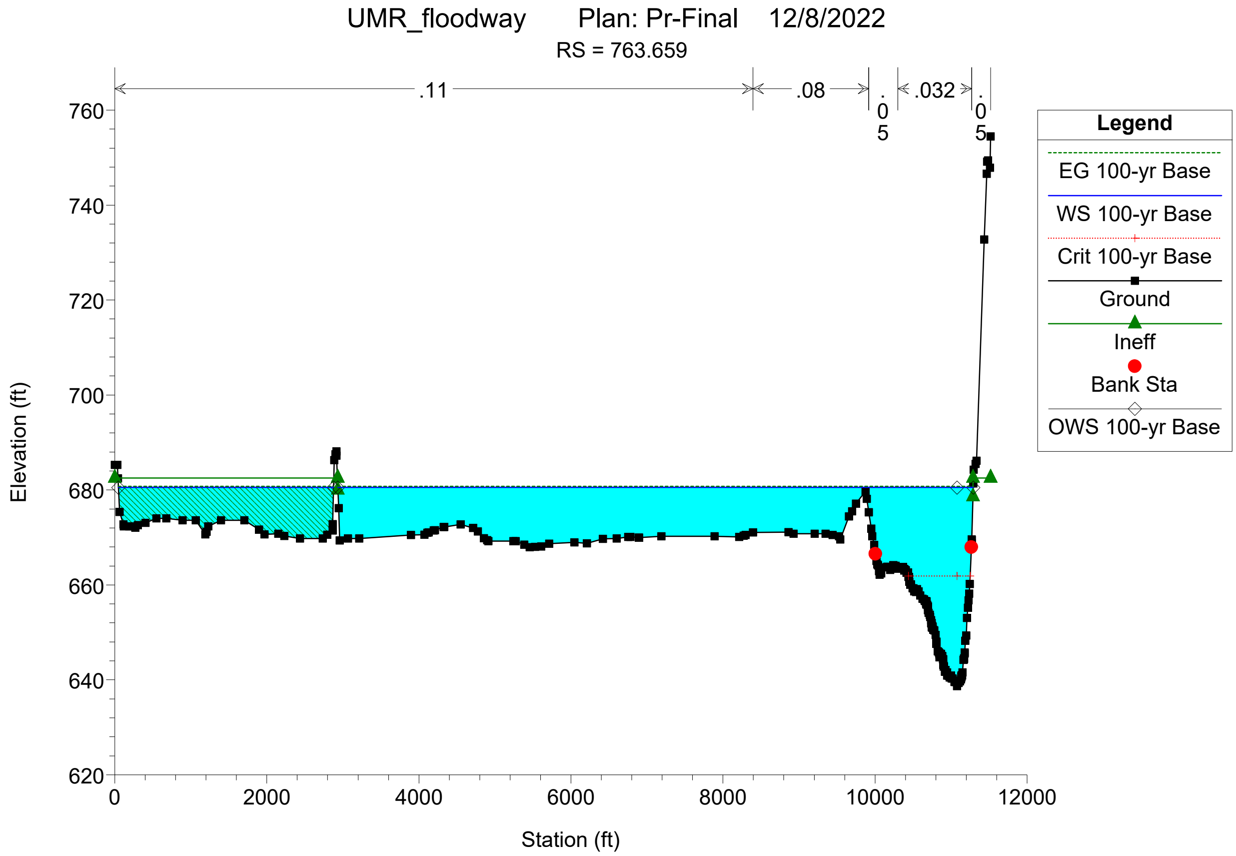
UMR_floodway Plan: Pr-Final 12/8/2022
RS = 765.103
.05
.045
.11
.08
.032
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

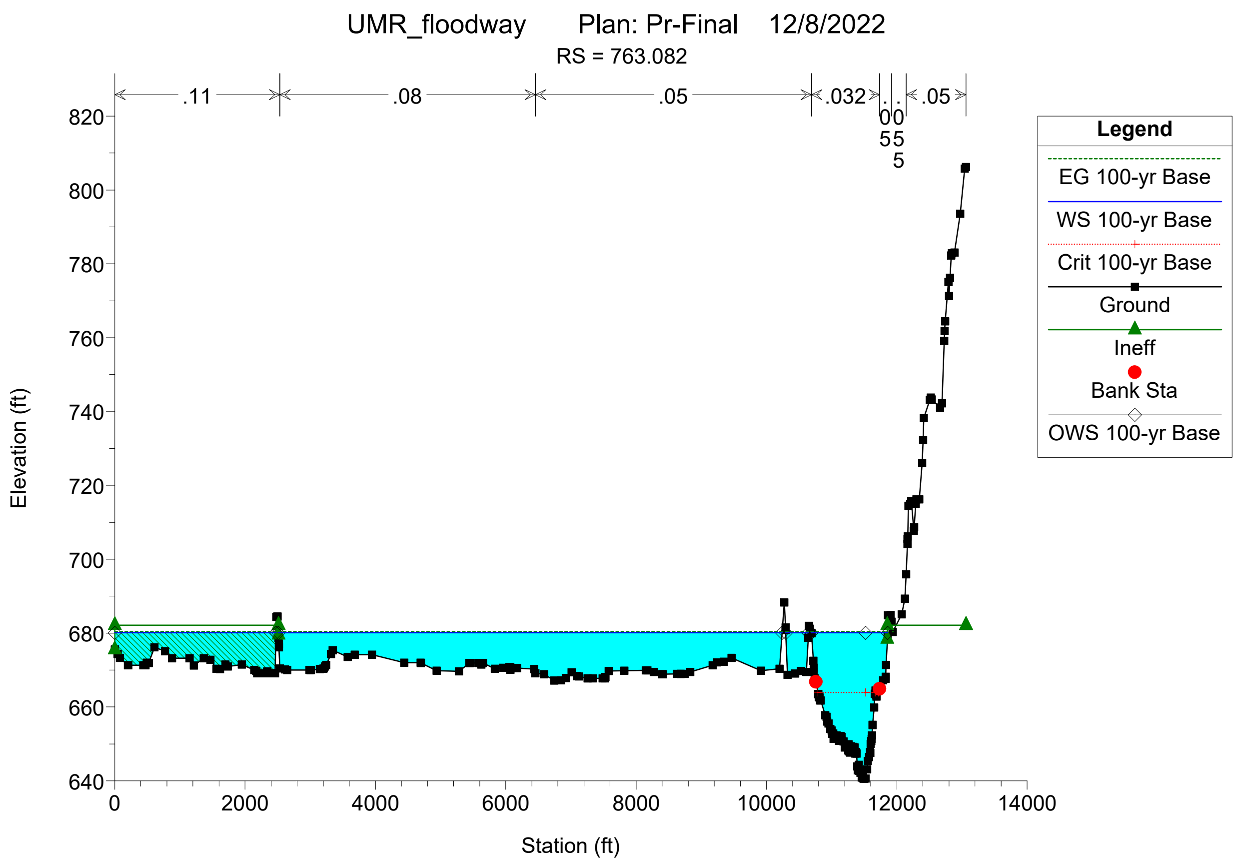


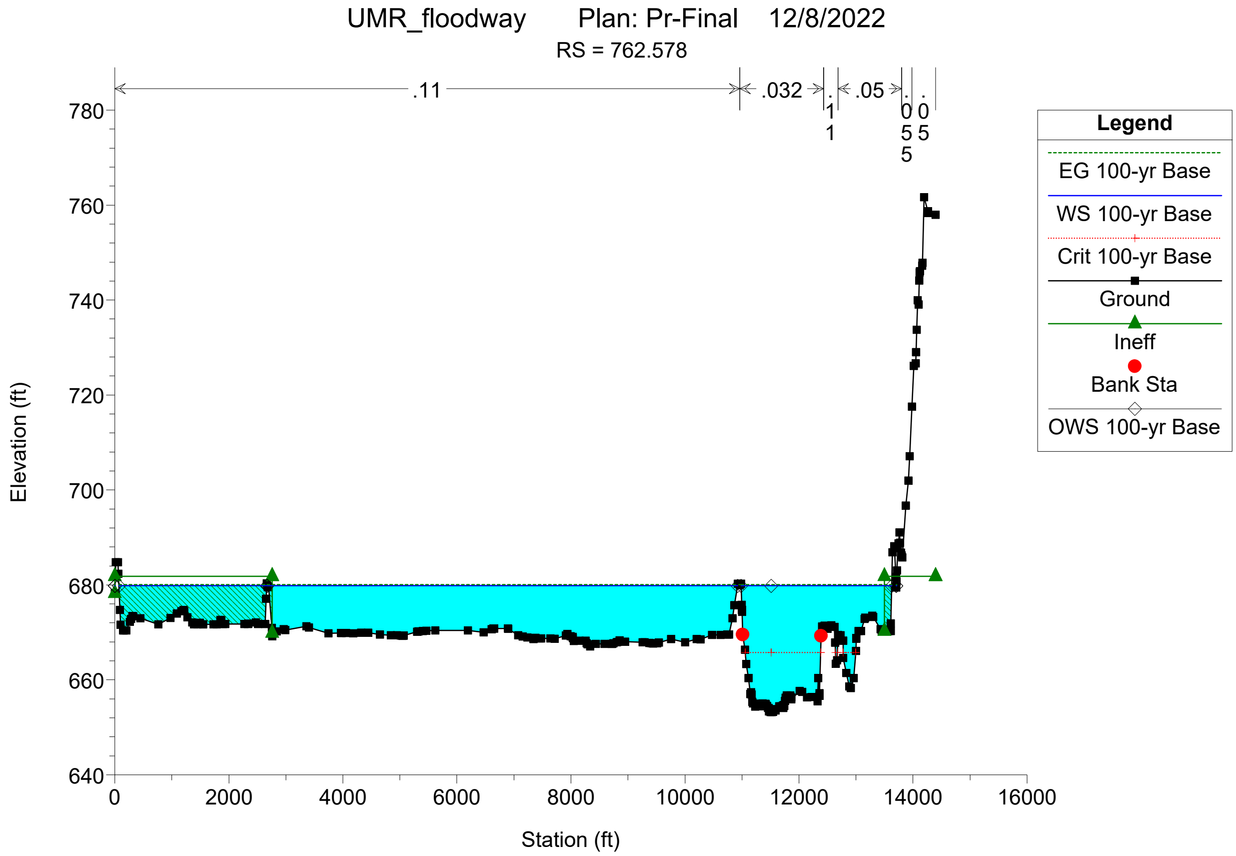
UMR_floodway Plan: Pr-Final 12/8/2022
RS = 764.552
.045
.11
.05
.05
.032
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base



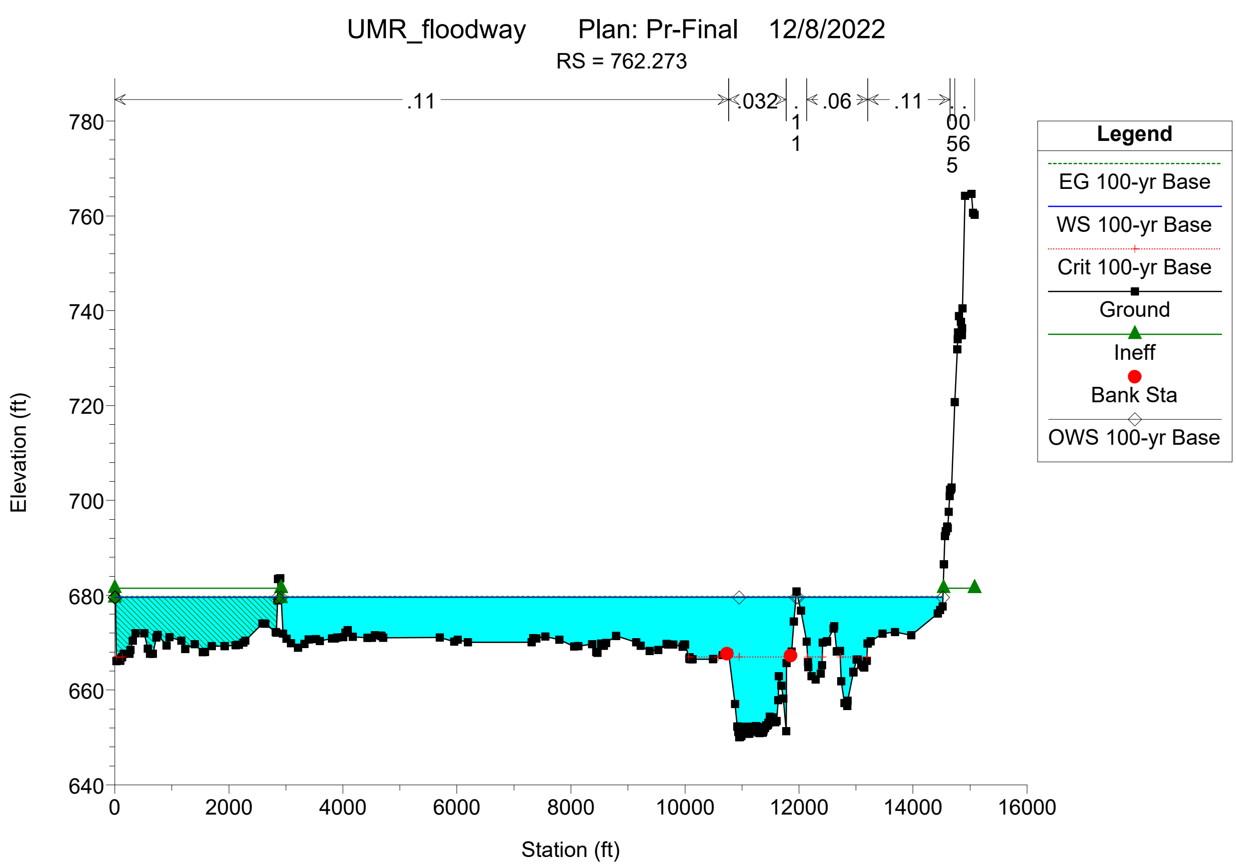
UMR_floodway Plan: Pr-Final 12/8/2022
RS = 764.091
.05
.11
.032
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base


UMR_floodway Plan: Pr-Final 12/8/2022
RS = 763.659
.11
.08
.032
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

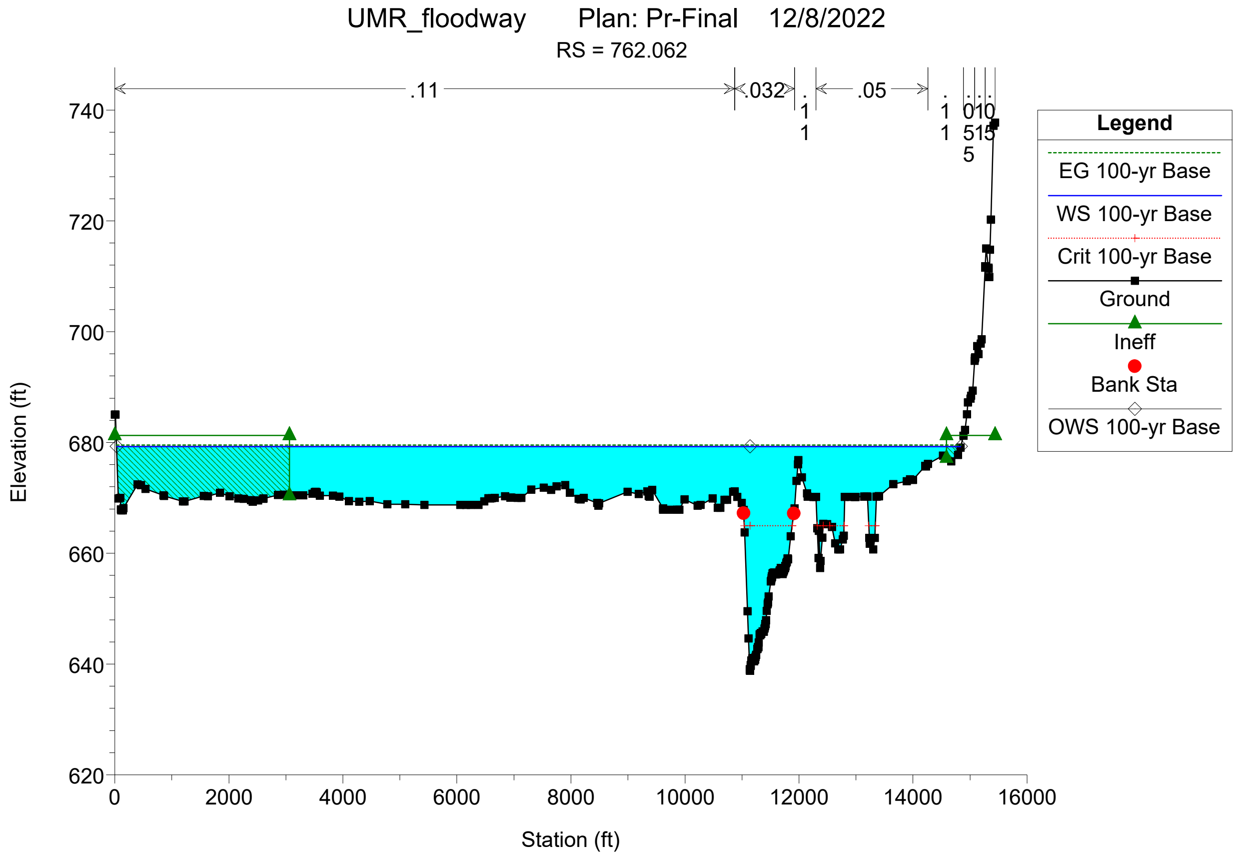

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 763.082
.11
.08
.05
.032
.05
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

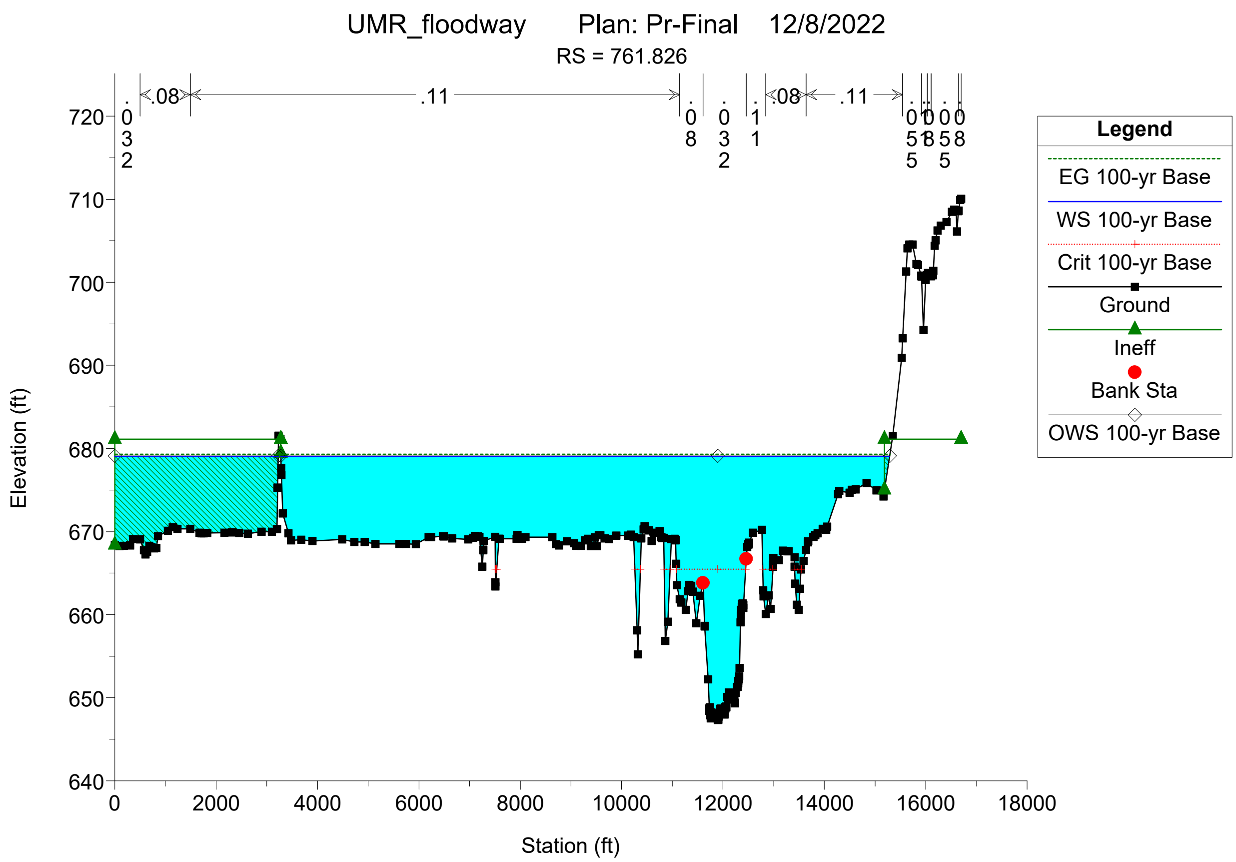


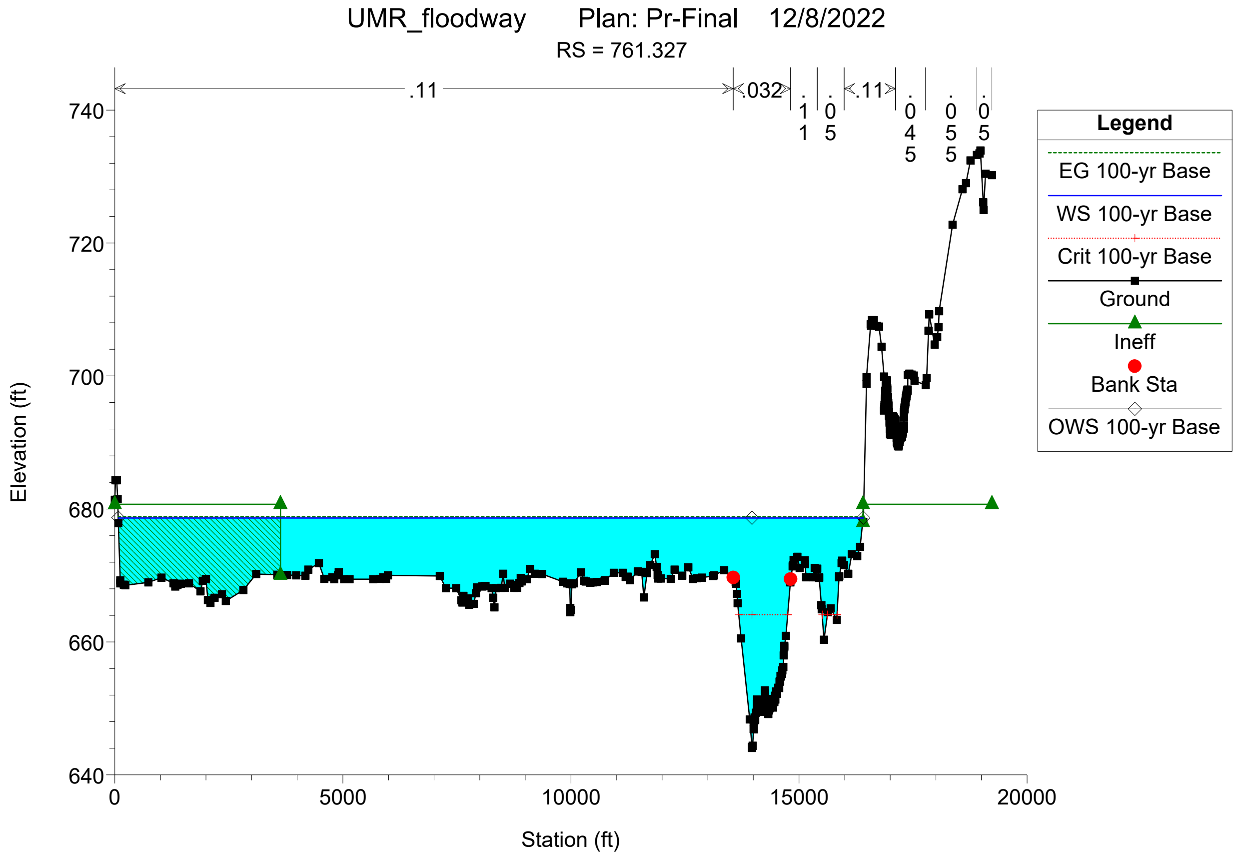
UMR_floodway Plan: Pr-Final 12/8/2022
RS = 762.578
.11
.032
.05
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base



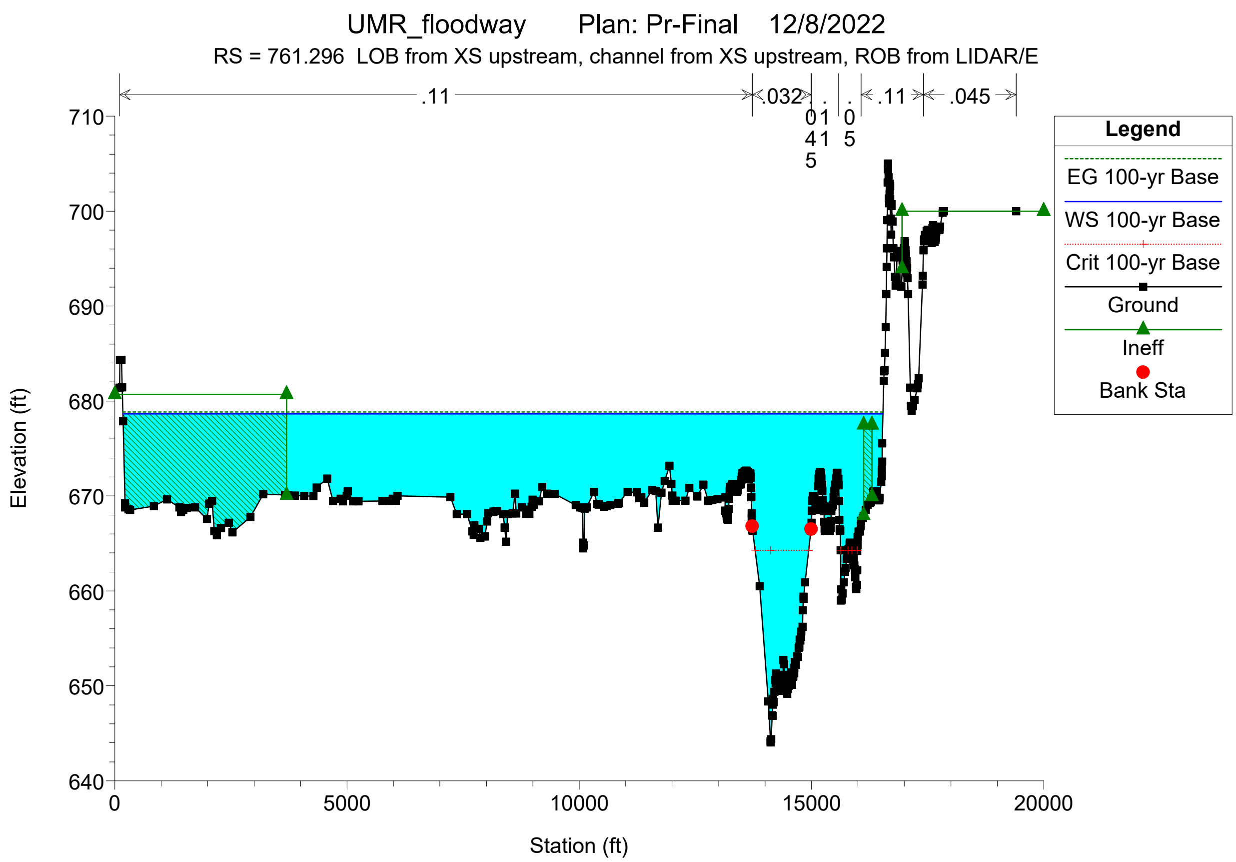
UMR_floodway Plan: Pr-Final 12/8/2022
RS = 762.273
.11
.032
.06
.11
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base


UMR_floodway Plan: Pr-Final 12/8/2022
RS = 762.062
.11
.032
.05
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

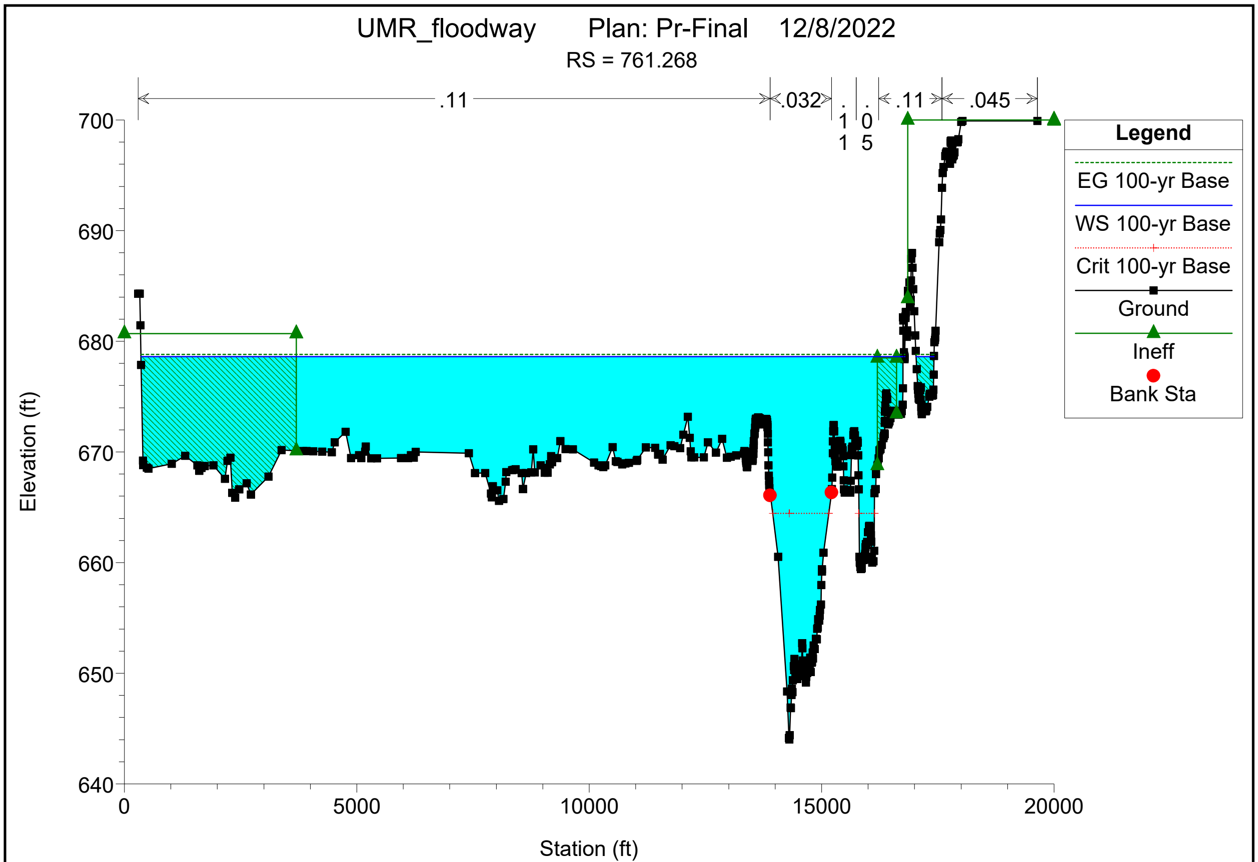

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 761.826
.08
.11
.08
.11
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

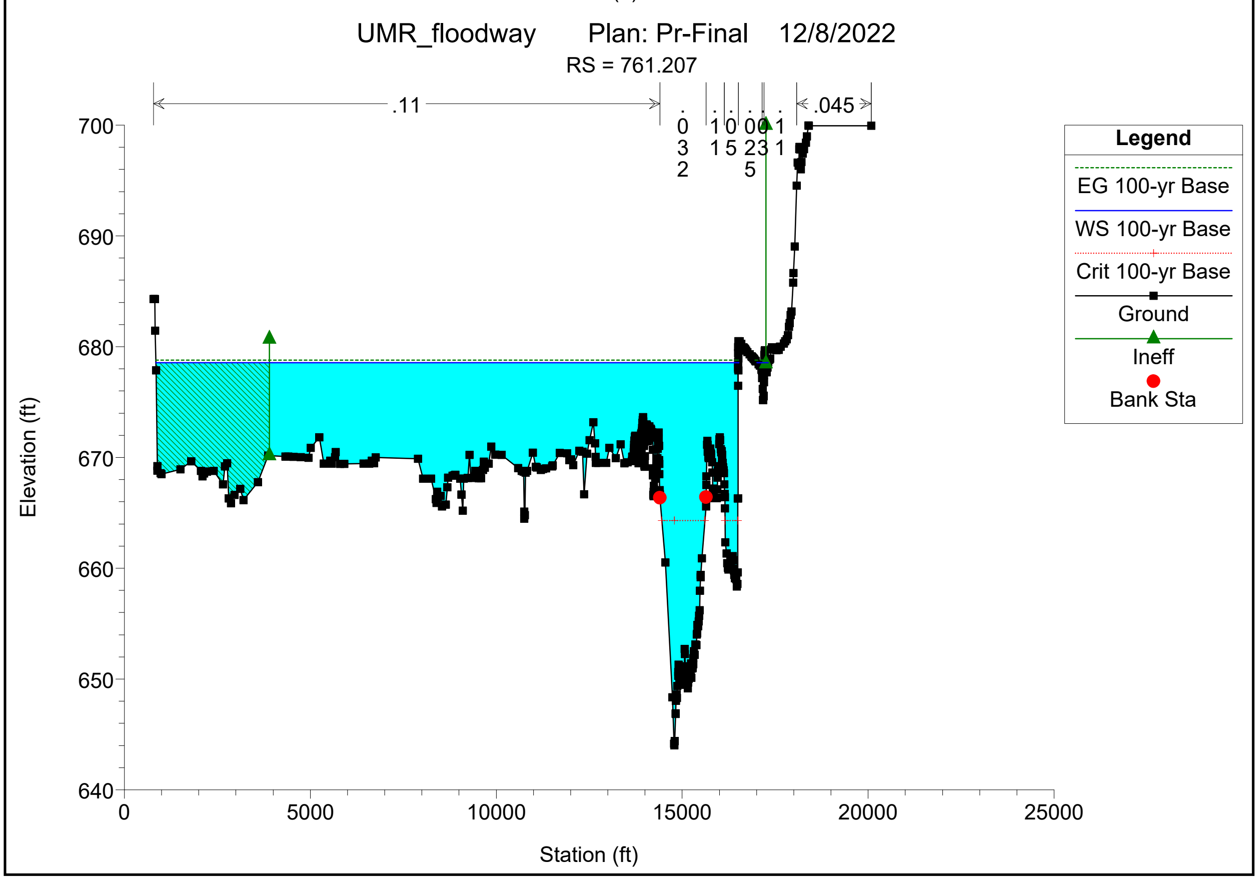


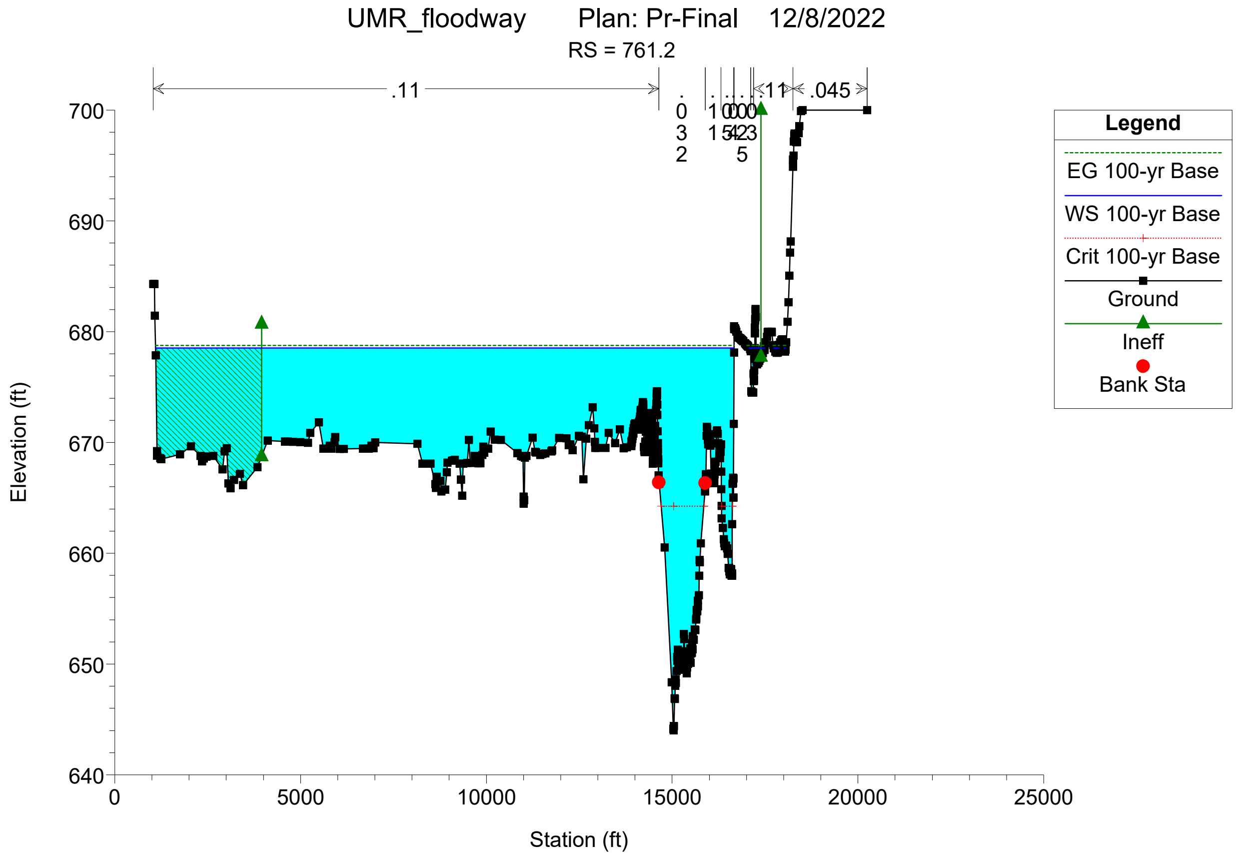
UMR_floodway Plan: Pr-Final 12/8/2022
RS = 761.327
.11
.032
.11
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)



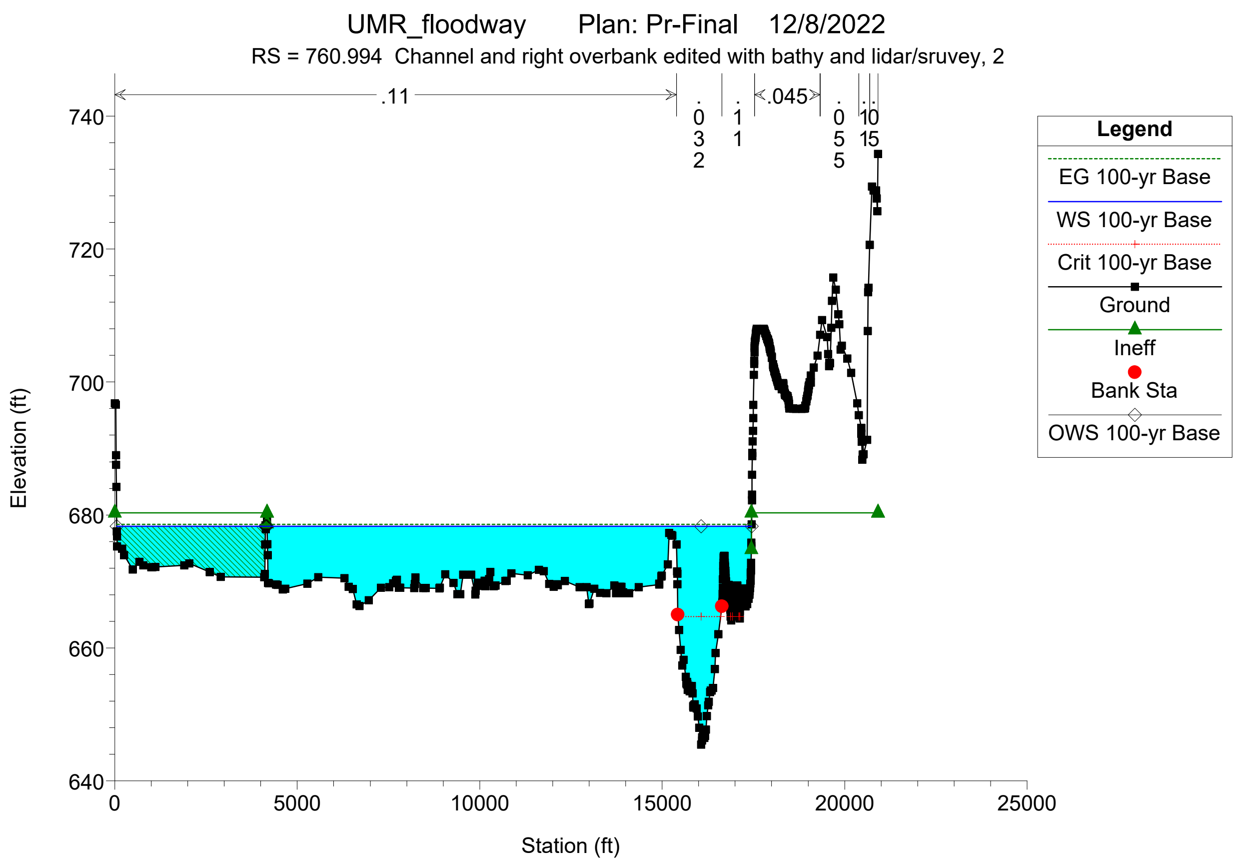
UMR_floodway Plan: Pr-Final 12/8/2022
RS = 761.296 LOB from XS upstream, channel from XS upstream, ROB from LIDAR/E
.11
.032
.11
.045
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


UMR_floodway Plan: Pr-Final 12/8/2022
RS = 761.268
.11
.032
.11
.045
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta

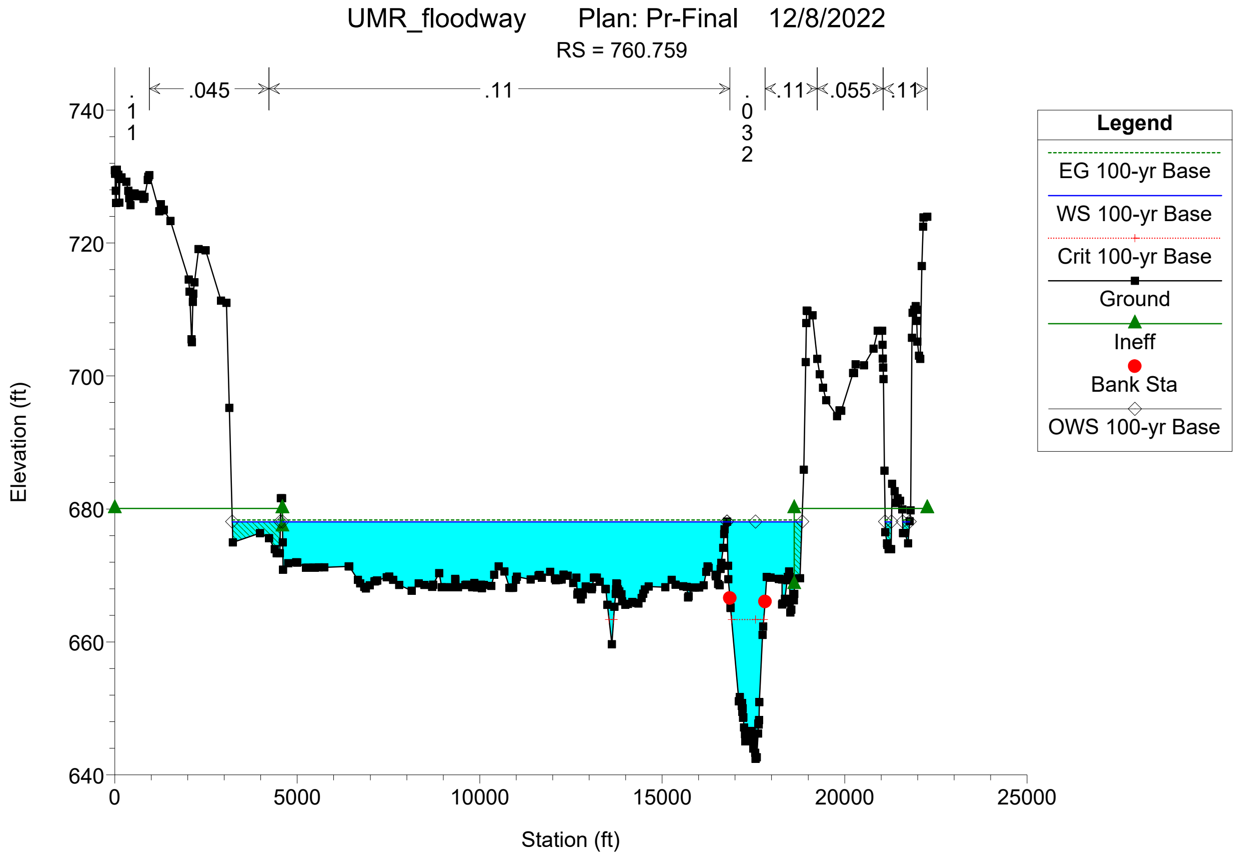

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 761.207
.11
.045
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta

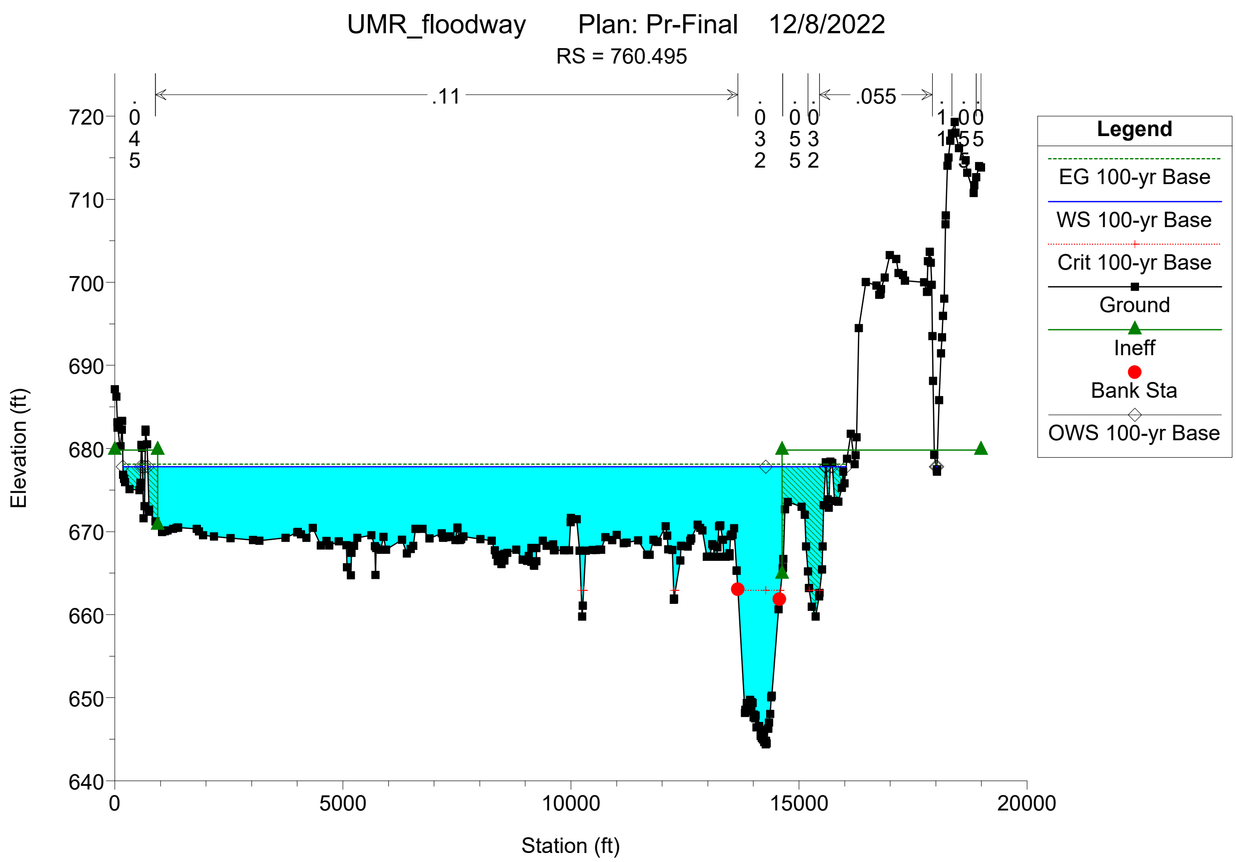


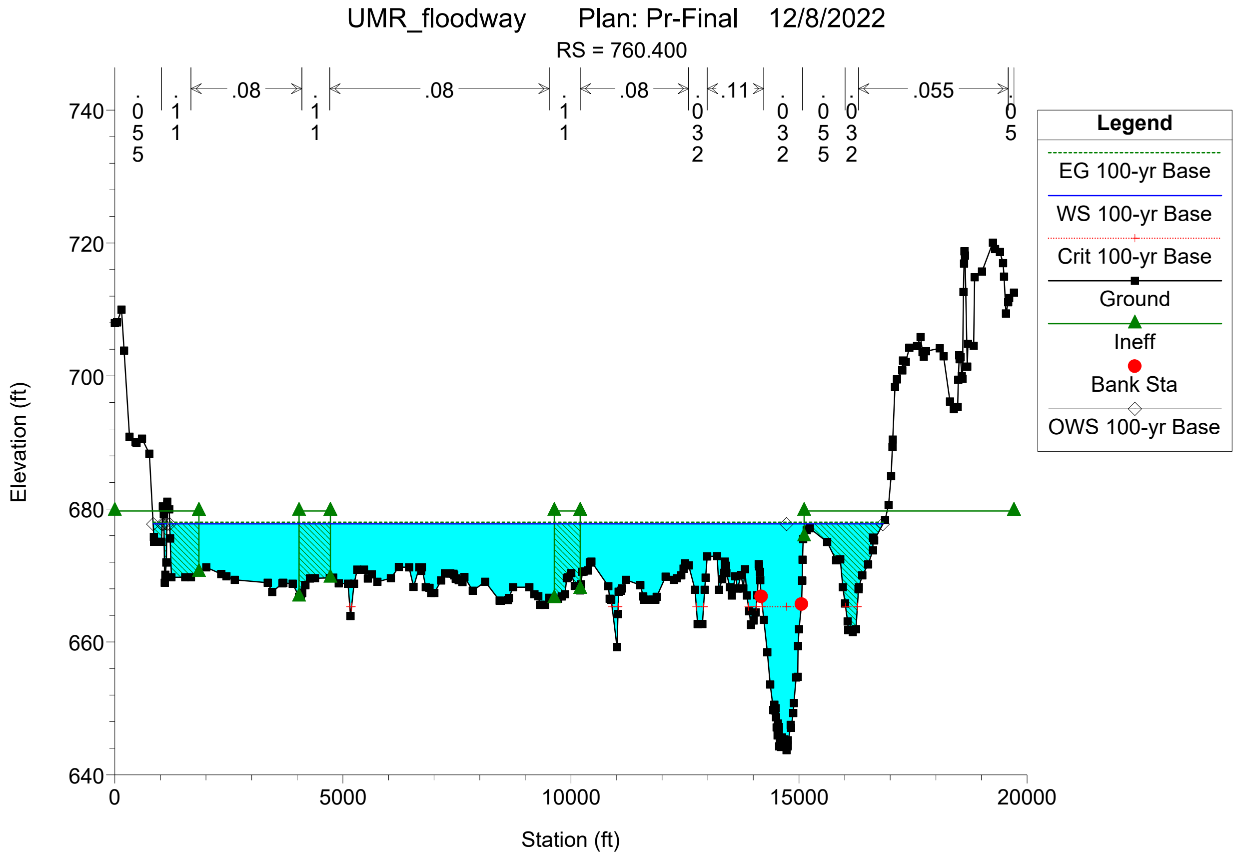
UMR_floodway Plan: Pr-Final 12/8/2022
RS = 761.2
.11
.045
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta



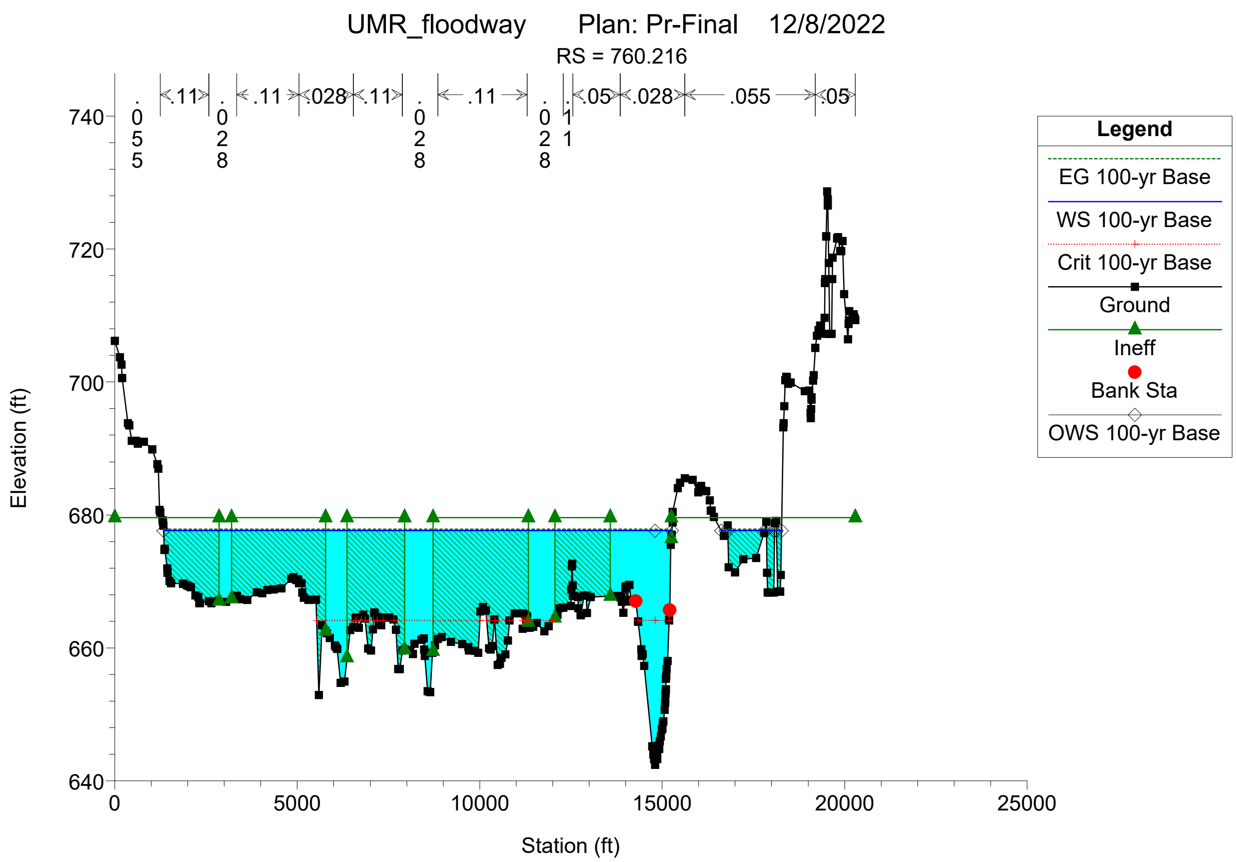
UMR_floodway Plan: Pr-Final 12/8/2022
RS = 760.994 Channel and right overbank edited with bathy and lidar/sruvey, 2
.11
.045
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base


UMR_floodway Plan: Pr-Final 12/8/2022
RS = 760.759
.045
.11
.11
.055
.11
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

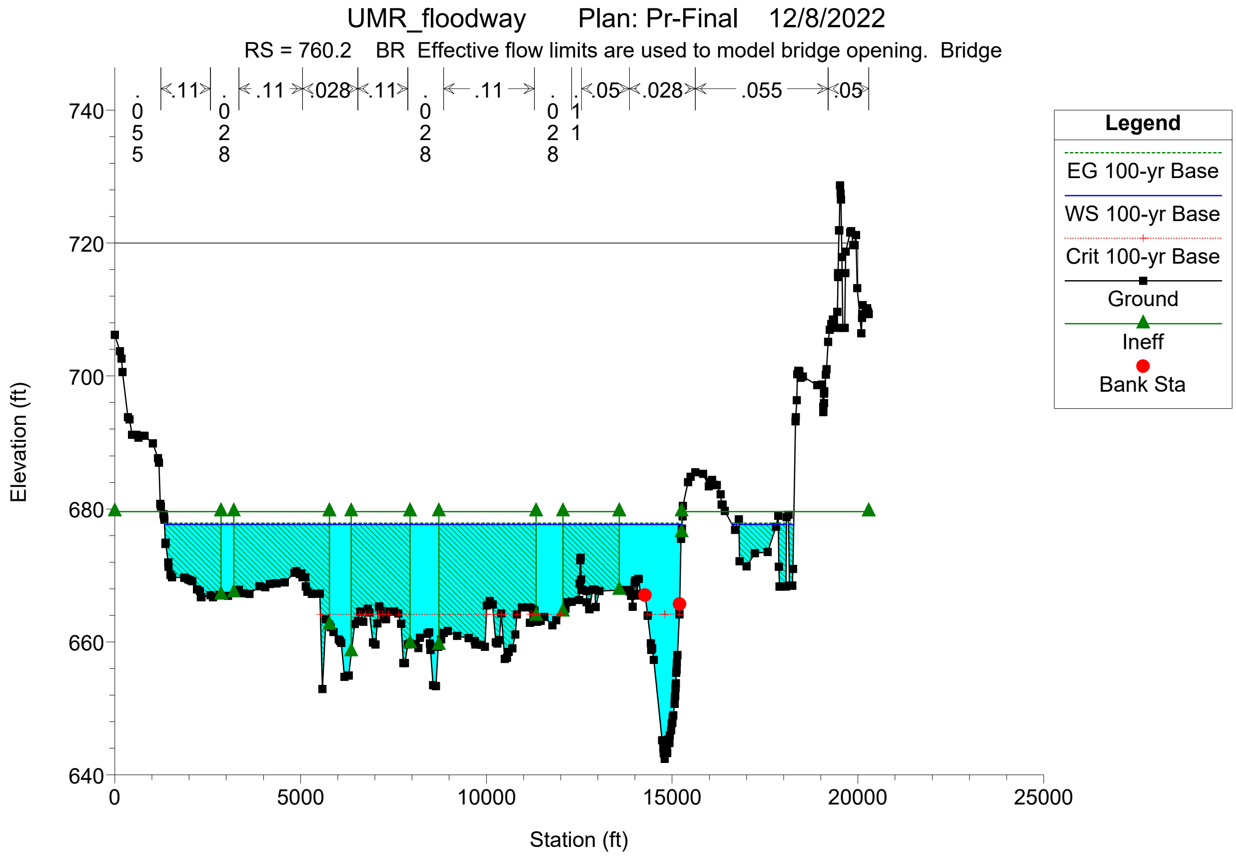

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 760.495
.11
.055
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

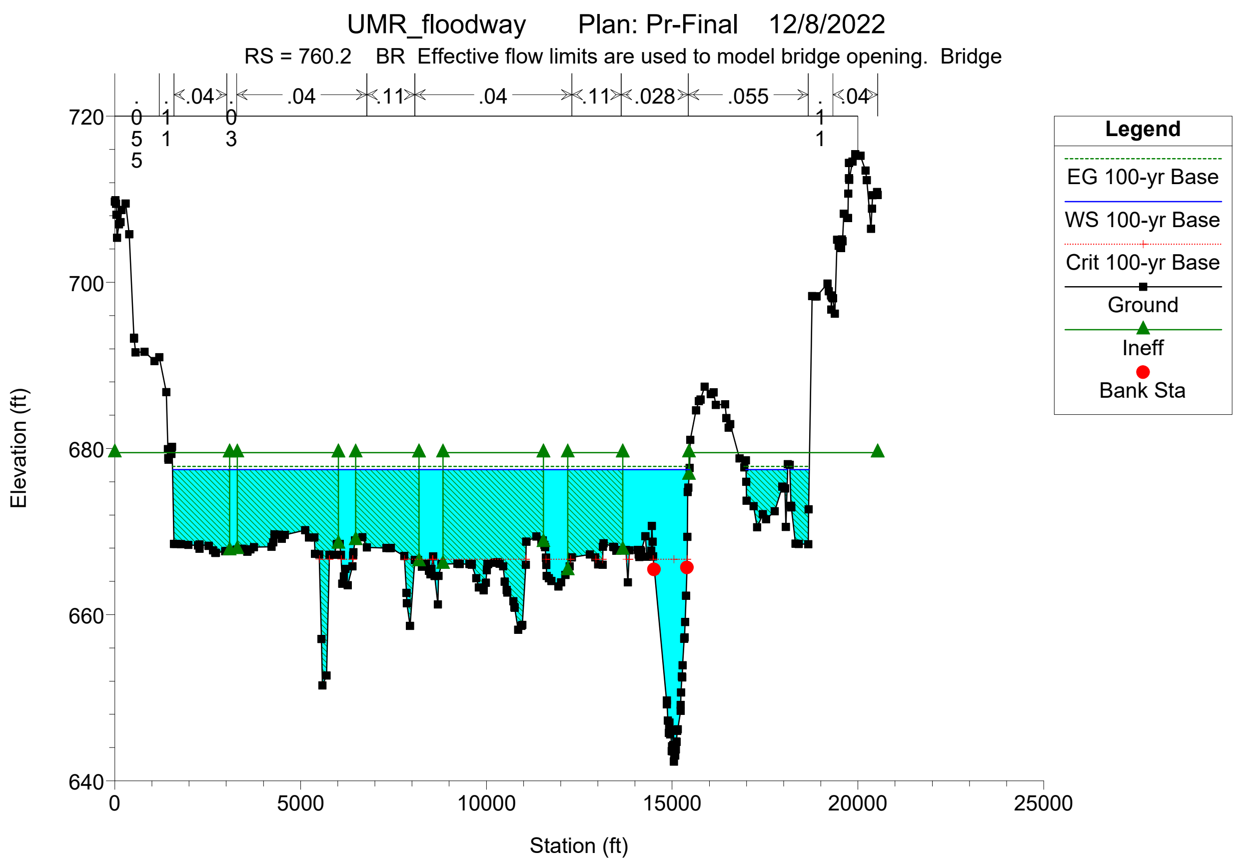


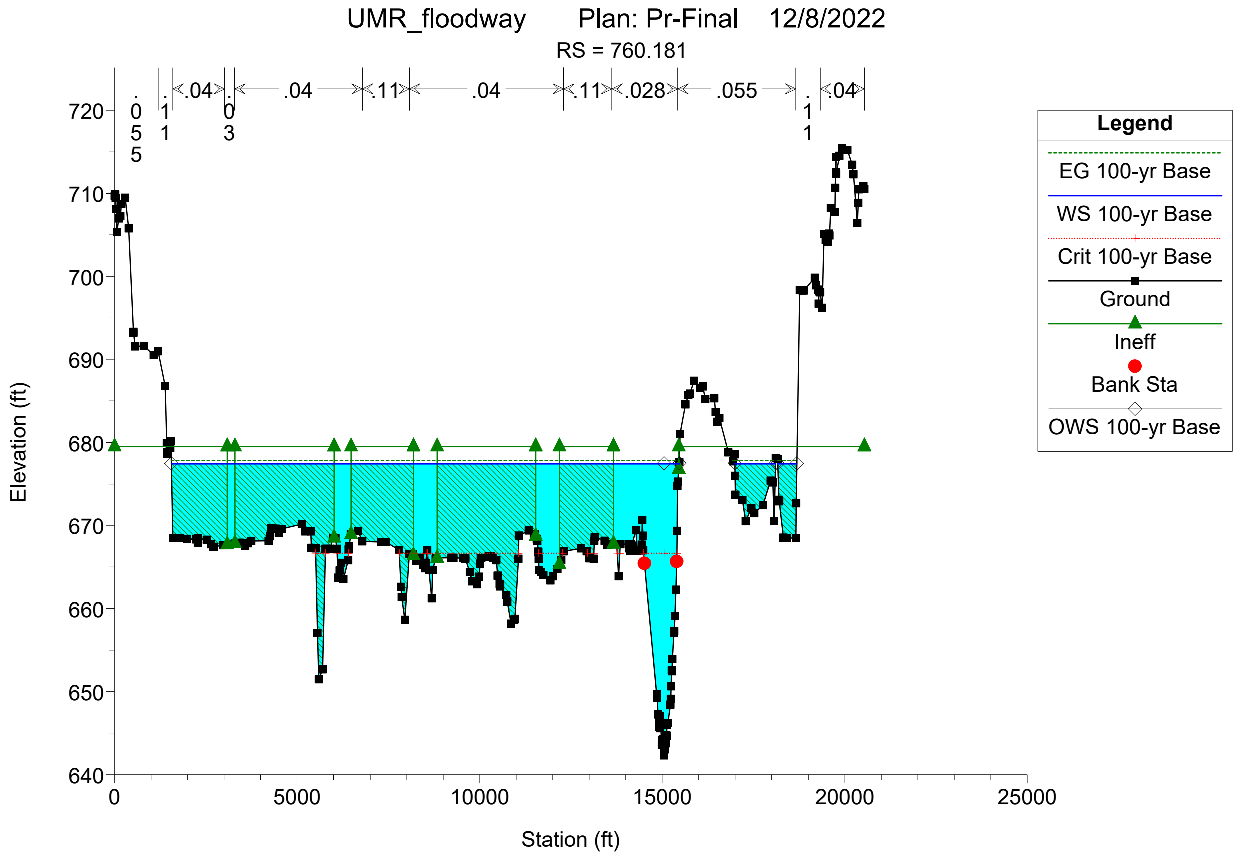
UMR_floodway Plan: Pr-Final 12/8/2022
RS = 760.400
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

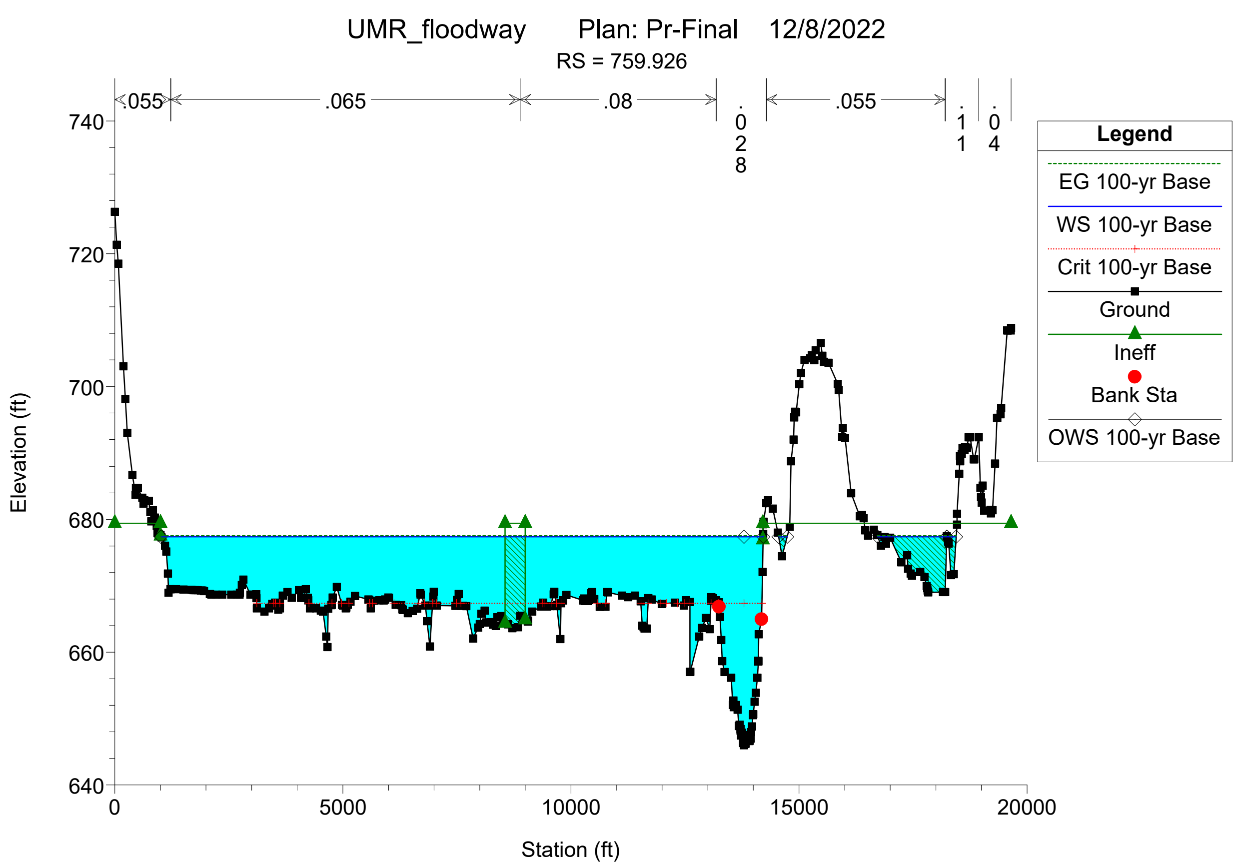


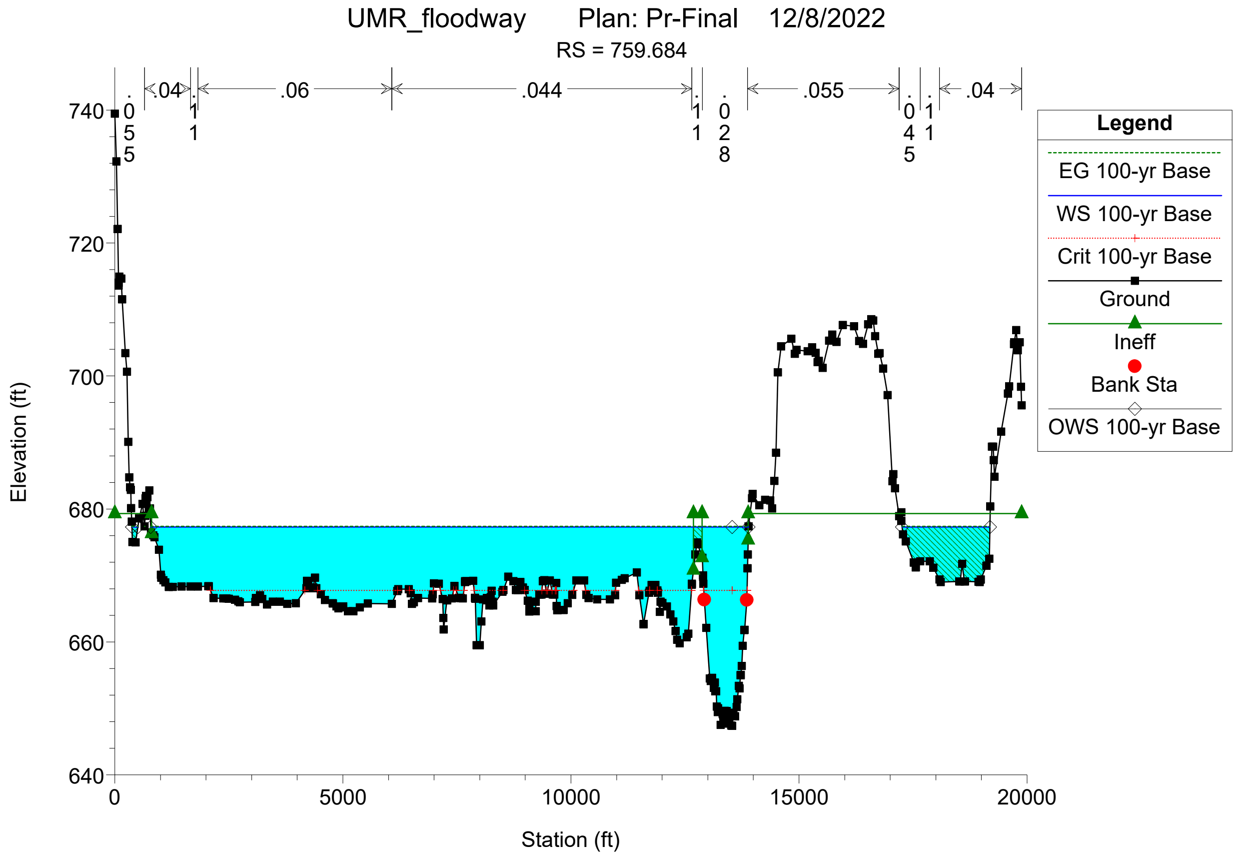
UMR_floodway Plan: Pr-Final 12/8/2022
RS = 760.216
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

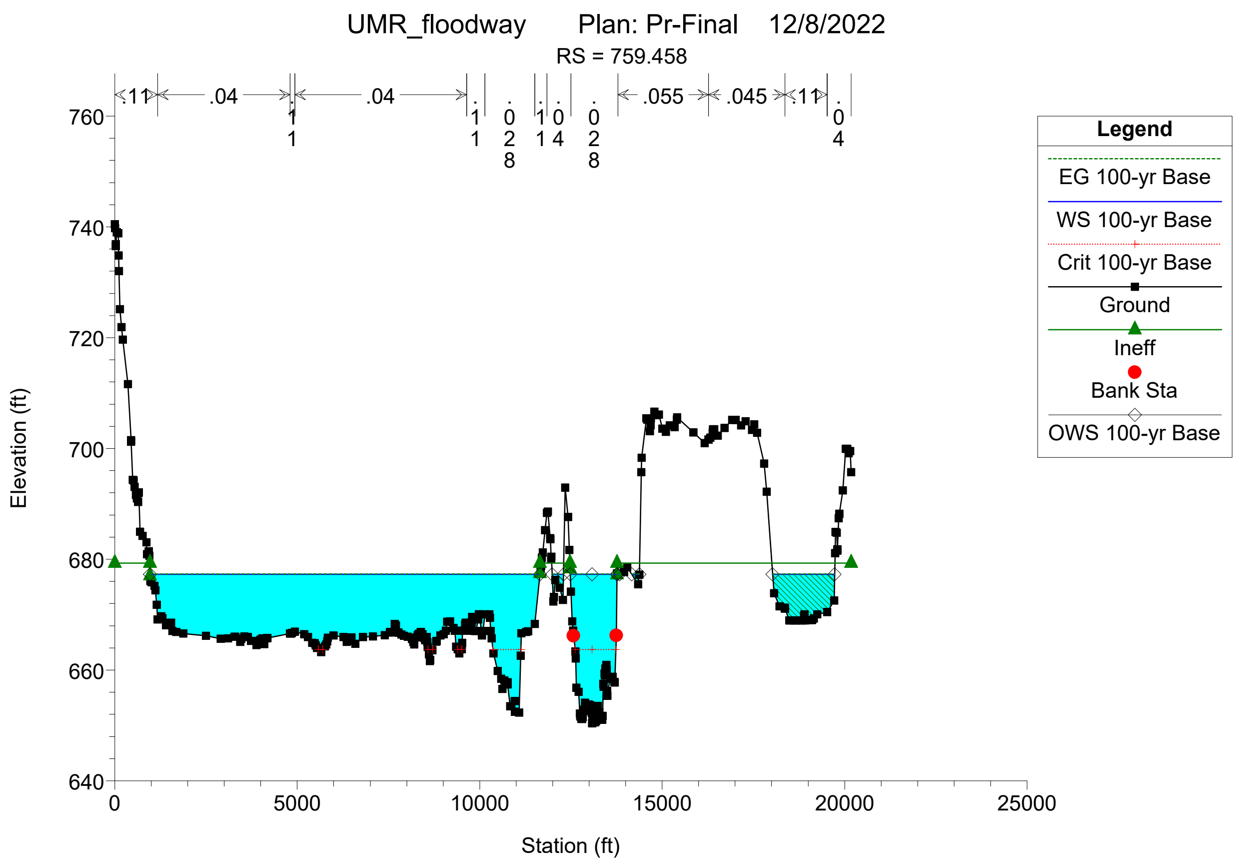

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 760.2 BR Effective flow limits are used to model bridge opening. Bridge
.11
.11
.028
.11
.11
.05
.028
.055
.05
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta

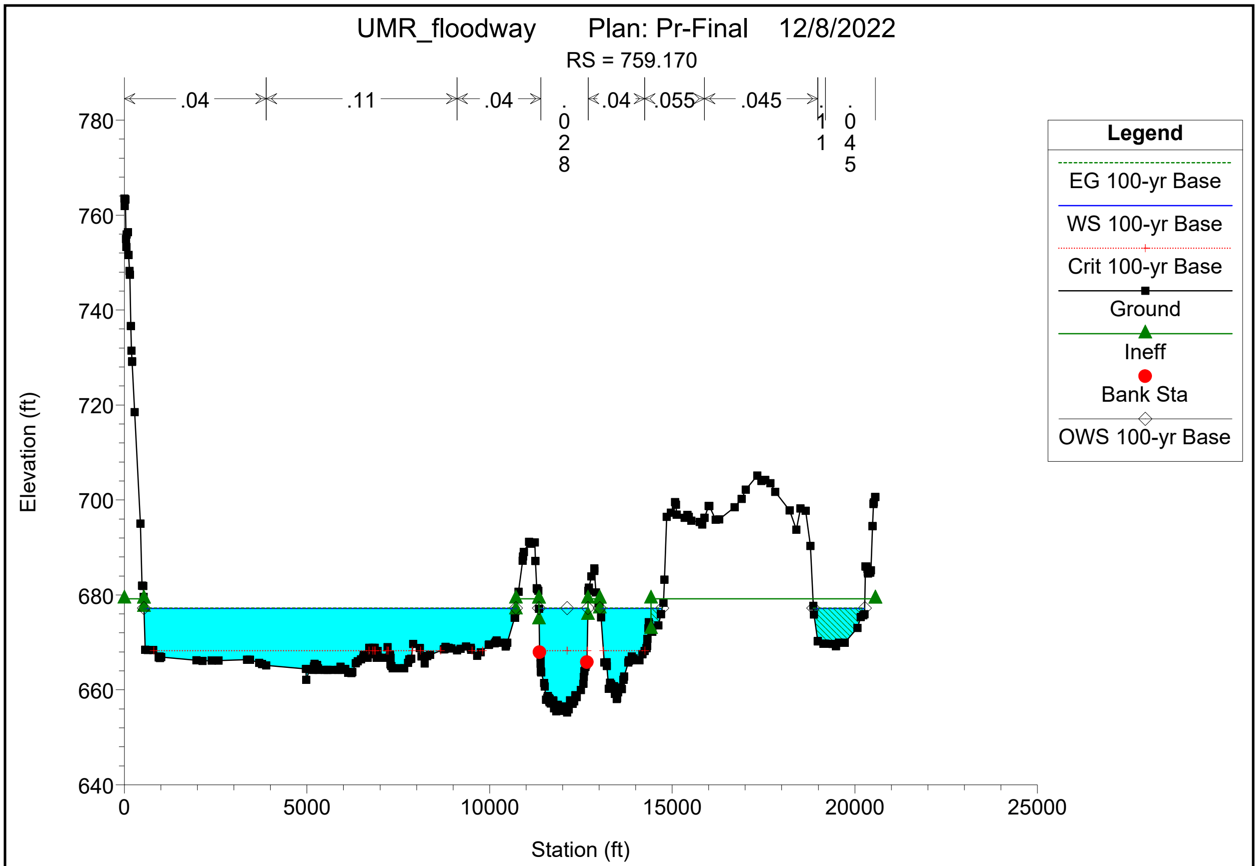

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 760.2 BR Effective flow limits are used to model bridge opening. Bridge
.04
.04
.11
.04
.11
.028
.055
.04
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta

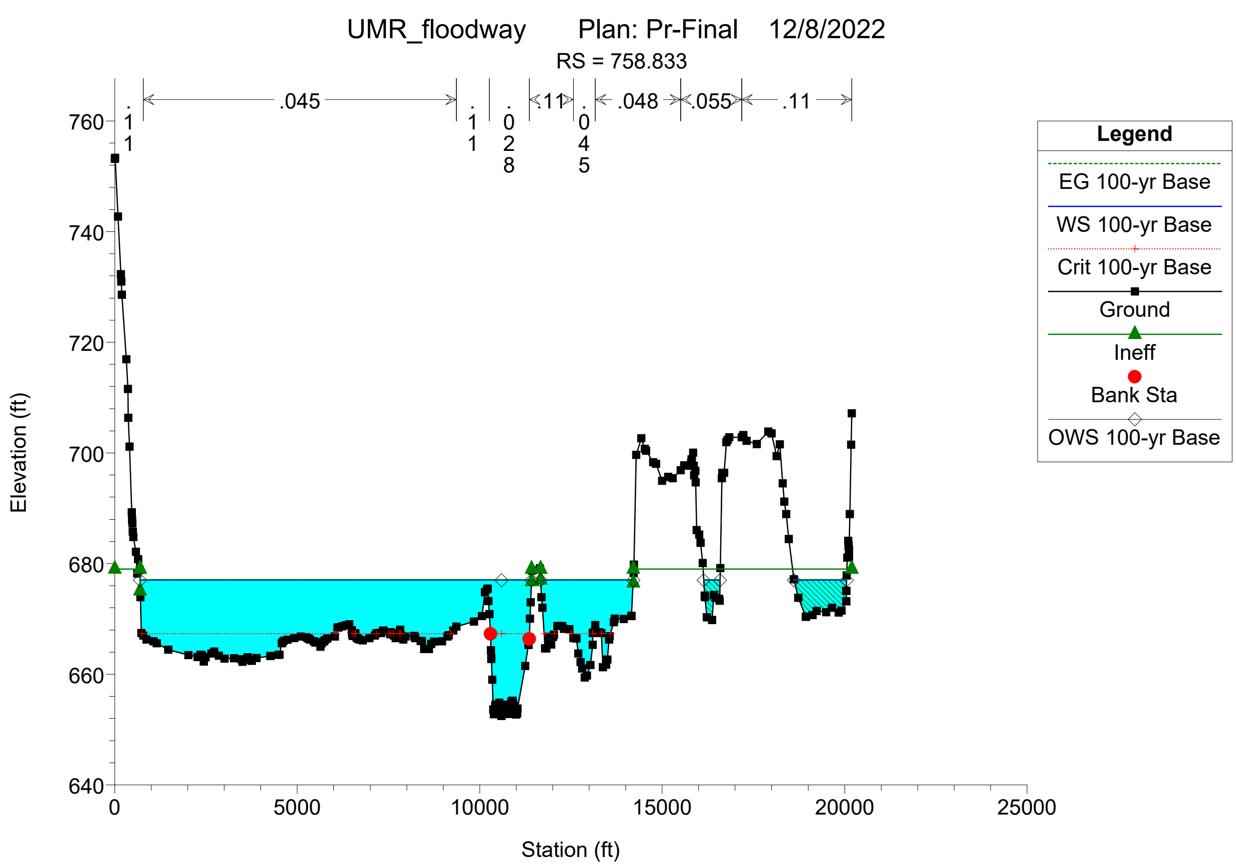

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 760.181
.055
.11
.04
.03
.04
.11
.04
.11
.028
.055
.11
.04
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

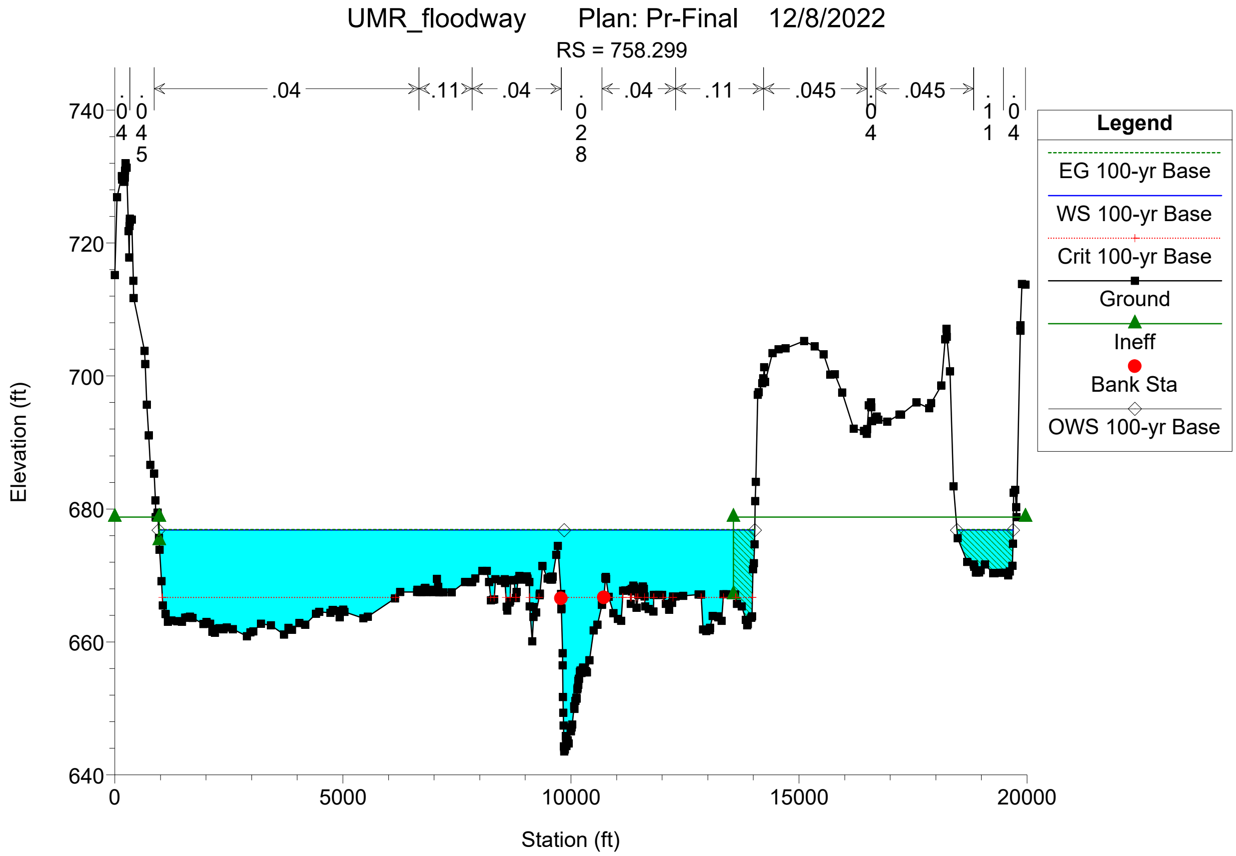

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 759.926
.055
.065
.08
.028
.055
.11
.04
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

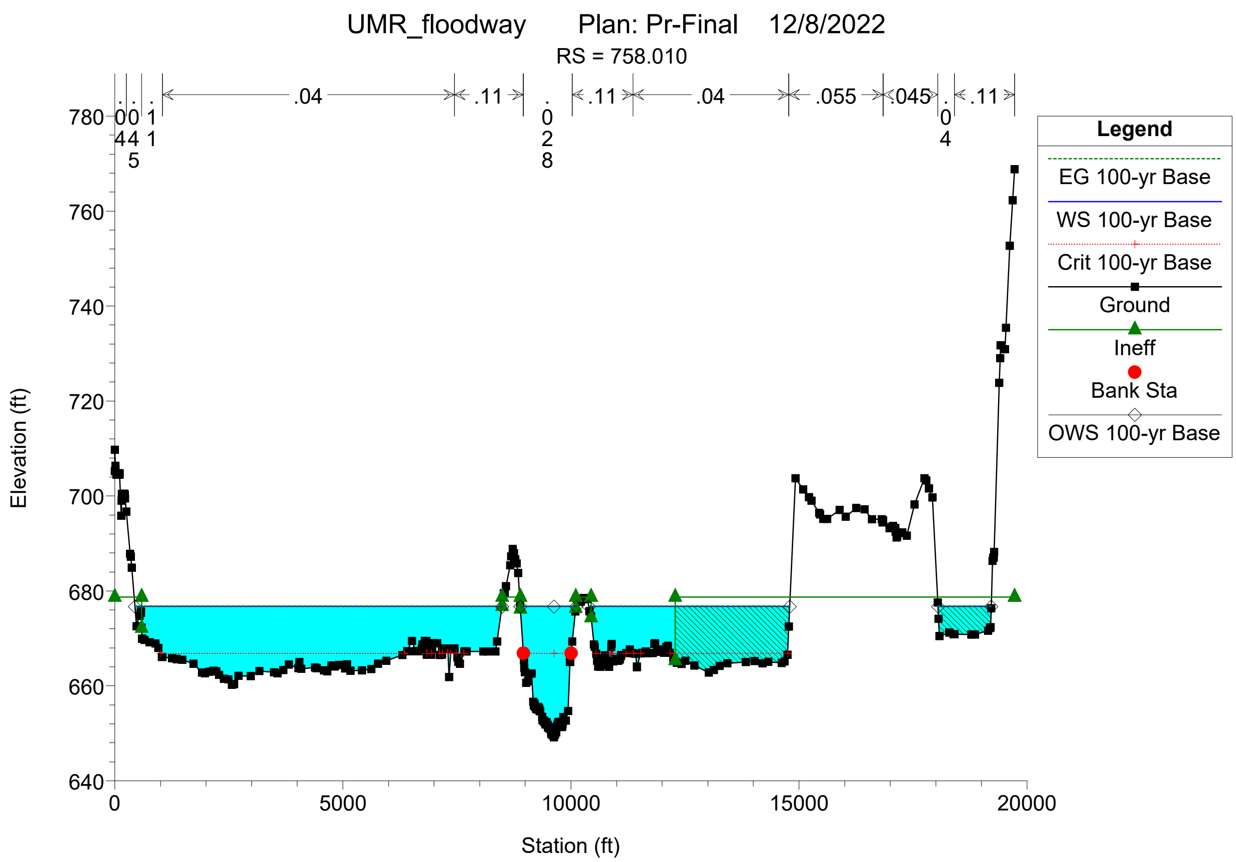

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 759.684
.04
.06
.044
.055
.04
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)

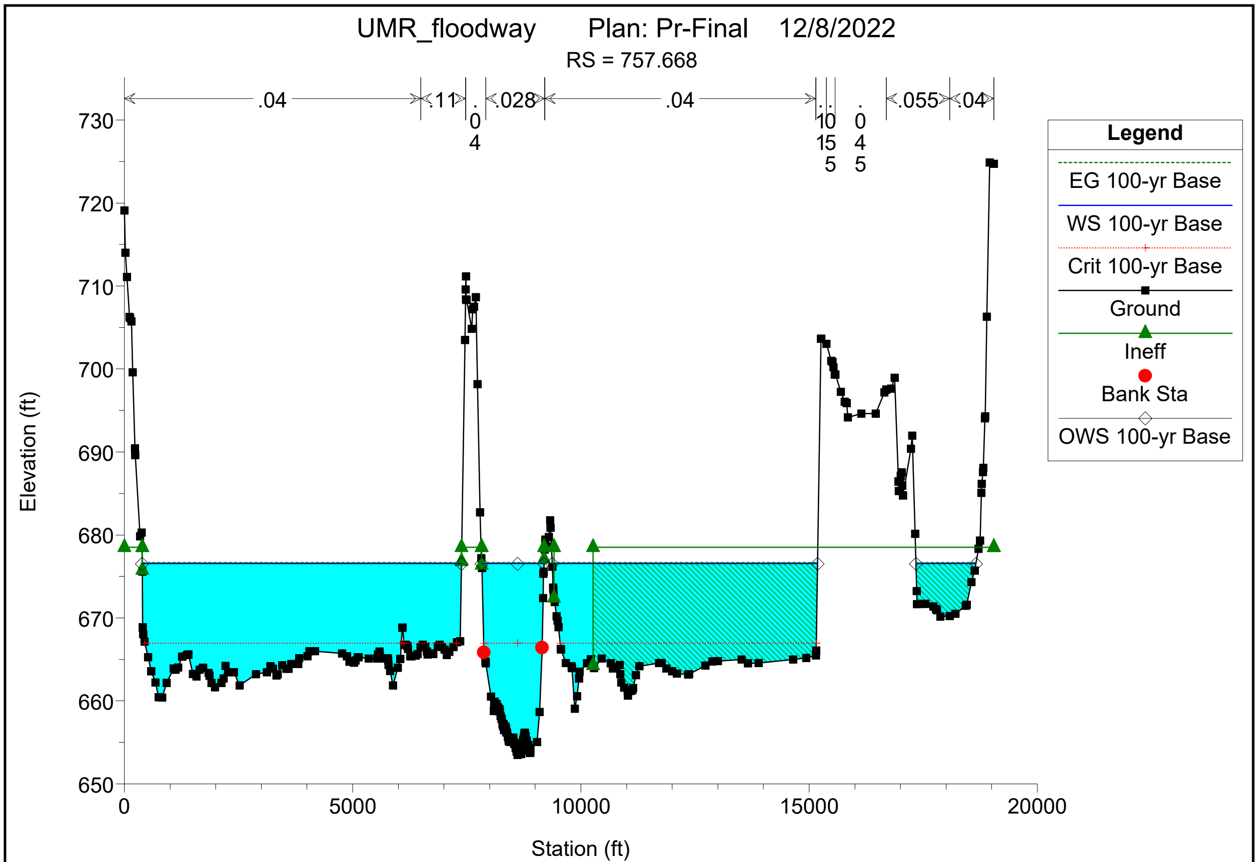

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 759.458
.04
.04
.055
.045
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)


UMR_floodway Plan: Pr-Final 12/8/2022
RS = 759.170
.04
.11
.04
.028
.04
.055
.045
.11
.045
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

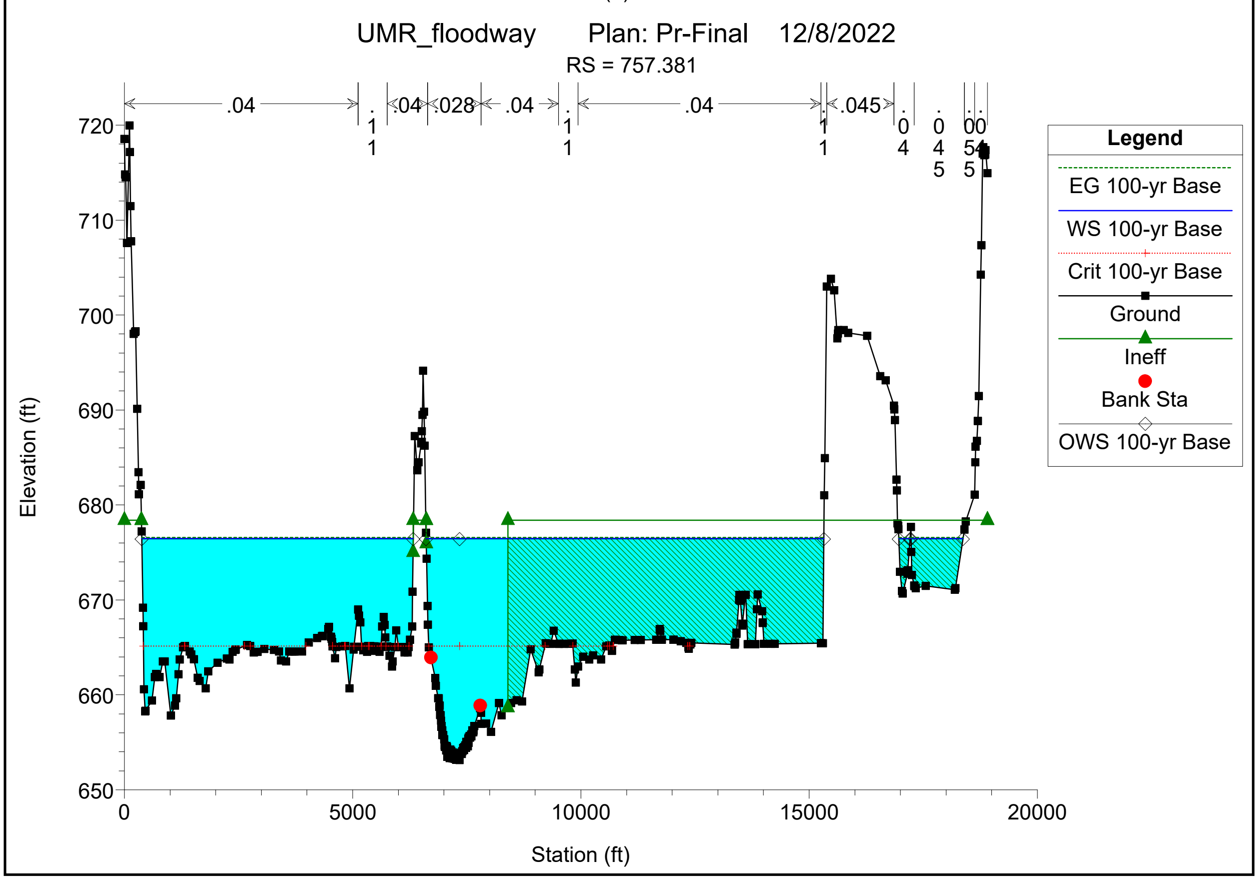

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 758.833
.11
.045
.11
.028
.11
.045
.048
.055
.11
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base


UMR_floodway Plan: Pr-Final 12/8/2022
RS = 758.299
Elevation (ft)
Station (ft)
.04
.11
.04
.04
.11
.045
.045
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

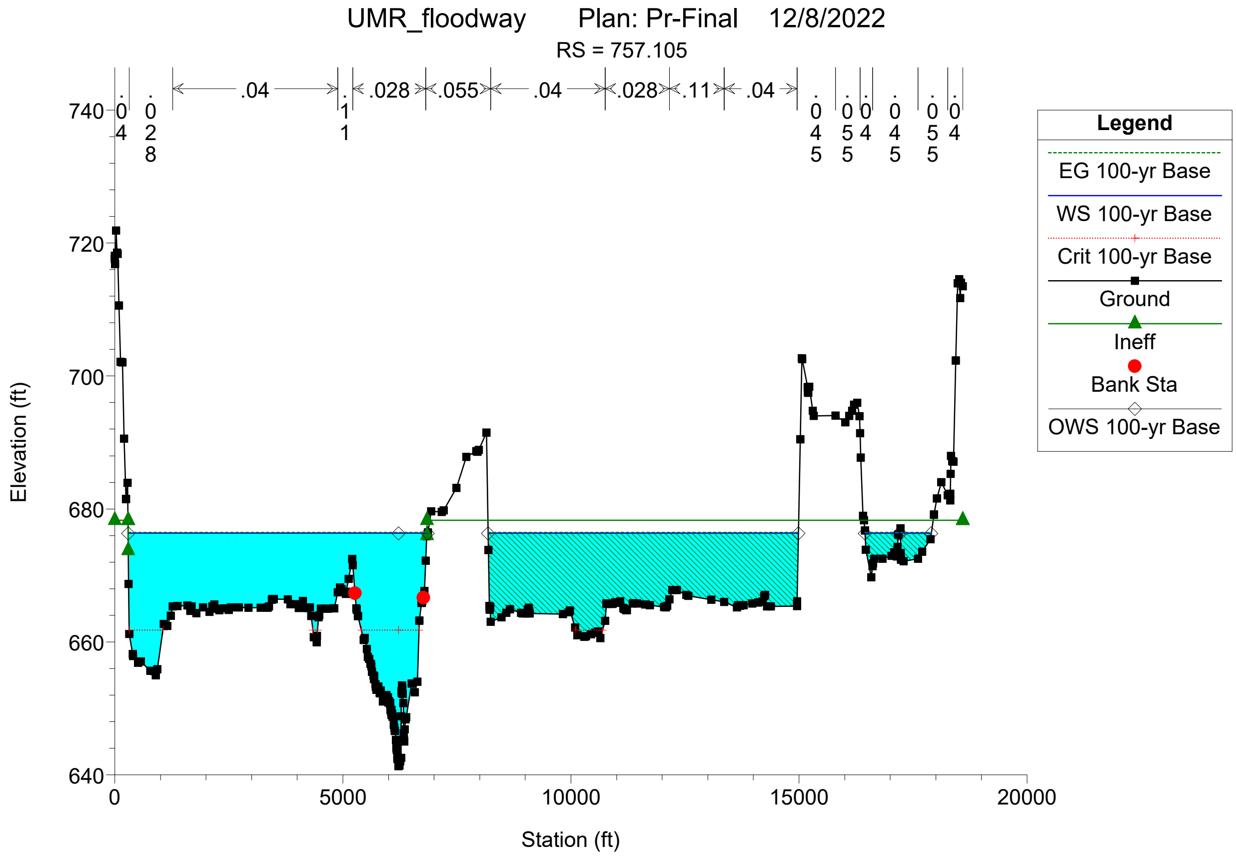

UMR_floodway Plan: Pr-Final 12/8/2022
RS = 758.010
Elevation (ft)
Station (ft)
.04
.11
.11
.04
.055
.045
.11
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base

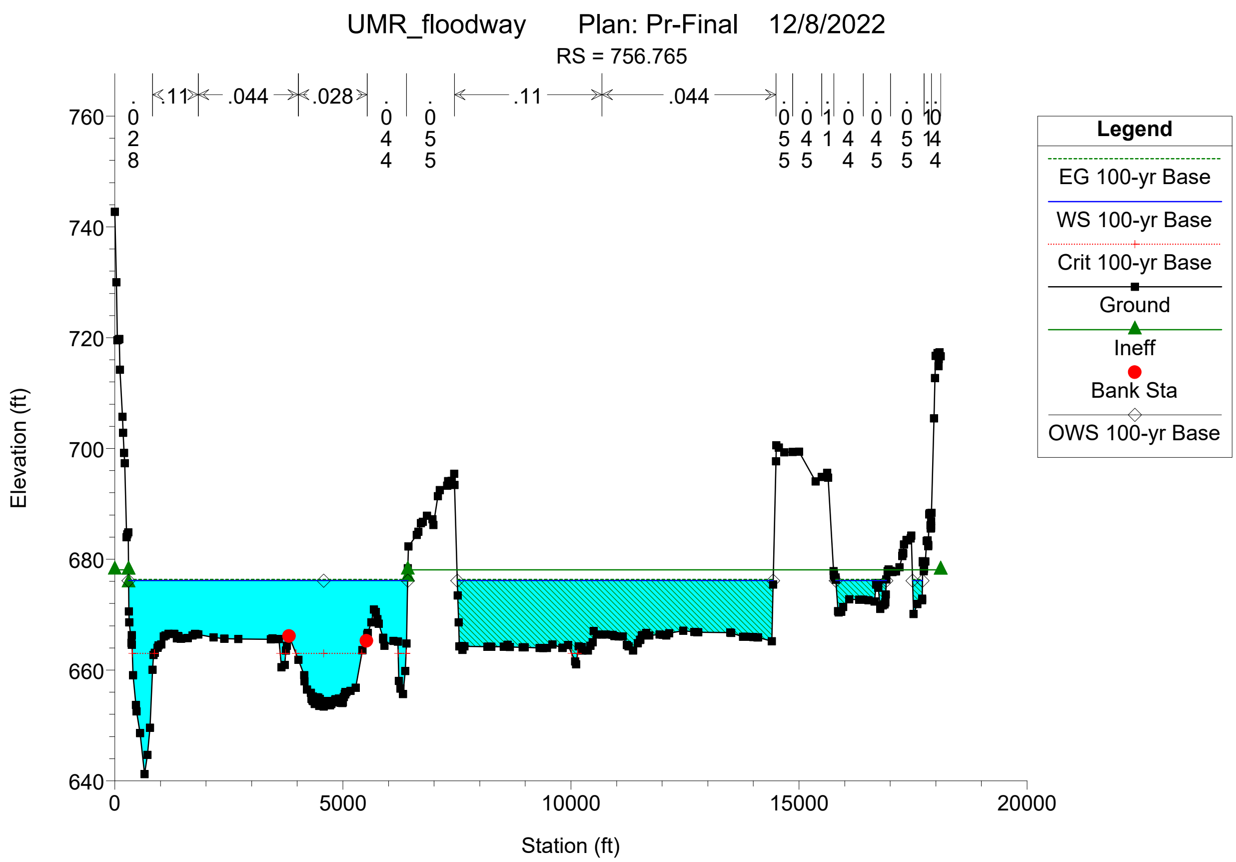


UMR_floodway Plan: Pr-Final 12/8/2022
RS = 757.668
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base



UMR_floodway Plan: Pr-Final 12/8/2022
RS = 757.381
Elevation (ft)
Station (ft)
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base


UMR_floodway Plan: Pr-Final 12/8/2022
RS = 757.105
.04
.028
.055
.04
.028
.11
.04
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)
640
660
680
700
720
740
0
5000
10000
15000
20000


UMR_floodway Plan: Pr-Final 12/8/2022
RS = 756.765
.11
.044
.028
.11
.044
Legend
EG 100-yr Base
WS 100-yr Base
Crit 100-yr Base
Ground
Ineff
Bank Sta
OWS 100-yr Base
Elevation (ft)
Station (ft)
640
660
680
700
720
740
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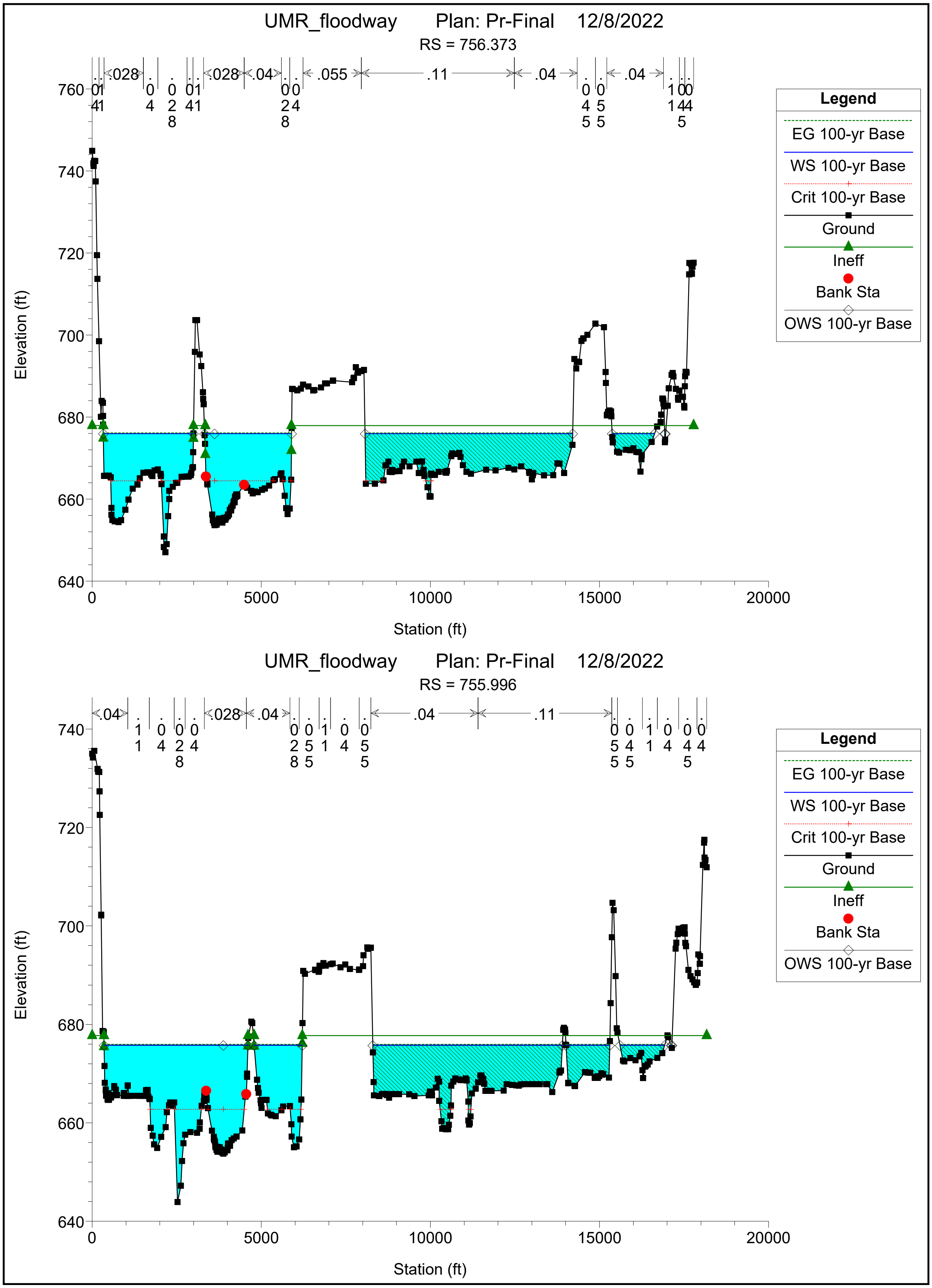

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Crit 100-yr Base
Ground
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Bank Sta
OWS 100-yr Base
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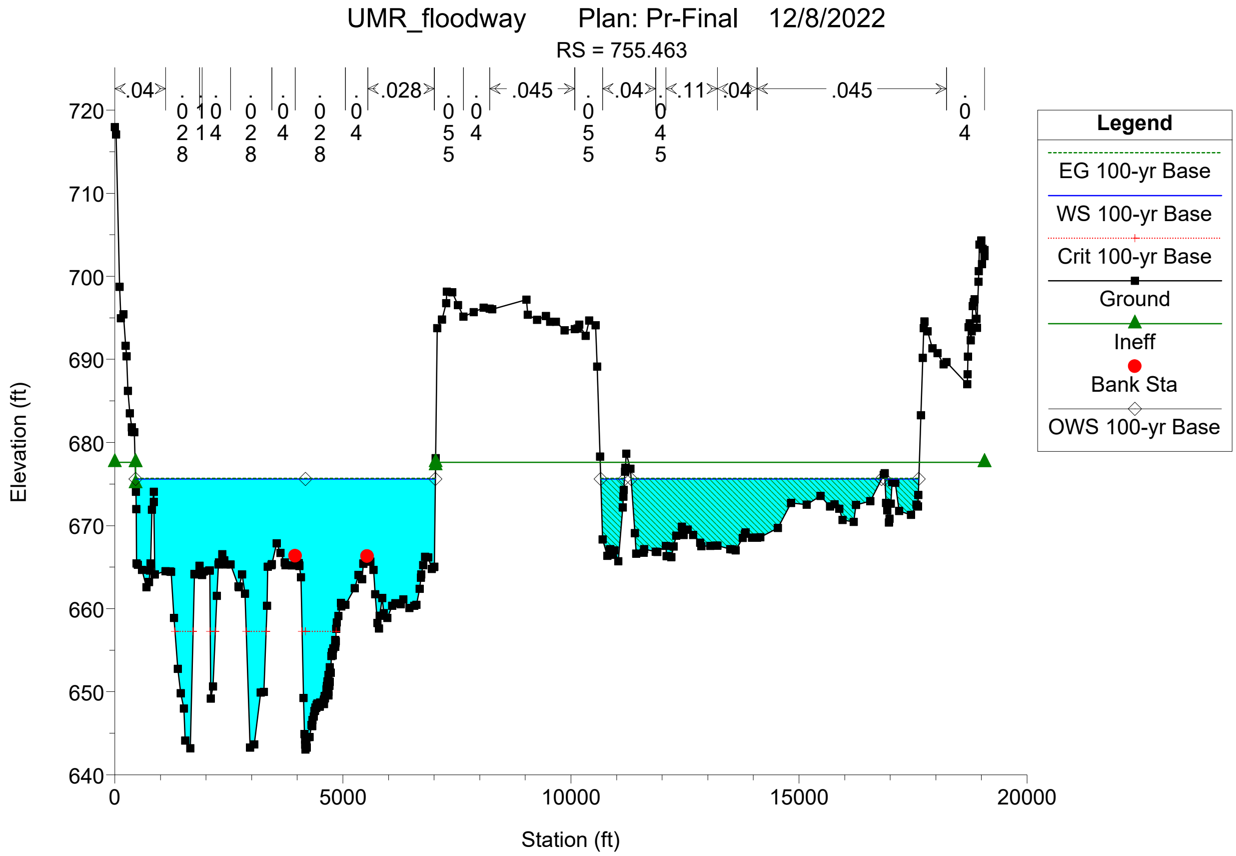

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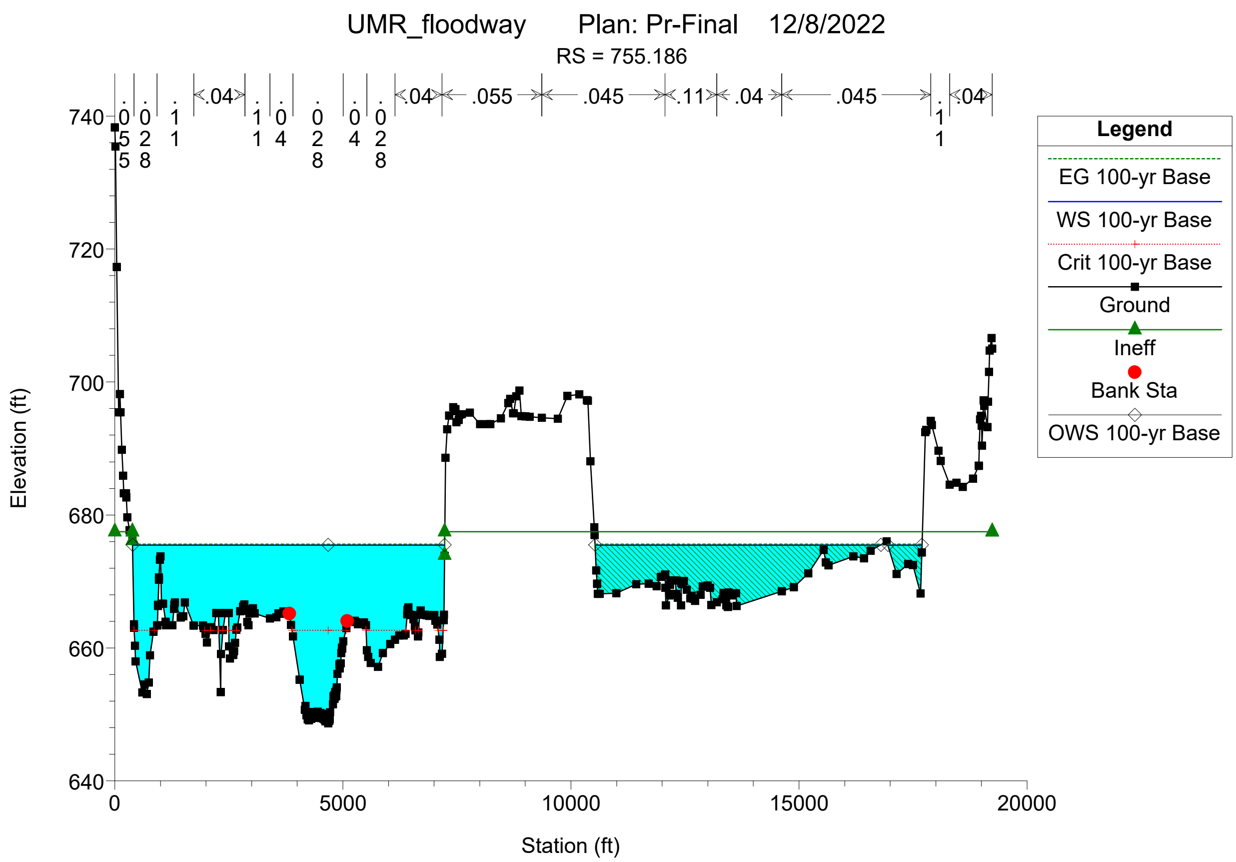

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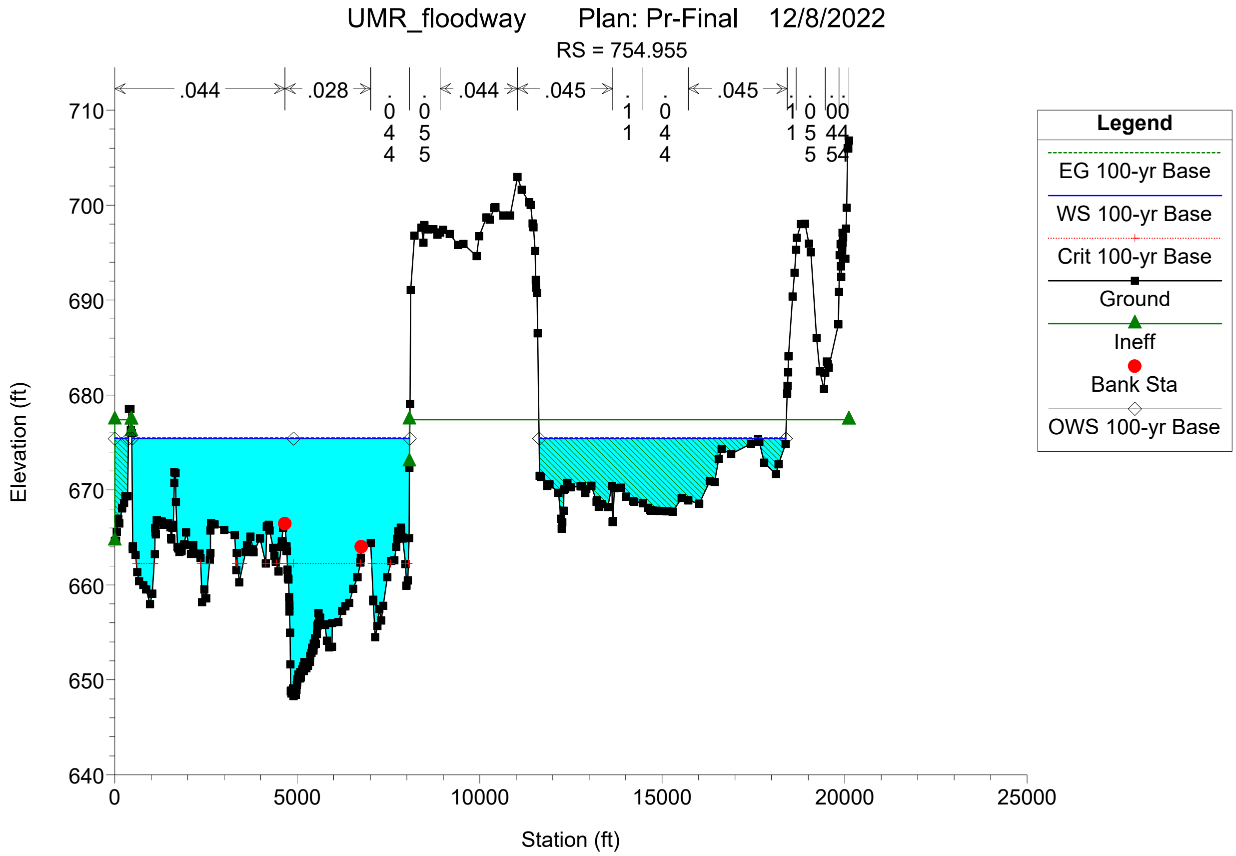
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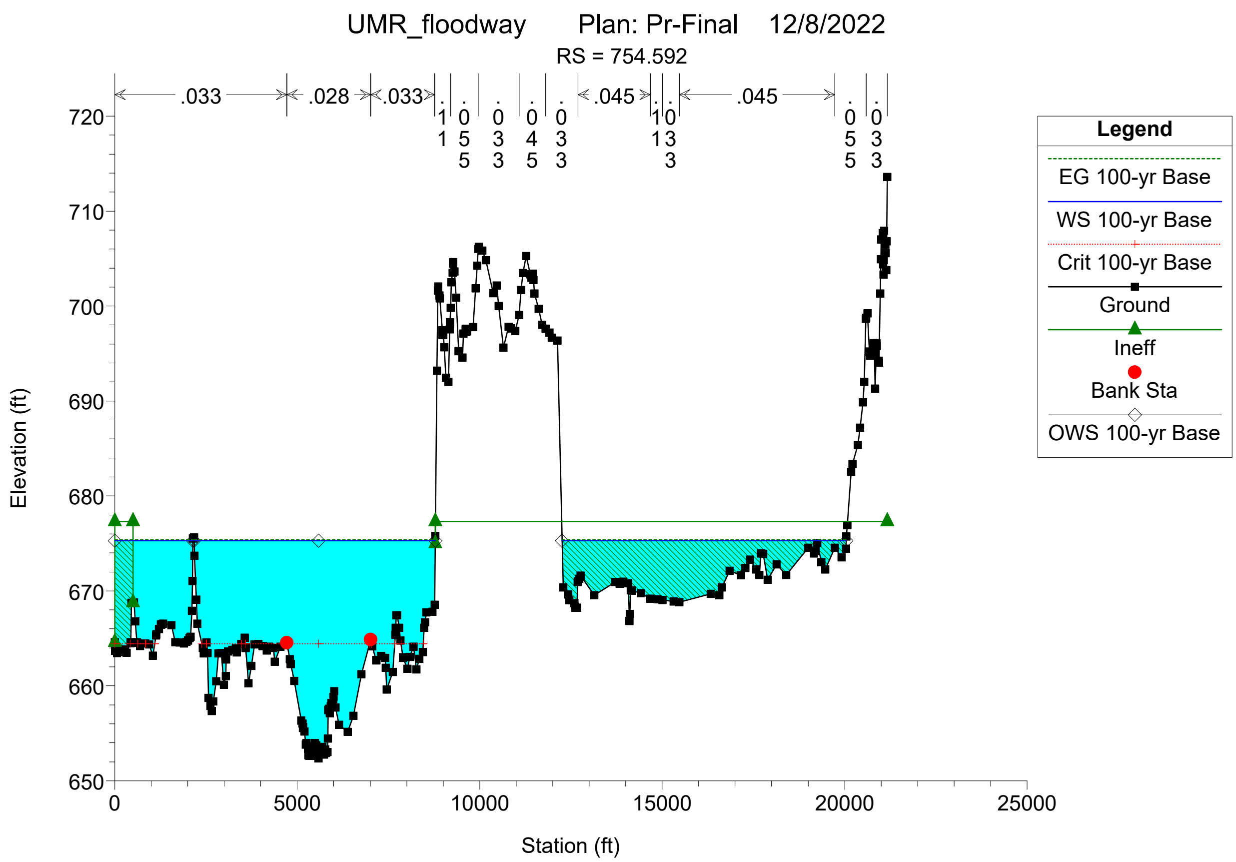
Station (ft)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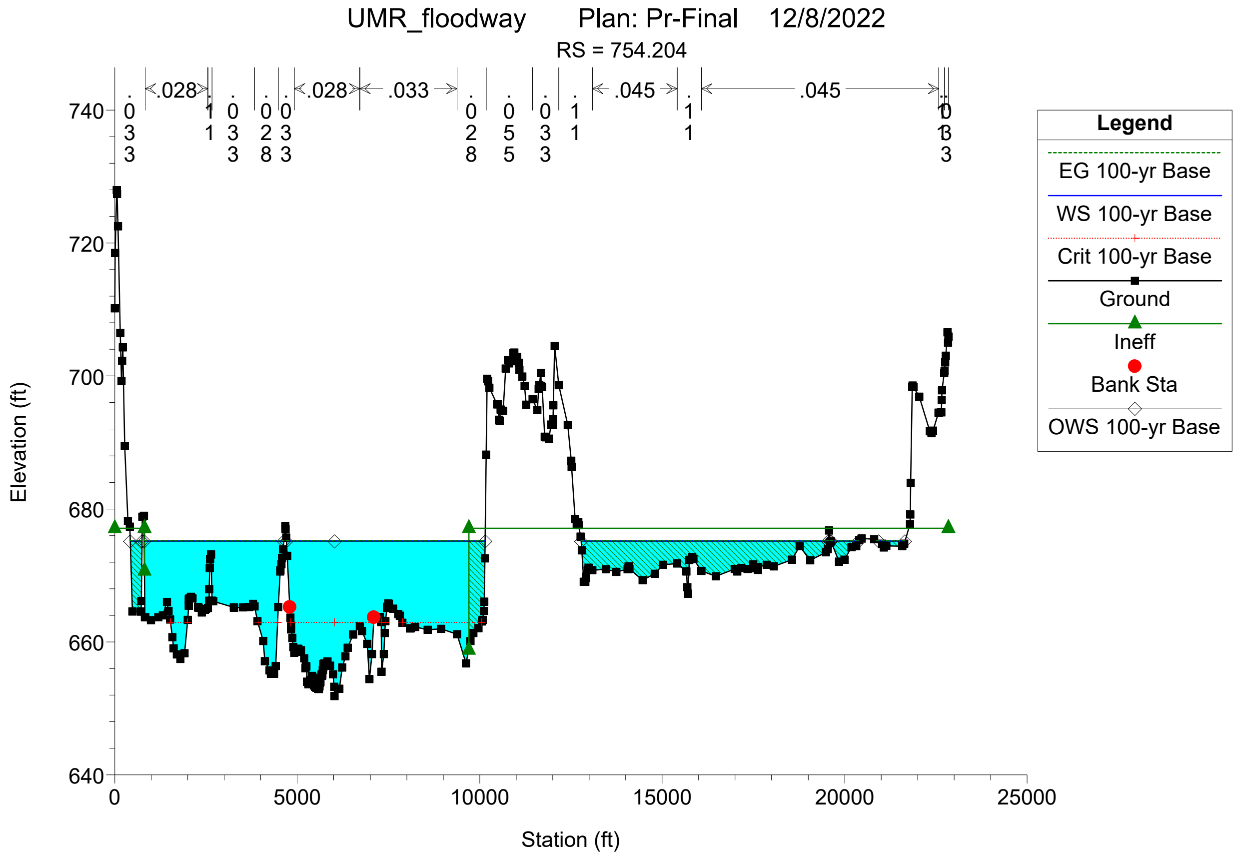

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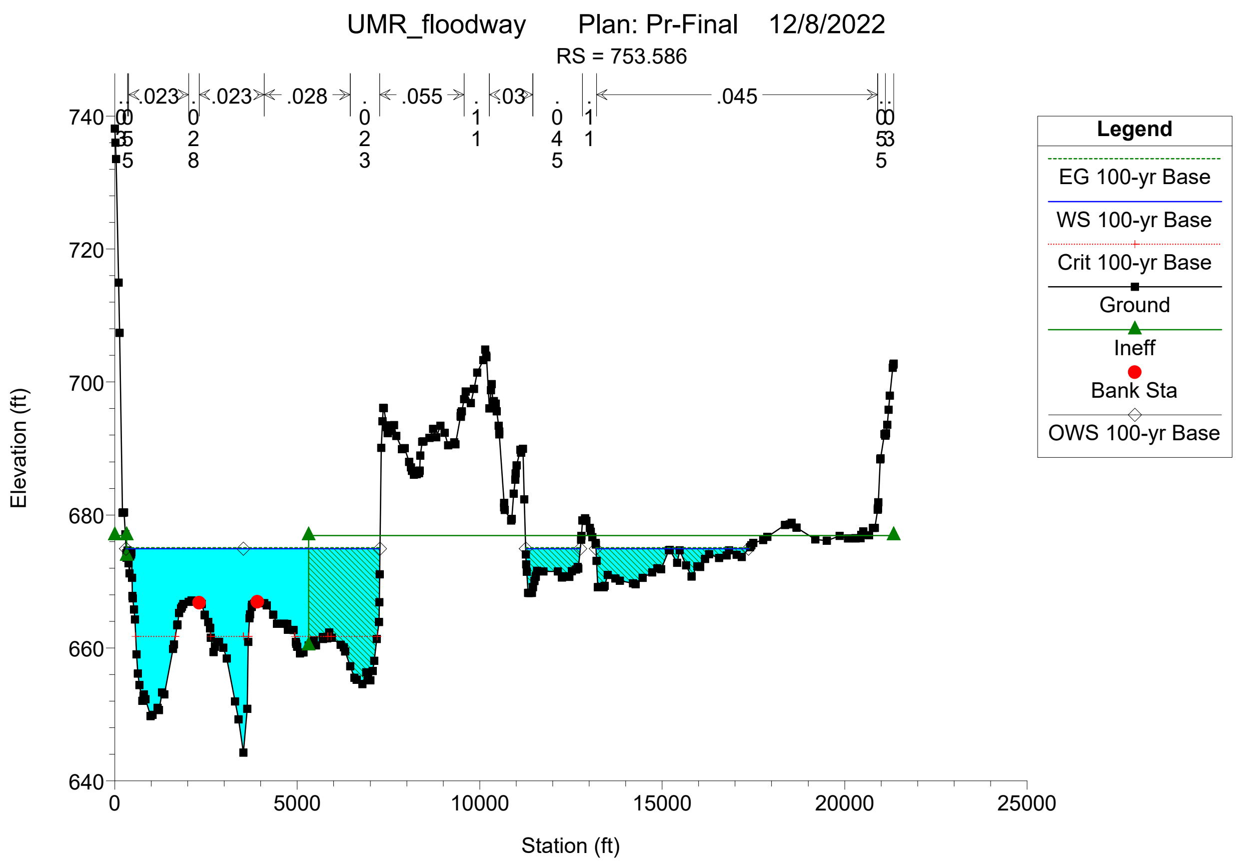

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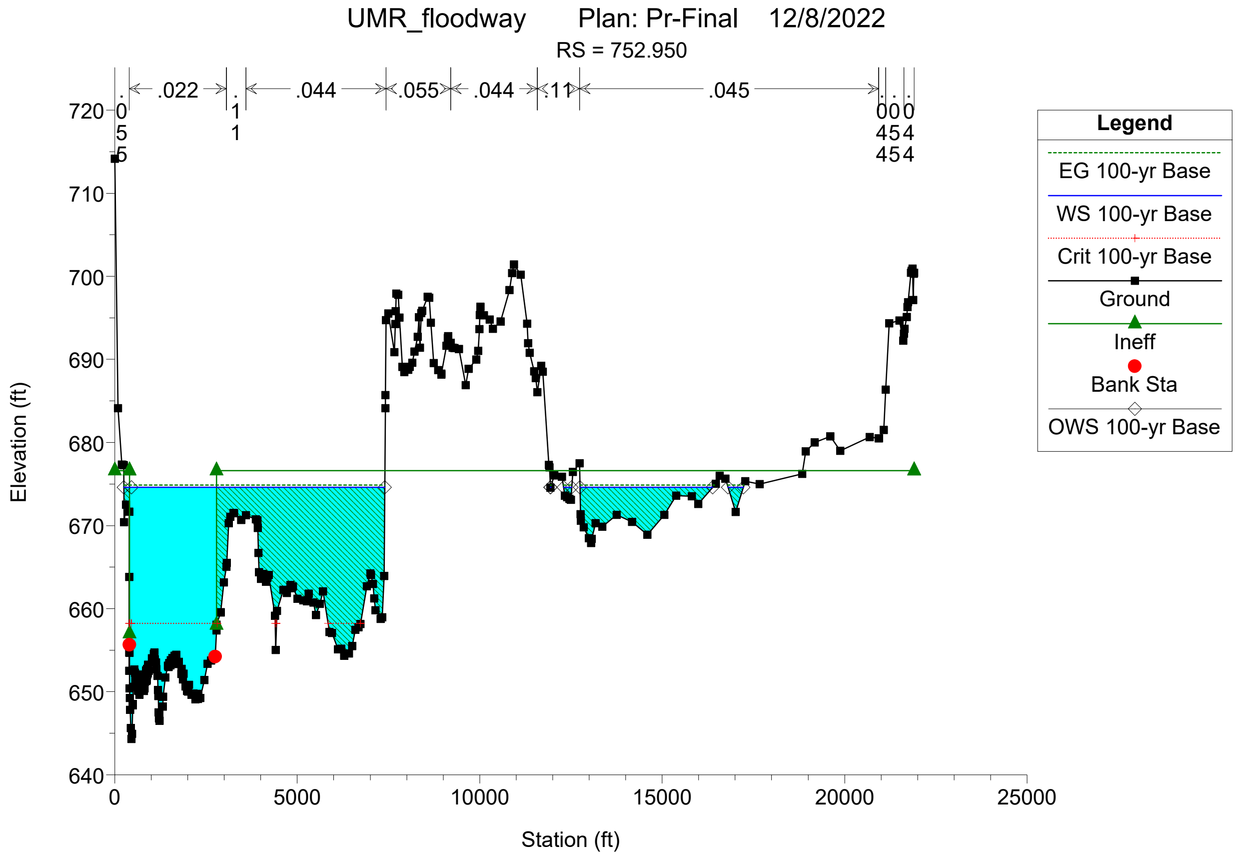

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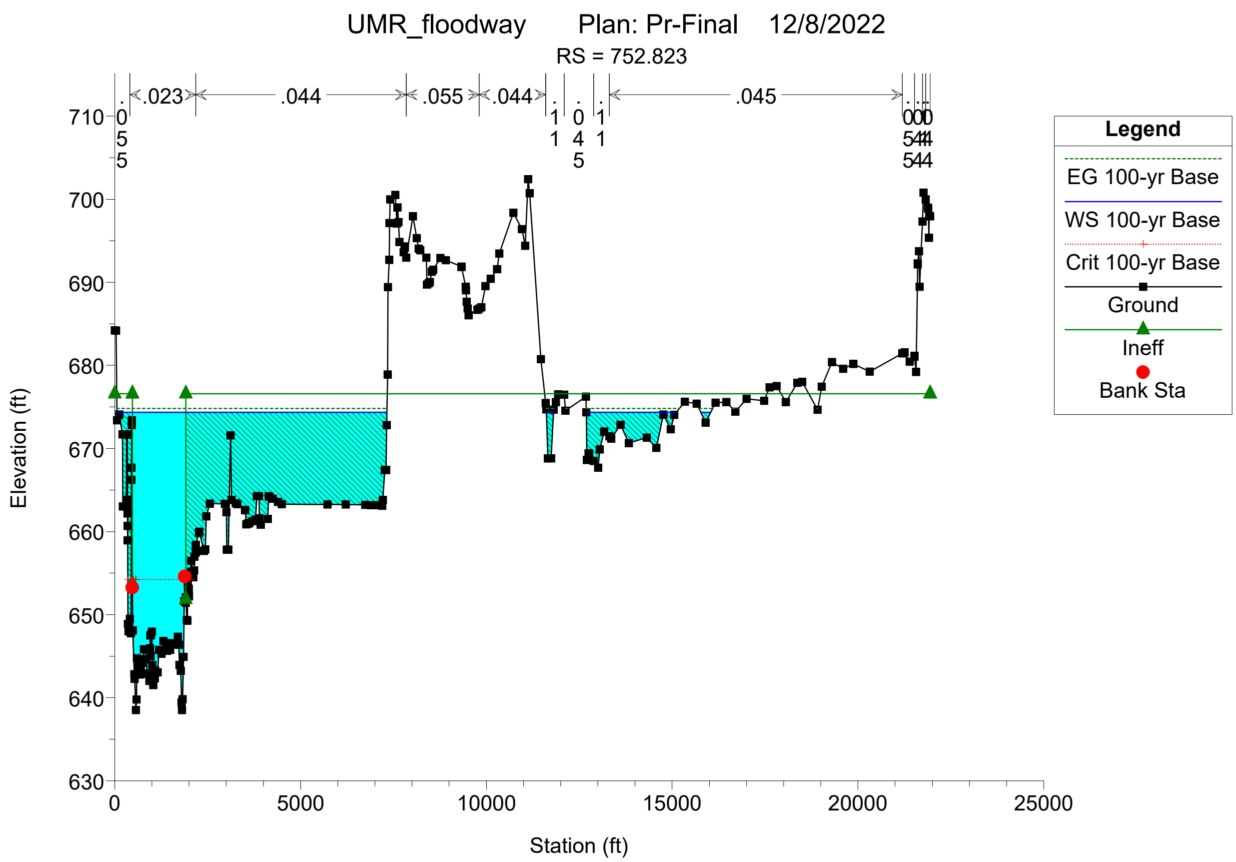
Station (ft)



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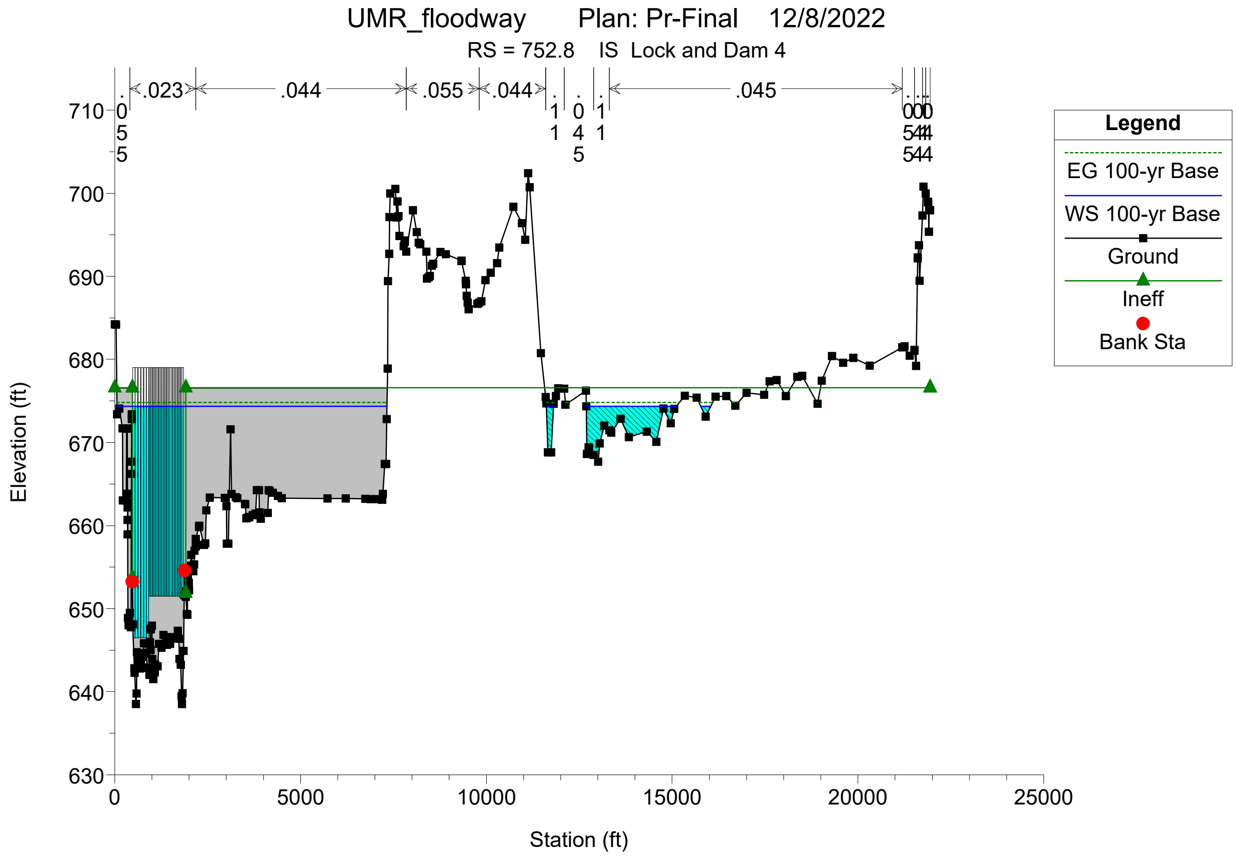

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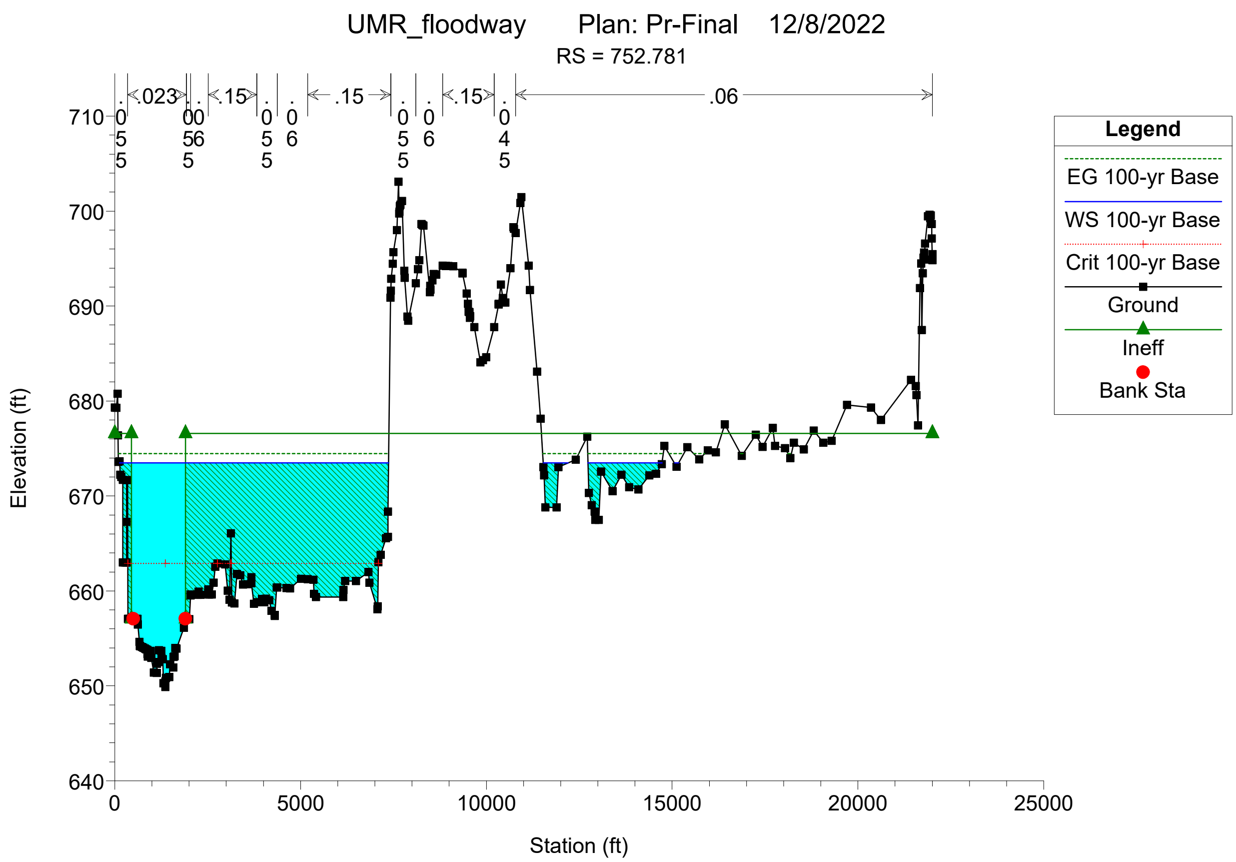

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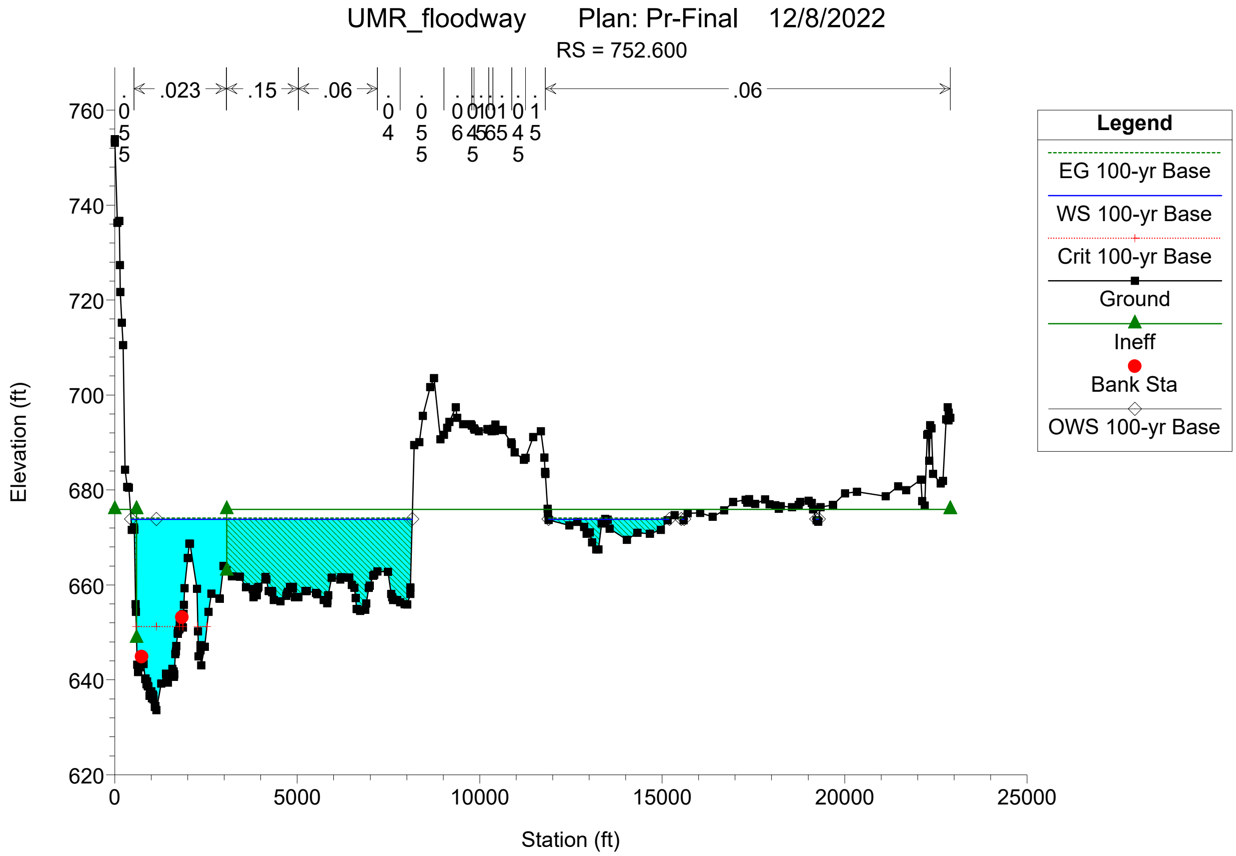
Station (ft)



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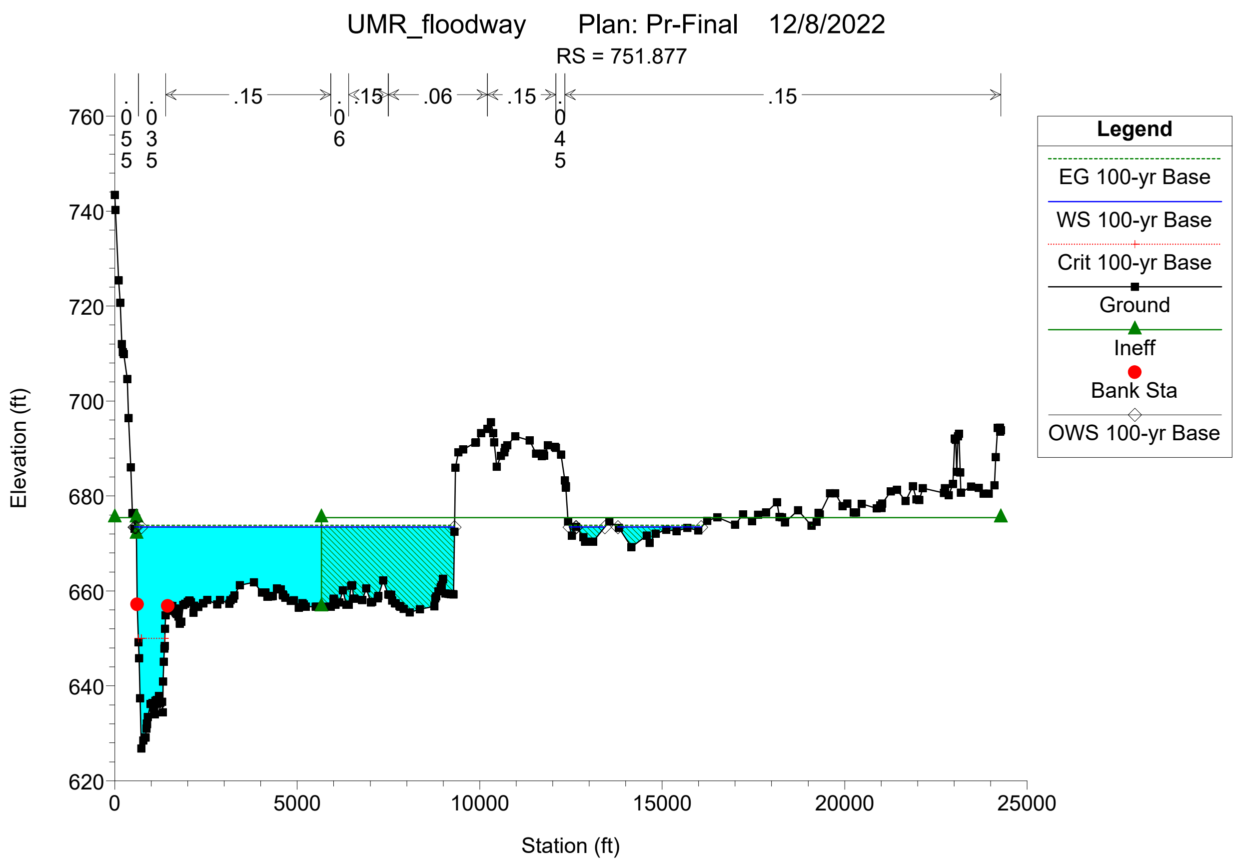

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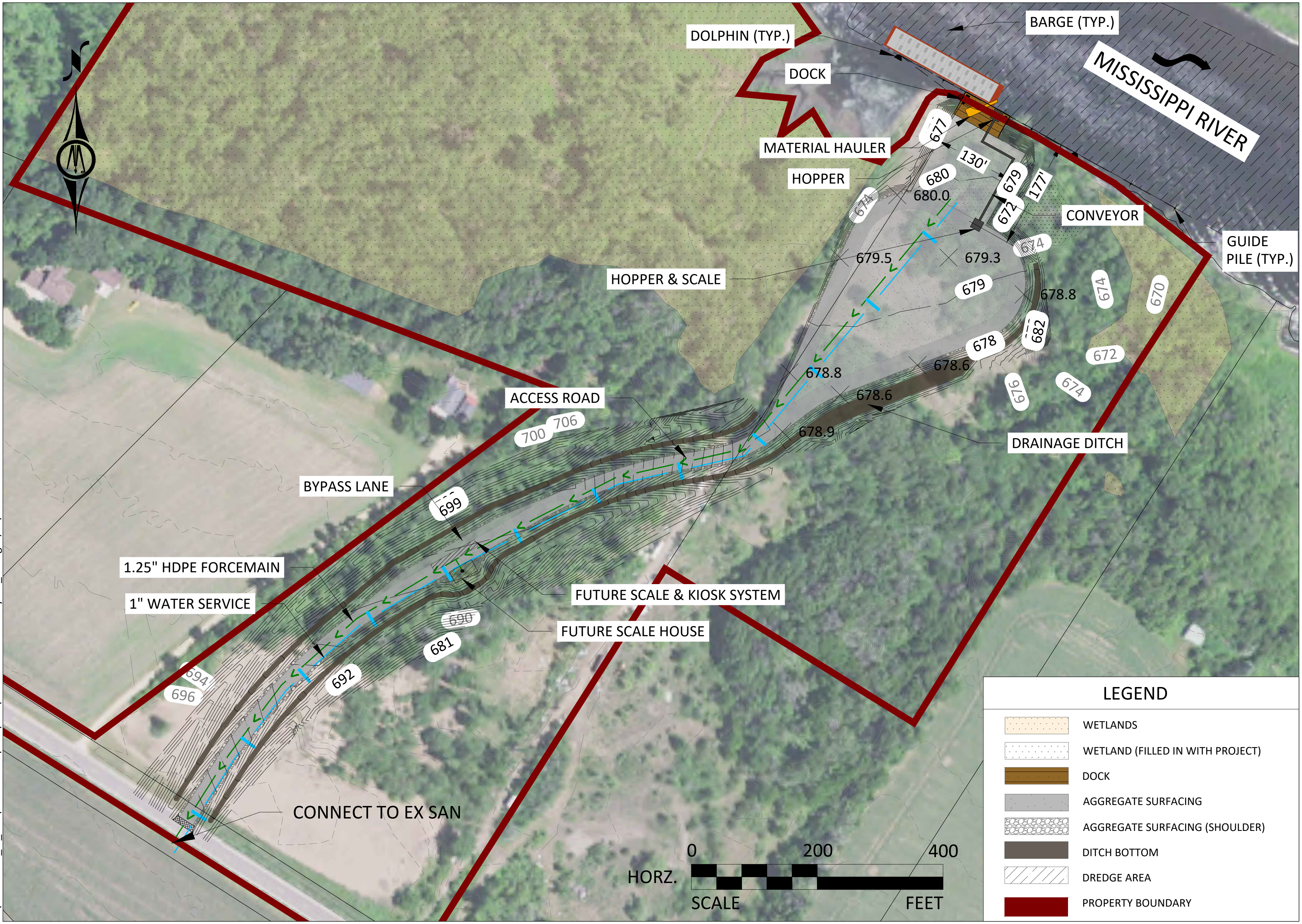
Elevation (ft)
Station (ft)

Appendix F:
Preliminary Site Layout



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Appendix G:
DVD of Digital Files

DIGITAL FILES
PENDING
FINAL REPORT

APPENDIX D

Wetlands

Proposed Barge Terminal

City of Wabasha, MN

Appendix G, Exhitit 1: Approved Wetland Map

August 2023

BOLTON & MENK

Real People. Real Solutions.

Map Document: C:\Users\LOCAL_~1.PON\TemplarcF2D2\114396_Layout_8x11T.mxd | Date Saved: 8/28/2023 11:11:17 AM

Wabasha Barge Facility

City of Wabasha, MN

Appendix G, Exhibit 2: Wetland Impacts Map

August 2023

Real People. Real Solutions.

Map Document: C:\Users\LOCAL_~1.PON\Temp\arc5E5A\AppG_Ex2_114396_Impacts.mxd | Date Saved: 8/28/2023 11:15:21 AM

Wabasha Barge Facility
City of Wabasha, MN

Appendix G, Exhibit 3: Minnesota Biological Survey Map
August 2023

BOLTON & MENK
Real People. Real Solutions.

Map Document: C:\Users\LOCAL_~1.PON\Temp\arcF711\AppG_Ex3_114396_MBS.mxd | Date Saved: 8/28/2023 11:17:49 AM

BOARD OF WATER AND SOIL RESOURCES

Minnesota Wetland Conservation Act
Notice of Decision

Local Government Unit: Wabasha SWCD	**County:** Wabasha
Applicant Name: Chad Springer	**Applicant Representative:** Brandon Bohks (Bolton & Menk)
Project Name: Khoner Property Wetland Delineation	**LGU Project No. (if any):** 20-4
Date Complete Application Received by LGU: 8/26/2020	
Date of LGU Decision: 9/4/2020	
Date this Notice was Sent: 9/15/2020	

WCA Decision Type - check all that apply

☑ Wetland Boundary/Type ☐ Sequencing ☐ Replacement Plan ☐ Bank Plan (not credit purchase)
☐ No-Loss (8420.0415) ☐ Exemption (8420.0420)
Part: ☐ A ☐ B ☐ C ☐ D ☐ E ☐ F ☐ G ☐ H Subpart: ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9

Replacement Plan Impacts (replacement plan decisions only)

Total WCA Wetland Impact Area: No impact, delineation only	
Wetland Replacement Type:	☐ Project Specific Credits: ☐ Bank Credits:
Bank Account Number(s):	

Technical Evaluation Panel Findings and Recommendations (attach if any)

☑ Approve ☐ Approve w/Conditions ☐ Deny ☐ No TEP Recommendation

LGU Decision

☐ Approved with Conditions (specify below)[1] ☑ Approved[1] ☐ Denied
List Conditions:

Decision-Maker for this Application: ☑ Staff ☐ Governing Board/Council ☐ Other:

Decision is valid for: ☑ 5 years (default) ☐ Other (specify):

[1] *Wetland Replacement Plan approval is not valid until BWSR confirms the withdrawal of any required wetland bank credits. For project-specific replacement a financial assurance per MN Rule 8420.0522, Subp. 9 and evidence that all required forms have been recorded on the title of the property on which the replacement wetland is located must be provided to the LGU for the approval to be valid.*

LGU Findings – Attach document(s) and/or insert narrative providing the basis for the LGU decision[1].

☐ Attachment(s) (specify):
☑ Summary:

This plan determination is for the plan orginally known as USACE Dredge Material Management Plan (NOA sent 8/19/2020 ammended and redistributed 9/15/2020).The plan was resubmitted as a delineation concurrence only with no impacts planned at this time. After a TEP discussion 8/20/2020 and site visit 9/4/2020 the TEP agreed with the delineations made.

[1] *Findings must consider any TEP recommendations.*

Attached Project Documents

☐ Site Location Map ☑ Project Plan(s)/Descriptions/Reports (specify):

Appeals of LGU Decisions

If you wish to appeal this decision, you must provide a written request within 30 calendar days of the date you received the notice. All appeals must be submitted to the Board of Water and Soil Resources Executive Director along with a check payable to BWSR for $500 *unless* the LGU has adopted a local appeal process as identified below. The check must be sent by mail and the written request to appeal can be submitted by mail or e-mail. The appeal should include a copy of this notice, name and contact information of appellant(s) and their representatives (if applicable), a statement clarifying the intent to appeal and supporting information as to why the decision is in error. Send to:

Appeals & Regulatory Compliance Coordinator
Minnesota Board of Water & Soils Resources
520 Lafayette Road North
St. Paul, MN 55155
travis.germundson@state.mn.us

Does the LGU have a local appeal process applicable to this decision?

☐ Yes[1] ☑ No

[1]*If yes, all appeals must first be considered via the local appeals process.*

Local Appeals Submittal Requirements (LGU must describe how to appeal, submittal requirements, fees, etc. as applicable)

Notice Distribution (include name)

Required on all notices:

☑ SWCD TEP Member: Terri Peters	☑ BWSR TEP Member: Alyssa Core
☑ LGU TEP Member (if different than LGU contact): Matt Kempinger & Darrin Thompson	
☑ DNR Representative: Taylor Huinker	
☐ Watershed District or Watershed Mgmt. Org.:	
☐ Applicant:	☑ Agent/Consultant: Brandon Bohks

Optional or As Applicable:

☑ Corps of Engineers: David Studenski and Meghan Brown	
☐ BWSR Wetland Mitigation Coordinator (required for bank plan applications only):	
☐ Members of the Public (notice only):	☐ Other:

Signature: Matthew J Kempinger	**Date:** 9/15/2020

This notice and accompanying application materials may be sent electronically or by mail. The LGU may opt to send a summary of the application to members of the public upon request per 8420.0255, Subp. 3.

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Type and Boundary Application/Jurisdictional Status

Kohner Property Wetland Delineation

Wabasha, Minnesota

July 6, 2020

Submitted by:
Bolton & Menk, Inc.
12224 Nicollet Ave
Burnsville, MN 55337
P: 952-890-0509

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Appendix

PART ONE: Applicant Information

If applicant is an entity (company, government entity, partnership, etc.), an authorized contact person must be identified. If the applicant is using an agent (consultant, lawyer, or other third party) and has authorized them to act on their behalf, the agent's contact information must also be provided.

Applicant/Landowner Name:	Chad Springer | City Administrator
Mailing Address:	900 Hiawatha Drive, East | PO Box 268 | Wabasha, MN 55981
Phone:	651-565-4568
E-mail Address:	cityadmin@wabasha.org

Authorized Contact (do not complete if same as above):	
Mailing Address:	
Phone:	
E-mail Address:	

Agent Name:	Brandon Bohks – Natural Resource Specialist
Mailing Address:	12224 Nicollet Avenue | Burnsville, MN 55337
Phone:	952-890-0509 ext. 3244
E-mail Address:	brandon.bohks@bolton-menk.com

PART TWO: Site Location Information

County:	**Wabasha**	**City/Township:**	**City of Wabasha**
Parcel ID and/or Address:	**27.00004.03 & 27.00005.03**		
Legal Description (Section, Township, Range):	**30, 111N, 10W**		
Lat/Long (decimal degrees):			
Attach a map showing the location of the site in relation to local streets, roads, highways.			
Approximate size of site (acres) or if a linear project, length (feet):	**48.3 acres**		

If you know that your proposal will require an individual Permit from the U.S. Army Corps of Engineers, you must provide the names and addresses of all property owners adjacent to the project site. This information may be provided by attaching a list to your application or by using block 25 of the Application for Department of the Army permit which can be obtained at:

http://www.mvp.usace.army.mil/Portals/57/docs/regulatory/RegulatoryDocs/engform_4345_2012oct.pdf

PART THREE: General Project/Site Information

If this application is related to a delineation approval, exemption determination, jurisdictional determination, or other correspondence submitted ***prior to*** this application then describe that here and provide the Corps of Engineers project number.

N/A

Describe the project that is being proposed, the project purpose and need, and schedule for implementation and completion. The project description must fully describe the nature and scope of the proposed activity including a description of all project elements that effect aquatic resources (wetland, lake, tributary, etc.) and must also include plans and cross section or profile drawings showing the location, character, and dimensions of all proposed activities and aquatic resource impacts.

PART FOUR: Aquatic Resource Impact[1] Summary

If your proposed project involves a direct or indirect impact to an aquatic resource (wetland, lake, tributary, etc.) identify each impact in the table below. Include all anticipated impacts, including those expected to be temporary. Attach an overhead view map, aerial photo, and/or drawing showing all of the aquatic resources in the project area and the location(s) of the proposed impacts. Label each aquatic resource on the map with a reference number or letter and identify the impacts in the following table.

Aquatic Resource ID (as noted on overhead view)	**Aquatic Resource Type** (wetland, lake, tributary etc.)	**Type of Impact** (fill, excavate, drain, or remove vegetation)	**Duration of Impact** Permanent (P) or Temporary (T)[1]	**Size of Impact**[2]	**Overall Size of Aquatic Resource** [3]	**Existing Plant Community Type(s)** in Impact Area[4]	**County, Major Watershed #, and Bank Service Area #** of Impact Area[5]

[1]If impacts are temporary; enter the **duration of the impacts in days next to the "T". For example, a project with a temporary access fill that would be removed after 220 days would be entered "T (220)".**

. 8, otherwise enter "N/A".

☐ Check here if you are requesting a pre-application consultation with the Corps and LGU based on the information you have provided. Regulatory entities will not initiate a formal application review if this box is checked.

By signature below, I attest that the information in this application is complete and accurate. I further attest that I possess the authority to undertake the work described herein.

Signature: ______________________ Date:

I hereby authorize **Bolton & Menk, Inc.** to act on my behalf as my agent in the processing of this application and to furnish, upon request, supplemental information in support of this application.

[1] **The term "impact" as used in this joint application form is a generic term used for disclosure purposes to identify**

Attachment A

Request for Delineation Review, Wetland Type Determination, or Jurisdictional Determination

By submission of the enclosed wetland delineation report, I am requesting that the U.S. Army Corps of Engineers, St. Paul District (Corps) and/or the Wetland Conservation Act Local Government Unit (LGU) provide me with the following (check all that apply):

☒ **Wetland Type Confirmation**

☒ **Delineation Concurrence**. Concurrence with a delineation is a written notification from the Corps and a decision from the LGU concurring, not concurring, or commenting on the boundaries of the aquatic resources delineated on the property. Delineation concurrences are generally valid for five years unless site conditions change. Under this request alone, the Corps will not address the jurisdictional status of the aquatic resources on the property, only the boundaries of the resources within the review area (including wetlands, tributaries, lakes, etc.).

☐ **Preliminary Jurisdictional Determination**. A preliminary jurisdictional determination (PJD) is a non-binding written indication from the Corps that waters, including wetlands, identified on a parcel may be waters of the United States. For purposes of computation of impacts and compensatory mitigation requirements, a permit decision made on the basis of a PJD will treat all waters and wetlands in the review area as if they are jurisdictional waters of the U.S. PJDs are advisory in nature and may not be appealed.

☐ **Approved Jurisdictional Determination**. An approved jurisdictional determination (AJD) is an official Corps determination that jurisdictional waters of the United States are either present or absent on the property. AJDs can generally be relied upon by the affected party for five years. An AJD may be appealed through the Corps administrative appeal process.

In order for the Corps and LGU to process your request, the wetland delineation must be prepared in accordance with the 1987 Corps of Engineers Wetland Delineation Manual, any approved Regional Supplements to the 1987 Manual, and the *Guidelines for Submitting Wetland Delineations in Minnesota* (2013).
http://www.mvp.usace.army.mil/Missions/Regulatory/DelineationJDGuidance.aspx

Attachment B

Supporting Information for Applications Involving Exemptions, No Loss Determinations, and Activities Not Requiring Mitigation

Complete this part ***if*** you maintain that the identified aquatic resource impacts in Part Four do not require wetland replacement/compensatory mitigation OR ***if*** you are seeking verification that the proposed water resource impacts are either exempt from replacement or are not under CWA/WCA jurisdiction.

Identify the specific exemption or no-loss provision for which you believe your project or site qualifies:

Provide a detailed explanation of how your project or site qualifies for the above. Be specific and provide and refer to attachments and exhibits that support your contention. Applicants should refer to rules (e.g. WCA rules), guidance documents (e.g. BWSR guidance, Corps guidance letters/public notices), and permit conditions (e.g. Corps General Permit conditions) to determine the necessary information to support the application. Applicants are strongly encouraged to contact the WCA LGU and Corps Project Manager prior to submitting an application if they are unsure of what type of information to provide:

Appendix

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Wetland Delineation Report

Kohner Property Wetland Delineation

Wabasha, Minnesota

July 6, 2020

Submitted by:
Bolton & Menk, Inc.
12224 Nicollet Avenue
Burnsville, MN 55337
P: 952-890-0509

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Tables

Exhibits

Appendix

I. INTRODUCTION

The City of Wabasha requested a wetland delineation on two parcels (27.00004.00 & 27.00005.03) owned by the Kohner Sand & Gravel Company. The delineation was conducted to determine the limits of all aquatic resources within the study parcels.

The sites are considered significantly disturbed due to a large sand mining operation that began in the 1930s and was in service for many decades to come. The undisturbed landcover is dominated by deciduous floodplain forest. It is apparent that the aquatic resources with this study corridor have been heavily influenced, if not created by excavation.

The project is found in Section 19 in Township 109 North of Range 9 West.

II. WETLAND DELINEATION METHODOLOGY

The wetland boundaries were delineated and staked in the field on June 18, 2020 and June 25, 2020, using methods described in the "Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region (Version 2.0)". Wetlands identified were classified using "Classification of Wetlands and Deepwater Habitats of the United States (Cowardin, et al., 1979)", "Wetlands of the United States (United States Fish and Wildlife Service Circular No. 39, 1971 edition)" and "Wetland Plants and Plant Communities of Minnesota and Wisconsin" (Eggers and Reed Third Edition). Subsequently, the three mandatory technical criteria for wetland determinations are as follows:

Hydrophytic Vegetation. A hydrophytic plant community is present when the dominant plant species present can endure prolonged inundation and/or soil saturation during the growing season. A plant's Wetland Indicator Status is determined using the 2016 National Wetland Plant List for Minnesota, published by the Army Corp of Engineers.

Hydric Soils. A hydric soil is defined as a soil that is formed under conditions of saturation, flooding or ponding long enough during the growing season (the portion of the year when there is above ground growth and development of vascular plants and/or soil temperature at 12 inches below the soil surface is above 41 degrees Fahrenheit or higher) to develop anaerobic conditions in the upper part.

Wetland Hydrology. An area has wetland hydrology if it experiences 14 or more consecutive days of flooding, ponding or a water table within 12 inches of the surface during the growing season at a minimum frequency of five out of ten years. This is determined by using both primary and secondary Wetland Hydrology indicators.

III. BACKGROUND INFORMATION

Prior to conducting a field investigation of this site, Exhibits A through E were used to complete a preliminary evaluation. The data gathered during the preliminary investigation was used as described below:

Exhibit A is a location map of the study area.

Exhibits B is an aerial photo with topographic information overlaid on it. This provides information regarding topography of the site, helping to identify areas that may have wetland characteristics.

Exhibit C is the National Wetlands Inventory of the site and surrounding properties. This information is used to complete a preliminary investigation of the wetlands that may or may not exist on the site.

Exhibit D is used to identify waters that are regulated by the DNR. This exhibit shows where there are DNR public waters relative to the site.

Exhibit E is the Wabasha County Soil Survey and is used to identify hydric soils that may lie within the study area.

Exhibit F is the site map showing the delineated aquatic resources.

Exhibit G includes the wetland delineation data sheets.

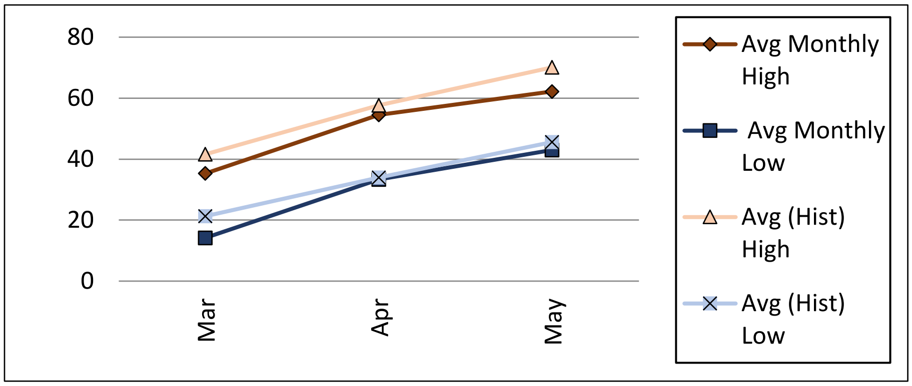
Exhibits F and G were prepared from the information gathered at the site.

Exhibit H is the Off-Site Hydrology Assessment.

IV. CLIMATE DATA

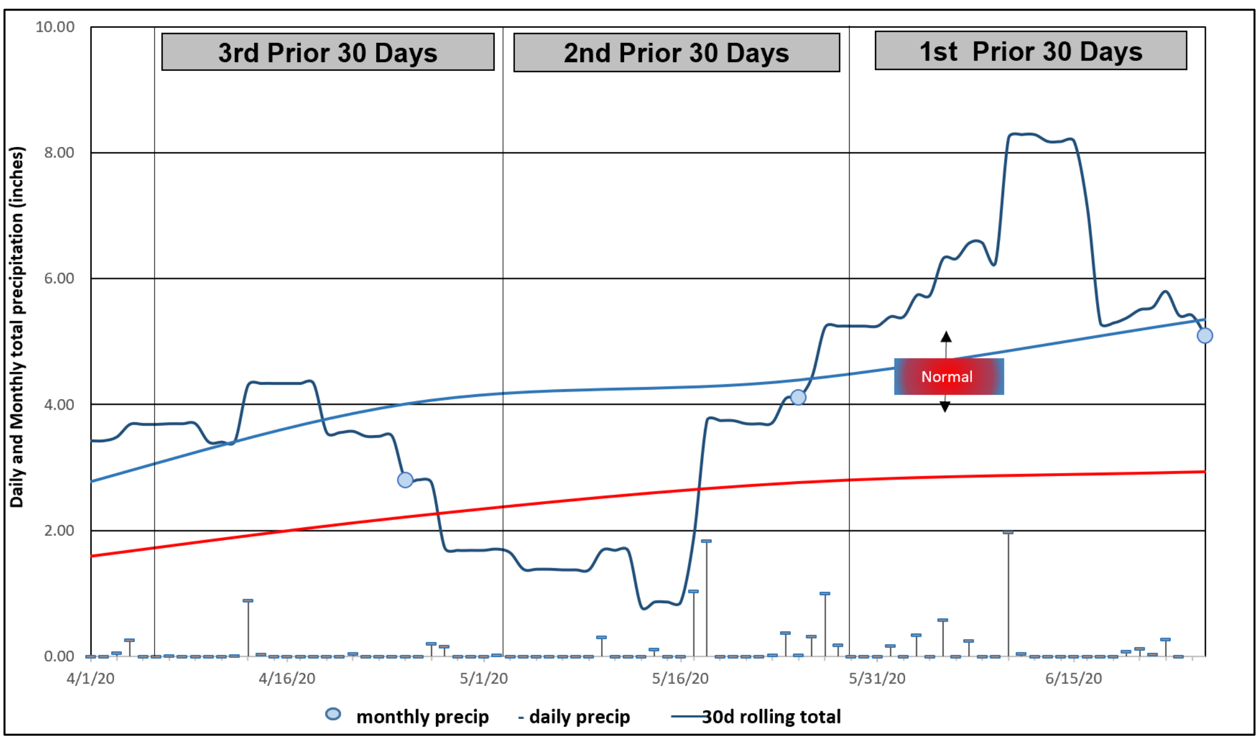
The monthly temperature table below shows the average high and low temperatures for the three months prior to the field delineation, along with the historical averages for these months. The average monthly highs were well below the historical averages, while the average monthly lows have also been below the historic averages over the past three months.

MONTHLY TEMPERATURE RANGE



Antecedent precipitation was evaluated using a combination of the NRCS Method and the Rolling Totals Method. The analysis found that precipitation totals were above at the time of the delineation.

ANTECEDENT PRECIPITATION CONDITIONS



This climatic data was gathered using the Climatology Working Group Website, http://climate.umn.edu/ and the National Weather Service Forecast Office, http://w2.weather.gov/climate/. The information for the investigation was retrieved from the WETS Station: Wabasha–Minneiska-Weaver (County–City-Township).

V. FINDINGS

On June 18 and 25, of 2020, a field investigation was performed to evaluate and verify the existence and boundary of any aquatic resources located within the proposed study corridor. The field investigation found that a total of four wetlands were found to exist within the study corridor. The following describes the aquatic resources identified, together with a brief description of wetland types and observations made during the field investigation.

Along with a field investigation, an off-site hydrology assessment was performed to identify locations within agricultural field that may possess wetland signatures. Eight years of aerial imagery was reviewed, of which five years were considered to have normal precipitation. Only one site was identified and reviewed. According to the off-site hydrology decision matrix, the site was not considered wetland.

Wetland 1

Wetland 1 (W1):
NWI Cowardin: PFO1Cx
PWI (Hydro) ID: None
Field Observation Circular 39: Type 1
Field Observation Eggers and Reed: Seasonally Flooded Basin
Soil Mapping Unit(s): Kalmarville complex, frequently flooded

Wetland 1 is located along the northern boundary of the study area, close to the bank of the Mississippi River. Wetland 1 appears to have been excavated while sand mining operations took place beginning in the 1930s.

The field investigation found that W1 has met all three wetland indicators and should be considered a palustrine forested broad-leaved deciduous seasonally flooded excavated (PFO1Cx) wetland. One transect and several sample points were taken to determine the wetland boundary. Soils, hydrology and topography aided in determining the wetland boundary.

At the wetland pit location, the plant community is dominated by American elm, box elder, buckthorn, and jewel weed. At the upland pit location, the plant community is dominated by buckthorn, creeping jenny, and poison ivy. Both plant communities are considered hydrophytic.

Soils at the wetland pit location were dug to a depth of 12-inches and met hydric soil indicator A11 – Depleted Below Dark Surface. Soils at the upland pit location were dug to a depth of 12-inches and failed to meet any of the hydric soil indicators.

Soils at the wetland pit location were saturated within 10-inches of the soil surface. Soils at the wetland pit location also met primary wetland indicators B8 – Sparsely Vegetated Concave Surface and B9 – Water Stained Leaves. Secondary hydrology indicators D2 – Geomorphic Position and D5 – FAC Neutral Test were also present. Soils at the upland pit location only met secondary hydrology indicator D5, therefore failing to meet wetland hydrology criteria.

The determining factor for this delineation was the lack of hydric soils and wetland hydrology at the upland pit location. The boundary was determined by following the topographic breaks.

Wetland 2 (W2):
NWI Cowardin: PFO1C
PWI (Hydro) ID: None
Field Observation Circular 39: Type 1
Field Observation Eggers and Reed: Seasonally Flooded Wetland
Soil Mapping Unit(s): Kalmarville complex, frequently flooded

Wetland 2 is a large floodplain wetland that begins along the northeast corner of the study area and extends to the southeast. Although there was no surface water present at the time of the site visit, several other primary wetland indicators were identified.

The field investigation found that W2 has met all three wetland indicators and should be considered a PFO1C. One transect and several sample points were taken to determine the wetland boundary. Soils, hydrology and topography aided in determining the wetland boundary.

At the wetland pit locations, the plant community is dominated by silver maple and buckthorn. At the upland pit location, the plant community is dominated by buckthorn, prickly ash, white vervain. Both plant communities are considered hydrophytic.

Soils at wetland pit location were dug to a depth of 12-inches and met hydric soil indicator A11. Soils at the upland pit location were dug to 13-inches and failed to meet any of the hydric soil indicators.

Soils at the wetland pit location were not saturated. Soils at the wetland pit location did meet primary hydrology indicators B3 – Drift Deposits and B9. Soils at the wetland pit location also met secondary hydrology indicators D2 and D5. Soils at the upland pit location were not saturated and failed to meet any secondary hydrology indicators, therefore failing to meet wetland hydrology criteria.

The determining factor for this delineation was the lack of hydric soils and wetland hydrology at the upland pit locations. The boundary was determined by following the topographic breaks.

Wetland 2

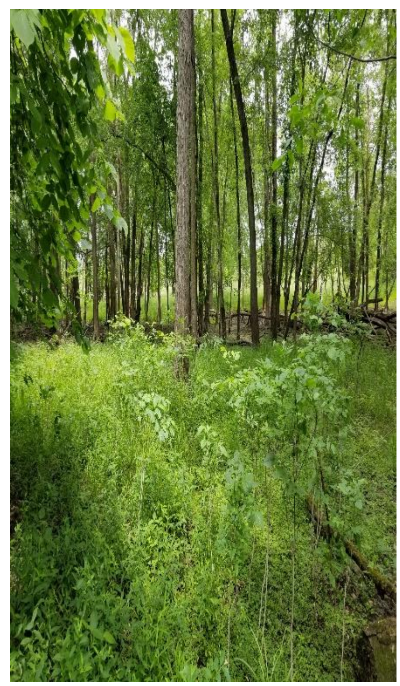
Wetland 3 (W3):
NWI Cowardin: PEM1C/PSS1C
PWI (Hydro) ID: 52296
Field Observation Circular 39: Type 1
Field Observation Eggers and Reed: Seasonally Flooded Wetland
Soil Mapping Unit(s): Kalmarville complex, frequently flooded

Wetland 3 makes up a large floodplain wetland complex beginning in the northcentral portion of the study area and extending to the northwest. Wetland 3 appears to be a very active floodplain and is fed by a channel inlet. Although there was no surface water present at the time of the site visit, several other primary wetland indicators were identified.

The field investigation found that wetland W3 has met all three wetland indicators and should be considered a PFO1C wetland. One transects and several sample points were taken to determine the wetland boundary. Soils, hydrology and topography aided in determining the wetland boundary.

At the wetland pit location, the plant communities are dominated silver maple, white vervain, and clear weed. At the upland pit location, the plant communities are dominated by green ash, buckthorn, and wood nettle. Both plant communities are considered hydrophytic.

Soils at wetland pit location were dug to a depth of 15-inches and met hydric soil indicator A11. Soils at the upland pit location were dug to 18-inches and failed to meet any of the hydric soil indicators.



Wetland 3

Soils at the wetland pit location were saturated within 7-inches of the soil surface, with the water table present at 10-inches. Soils at the wetland pit location also met primary wetland indicators B3, B4 – Algal Mat or Crust, and B9. Secondary hydrology indicator D5 was also present. Soils at the upland pit location only met secondary hydrology indicator D5, therefore failing to meet wetland hydrology criteria.

The determining factor for this delineation was the lack of hydric soils and wetland hydrology at the upland pit location. The boundary was determined by following the topographic breaks.

Wetland 4 (W4):
NWI Cowardin: None
PWI (Hydro) ID: None
Field Observation Circular 39: Type 1
Field Observation Eggers and Reed: Seasonally Flooded Wetland
Soil Mapping Unit(s): Pits, gravel-Udispsammetents

Wetland 4 is a small basin/depression located close to the southeastern boarder of the study area. It appears W4 was created as the result of sand mining activity which began in the 1930s.

The field investigation found that wetland (W4) has met all three wetland indicators and should be considered a PFO1A. One transect and several sample points were taken to determine the wetland boundary. Soils, hydrology and topography aided in determining the wetland boundary.

At the wetland pit location, the plant community is dominated by bebb's willow and green ash. At the upland pit location, the plant community is dominated by cottonwood, buckthorn, and creeping jenny. Both plant communities are considered hydrophytic.

Soils at the wetland pit location were dug to a depth of 14-inches and met hydric soil indicator A11. Soils at the upland pit location were dug to a depth of 16-inches and failed to meet any of the hydric soil indicators.

Soils at the wetland pit location were saturated within 7-inches of the soil surface, with the water table present at 11-inches. Soils at the wetland pit location also met primary wetland indicators B8, B8 and B9. Secondary hydrology indicators D2 and D5 were also present. Soils at the upland pit location only met secondary hydrology indicator D5, therefore failing to meet wetland hydrology criteria.

The determining factor for this delineation was the hydric soils and wetland hydrology indicators at the upland pit location. The boundary was determined by following the topographic breaks.

Sample Point (SP-1):
NWI Cowardin: None
PWI (Hydro) ID: None
Field Observation Circular 39: Upland
Field Observation Eggers and Reed: Upland
Soil Mapping Unit(s): Pits, gravel-Udispsammetents

Sample point 1 (SP-1) was taken to investigate the presence of potential wetland indicators. Vegetation at the sample pit location is dominated by American elm, buckthorn, and jewel weed, therefore hydrophytic vegetation is considered present. Soils at SP-1 were dug to a depth of 5-inches before a restrictive layer was observed. Hydric soils were not encountered within the upper 5-inches. Soils at SP-1 did meet secondary wetland hydrology indicator D2 and D5. The determining factor for this investigation was the lack of hydric soils at the sample pit location, therefore this area is considered upland.

Sample Point (SP-2):
NWI Cowardin: None
PWI (Hydro) ID: None
Field Observation Circular 39: Upland
Field Observation Eggers and Reed: Upland
Soil Mapping Unit(s): Pits, gravel-Udispsammetents

Sample point 2 (SP-2 was taken to investigate the presence of potential wetland indicators. Vegetation at the sample pit location is dominated by Siberian elm and switch grass, therefore hydrophytic vegetation is considered absent. Soils at SP-2 were dug to a depth of 3-inches before a restrictive layer was observed. Hydric soils were not encountered within the upper 3-inches. Soils at SP-2 only met secondary wetland hydrology indicator D2. The determining factor for this investigation was the lack of all three wetland indicators at the sample pit location, therefore this area is considered upland.

<u>Sample Point (SP-3):</u>
NWI Cowardin: None
PWI (Hydro) ID: None
Field Observation Circular 39: Upland
Field Observation Eggers and Reed: Upland
Soil Mapping Unit(s): Pits, gravel-Udispsammetents

Sample point 3 (SP-3) was taken to investigate the presence of potential wetland indicators. Vegetation at the sample pit location is dominated by cottonwood, green ash, American germander, and Canada thistle, therefore hydrophytic vegetation is considered present. Soils at SP-3 were dug to a depth of 15-inches and failed to meet any hydric soil indicators. Soils at SP-3 only met secondary wetland hydrology indicator D5. The determining factor for this investigation was the lack of hydric soils and wetland hydrology at the sample pit location, therefore this area is considered upland.

<u>Sample Point (SP-4):</u>
NWI Cowardin: None
PWI (Hydro) ID: None
Field Observation Circular 39: Upland
Field Observation Eggers and Reed: Upland
Soil Mapping Unit(s): Pits, gravel-Udispsammetents

Sample point 4 (SP-4) was taken to investigate the presence of potential wetland indicators. Vegetation at the sample pit location is dominated by American elm, green ash, buckthorn, and poison ivy, therefore hydrophytic vegetation is considered present. Soils at SP-4 were dug to a depth of 4-inches before a restrictive layer was observed. Hydric soils were not encountered within the upper 4-inches. Soils at SP-4 did meet secondary wetland hydrology indicators D2 and D5. The determining factor for this investigation was the lack of hydric soils at the sample pit location, therefore this area is considered upland.

<u>Sample Point (SP-5):</u>
NWI Cowardin: None
PWI (Hydro) ID: None
Field Observation Circular 39: Upland
Field Observation Eggers and Reed: Upland
Soil Mapping Unit(s): Pits, gravel-Udispsammetents

Sample point 5 (SP-5) was taken to investigate the presence of potential wetland indicators. Vegetation at the sample pit location is dominated by pin oak, buckthorn, green ash, and Virginia creeper, therefore hydrophytic vegetation is considered present. Soils at SP-5 were dug to a depth of 14-inches and failed to meet any hydric soil indicators. Soils at SP-5 did meet secondary wetland hydrology indicators D2 and D5. The determining factor for this investigation was the lack of hydric soils at the sample pit location, therefore this area is considered upland.

<u>Sample Point (SP-6):</u>
NWI Cowardin: None
PWI (Hydro) ID: None
Field Observation Circular 39: Upland
Field Observation Eggers and Reed: Upland
Soil Mapping Unit(s): Pits, gravel-Udispsammetents

Sample point 6 (SP-6) was taken to investigate the presence of potential wetland indicators.

Vegetation at the sample pit location is dominated by black walnut, prickly ash, black snakeroot, and wood nettle, therefore hydrophytic vegetation is considered absent. Soils at SP-6 were dug to a depth of 17-inches and failed to meet any hydric soil indicators. Soils at SP-6 only met secondary wetland hydrology indicators D2. The determining factor for this investigation was the lack of all three wetland indicators at the sample pit location, therefore this area is considered upland.

Sample Point (SP-7):
NWI Cowardin: None
PWI (Hydro) ID: None
Field Observation Circular 39: Upland
Field Observation Eggers and Reed: Upland
Soil Mapping Unit(s): Pits, gravel-Udispsammetents

Sample point 7 (SP-7) was taken to investigate the presence of potential wetland indicators. Vegetation at the sample pit location is dominated by box elder, green ash, cottonwood, buckthorn, wood nettle and jumpseed, therefore hydrophytic vegetation is considered present. Soils at SP-7 were dug to a depth of 20-inches and failed to meet any hydric soil indicators. Soils at SP-7 did meet secondary wetland hydrology indicators D2 and D5. The determining factor for this investigation was the lack of hydric soils at the sample pit location, therefore this area is considered upland.

VI. CONCLUSION

This delineation was performed on June 18, 2020 and June 25, 2020. The boundaries of the wetlands were staked in the field with three foot "Wetland Delineation" pin flags. The location of the pin flags were surveyed by Bolton & Menk, Inc. using a Trimble Geo-XH GPS Data Collector and tied to the Wabasha County coordinate system. The delineated limits are believed to be the upper limits of where all three of the required wetland criteria were present.

Bolton & Menk, Inc., was asked to determine the boundaries of those jurisdictional wetlands that exist upon this property as defined by the Wetland Conservation Act.

Based upon all available information, the existing conditions that currently prevail, and the on-site investigation, evidence supports the presence of four wetlands within the boundaries of the study corridor.

WETLAND SUMMARY

Id #	Wetland Type^	Size*
W1	Type 1	0.40 ac
W2	Type 1	0.92 ac
W3	Type 1	14.8 ac
W4	Type 1	0.02 ac

**size measured within study area.*
^wetland type within study area

Sincerely,
BOLTON & MENK, INC.

Brandon Bohks
Certified Wetland Delineator, No. 1341

APPENDIX

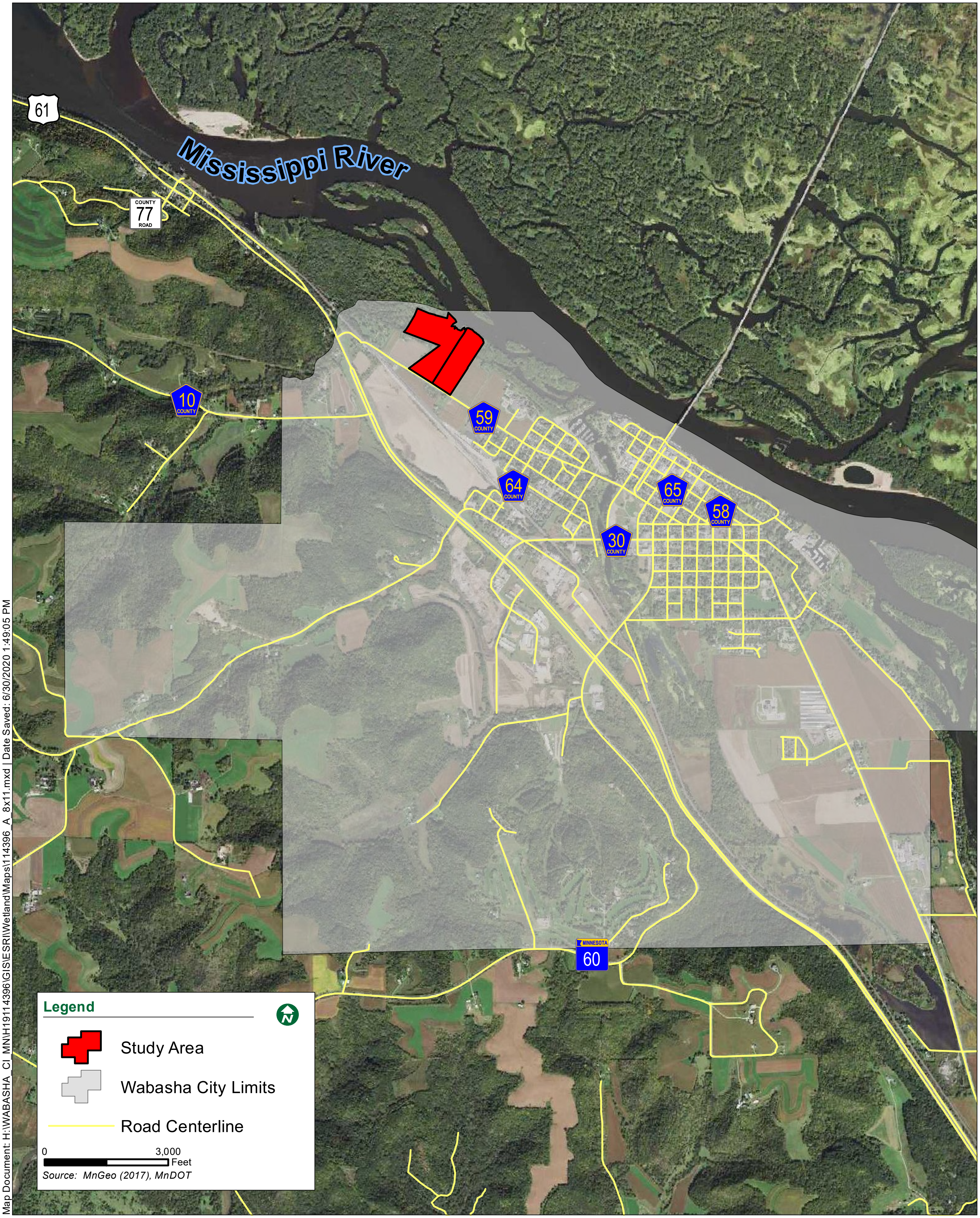
Kohner Property Wetland Delineation

July 2020

Exhibit A: Location Map

BOLTON & MENK

Real People. Real Solutions.



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Kohner Propety Wetland Delineation

July 2020

Exhibit B: 2-Foot LiDAR Contours

BOLTON & MENK

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Kohner Property Wetland Delineation

July 2020

Exhibit C: National Wetland Inventory

BOLTON & MENK

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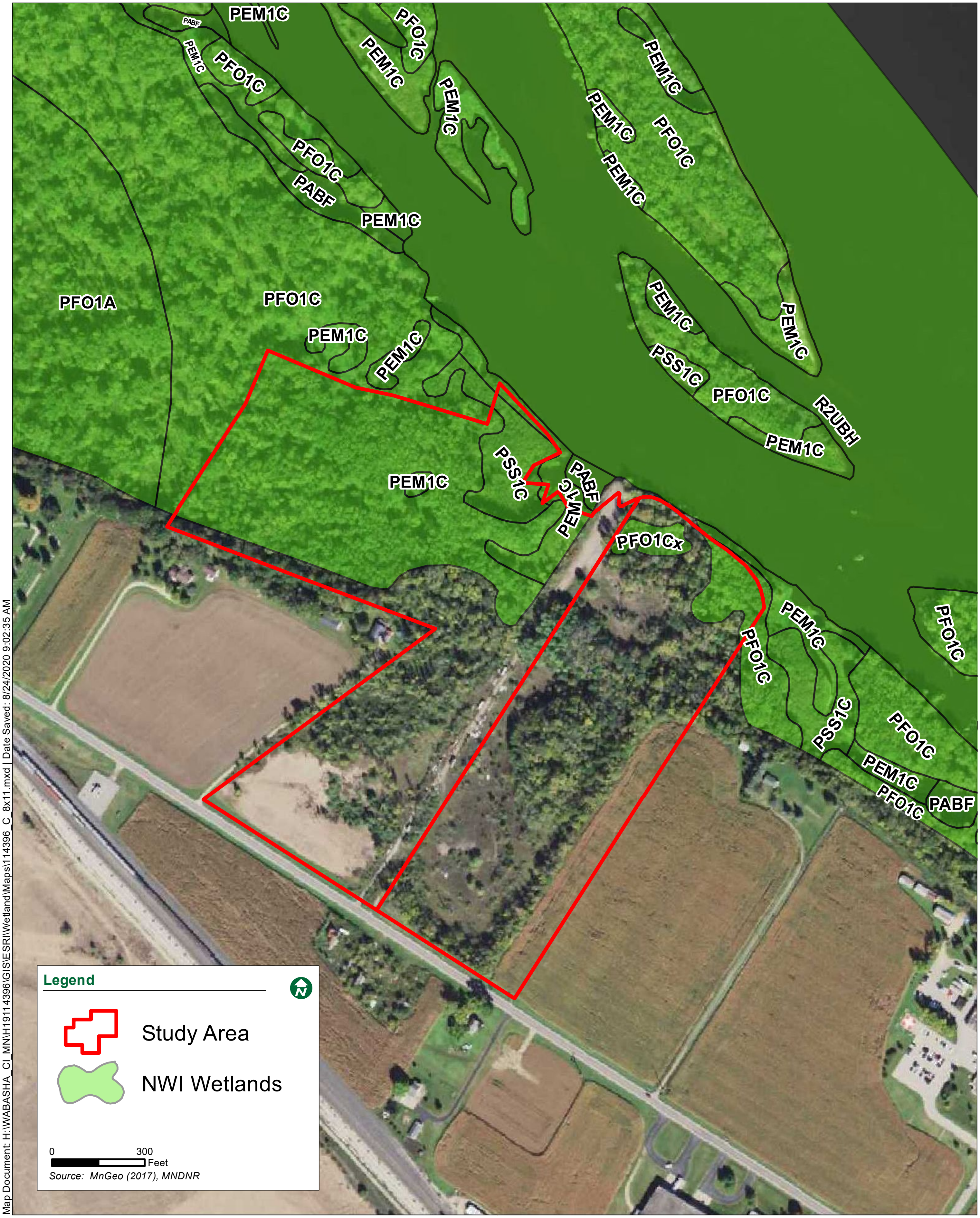

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Soils Legend

Symbol	Name	Slopes	Hydric Rating	Hydric Class
GP	Pits, gravel-Udipsamments	N/A	No	0
MdA	Meridian sandly loam	0-2%	No	0
N646A	Ceresco-Spillville complex, frequently flooded	0-3%	No	0
N648A	Kalmarville complex, frequently flooded	0-3%	Yes	75
Ts	Plainfield sand, river valley	15-60%	No	0

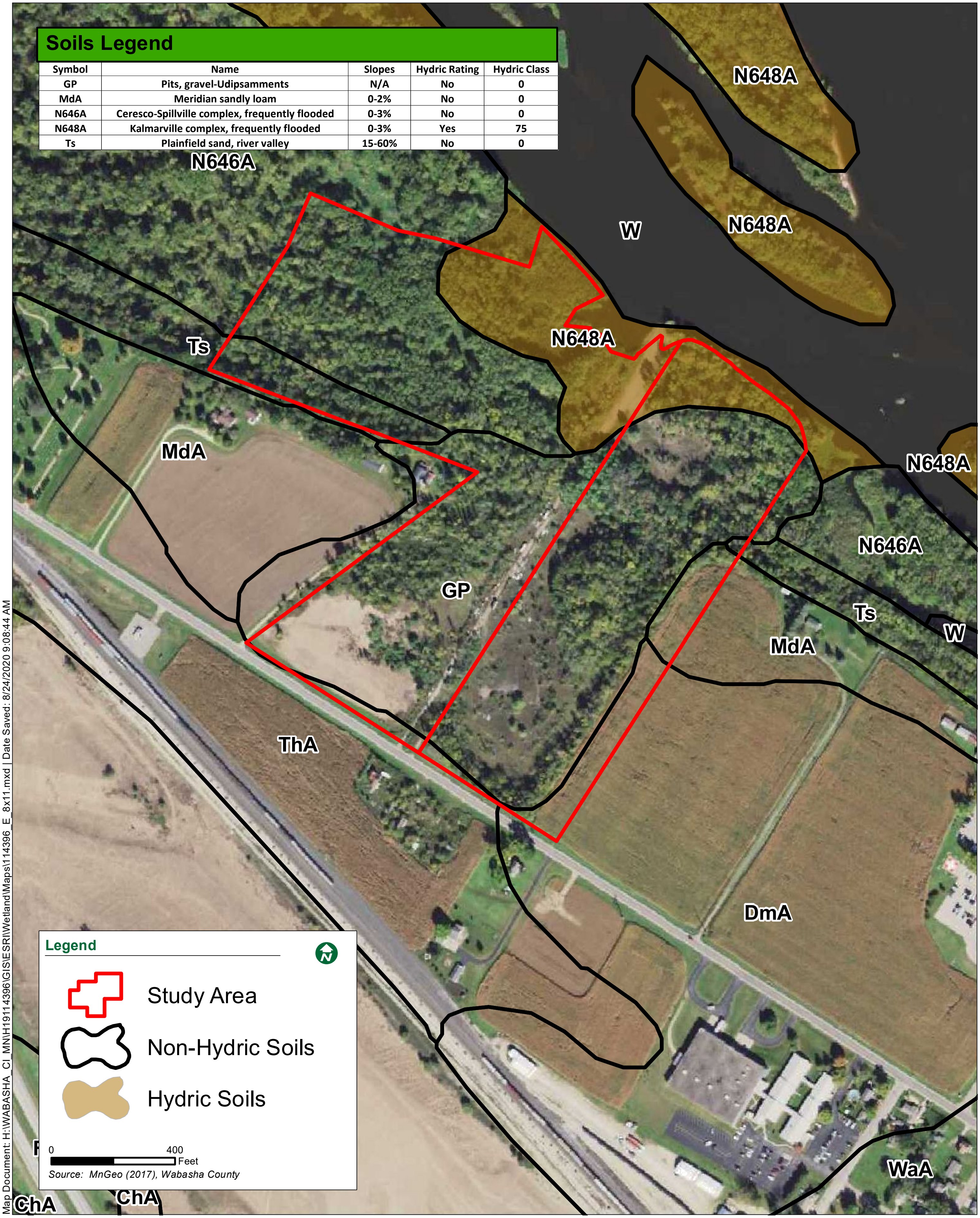

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Exhibit F: Delineated Aquatic Resources

Kohner Property Wetland Delineation

July 2020

Map Document: H:\WABASHA_CI_MN\H19114396\GIS\ESRI\Wetland\Maps\114396_F_8x11T.mxd | Date Saved: 8/24/2020 9:10:46 AM

EXHIBIT G:
WETLAND DETERMINATION DATA FORM

(Midwest Region)

Real People. Real Solutions.

Project/Site: **Kohner Property Wetland Delineation** City/County: **Wabasha County** Sampling Date: **6/18/2020**

Applicant/Owner: **City of Wabasha** State: **MN** Sample Point: **W1-A**

Investigator(s): **Brandon Bohks** Section, Township, Range: **30, 111N, 10W**

Landforms (hillside, terrace, etc.): **Toeslope/Depression** Local Relief (concave, convex, none): **Concave**

Slope (%): **0-2** Latitude: Longitude: Datum:

Soil Map Unit Name: **Kalmarville complex, frequently flooded** NWI Classification: **PFO1Cx**

Are climatic/hydrologic conditions of the site typical for this time of year? ____ (If no, explain in remarks)

Are vegetation **X**, soils **X**, or hydrology **X** significantly disturbed? Are normal circumstances present? **No**

Are vegetation ____, soils ____, or hydrology ____ naturally problematic? (If needed, explain any answers in Remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	**Yes**	**Is the sampled area within a wetland?** **Yes**
Hydric soils present?	**Yes**	
Wetland hydrology present?	**Yes**	

Remarks: **Very likely the site was previously excavated du eto mining practices.**

VEGETATION - Use scientific names of plants

	Absolute % Cover	Dominant Species	Indicator Status
Tree Stratum (Plot size: 30 feet)			
1 **Ulmus americana**	**35**	**Yes**	**FACW**
2 **Acer negundo**	**15**	**Yes**	**FAC**
3			
4			
5			
	50 =Total Cover		
Sapling/Shrub stratum (Plot size: 15 feet)			
1 **Rhamnus cathartica**	**25**	**Yes**	**FAC**
2			
3			
4			
5			
	25 =Total Cover		
Herb stratum: (Plot size: 5 feet)			
1 **Impatiens capensis**	**3**	**No**	**FACW**
2			
3			
4			
5			
6			
7			
8			
9			
10			
	3 =Total Cover		
Woody vine stratum: (Plot size: 15 feet)			
1			
2			
	0 =Total Cover		

Dominance Test Worksheet

Number of dominant species that are OBL, FACW, or FAC: **3** (A)

Total number of dominant species across all strata: **3** (B)

Percent of dominant species that are OBL, FACW or FAC: **100%** (A/B)

Prevalence Index Worksheet

Total % cover of:

OBL Species:	**0**	x 1 =	**0**
FACW Species:	**38**	x 2 =	**76**
FAC Species:	**40**	x 3 =	**120**
FACU species:	**0**	x 4 =	**0**
UPL Species:	**0**	x 5 =	**0**
Totals:	**78** (A)		**196** (B)

Prevalence Index (B/A): **2.51**

Hydrophytic Vegetation Indicators

- ____ Rapid test for hydrophytic vegetation
- **X** Dominance test >50%
- **X** Prevalence index is ≤3.0*
- ____ Morphological adaptations* (Provide supporting data in remarks)
- ____ Problematic hydrophytic vegetation* (Explain in remarks)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? **Yes**

Remarks:

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EXHIBIT G:
WETLAND DETERMINATION DATA FORM

(Midwest Region)

Sample Point: **W1-A**

SOILS

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type*	Loc**		
0-3	**10YR 2/1**	**100**					**Mucky Mod**	
3-12+	**10YR 5/1**	**100**					**Sand**	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Material (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Material (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils*:

- ___ Coast Prairie Redox (A16)(**LRR K,L,R**)
- ___ Dark Surface (S7)(**LRR K, L**)
- ___ Iron-Manganese Masses (F12)(**LRR K, L, R**)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in remarks)

*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: ___

Depth (inches): ___

Hydric Soils Present? **Yes**

Remarks: **Soik pit dug to 12 inches**

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- X Sparsely Vegetated Concave Surface (B8)
- X Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence or Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Crack (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?		Depth (inches):	
Water Table Present?		Depth (inches):	
Saturation Present?	**Yes**	Depth (inches):	**10**

Indicators of Wetland Hydrology Present? **Yes**

Remarks:

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EXHIBIT G:
WETLAND DETERMINATION DATA FORM
(Midwest Region)

Project/Site: **Kohner Property Wetland Delineation** City/County: **Wabasha County** Sampling Date: **6/18/2020**

Applicant/Owner: **City of Wabasha** State: **MN** Sample Point: **W1-B**

Investigator(s): **Brandon Bohks** Section, Township, Range: **30, 111N, 10W**

Landforms (hillside, terrace, etc.): **Terrace** Local Relief (concave, convex, none): **Linear**

Slope (%): **1-3** Latitude: Longitude: Datum:

Soil Map Unit Name: **Kalmarville complex, frequently flooded** NWI Classification:

Are climatic/hydrologic conditions of the site typical for this time of year? (If no, explain in remarks)

Are vegetation **X**, soils **X**, or hydrology **X** significantly disturbed? Are normal circumstances present? **No**

Are vegetation , soils , or hydrology naturally problematic? (If needed, explain any answers in Remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	**Yes**	Is the sampled area within a wetland? **No**
Hydric soils present?	**No**	
Wetland hydrology present?	**No**	

Remarks: **Very likely the site was previously excavated due to mining practices.**

VEGETATION - Use scientific names of plants

Tree Stratum (Plot size: 30 feet)	Absolute % Cover	Dominant Species	Indicator Status
1			
2			
3			
4			
5			
	0 =Total Cover		
Sapling/Shrub stratum (Plot size: 15 feet)			
1 **Rhamnus cathartica**	**80**	**Yes**	**FAC**
2 **Zanthoxylum americanum**	**10**	**No**	**FACU**
3			
4			
5			
	90 =Total Cover		
Herb stratum: (Plot size: 5 feet)			
1 **Lysimachia nummularia**	**60**	**Yes**	**FACW**
2 **Toxicodendron radicans**	**20**	**Yes**	**FACW**
3 **Rhamnus cathartica**	**15**	**No**	**FAC**
4 **Euthamia graminifolia**	**3**	**No**	**FACW**
5			
6			
7			
8			
9			
10			
	98 =Total Cover		
Woody vine stratum: (Plot size: 15 feet)			
1			
2			
	0 =Total Cover		

Dominance Test Worksheet

Number of dominant species that are OBL, FACW, or FAC: **3** (A)

Total number of dominant species across all strata: **3** (B)

Percent of dominant species that are OBL, FACW or FAC: **100%** (A/B)

Prevalence Index Worksheet

Total % cover of:			
OBL Species:	**0**	x 1 =	**0**
FACW Species:	**83**	x 2 =	**166**
FAC Species:	**95**	x 3 =	**285**
FACU species:	**10**	x 4 =	**40**
UPL Species:	**0**	x 5 =	**0**
Totals:	**188** (A)		**491** (B)

Prevalence Index (B/A): **2.61**

Hydrophytic Vegetation Indicators

- [ ] Rapid test for hydrophytic vegetation
- **X** Dominance test >50%
- **X** Prevalence index is ≤3.0*
- [ ] Morphological adaptations* (Provide supporting data in remarks)
- [ ] Problematic hydrophytic vegetation* (Explain in remarks)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? **Yes**

Remarks:

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EXHIBIT G:
WETLAND DETERMINATION DATA FORM

(Midwest Region)

Sample Point: **W1-B**

SOILS

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type*	Loc**		
0-12+	**10YR 4/4**	**100**					**Sand**	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

___ Histisol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ 2 cm Muck (A10)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Material (S1)
___ 5 cm Mucky Peat or Peat (S3)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Material (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils*:

___ Coast Prairie Redox (A16)(**LRR K,L,R**)
___ Dark Surface (S7)(**LRR K, L**)
___ Iron-Manganese Masses (F12)(**LRR K, L, R**)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in remarks)

*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: ___
Depth (inches): ___

Hydric Soils Present? **No**

Remarks: **Soil pit dug to 12 inches.**

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9)
___ Aquatic Fauna (B13)
___ True Aquatic Plants (B14)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres on Living Roots (C3)
___ Presence or Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Thin Muck Surface (C7)
___ Gauge or Well Data (C7)
___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

___ Surface Soil Crack (B6)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Stunted or Stressed Plants (D1)
___ Geomorphic Position (D2)
X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? ___ Depth (inches): ___
Water Table Present? ___ Depth (inches): ___
Saturation Present? ___ Depth (inches): ___

Indicators of Wetland Hydrology Present? **No**

Remarks:

Real People. Real Solutions.

EXHIBIT G:
WETLAND DETERMINATION DATA FORM

(Midwest Region)

Project/Site: **Kohner Property Wetland Delineation** City/County: **Wabasha County** Sampling Date: **6/18/2020**

Applicant/Owner: **City of Wabasha** State: **MN** Sample Point: **W2-A**

Investigator(s): **Brandon Bohks** Section, Township, Range: **30, 111N, 10W**

Landforms (hillside, terrace, etc.): **Floodplain** Local Relief (concave, convex, none): **Linear**

Slope (%): **1-3** Latitude: Longitude: Datum:

Soil Map Unit Name: **Kalmarville complex, frequently flooded** NWI Classification: **PEM1C**

Are climatic/hydrologic conditions of the site typical for this time of year? ______ (If no, explain in remarks)

Are vegetation ______, soils ______, or hydrology ______ significantly disturbed? Are normal circumstances present? **Yes**

Are vegetation ______, soils ______, or hydrology ______ naturally problematic? (If needed, explain any answers in Remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	**Yes**	**Is the sampled area within a wetland?** **Yes**
Hydric soils present?	**Yes**	
Wetland hydrology present?	**Yes**	

Remarks:

VEGETATION - Use scientific names of plants

	Absolute % Cover	Dominant Species	Indicator Status
Tree Stratum (Plot size: 30 feet)			
1 **Acer saccharinum**	**75**	**Yes**	**FACW**
2 **Salix nigra**	**15**	**No**	**FACW**
3 **Fraxinus pennsylvanica**	**10**	**No**	**FACW**
4			
5			
	100	=Total Cover	
Sapling/Shrub stratum (Plot size: 15 feet)			
1 **Rhamnus cathartica**	**55**	**Yes**	**FAC**
2			
3			
4			
5			
	55	=Total Cover	
Herb stratum: (Plot size: 5 feet)			
1 **Acer saccharinum**	**8**	**Yes**	**FACW**
2 **Toxicodendron radicans**	**3**	**No**	**FAC**
3 **Impatiens capensis**	**3**	**No**	**FACW**
4			
5			
6			
7			
8			
9			
10			
	14	=Total Cover	
Woody vine stratum: (Plot size: 15 feet)			
1			
2			
	0	=Total Cover	

Dominance Test Worksheet

Number of dominant species that are OBL, FACW, or FAC: **3** (A)

Total number of dominant species across all strata: **3** (B)

Percent of dominant species that are OBL, FACW or FAC: **100%** (A/B)

Prevalence Index Worksheet

Total % cover of:

OBL Species:	**0**	x 1 =	**0**
FACW Species:	**111**	x 2 =	**222**
FAC Species:	**58**	x 3 =	**174**
FACU species:	**0**	x 4 =	**0**
UPL Species:	**0**	x 5 =	**0**
Totals:	**169** (A)		**396** (B)

Prevalence Index (B/A): **2.34**

Hydrophytic Vegetation Indicators

- ___ Rapid test for hydrophytic vegetation
- **X** Dominance test >50%
- **X** Prevalence index is ≤3.0*
- ___ Morphological adaptations* (Provide supporting data in remarks)
- ___ Problematic hydrophytic vegetation* (Explain in remarks)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? **Yes**

Remarks:

BOLTON & MENK
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EXHIBIT G:
WETLAND DETERMINATION DATA FORM

(Midwest Region)

Sample Point: **W2-A**

SOILS

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type*	Loc**	Texture	Remarks
0-3	**10YR 2/2**	**100**					**Mucky Mod**	
3-12+	**10YR 4/1**	**90**					**Sand**	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

___ Histisol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ 2 cm Muck (A10)
X Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Material (S1)
___ 5 cm Mucky Peat or Peat (S3)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Material (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils*:

___ Coast Prairie Redox (A16)(**LRR K,L,R**)
___ Dark Surface (S7)(**LRR K, L**)
___ Iron-Manganese Masses (F12)(**LRR K, L, R**)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in remarks)

*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: ___
Depth (inches): ___

Hydric Soils Present? **Yes**

Remarks: **Soik pit dug to 12 inches**

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
X Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
X Water-Stained Leaves (B9)
___ Aquatic Fauna (B13)
___ True Aquatic Plants (B14)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres on Living Roots (C3)
___ Presence or Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Thin Muck Surface (C7)
___ Gauge or Well Data (C7)
___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

___ Surface Soil Crack (B6)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Stunted or Stressed Plants (D1)
X Geomorphic Position (D2)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? ___ Depth (inches): ___
Water Table Present? ___ Depth (inches): ___
Saturation Present? ___ Depth (inches): ___

Indicators of Wetland Hydrology Present? **Yes**

Remarks:

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EXHIBIT G:
WETLAND DETERMINATION DATA FORM
(Midwest Region)

Project/Site: **Kohner Property Wetland Delineation** City/County: **Wabasha County** Sampling Date: **6/18/2020**

Applicant/Owner: **City of Wabasha** State: **MN** Sample Point: **W2-B**

Investigator(s): **Brandon Bohks** Section, Township, Range: **30, 111N, 10W**

Landforms (hillside, terrace, etc.): **Terrace** Local Relief (concave, convex, none): **Linear**

Slope (%): **1-3** Latitude: ______ Longitude: ______ Datum: ______

Soil Map Unit Name: **Kalmarville complex, frequently flooded** NWI Classification: ______

Are climatic/hydrologic conditions of the site typical for this time of year? ______ (If no, explain in remarks)

Are vegetation ______ , soils ______ , or hydrology ______ significantly disturbed? Are normal circumstances present? **No**

Are vegetation ______ , soils ______ , or hydrology ______ naturally problematic? (If needed, explain any answers in Remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	**Yes**	**Is the sampled area within a wetland?** **No**
Hydric soils present?	**No**	
Wetland hydrology present?	**No**	

Remarks:

VEGETATION - Use scientific names of plants

Tree Stratum (Plot size: 30 feet)	Absolute % Cover	Dominant Species	Indicator Status
1			
2			
3			
4			
5			
	0 =Total Cover		
Sapling/Shrub stratum (Plot size: 15 feet)			
1 **Rhamnus cathartica**	**65**	**Yes**	**FAC**
2 **Zanthoxylum americanum**	**20**	**Yes**	**FACU**
3			
4			
5			
	85 =Total Cover		
Herb stratum: (Plot size: 5 feet)			
1 **Verbena urticifolia**	**35**	**Yes**	**FAC**
2 **Carex pensylvanica**	**10**	**No**	**FACU**
3 **Parthenocissus quinquefolia**	**10**	**No**	**FACU**
4 **Rhamnus cathartica**	**8**	**No**	**FAC**
5 **Viola sororia**	**7**	**No**	**FAC**
6 **Toxicodendron radicans**	**3**	**No**	**FAC**
7			
8			
9			
10			
	73 =Total Cover		
Woody vine stratum: (Plot size: 15 feet)			
1			
2			
	0 =Total Cover		

Dominance Test Worksheet

Number of dominant species that are OBL, FACW, or FAC: **2** (A)

Total number of dominant species across all strata: **3** (B)

Percent of dominant species that are OBL, FACW or FAC: **67%** (A/B)

Prevalence Index Worksheet

Total % cover of:			
OBL Species:	**0**	x 1 =	**0**
FACW Species:	**0**	x 2 =	**0**
FAC Species:	**118**	x 3 =	**354**
FACU species:	**40**	x 4 =	**160**
UPL Species:	**0**	x 5 =	**0**
Totals:	**158** (A)		**514** (B)

Prevalence Index (B/A): **3.25**

Hydrophytic Vegetation Indicators

	Rapid test for hydrophytic vegetation
X	Dominance test >50%
	Prevalence index is ≤3.0*
	Morphological adaptations* (Provide supporting data in remarks)
	Problematic hydrophytic vegetation* (Explain in remarks)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? **Yes**

Remarks:

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EXHIBIT G:
WETLAND DETERMINATION DATA FORM
(Midwest Region)

Sample Point: **W2-B**

SOILS

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type*	Loc**		
0-6	**10YR 2/2**	**100**					**Sandy Loam**	
6-13+	**10YR 4/1**	**95**	**7.5YR 4/6**	**5**	**C**	**M**	**Sand**	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

___ Histisol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ 2 cm Muck (A10)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Material (S1)
___ 5 cm Mucky Peat or Peat (S3)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Material (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils*:

___ Coast Prairie Redox (A16)(**LRR K,L,R**)
___ Dark Surface (S7)(**LRR K, L**)
___ Iron-Manganese Masses (F12)(**LRR K, L, R**)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in remarks)

*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: ___
Depth (inches): ___

Hydric Soils Present? **No**

Remarks: **Soil pit dug to 13 inches.**

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9)
___ Aquatic Fauna (B13)
___ True Aquatic Plants (B14)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres on Living Roots (C3)
___ Presence or Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Thin Muck Surface (C7)
___ Gauge or Well Data (C7)
___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

___ Surface Soil Crack (B6)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Stunted or Stressed Plants (D1)
___ Geomorphic Position (D2)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? ___ Depth (inches): ___
Water Table Present? ___ Depth (inches): ___
Saturation Present? ___ Depth (inches): ___

Indicators of Wetland Hydrology Present? **No**

Remarks:

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EXHIBIT G:
WETLAND DETERMINATION DATA FORM

(Midwest Region)

Project/Site: **Kohner Property Wetland Delineation** City/County: **Wabasha County** Sampling Date: **6/18/2020**

Applicant/Owner: **City of Wabasha** State: **MN** Sample Point: **W3-A**

Investigator(s): **Brandon Bohks** Section, Township, Range: **30, 111N, 10W**

Landforms (hillside, terrace, etc.): **Floodplain** Local Relief (concave, convex, none): **Linear**

Slope (%): **1-3** Latitude: ______ Longitude: ______ Datum: ______

Soil Map Unit Name: **Kalmarville complex, frequently flooded** NWI Classification: **PEM1C**

Are climatic/hydrologic conditions of the site typical for this time of year? ______ (If no, explain in remarks)

Are vegetation ______, soils ______, or hydrology ______ significantly disturbed? Are normal circumstances present? **Yes**

Are vegetation ______, soils ______, or hydrology ______ naturally problematic? (If needed, explain any answers in Remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	**Yes**	**Is the sampled area within a wetland?**	**Yes**
Hydric soils present?	**Yes**		
Wetland hydrology present?	**Yes**		

Remarks:

VEGETATION - Use scientific names of plants

Tree Stratum (Plot size: 30 feet)	Absolute % Cover	Dominant Species	Indicator Status
1 **Acer saccharinum**	**85**	**Yes**	**FACW**
2			
3			
4			
5			
	85	=Total Cover	
Sapling/Shrub stratum (Plot size: 15 feet)			
1			
2			
3			
4			
5			
	0	=Total Cover	
Herb stratum: (Plot size: 5 feet)			
1 **Verbena urticifolia**	**10**	**Yes**	**FAC**
2 **Pilea pumila**	**5**	**Yes**	**FACW**
3 **Lysimachia nummularia**	**3**	**No**	**FACW**
4 **Impatiens capensis**	**3**	**No**	**FACW**
5			
6			
7			
8			
9			
10			
	21	=Total Cover	
Woody vine stratum: (Plot size: 15 feet)			
1			
2			
	0	=Total Cover	

Dominance Test Worksheet

Number of dominant species that are OBL, FACW, or FAC: **3** (A)

Total number of dominant species across all strata: **3** (B)

Percent of dominant species that are OBL, FACW or FAC: **100%** (A/B)

Prevalence Index Worksheet

Total % cover of:

OBL Species:	**0**	x 1 =	**0**
FACW Species:	**96**	x 2 =	**192**
FAC Species:	**10**	x 3 =	**30**
FACU species:	**0**	x 4 =	**0**
UPL Species:	**0**	x 5 =	**0**
Totals:	**106** (A)		**222** (B)

Prevalence Index (B/A): **2.09**

Hydrophytic Vegetation Indicators

- ___ Rapid test for hydrophytic vegetation
- **X** Dominance test >50%
- **X** Prevalence index is ≤3.0*
- ___ Morphological adaptations* (Provide supporting data in remarks)
- ___ Problematic hydrophytic vegetation* (Explain in remarks)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? **Yes**

Remarks:

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EXHIBIT G:
WETLAND DETERMINATION DATA FORM

(Midwest Region)

Sample Point: **W3-A**

SOILS

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type*	Loc**	Texture	Remarks
0-6	**10YR 2/2**	**100**					**Mucky Mod**	
6-15+	**10YR 5/1**	**100**					**Sand**	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Material (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Material (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils*:

- ___ Coast Prairie Redox (A16)(**LRR K,L,R**)
- ___ Dark Surface (S7)(**LRR K, L**)
- ___ Iron-Manganese Masses (F12)(**LRR K, L, R**)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in remarks)

*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: ___
Depth (inches): ___

Hydric Soils Present? **Yes**

Remarks: **Soik pit dug to 15 inches**

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- X Drift Deposits (B3)
- X Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- X Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence or Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Crack (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- X Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?		Depth (inches):	
Water Table Present?	**Yes**	Depth (inches):	**10**
Saturation Present?	**Yes**	Depth (inches):	**7**

Indicators of Wetland Hydrology Present? **Yes**

Remarks:

BOLTON & MENK
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EXHIBIT G:
WETLAND DETERMINATION DATA FORM
(Midwest Region)

Project/Site: **Kohner Property Wetland Delineation** City/County: **Wabasha County** Sampling Date: **6/18/2020**
Applicant/Owner: **City of Wabasha** State: **MN** Sample Point: **W3-B**
Investigator(s): **Brandon Bohks** Section, Township, Range: **30, 111N, 10W**
Landforms (hillside, terrace, etc.): **Backslope** Local Relief (concave, convex, none): **Convex**
Slope (%): **6-8** Latitude: ____ Longitude: ____ Datum: ____
Soil Map Unit Name: **Ceresco-Spillville complex, frequently flooded** NWI Classification: ____
Are climatic/hydrologic conditions of the site typical for this time of year? ____ (If no, explain in remarks)
Are vegetation ____, soils ____, or hydrology ____ significantly disturbed? Are normal circumstances present? **No**
Are vegetation ____, soils ____, or hydrology ____ naturally problematic? (If needed, explain any answers in Remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	**Yes**	**Is the sampled area within a wetland?**	**No**
Hydric soils present?	**No**		
Wetland hydrology present?	**No**		

Remarks:

VEGETATION - Use scientific names of plants

		Absolute % Cover	Dominant Species	Indicator Status
Tree Stratum (Plot size: 30 feet)				
1	**Fraxinus pennsylvanica**	**20**	**Yes**	**FACW**
2	**Ulmus americana**	**10**	**Yes**	**FACW**
3				
4				
5				
		30	=Total Cover	
Sapling/Shrub stratum (Plot size: 15 feet)				
1	**Rhamnus cathartica**	**10**	**Yes**	**FAC**
2				
3				
4				
5				
		10	=Total Cover	
Herb stratum: (Plot size: 5 feet)				
1	**Laportea canadensis**	**55**	**Yes**	**FACW**
2	**Pilea fontana**	**5**	**No**	**FACW**
3				
4				
5				
6				
7				
8				
9				
10				
		60	=Total Cover	
Woody vine stratum: (Plot size: 15 feet)				
1				
2				
		0	=Total Cover	

Dominance Test Worksheet

Number of dominant species that are OBL, FACW, or FAC: **4** (A)
Total number of dominant species across all strata: **4** (B)
Percent of dominant species that are OBL, FACW or FAC: **100%** (A/B)

Prevalence Index Worksheet

Total % cover of:

OBL Species:	**0**	x 1 =	**0**
FACW Species:	**90**	x 2 =	**180**
FAC Species:	**10**	x 3 =	**30**
FACU species:	**0**	x 4 =	**0**
UPL Species:	**0**	x 5 =	**0**
Totals:	**100** (A)		**210** (B)

Prevalence Index (B/A): **2.10**

Hydrophytic Vegetation Indicators

	Rapid test for hydrophytic vegetation
X	Dominance test >50%
X	Prevalence index is ≤3.0*
	Morphological adaptations* (Provide supporting data in remarks)
	Problematic hydrophytic vegetation* (Explain in remarks)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? **Yes**

Remarks:

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EXHIBIT G:
WETLAND DETERMINATION DATA FORM
(Midwest Region)

Sample Point: **W3-B**

SOILS

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type*	Loc**		
0-10	**10YR 2/1**	**100**					**Sandy Loam**	
10-18	**10YR 4/2**	**100**					**Sand**	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

___ Histisol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ 2 cm Muck (A10)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Material (S1)
___ 5 cm Mucky Peat or Peat (S3)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Material (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils*:

___ Coast Prairie Redox (A16)(**LRR K,L,R**)
___ Dark Surface (S7)(**LRR K, L**)
___ Iron-Manganese Masses (F12)(**LRR K, L, R**)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in remarks)

*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: ___
Depth (inches): ___

Hydric Soils Present? **No**

Remarks: **Soil pit dug to 18 inches.**

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9)
___ Aquatic Fauna (B13)
___ True Aquatic Plants (B14)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres on Living Roots (C3)
___ Presence or Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Thin Muck Surface (C7)
___ Gauge or Well Data (C7)
___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

___ Surface Soil Crack (B6)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Stunted or Stressed Plants (D1)
___ Geomorphic Position (D2)
X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? ___ Depth (inches): ___
Water Table Present? ___ Depth (inches): ___
Saturation Present? ___ Depth (inches): ___

Indicators of Wetland Hydrology Present? **No**

Remarks:

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EXHIBIT G:
WETLAND DETERMINATION DATA FORM
(Midwest Region)

Project/Site: **Kohner Property Wetland Delineation** City/County: **Wabasha County** Sampling Date: **6/25/2020**
Applicant/Owner: **City of Wabasha** State: **MN** Sample Point: **W4-A**
Investigator(s): **Brandon Bohks** Section, Township, Range: **30, 111N, 10W**
Landforms (hillside, terrace, etc.): **Toeslope/Depression** Local Relief (concave, convex, none): **Concave**
Slope (%): **0-2** Latitude: ______ Longitude: ______ Datum: ______
Soil Map Unit Name: **Pits, gravel-Udipsamments** NWI Classification: ______
Are climatic/hydrologic conditions of the site typical for this time of year? ______ (If no, explain in remarks)
Are vegetation **X**, soils **X**, or hydrology **X** significantly disturbed? Are normal circumstances present? **No**
Are vegetation ______, soils ______, or hydrology ______ naturally problematic? (If needed, explain any answers in Remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	**Yes**	**Is the sampled area within a wetland?** **Yes**
Hydric soils present?	**Yes**	
Wetland hydrology present?	**Yes**	

Remarks: **Very likely the site was previously excavated du eto mining practices.**

VEGETATION - Use scientific names of plants

	Absolute % Cover	Dominant Species	Indicator Status
Tree Stratum (Plot size: 30 feet)			
1			
2			
3			
4			
5			
	0 =Total Cover		
Sapling/Shrub stratum (Plot size: 15 feet)			
1 **Salix bebbiana**	**10**	**Yes**	**FACW**
2 **Fraxinus pennsylvanica**	**5**	**Yes**	**FACW**
3			
4			
5			
	15 =Total Cover		
Herb stratum: (Plot size: 5 feet)			
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
	0 =Total Cover		
Woody vine stratum: (Plot size: 15 feet)			
1			
2			
	0 =Total Cover		

Dominance Test Worksheet

Number of dominant species that are OBL, FACW, or FAC: **2** (A)
Total number of dominant species across all strata: **2** (B)
Percent of dominant species that are OBL, FACW or FAC: **100%** (A/B)

Prevalence Index Worksheet

Total % cover of:			
OBL Species:	**0**	x 1 =	**0**
FACW Species:	**15**	x 2 =	**30**
FAC Species:	**0**	x 3 =	**0**
FACU species:	**0**	x 4 =	**0**
UPL Species:	**0**	x 5 =	**0**
Totals:	**15** (A)		**30** (B)

Prevalence Index (B/A): **2.00**

Hydrophytic Vegetation Indicators

X Rapid test for hydrophytic vegetation
___ Dominance test >50%
___ Prevalence index is ≤3.0*
___ Morphological adaptations* (Provide supporting data in remarks)
___ Problematic hydrophytic vegetation* (Explain in remarks)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? **Yes**

Remarks:

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EXHIBIT G:
WETLAND DETERMINATION DATA FORM

(Midwest Region)

Sample Point: **W4-A**

SOILS

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Color (moist)	Redox %	Type*	Loc**	Texture	Remarks
0-8	**10YR 2/1**	**100**					**Mucky Mod**	
8-14+	**10YR 5/1**	**100**					**Sand**	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- **X** Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Material (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Material (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils*:

- ___ Coast Prairie Redox (A16)(**LRR K,L,R**)
- ___ Dark Surface (S7)(**LRR K, L**)
- ___ Iron-Manganese Masses (F12)(**LRR K, L, R**)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in remarks)

*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: ___
Depth (inches): ___

Hydric Soils Present? **Yes**

Remarks: **Soil pit dug to 14 inches**

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- **X** High Water Table (A2)
- **X** Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- **X** Sparsely Vegetated Concave Surface (B8)
- **X** Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence or Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Crack (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- **X** Geomorphic Position (D2)
- **X** FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	___	Depth (inches):	___
Water Table Present?	**Yes**	Depth (inches):	**11**
Saturation Present?	**Yes**	Depth (inches):	**7**

Indicators of Wetland Hydrology Present? **Yes**

Remarks:

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EXHIBIT G:
WETLAND DETERMINATION DATA FORM

(Midwest Region)

Project/Site: **Kohner Property Wetland Delineation** City/County: **Wabasha County** Sampling Date: **6/18/2020**

Applicant/Owner: **City of Wabasha** State: **MN** Sample Point: **W4-B**

Investigator(s): **Brandon Bohks** Section, Township, Range: **30, 111N, 10W**

Landforms (hillside, terrace, etc.): **Terrace** Local Relief (concave, convex, none): **Linear**

Slope (%): **1-3** Latitude: Longitude: Datum:

Soil Map Unit Name: **Pits, gravel-Udipsamments** NWI Classification:

Are climatic/hydrologic conditions of the site typical for this time of year? ____ (If no, explain in remarks)

Are vegetation **X** , soils **X** , or hydrology **X** significantly disturbed? Are normal circumstances present? **No**

Are vegetation ____ , soils ____ , or hydrology ____ naturally problematic? (If needed, explain any answers in Remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	**Yes**	**Is the sampled area within a wetland?** **No**
Hydric soils present?	**No**	
Wetland hydrology present?	**No**	

Remarks: **Very likely the site was previously excavated du eto mining practices.**

VEGETATION - Use scientific names of plants

Tree Stratum (Plot size: 30 feet)	Absolute % Cover	Dominant Species	Indicator Status
1 **Populus deltoides**	**20**	**Yes**	**FAC**
2			
3			
4			
5			
	20 =Total Cover		
Sapling/Shrub stratum (Plot size: 15 feet)			
1 **Rhamnus cathartica**	**80**	**Yes**	**FAC**
2 **Zanthoxylum americanum**	**5**	**No**	**FACU**
3			
4			
5			
	85 =Total Cover		
Herb stratum: (Plot size: 5 feet)			
1 **Lysimachia nummularia**	**30**	**Yes**	**FACW**
2 **Toxicodendron radicans**	**5**	**No**	**FACW**
3 **Rhamnus cathartica**	**5**	**No**	**FAC**
4			
5			
6			
7			
8			
9			
10			
	40 =Total Cover		
Woody vine stratum: (Plot size: 15 feet)			
1			
2			
	0 =Total Cover		

Dominance Test Worksheet

Number of dominant species that are OBL, FACW, or FAC: **3** (A)

Total number of dominant species across all strata: **3** (B)

Percent of dominant species that are OBL, FACW or FAC: **100%** (A/B)

Prevalence Index Worksheet

Total % cover of:

OBL Species:	**0**	x 1 =	**0**
FACW Species:	**35**	x 2 =	**70**
FAC Species:	**105**	x 3 =	**315**
FACU species:	**5**	x 4 =	**20**
UPL Species:	**0**	x 5 =	**0**
Totals:	**145** (A)		**405** (B)

Prevalence Index (B/A): **2.79**

Hydrophytic Vegetation Indicators

- ____ Rapid test for hydrophytic vegetation
- **X** Dominance test >50%
- **X** Prevalence index is ≤3.0*
- ____ Morphological adaptations* (Provide supporting data in remarks)
- ____ Problematic hydrophytic vegetation* (Explain in remarks)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? **Yes**

Remarks:

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EXHIBIT G:
WETLAND DETERMINATION DATA FORM
(Midwest Region)

Sample Point: **W4-B**

SOILS

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type*	Loc**	Texture	Remarks
0-8	**10YR 2/3**	**100**					**Sand**	
8-16+	**10YR 5/3**	**100**					**Sand**	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

___ Histisol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ 2 cm Muck (A10)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Material (S1)
___ 5 cm Mucky Peat or Peat (S3)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Material (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils*:

___ Coast Prairie Redox (A16)(**LRR K,L,R**)
___ Dark Surface (S7)(**LRR K, L**)
___ Iron-Manganese Masses (F12)(**LRR K, L, R**)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in remarks)

*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: ___
Depth (inches): ___

Hydric Soils Present? **No**

Remarks: **Soil pit dug to 16 inches.**

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9)
___ Aquatic Fauna (B13)
___ True Aquatic Plants (B14)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres on Living Roots (C3)
___ Presence or Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Thin Muck Surface (C7)
___ Gauge or Well Data (C7)
___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

___ Surface Soil Crack (B6)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Stunted or Stressed Plants (D1)
___ Geomorphic Position (D2)
X FAC-Neutral Test (D5)

Field Observations:
Surface Water Present? ___ Depth (inches): ___
Water Table Present? ___ Depth (inches): ___
Saturation Present? ___ Depth (inches): ___

Indicators of Wetland Hydrology Present? **No**

Remarks:

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EXHIBIT G:
WETLAND DETERMINATION DATA FORM
(Midwest Region)

Project/Site: **Kohner Property Wetland Delineation** City/County: **Wabasha County** Sampling Date: **6/18/2020**
Applicant/Owner: **City of Wabasha** State: **MN** Sample Point: **Site 1**
Investigator(s): **Brandon Bohks** Section, Township, Range: **30, 111N, 10W**
Landforms (hillside, terrace, etc.): **Depression** Local Relief (concave, convex, none): **Concave**
Slope (%): **0-2** Latitude: Longitude: Datum:
Soil Map Unit Name: **Pits, gravel-Udipsamments** NWI Classification:
Are climatic/hydrologic conditions of the site typical for this time of year? (If no, explain in remarks)
Are vegetation **X** , soils **X** , or hydrology **X** significantly disturbed? Are normal circumstances present? **No**
Are vegetation , soils , or hydrology naturally problematic? (If needed, explain any answers in Remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	**Yes**	**Is the sampled area within a wetland?** **No**
Hydric soils present?	**No**	
Wetland hydrology present?	**Yes**	

Remarks: **Very likely the site was previously excavated du eto mining practices.**

VEGETATION - Use scientific names of plants

	Absolute % Cover	Dominant Species	Indicator Status
Tree Stratum (Plot size: 30 feet)			
1 **Ulmus americana**	**15**	**Yes**	**FACW**
2			
3			
4			
5			
	15 =Total Cover		
Sapling/Shrub stratum (Plot size: 15 feet)			
1 **Rhamnus cathartica**	**85**	**Yes**	**FAC**
2 **Lonicera ×bella**	**10**	**No**	**FACU**
3			
4			
5			
	95 =Total Cover		
Herb stratum: (Plot size: 5 feet)			
1 **Impatiens capensis**	**20**	**Yes**	**FACW**
2 **Rhamnus cathartica**	**6**	**Yes**	**FAC**
3			
4			
5			
6			
7			
8			
9			
10			
	26 =Total Cover		
Woody vine stratum: (Plot size: 15 feet)			
1			
2			
	0 =Total Cover		

Dominance Test Worksheet

Number of dominant species that are OBL, FACW, or FAC: **4** (A)
Total number of dominant species across all strata: **4** (B)
Percent of dominant species that are OBL, FACW or FAC: **100%** (A/B)

Prevalence Index Worksheet

Total % cover of:

OBL Species:	**0**	x 1 =	**0**
FACW Species:	**35**	x 2 =	**70**
FAC Species:	**91**	x 3 =	**273**
FACU species:	**10**	x 4 =	**40**
UPL Species:	**0**	x 5 =	**0**
Totals:	**136** (A)		**383** (B)

Prevalence Index (B/A): **2.82**

Hydrophytic Vegetation Indicators

- ___ Rapid test for hydrophytic vegetation
- **X** Dominance test >50%
- **X** Prevalence index is ≤3.0*
- ___ Morphological adaptations* (Provide supporting data in remarks)
- ___ Problematic hydrophytic vegetation* (Explain in remarks)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? **Yes**

Remarks:

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EXHIBIT G:
WETLAND DETERMINATION DATA FORM

(Midwest Region)

Sample Point: **Site 1**

SOILS

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type*	Loc**	Texture	Remarks
0-5	**10YR 2/3**	**100**					**Sand**	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

___ Histisol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ 2 cm Muck (A10)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Material (S1)
___ 5 cm Mucky Peat or Peat (S3)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Material (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils*:

___ Coast Prairie Redox (A16)(**LRR K,L,R**)
___ Dark Surface (S7)(**LRR K, L**)
___ Iron-Manganese Masses (F12)(**LRR K, L, R**)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in remarks)

*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: **Bedrock**
Depth (inches): **5**

Hydric Soils Present? **No**

Remarks: **Soil pit dug to 5 inches when a restricitve layer was observed.**

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9)
___ Aquatic Fauna (B13)
___ True Aquatic Plants (B14)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres on Living Roots (C3)
___ Presence or Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Thin Muck Surface (C7)
___ Gauge or Well Data (C7)
___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

___ Surface Soil Crack (B6)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Stunted or Stressed Plants (D1)
X Geomorphic Position (D2)
X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? ___ Depth (inches): ___
Water Table Present? ___ Depth (inches): ___
Saturation Present? ___ Depth (inches): ___

Indicators of Wetland Hydrology Present? **Yes**

Remarks:

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EXHIBIT G:
WETLAND DETERMINATION DATA FORM
(Midwest Region)

Project/Site: **Kohner Property Wetland Delineation** City/County: **Wabasha County** Sampling Date: **6/18/2020**

Applicant/Owner: **City of Wabasha** State: **MN** Sample Point: **Site 2**

Investigator(s): **Brandon Bohks** Section, Township, Range: **30, 111N, 10W**

Landforms (hillside, terrace, etc.): **Depression** Local Relief (concave, convex, none): **Concave**

Slope (%): **0-2** Latitude: ______ Longitude: ______ Datum: ______

Soil Map Unit Name: **Pits, gravel-Udipsamments** NWI Classification: ______

Are climatic/hydrologic conditions of the site typical for this time of year? ______ (If no, explain in remarks)

Are vegetation **X** , soils **X** , or hydrology **X** significantly disturbed? Are normal circumstances present? **No**

Are vegetation ______ , soils ______ , or hydrology ______ naturally problematic? (If needed, explain any answers in Remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	**No**	Is the sampled area within a wetland?	**No**
Hydric soils present?	**No**		
Wetland hydrology present?	**No**		

Remarks: **Very likely the site was previously excavated du eto mining practices.**

VEGETATION - Use scientific names of plants

	Absolute % Cover	Dominant Species	Indicator Status
Tree Stratum (Plot size: 30 feet)			
1			
2			
3			
4			
5			
	0 =Total Cover		
Sapling/Shrub stratum (Plot size: 15 feet)			
1 **Ulmus pumila**	**5**	**Yes**	**FACU**
2			
3			
4			
5			
	5 =Total Cover		
Herb stratum: (Plot size: 5 feet)			
1 **Panicum virgatum**	**65**	**Yes**	**FAC**
2 **Trifolium campestre**	**15**	**No**	**UPL**
3 **Poa pratensis**	**10**	**No**	**FACU**
4 **Vicia americana**	**6**	**No**	**FACU**
5			
6			
7			
8			
9			
10			
	96 =Total Cover		
Woody vine stratum: (Plot size: 15 feet)			
1			
2			
	0 =Total Cover		

Dominance Test Worksheet

Number of dominant species that are OBL, FACW, or FAC: **0** (A)

Total number of dominant species across all strata: **2** (B)

Percent of dominant species that are OBL, FACW or FAC: **0%** (A/B)

Prevalence Index Worksheet

Total % cover of:

OBL Species:	**0**	x 1 =	**0**
FACW Species:	**0**	x 2 =	**0**
FAC Species:	**65**	x 3 =	**195**
FACU species:	**21**	x 4 =	**84**
UPL Species:	**15**	x 5 =	**75**
Totals:	**101** (A)		**354** (B)

Prevalence Index (B/A): **3.50**

Hydrophytic Vegetation Indicators

___ Rapid test for hydrophytic vegetation
___ Dominance test >50%
___ Prevalence index is ≤3.0*
___ Morphological adaptations* (Provide supporting data in remarks)
___ Problematic hydrophytic vegetation* (Explain in remarks)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? **No**

Remarks:

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EXHIBIT G:
WETLAND DETERMINATION DATA FORM

(Midwest Region)

Sample Point: **Site 2**

SOILS

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type*	Redox Features Loc**	Texture	Remarks
0-2	**10YR 2/3**	**100**					**Sandy Loam**	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

___ Histisol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ 2 cm Muck (A10)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Material (S1)
___ 5 cm Mucky Peat or Peat (S3)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Material (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils*:

___ Coast Prairie Redox (A16)(**LRR K,L,R**)
___ Dark Surface (S7)(**LRR K, L**)
___ Iron-Manganese Masses (F12)(**LRR K, L, R**)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in remarks)

*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: **Bedrock**
Depth (inches): **3**

Hydric Soils Present? **No**

Remarks: **Soil pit dug to 3 inches when a restricitve layer was observed.**

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9)
___ Aquatic Fauna (B13)
___ True Aquatic Plants (B14)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres on Living Roots (C3)
___ Presence or Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Thin Muck Surface (C7)
___ Gauge or Well Data (C7)
___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

___ Surface Soil Crack (B6)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Stunted or Stressed Plants (D1)
X Geomorphic Position (D2)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? ___ Depth (inches): ___
Water Table Present? ___ Depth (inches): ___
Saturation Present? ___ Depth (inches): ___

Indicators of Wetland Hydrology Present? **No**

Remarks:

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EXHIBIT G:
WETLAND DETERMINATION DATA FORM

(Midwest Region)

Project/Site: **Kohner Property Wetland Delineation** City/County: **Wabasha County** Sampling Date: **6/18/2020**

Applicant/Owner: **City of Wabasha** State: **MN** Sample Point: **Site 3**

Investigator(s): **Brandon Bohks** Section, Township, Range: **30, 111N, 10W**

Landforms (hillside, terrace, etc.): **Terrace** Local Relief (concave, convex, none): **Linear**

Slope (%): **1-3** Latitude: Longitude: Datum:

Soil Map Unit Name: **Kalmarville complex, frequently flooded** NWI Classification:

Are climatic/hydrologic conditions of the site typical for this time of year? ______ (If no, explain in remarks)

Are vegetation ______, soils ______, or hydrology ______ significantly disturbed? Are normal circumstances present? **Yes**

Are vegetation ______, soils ______, or hydrology ______ naturally problematic? (If needed, explain any answers in Remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	**Yes**	Is the sampled area within a wetland?	**No**
Hydric soils present?	**No**		
Wetland hydrology present?	**No**		

Remarks:

VEGETATION - Use scientific names of plants

Tree Stratum (Plot size: 30 feet)	Absolute % Cover	Dominant Species	Indicator Status
1 **Populus deltoides**	**35**	**Yes**	**FAC**
2			
3			
4			
5			
	35	=Total Cover	

Sapling/Shrub stratum (Plot size: 15 feet)	Absolute % Cover	Dominant Species	Indicator Status
1 **Fraxinus pennsylvanica**	**15**	**Yes**	**FACU**
2			
3			
4			
5			
	15	=Total Cover	

Herb stratum: (Plot size: 5 feet)	Absolute % Cover	Dominant Species	Indicator Status
1 **Teucrium canadens**	**35**	**Yes**	**FACW**
2 **Cirsium arvense**	**20**	**Yes**	**FACU**
3 **Phalaris arundincaea**	**15**	**No**	**FACW**
4 **Solidago gigantea**	**10**	**No**	**FACW**
5 **Toxicodendron radicans**	**10**	**No**	**FAC**
6 **Viola sororia**	**8**	**No**	**FAC**
7			
8			
9			
10			
	98	=Total Cover	

Woody vine stratum: (Plot size: 15 feet)	Absolute % Cover	Dominant Species	Indicator Status
1			
2			
	0	=Total Cover	

Dominance Test Worksheet

Number of dominant species that are OBL, FACW, or FAC:	**2**	(A)
Total number of dominant species across all strata:	**4**	(B)
Percent of dominant species that are OBL, FACW or FAC:	**50%**	(A/B)

Prevalence Index Worksheet

Total % cover of:

OBL Species:	**0**	x 1 =	**0**	
FACW Species:	**60**	x 2 =	**120**	
FAC Species:	**53**	x 3 =	**159**	
FACU species:	**35**	x 4 =	**140**	
UPL Species:	**0**	x 5 =	**0**	
Totals:	**148** (A)		**419**	(B)

Prevalence Index (B/A): **2.83**

Hydrophytic Vegetation Indicators

	Rapid test for hydrophytic vegetation
	Dominance test >50%
X	Prevalence index is ≤3.0*
	Morphological adaptations* (Provide supporting data in remarks)
	Problematic hydrophytic vegetation* (Explain in remarks)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? **Yes**

Remarks:

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EXHIBIT G:
WETLAND DETERMINATION DATA FORM
(Midwest Region)

Sample Point: **Site 3**

SOILS

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type*	Loc**		
0-6	**10YR 2/2**	**100**					**Sandy Loam**	
6-15	**10YR 3/4**	**100**					**Sand**	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

___ Histisol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ 2 cm Muck (A10)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Material (S1)
___ 5 cm Mucky Peat or Peat (S3)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Material (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils*:

___ Coast Prairie Redox (A16)(**LRR K,L,R**)
___ Dark Surface (S7)(**LRR K, L**)
___ Iron-Manganese Masses (F12)(**LRR K, L, R**)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in remarks)

*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: ___
Depth (inches): ___

Hydric Soils Present? **No**

Remarks: **Soil pit was dug to 15 inches.**

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9)
___ Aquatic Fauna (B13)
___ True Aquatic Plants (B14)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres on Living Roots (C3)
___ Presence or Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Thin Muck Surface (C7)
___ Gauge or Well Data (C7)
___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

___ Surface Soil Crack (B6)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Stunted or Stressed Plants (D1)
___ Geomorphic Position (D2)
X FAC-Neutral Test (D5)

Field Observations:
Surface Water Present? ___ Depth (inches): ___
Water Table Present? ___ Depth (inches): ___
Saturation Present? ___ Depth (inches): ___

Indicators of Wetland Hydrology Present? **No**

Remarks:

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EXHIBIT G:
WETLAND DETERMINATION DATA FORM
(Midwest Region)

Project/Site: **Kohner Property Wetland Delineation** City/County: **Wabasha County** Sampling Date: **6/25/2020**

Applicant/Owner: **City of Wabasha** State: **MN** Sample Point: **Site 4**

Investigator(s): **Brandon Bohks** Section, Township, Range: **30, 111N, 10W**

Landforms (hillside, terrace, etc.): **Depression** Local Relief (concave, convex, none): **Concave**

Slope (%): **0-2** Latitude: ______ Longitude: ______ Datum: ______

Soil Map Unit Name: **Pits, gravel-Udipsamments** NWI Classification: ______

Are climatic/hydrologic conditions of the site typical for this time of year? ______ (If no, explain in remarks)

Are vegetation **X** , soils **X** , or hydrology **X** significantly disturbed? Are normal circumstances present? **No**

Are vegetation ______ , soils ______ , or hydrology ______ naturally problematic? (If needed, explain any answers in Remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	**Yes**	**Is the sampled area within a wetland?**	**No**
Hydric soils present?	**No**		
Wetland hydrology present?	**Yes**		

Remarks: **Very likely the site was previously excavated du to mining practices.**

VEGETATION - Use scientific names of plants

	Absolute % Cover	Dominant Species	Indicator Status
Tree Stratum (Plot size: 30 feet)			
1 **Ulmus americana**	**15**	**Yes**	**FACW**
2 **Fraxinus pennsylvanica**	**8**	**Yes**	**FACW**
3			
4			
5			
	23 =Total Cover		
Sapling/Shrub stratum (Plot size: 15 feet)			
1 **Rhamnus cathartica**	**15**	**Yes**	**FAC**
2			
3			
4			
5			
	15 =Total Cover		
Herb stratum: (Plot size: 5 feet)			
1 **Toxicodendron radicans**	**10**	**Yes**	**FAC**
2 **Rhamnus cathartica**	**6**	**Yes**	**FAC**
3 **Laportea canadensis**	**3**	**No**	**FACW**
4			
5			
6			
7			
8			
9			
10			
	19 =Total Cover		
Woody vine stratum: (Plot size: 15 feet)			
1			
2			
	0 =Total Cover		

Dominance Test Worksheet

Number of dominant species that are OBL, FACW, or FAC: **4** (A)

Total number of dominant species across all strata: **5** (B)

Percent of dominant species that are OBL, FACW or FAC: **80%** (A/B)

Prevalence Index Worksheet

Total % cover of:

OBL Species:	**0**	x 1 =	**0**
FACW Species:	**26**	x 2 =	**52**
FAC Species:	**31**	x 3 =	**93**
FACU species:	**0**	x 4 =	**0**
UPL Species:	**0**	x 5 =	**0**
Totals:	**57** (A)		**145** (B)

Prevalence Index (B/A): **2.54**

Hydrophytic Vegetation Indicators

- ___ Rapid test for hydrophytic vegetation
- **X** Dominance test >50%
- **X** Prevalence index is ≤3.0*
- ___ Morphological adaptations* (Provide supporting data in remarks)
- ___ Problematic hydrophytic vegetation* (Explain in remarks)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? **Yes**

Remarks:

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EXHIBIT G:
WETLAND DETERMINATION DATA FORM

(Midwest Region)

Sample Point: **Site 4**

SOILS

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type*	Loc**	Texture	Remarks
0-4	**10YR 2/3**	**100**					**Sand**	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Material (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Material (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils*:

- ___ Coast Prairie Redox (A16)(**LRR K,L,R**)
- ___ Dark Surface (S7)(**LRR K, L**)
- ___ Iron-Manganese Masses (F12)(**LRR K, L, R**)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in remarks)

*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: **Bedrock**

Depth (inches): **4**

Hydric Soils Present? **No**

Remarks: **Soil pit dug to 4 inches when a restricitve layer was observed.**

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- **X** Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence or Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Crack (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- **X** Geomorphic Position (D2)
- **X** FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? ______ Depth (inches): ______

Water Table Present? ______ Depth (inches): ______

Saturation Present? ______ Depth (inches): ______

Indicators of Wetland Hydrology Present? **Yes**

Remarks:

EXHIBIT G:
WETLAND DETERMINATION DATA FORM

(Midwest Region)

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Project/Site: **Kohner Property Wetland Delineation** City/County: **Wabasha County** Sampling Date: **6/25/2020**

Applicant/Owner: **City of Wabasha** State: **MN** Sample Point: **Site 5**

Investigator(s): **Brandon Bohks** Section, Township, Range: **30, 111N, 10W**

Landforms (hillside, terrace, etc.): **Depression** Local Relief (concave, convex, none): **Concave**

Slope (%): **0-2** Latitude: Longitude: Datum:

Soil Map Unit Name: **Pits, gravel-Udipsamments** NWI Classification:

Are climatic/hydrologic conditions of the site typical for this time of year? (If no, explain in remarks)

Are vegetation **X**, soils **X**, or hydrology **X** significantly disturbed? Are normal circumstances present? **No**

Are vegetation , soils , or hydrology naturally problematic? (If needed, explain any answers in Remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	**Yes**	Is the sampled area within a wetland? **No**
Hydric soils present?	**No**	
Wetland hydrology present?	**Yes**	

Remarks: **Very likely the site was previously excavated du to mining practices.**

VEGETATION - Use scientific names of plants

	Absolute % Cover	Dominant Species	Indicator Status
Tree Stratum (Plot size: 30 feet)			
1 **Quercus ellipsoidalis**	**35**	**Yes**	**FACW**
2 **Ulmus americana**	**5**	**No**	**FACW**
3			
4			
5			
	40	=Total Cover	
Sapling/Shrub stratum (Plot size: 15 feet)			
1 **Rhamnus cathartica**	**45**	**Yes**	**FAC**
2			
3			
4			
5			
	45	=Total Cover	
Herb stratum: (Plot size: 5 feet)			
1 **Fraxinus pennsylvanica**	**6**	**Yes**	**FACW**
2 **Parthenocissus quinquefolia**	**5**	**Yes**	**FACU**
3 **Rhamnus cathartica**	**2**	**No**	**FAC**
4			
5			
6			
7			
8			
9			
10			
	13	=Total Cover	
Woody vine stratum: (Plot size: 15 feet)			
1			
2			
	0	=Total Cover	

Dominance Test Worksheet

Number of dominant species that are OBL, FACW, or FAC: **3** (A)

Total number of dominant species across all strata: **4** (B)

Percent of dominant species that are OBL, FACW or FAC: **75%** (A/B)

Prevalence Index Worksheet

Total % cover of:

OBL Species:	**0**	x 1 =	**0**
FACW Species:	**46**	x 2 =	**92**
FAC Species:	**47**	x 3 =	**141**
FACU species:	**5**	x 4 =	**20**
UPL Species:	**0**	x 5 =	**0**
Totals:	**98** (A)		**253** (B)

Prevalence Index (B/A): **2.58**

Hydrophytic Vegetation Indicators

- ___ Rapid test for hydrophytic vegetation
- **X** Dominance test >50%
- **X** Prevalence index is ≤3.0*
- ___ Morphological adaptations* (Provide supporting data in remarks)
- ___ Problematic hydrophytic vegetation* (Explain in remarks)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? **Yes**

Remarks:

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EXHIBIT G: WETLAND DETERMINATION DATA FORM

(Midwest Region)

Sample Point: **Site 5**

SOILS

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type*	Loc**	Texture	Remarks
0-7	**10YR 2/32**	**100**					**Sandy Loam**	
7-14+	**10YR 4/3**	**100**					**Sand**	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Material (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Material (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils*:

- ___ Coast Prairie Redox (A16)(**LRR K,L,R**)
- ___ Dark Surface (S7)(**LRR K, L**)
- ___ Iron-Manganese Masses (F12)(**LRR K, L, R**)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in remarks)

*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: ___

Depth (inches): ___

Hydric Soils Present? **No**

Remarks: **Soil pit dug to 14 inches**

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence or Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Crack (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- **X** Geomorphic Position (D2)
- **X** FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? ___ Depth (inches): ___

Water Table Present? ___ Depth (inches): ___

Saturation Present? ___ Depth (inches): ___

Indicators of Wetland Hydrology Present? **Yes**

Remarks:

EXHIBIT G:
WETLAND DETERMINATION DATA FORM

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(Midwest Region)

Project/Site: **Kohner Property Wetland Delineation** City/County: **Wabasha County** Sampling Date: **6/25/2020**

Applicant/Owner: **City of Wabasha** State: **MN** Sample Point: **Site 6**

Investigator(s): **Brandon Bohks** Section, Township, Range: **30, 111N, 10W**

Landforms (hillside, terrace, etc.): **Depression** Local Relief (concave, convex, none): **Concave**

Slope (%): **0-2** Latitude: Longitude: Datum:

Soil Map Unit Name: **Pits, gravel-Udipsamments** NWI Classification:

Are climatic/hydrologic conditions of the site typical for this time of year? ____ (If no, explain in remarks)

Are vegetation **X**, soils **X**, or hydrology **X** significantly disturbed? Are normal circumstances present? **No**

Are vegetation ____, soils ____, or hydrology ____ naturally problematic? (If needed, explain any answers in Remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	**No**	**Is the sampled area within a wetland?**	**No**
Hydric soils present?	**No**		
Wetland hydrology present?	**No**		

Remarks: **Very likely the site was previously excavated due to mining practices.**

VEGETATION - Use scientific names of plants

	Absolute % Cover	Dominant Species	Indicator Status
Tree Stratum (Plot size: 30 feet)			
1 **Juglans nigra**	**90**	**Yes**	**FACU**
2 **Ulmus americana**	**10**	**No**	**FACW**
3			
4			
5			
	100	=Total Cover	
Sapling/Shrub stratum (Plot size: 15 feet)			
1 **Zanthoxylum americanum**	**25**	**Yes**	**FACU**
2			
3			
4			
5			
	25	=Total Cover	
Herb stratum: (Plot size: 5 feet)			
1 **Sanicula canadensis**	**35**	**Yes**	**FACU**
2 **Laportea canadensis**	**30**	**Yes**	**FACW**
3 **Parthenocissus quinquefolia**	**20**	**No**	**FACU**
4 **Persicaria virginiana**	**15**	**No**	**FAC**
5 **Pilea fontana**	**15**	**No**	**FACW**
6 **Carex pensylvanica**	**5**	**No**	**FACU**
7			
8			
9			
10			
	120	=Total Cover	
Woody vine stratum: (Plot size: 15 feet)			
1			
2			
	0	=Total Cover	

Dominance Test Worksheet

Number of dominant species that are OBL, FACW, or FAC: **1** (A)

Total number of dominant species across all strata: **4** (B)

Percent of dominant species that are OBL, FACW or FAC: **25%** (A/B)

Prevalence Index Worksheet

Total % cover of:

OBL Species:	**0**	x 1 =	**0**
FACW Species:	**55**	x 2 =	**110**
FAC Species:	**15**	x 3 =	**45**
FACU species:	**175**	x 4 =	**700**
UPL Species:	**0**	x 5 =	**0**
Totals:	**245** (A)		**855** (B)

Prevalence Index (B/A): **3.49**

Hydrophytic Vegetation Indicators

____ Rapid test for hydrophytic vegetation
____ Dominance test >50%
____ Prevalence index is ≤3.0*
____ Morphological adaptations* (Provide supporting data in remarks)
____ Problematic hydrophytic vegetation* (Explain in remarks)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? **No**

Remarks:

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EXHIBIT G:
WETLAND DETERMINATION DATA FORM
(Midwest Region)

Project/Site: **Kohner Property Wetland Delineation** City/County: **Wabasha County** Sampling Date: **6/25/2020**
Applicant/Owner: **City of Wabasha** State: **MN** Sample Point: **Site 7**
Investigator(s): **Brandon Bohks** Section, Township, Range: **30, 111N, 10W**
Landforms (hillside, terrace, etc.): **Depression/Gully** Local Relief (concave, convex, none): **Concave**
Slope (%): **0-2** Latitude: ____ Longitude: ____ Datum: ____
Soil Map Unit Name: **Plainfield sand** NWI Classification: ____
Are climatic/hydrologic conditions of the site typical for this time of year? ____ (If no, explain in remarks)
Are vegetation **X**, soils **X**, or hydrology **X** significantly disturbed? Are normal circumstances present? **No**
Are vegetation ____, soils ____, or hydrology ____ naturally problematic? (If needed, explain any answers in Remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	**Yes**	**Is the sampled area within a wetland?** **No**
Hydric soils present?	**No**	
Wetland hydrology present?	**Yes**	

Remarks: **Very likely the site was previously excavated due to mining practices.**

VEGETATION - Use scientific names of plants

	Absolute % Cover	Dominant Species	Indicator Status
Tree Stratum (Plot size: 30 feet)			
1 **Acer negundo**	**30**	**Yes**	**FAC**
2 **Fraxinus pennsylvanica**	**25**	**Yes**	**FACW**
3 **Populus deltoides**	**20**	**Yes**	**FAC**
4			
5			
	75	=Total Cover	
Sapling/Shrub stratum (Plot size: 15 feet)			
1 **Rhamnus Cathartica**	**35**	**Yes**	**FAC**
2			
3			
4			
5			
	35	=Total Cover	
Herb stratum: (Plot size: 5 feet)			
1 **Laportea canadensis**	**65**	**Yes**	**FACW**
2 **Persicaria virginiana**	**45**	**Yes**	**FAC**
3			
4			
5			
6			
7			
8			
9			
10			
	110	=Total Cover	
Woody vine stratum: (Plot size: 15 feet)			
1			
2			
	0	=Total Cover	

Dominance Test Worksheet

Number of dominant species that are OBL, FACW, or FAC: **6** (A)
Total number of dominant species across all strata: **6** (B)
Percent of dominant species that are OBL, FACW or FAC: **100%** (A/B)

Prevalence Index Worksheet

Total % cover of:

OBL Species:	**0**	x 1 =	**0**
FACW Species:	**90**	x 2 =	**180**
FAC Species:	**130**	x 3 =	**390**
FACU species:	**0**	x 4 =	**0**
UPL Species:	**0**	x 5 =	**0**
Totals:	**220** (A)		**570** (B)

Prevalence Index (B/A): **2.59**

Hydrophytic Vegetation Indicators

	Rapid test for hydrophytic vegetation
X	Dominance test >50%
X	Prevalence index is ≤3.0*
	Morphological adaptations* (Provide supporting data in remarks)
	Problematic hydrophytic vegetation* (Explain in remarks)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? **Yes**

Remarks:

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EXHIBIT G:
WETLAND DETERMINATION DATA FORM

(Midwest Region)

Sample Point: **Site 7**

SOILS

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type*	Loc**		
0-6	**10YR 2/1**	**100**					**Sandy Loam**	
6-20	**10YR 5/3**	**100**					**Sand**	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

___ Histisol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ 2 cm Muck (A10)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Material (S1)
___ 5 cm Mucky Peat or Peat (S3)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Material (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils*:

___ Coast Prairie Redox (A16)(**LRR K,L,R**)
___ Dark Surface (S7)(**LRR K, L**)
___ Iron-Manganese Masses (F12)(**LRR K, L, R**)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in remarks)

*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: ___
Depth (inches): ___

Hydric Soils Present? **No**

Remarks: **Soil pit dug to 20 inches**

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9)
___ Aquatic Fauna (B13)
___ True Aquatic Plants (B14)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres on Living Roots (C3)
___ Presence or Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Thin Muck Surface (C7)
___ Gauge or Well Data (C7)
___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

___ Surface Soil Crack (B6)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Stunted or Stressed Plants (D1)
X Geomorphic Position (D2)
X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? ___ Depth (inches): ___
Water Table Present? ___ Depth (inches): ___
Saturation Present? ___ Depth (inches): ___

Indicators of Wetland Hydrology Present? **Yes**

Remarks:

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EXHIBIT G:
OFF-SITE HYDROLOGY ASSESSMENT RECORDING FORM

Project/Site: **Kohner Property Wetland Delineation** City/County: **Wabasha** Date: **6/15/2020**

Applicant/Owner: **City of Wabasha** State: **Minnesota**

Investigator(s): **Brandon Bohks** Sec, Twp, Ran: **19, 109N, 9W**

WETS Station ID: **Wabasha-Minneiska-Weaver (County-Township-City)**

Date:	Source:	Climatic Condition:	Image Interpretations							
			Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8
1979										
1980										
1981										
1982										
1983										
1984										
1985										
1986										
1987										
1988										
1989										
1990										
1991										
1992										
1993										
1994										
1995										
1996										
1997										
1998										
1999										
2000										
2001										
2002										
2003	FSA	Normal	NV							
2004										
2005										
2006										
2007										
2008	FSA	Normal	NV							
2009	FSA	Normal	NV							
2010	FSA	Dry	NV							
2011	Google	Normal	NV							
2012										
2013	FSA	Wet	NV							
2014										
2015	FSA	Normal	NV							
2016										
2017	FSA	Wet	CS							
		Hydric Soil	No							
		NWI	No							
		Normal Years	5							
		Wet Signatures	0							
		Percent Wet Signatures	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
		Field Verification required								

NV - Normal Vegetation, WS - Wet Signature, CS - Crop Stress, DO - Drown Out, SW - Standing Water, AP - Altered Pattern, NC - Not Cropped

Decision Matrix

Hydric soil	NWI	% Wet	Field visit?	Wetland?
Yes	Yes	>50%	No	Yes
Yes	Yes	30-50%	No	Yes
Yes	Yes	<30%	Yes	Yes, w/field hydro
Yes	No	>50%	No	Yes
Yes	No	30-50%	Yes	Yes, w/field hydro
Yes	No	<30%	No	No
No	Yes	>50%	No	Yes
No	Yes	30-50%	No	Yes
No	Yes	<30%	No	No
No	No	>50%	Yes	Yes, w/field hydro

Decision Table

Site	Hydric soil	NWI	% Wet	Field Hydro	ID #
1	No	No	0	No	
2	0	0	0		
3	0	0	0		
4	0	0	0		
5	0	0	0		
6	0	0	0		
7	0	0	0		
8	0	0	0		

Exhibit H: Historical Photo Array (2003 - 2010)
July 2020

BOLTON & MENK
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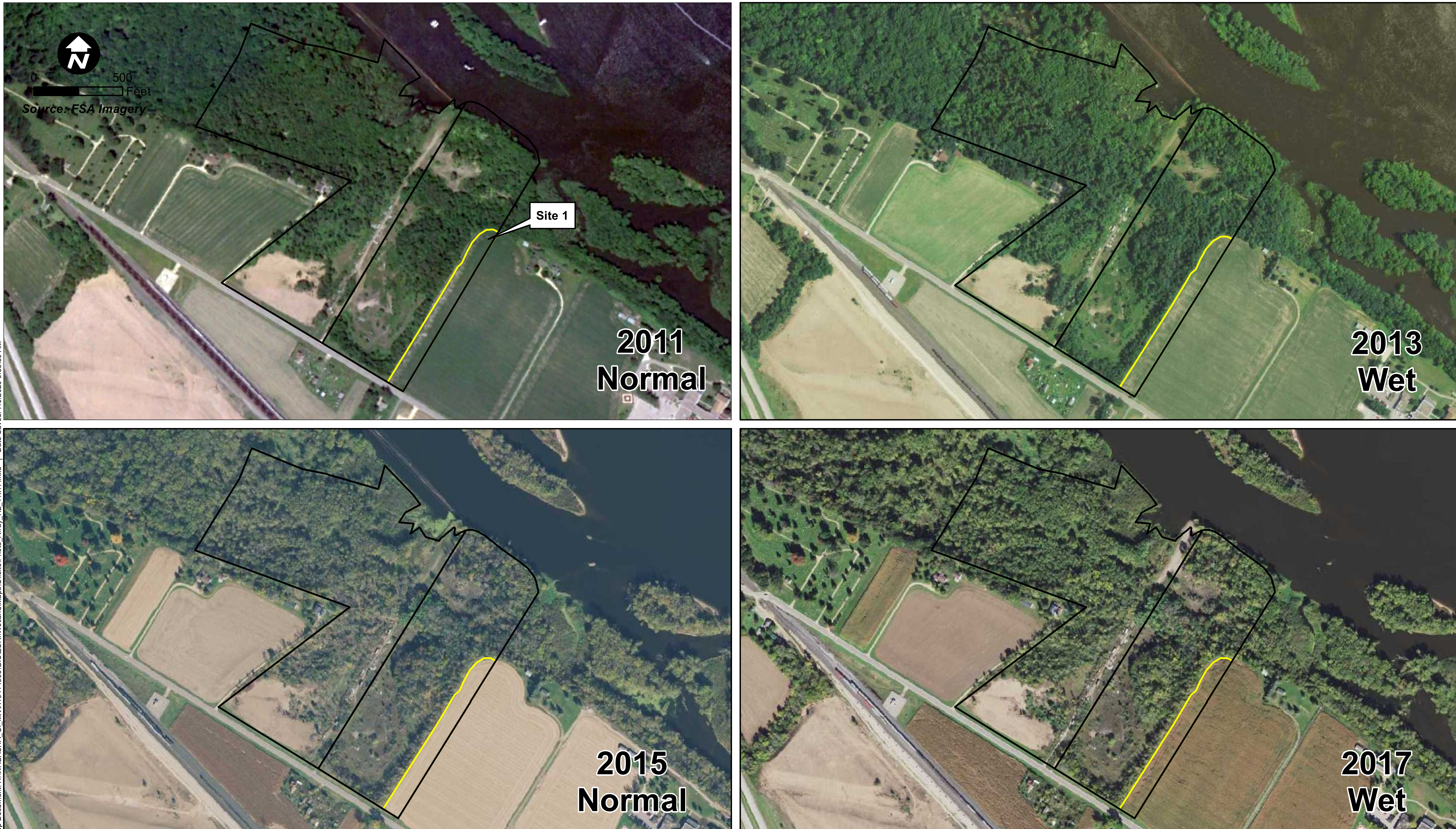
Map Document: H:\WABASHA_CI_MN\H19114396\GIS\ESRI\Wetland\Maps\Offsite\Photo_Array_H1_11x17.mxd | Date Saved: 8/24/2020 9:49:48 AM

Exhibit H: Historical Photo Array 2011 - 2017)
July 2020



Map Document: H:\WABASHA_CI_MN\H19114396\GIS\ESRI\Wetland\Maps\Offsite\Photo_Array_H2_11x17.mxd | Date Saved: 7/6/2020 9:33:09 AM

APPENDIX E

Preliminary Drainage Memo

BOLTON & MENK
Real People. Real Solutions.

12224 Nicollet Avenue
Burnsville, MN 55337-1649

Ph: (952) 890-0509
Fax: (952) 890-8065
Bolton-Menk.com

December 12, 2022

Tony Johnson – Public Works Director
900 Hiawatha Drive, East
Wabasha, MN 55981
pwdirector@wabasha.org
(651) 565-3404

RE: USACE Dredge Material Management Plan – Preliminary Drainage Memo
City of Wabasha, Wabasha County, MN
Project No.: H19.114396

I. INTRODUCTION

The City of Wabasha in conjunction with the Wabasha Port Authority is working on a dredge material management plan for the Mississippi River that includes constructing a barge facility on the north end of the City of Wabasha, MN (River Mile 760). Approximately 270,000 CY of sand will be dredged annually to maintain a 9-ft navigable channel in the river. This barge facility is intended to facilitate dredged material storage and, by extension, transportation of agricultural products and shipping containers on the Mississippi River. The primary purpose is to transport sand from the navigation channel dredging operations to offsite locations for beneficial re-use.

Specifically, the project includes the following activities:

1. Construction of infrastructure including a site access road, weighing station and small operations facility
2. Construction of a sheet pile dock wall, mooring and maneuvering facilities, and conveyers and hoppers for material processing
3. Temporary storage of dredged material on site
4. Channel dredging for barge access to the proposed docking and off-loading facilities
5. Use of dredged material as fill on the terminal site to raise the dredge material storage area above the 100-year flood elevation

The proposed project triggers NPDES Construction Stormwater permit requirements by adding 2.99 acres of impervious surface to the site. Wabasha is not an MS4 city nor is it subject to more specific pollutant reduction criteria. The site is shown in Figure 1.

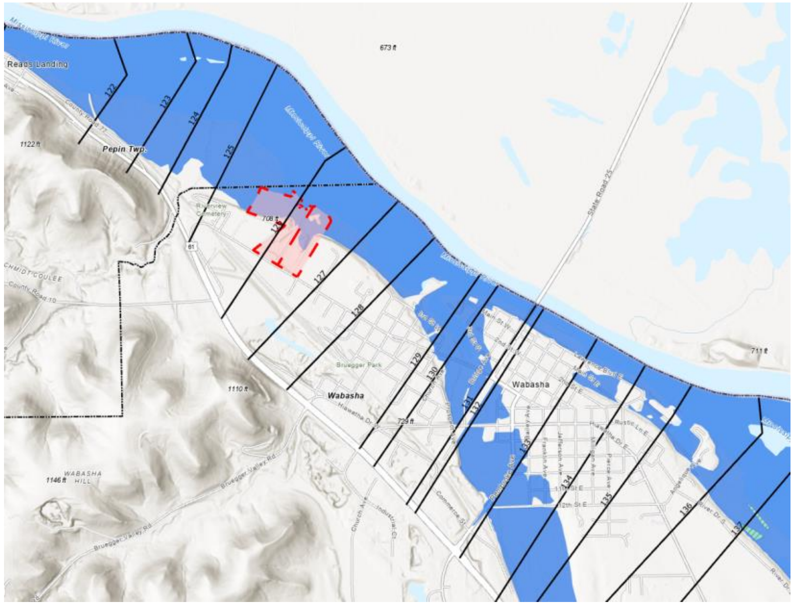


Figure 1: Vicinity Map
(not to scale)

The City is proposing an infiltration practice along the access road and offloading facilities to treat runoff on site before discharging to the Mississippi River. The preliminary site design and existing conditions hydrology and hydraulics were assessed using Storm and Sanitary Analysis (SSA) 2021. Design considerations and calculations are described in the following sections.

II. EXISTING CONDITIONS

The existing site includes two mostly undeveloped parcels totaling 48 acres north of Wabasha, MN off of Grant Blvd. W. The land cover is primarily forest and wetland. USGS soil data shows the site is primarily type A and B soils.

SCS methodology was using in SSA 2021 to analyze the existing conditions hydrology and hydraulics. Atlas 14 rainfall depths for the 2-year through 100-year 24-hour storm were applied in the modeling via the MSE 3 rainfall distribution curve. Curve Numbers (CN) were determined using weighted averages of existing land cover and USGS soils data by subbasin. The SCS TR-55 method for time of concentration (Tc) was used. Runoff follows ephemeral gullies and ravines down the major bluff system to flat wetlands and low-lying areas that buffer the Mississippi River. Peak flow rates contributing to the river at the bank line along the site boundary are reported in Table 1.

Table 1: Existing Discharge Rates

Storm Event	Site Peak Discharge (cfs)
2-year	5.9
10-year	23.0
100-year	82.7

III. PROPOSED CONDITIONS

The proposed project adds 2.99 acres of impervious surface to the site by providing an access road and barge docking station with associated infrastructure. There are no local karst regions, the site is mostly A and B soils, and there are no DWSMA's within 1000 ft of the site, allowing for infiltration to treat stormwater runoff. An infiltration basin is proposed at the southern toe of the access road along the base of the bluff to treat stormwater runoff. CN values were determined based on weighted averages of proposed land uses and USGS soil type. The proposed infiltration basin was designed using the MN Stormwater Manual standards. A proposed conditions workmap is attached.

We assume an infiltration rate of 0.45 in/hr., the maximum for type B soils and note a required drawdown time of 48 hrs. Drainage area to the basin, provided storage volumes, and key elevations are reported in the table below. Pretreatment via rock check dams is included along the swale on the south side of the road. The low spot of the loading pad will be placed just upstream of the final check dam before entering the infiltration basin. If possible, water along the edge of the access road will be routed to this low point. Where runoff sheet flows into the infiltration basin directly, filter strips will be used.

Table 2: Water Quality BMP Design Summary

Parameter	Value	Unit
Drainage Area to Basin =	3.73	Acres
Site New Impervious Area =	2.99	Acres
Required Dead Storage Volume =	0	Cu. ft.
Required Water Quality Volume =	10,890[1]	Cu. ft.
Provided Water Quality Volume =	18,729	Cu. ft.
Hydrologic Soil Group =	B	
Infiltration Rate =	0.45	in/hr
Basin Bottom Area =	6065	Sq. ft.
Basin Bottom Elevation =	674.5	ft
Required Drawdown Time =	48	Hrs
Calculated Drawdown Time =	48	Hrs
Emergency Overflow Elevation =	677.5	ft

1. 1-in per acre of impervious surface.

One outlet is provided for the basin. This is one 8" corrugated pipe direct northeast towards the river. See the attached workmaps. Two separated overflow locations are provided at 677.5 ft along the southern edge of the ditch, which spill to existing ground and will sheet flow towards the river. These emergency overflows are accessed starting at roughly the 50-year storm.

Proposed infiltration basin flow attenuation, high water levels, and site discharge rates are presented in Table 3. The basin design and emergency overflow adequately provide rate control for the 2-, 10-, and 100-year flows off site.

Table 3: Proposed Discharge Rates and High Water Levels

Storm Event	Basin Peak Inflow (cfs)	Basin Peak Outflow (cfs)	Basin Water Elevation (ft)	Site Peak Discharge (cfs)
Dry Condition	---	---	674.5	---
2-year	10.1	0.0	676.0	5.8
10-year	29.2	0.4	676.9	21.8
100-year	56.6	22.9	677.7	82.2

The high-water elevation is 677.7 ft. This is well below any proposed structures which are protected from the Mississippi River base flood elevation of 678.6 ft. The high water level does not threaten the proposed utilities or road infrastructure with regards to flooding.

The infiltration basin and pretreatment swale is easily accessible with an 8' bottom and 3:1 side slopes. Stable vegetation in combination with the rock checks will adequately prevent scour with the ditch and infiltration basin. The basin would need to be inspected after high Mississippi River flows when fine sediment and other debris may be deposited in the basin, or if significant washout of onsite dredge material is observed. The City will oversee the maintenance of the basin and outlet.

Sincerely,

Bolton & Menk, Inc.

DRAFT

Roberta Cronquist, PE, CFM
Senior Water Resources Engineer

Attachments:

- Hydrologic Data
- SSA Workmaps
- Preliminary Site Layout

NOAA Atlas 14, Volume 8, Version 2
Location name: Wabasha, Minnesota, USA*
Latitude: 44.3915°, Longitude: -92.0541°
Elevation: 695.36 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Michael Yekta, Geoffery Bonnin

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.369** (0.288-0.479)	**0.440** (0.343-0.571)	**0.559** (0.435-0.727)	**0.661** (0.511-0.863)	**0.807** (0.604-1.09)	**0.923** (0.675-1.25)	**1.04** (0.737-1.44)	**1.17** (0.791-1.65)	**1.34** (0.872-1.94)	**1.47** (0.933-2.15)
10-min	**0.540** (0.422-0.701)	**0.644** (0.502-0.836)	**0.819** (0.636-1.06)	**0.968** (0.748-1.26)	**1.18** (0.885-1.59)	**1.35** (0.988-1.84)	**1.53** (1.08-2.11)	**1.71** (1.16-2.42)	**1.96** (1.28-2.83)	**2.15** (1.37-3.15)
15-min	**0.659** (0.515-0.855)	**0.785** (0.613-1.02)	**0.998** (0.776-1.30)	**1.18** (0.913-1.54)	**1.44** (1.08-1.94)	**1.65** (1.21-2.24)	**1.86** (1.32-2.58)	**2.09** (1.41-2.95)	**2.39** (1.56-3.46)	**2.63** (1.67-3.84)
30-min	**0.917** (0.716-1.19)	**1.10** (0.859-1.43)	**1.41** (1.10-1.83)	**1.68** (1.30-2.19)	**2.05** (1.53-2.76)	**2.35** (1.72-3.19)	**2.65** (1.87-3.67)	**2.97** (2.01-4.20)	**3.40** (2.22-4.92)	**3.74** (2.37-5.47)
60-min	**1.20** (0.940-1.56)	**1.43** (1.12-1.86)	**1.84** (1.43-2.39)	**2.20** (1.70-2.87)	**2.75** (2.07-3.73)	**3.20** (2.35-4.37)	**3.68** (2.61-5.12)	**4.19** (2.85-5.96)	**4.92** (3.21-7.14)	**5.50** (3.49-8.04)
2-hr	**1.49** (1.18-1.91)	**1.77** (1.39-2.26)	**2.27** (1.78-2.91)	**2.73** (2.14-3.52)	**3.44** (2.63-4.64)	**4.05** (3.01-5.49)	**4.70** (3.37-6.50)	**5.41** (3.73-7.65)	**6.43** (4.25-9.30)	**7.26** (4.65-10.5)
3-hr	**1.68** (1.33-2.13)	**1.97** (1.57-2.50)	**2.52** (2.00-3.21)	**3.06** (2.41-3.90)	**3.89** (3.02-5.25)	**4.62** (3.48-6.27)	**5.43** (3.93-7.50)	**6.32** (4.39-8.92)	**7.61** (5.07-11.0)	**8.68** (5.59-12.5)
6-hr	**1.98** (1.59-2.47)	**2.30** (1.85-2.88)	**2.94** (2.36-3.70)	**3.57** (2.85-4.51)	**4.59** (3.61-6.15)	**5.49** (4.18-7.38)	**6.49** (4.77-8.91)	**7.62** (5.35-10.7)	**9.26** (6.24-13.3)	**10.6** (6.92-15.3)
12-hr	**2.23** (1.82-2.76)	**2.61** (2.13-3.23)	**3.34** (2.71-4.14)	**4.04** (3.26-5.02)	**5.15** (4.09-6.78)	**6.12** (4.71-8.11)	**7.18** (5.33-9.74)	**8.37** (5.94-11.6)	**10.1** (6.88-14.4)	**11.5** (7.58-16.4)
24-hr	**2.55** (2.11-3.10)	**2.93** (2.42-3.57)	**3.67** (3.02-4.48)	**4.38** (3.59-5.38)	**5.52** (4.44-7.18)	**6.52** (5.08-8.55)	**7.63** (5.73-10.2)	**8.85** (6.36-12.2)	**10.6** (7.33-15.0)	**12.1** (8.06-17.2)
2-day	**2.95** (2.47-3.54)	**3.31** (2.77-3.97)	**4.01** (3.35-4.83)	**4.72** (3.91-5.70)	**5.86** (4.78-7.54)	**6.88** (5.44-8.92)	**8.02** (6.10-10.7)	**9.30** (6.76-12.7)	**11.2** (7.79-15.7)	**12.8** (8.57-17.9)
3-day	**3.25** (2.75-3.87)	**3.59** (3.03-4.28)	**4.29** (3.60-5.12)	**4.99** (4.17-5.98)	**6.13** (5.04-7.83)	**7.16** (5.70-9.23)	**8.32** (6.38-11.0)	**9.62** (7.05-13.1)	**11.5** (8.10-16.1)	**13.1** (8.89-18.4)
4-day	**3.50** (2.97-4.13)	**3.86** (3.27-4.56)	**4.58** (3.87-5.43)	**5.29** (4.45-6.31)	**6.45** (5.32-8.17)	**7.48** (5.99-9.57)	**8.64** (6.65-11.3)	**9.93** (7.31-13.4)	**11.8** (8.34-16.5)	**13.4** (9.12-18.8)
7-day	**4.09** (3.51-4.78)	**4.58** (3.93-5.35)	**5.46** (4.67-6.40)	**6.27** (5.33-7.39)	**7.51** (6.21-9.30)	**8.55** (6.88-10.8)	**9.68** (7.50-12.5)	**10.9** (8.07-14.6)	**12.7** (8.98-17.4)	**14.1** (9.67-19.6)
10-day	**4.63** (4.00-5.37)	**5.22** (4.51-6.06)	**6.24** (5.37-7.26)	**7.14** (6.10-8.35)	**8.45** (7.00-10.3)	**9.53** (7.69-11.8)	**10.7** (8.28-13.6)	**11.9** (8.80-15.7)	**13.5** (9.62-18.5)	**14.9** (10.2-20.6)
20-day	**6.26** (5.49-7.15)	**7.03** (6.16-8.04)	**8.32** (7.26-9.54)	**9.40** (8.15-10.8)	**10.9** (9.14-13.1)	**12.1** (9.89-14.8)	**13.4** (10.5-16.8)	**14.6** (11.0-19.0)	**16.3** (11.7-22.0)	**17.6** (12.3-24.3)
30-day	**7.69** (6.80-8.71)	**8.61** (7.60-9.75)	**10.1** (8.89-11.5)	**11.3** (9.91-13.0)	**13.0** (11.0-15.5)	**14.4** (11.8-17.4)	**15.7** (12.4-19.6)	**17.0** (12.8-22.0)	**18.8** (13.6-25.2)	**20.1** (14.1-27.5)
45-day	**9.57** (8.53-10.7)	**10.7** (9.52-12.0)	**12.5** (11.1-14.1)	**14.0** (12.3-15.8)	**15.9** (13.5-18.6)	**17.3** (14.3-20.8)	**18.8** (14.9-23.2)	**20.2** (15.3-25.8)	**21.9** (15.9-29.2)	**23.2** (16.4-31.7)
60-day	**11.2** (10.0-12.5)	**12.5** (11.2-14.0)	**14.7** (13.1-16.4)	**16.3** (14.5-18.4)	**18.5** (15.7-21.4)	**20.0** (16.6-23.8)	**21.5** (17.1-26.4)	**22.9** (17.4-29.2)	**24.6** (17.9-32.5)	**25.8** (18.3-35.1)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

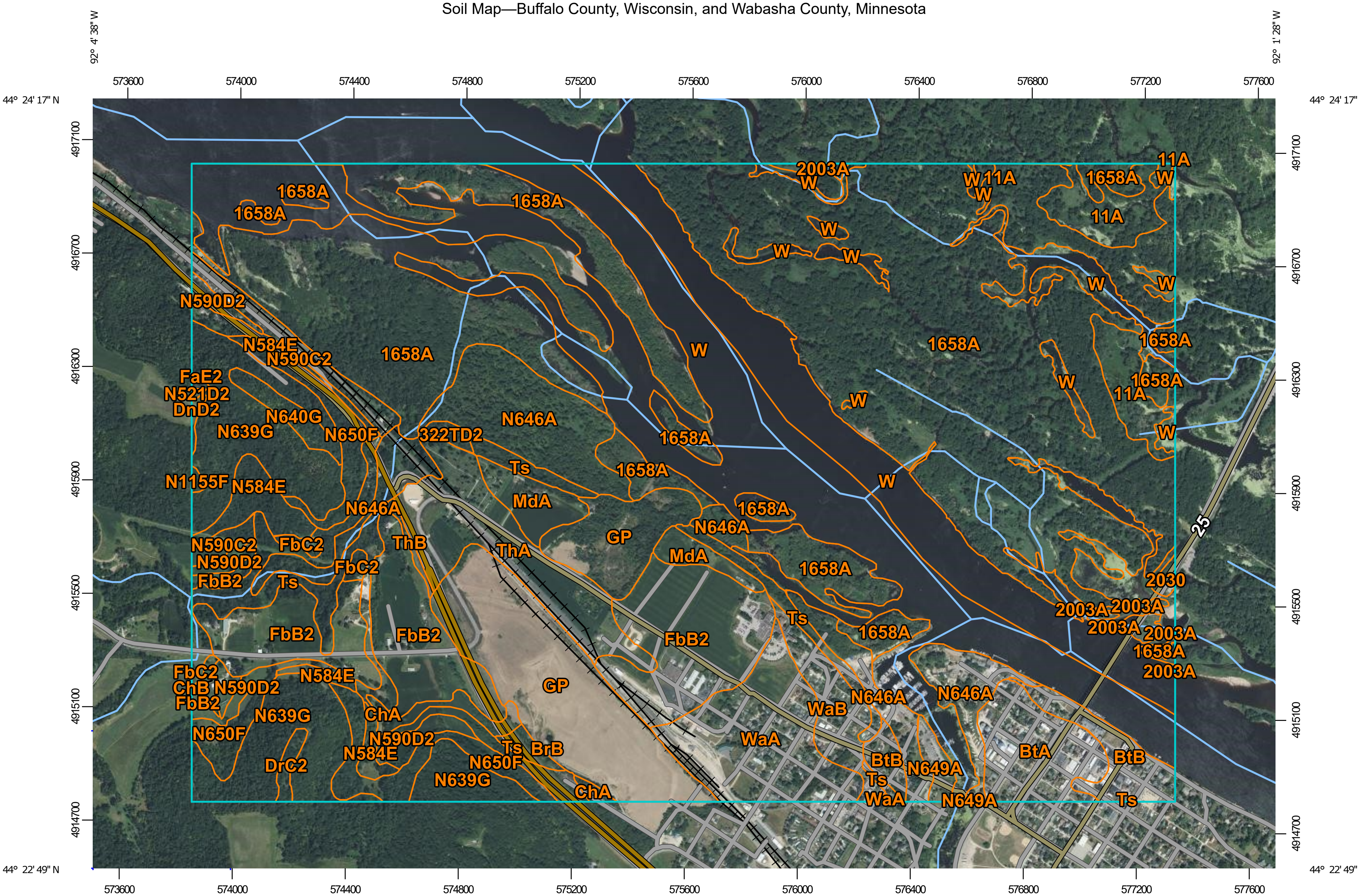
Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

Back to Top

PF graphical

Soil Map—Buffalo County, Wisconsin, and Wabasha County, Minnesota



Map Scale: 1:19,100 if printed on A landscape (11" x 8.5") sheet.

Meters: 0, 250, 500, 1000, 1500

Feet: 0, 500, 1000, 2000, 3000

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at scales ranging from 1:12,000 to 1:20,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Buffalo County, Wisconsin
Survey Area Data: Version 16, Sep 6, 2022

Soil Survey Area: Wabasha County, Minnesota
Survey Area Data: Version 19, Sep 6, 2022

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 17, 2020—Sep 2, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
11A	Markey muck, 0 to 1 percent slopes, frequently flooded	35.7	1.8%
1658A	Algansee-Kalmarville complex, river valleys, 0 to 3 percent slopes, frequently flooded	382.2	19.7%
2003A	Riverwash, nearly level	8.5	0.4%
2030	Udorthents and Udipsamments, cut or fill	1.8	0.1%
W	Water	158.7	8.2%
Subtotals for Soil Survey Area		**586.9**	**30.2%**
Totals for Area of Interest		**1,943.9**	**100.0%**

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
322TD2	Plumcreek silt loam, 20 to 45 percent slopes	2.4	0.1%
1658A	Algansee-Kalmarville complex, river valleys, 0 to 3 percent slopes, frequently flooded	235.5	12.1%
BrB	Burkhardt loam, 2 to 6 percent slopes	3.6	0.2%
BtA	Burkhardt sandy loam, 0 to 2 percent slopes	33.9	1.7%
BtB	Burkhardt sandy loam, 2 to 6 percent slopes	24.6	1.3%
ChA	Chaseburg silt loam, moderately well drained, 0 to 2 percent slopes	8.4	0.4%
ChB	Chaseburg silt loam, moderately well drained, 2 to 6 percent slopes	1.9	0.1%
DnD2	Dubuque silt loam, 12 to 18 percent slopes, moderately eroded	1.1	0.1%
DrC2	Dubuque silt loam, shallow, 6 to 12 percent slopes, moderately eroded	3.2	0.2%
FaE2	Fayette silt loam, 18 to 35 percent slopes, moderately eroded	0.6	0.0%
FbB2	Festina silt loam, 1 to 6 percent slopes, moderately eroded	133.0	6.8%
FbC2	Festina silt loam, 6 to 12 percent slopes, moderately eroded	3.7	0.2%

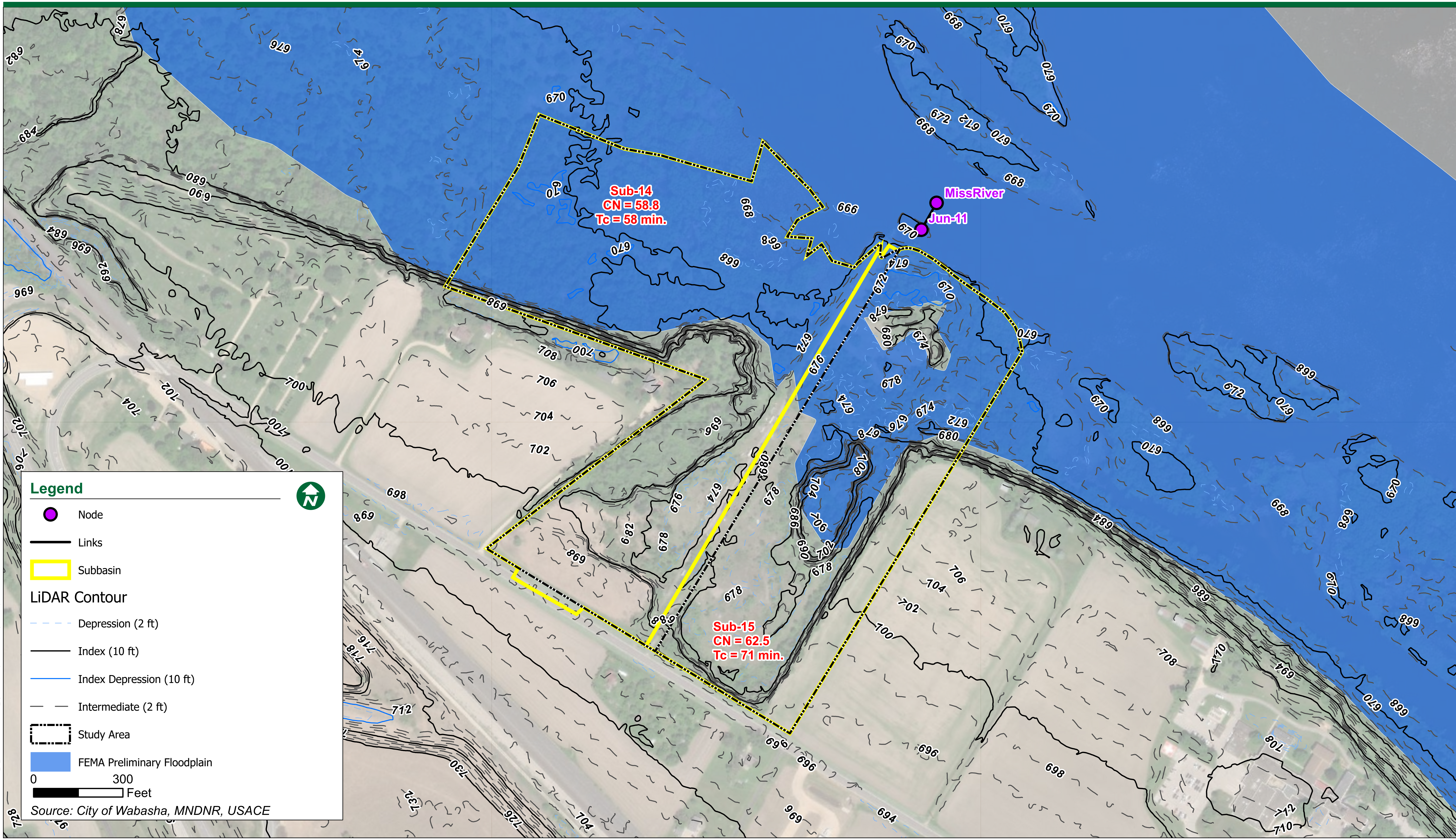
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
GP	Pits, gravel-Udipsamments complex	113.8	5.9%
MdA	Meridian sandy loam, 0 to 2 percent slopes	20.7	1.1%
N521D2	Mt. Carroll silt loam, 12 to 20 percent slopes, moderately eroded	0.3	0.0%
N584E	Downs silt loam, valleys, 18 to 25 percent slopes	26.2	1.3%
N590C2	Tama silt loam, driftless valley, 6 to 12 percent slopes, moderately eroded	21.6	1.1%
N590D2	Tama silt loam, driftless valley, 12 to 18 percent slopes, moderately eroded	18.1	0.9%
N639G	Frontenac-Lacrescent complex, 30 to 70 percent slopes, rocky	104.2	5.4%
N640G	Lacrescent, flaggy-Frontenac-Rock outcrop complex, 45 to 90 percent slopes	8.0	0.4%
N646A	Ceresco-Spillville complex, 0 to 3 percent slopes, frequently flooded	100.9	5.2%
N649A	Shandep loam, channeled, 0 to 2 percent slopes, frequently flooded	5.5	0.3%
N650F	Downs-Oak Center complex, 25 to 35 percent slopes	42.2	2.2%
N1155F	Brodale-Bellechester complex, 30 to 60 percent slopes, rocky	0.7	0.0%
ThA	Tell silt loam, 0 to 2 percent slopes	53.6	2.8%
ThB	Tell silt loam, 2 to 6 percent slopes	1.8	0.1%
Ts	Plainfield sand, river valley, 15 to 60 percent slopes	58.3	3.0%
W	Water	251.4	12.9%
WaA	Waukegan silt loam, 0 to 2 percent slopes	57.6	3.0%
WaB	Waukegan silt loam, 2 to 6 percent slopes	20.3	1.0%
Subtotals for Soil Survey Area		**1,356.9**	**69.8%**
Totals for Area of Interest		**1,943.9**	**100.0%**

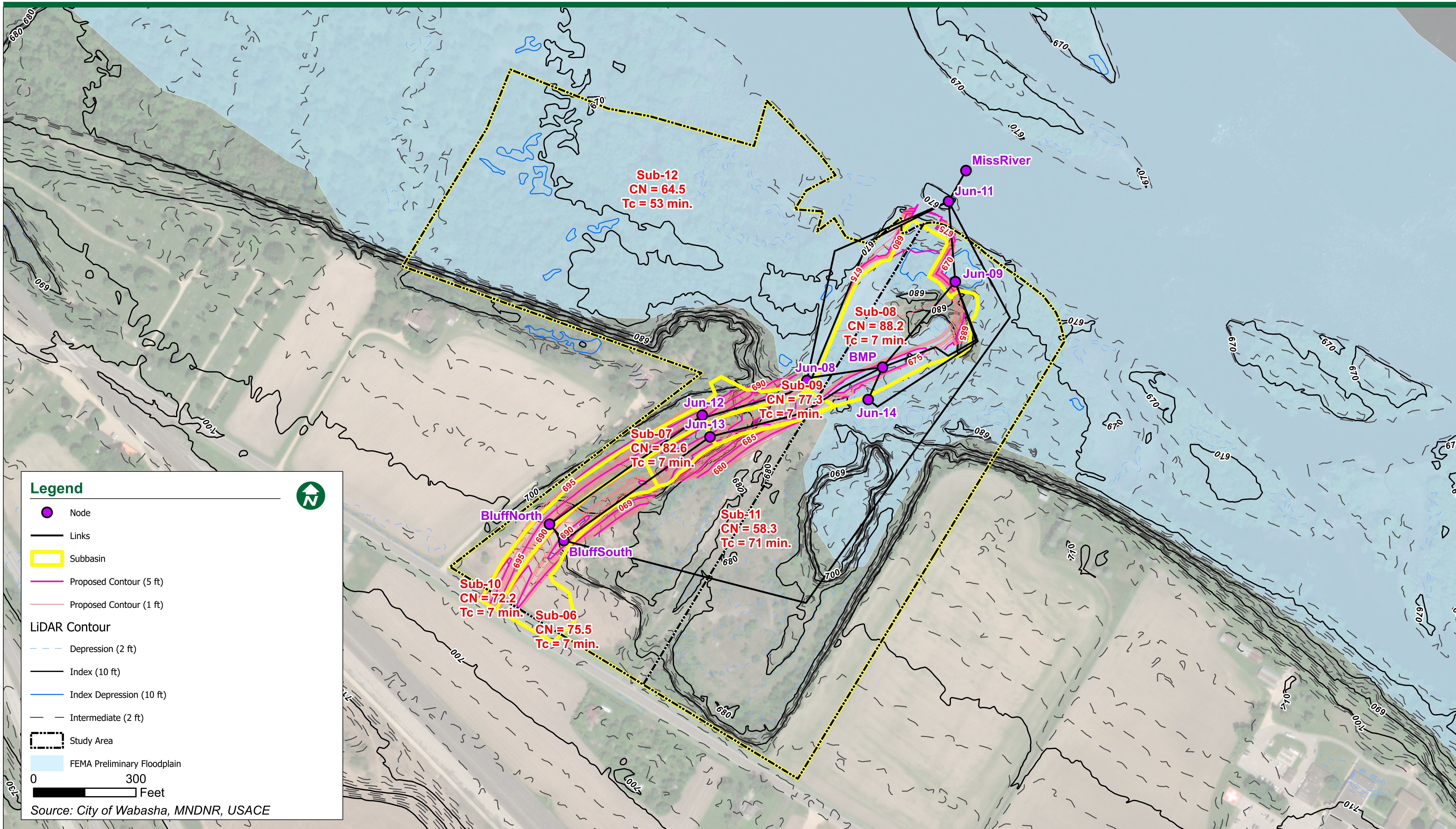
USACE Dredge Material Management Plan

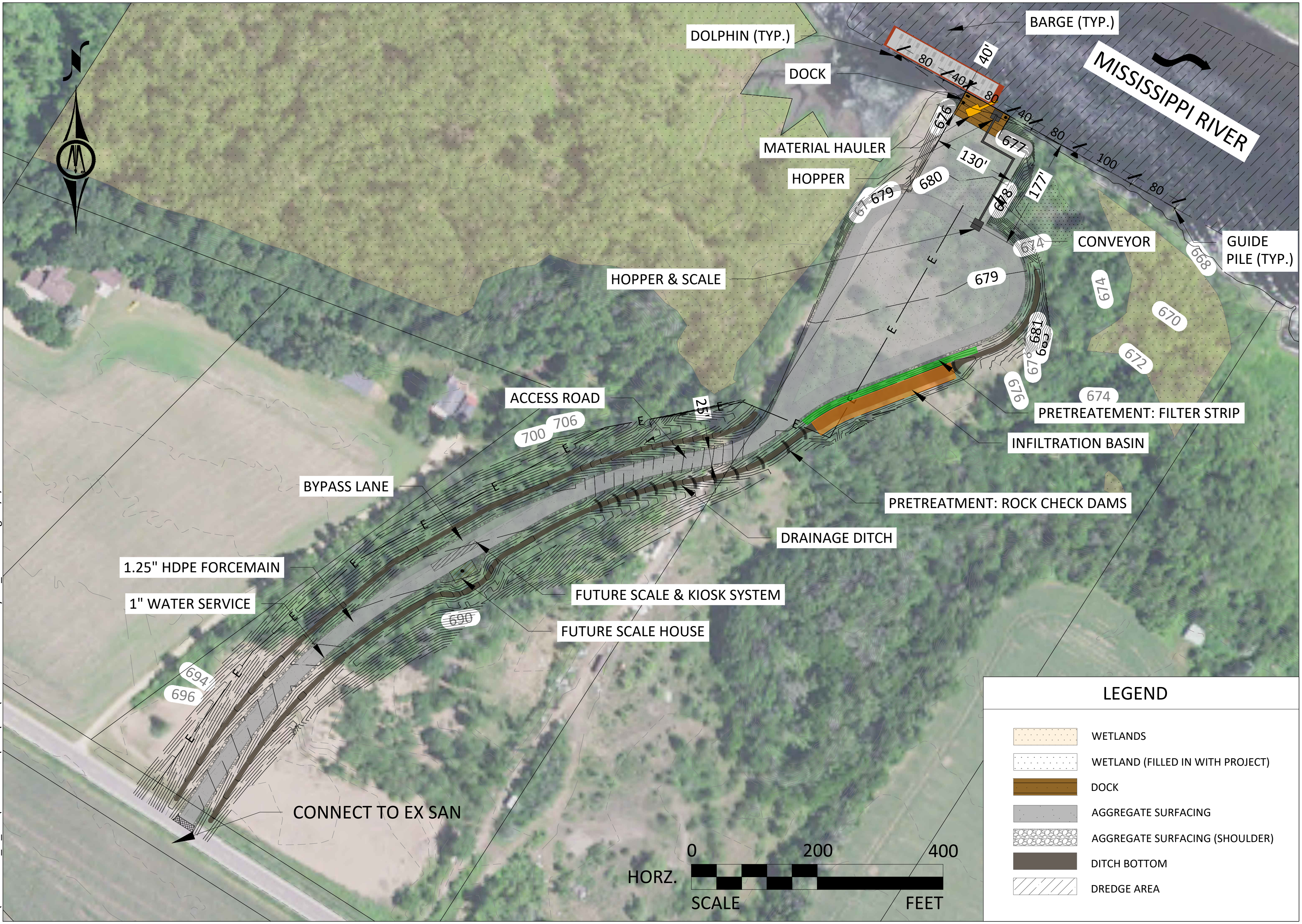
City of Wabasha

SSA Existing Conditions Workmap

November 2022




Sub-12
CN = 64.5
Tc = 53 min.
MissRiver
Jun-11
Jun-09
Sub-08
CN = 88.2
Tc = 7 min.
BMP
Jun-08
Sub-09
CN = 77.3
Tc = 7 min.
Jun-14
Jun-12
Jun-13
Sub-07
CN = 82.6
Tc = 7 min.
Sub-11
CN = 58.3
Tc = 71 min.
BluffNorth
BluffSouth
Sub-10
CN = 72.2
Tc = 7 min.
Sub-06
CN = 75.5
Tc = 7 min.
Legend
Node
Links
Subbasin
Proposed Contour (5 ft)
Proposed Contour (1 ft)
LiDAR Contour
Depression (2 ft)
Index (10 ft)
Index Depression (10 ft)
Intermediate (2 ft)
Study Area
FEMA Preliminary Floodplain
0
300
Feet
Source: City of Wabasha, MNDNR, USACE



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APPENDIX F

Mussel Survey

<u>FINAL REPORT</u>

Mussel Survey of the Mississippi River for a Proposed Barge Terminal in Wabasha, MN

by

Brett J. K. Ostby
Daguna Consulting, LLC
617 20th Street NE
Rochester, MN 55906

for

July 20th
2023

CONTENTS

INTRODUCTION

A proposed barge terminal north of Wabasha, MN would disturb riverbed habitats of the Mississippi River along the Minnesota bank at 44.392760, -92.050422 (WGS84). The proposed footprint was mostly in a side channel of the river but included habitats adjacent to the navigation channel (Figure 1). Based on a site map provided by Bolton and Menk, the approximate extent of direct disturbance encompassed a 27,000 square meter (m^2) area of riverbed.

The Mississippi River is inhabited by several federally listed species, with the federally endangered Higgin's Eye Pearlymussel (*Lampsilis higginsii*) most likely to occur at the site. Other state-listed species are known from this pool of the Mississippi River, including but not limited to Wartyback (*Cyclonaias nodulata*), Butterfly (*Ellipsaria lineolata*), Mucket (*Actinonaias ligamentina*), and Monkeyface (*Theliderma metanerva*). A recent survey and relocation conducted by Daguna Consulting, LLC approximately 1.5 kilometers (km) downstream detected several state-listed species and native mussel densities of 18.6 mussels per square meter (m^{-2}) (Ostby 2022a,b).

As part of the environmental review for the project, the Minnesota Department of Natural Resources (DNR) and U. S. Fish and Wildlife Service (USFWS) required a mussel survey. The purpose of the survey was to determine the presence or absence of protected species and to assess the condition of the mussel assemblage in and around the proposed footprint.

Daguna Consulting, LLC conducted surveys on June 6-8, 2023. Surveys covered habitats in areas that may be directly and indirectly disturbed by proposed construction and operation activities. This area was defined as the study area and was approximately 45,000 m^2 in extent. According to the "Minnesota Freshwater Survey and Relocation Protocol", at least one "Level I" survey was required for each 2,000 m^2 of instream habitat in a study area. Thus, 23 Level I surveys were conducted. All mussel species native to the state were targeted in Level I surveys. Where Level I survey efforts encountered more than 1 mussel per minute or a listed species, "Level II" surveys were initiated.

METHODS

Level I surveys were conducted June 6-8, 2023 and a Level II survey was conducted on June 8th, 2023. Brett J. K. Ostby was the permit holder, led fieldwork, and was responsible for species identification. The SCUBA divers were Emory Hagemeyer and Hunter Poffinbarger. All work was covered by Minnesota DNR Special Permit No. 32812 and USFWS Recovery Permit ES59798B-2.

Level I Survey

The mussel assemblage in the defined study area was surveyed by biologists to qualitatively assess species composition, relative abundance, and the possible presence of protected species. All habitats in the study area were searched unless deemed "unsuitable" for mussels, based on the site visit. The "unsuitability" of any habitat for mussels was fully documented. Sufficient effort was expended to inspect all suitable habitat so that the biologists could state with reasonable confidence that endangered and/or threatened species do or do not occur in the areas sampled. Based on the extent of the study area and desire to detect all species present, 23 timed dives were conducted, each lasting no fewer than 20 minutes. Due to average depth being greater than 2 m, biologists used SCUBA to conduct visual and tactile searches of the riverbed. During each dive, a biologist searched the riverbed while connected to the sampling boat and guided by the surface operator via an underwater communication system. All live mussels and shells encountered were collected and relayed to the surface. A GPS unit was used to georeference the approximate center of each survey (Table 1, Figure 2).

All mussels were identified to species and then measured for maximum length (in millimeters, mm) and aged by counting annual growth arrest lines. Any endangered or threatened mussels collected were returned to the riverbed by hand. Other species returned to the substrate from the water surface.

If during Level I surveys more than 1 mussel per minute or a listed species were encountered, the Level II survey protocol was initiated for that habitat.

Level II Survey
Within selected habitats, sample locations assigned using a systematic grid. The base point of the grid was located randomly within the identified Level II unit to avoid bias in estimating density. Points were at most 20 m from each other. At each location, a 0.25 m^2 total substrate quadrat attached to a rope was thrown from the boat. A diver excavated the streambed within the quadrat to a depth of 10-15 cm and placed the contents of the sample into the mesh bag attached to the quadrat frame. At each quadrat location, all mussels collected were identified to species, measured for maximum length (in mm), and aged. After processing, mussels were promptly returned to the riverbed. Endangered or threatened species were hand-placed, while others were returned from the water surface. The locations of quadrats were geo-referenced using a GPS unit (Table 1, Figure 3).

RESULTS

Flow Conditions and Weather
On the morning of June 6th, flow was 42,000 cubic feet per second (cfs) at USGS Gage 05378500 in Winona, MN. Flow declined throughout the study period to 35,200 cfs on the afternoon of June 8th. These flows were just below median for early June, having rapidly dropped from flood stages observed in April due to the onset of a “flash drought” in May. The Winona gage used to approximate conditions was located approximately 49 kilometers (km) downstream and had flow data for the previous 95 years.

During the survey period, air temperatures were above average, ranging from 28°C at mid-morning to as high as 33°C in the afternoon on all three days. Skies were mostly to partly sunny during the survey period with haze from Canadian wildfires present every day, limiting visibility and air quality.

Water clarity was good for the Mississippi River, with habitats visible at a distance of 1.25 m. Water temperatures ranged from 23-25 ^{o}C.

Level I Surveys

Most Level I Surveys (16 of 23) were conducted in a side channel that was located between an unnamed island and the Minnesota bank (Figure 4). The side channel was separated from the main channel by the larger Drury Island, which was located farther upstream of the study area, and by the aforementioned unnamed island seen in Figures 1-4. Currents in the side channel were moderately strong. This made it difficult for divers to maintain position in some sandy habitats near the middle of the channel. The downstream portion of the side channel had unusual habitats for the hydrologically altered Mississippi River; a riffle was located between an anthropomorphic rock pile and the bank (Figure 5). Its location was marked in Figures 2 and 3. The riffle had a riverbed of boulder, cobble, gravel, and sand substrates. Another rock pile was located farther out from the bank in deeper waters. Areas around that outer rock pile likewise had larger substrates than observed elsewhere in the side channel (Survey 17). These habitats were unlike most of the side channel. In general, the side channel was 2 to 3 m deep with a sand dominated riverbed. Water depths in the side channel increased precipitously from both the Minnesota and the island bank, reaching a depth of 2 m or greater within 5 m of the bank. Both banks had some exposed clay along those steep submerged slopes. Mussels were mostly observed within 5-10 m of the Minnesota bank and also in riffle habitats near the inner rock pile. Mussels were rarer in the center of the channel and near the island.

Several Level I surveys were conducted in habitats adjacent to the navigation channel. Except for areas near wing dams, the riverbed was mostly sand. Depths and flows varied greatly over short distances, with a maximum depth of 4 m observed at the edge of the navigation channel and depths < 1 m near wing dams. Mussels were rare in the main channel and no listed species were detected there.

A list of species detected and their corresponding photographs are provided in Table 2. Photographs of all but one species are in Appendix A. Habitat information for each Level I survey can be found in Table 3.

Across all Level I surveys, a total of 418 live mussels (native) were detected in 8 person-hours of search. Live specimens of 15 species were detected (Table 5). Just over half of all live mussels were Threeridge (*Amblema plicata*). Threehorn Wartyback (*Obliquaria reflexa*) was the second most abundant species, comprising 12.4 % of live mussels. Mucket (*A. ligamentina*) was the only state listed species detected live and all specimens were found within 5 m of the Minnesota bank. Two species of special concern, Round Pigtoe (*Pleurobema sintoxia*) and Black Sandshell (*Ligumia recta*), were also detected live, with Black Sandshell detected throughout the entire study area, comprising 3.8% of live mussels. Round Pigtoe was only detected near the Minnesota bank, comprising 1.2% of live mussels. Catch-per-unit-effort (CPUE) for habitats along the Minnesota bank and in the riffle were, on average, more than 8 times greater than surveys conducted elsewhere in the study area.

Level II Survey
Level II surveys focused on habitats within 20 m of the Minnesota Bank and in the riffle habitat near the inner rock pile (see Figure 3). These habitats supported a state-listed species and relatively greater abundances. Mussel and habitat data for each Level II quadrat were summarized in Table 6. The Level II survey detected an additional species, Paper Pondshell (*Utterbackia imbecillis*). This species was not found during the Level I surveys. Density in the best habitats was estimated at 2.8 m^{-2}, with a 95% confidence interval of 1.97 – 3.63 m^{-2}. Sampling was sufficient for estimating population size, achieving a desired Coefficient of Variation (CV) of 0.146, generally CV < 0.2 is considered good for estimating mussel densities. The best habitats within the proposed project footprint were limited to a 4,000 m^2 area off the Minnesota bank and likely supported no more than 14,518 mussels Figure 3. Both Level I and II results suggest that Threeridge may be half of all mussels in these habitats. Habitats in the Level II survey area had a mean depth of 1.8 m and tended to have a sand/gravel riverbed. Some quadrats were in a shallow inlet, with much shallower depths where organic debris and silt were more common.

Demographics
Length and age statistics for a representative subset of mussels observed in both Level I and Level II surveys are presented in Table 6. Younger year classes were common in the study area, with 3 species demonstrating recruitment in the last year or so. Mussels ≤ 5 years old comprised 46.7% of mussels that were measured. Older mussels, defined as specimens ≥15 years old, were present but comprised only 14.7% of mussels that were measured.

Zebra Mussels
The invasive, non-native Zebra Mussel (*Driessen polymorpha*) was abundant in the study area. Most native mussels had more than 20 attached to their shells (Figure 6), so percent of a native mussel shell covered by Zebra Mussels was estimated in lieu of counting individual Zebra Mussels. Mean coverage was 32.8% (n =262). Some smaller natives, like Threehorn Wartyback and Deertoe, were covered by 1-2 layers of Zebra Mussels over >80% of their shell surface.

Species Curve
A species richness curve was produced with cumulative total species richness indexed with live individual encounters (Figure 7). A logarithmic model was fit using JMP 17.0 (© 2023 JMP Statistical Discovery LLC).

$$\text{Richness} = -1.814 + 2.850 * \text{Ln}(\text{Cumulative Live Mussels})$$

The model suggested that it would require 73 additional mussels to increase species richness by 1. This suggests 2 additional Level II surveys or 100 quadrats near the Minnesota bank would yield an additional species.

DISCUSSION

No federally listed mussel species were detected during surveys. Given the number of mussels encountered and number of surveys conducted, it was extremely unlikely that federally listed mussels inhabit the study area. Only one state-listed species was detected, the Mucket; it was relatively rare. Two species of special concern—Black Sandshell and Round Pigtoe—were detected live, with the Black Sandshell relatively common throughout the study area. It is likely that 1-2 additional species may be present in the best habitats. Nonetheless, sampling was more than adequate according to state guidelines.

The best habitats for mussels in the study area were identified, delineated, and quantified. These habitats would be impacted by the proposed project. One was located along the Minnesota bank, which formed the southwest boundary of the proposed project footprint. The second was a riffle habitat, located just downstream (southeast) of the proposed footprint. These habitats were relatively better than other areas sampled. Most of the project footprint (85%) was 2-3 m deep with a sand riverbed, supporting native mussel densities < 1 m^{-2}.

Habitats near the bank and in the riffle had mean mussel densities of 2.8 m^{-2}. For comparison, mussel assemblages documented 1.5 km downstream by Ostby (2022a) had a mean density of 18.6 m^{-2}, suggesting high quality habitats along the Minnesota bank in the Mississippi River have the compacity to support far greater numbers than detected in the study area. Richness was also low for this reach of the Mississippi River. This low density and richness was likely caused by the unstable sand dominated substrate observed in most of the side channel. Surveys and relocations downstream detected a total of 24 species (Ostby 2022a,b) compared to 16 detected in this study. There were historically 41 species known from the Minnesota reaches of the Mississippi River. Better Mississippi River mussel beds still support greater than 25 species.

The study area skewed toward younger mussels, with nearly half of all mussels measured being ≤ 5 years old. This suggests that mussels may have recently colonized the area or that many habitats are not stable over greater time scales.

Zebra Mussel densities were high for the Mississippi River, especially compared to those observed the previous year in habitats 1.5 km downstream. All but a few native mussels were infested, with some almost completely covered by Zebra Mussels. Many of the Zebra Mussels observed were <20mm, suggesting a recent population outbreak.

The riffle habitat downstream of the study area was a habitat type more common in tributaries and to the Mississippi River and in the river itself upstream of the metro area. These habitats are not common in the regulated reached of the Mississippi River downstream of St. Anthony Falls. This habitat type may have been more common in the unaltered river before navigation channels were maintained and dams built. Level II surveys #16-#18 focused on the riffle habitat and habitats associated with anthropogenic rockpiles. While unique features with potential for species like Spectaclecase and Salamander Mussel, focused efforts did not yield additional species.

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Ostby, B. J. K. 2022b. Mussel Relocation for a Dock Removal and Installation in the Mississippi River at the National Eagle Center in Wabasha, MN: Preliminary Results. Report for Bolton and Menk, Rochester, MN. 5 pp.

Smith, D. R. 2006. Survey design for detecting rare freshwater mussels. Journal of the North American Benthological Society 25:701–711.

TABLES AND FIGURES

Table 1. Latitude and Longitude in WGS 84 for each Level I survey and Level II quadrat.

Level I Survey	Latitude	Longitude	Level II Quadrat	Latitude	Longitude
1	44.39338	-92.05257	1	44.39356	-92.05299
2	44.39379	-92.05209	2	44.39344	-92.05280
3	44.39324	-92.05206	3	44.39333	-92.05264
4	44.393668	-92.051568	4	44.39324	-92.05249
5	44.39334	-92.05153	5	44.39315	-92.05230
6	44.39307	-92.0516	6	44.39319	-92.05271
7	44.39382	-92.05123	7	44.39310	-92.05251
8	44.39347	-92.05101	8	44.39300	-92.05230
9	44.39302	-92.0509	9	44.39361	-92.05274
10	44.39275	-92.05093	10	44.39348	-92.05256
11	44.39363	-92.05065	11	44.39337	-92.05240
12	44.39291	-92.05023	12	44.39328	-92.05220
13	44.392568	-92.050307	13	44.39319	-92.05203
14	44.393199	-92.050347	14	44.39310	-92.05184
15	44.39273	-92.04953	15	44.39301	-92.05167
16	44.393014	-92.049077	16	44.39292	-92.05150
17	44.39275	-92.04879	17	44.39315	-92.05166
18	44.392431	-92.04934	18	44.39304	-92.05145
19	44.39284	-92.04825	19	44.39294	-92.05129
20	44.392589	-92.048481	20	44.39284	-92.05115
21	44.392612	-92.047628	21	44.39275	-92.05098
22	44.392886	-92.04725	22	44.39263	-92.05081
23	44.392623	-92.046734	23	44.39253	-92.05064
			24	44.39274	-92.05077
			25	44.39264	-92.05062
			26	44.39283	-92.05134
			27	44.39254	-92.05045
			28	44.39248	-92.04932
			29	44.39236	-92.04950
			30	44.39227	-92.04932
			31	44.39233	-92.04926
			32	44.39239	-92.04928
			33	44.39243	-92.04949
			34	44.39323	-92.05222
			35	44.39349	-92.05270
			36	44.39367	-92.05299
			37	44.39241	-92.05041
			38	44.39226	-92.05005
			39	44.39239	-92.05018
			40	44.39235	-92.04986

Table 2. Scientific name, common name, and status for native mussels detected in the study area during each survey type are provided. Corresponding figure numbers are listed (most are in Appendix A).

Species Name	Common Name	Status	Level I	Level II	Figure
Actinonaias ligamentina	Mucket	Minnesota Threatened	X		A1
Amblema plicata	Threeridge		X	X	A2, A3
Cyclonaias pustulosa	Pimpleback		X	X	A4
Fusconaia flava	Wabash Pigtoe		X	X	A5, A6
Lampsilis cardium	Plain Pocketbook		X		A7
Lampsilis siliquoidea	Fat Mucket		X		A8
Lasmigonia complanata	White Heelsplitter		X		A9
Leptodea fragilis	Fragile Papershell		X	X	6, A10
Ligumia recta	Black Sandshell	Minnesota Special Concern	X	X	A11, A12
Obliquaria reflexa	Threehorn Wartyback		X	X	A13, A14
Oblovaria olivaria	Hickorynut		X	X	A15, A16
Pleurobema sintoxia	Round Pigtoe	Minnesota Special Concern	X		A17, A18
Potamilus alatus	Pink Heelsplitter		X		A19
Pyganodon grandis	Giant Floater		X	X	A20
Truncilla truncata	Deertoe		X	X	A21
Utterbackia imbecillis	Paper Pondshell			X	Not pictured, lost in handling

Table 3. Average depths and percent riverbed for Level I surveys are listed. Most of the study area had a sand riverbed and was greater than 2 m deep.

Survey	Latitude	Longitude	Depth (m)	%Boulder	%Cobble	%Gravel	%Sand	%Silt	%Clay	Woody Debris
1	44.39338	-92.0526	2.1	0	0	10	80	0	10	0
2	44.39379	-92.0521	1.5	0	0	0	100	0	0	0
3	44.39324	-92.0521	2.4	0	0	20	80	0	0	0
4	44.39367	-92.0516	2.7	0	0	10	90	0	0	0
5	44.39334	-92.0515	1.5 - 3.0	0	0	0	100	0	0	0
6	44.39307	-92.0516	3.0	0	0	0	100	0	0	0
7	44.39382	-92.0512	2.1	0	0	20	80	0	0	0
8	44.39347	-92.051	2.4	0	0	10	90	0	0	0
9	44.39302	-92.0509	3.0	0	0	0	100	0	0	0
10	44.39275	-92.0509	3.4	0	0	30	70	0	0	0
11	44.39363	-92.0507	1.5	0	0	10	80	10	0	0
12	44.39291	-92.0502	3.4	0	0	0	100	0	0	0
13	44.39257	-92.0503	2.7	0	0	20	80	0	0	0
14	44.3932	-92.0503	0.9 - 2.1	0	0	0	60	0	40	0
15	44.39273	-92.0495	2.7	0	0	0	100	0	0	0
16	44.39301	-92.0491	0.6 - 1.5	0	0	5	95	0	0	0
17	44.39275	-92.0488	1.2	40	10	10	40	0	0	0
18	44.39243	-92.0493	0.3 - 2.4	5	20	20	35	0	20	0
19	44.39284	-92.0483	1.2 - 2.1	0	0	10	90	0	0	0
20	44.39259	-92.0485	0.9 - 2.0	0	0	10	90	0	0	0
21	44.39261	-92.0476	1.5 - 2.7	0	0	10	90	0	0	0
22	44.39289	-92.0473	0.9 - 4.0	20	10	10	50	0	0	10
23	44.39262	-92.0467	1.2 - 3.0	20	10	10	60	0	0	0
Mean			**2.1**	**3.7**	**2.2**	**9.3**	**80.9**	**0.4**	**3.0**	**0.4**

Table 4. Number of live mussels detected in each Level I survey and in the Level II survey. Survey effort for Level I surveys was recorded in person-hours, with the Catch-Per-Unit-Effort (CPUE) calculated by dividing total number of live by person hours effort.

Level I Survey	**Effort (person-hours)**	***A. ligamentina***	***A. plicata***	***C. pustulosa***	***F. flava***	***L. cardium***	***L. siliquoidea***	***L. complanata***	***L. fragilis***	***L. recta***	***O. reflexa***	***O. olivaria***	***P. sintoxia***	***P. alatus***	***P. grandis***	***T. truncata***	***U. imbecillis***	**Total**	**CPUE**
1	0.33	0	55	5	6	0	1	1	0	1	12	1	3	0	1	1	0	87	261
2	0.33	0	1	0	0	0	0	0	2	0	0	0	0	0	0	0	0	3	9
3	0.33	1	41	2	6	0	0	0	1	1	11	2	2	0	0	1	0	68	204
4	0.33	0	3	0	1	0	0	0	1	0	1	2	0	0	0	0	0	8	24
5	0.33	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3
6	0.33	0	8	3	0	1	FD	0	1	0	2	0	0	0	0	0	0	15	45
7	0.33	0	3	1	0	0	0	0	1	1	1	0	0	0	0	0	0	7	21
8	0.33	0	1	0	0	0	0	0	0	0	5	0	0	0	0	0	0	6	18
9	0.33	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3
10	0.33	FD	25	0	3	3	0	0	0	3	1	1	0	0	0	0	0	36	108
11	0.33	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	6
12	0.33	0	2	0	0	1	0	0	0	0	1	0	0	0	0	0	0	4	12
13	0.33	1	16	14	4	0	0	0	0	4	6	2	0	0	0	0	0	47	141
14	0.33	0	1	1	0	5	2	0	0	2	0	1	0	0	0	0	0	12	36
15	0.33	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	6
16	0.33	0	0	1	1	2	0	0	1	0	0	2	0	0	0	2	0	9	27
17	0.33	0	11	2	1	3	0	0	0	0	2	0	0	0	0	0	0	19	57
18	0.33	0	42	0	2	5	0	0	2	0	2	0	0	0	0	0	0	53	159
19	0.33	0	1	0	0	2	0	0	0	0	1	0	0	0	0	0	0	4	12
20	0.33	0	0	0	0	2	0	0	0	1	4	0	0	0	0	0	0	7	21
21	0.33	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2	6
22	0.33	0	6	0	2	5	0	0	0	3	1	1	0	0	0	0	0	18	54
23	0.33	0	0	0	0	4	0	0	0	0	2	0	0	1	0	0	0	7	21
Level I Total	**8**	**2**	**220**	**30**	**26**	**33**	**3**	**1**	**10**	**16**	**52**	**13**	**5**	**2**	**1**	**4**	**0**	**418**	**52.3**
Assemblage %		**0.5**	**52.6**	**7.2**	**6.2**	**7.9**	**0.7**	**0.2**	**2.4**	**3.8**	**12.4**	**3.1**	**1.2**	**0.5**	**0.2**	**1.0**	**0.0**		
Level II Total		**0**	**11**	**2**	**4**	**0**	**0**	**0**	**2**	**2**	**2**	**1**	**0**	**0**	**1**	**2**	**1**	**28**	
Grand Total		**2**	**231**	**32**	**30**	**33**	**3**	**1**	**12**	**18**	**54**	**14**	**5**	**2**	**2**	**6**	**1**	**446**	

Table 5. Mussels detected and habitat information for each 0.25 m^2 quadrat in the Level II survey.

Quadrat	Latitude	Longitude	*A. plicata*	*C. pustulosa*	*F. flava*	*L. fragilis*	*L. recta*	*O. reflexa*	*O. olivaria*	*P. grandis*	*T. truncata*	*U. imbecillis*	Total	Depth (m)	%Gravel	%Sand	%Silt	%Clay	%Debris	%Organic Debris
1	44.39356	-92.05299	0	0	1	0	0	0	0	0	0	0	1	1.5	0	100	0	0	0	0
2	44.39344	-92.05280	0	0	0	0	0	0	0	0	0	1	1	1.5	5	95	0	0	0	0
3	44.39333	-92.05264	0	0	0	1	0	0	0	0	0	0	1	0.6	0	100	0	0	0	0
4	44.39324	-92.05249	0	0	1	0	0	0	0	0	0	0	1	1.8	10	70	20	0	0	0
5	44.39315	-92.05230	0	0	0	0	0	0	0	0	0	0	0	0.3	0	40	30	0	0	30
6	44.39319	-92.05271	0	0	0	0	0	0	0	1	0	0	1	0.9	0	40	30	0	0	30
7	44.39310	-92.05251	0	0	0	0	0	0	0	0	0	0	0	0.6	0	40	40	0	0	20
8	44.39300	-92.05230	0	0	0	0	0	0	0	0	0	0	0	0.3	0	40	30	0	0	30
9	44.39361	-92.05274	1	0	0	0	0	0	0	0	0	0	1	1.5	0	100	0	0	0	0
10	44.39348	-92.05256	1	0	0	0	0	0	0	0	0	0	1	2.7	0	100	0	0	0	0
11	44.39337	-92.05240	0	0	0	0	0	1	0	0	0	0	1	1.8	20	70	10	0	0	0
12	44.39328	-92.05220	1	0	0	0	0	0	0	0	0	0	1	2.1	0	10	90	0	0	0
13	44.39319	-92.05203	1	0	0	0	0	0	0	0	1	0	2	1.5	10	90	0	0	0	0
14	44.39310	-92.05184	0	0	0	0	1	0	0	0	0	0	1	2.1	0	60	0	0	40	0
15	44.39301	-92.05167	0	0	1	0	0	0	0	0	0	0	1	2.4	20	70	10	0	0	0
16	44.39292	-92.05150	1	0	0	0	0	0	0	0	0	0	1	2.4	20	70	10	0	0	0
17	44.39315	-92.05166	0	0	0	0	0	0	0	0	0	0	0	3.0	0	100	0	0	0	0
18	44.39304	-92.05145	0	0	0	1	0	0	0	0	0	0	1	3.1	30	60	10	0	0	0
19	44.39294	-92.05129	0	0	0	0	0	0	0	0	0	0	0	3.0	40	50	10	0	0	0
20	44.39284	-92.05115	0	0	0	0	0	0	0	0	0	0	0	3.1	30	60	10	0	0	0
21	44.39275	-92.05098	1	0	0	0	0	0	0	0	0	0	1	3.1	30	70	0	0	0	0
22	44.39263	-92.05081	0	0	0	0	0	0	0	0	0	0	0	2.7	30	70	0	0	0	0
23	44.39253	-92.05064	0	0	0	0	0	0	0	0	0	0	0	1.8	80	20	0	0	0	0
24	44.39274	-92.05077	0	0	0	0	0	0	0	0	0	0	0	3.4	10	90	0	0	0	0
25	44.39264	-92.05062	0	0	0	0	0	0	0	0	0	0	0	2.4	30	70	0	0	0	0
26	44.39283	-92.05134	0	0	0	0	0	0	0	0	0	0	0	0.9	30	60	10	0	0	0
27	44.39254	-92.05045	0	0	0	0	0	0	0	0	0	0	0	2.1	95	5	0	0	0	0
28	44.39248	-92.04932	0	0	0	0	0	0	0	0	0	0	0	0.6	60	20	0	20	0	0
29	44.39236	-92.04950	1	0	0	0	0	0	0	0	0	0	1	1.2	30	70	0	0	0	0
30	44.39227	-92.04932	0	0	0	0	1	0	0	0	0	0	1	1.2	0	0	100	0	0	0
31	44.39233	-92.04926	1	0	1	0	0	0	0	0	0	0	2	0.9	10	90	0	0	0	0
32	44.39239	-92.04928	1	0	0	0	0	0	0	0	0	0	1	0.5	80	20	0	0	0	0
33	44.39243	-92.04949	0	0	0	0	0	0	0	0	1	0	1	2.4	80	20	0	0	0	0
34	44.39323	-92.05222	1	1	0	0	0	0	0	0	0	0	2	2.4	10	90	0	0	0	0
35	44.39349	-92.05270	0	1	0	0	0	0	0	0	0	0	1	1.8	0	100	0	0	0	0
36	44.39367	-92.05299	0	0	0	0	0	1	1	0	0	0	2	1.4	0	100	0	0	0	0
37	44.39241	-92.05041	0	0	0	0	0	0	0	0	0	0	0	1.5	0	100	0	0	0	0
38	44.39226	-92.05005	0	0	0	0	0	0	0	0	0	0	0	1.8	0	100	0	0	0	0
39	44.39239	-92.05018	1	0	0	0	0	0	0	0	0	0	1	1.5	0	20	20	60	0	0
40	44.39235	-92.04986	0	0	0	0	0	0	0	0	0	0	0	1.5	10	90	0	0	0	0
Totals			**11**	**2**	**4**	**2**	**2**	**2**	**1**	**1**	**2**	**1**	**28**							
Mean*			**1.1**	**0.2**	**0.4**	**0.2**	**0.2**	**0.2**	**0.1**	**0.1**	**0.2**	**0.1**	**2.8**	**1.8**	**19**	**64**	**11**	**2**	**1**	**3**

Table 6. Mean, standard error, and range of lengths (mm) for a representative subset of each species (n). Age was also estimated and assigned here to age groups standard for the Mississippi River.

		Length (mm)			Age Range	% Age Groups (yrs)		
Species	**n**	**mean**	**SE**	**Range**	**(yrs)**	**≤ 5**	**6 to 10**	**≥ 15**
A.ligamentina	2	114.5	5.5	109-120	11-12	0.0	100.0	0.0
A. plicata	74	62.0	3	15-106	1-25+	44.6	37.8	17.6
C. pustulosa	45	59.6	1.9	45-79	4-25	8.0	68.0	24.0
F. flava	27	56.0	2.3	27-74	4-20	14.8	66.7	18.5
L. cardium	32	104.8	2.9	61-125	3-25+	41.9	35.5	22.6
L. siliquoidea	4	96.5	6.4	88-115	3-25+	50.0	25.0	25.0
L. complanata	1	156.0	n/a	156	20+	0.0	0.0	100.0
L. fragilis	12	69.6	8	21-108	1-5	100.0	0.0	0.0
L. recta	19	133.0	4.1	85-157	3-20+	15.8	68.4	15.8
O. olivaria	14	43.8	2.4	33-65	3-13	85.7	14.3	0.0
O. reflexa	24	40.1	1.5	24-57	3-14	85.7	11.4	2.9
P. alatus	2	85.0	27	58-112	2-5	100.0	0.0	0.0
P. grandis	2	121.5	18.5	103-140	3-5	100.0	0.0	0.0
P. sintoxia	5	57.4	5.3	46-73	6-15+	0.0	80.0	20.0
T. truncata	5	28.8	2.9	19-35	2-4	100.0	0.0	0.0
U. imbecillis	1	16.0	n/a	16	1	100.0	0.0	0.0
Assemblage						46.7	38.6	14.7

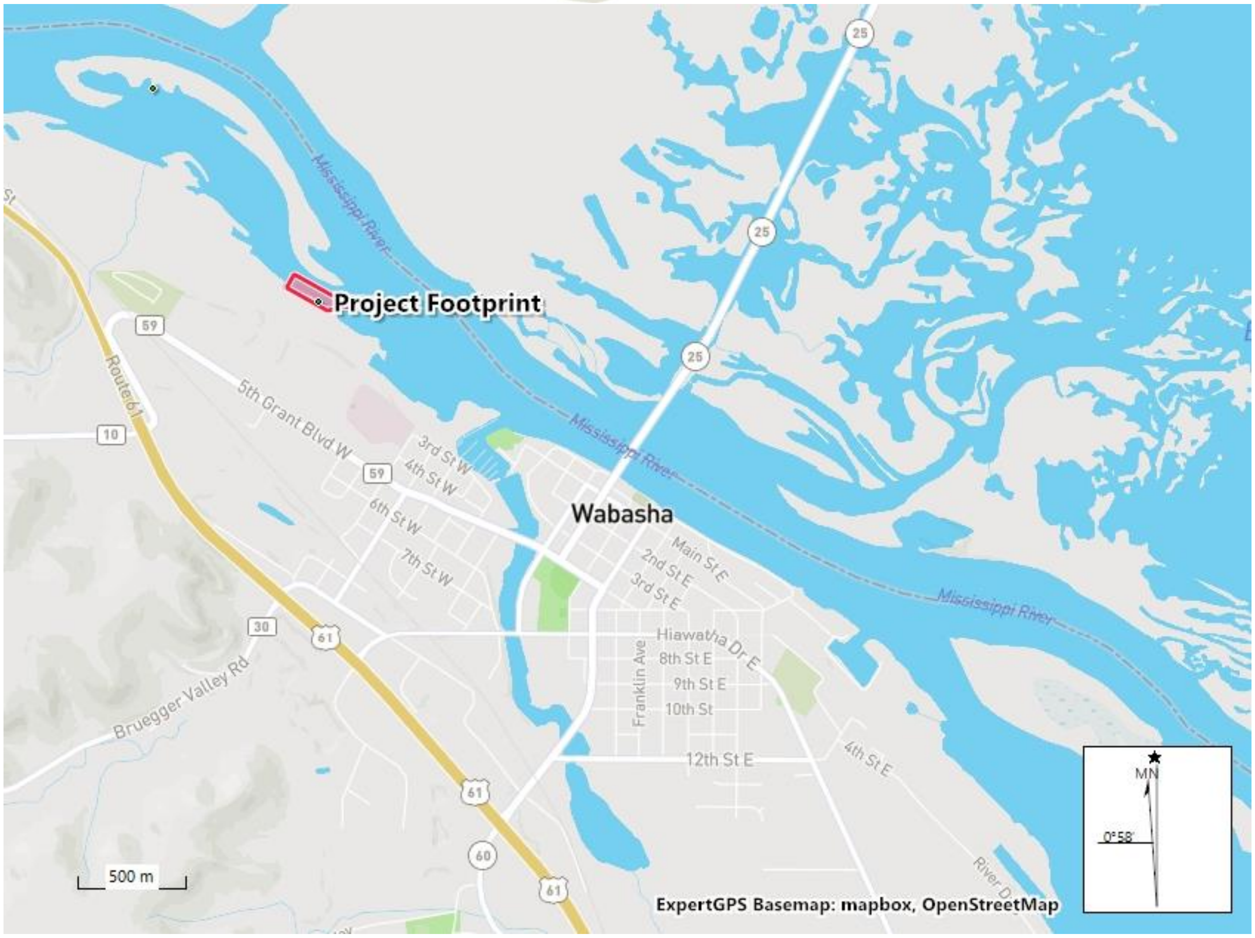


Figure 1. Street map demonstrating location of project footprint north of Wabasha, Minnesota.

Figure 2. Aerial image of the project footprint and centroid of each Level I survey. The locations of the riffle and rock piles are shown.

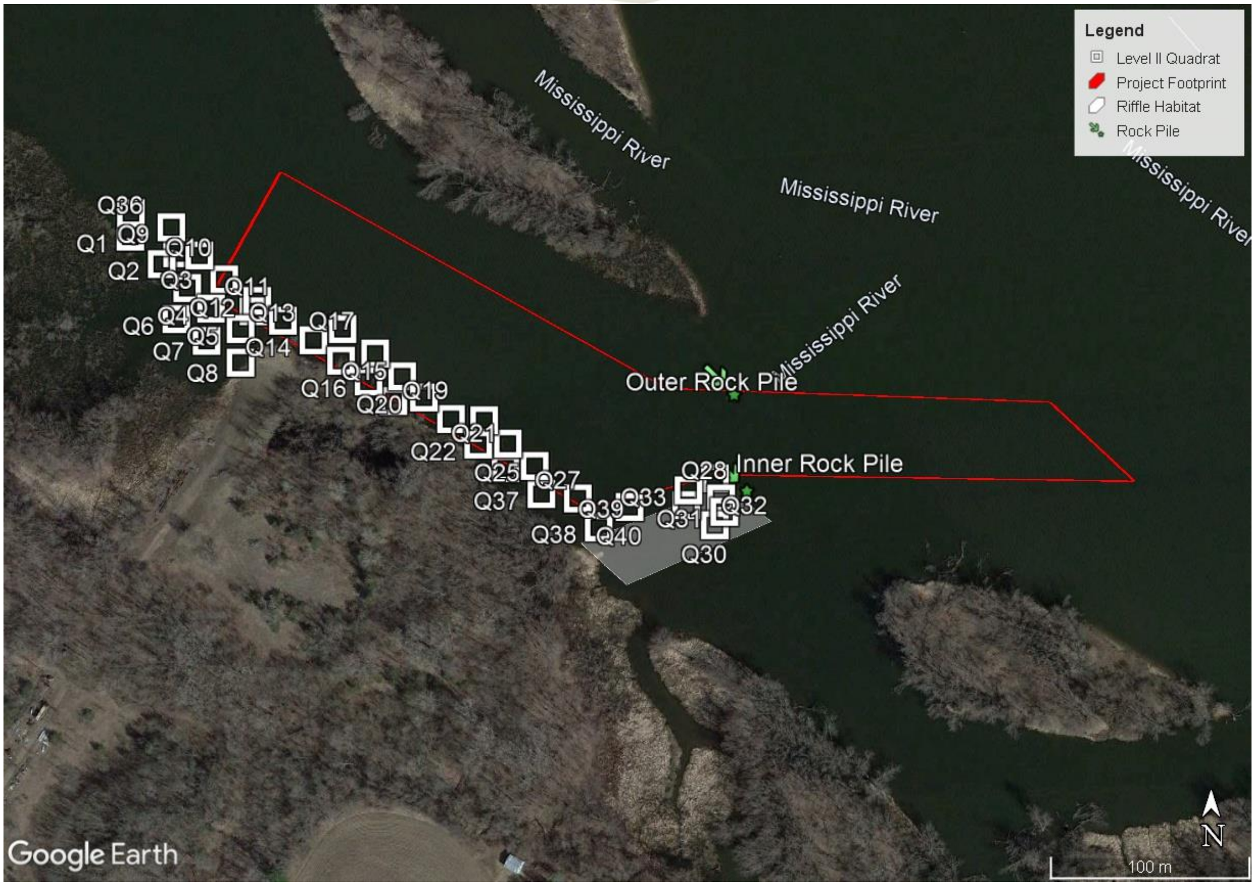


Figure 3. Quadrats were systematically distributed in areas with greater CPUE along the Minnesota bank and in the riffle habitat.

Figure 4. Side channel of the Mississippi River with the Minnesota bank photograph left to center. The unnamed island was photograph right and in the foreground. This photograph was taken facing upstream toward the northwest from the downstream corner of the unnamed island.

Figure 5. Diver sampling shallow riffle habitat with the inner rock pile pictured on the left. This photograph was taken while wading in shallows facing downstream towards the southeast.

Figure 6. Fragile Papershell (*L. fragilis*) heavily infested by Zebra Mussels (*Dreissena polymorpha*). This was a typical condition for mussels in the side channel of the Mississippi River that was surveyed.

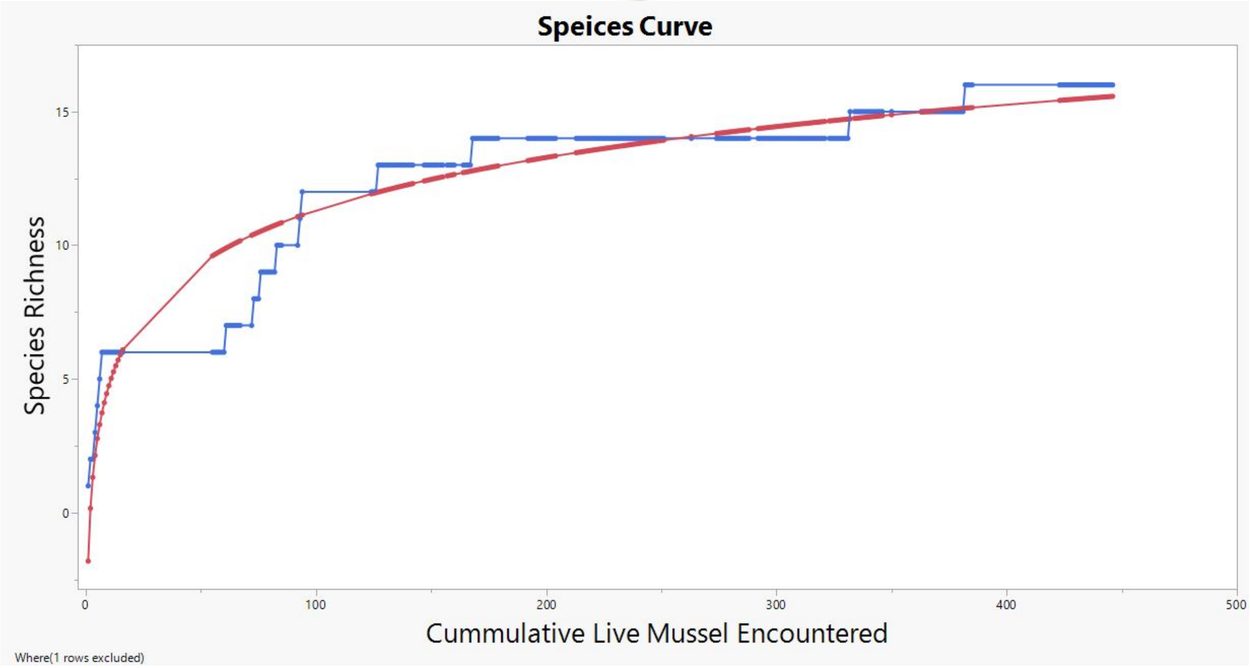


Figure 7. Cumulative total species richness (live) was plotted by live individual mussel encountered. Blue points and line are raw data. A logarithmic model was fit using JMP software (red points and line).

APPENDIX A

Representative Photographs


Figure A1. State-threatened Mucket (*A. ligamentina*) observed near the Minnesota bank.

Figure A2. Range of Threeridge (*A. plicata*) observed during Level I surveys.

Figure A3. Younger specimens of Threeridge with green coloration were observed in sandy habitats.


Figure A4. Live Pimpleback (*C. pustulosa*) observed during Level I surveys.


Figure A.5 Younger specimen of Wabash Pigtoe (*F. flava*) observed in the study area.

Figure A6. This specimen was identified as Wabash Pigtoe (*F. flava*) due to its deep sulcus and cloth-like periostracum.

Figure A7. Female (left) and male (right) specimens of Plain Pocketbook (*L. cardium*).

Figure A8. Fat Mucket (*L. siliquoidea*) with beak structure shown in the lower figure.


Figure A9. This live White Heelsplitter (*L. complanata*) was encrusted with Zebra Mussels.

Figure A10. Live Fragile Papershell (*L. fragilis*) observed during Level I surveys.

Figure A11. Live femail Black Sandshell (*L. recta*) observed in study area.

Figure A12. Black Sandshell observed in the side channel of the Misssippi River.

Figure A13. Threehorn Wartyback (*O. reflexa*) were common in the study area. Many were heavily encrusted by Zebra Mussels.

Figure A14. Side view of a Threehorn Wartyback.


Figure A15. Live Hickorynut (*O. olivaria*) detected in the study area.

Figure A16. Olive coloration of younger Hickorynuts detected in the side channel.


Figure A17. Live Round Pigtoe (*Pleurobema sintoxia*) observed near Minnesota bank.

Figure A18. View of same Round Pigtoe in A18 showing anterior of the shell and umbo.

Figure A19. Pink Heelpslitter (*P. alatus*) observed in the study area.


Figure A 20. Giant Floater (*P. grandis*) observed in the study area.


Figure A21. Deertoe (*T. truncata*) detected live in the study area.

APPENDIX G

MnDNR Correspondence

Minnesota Department of Natural Resources
Division of Ecological & Water Resources
500 Lafayette Road, Box 25
St. Paul, MN 55155-4025

July 8, 2022
Correspondence # MCE 2022-00127

Robert Rogers
Bolton & Menk, Inc.

RE: Natural Heritage Review of the proposed Wabasha Barge Terminal Project,
T111N R10W Section 30; Wabasha County

Dear Robert Rogers,

As requested, the [Minnesota Natural Heritage Information System] has been reviewed to determine if the proposed project has the potential to impact any rare species or other significant natural features. Based on the project details provided with the request, the following rare features may be impacted by the proposed project:

Ecologically Significant Areas

- The proposed project is within a site identified by the Minnesota Biological Survey (MBS) as a Site of *Moderate* Biodiversity Significance. Sites of Biodiversity Significance have varying levels of native biodiversity and are ranked based on the relative significance of this biodiversity at a statewide level. Sites ranked as *Moderate* contain occurrences of rare species and/or moderately disturbed native plant communities, and/or landscapes that have a strong potential for recovery. Green dragon (*Arisaema dracontium*), Gary's sedge (*Carex grayi*), and cattail sedge (*Carex typhina*), all state-listed plant species of special concern, have been documented within this Site and may be impacted by this project.

  We encourage you to consider project alternatives that would avoid or minimize disturbance to this ecologically significant area. Actions to minimize disturbance may include, but are not limited to, the following recommendations:
  - Minimize vehicular disturbance in the MBS Site (allow only vehicles/equipment necessary for construction activities);
  - Do not park equipment or stockpile supplies in the MBS Site;
  - Do not place spoil within MBS Site or other sensitive areas;

- Retain a buffer between proposed activities and the MBS Site;
- If possible, conduct the work under frozen ground conditions;
- Use effective erosion prevention and sediment control measures;
- Inspect and clean all equipment prior to bringing it to the site to prevent the introduction and spread of invasive species;
- As much as possible, operate within already-disturbed areas;
- Revegetate disturbed soil with native species suitable to the local habitat as soon after construction as possible; and
- Use only weed-free mulches, topsoils, and seed mixes. Of particular concern are birdsfoot trefoil (Lotus corniculatus) and crown vetch (Coronilla varia), two invasive species that are sold commercially and are problematic in prairies and disturbed open areas.

MBS Sites of Biodiversity Significance and DNR Native Plant Communities community can be viewed using the Minnesota Conservation Explorer or their GIS shapefiles can be downloaded from the MN Geospatial Commons. Please contact me if you do not have access to the appropriate mapping services. For information on interpreting the data, reference the MBS Site Biodiversity Significance and Native Plant Community websites.

- Pool 4 of the Mississippi River has been identified as a Lake of *Outstanding* Biological Significance. Lakes of Biological Significance were ranked as *Outstanding, High, or Moderate* based on unique plant and animal presence. It is important that effective erosion prevention and sediment control practices be implemented and maintained near lakes throughout the project. Indirect impacts, such as the introduction or spread of invasive species, should also be considered and minimized.

State-listed Species

- Several state-listed fish including paddlefish (*Polyodon spathula*), a state-listed threatened fish species have been documented in the Mississippi River near the proposed project. In Minnesota, paddlefish spawn in the spring in temporarily flooded tributaries to the large rivers. Minnesota's Endangered Species Statute (Minnesota Statutes, section 84.0895) and associated Rules (Minnesota Rules, part 6212.1800 to 6212.2300 and 6134) prohibit the take of threatened or endangered species without a permit. To protect this species, **work within the water needs to be avoided from April to mid-June.** Contact the DNR Endangered Species Environmental Review Coordinator, Lisa Joyal (Lisa.Joyal@state.mn.us or 651-259-5109) if this is not feasible as additional action may be needed.

- Timber rattlesnakes (*Crotalus horridus)*, a state-listed threatened species, have been reported from the vicinity of the proposed project and may be encountered on site. In Minnesota, the ideal habitat for this species is forested bluffs, south-facing rock outcrops, and bluff prairies, particularly in the Mississippi River Valley. Nearby forests, prairies, and agricultural lands are used as summer feeding grounds. Two necessary habitat components are open areas for thermoregulation, and dens for overwintering. The dens are often located on steep, south or west-facing hillsides with rock outcroppings and ledges. Timber rattlesnakes emerge from their dens in late April to early May and return to them in late September to early October. In the spring and fall, timber rattlesnakes are active during the day; while during the hottest months of summer, they are mostly active at night.

Timber rattlesnake mortality in Minnesota is most commonly caused by poaching, vehicle collisions, and habitat destruction. The loss of a single adult, especially a female, can impact the population significantly. As such, crews working in the area should be advised that if they encounter any snakes, the snakes should not be disturbed. The use of erosion control blanket shall be limited to 'bio-netting' or 'naturalnetting' types, and specifically not products containing plastic mesh netting or other plastic components. Also, be aware that hydro-mulch products may contain small synthetic (plastic) fibers to aid in their matrix strength. These loose fibers could potentially re-suspend and make their way into Public Waters. As such, please review mulch products and not allow any materials with synthetic (plastic) fiber additives in areas that drain into Public Waters. Be aware, that there are also other species of snakes in the area that will mimic rattlesnakes. Contact the DNR Regional Nongame Wildlife Specialist, Bridgette Timm (952-207-9769 or bridgette.timm@state.mn.us) if timber rattlesnakes are encountered on-site or if you have any questions regarding this species.

- Please visit the DNR Rare Species Guide for more information on the habitat use of these species and recommended measures to avoid or minimize impacts. For further assistance with these species, please contact the appropriate DNR Regional Nongame Specialist or Regional Ecologist.

Federally Protected Species

- Several federally and state-listed mussels, including the sheepnose (*Plethobasus cyphyus*), a federally and state-listed endangered species, have been documented in the Mississippi River in the vicinity of the proposed project, some as recently as 2021. As mussels are particularly vulnerable to deterioration in water quality, especially increased siltation, it is important that effective erosion prevention and sediment control practices be implemented and maintained near the river.

  Minnesota's Endangered Species Statute (Minnesota Statutes, section 84.0895) and associated Rules (Minnesota Rules, part 6212.1800 to 6212.2300 and chapter 6134) prohibit the take of threatened or endangered species without a permit. In order to determine the potential for a take of state-protected mussels, **a qualified surveyor (see attached list) will need to conduct a mussel survey and/or relocation in any potential mussel habitat prior to construction within these habitats**.

  The surveyor will need to obtain a permit from the DNR Endangered Species Coordinator, Bridget Henning-Randa (Bridget.Henning-Randa@state.mn.us or 651-259-5073) before conducting any mussel surveys and will need to follow the mussel survey and relocation protocol. The extent of the mussel survey should include all areas of the riverbed that will be directly impacted by excavation, pile driving, placing of fill or riprap, driving of equipment, or dewatering; as well as any areas downstream that will receive sediment from project activities. Please send the results of all survey work to the DNR Endangered Species Environmental Review Coordinator, Lisa Joyal. **No work in the riverbed shall occur until potential impacts to mussels have been resolved** to the satisfaction of the DNR's Endangered Species Coordinator, Bridget Henning-Randa.

- To ensure compliance with federal law, conduct a federal regulatory review using the U.S. Fish and Wildlife Service's (USFWS) online Information for Planning and Consultation (IPaC) tool.

Environmental Review and Permitting

- Please include a copy of this letter and the MCE-generated Final Project Report in any state or local license or permit application. Please note that measures to avoid or minimize disturbance to the above rare features may be included as restrictions or conditions in any required permits or licenses.

The Natural Heritage Information System (NHIS), a collection of databases that contains information about Minnesota's rare natural features, is maintained by the Division of Ecological and Water Resources, Department of Natural Resources. The NHIS is continually updated as new information becomes available, and is the most complete source of data on Minnesota's rare or otherwise significant species, native plant communities, and other natural features. However, the NHIS is not an exhaustive inventory and thus does not represent all of the occurrences of rare features within the state. Therefore, ecologically significant features for which we have no records may exist within the project area. If additional information becomes available regarding rare features in the vicinity of the project, further review may be necessary.

For environmental review purposes, the results of this Natural Heritage Review are valid for one year; the results are only valid for the project location and project description provided with the request. If project details change or the project has not occurred within one year, please resubmit the project for review within one year of initiating project activities.

The Natural Heritage Review does not constitute project approval by the Department of Natural Resources. Instead, it identifies issues regarding known occurrences of rare features and potential impacts to these rare features. Visit the Natural Hertiage Review website for additional information regarding this process, survey guidance, and other related information. For information on the environmental review process or other natural resource concerns, you may contact your DNR Regional Environmental Assessment Ecologist.

Thank you for consulting us on this matter, and for your interest in preserving Minnesota's rare natural resources.

Sincerely,

Samantha Bump

Samantha Bump
Natural Heritage Review Specialist
Samantha.Bump@state.mn.us

James Drake

James Drake
Natural Heritage Review Specialist
James.F.Drake@state.mn.us

Cc: Melissa Collins, Bridgette Timm, and Bridget Henning-Randa

DEPARTMENT OF NATURAL RESOURCES

Formal Natural Heritage Review - Cover Page

See next page for results of review. A draft watermark means the project details have not been finalized and the results are not official.

Project Name: Wabahsa Barge Terminal Project

Project Proposer: City of Wabasha

Project Type: Development, Commercial/Institutional/Industrial

Project Type Activities: Lakeshore;Tree Removal;Waterbody, watercourse, streambed impacts (e.g., discharge, runoff, sedimentation, fill, excavation)

TRS: T111 R10 S30

County(s): Wabasha

DNR Admin Region(s): Central

Reason Requested: State EIS

Project Description: The barge facility will serve to transport Mississippi River dredge materials from the river to offsite locations. The project area encompasses 54.0 acres ...

Existing Land Uses: Site consists of a combination of old gravel mining/burrow site, agricultural, and undeveloped/open space

Landcover / Habitat Impacted: Wooded/forest, brush/grassland, and agricultural cropland

Waterbodies Affected: The site is located adjacent to and will involve impacts to the Mississippi River with the proposed barge fleeting area

Groundwater Resources Affected: NA

Previous Natural Heritage Review: No

Previous Habitat Assessments / Surveys: No

SUMMARY OF AUTOMATED RESULTS

Category	Results	Response By Category
Project Details	No Comments	No Further Review Required
Ecologically Significant Area	Comments	MBS Sites - Recommendations Potential RNC - Will Require Consultation Lakes - Recommendations
State-Listed Endangered or Threatened Species	Needs Further Review	Needs Further Review
State-Listed Species of Special Concern	Comments	Recommendations
Federally Listed Species	Comments	Visit IPaC for Federal Review

DEPARTMENT OF NATURAL RESOURCES

April 6, 2022

Project Name: Wabahsa Barge Terminal Project
Project Proposer: City of Wabasha
Project Type: Development, Commercial/Institutional/Industrial
Project ID: MCE #2022-00127

AUTOMATED RESULTS: FURTHER REVIEW IS NEEDED

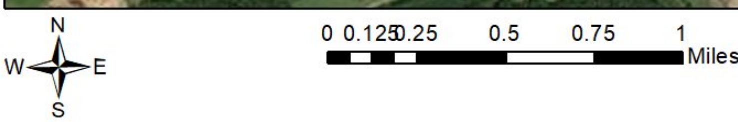
As requested, the above project has undergone an automated review for potential impacts to rare features. Based on this review, one or more rare features may be impacted by the proposed project and further review by the Natural Heritage Review Team is needed. You will receive a separate notification email when the review process is complete and the Natural Heritage Review letter has been posted.

Please refer to the table on the cover page of this report for a summary of potential impacts to rare features. For additional information or planning purposes, use the Explore Page in Minnesota Conservation Explorer to view the potentially impacted rare features or to create a Conservation Planning Report for the proposed project.

If you have additional information to help resolve the potential impacts listed in the summary results, please attach related project documentation in the Edit Details tab of the Project page. Relevant information includes, but is not limited to, additional project details, completed habitat assessments, or survey results. This additional information will be considered during the project review.

Wabahsa Barge Terminal Project

Aerial Imagery With Locator Map



Project Boundary

Project Type: Development, Commercial/Institutional/Industrial

Project Size (acres): 40.56

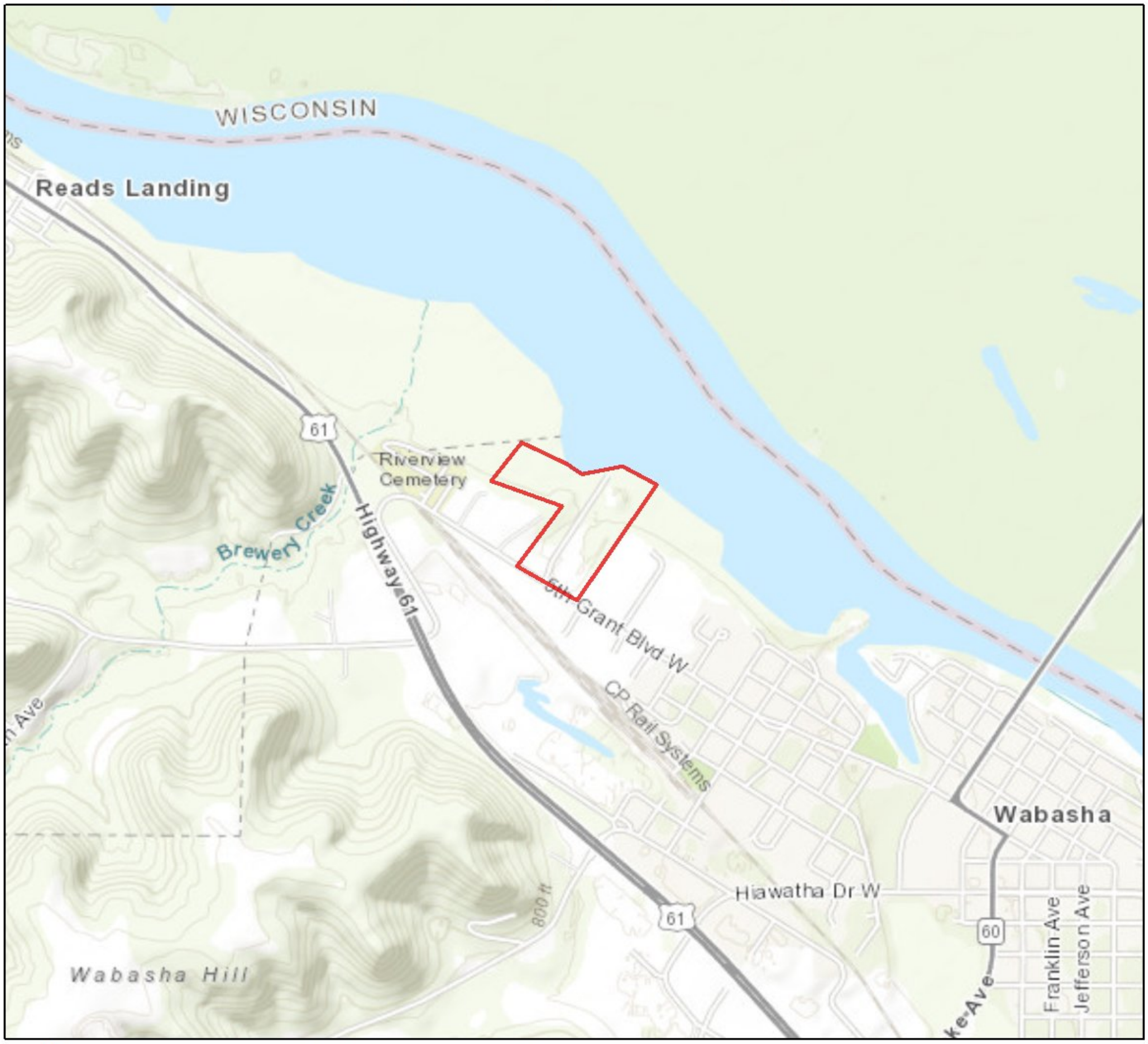
County(s): Wabasha

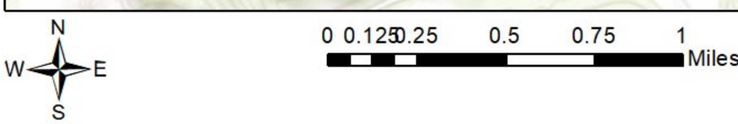
TRS: T111 R10 S30

Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri

Wabahsa Barge Terminal Project

USA Topo Basemap With Locator Map





Project Boundary

Project Type: Development, Commercial/Institutional/Industrial

Project Size (acres): 40.56

County(s): Wabasha

TRS: T111 R10 S30

Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User

APPENDIX H

Traffic Impact Memorandum

BOLTON & MENK
Real People. Real Solutions.

111 Washington Avenue S
Suite 650
Minneapolis, MN 55401

Ph: (612) 416-0220
Fax: (612) 416-0222
Bolton-Menk.com

MEMORANDUM

Date: December 8, 2022

To: Caroline Gregerson, Wabasha City Administrator

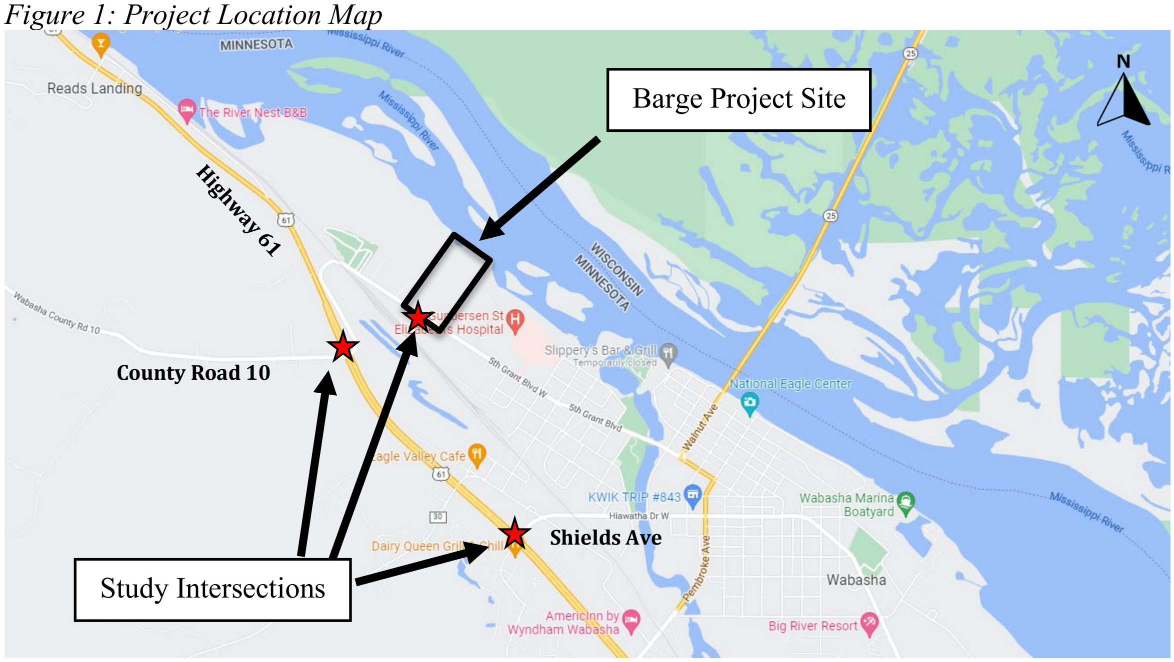
From: Ross Tillman P.E.
Kelsey Retherford P.E., PTOE

Subject: Wabasha Barge Terminal Project Traffic Impacts
City of Wabasha
Project No.: H19114396

Introduction

A study of the intersections of TH 61 and County Road 10/5th Grant Boulevard, TH 61 and Shields Avenue, and 5th Grant Boulevard and the Wabasha Barge Site was completed to determine the recommended traffic control with for the proposed barge terminal site being constructed along the Mississippi River. As a part of the project, a new driveway will be constructed along 5th Grant Boulevard to allow trucks to access the new site. The project is located in northwest Wabasha and just northwest of Gundersen St. Elizabeth's Hospital. TH 61 is the main traffic artery connecting Wabasha to the surrounding communities up and down the Mississippi River, while 5th Grant Blvd is a low traffic connecting road between TH 61 and Wabasha. See **Figure 1** for the project location map. Trucks accessing the site will follow a specific truck route to and from the site, which will take them from the project site on 5th Grant Blvd, along TH 61, and then onto Shields Ave. The route map can be found in the **Appendix**.

Figure 1: Project Location Map



Existing Conditions

The intersection of TH 61 and County Road 10/ 5th Grant Blvd has the following characteristics:

- Side street stop-controlled intersection
- The speed limit on TH 61 is 55 MPH
- The speed limit on County Road 10 is 40 MPH
- The speed limit on 5th Grant Blvd is 40 MPH
- TH 61 is an undivided 2 lane roadway north of the intersection, and a divided 4 lane roadway south of the intersection
- The intersection has left and right turn lanes along the northbound and southbound approaches
- TH 61 is classified as a Principal Arterial
- County Road 10 is classified as a Major Collector
- 5th Grant Blvd is classified as a Major Collector
- Downtown Wabasha and the intersection of Pembroke Ave and Main St W is approximately two miles east of the study intersection
- There is no pedestrian or bicycle infrastructure along TH 61, County Road 10, or 5th Grant Blvd

The intersection of TH 61 and Shields Ave has the following characteristics:

- Restricted Crossing U-Turn (RCUT) intersection (Built in 2019)
- Each U-Turn location includes a Loon bump out to accommodate trucks
- The speed limit on TH 61 is 55 MPH
- The speed limit on Shields Ave is MPH
- TH 61 is a divided 4 lane highway
- Shields Ave at the study intersection is classified as a Local Road
- TH 61 is classified as a Principal Arterial
- Downtown Wabasha and the intersection of Pembroke Ave and Main St W is approximately 1.1 miles northeast of the study intersection
- There is no pedestrian or bicycle infrastructure along TH 61 or Shields Ave immediately adjacent to the study intersection

Currently, the 5th Grant Boulevard and Project Driveway intersection does not exist.

Data Collection

A traffic count was completed on September 29, 2022. A 13-hour count was completed for the intersection of County Road 10/5th Grant Blvd and Highway 61. The AM peak hour was found to be 9:30-10:30 AM and the PM peak hour was found to be 3:45-4:45 PM. A 13-hour count from 2015 for the intersection of TH 61 and Shields Ave was available from a previous study. Traffic volumes from the peak hours of the previous count was compared to the new count. The volumes were found to differ by at most 25 vehicles, or approximately 10%. The previous counts were adjusted to match in with the new count. The turning movement counts are included in the **Appendix**.

Safety Analysis

A crash review was completed for the three intersections being investigated in this study. This review analyzed the last three years (2019-2021) of crash data, which was obtained from the Minnesota Crash Mapping Analysis Tool (MnCMAT2). Over the past three years, no crashes were recorded at the intersection of TH 61 and County Road 10 and on 5th Grant Ave near the barge site. At the intersection of TH 61 and Shields Ave there were four reported crashes, one minor injury crash, one possible injury crash, and two property damage only crashes. The RCUT at the TH 61 and Shields Ave intersection was built during 2019, and one of the four crashes occurred while construction was ongoing. That crash was the minor injury crash, which was a left turn crash involving a northbound left turning vehicle and a southbound vehicle. The possible injury incident was a rear end crash involving an eastbound right turn vehicle onto southbound TH 61 who turned in front of another southbound vehicle and was not being able to speed up in time. Weather was not a factor in either crash.

MnDOT uses a comparison of the crash rate and the critical rate when determining whether there is a safety issue at an intersection. The crash rate is the number of crashes per million entering vehicles (MEV). The critical rate is a statistical comparison based on similar intersections statewide. An observed crash rate greater than the critical rate indicates that the intersection operates outside of the expected, normal range. The critical index reports the magnitude of this difference and a critical index of less than one indicates that the intersection is operating within the normal range.

At TH 61 and Shields Ave, the total crash critical index is less than one for the analysis period which concludes that this intersection is operating within the normal range. The observed crash rate with three years of crash data was found to be 0.45, which is above the average of 0.19 for similar intersections statewide but below the critical rate of 0.61. The fatal and serious injury critical index is 0, as no fatal or serious injury crashes have occurred in the last three years. The intersection crash worksheets for each intersection are included in the **Appendix**.

Future Conditions

Traffic Forecasting

Future traffic volumes for 2042 were developed based on current and past volume data collected from the MnDOT Traffic Mapping Application. Historic growth rates throughout the project area are listed below:

- TH 61 north of County Road 10: 0.48%
- TH 61 south of Shields Ave: 0.85%
- 5th Grant Blvd east of TH 61: -0.08%
- County Road 10 west of TH 61: 0.96%
- Shields Ave/Hiawatha Dr east of TH 61: 0.16%

Based on the historic growth rates, a growth rate of 0.5% per year was assumed for TH 61 north of County Road, 5th Grant Blvd east of TH 61, and Shields Ave/Hiawatha Dr east of TH 61. A growth rate of 1% per year was assumed for TH 61 south of Shields Ave and County Road 10 west of TH 61.

The existing and 2042 average daily traffic volumes (ADTs) are listed in **Table 1** below.

Table 1 – Traffic Volumes

Location	2022 ADT	2042 ADT
TH 61 north of County Road 10	5,500	6,050
County Road 10 west of TH 61	560	675
5th Grant Blvd east of TH 61	525	575
TH 61 south of County Road 10	5,700	6,300
Shields Ave/Hiawatha Dr east of TH 61	3,100	3,400
Shields Ave west of TH 61	1,700	1,800
TH 61 south of Shields Ave	3,600	4,300

Proposed Development

The site is currently agricultural. A new barge terminal facility is proposed that will receive Mississippi River dredge material from the US Corps of Engineers and transport the material offsite. The barge facility is planned to be built on the north side of 5th Grant Blvd approximately 1,500 feet northwest of Steele Rd. Concept plans showing the proposed development are included in the **Appendix**.

The site will be operational between April and October. 100 truckloads per day on average are planned into and out of the site between 7:00 AM and 5:30 PM with the truckloads evenly distributed throughout the day. Based on this information 10 trucks were assumed to both enter and exit the site during the AM and PM peak hours. The proposed development will have access to TH 61 via 5th Grant Blvd, with the TH 61 at 5th Grant Blvd and TH 61 at Shields Ave intersections being primary intersections along the truck route to and from the barge facility.

Operational Analysis

The traffic operation analysis for the intersection included an evaluation of existing intersection delay and Level of Service (LOS). LOS results are described using letters ranging from A to F. These letters serve to describe a range of operating conditions for different types of facilities. Levels of Service are calculated based on the Highway Capacity Manual (HCM) 6th Edition, which defines the LOS, based on control delay. Control delay is the delay experienced by vehicles slowing down as they are approaching the intersection, the wait time at the intersection, and the time for the vehicle to speed up through the intersection and enter into the traffic stream. The average intersection control delay is a volume weighted average of delay experienced by all motorists entering the intersection on all intersection approaches. The control delay is modeled within the analysis software Trafficware Synchro. LOS D is commonly taken as an acceptable design year LOS.

Existing and forecasted turning movement counts were analyzed in Synchro for the intersections of TH 61 and CR 10/5th Grant Blvd, and TH 61 and Shields Ave. The intersection of TH 61 and Hiawatha Avenue was not analyzed, as the only traffic added as a result of the project are approximately 10 vehicles per hour of mainline traffic, approximately a 4% increase. There are no additional vehicles turning at this intersection as a result of completing the project. The TH 61 and Shields Ave intersection is an RCUT, and both U turns are included in the analysis, separately. **Table 1** shows the operational results for the existing conditions.

Table 1: Existing Conditions (2022) Traffic Operations Analysis

		Traffic Delay (sec/veh)											
		AM Peak Hour						PM Peak Hour					
Intersection	Approach	Movement (Delay - LOS)				Approach (Delay - LOS)	Intersection (Delay - LOS)	Movement (Delay - LOS)				Approach (Delay - LOS)	Intersection (Delay - LOS)
		U	L	T	R			U	L	T	R		
TH 61 at CR 10/5th Grant Blvd	EB	-	10 - B	10 - B	10 - B	10 - B	2 - A	-	11 - B	11 - B	11 - B	11 - B	2 - A
	WB	-	10 - B	10 - B	10 - B	10 - B		-	12 - B	12 - B	12 - B	12 - B	
	NB	-	8 - A	0 - A	0 - A	1 - A		-	8 - A	0 - A	0 - A	1 - A	
	SB	-	8 - A	0 - A	0 - A	2 - A		-	8 - A	0 - A	0 - A	1 - A	
North U-Turn	NB	9 - A	-	0 - A	-	3 - A	2 - A	9 - A	-	0 - A	-	3 - A	1 - A
	SB	-	-	0 - A	-	0 - A		-	-	0 - A	-	0 - A	
TH 61 at Shields	EB	-	-	-	9 - A	9 - A	4 - A	-	-	-	10 - B	10 - B	4 - A
	WB	-	-	-	10 - B	10 - B		-	-	-	10 - B	10 - B	
	NB	-	8 - A	0 - A	0 - A	1 - A		-	8 - A	0 - A	0 - A	1 - A	
	SB	-	8 - A	0 - A	0 - A	3 - A		-	8 - A	0 - A	0 - A	3 - A	
South U-Turn	NB	-	-	0 - A	-	0 - A	1 - A	-	-	0 - A	-	0 - A	1 - A
	SB	8 - A	-	0 - A	-	2 - A		9 - A	-	0 - A	-	3 - A	

Table 1 shows the overall intersection delay and movement delays for each intersection on TH 61, including the U-Turn locations for the RCUT at Shields Ave. The overall intersection delay at all four locations operate with LOS A during both peak hours, while the approach delay for the side streets of TH 61 operate at LOS B.

Table 2 shows the 2042 No Build traffic operations.

Table 2: 2042 Traffic Operations Analysis – No Build Scenario

		Traffic Delay (sec/veh)											
		AM Peak Hour						PM Peak Hour					
Intersection	Approach	Movement (Delay - LOS)				Approach (Delay - LOS)	Intersection (Delay - LOS)	Movement (Delay - LOS)				Approach (Delay - LOS)	Intersection (Delay - LOS)
		U	L	T	R			U	L	T	R		
TH 61 at CR 10/5th Grant Blvd	EB	-	10 - B	10 - B	10 - B	10 - B	2 - A	-	12 - B	12 - B	12 - B	12 - B	2 - A
	WB	-	10 - B	10 - B	10 - B	10 - B		-	14 - B	14 - B	14 - B	14 - B	
	NB	-	8 - A	0 - A	0 - A	1 - A		-	8 - A	0 - A	0 - A	1 - A	
	SB	-	8 - A	0 - A	0 - A	2 - A		-	8 - A	0 - A	0 - A	1 - A	
North U-Turn	NB	9 - A	-	0 - A	-	3 - A	2 - A	10 - B	-	0 - A	-	3 - A	1 - A
	SB	-	-	0 - A	-	0 - A		-	-	0 - A	-	0 - A	
TH 61 at Shields	EB	-	-	-	10 - B	10 - B	4 - A	-	-	-	10 - B	10 - B	4 - A
	WB	-	-	-	10 - B	10 - B		-	-	-	10 - B	10 - B	
	NB	-	8 - A	0 - A	0 - A	1 - A		-	8 - A	0 - A	0 - A	1 - A	
	SB	-	8 - A	0 - A	0 - A	3 - A		-	9 - A	0 - A	0 - A	3 - A	
South U-Turn	NB	-	-	0 - A	-	0 - A	1 - A	-	-	0 - A	-	0 - A	1 - A
	SB	8 - A	-	0 - A	-	2 - A		9 - A	-	0 - A	-	3 - A	

Table 2 shows that with 2042 volumes the overall intersection delay operates at LOS A during both peak hours and all approaches operate with LOS A or B which is consistent with 2022 volumes.

Tables 3 and 4 show the operational analysis of the 2022 and 2042 traffic volumes with the proposed barge facility. These tables help to illustrate how the proposed facility would affect operations.

Table 3: 2022 Traffic Operations Analysis – Build Scenario

		Traffic Delay (sec/veh)											
		AM Peak Hour						PM Peak Hour					
Intersection	Approach	Movement (Delay - LOS) U	L	T	R	Approach (Delay - LOS)	Intersection (Delay - LOS)	Movement (Delay - LOS) U	L	T	R	Approach (Delay - LOS)	Intersection (Delay - LOS)
TH 61 at CR 10/5th Grant Blvd	EB	-	10 - B	10 - B	10 - B	10 - B	2 - A	-	11 - B	11 - B	11 - B	11 - B	3 - A
	WB	-	13 - B	13 - B	13 - B	13 - B		-	17 - C	17 - C	17 - C	17 - C	
	NB	-	8 - A	0 - A	0 - A	1 - A		-	8 - A	0 - A	0 - A	1 - A	
	SB	-	8 - A	0 - A	0 - A	2 - A		-	8 - A	0 - A	0 - A	1 - A	
North U-Turn	NB	9 - A	-	0 - A	-	3 - A	2 - A	9 - A	-	0 - A	-	3 - A	1 - A
	SB	-	-	0 - A	-	0 - A		-	-	0 - A	-	0 - A	
TH 61 at Shields	EB	-	-	-	9 - A	9 - A	5 - A	-	-	-	10 - B	10 - B	4 - A
	WB	-	-	-	10 - B	10 - B		-	-	-	10 - B	10 - B	
	NB	-	8 - A	0 - A	0 - A	1 - A		-	8 - A	0 - A	0 - A	1 - A	
	SB	-	8 - A	0 - A	0 - A	3 - A		-	9 - A	0 - A	0 - A	3 - A	
South U-Turn	NB	-	-	0 - A	-	0 - A	1 - A	-	-	0 - A	-	0 - A	2 - A
	SB	8 - A	-	0 - A	-	3 - A		9 - A	-	0 - A	-	3 - A	
New Driveway Access / 5th Grant Blvd	EB	-	1 - A	0 - A	-	1 - A	2 - A	-	2 - A	0 - A	-	1 - A	2 - A
	WB	-	-	0 - A	-	0 - A		-	-	0 - A	-	0 - A	
	WB	-	8 - A	-	-	8 - A		-	9 - A	-	-	9 - A	

Table 3 shows that the overall intersections continue to operate with LOS A during both peak hours. The westbound approach of TH 61 at CR 10/5th Grant Blvd worsens to LOS C during the PM peak hour with the proposed development. All other approaches continue to operate with LOS A or B during both peak hours.

Table 4: 2042 Traffic Operations Analysis – Build Scenario

		Traffic Delay (sec/veh)											
		AM Peak Hour						PM Peak Hour					
Intersection	Approach	Movement (Delay - LOS) U	L	T	R	Approach (Delay - LOS)	Intersection (Delay - LOS)	Movement (Delay - LOS) U	L	T	R	Approach (Delay - LOS)	Intersection (Delay - LOS)
TH 61 at CR 10/5th Grant Blvd	EB	-	10 - B	10 - B	10 - B	10 - B	2 - A	-	12 - B	12 - B	12 - B	12 - B	3 - A
	WB	-	12 - B	12 - B	12 - B	12 - B		-	19 - C	19 - C	19 - C	19 - C	
	NB	-	8 - A	0 - A	0 - A	1 - A		-	8 - A	0 - A	0 - A	1 - A	
	SB	-	8 - A	0 - A	0 - A	2 - A		-	8 - A	0 - A	0 - A	1 - A	
North U-Turn	NB	9 - A	-	0 - A	-	3 - A	1 - A	10 - B	-	0 - A	-	3 - A	1 - A
	SB	-	-	0 - A	-	0 - A		-	-	0 - A	-	0 - A	
TH 61 at Shields	EB	-	-	-	10 - B	10 - B	4 - A	-	-	-	11 - B	11 - B	4 - A
	WB	-	-	-	10 - B	10 - B		-	-	-	10 - B	10 - B	
	NB	-	8 - A	0 - A	0 - A	1 - A		-	8 - A	0 - A	0 - A	1 - A	
	SB	-	8 - A	0 - A	0 - A	3 - A		-	9 - A	0 - A	0 - A	3 - A	
South U-Turn	NB	-	-	0 - A	-	0 - A	1 - A	-	-	0 - A	-	0 - A	2 - A
	SB	8 - A	-	0 - A	-	2 - A		9 - A	-	0 - A	-	3 - A	
New Driveway Access / 5th Grant Blvd	EB	-	1 - A	0 - A	-	1 - A	2 - A	-	2 - A	0 - A	-	1 - A	2 - A
	WB	-	-	0 - A	-	0 - A		-	-	0 - A	-	0 - A	
	WB	-	8 - A	-	-	8 - A		-	9 - A	-	-	9 - A	

Table 4 shows that, similar to the 2022 conditions the overall intersection delay at all four locations is LOS A during both peak hours. The approach delay for the most approaches along side streets of TH 61 operate at LOS B, with the Westbound approach of TH 61 at CR 10/5th Grant Blvd operating at LOS C.

The operational analysis indicates that both intersections are expected to operate acceptably as a side through 2042 whether or not the barge facility is built. Detailed operational results are included in the **Appendix**.

Summary

TH 61 and County Road 10/5th Grant Boulevard

With the current volumes and geometry, the intersection of TH 61 and CR 10/5th Grant Blvd operates well. There have been no crashes at the intersection in the last three years. This intersection will see an increase in truck traffic with the development of the proposed barge facility, and due to the operational schedule, there will not be peak times with large volumes of truck traffic, but instead the trucks will be well dispersed throughout the day. This will not lead to a significant impact in traffic, as the estimates are there will be 10 truck arrivals to the site and 10 truck departures from the site every hour. The current two way stop configuration is sufficient for current 2022 and for future 2040 volumes, and no additional intersection control should be required during this time period. The operational analysis indicated that all approaches would operate with LOS C or better during both peak hours.

TH 61 and Shields Avenue

Under current conditions, the intersection of TH 61 and Shields Ave operates well. There have been four crashes at the intersection over the last three years, but none have resulted in serious injury or fatality. The crash that occurred during construction of the RCUT was a minor injury crash. With the opening of the proposed barge facility, there will be an increase of truck traffic at this intersection, however with the operation schedule being spread out throughout the day, there will not be peak times during the day that sees increased truck traffic, and it will remain rather consistent. The operational analysis indicated that all approaches would operate with LOS B or better during both peak hours.

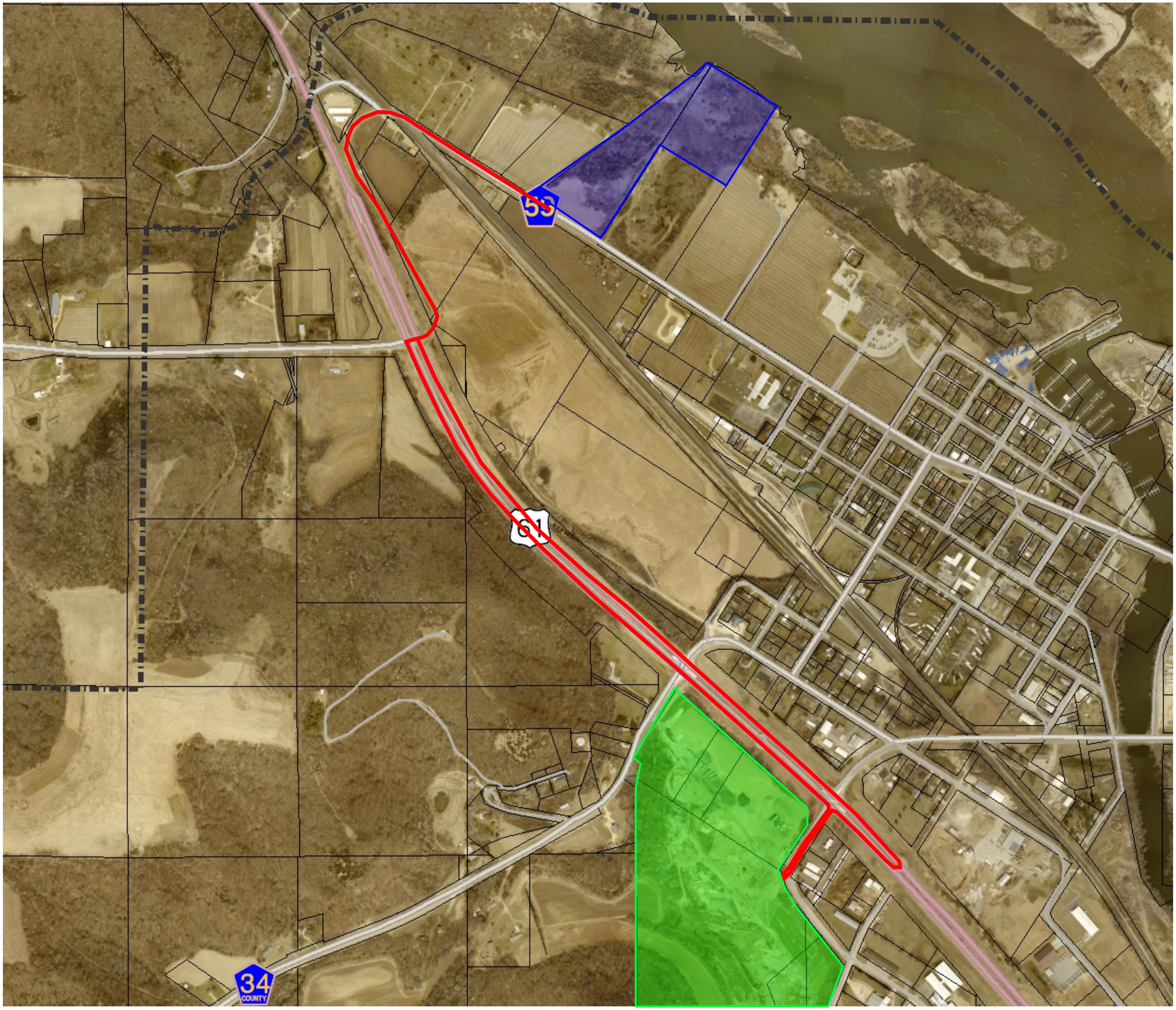
5th Grant Boulevard and Barge Site Driveway

Currently there is no intersection at the project site, and 5th Grand Boulevard operates at LOS A. With construction, very little will change in terms of operation. The new intersection will operate at LOS A, and intersection delay times will be minimal. Turn lanes for site access are not necessary based upon both the vehicle volumes and the speed limit of the roadway.

Recommendation

Based on the analysis reviewed in this memorandum, no mitigation measures are recommended with the construction of the barge facility. The operational analysis indicated that the intersections in the project area will continue to operate with minimal delay through 2042. The existing safety analysis indicated that there are no crash concerns in the project area that need to be addressed.

Appendix



CITY OF WABASHA

Legend

City Limits

Roads

- Local Roads
- Interstate
- US Highway
- State Highway
- County Roads

Parcels (09/01/22)

Truck Route

0 1,053 Feet

BOLTON & MENK

Real People. Real Solutions.

Disclaimer:

This drawing is neither a legally recorded map nor a survey and is not intended to be used as one. This drawing is a compilation of records, information, and data located in various city, county, and state offices, and other sources affecting the area shown, and is to be used for reference purposes only. The City of Wabasha is not responsible for any inaccuracies herein contained.

Bolton & Menk, Inc.

Turning Movement Counts

File Name : Hwy 61 & CR 10-5th Grant Blvd, 9-29-22, 6am-7pm
Site Code : 4
Start Date : 9/29/2022
Page No : 1

Hwy 61 & 5th Grant Blvd/CR 10
Wabasha, MN

Groups Printed- Cars + - Trucks

	Highway 61 Southbound						5th Grant Blvd Westbound						Highway 61 Northbound						County Rd 10 Eastbound						
Start Time	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Int. Total
06:00 AM	0	14	1	0	0	15	0	1	0	0	0	1	0	33	0	0	0	33	2	0	0	0	0	2	51
06:15 AM	0	17	3	0	0	20	0	0	0	0	0	0	0	26	0	0	0	26	0	2	0	0	0	2	48
06:30 AM	0	15	1	0	0	16	2	0	0	0	0	2	0	31	1	0	0	32	1	0	1	0	0	2	52
06:45 AM	1	25	0	0	0	26	2	0	0	0	0	2	0	30	3	1	0	34	0	0	0	0	0	0	62
Total	1	71	5	0	0	77	4	1	0	0	0	5	0	120	4	1	0	125	3	2	1	0	0	6	213
07:00 AM	1	33	1	0	0	35	1	0	0	0	0	1	0	39	1	0	0	40	7	1	0	0	0	8	84
07:15 AM	0	42	3	0	0	45	1	1	0	0	0	2	0	35	4	0	0	39	4	2	0	0	0	6	92
07:30 AM	0	34	7	0	0	41	3	0	0	0	0	3	2	28	3	0	0	33	9	0	0	0	0	9	86
07:45 AM	0	27	1	0	0	28	2	1	0	0	0	3	1	27	5	0	0	33	5	2	0	0	0	7	71
Total	1	136	12	0	0	149	7	2	0	0	0	9	3	129	13	0	0	145	25	5	0	0	0	30	333
08:00 AM	0	30	0	0	0	30	3	1	0	0	0	4	1	35	2	0	0	38	4	1	0	0	0	5	77
08:15 AM	0	42	1	0	0	43	1	0	1	0	0	2	1	25	2	3	0	31	2	1	1	0	0	4	80
08:30 AM	0	24	1	0	0	25	1	0	2	0	0	3	0	31	1	1	0	33	7	0	0	0	0	7	68
08:45 AM	0	37	1	0	0	38	3	0	0	0	0	3	2	34	2	0	0	38	5	0	0	0	0	5	84
Total	0	133	3	0	0	136	8	1	3	0	0	12	4	125	7	4	0	140	18	2	1	0	0	21	309
09:00 AM	0	41	4	0	0	45	1	0	0	0	0	1	1	38	2	0	0	41	2	0	0	0	0	2	89
09:15 AM	0	21	2	0	0	23	2	0	0	0	0	2	0	40	2	0	0	42	7	0	1	0	0	8	75
09:30 AM	0	41	9	0	0	50	1	0	1	0	0	2	0	38	3	1	0	42	3	1	1	0	0	5	99
09:45 AM	1	31	8	0	0	40	4	1	0	0	0	5	0	31	0	1	0	32	5	1	1	0	0	7	84
Total	1	134	23	0	0	158	8	1	1	0	0	10	1	147	7	2	0	157	17	2	3	0	0	22	347
10:00 AM	0	51	3	0	0	54	3	0	1	0	0	4	1	42	3	1	0	47	2	1	1	0	0	4	109
10:15 AM	0	38	5	0	0	43	6	0	0	0	0	6	1	31	4	1	0	37	3	0	0	0	0	3	89
10:30 AM	1	40	3	0	0	44	1	0	2	0	0	3	0	30	2	0	0	32	4	0	0	0	0	4	83
10:45 AM	0	40	3	0	0	43	4	0	1	0	0	5	0	44	1	0	0	45	1	0	0	0	0	1	94
Total	1	169	14	0	0	184	14	0	4	0	0	18	2	147	10	2	0	161	10	1	1	0	0	12	375
11:00 AM	0	40	3	0	0	43	3	0	0	0	0	3	0	32	5	0	0	37	1	1	0	0	0	2	85
11:15 AM	0	32	7	0	0	39	3	0	1	0	0	4	0	36	1	0	0	37	2	0	0	0	0	2	82
11:30 AM	1	41	3	0	0	45	6	0	0	0	0	6	0	36	2	0	0	38	1	1	0	0	0	2	91
11:45 AM	0	55	0	0	0	55	0	0	2	0	0	2	1	48	1	1	0	51	1	0	0	0	0	1	109
Total	1	168	13	0	0	182	12	0	3	0	0	15	1	152	9	1	0	163	5	2	0	0	0	7	367

Bolton & Menk, Inc.

Turning Movement Counts

File Name : Hwy 61 & CR 10-5th Grant Blvd, 9-29-22, 6am-7pm
Site Code : 4
Start Date : 9/29/2022
Page No : 2

Hwy 61 & 5th Grant Blvd/CR 10
Wabasha, MN

Groups Printed- Cars + - Trucks

	Highway 61 Southbound						5th Grant Blvd Westbound						Highway 61 Northbound						County Rd 10 Eastbound						
Start Time	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Int. Total
12:00 PM	0	56	2	0	0	58	4	0	0	0	0	4	0	37	3	0	0	40	2	0	0	0	0	2	104
12:15 PM	1	33	4	0	1	39	5	0	2	0	0	7	1	44	4	1	0	50	4	0	0	0	0	4	100
12:30 PM	1	59	6	0	0	66	2	0	0	0	0	2	1	42	5	1	0	49	2	0	0	0	0	2	119
12:45 PM	0	35	1	0	0	36	3	1	1	0	0	5	1	44	6	1	0	52	3	1	0	0	0	4	97
Total	2	183	13	0	1	199	14	1	3	0	0	18	3	167	18	3	0	191	11	1	0	0	0	12	420
01:00 PM	1	38	3	0	1	43	5	1	0	0	0	6	0	56	1	2	0	59	1	2	0	0	0	3	111
01:15 PM	0	48	2	0	0	50	5	1	0	0	0	6	0	36	4	2	0	42	9	0	1	0	0	10	108
01:30 PM	0	63	4	0	0	67	4	0	0	0	0	4	1	37	3	0	0	41	5	2	1	0	0	8	120
01:45 PM	0	40	3	0	0	43	7	2	0	0	0	9	0	58	5	1	0	64	2	1	0	0	0	3	119
Total	1	189	12	0	1	203	21	4	0	0	0	25	1	187	13	5	0	206	17	5	2	0	0	24	458
02:00 PM	1	41	1	0	0	43	4	0	1	0	0	5	2	53	5	0	0	60	1	0	0	0	0	1	109
02:15 PM	1	44	4	0	0	49	7	0	2	0	0	9	0	65	3	1	0	69	2	1	0	0	0	3	130
02:30 PM	0	58	5	0	0	63	4	2	0	0	0	6	0	58	5	1	0	64	3	1	0	0	0	4	137
02:45 PM	2	50	4	0	0	56	7	0	3	0	0	10	0	57	6	0	0	63	3	0	0	0	0	3	132
Total	4	193	14	0	0	211	22	2	6	0	0	30	2	233	19	2	0	256	9	2	0	0	0	11	508
03:00 PM	0	47	5	0	0	52	6	2	0	0	0	8	0	60	8	1	0	69	6	3	0	0	0	9	138
03:15 PM	0	65	7	0	0	72	1	0	1	0	0	2	0	49	4	2	0	55	2	2	0	0	0	4	133
03:30 PM	1	54	6	0	0	61	6	0	0	0	0	6	1	58	4	0	0	63	1	0	0	0	0	1	131
03:45 PM	0	51	3	0	0	54	2	1	1	0	0	4	0	58	5	1	0	64	3	1	1	0	0	5	127
Total	1	217	21	0	0	239	15	3	2	0	0	20	1	225	21	4	0	251	12	6	1	0	0	19	529
04:00 PM	0	44	5	0	0	49	8	2	0	0	0	10	0	68	6	2	0	76	6	0	0	0	0	6	141
04:15 PM	1	89	3	0	0	93	6	1	2	0	0	9	1	54	4	0	0	59	8	0	1	0	0	9	170
04:30 PM	0	61	1	0	0	62	5	1	0	0	0	6	0	52	8	1	0	61	7	1	0	0	0	8	137
04:45 PM	0	53	1	0	0	54	2	4	0	0	0	6	1	51	4	0	0	56	7	1	0	0	0	8	124
Total	1	247	10	0	0	258	21	8	2	0	0	31	2	225	22	3	0	252	28	2	1	0	0	31	572
05:00 PM	0	55	6	0	0	61	3	4	0	0	0	7	1	55	3	0	0	59	4	2	1	0	0	7	134
05:15 PM	0	60	4	0	0	64	0	0	2	0	0	2	0	56	7	0	0	63	6	0	0	0	0	6	135
05:30 PM	0	49	3	0	0	52	3	1	0	0	0	4	0	41	4	1	0	46	2	2	0	0	0	4	106
05:45 PM	1	39	3	1	0	44	2	1	0	0	0	3	0	31	3	1	0	35	3	0	0	0	0	3	85
Total	1	203	16	1	0	221	8	6	2	0	0	16	1	183	17	2	0	203	15	4	1	0	0	20	460
06:00 PM	0	44	0	0	0	44	2	0	0	0	0	2	0	31	4	1	0	36	9	0	0	0	0	9	91
06:15 PM	0	42	1	0	0	43	2	0	0	0	0	2	1	35	8	0	0	44	11	0	0	0	0	11	100
06:30 PM	0	48	3	0	0	51	2	0	1	0	0	3	0	24	9	0	0	33	5	2	1	0	0	8	95
06:45 PM	2	30	4	0	1	37	1	0	0	0	0	1	0	19	5	0	0	24	2	1	0	0	0	3	65
Total	2	164	8	0	1	175	7	0	1	0	0	8	1	109	26	1	0	137	27	3	1	0	0	31	351

Bolton & Menk, Inc.

Turning Movement Counts

File Name : Hwy 61 & CR 10-5th Grant Blvd, 9-29-22, 6am-7pm
Site Code : 4
Start Date : 9/29/2022

Hwy 61 & 5th Grant Blvd/CR 10
Wabasha, MN

Groups Printed- Cars + - Trucks

	Highway 61 Southbound						5th Grant Blvd Westbound						Highway 61 Northbound						County Rd 10 Eastbound						
	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Int. Total
Grand Total	17	2207	164	1	3	2392	161	29	27	0	0	217	22	2149	186	30	0	2387	197	37	12	0	0	246	5242
Apprch %	0.7	92.3	6.9	0	0.1		74.2	13.4	12.4	0	0		0.9	90	7.8	1.3	0		80.1	15	4.9	0	0		
Total %	0.3	42.1	3.1	0	0.1	45.6	3.1	0.6	0.5	0	0	4.1	0.4	41	3.5	0.6	0	45.5	3.8	0.7	0.2	0	0	4.7	
Cars +	17	1939	154	1	3	2114	149	29	23	0	0	201	22	1894	167	29	0	2112	183	36	12	0	0	231	4658
% Cars +	100	87.9	93.9	100	100	88.4	92.5	100	85.2	0	0	92.6	100	88.1	89.8	96.7	0	88.5	92.9	97.3	100	0	0	93.9	88.9
Trucks	0	268	10	0	0	278	12	0	4	0	0	16	0	255	19	1	0	275	14	1	0	0	0	15	584
% Trucks	0	12.1	6.1	0	0	11.6	7.5	0	14.8	0	0	7.4	0	11.9	10.2	3.3	0	11.5	7.1	2.7	0	0	0	6.1	11.1

Bolton & Menk, Inc.

Turning Movement Counts

Hwy 61 & 5th Grant Blvd/CR 10
Wabasha, MN

File Name : Hwy 61 & CR 10-5th Grant Blvd, 9-29-22, 6am-7pm
Site Code : 4
Start Date : 9/29/2022
Page No : 4

North

9/29/2022 06:00 AM
9/29/2022 06:45 PM

Cars +
Trucks

Highway 61 (north)

Out	In	Total
2055	2114	4169
267	278	545
2322	2392	4714

Right	Thru	Left	UTrn	Peds
17	1939	154	1	3
0	268	10	0	0
17	2207	164	1	3

5th Grant Blvd

Out	In	Total
212	201	413
11	16	27
223	217	440

Right	Thru	Left	UTrn	Peds
149	29	23	0	0
12	0	4	0	0
161	29	27	0	0

Highway 61 (south)

UTrn	Left	Thru	Right	Peds
29	167	1894	22	0
1	19	255	0	0
30	186	2149	22	0

Out	In	Total
2145	2112	4257
286	275	561
2431	2387	4818

County Rd 10

Out	In	Total
213	231	444
19	15	34
232	246	478

UTrn	Left	Thru	Right	Peds
0	12	36	183	0
0	0	1	14	0
0	12	37	197	0

Shields Ave (northwest)

Out	In	Total
0	0	0
0	0	0
0	0	0

Northeast

Out	In	Total
1	0	1
0	0	0
1	0	1

Southwest

Out	In	Total
29	0	29
1	0	1
30	0	30

Shields Ave (southeast)

Out	In	Total
0	0	0
0	0	0
0	0	0

Bolton & Menk, Inc.

Turning Movement Counts

File Name : Hwy 61 & CR 10-5th Grant Blvd, 9-29-22, 6am-7pm
Site Code : 4
Start Date : 9/29/2022
Page No : 5

Hwy 61 & 5th Grant Blvd/CR 10
Wabasha, MN

	Highway 61 Southbound						5th Grant Blvd Westbound						Highway 61 Northbound						County Rd 10 Eastbound						
Start Time	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 11:45 AM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 09:30 AM																									
09:30 AM	0	41	**9**	0	0	50	1	0	**1**	0	0	2	0	38	3	**1**	0	42	3	**1**	**1**	0	0	5	99
09:45 AM	**1**	31	8	0	0	40	4	**1**	0	0	0	5	0	31	0	1	0	32	**5**	1	1	0	0	**7**	84
10:00 AM	0	**51**	3	0	0	**54**	3	0	1	0	0	4	**1**	**42**	3	1	0	**47**	2	1	1	0	0	4	**109**
10:15 AM	0	38	5	0	0	43	**6**	0	0	0	0	**6**	1	31	**4**	1	0	37	3	0	0	0	0	3	89
Total Volume	1	161	25	0	0	187	14	1	2	0	0	17	2	142	10	4	0	158	13	3	3	0	0	19	381
% App. Total	0.5	86.1	13.4	0	0		82.4	5.9	11.8	0	0		1.3	89.9	6.3	2.5	0		68.4	15.8	15.8	0	0		
PHF	.250	.789	.694	.000	.000	.866	.583	.250	.500	.000	.000	.708	.500	.845	.625	1.00	.000	.840	.650	.750	.750	.000	.000	.679	.874
Peak Hour Analysis From 12:00 PM to 06:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 03:45 PM																									
03:45 PM	0	51	3	0	0	54	2	1	1	0	0	4	0	58	5	1	0	64	3	**1**	**1**	0	0	5	127
04:00 PM	0	44	**5**	0	0	49	**8**	**2**	0	0	0	**10**	0	**68**	6	**2**	0	**76**	6	0	0	0	0	6	141
04:15 PM	**1**	**89**	3	0	0	**93**	6	1	**2**	0	0	9	**1**	54	4	0	0	59	**8**	0	1	0	0	**9**	**170**
04:30 PM	0	61	1	0	0	62	5	1	0	0	0	6	0	52	**8**	1	0	61	7	1	0	0	0	8	137
Total Volume	1	245	12	0	0	258	21	5	3	0	0	29	1	232	23	4	0	260	24	2	2	0	0	28	575
% App. Total	0.4	95	4.7	0	0		72.4	17.2	10.3	0	0		0.4	89.2	8.8	1.5	0		85.7	7.1	7.1	0	0		
PHF	.250	.688	.600	.000	.000	.694	.656	.625	.375	.000	.000	.725	.250	.853	.719	.500	.000	.855	.750	.500	.500	.000	.000	.778	.846

Traffic Data Inc

PO Box 16296
St. Louis Park, MN 55416

File Name : 4 - Hwy 61 & Shields Ave, 12-3-15, 6am-7pm
Site Code : 4
Start Date : 12/3/2015
Page No : 1

Hwy 61 & Shields Ave
Wabasha, MN

Groups Printed- Cars + - Trucks

	Highway 61 Southbound						Shields Ave Westbound						Highway 61 Northbound						Shields Ave Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
06:00 AM	0	3	12	0	0	15	0	2	1	4	0	7	0	0	7	7	0	14	0	0	1	0	0	1	37
06:15 AM	0	5	11	0	0	16	0	1	3	14	0	18	0	0	16	5	0	21	0	0	0	1	0	1	56
06:30 AM	0	3	11	0	0	14	0	4	1	14	0	19	0	1	16	6	0	23	0	0	0	0	0	0	56
06:45 AM	0	6	14	4	0	24	0	2	4	8	0	14	0	1	19	13	0	33	0	0	0	0	0	0	71
Total	0	17	48	4	0	69	0	9	9	40	0	58	0	2	58	31	0	91	0	0	1	1	0	2	220
07:00 AM	0	8	19	2	0	29	0	4	6	12	0	22	0	4	19	5	0	28	0	0	2	0	0	2	81
07:15 AM	0	15	32	3	0	50	0	1	11	19	0	31	0	2	12	6	0	20	0	0	7	0	0	7	108
07:30 AM	0	19	21	4	0	44	0	6	7	18	0	31	0	2	24	11	0	37	0	1	2	0	0	3	115
07:45 AM	0	15	25	6	0	46	0	1	19	13	0	33	0	5	16	10	0	31	0	2	9	0	0	11	121
Total	0	57	97	15	0	169	0	12	43	62	0	117	0	13	71	32	0	116	0	3	20	0	0	23	425
08:00 AM	0	12	25	6	0	43	0	8	12	12	0	32	0	1	17	7	0	25	0	0	6	2	0	8	108
08:15 AM	0	12	20	1	0	33	0	6	9	10	0	25	0	2	20	3	0	25	0	1	7	0	0	8	91
08:30 AM	0	9	22	2	0	33	0	7	7	9	0	23	0	3	22	6	1	32	0	2	7	4	0	13	101
08:45 AM	0	8	24	1	0	33	0	3	8	13	0	24	0	2	14	5	0	21	0	2	6	1	0	9	87
Total	0	41	91	10	0	142	0	24	36	44	0	104	0	8	73	21	1	103	0	5	26	7	0	38	387
09:00 AM	0	10	14	2	0	26	0	6	8	7	0	21	0	1	12	1	0	14	0	2	7	2	0	11	72
09:15 AM	0	11	23	2	0	36	0	4	14	8	0	26	0	6	21	4	0	31	0	4	5	1	0	10	103
09:30 AM	0	8	18	5	0	31	0	3	10	11	0	24	0	2	23	4	0	29	0	3	14	3	0	20	104
09:45 AM	0	10	19	1	0	30	0	2	13	14	0	29	0	1	19	4	0	24	0	2	12	3	0	17	100
Total	0	39	74	10	0	123	0	15	45	40	0	100	0	10	75	13	0	98	0	11	38	9	0	58	379
10:00 AM	0	12	21	3	1	37	0	4	5	12	0	21	0	3	17	2	0	22	0	1	9	2	0	12	92
10:15 AM	0	10	21	6	0	37	0	3	12	15	0	30	0	3	26	2	0	31	0	1	7	4	0	12	110
10:30 AM	0	12	23	5	0	40	0	4	8	11	0	23	1	2	21	4	0	28	0	3	13	2	0	18	109
10:45 AM	0	7	18	7	0	32	0	5	3	9	0	17	0	1	34	5	0	40	0	4	8	5	0	17	106
Total	0	41	83	21	1	146	0	16	28	47	0	91	1	9	98	13	0	121	0	9	37	13	0	59	417
11:00 AM	0	12	17	2	0	31	0	3	8	10	0	21	0	2	21	9	0	32	0	3	9	3	0	15	99
11:15 AM	0	7	22	2	0	31	0	10	13	7	0	30	0	3	18	4	0	25	0	2	10	1	0	13	99
11:30 AM	0	8	14	4	0	26	0	3	15	14	0	32	0	2	20	3	0	25	0	5	5	5	0	15	98
11:45 AM	0	8	21	6	0	35	0	3	14	10	0	27	0	6	25	4	0	35	0	4	20	4	0	28	125
Total	0	35	74	14	0	123	0	19	50	41	0	110	0	13	84	20	0	117	0	14	44	13	0	71	421
12:00 PM	0	10	29	1	0	40	0	3	13	10	0	26	0	3	20	3	0	26	0	6	12	7	0	25	117
12:15 PM	0	12	20	7	0	39	0	2	15	11	0	28	0	1	19	6	0	26	0	5	18	2	0	25	118
12:30 PM	0	7	27	4	0	38	0	4	10	12	0	26	0	10	17	7	0	34	0	2	20	6	0	28	126
12:45 PM	0	7	16	4	0	27	0	10	12	12	0	34	0	4	20	4	0	28	0	4	4	3	0	11	100
Total	0	36	92	16	0	144	0	19	50	45	0	114	0	18	76	20	0	114	0	17	54	18	0	89	461
01:00 PM	0	12	30	3	0	45	0	3	9	15	0	27	0	8	25	8	0	41	0	6	12	3	0	21	134
01:15 PM	0	10	20	3	0	33	0	3	14	11	0	28	0	2	23	4	0	29	0	2	12	3	0	17	107
01:30 PM	0	5	30	3	0	38	0	2	10	11	0	23	0	3	27	3	0	33	0	5	10	4	0	19	113
01:45 PM	0	12	25	3	0	40	0	5	11	12	0	28	0	3	29	5	0	37	0	4	10	3	0	17	122
Total	0	39	105	12	0	156	0	13	44	49	0	106	0	16	104	20	0	140	0	17	44	13	0	74	476

Traffic Data Inc

PO Box 16296
St. Louis Park, MN 55416

File Name : 4 - Hwy 61 & Shields Ave, 12-3-15, 6am-7pm
Site Code : 4
Start Date : 12/3/2015
Page No : 2

Hwy 61 & Shields Ave
Wabasha, MN

Groups Printed- Cars + - Trucks

	Highway 61 Southbound						Shields Ave Westbound						Highway 61 Northbound						Shields Ave Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
02:00 PM	0	7	22	3	0	32	0	4	5	10	0	19	0	0	21	7	0	28	0	3	8	5	0	16	95
02:15 PM	0	16	16	1	0	33	0	6	9	17	0	32	0	1	21	6	0	28	0	2	12	2	0	16	109
02:30 PM	0	12	25	4	0	41	0	5	9	14	0	28	0	1	40	5	0	46	0	2	5	2	0	9	124
02:45 PM	0	12	27	7	0	46	0	0	10	13	0	23	0	6	29	6	0	41	0	5	3	2	0	10	120
Total	0	47	90	15	0	152	0	15	33	54	0	102	0	8	111	24	0	143	0	12	28	11	0	51	448
03:00 PM	0	17	24	4	0	45	0	10	19	21	0	50	0	5	23	3	0	31	0	6	13	2	0	21	147
03:15 PM	0	37	29	2	0	68	0	6	11	21	0	38	0	1	25	3	0	29	0	2	7	7	0	16	151
03:30 PM	0	23	30	3	1	57	0	12	5	22	0	39	0	3	23	7	0	33	0	6	19	7	0	32	161
03:45 PM	0	19	35	4	0	58	0	5	2	12	0	19	0	4	33	7	0	44	0	3	11	3	0	17	138
Total	0	96	118	13	1	228	0	33	37	76	0	146	0	13	104	20	0	137	0	17	50	19	0	86	597
04:00 PM	0	24	15	1	0	40	0	10	9	18	0	37	0	0	37	4	0	41	0	6	19	4	0	29	147
04:15 PM	0	25	38	1	0	64	0	7	8	15	0	30	0	3	33	5	0	41	0	2	9	3	0	14	149
04:30 PM	0	15	30	5	0	50	0	6	2	19	0	27	0	2	30	1	0	33	0	3	16	3	0	22	132
04:45 PM	0	21	29	1	0	51	0	11	6	17	0	34	0	2	26	3	0	31	0	4	10	3	0	17	133
Total	0	85	112	8	0	205	0	34	25	69	0	128	0	7	126	13	0	146	0	15	54	13	0	82	561
05:00 PM	0	16	21	2	0	39	0	8	3	21	0	32	0	3	23	3	0	29	0	4	14	6	0	24	124
05:15 PM	0	12	28	1	0	41	0	4	3	8	0	15	0	3	20	3	0	26	0	1	7	3	0	11	93
05:30 PM	0	12	18	0	0	30	0	5	2	12	0	19	0	2	26	6	0	34	0	1	3	5	0	9	92
05:45 PM	0	8	16	2	0	26	0	2	2	7	0	11	0	3	23	1	0	27	0	2	8	1	0	11	75
Total	0	48	83	5	0	136	0	19	10	48	0	77	0	11	92	13	0	116	0	8	32	15	0	55	384
06:00 PM	0	6	29	0	0	35	0	5	1	6	0	12	0	1	25	5	0	31	0	1	4	1	0	6	84
06:15 PM	0	13	21	2	0	36	0	1	0	8	0	9	0	0	15	0	0	15	0	0	0	1	0	1	61
06:30 PM	0	13	16	1	0	30	0	1	3	9	0	13	0	2	18	2	0	22	0	2	3	4	0	9	74
06:45 PM	0	8	22	2	0	32	0	2	3	3	0	8	0	0	11	0	0	11	0	0	2	2	0	4	55
Total	0	40	88	5	0	133	0	9	7	26	0	42	0	3	69	7	0	79	0	3	9	8	0	20	274
Grand Total	0	621	1155	148	2	1926	0	237	417	641	0	1295	1	131	1141	247	1	1521	0	131	437	140	0	708	5450
Apprch %	0	32.2	60	7.7	0.1		0	18.3	32.2	49.5	0		0.1	8.6	75	16.2	0.1		0	18.5	61.7	19.8	0		
Total %	0	11.4	21.2	2.7	0	35.3	0	4.3	7.7	11.8	0	23.8	0	2.4	20.9	4.5	0	27.9	0	2.4	8	2.6	0	13	
Cars +	0	574	959	96	2	1631	0	214	331	577	0	1122	0	114	942	224	1	1281	0	84	355	125	0	564	4598
% Cars +	0	92.4	83	64.9	100	84.7	0	90.3	79.4	90	0	86.6	0	87	82.6	90.7	100	84.2	0	64.1	81.2	89.3	0	79.7	84.4
Trucks	0	47	196	52	0	295	0	23	86	64	0	173	1	17	199	23	0	240	0	47	82	15	0	144	852
% Trucks	0	7.6	17	35.1	0	15.3	0	9.7	20.6	10	0	13.4	100	13	17.4	9.3	0	15.8	0	35.9	18.8	10.7	0	20.3	15.6

Traffic Data Inc

PO Box 16296
St. Louis Park, MN 55416

File Name : 4 - Hwy 61 & Shields Ave, 12-3-15, 6am-7pm
Site Code : 4
Start Date : 12/3/2015
Page No : 3

Hwy 61 & Shields Ave
Wabasha, MN

North

12/3/2015 06:00 AM
12/3/2015 06:45 PM

Cars +
Trucks

Highway 61 (North)

Out	In	Total
1603	1631	3234
310	295	605
1913	1926	3839

Right	Thru	Left	UTrn	Peds
96	959	574	0	2
52	196	47	0	0
148	1155	621	0	2

Shields Ave (West)

Out	In	Total
541	564	1105
155	144	299
696	708	1404

UTrn	Left	Thru	Right	Peds
0	84	355	125	0
0	47	82	15	0
0	131	437	140	0

Shields Ave (East)

Out	In	Total
1153	1122	2275
152	173	325
1305	1295	2600

Right	Thru	Left	UTrn	Peds
577	331	214	0	0
64	86	23	0	0
641	417	237	0	0

Highway 61 (South)

UTrn	Left	Thru	Right	Peds
0	114	942	224	1
1	17	199	23	0
1	131	1141	247	1

Out	In	Total
1298	1281	2579
234	240	474
1532	1521	3053

Northwest corner

Out	In	Total
0	0	0
0	0	0
0	0	0

Northeast corner

Out	In	Total
0	0	0
0	0	0
0	0	0

Southwest corner

Out	In	Total
0	0	0
1	0	1
1	0	1

Southeast corner

Out	In	Total
0	0	0
0	0	0
0	0	0

Traffic Data Inc
PO Box 16296
St. Louis Park, MN 55416

File Name : 4 - Hwy 61 & Shields Ave, 12-3-15, 6am-7pm
Site Code : 4
Start Date : 12/3/2015

Hwy 61 & Shields Ave
Wabasha, MN

	Highway 61 Southbound						Shields Ave Westbound						Highway 61 Northbound						Shields Ave Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total

Peak Hour Analysis From 06:00 AM to 09:45 AM - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 07:15 AM

Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
07:15 AM	0	15	32	3	0	50	0	1	11	19	0	31	0	2	12	6	0	20	0	0	7	0	0	7	108
07:30 AM	0	19	21	4	0	44	0	6	7	18	0	31	0	2	24	11	0	37	0	1	2	0	0	3	115
07:45 AM	0	15	25	6	0	46	0	1	19	13	0	33	0	5	16	10	0	31	0	2	9	0	0	11	121
08:00 AM	0	12	25	6	0	43	0	8	12	12	0	32	0	1	17	7	0	25	0	0	6	2	0	8	108
Total Volume	0	61	103	19	0	183	0	16	49	62	0	127	0	10	69	34	0	113	0	3	24	2	0	29	452
% App. Total	0	33.3	56.3	10.4	0		0	12.6	38.6	48.8	0		0	8.8	61.1	30.1	0		0	10.3	82.8	6.9	0		
PHF	.000	.803	.805	.792	.000	.915	.000	.500	.645	.816	.000	.962	.000	.500	.719	.773	.000	.764	.000	.375	.667	.250	.000	.659	.934

Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 11:45 AM

Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
11:45 AM	0	8	21	6	0	35	0	3	14	10	0	27	0	6	25	4	0	35	0	4	20	4	0	28	125
12:00 PM	0	10	29	1	0	40	0	3	13	10	0	26	0	3	20	3	0	26	0	6	12	7	0	25	117
12:15 PM	0	12	20	7	0	39	0	2	15	11	0	28	0	1	19	6	0	26	0	5	18	2	0	25	118
12:30 PM	0	7	27	4	0	38	0	4	10	12	0	26	0	10	17	7	0	34	0	2	20	6	0	28	126
Total Volume	0	37	97	18	0	152	0	12	52	43	0	107	0	20	81	20	0	121	0	17	70	19	0	106	486
% App. Total	0	24.3	63.8	11.8	0		0	11.2	48.6	40.2	0		0	16.5	66.9	16.5	0		0	16	66	17.9	0		
PHF	.000	.771	.836	.643	.000	.950	.000	.750	.867	.896	.000	.955	.000	.500	.810	.714	.000	.864	.000	.708	.875	.679	.000	.946	.964

Peak Hour Analysis From 02:00 PM to 06:45 PM - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 03:00 PM

Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
03:00 PM	0	17	24	4	0	45	0	10	19	21	0	50	0	5	23	3	0	31	0	6	13	2	0	21	147
03:15 PM	0	37	29	2	0	68	0	6	11	21	0	38	0	1	25	3	0	29	0	2	7	7	0	16	151
03:30 PM	0	23	30	3	1	57	0	12	5	22	0	39	0	3	23	7	0	33	0	6	19	7	0	32	161
03:45 PM	0	19	35	4	0	58	0	5	2	12	0	19	0	4	33	7	0	44	0	3	11	3	0	17	138
Total Volume	0	96	118	13	1	228	0	33	37	76	0	146	0	13	104	20	0	137	0	17	50	19	0	86	597
% App. Total	0	42.1	51.8	5.7	0.4		0	22.6	25.3	52.1	0		0	9.5	75.9	14.6	0		0	19.8	58.1	22.1	0		
PHF	.000	.649	.843	.813	.250	.838	.000	.688	.487	.864	.000	.730	.000	.650	.788	.714	.000	.778	.000	.708	.658	.679	.000	.672	.927

Intersection Safety Screening

Intersection: 5th Grant Ave and Barge Site Road

Crash Data, 2019-2021.

Crashes by Crash Severity	
Fatal	0
Incapacitating Injury	0
Non-incapacitating Injury	0
Possible Injury	0
Property Damage	0
Total Crashes	0

Intersection Characteristics	
Entering Volume	400
Traffic Control	Thru / stop
Environment	Suburban
Speed Limit	40 mph

Annual crash cost = $0

Statewide Comparison *Urban Thru / Stop*

Total Crash Rate	
Observed	0.00
Statewide Average	0.19
Critical Rate	3.01
Critical Index	**0.00**

Fatal & Serious Injury Crash Rate	
Observed	0.00
Statewide Average	0.36
Critical Rate	126.07
Critical Index	**0.00**

The observed crash rate is the number of crashes per million entering vehicles (MEV). The critical rate is a statistical comparison based on similar intersections statewide. An observed crash rate greater than the critical rate indicates that the intersection operates outside the expected, normal range. The critical index reports the magnitude of this difference.

The observed total crash rate for this period is 0.00 per MEV; this is 100% below the critical rate. Based on similar statewide intersections, an additional 2 crashes over the three years would indicate this intersection operaters outside the normal range.

The observed fatal and serious injury crash rate for this period is 0.00 per 100 MEV; this is 100% below the critical rate. The intersection operates within the normal range.

Intersection Safety Screening

Intersection: Highway 61 and CR 10

Crash Data, 2019-2021.

Crashes by Crash Severity	
Fatal	0
Incapacitating Injury	0
Non-incapacitating Injury	0
Possible Injury	0
Property Damage	0
Total Crashes	0

Intersection Characteristics	
Entering Volume	5,239
Traffic Control	Thru / stop
Environment	Suburban
Speed Limit	55 mph

Annual crash cost = $0

Statewide Comparison *Urban Thru / Stop*

Total Crash Rate	
Observed	0.00
Statewide Average	0.19
Critical Rate	0.74
Critical Index	**0.00**

Fatal & Serious Injury Crash Rate	
Observed	0.00
Statewide Average	0.36
Critical Rate	12.27
Critical Index	**0.00**

The observed crash rate is the number of crashes per million entering vehicles (MEV). The critical rate is a statistical comparison based on similar intersections statewide. An observed crash rate greater than the critical rate indicates that the intersection operates outside the expected, normal range. The critical index reports the magnitude of this difference.

The observed total crash rate for this period is 0.00 per MEV; this is 100% below the critical rate. Based on similar statewide intersections, an additional 5 crashes over the three years would indicate this intersection operaters outside the normal range.

The observed fatal and serious injury crash rate for this period is 0.00 per 100 MEV; this is 100% below the critical rate. The intersection operates within the normal range.

Intersection Safety Screening

Intersection: Highway 61 and Shields Ave

Crash Data, 2019-2021.

Crashes by Crash Severity	
Fatal	0
Incapacitating Injury	0
Non-incapacitating Injury	1
Possible Injury	1
Property Damage	2
Total Crashes	4

Intersection Characteristics	
Entering Volume	8,200
Traffic Control	Thru / stop
Environment	Suburban
Speed Limit	55 mph

Annual crash cost = $89,400

Statewide Comparison *Urban Thru / Stop*

Total Crash Rate	
Observed	0.45
Statewide Average	0.19
Critical Rate	0.61
Critical Index	**0.74**

Fatal & Serious Injury Crash Rate	
Observed	0.00
Statewide Average	0.36
Critical Rate	8.48
Critical Index	**0.00**

The observed crash rate is the number of crashes per million entering vehicles (MEV). The critical rate is a statistical comparison based on similar intersections statewide. An observed crash rate greater than the critical rate indicates that the intersection operates outside the expected, normal range. The critical index reports the magnitude of this difference.

The observed total crash rate for this period is 0.45 per MEV; this is 26% below the critical rate. Based on similar statewide intersections, an additional 2 crashes over the three years would indicate this intersection operaters outside the normal range.

The observed fatal and serious injury crash rate for this period is 0.00 per 100 MEV; this is 100% below the critical rate. The intersection operates within the normal range.

Crash Detail Report - Short Form

TH 61 and Shields Ave

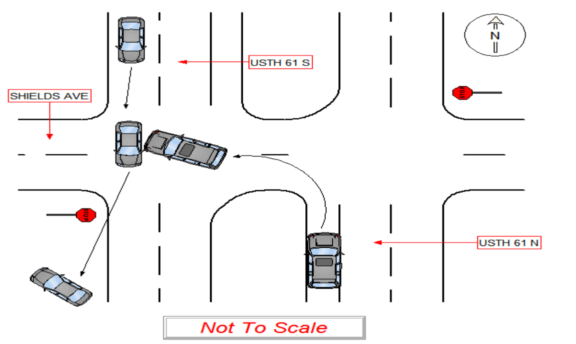
INCIDENT ID	ROUTE SYS	ROUTE NUM	MEASURE	ROUTE NAME	ROUTE ID	COUNTY	CITY
00735404	02-USTH	0061	59.806	USTH 61	0200000000000061-D	79-Wabasha	Wabasha

INTERSECT WITH	# VEH	# KILL	DATE	TIME	DAY	LAT	LONG	UTM X	UTM Y	WORK ZONE TYPE
	2	0	07/21/19	14:34	Sun	44.376392	-92.047027	575919.7	4914119.9	Lane Closure

BASIC TYPE	CRASH SEVERITY	FIRST HARMFUL	LIGHT CONDITION	WEATHER PRIMARY
Left Turn	B - Minor Injury	Motor Vehicle In Transport	Daylight	Clear

	Unit 1	Unit 2	Unit 3	Unit 4
Unit Type	Motor Vehicle in Transport	Motor Vehicle in Transport		
Vehicle Type	Sport Utility Vehicle	Passenger Car		
Direction of Travel	Northbound	Southbound		
Manuever	Turning Left	Moving Forward		
Age/Sex	21 M	28 M		
Physical Cond	Apparently Normal	Apparently Normal		
Contributing Factor 1	Failure to Yield Right-of-Way	No Clear Contributing Action		

OFFICER SKETCH



NARRATIVE

BAUER WAS THE DRIVER OF THE CHEVROLET TRAVELING NORTHBOUND USTH 61 ATTEMPTING TO MAKE A LEFT TURN ONTO SHIELDS AVE. GERSON WAS THE DRIVER OF THE TOYOTA TRAVELING SOUTHBOUND USTH 61. THE AREA IS AN ACTIVE CONSTRUCTION ZONE. BAUER STATED THERE WAS A VEHICLE IN THE SOUTHBOUND LEFT TURN LANE. BAUER DID NOT SEE GERSON TRAVELING SOUTHBOUND AND PERCEIVED SOUTHBOUND LANE TO BE CLEAR OF TRAFFIC AND STARTED TO MAKE A LEFT TURN. GERSON STEERED TO THE RIGHT IN ORDER TO AVOID A COLLISION. BAUER'S CHEVROLET COLLIDED WITH THE DRIVERS SIDE OF GERSON'S TOYOTA. GERSON'S TOYOTA RAN OF THE ROAD TO THE RIGHT SIDE AND ROLLED ONCE, COMING TO REST BACK ON ITS WHEELS. BAUER WAS NOT INJURED IN THE CRASH. WAS BELTED. NO AIRBAG DEPLOYMENT. GERSON SUSTAINED MINOR INJURIES AND WAS TRANSPORTED TO THE WABASHA HOSPITAL VIA GROUND AMBULANCE. ONCE AT THE

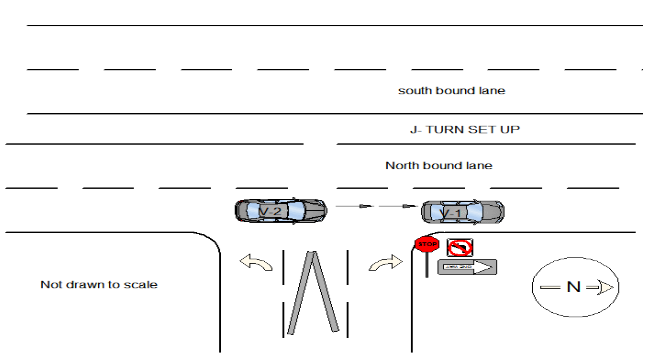
INCIDENT ID	ROUTE SYS	ROUTE NUM	MEASURE	ROUTE NAME	ROUTE ID	COUNTY	CITY
00781833	02-USTH	0061	59.842	USTH 61	0200000000000061-I	79-Wabasha	Wabasha

INTERSECT WITH	# VEH	# KILL	DATE	TIME	DAY	LAT	LONG	UTM X	UTM Y	WORK ZONE TYPE
	2	0	01/20/20	16:16	Mon	44.377618	-92.048319	575815.3	4914255.0	NOT APPLICABLE

BASIC TYPE	CRASH SEVERITY	FIRST HARMFUL	LIGHT CONDITION	WEATHER PRIMARY
Rear End	C - Possible Injury	Motor Vehicle In Transport	Daylight	Clear

	Unit 1	Unit 2	Unit 3	Unit 4
Unit Type	Motor Vehicle in Transport	Motor Vehicle in Transport		
Vehicle Type	Passenger Car	Passenger Car		
Direction of Travel	Westbound	Westbound		
Manuever	Turning Right	Moving Forward		
Age/Sex	25 M	59 F		
Physical Cond	Apparently Normal	Apparently Normal		
Contributing Factor 1	Other Contributing Action	No Clear Contributing Action		

OFFICER SKETCH



NARRATIVE

VEHICLE #1 WAS TRAVELING ON SHIELDS AVE COMING TO THE INTERSECTION OF HWY 61. DRIVER OF VEHICLE #1 STATED THAT THE ACCIDENT WAS HIS FAULT. HE STATED THAT HE BELIEVED THE INTERSECTION WAS A ROUND ABOUT. DRIVER #1 STATED HE THOUGHT THE OTHER VEHICLE WAS SLOWING DOWN SINCE IT WAS A ROUND ABOUT AND THAT HE PULLED OUT ON TO HIGHWAY 61 NORTHBOUND. HE STATED HE THEN REALIZED THAT IT WAS NOT A ROUND ABOUT AND THAT THE CAR BEHIND HIM WAS STILL COMING. HE STATED THAT HE TRIED TO ACCELERATE QUICKLY TO AVOID THE CRASH BUT WAS UNABLE TO DO SO AND WAS STRUCK FROM BEHIND. NO AIRBAGS DEPLOYED AND HE ADVISED THAT HE WAS NOT INJURED. DRIVER #1 PROVIDED INSURANCE INFORMATION AND HIS VEHICLE WAS TOWED BY WABASHA TOWING. VEHICLE #2 WAS TRAVELING NORTH ON HWY 61 COMING TO THE INTERSECTION AT SHIELDS AVE. DRIVER #2 STATED THAT SHE SAW THE VEHICLE PULL

Crash Detail Report - Short Form

TH 61 and Shields Ave

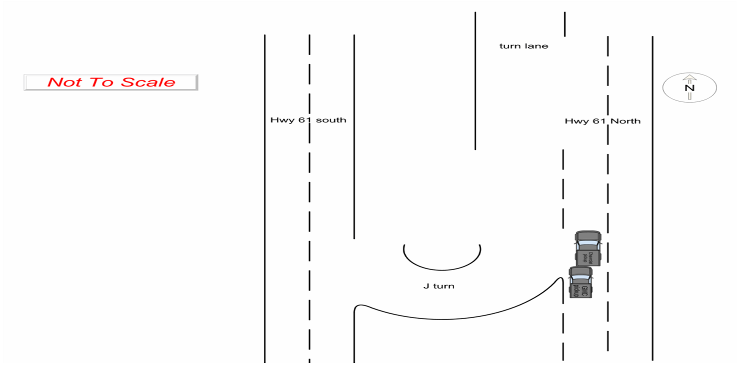
INCIDENT ID	ROUTE SYS	ROUTE NUM	MEASURE	ROUTE NAME	ROUTE ID	COUNTY	CITY
00841541	02-USTH	0061	59.853	USTH 61	0200000000000061-I	79-Wabasha	Wabasha

INTERSECT WITH	# VEH	# KILL	DATE	TIME	DAY	LAT	LONG	UTM X	UTM Y	WORK ZONE TYPE
SHIELDS AVE	2	0	09/18/20	16:27	Fri	44.377721	-92.048472	575802.9	4914266.2	NOT APPLICABLE

BASIC TYPE	CRASH SEVERITY	FIRST HARMFUL	LIGHT CONDITION	WEATHER PRIMARY
Rear End	N - Prop Damage Only	Motor Vehicle In Transport	Daylight	Clear

	Unit 1	Unit 2	Unit 3	Unit 4
Unit Type	Motor Vehicle in Transport	Motor Vehicle in Transport		
Vehicle Type	Pickup	Pickup		
Direction of Travel	Northbound	Northbound		
Manuever	Entering Traffic Lane	Moving Forward		
Age/Sex	20 M	68 M		
Physical Cond	Apparently Normal	Apparently Normal		
Contributing Factor 1	Failure to Yield Right-of-Way	Failure to Yield Right-of-Way		

OFFICER SKETCH



NARRATIVE

ON SEPTEMBER 18, 2020 AT 16:27 HOURS I, SERGEANT WAGONER RESPONDED TO A TRAFFIC CRASH WITH NO INJURIES AT THE J TURN LOCATED ON NORTHBOUND HIGHWAY 61 AND SHIELDS AVENUE. I ARRIVED ON SCENE AND SAW TWO VEHICLES, A WHITE CHEVY SILVERADO BEARING MINNESOTA PLATE NUMBER EVS554 AND A RED GMC SONOMA BEARING MINNESOTA PLATE NUMBER BUZ657. THE CHEVY HAD MINOR DAMAGE TO THE REAR CENTER OF IT AND THE GMC HAD MODERATE DAMAGE TO THE FRONT RIGHT. I SPOKE WITH GENE RICHARD MARX (11/06/1951), THE DRIVER OF THE GMC. MR. MARX STATED THAT HE WAS TRAVELING NORTHBOUND ON HIGHWAY 61 IN THE LEFT LANE BECAUSE HE WAS PREPARING TO TURN. MR. MARX STATED THAT THE CHEVY USED THE J TURN TO TURN FROM THE SOUTHBOUND LANE TO THE NORTHBOUND, PULLED IN FRONT OF HIM, AND HE WAS UNABLE TO STOP IN TIME. MR. MARX STATED THAT THE FRONT OF HIS VEHICLE MADE CONTACT WITH THE REAR

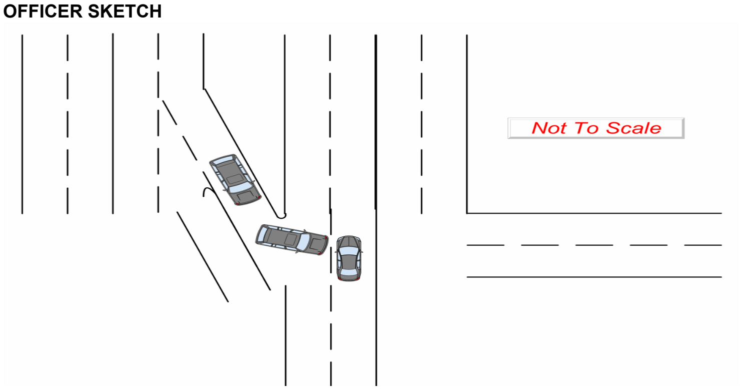
INCIDENT ID	ROUTE SYS	ROUTE NUM	MEASURE	ROUTE NAME	ROUTE ID	COUNTY	CITY
00809789	04-CSAH	0030	5.567	SHIELDS AVE	0400006595230030-I	79-Wabasha	Wabasha

INTERSECT WITH	# VEH	# KILL	DATE	TIME	DAY	LAT	LONG	UTM X	UTM Y	WORK ZONE TYPE
	2	0	05/10/20	15:35	Sun	44.377701	-92.048431	575806.2	4914264.1	NOT APPLICABLE

BASIC TYPE	CRASH SEVERITY	FIRST HARMFUL	LIGHT CONDITION	WEATHER PRIMARY
Angle	N - Prop Damage Only	Motor Vehicle In Transport	Daylight	Cloudy

	Unit 1	Unit 2	Unit 3	Unit 4
Unit Type	Motor Vehicle in Transport	Motor Vehicle in Transport		
Vehicle Type	Sport Utility Vehicle	Passenger Car		
Direction of Travel	Eastbound	Northbound		
Manuever	Turning Left	Moving Forward		
Age/Sex	21 F	21 F		
Physical Cond	Apparently Normal	Apparently Normal		
Contributing Factor 1	Failure to Yield Right-of-Way	No Clear Contributing Action		

OFFICER SKETCH



NARRATIVE

UNIT 1 WAS SOUTHBOUND AND TURNED INTO THE MEDIAN LANE TO EXIT HWY 61 AND ENTER THE CITY OF WABASHA ON SHIELDS AVE. UNIT 1 STOPPED AT THE YIELD SIGN AND PULLED OUT INTO THE NORTHBOUND LANE OF HWY 61 STRIKING UNIT 2 IN THE SIDE. UNIT 1 STATED SHE LOOKED AND DID NOT SEE ANY NORTHBOUND TRAFFIC. BOTH VEHICLES DISABLED. BOTH WERE TOWED BY WABASHA TOWING. UNIT 1 HAD NO INSURANCE AND FAILED TO YIELD THE RIGHT OF WAY. A CITATION WAS MAILED.

Crash Detail Report - Short Form

TH 61 and Shields Ave

Selection Filter:

WORK AREA: County('659523') - FILTER: Year('2019','2020','2021') - SPATIAL FILTER APPLIED

Analyst:	Notes:
Kelsey Retherford	

2: TH 61 & CR 10/5th Grant Blvd

Lane Group	EBT	WBT	NBL	NBT	NBR	SBL	SBT	SBR	All
Future Volume (vph)	19	17	10	142	2	25	161	1	377
Control Delay / Veh (s/v)	10	10	8	0	0	8	0	0	2
Queue Delay / Veh (s/v)	0	0	0	0	0	0	0	0	0
Total Delay / Veh (s/v)	10	10	8	0	0	8	0	0	2
Total Delay (hr)	0	0	0	0	0	0	0	0	0
Stops / Veh	1.00	1.00	1.60	0.00	0.00	1.52	0.00	0.00	0.24
Stops (#)	19	17	16	0	0	38	0	0	90
Average Speed (mph)	24	31	43	55	55	42	55	55	49
Total Travel Time (hr)	0	0	0	1	0	0	1	0	3
Distance Traveled (mi)	3	12	4	60	1	10	64	0	155
Fuel Consumed (gal)	0	1	0	2	0	1	2	0	7
Fuel Economy (mpg)	NA	NA	NA	29.9	NA	9.2	29.9	NA	23.1
CO Emissions (kg)	0.02	0.04	0.03	0.14	0.00	0.08	0.15	0.00	0.47
NOx Emissions (kg)	0.00	0.01	0.01	0.03	0.00	0.01	0.03	0.00	0.09
VOC Emissions (kg)	0.01	0.01	0.01	0.03	0.00	0.02	0.03	0.00	0.11
Unserved Vehicles (#)	0	0	0	0	0	0	0	0	0
Vehs dilemma zone (#)	0	0	0	0	0	0	0	0	0

4: Shields Ave & TH 61

Lane Group	EBR	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Future Volume (vph)	31	140	11	84	63	67	109	75	580
Control Delay / Veh (s/v)	9	10	8	0	0	8	0	0	4
Queue Delay / Veh (s/v)	0	0	0	0	0	0	0	0	0
Total Delay / Veh (s/v)	9	10	8	0	0	8	0	0	4
Total Delay (hr)	0	0	0	0	0	0	0	0	1
Stops / Veh	1.00	1.00	1.55	0.00	0.00	1.58	0.00	0.00	0.51
Stops (#)	31	140	17	0	0	106	0	0	294
Average Speed (mph)	18	28	32	55	55	31	55	55	37
Total Travel Time (hr)	0	1	0	0	0	0	0	0	3
Distance Traveled (mi)	4	33	2	14	11	10	17	12	103
Fuel Consumed (gal)	0	3	0	0	0	2	1	0	8
Fuel Economy (mpg)	NA	11.7	NA	NA	NA	4.3	NA	NA	13.1
CO Emissions (kg)	0.03	0.20	0.03	0.03	0.03	0.17	0.04	0.03	0.55
NOx Emissions (kg)	0.01	0.04	0.01	0.01	0.00	0.03	0.01	0.01	0.11
VOC Emissions (kg)	0.01	0.05	0.01	0.01	0.01	0.04	0.01	0.01	0.13
Unserved Vehicles (#)	0	0	0	0	0	0	0	0	0
Vehs dilemma zone (#)	0	0	0	0	0	0	0	0	0

10:

Lane Group	EBT	WBT	All
Future Volume (vph)	30	17	47
Control Delay / Veh (s/v)	0	0	0
Queue Delay / Veh (s/v)	0	0	0
Total Delay / Veh (s/v)	0	0	0
Total Delay (hr)	0	0	0
Stops / Veh	0.00	0.00	0.00
Stops (#)	0	0	0
Average Speed (mph)	33	40	34
Total Travel Time (hr)	1	0	1
Distance Traveled (mi)	21	5	26
Fuel Consumed (gal)	1	0	1
Fuel Economy (mpg)	NA	NA	25.9
CO Emissions (kg)	0.06	0.01	0.07
NOx Emissions (kg)	0.01	0.00	0.01
VOC Emissions (kg)	0.01	0.00	0.02
Unserved Vehicles (#)	0	0	0
Vehs dilemma zone (#)	0	0	0

22: TH 61

Lane Group	NBU	NBT	SBU	SBT	All
Future Volume (vph)	72	152	10	179	413
Control Delay / Veh (s/v)	0	0	0	0	0
Queue Delay / Veh (s/v)	0	0	0	0	0
Total Delay / Veh (s/v)	0	0	0	0	0
Total Delay (hr)	0	0	0	0	0
Stops / Veh	0.00	0.00	0.00	0.00	0.00
Stops (#)	0	0	0	0	0
Average Speed (mph)	55	55	55	55	55
Total Travel Time (hr)	0	0	0	0	1
Distance Traveled (mi)	11	24	1	24	61
Fuel Consumed (gal)	0	1	0	1	2
Fuel Economy (mpg)	NA	NA	NA	NA	29.9
CO Emissions (kg)	0.03	0.06	0.00	0.06	0.14
NOx Emissions (kg)	0.01	0.01	0.00	0.01	0.03
VOC Emissions (kg)	0.01	0.01	0.00	0.01	0.03
Unserved Vehicles (#)	0	0	0	0	0
Vehs dilemma zone (#)	0	0	0	0	0

23: TH 61

Lane Group	NBT	SBU	SBT	All
Future Volume (vph)	129	29	111	269
Control Delay / Veh (s/v)	0	0	0	0
Queue Delay / Veh (s/v)	0	0	0	0
Total Delay / Veh (s/v)	0	0	0	0
Total Delay (hr)	0	0	0	0
Stops / Veh	0.00	0.00	0.00	0.00
Stops (#)	0	0	0	0
Average Speed (mph)	55	55	55	55
Total Travel Time (hr)	1	0	0	1
Distance Traveled (mi)	36	5	19	59
Fuel Consumed (gal)	1	0	1	2
Fuel Economy (mpg)	29.9	NA	NA	29.9
CO Emissions (kg)	0.08	0.01	0.04	0.14
NOx Emissions (kg)	0.02	0.00	0.01	0.03
VOC Emissions (kg)	0.02	0.00	0.01	0.03
Unserved Vehicles (#)	0	0	0	0
Vehs dilemma zone (#)	0	0	0	0

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	3	3	13	2	1	14	10	142	2	25	161	1
Future Vol, veh/h	3	3	13	2	1	14	10	142	2	25	161	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	280	-	265	300	-	250
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	75	75	65	50	25	58	62	84	50	69	79	25
Heavy Vehicles, %	0	3	7	15	0	7	10	12	0	6	12	0
Mvmt Flow	4	4	20	4	4	24	16	169	4	36	204	4

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	395	481	102	377	481	85	208	0	0	173	0	0
Stage 1	276	276	-	201	201	-	-	-	-	-	-	-
Stage 2	119	205	-	176	280	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.56	7.04	7.8	6.5	7.04	4.3	-	-	4.22	-	-
Critical Hdwy Stg 1	6.5	5.56	-	6.8	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.56	-	6.8	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.03	3.37	3.65	4	3.37	2.3	-	-	2.26	-	-
Pot Cap-1 Maneuver	544	481	918	524	487	941	1304	-	-	1372	-	-
Stage 1	712	678	-	746	739	-	-	-	-	-	-	-
Stage 2	879	728	-	772	683	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	511	463	918	494	468	941	1304	-	-	1372	-	-
Mov Cap-2 Maneuver	511	463	-	494	468	-	-	-	-	-	-	-
Stage 1	703	660	-	737	730	-	-	-	-	-	-	-
Stage 2	841	719	-	731	665	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.1	9.9	0.7	1.1
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1304	-	-	732	760	1372	-	-
HCM Lane V/C Ratio	0.012	-	-	0.038	0.042	0.026	-	-
HCM Control Delay (s)	7.8	-	-	10.1	9.9	7.7	-	-
HCM Lane LOS	A	-	-	B	A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0.1	0.1	-	-

Intersection	
Int Delay, s/veh	4.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	31	0	0	140	11	84	63	67	109	75
Future Vol, veh/h	0	0	31	0	0	140	11	84	63	67	109	75
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	0	265	-	250	250	-	250
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	38	67	25	50	65	82	50	72	77	80	81	79
Heavy Vehicles, %	36	19	11	10	21	10	13	17	9	7	17	35
Mvmt Flow	0	0	124	0	0	171	22	117	82	84	135	95

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	-	68	-	-	59	230	0	0	199	0	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	7.12	-	-	7.1	4.36	-	-	4.24	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.41	-	-	3.4	2.33	-	-	2.27	-	-
Pot Cap-1 Maneuver	0	0	953	0	0	969	1259	-	-	1335	-	-
Stage 1	0	0	-	0	0	-	-	-	-	-	-	-
Stage 2	0	0	-	0	0	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	-	953	-	-	969	1259	-	-	1335	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.3	9.5	0.8	2.1
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1259	-	-	953	969	1335	-	-
HCM Lane V/C Ratio	0.017	-	-	0.13	0.176	0.063	-	-
HCM Control Delay (s)	7.9	-	-	9.3	9.5	7.9	-	-
HCM Lane LOS	A	-	-	A	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.4	0.6	0.2	-	-

Intersection						
Int Delay, s/veh	0					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	30	17	0	0	0
Future Vol, veh/h	0	30	17	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	75	71	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	40	24	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	24	0	-	0	64	24
Stage 1	-	-	-	-	24	-
Stage 2	-	-	-	-	40	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1591	-	-	-	942	1052
Stage 1	-	-	-	-	999	-
Stage 2	-	-	-	-	982	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1591	-	-	-	942	1052
Mov Cap-2 Maneuver	-	-	-	-	942	-
Stage 1	-	-	-	-	999	-
Stage 2	-	-	-	-	982	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1591	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	1.7

Movement	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations														
Traffic Vol, veh/h	72	0	152	0	10	0	179	0	0	0	0	0	0	0
Future Vol, veh/h	72	0	152	0	10	0	179	0	0	0	0	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	-	None	-	-	-	None	-	-	None	-	-	None
Storage Length	-	0	-	-	-	0	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	-	0	-	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-	0	-	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	78	0	165	0	11	0	195	0	0	0	0	0	0	0

Major/Minor	Major1				Major2				Minor2			Minor1		
Conflicting Flow All	195	-	0	-	165	-	-	0	-	-	98	-	-	83
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	6.44	-	-	-	6.44	-	-	-	-	-	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	2.52	-	-	-	2.52	-	-	-	-	-	3.32	-	-	3.32
Pot Cap-1 Maneuver	1078	0	-	0	1126	0	-	0	0	0	939	0	0	960
Stage 1	-	0	-	0	-	0	-	0	0	0	-	0	0	-
Stage 2	-	0	-	0	-	0	-	0	0	0	-	0	0	-
Platoon blocked, %			-				-							
Mov Cap-1 Maneuver	1078	-	-	-	1126	-	-	-	-	-	939	-	-	960
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Approach	NB	SB	NE	SW
HCM Control Delay, s	2.8	0.4	0	0
HCM LOS			A	A

Minor Lane/Major Mvmt	NELn1	NBU	NBT	SBU	SBT	SWLn1
Capacity (veh/h)	-	1078	-	1126	-	-
HCM Lane V/C Ratio	-	0.073	-	0.01	-	-
HCM Control Delay (s)	0	8.6	-	8.2	-	0
HCM Lane LOS	A	A	-	A	-	A
HCM 95th %tile Q(veh)	-	0.2	-	0	-	-

Intersection	
Int Delay, s/veh	0.9

Movement	NBT	NBR	SBU	SBL	SBT	SWL	SWR
Lane Configurations							
Traffic Vol, veh/h	129	0	29	0	111	0	0
Future Vol, veh/h	129	0	29	0	111	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	-	None	-	None
Storage Length	-	-	-	0	-	-	0
Veh in Median Storage, #	0	-	-	-	0	0	-
Grade, %	0	-	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2
Mvmt Flow	140	0	32	0	121	0	0

Major/Minor	Major1		Major2			Minor1	
Conflicting Flow All	0	-	140	-	-	-	70
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.44	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.52	-	-	-	3.32
Pot Cap-1 Maneuver	-	0	1167	0	-	0	978
Stage 1	-	0	-	0	-	0	-
Stage 2	-	0	-	0	-	0	-
Platoon blocked, %	-				-		
Mov Cap-1 Maneuver	-	-	1167	-	-	-	978
Mov Cap-2 Maneuver	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-

Approach	NB	SB	SW
HCM Control Delay, s	0	1.7	0
HCM LOS			A

Minor Lane/Major Mvmt	NBT	SBU	SBT	SWLn1
Capacity (veh/h)	-	1167	-	-
HCM Lane V/C Ratio	-	0.027	-	-
HCM Control Delay (s)	-	8.2	-	0
HCM Lane LOS	-	A	-	A
HCM 95th %tile Q(veh)	-	0.1	-	-

2: TH 61 & CR 10/5th Grant Blvd

Lane Group	EBT	WBT	NBL	NBT	NBR	SBL	SBT	SBR	All
Future Volume (vph)	19	27	10	142	12	25	161	1	397
Control Delay / Veh (s/v)	10	11	8	0	0	8	0	0	2
Queue Delay / Veh (s/v)	0	0	0	0	0	0	0	0	0
Total Delay / Veh (s/v)	10	11	8	0	0	8	0	0	2
Total Delay (hr)	0	0	0	0	0	0	0	0	0
Stops / Veh	1.00	1.00	1.60	0.00	0.00	1.56	0.00	0.00	0.25
Stops (#)	19	27	16	0	0	39	0	0	101
Average Speed (mph)	24	31	43	55	55	42	55	55	48
Total Travel Time (hr)	0	1	0	1	0	0	1	0	3
Distance Traveled (mi)	3	19	4	60	5	10	64	0	166
Fuel Consumed (gal)	0	1	0	2	0	1	2	0	7
Fuel Economy (mpg)	NA	19.3	NA	29.9	NA	9.1	29.9	NA	23.0
CO Emissions (kg)	0.02	0.07	0.03	0.14	0.01	0.08	0.15	0.00	0.50
NOx Emissions (kg)	0.00	0.01	0.01	0.03	0.00	0.01	0.03	0.00	0.10
VOC Emissions (kg)	0.01	0.02	0.01	0.03	0.00	0.02	0.03	0.00	0.12
Unserved Vehicles (#)	0	0	0	0	0	0	0	0	0
Vehs dilemma zone (#)	0	0	0	0	0	0	0	0	0

4: Shields Ave & TH 61

Lane Group	EBR	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Future Volume (vph)	41	140	11	94	63	67	109	85	610
Control Delay / Veh (s/v)	10	10	8	0	0	8	0	0	4
Queue Delay / Veh (s/v)	0	0	0	0	0	0	0	0	0
Total Delay / Veh (s/v)	10	10	8	0	0	8	0	0	4
Total Delay (hr)	0	0	0	0	0	0	0	0	1
Stops / Veh	1.00	1.00	1.55	0.00	0.00	1.58	0.00	0.00	0.50
Stops (#)	41	140	17	0	0	106	0	0	304
Average Speed (mph)	18	28	32	55	55	31	55	55	37
Total Travel Time (hr)	0	1	0	0	0	0	0	0	3
Distance Traveled (mi)	5	33	2	16	11	10	17	13	107
Fuel Consumed (gal)	1	3	0	1	0	2	1	0	8
Fuel Economy (mpg)	NA	11.7	NA	NA	NA	4.3	NA	NA	13.3
CO Emissions (kg)	0.04	0.20	0.03	0.04	0.03	0.17	0.04	0.03	0.56
NOx Emissions (kg)	0.01	0.04	0.01	0.01	0.00	0.03	0.01	0.01	0.11
VOC Emissions (kg)	0.01	0.05	0.01	0.01	0.01	0.04	0.01	0.01	0.13
Unserved Vehicles (#)	0	0	0	0	0	0	0	0	0
Vehs dilemma zone (#)	0	0	0	0	0	0	0	0	0

10:

Lane Group	EBT	WBT	SBL	All
Future Volume (vph)	40	17	10	67
Control Delay / Veh (s/v)	1	0	8	2
Queue Delay / Veh (s/v)	0	0	0	0
Total Delay / Veh (s/v)	1	0	8	2
Total Delay (hr)	0	0	0	0
Stops / Veh	0.30	0.00	1.00	0.33
Stops (#)	12	0	10	22
Average Speed (mph)	33	40	14	33
Total Travel Time (hr)	1	0	0	1
Distance Traveled (mi)	29	5	1	34
Fuel Consumed (gal)	1	0	0	1
Fuel Economy (mpg)	23.5	NA	NA	22.9
CO Emissions (kg)	0.08	0.01	0.01	0.10
NOx Emissions (kg)	0.02	0.00	0.00	0.02
VOC Emissions (kg)	0.02	0.00	0.00	0.02
Unserved Vehicles (#)	0	0	0	0
Vehs dilemma zone (#)	0	0	0	0

22: TH 61

Lane Group	NBU	NBT	SBU	SBT	All
Future Volume (vph)	72	162	10	189	433
Control Delay / Veh (s/v)	0	0	0	0	0
Queue Delay / Veh (s/v)	0	0	0	0	0
Total Delay / Veh (s/v)	0	0	0	0	0
Total Delay (hr)	0	0	0	0	0
Stops / Veh	0.00	0.00	0.00	0.00	0.00
Stops (#)	0	0	0	0	0
Average Speed (mph)	55	55	55	55	55
Total Travel Time (hr)	0	0	0	0	1
Distance Traveled (mi)	11	25	1	26	63
Fuel Consumed (gal)	0	1	0	1	2
Fuel Economy (mpg)	NA	NA	NA	NA	29.9
CO Emissions (kg)	0.03	0.06	0.00	0.06	0.15
NOx Emissions (kg)	0.01	0.01	0.00	0.01	0.03
VOC Emissions (kg)	0.01	0.01	0.00	0.01	0.03
Unserved Vehicles (#)	0	0	0	0	0
Vehs dilemma zone (#)	0	0	0	0	0

23: TH 61

Lane Group	NBT	SBU	SBT	All
Future Volume (vph)	129	39	111	279
Control Delay / Veh (s/v)	0	0	0	0
Queue Delay / Veh (s/v)	0	0	0	0
Total Delay / Veh (s/v)	0	0	0	0
Total Delay (hr)	0	0	0	0
Stops / Veh	0.00	0.00	0.00	0.00
Stops (#)	0	0	0	0
Average Speed (mph)	55	55	55	55
Total Travel Time (hr)	1	0	0	1
Distance Traveled (mi)	36	7	19	61
Fuel Consumed (gal)	1	0	1	2
Fuel Economy (mpg)	29.9	NA	NA	29.9
CO Emissions (kg)	0.08	0.02	0.04	0.14
NOx Emissions (kg)	0.02	0.00	0.01	0.03
VOC Emissions (kg)	0.02	0.00	0.01	0.03
Unserved Vehicles (#)	0	0	0	0
Vehs dilemma zone (#)	0	0	0	0

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	3	3	13	12	1	14	10	142	12	25	161	1
Future Vol, veh/h	3	3	13	12	1	14	10	142	12	25	161	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	280	-	265	300	-	250
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	75	75	65	50	25	58	62	84	50	69	79	25
Heavy Vehicles, %	0	3	7	15	0	7	10	12	83	6	12	0
Mvmt Flow	4	4	20	24	4	24	16	169	24	36	204	4

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	395	501	102	377	481	85	208	0	0	193	0	0
Stage 1	276	276	-	201	201	-	-	-	-	-	-	-
Stage 2	119	225	-	176	280	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.56	7.04	7.8	6.5	7.04	4.3	-	-	4.22	-	-
Critical Hdwy Stg 1	6.5	5.56	-	6.8	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.56	-	6.8	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.03	3.37	3.65	4	3.37	2.3	-	-	2.26	-	-
Pot Cap-1 Maneuver	544	468	918	524	487	941	1304	-	-	1349	-	-
Stage 1	712	678	-	746	739	-	-	-	-	-	-	-
Stage 2	879	714	-	772	683	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	511	450	918	494	468	941	1304	-	-	1349	-	-
Mov Cap-2 Maneuver	511	450	-	494	468	-	-	-	-	-	-	-
Stage 1	703	660	-	737	730	-	-	-	-	-	-	-
Stage 2	841	705	-	731	665	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.2	11.2	0.6	1.1
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1304	-	-	727	630	1349	-	-
HCM Lane V/C Ratio	0.012	-	-	0.039	0.083	0.027	-	-
HCM Control Delay (s)	7.8	-	-	10.2	11.2	7.7	-	-
HCM Lane LOS	A	-	-	B	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0.3	0.1	-	-

Intersection												
Int Delay, s/veh	4.6											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	41	0	0	140	11	94	63	67	109	85
Future Vol, veh/h	0	0	41	0	0	140	11	94	63	67	109	85
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	0	265	-	250	250	-	250
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	38	67	25	50	65	82	50	72	77	80	81	79
Heavy Vehicles, %	36	19	33	10	21	10	13	26	9	7	17	35
Mvmt Flow	0	0	164	0	0	171	22	131	82	84	135	108

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	-	68	-	-	66	243	0	0	213	0	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	7.56	-	-	7.1	4.36	-	-	4.24	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.63	-	-	3.4	2.33	-	-	2.27	-	-
Pot Cap-1 Maneuver	0	0	890	0	0	959	1244	-	-	1319	-	-
Stage 1	0	0	-	0	0	-	-	-	-	-	-	-
Stage 2	0	0	-	0	0	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	-	890	-	-	959	1244	-	-	1319	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10	9.6	0.7	2
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1244	-	-	890	959	1319	-	-
HCM Lane V/C Ratio	0.018	-	-	0.184	0.178	0.063	-	-
HCM Control Delay (s)	7.9	-	-	10	9.6	7.9	-	-
HCM Lane LOS	A	-	-	B	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.7	0.6	0.2	-	-

Intersection						
Int Delay, s/veh	2.1					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	10	30	17	0	0	10
Future Vol, veh/h	10	30	17	0	0	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	75	71	92	92	92
Heavy Vehicles, %	95	2	2	2	2	2
Mvmt Flow	11	40	24	0	0	11

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	24	0	-	0	86	24
Stage 1	-	-	-	-	24	-
Stage 2	-	-	-	-	62	-
Critical Hdwy	5.05	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	3.055	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1151	-	-	-	915	1052
Stage 1	-	-	-	-	999	-
Stage 2	-	-	-	-	961	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1151	-	-	-	906	1052
Mov Cap-2 Maneuver	-	-	-	-	906	-
Stage 1	-	-	-	-	989	-
Stage 2	-	-	-	-	961	-

Approach	EB	WB	SB
HCM Control Delay, s	1.7	0	8.5
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1151	-	-	-	1052
HCM Lane V/C Ratio	0.009	-	-	-	0.01
HCM Control Delay (s)	8.2	0	-	-	8.5
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	1.6

Movement	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations														
Traffic Vol, veh/h	72	0	162	0	10	0	189	0	0	0	0	0	0	0
Future Vol, veh/h	72	0	162	0	10	0	189	0	0	0	0	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	-	None	-	-	-	None	-	-	None	-	-	None
Storage Length	-	0	-	-	-	0	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	-	0	-	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-	0	-	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	78	0	176	0	11	0	205	0	0	0	0	0	0	0

Major/Minor	Major1				Major2				Minor2			Minor1		
Conflicting Flow All	205	-	0	-	176	-	-	0	-	-	103	-	-	88
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	6.44	-	-	-	6.44	-	-	-	-	-	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	2.52	-	-	-	2.52	-	-	-	-	-	3.32	-	-	3.32
Pot Cap-1 Maneuver	1063	0	-	0	1108	0	-	0	0	0	932	0	0	953
Stage 1	-	0	-	0	-	0	-	0	0	0	-	0	0	-
Stage 2	-	0	-	0	-	0	-	0	0	0	-	0	0	-
Platoon blocked, %			-				-							
Mov Cap-1 Maneuver	1063	-	-	-	1108	-	-	-	-	-	932	-	-	953
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Approach	NB	SB	NE	SW
HCM Control Delay, s	2.7	0.4	0	0
HCM LOS			A	A

Minor Lane/Major Mvmt	NELn1	NBU	NBT	SBU	SBT	SWLn1
Capacity (veh/h)	-	1063	-	1108	-	-
HCM Lane V/C Ratio	-	0.074	-	0.01	-	-
HCM Control Delay (s)	0	8.7	-	8.3	-	0
HCM Lane LOS	A	A	-	A	-	A
HCM 95th %tile Q(veh)	-	0.2	-	0	-	-

Intersection	
Int Delay, s/veh	1.1

Movement	NBT	NBR	SBU	SBL	SBT	SWL	SWR
Lane Configurations							
Traffic Vol, veh/h	129	0	39	0	111	0	0
Future Vol, veh/h	129	0	39	0	111	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	-	None	-	None
Storage Length	-	-	-	0	-	-	0
Veh in Median Storage, #	0	-	-	-	0	0	-
Grade, %	0	-	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2
Mvmt Flow	140	0	42	0	121	0	0

Major/Minor	Major1		Major2			Minor1	
Conflicting Flow All	0	-	140	-	-	-	70
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.44	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.52	-	-	-	3.32
Pot Cap-1 Maneuver	-	0	1167	0	-	0	978
Stage 1	-	0	-	0	-	0	-
Stage 2	-	0	-	0	-	0	-
Platoon blocked, %	-				-		
Mov Cap-1 Maneuver	-	-	1167	-	-	-	978
Mov Cap-2 Maneuver	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-

Approach	NB	SB	SW
HCM Control Delay, s	0	2.1	0
HCM LOS			A

Minor Lane/Major Mvmt	NBT	SBU	SBT	SWLn1
Capacity (veh/h)	-	1167	-	-
HCM Lane V/C Ratio	-	0.036	-	-
HCM Control Delay (s)	-	8.2	-	0
HCM Lane LOS	-	A	-	A
HCM 95th %tile Q(veh)	-	0.1	-	-

Detailed Measures of Effectiveness

11/28/2022

2: TH 61 & CR 10/5th Grant Blvd

Lane Group	EBT	WBT	NBL	NBT	NBR	SBL	SBT	SBR	All
Future Volume (vph)	28	29	23	232	1	12	245	1	571
Control Delay / Veh (s/v)	11	12	8	0	0	8	0	0	2
Queue Delay / Veh (s/v)	0	0	0	0	0	0	0	0	0
Total Delay / Veh (s/v)	11	12	8	0	0	8	0	0	2
Total Delay (hr)	0	0	0	0	0	0	0	0	0
Stops / Veh	1.00	1.00	1.65	0.00	0.00	1.58	0.00	0.00	0.20
Stops (#)	28	29	38	0	0	19	0	0	114
Average Speed (mph)	23	30	42	55	55	42	55	55	49
Total Travel Time (hr)	0	1	0	2	0	0	2	0	5
Distance Traveled (mi)	5	21	10	98	0	5	97	0	236
Fuel Consumed (gal)	1	1	1	3	0	1	3	0	10
Fuel Economy (mpg)	NA	19.2	9.1	29.9	NA	NA	29.9	NA	24.2
CO Emissions (kg)	0.04	0.08	0.07	0.23	0.00	0.04	0.23	0.00	0.68
NOx Emissions (kg)	0.01	0.01	0.01	0.04	0.00	0.01	0.04	0.00	0.13
VOC Emissions (kg)	0.01	0.02	0.02	0.05	0.00	0.01	0.05	0.00	0.16
Unserved Vehicles (#)	0	0	0	0	0	0	0	0	0
Vehs dilemma zone (#)	0	0	0	0	0	0	0	0	0

4: Shields Ave & TH 61

Lane Group	EBR	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Future Volume (vph)	95	161	14	168	77	106	189	55	865
Control Delay / Veh (s/v)	10	10	8	0	0	8	0	0	4
Queue Delay / Veh (s/v)	0	0	0	0	0	0	0	0	0
Total Delay / Veh (s/v)	10	10	8	0	0	8	0	0	4
Total Delay (hr)	0	0	0	0	0	0	0	0	1
Stops / Veh	1.00	1.00	1.64	0.00	0.00	1.70	0.00	0.00	0.53
Stops (#)	95	161	23	0	0	180	0	0	459
Average Speed (mph)	18	30	32	55	55	30	55	55	36
Total Travel Time (hr)	1	2	0	1	0	1	1	0	5
Distance Traveled (mi)	12	55	2	29	13	17	29	9	166
Fuel Consumed (gal)	1	4	1	1	0	4	1	0	12
Fuel Economy (mpg)	9.9	14.2	NA	NA	NA	4.1	NA	NA	13.4
CO Emissions (kg)	0.08	0.27	0.04	0.07	0.03	0.29	0.07	0.02	0.86
NOx Emissions (kg)	0.02	0.05	0.01	0.01	0.01	0.06	0.01	0.00	0.17
VOC Emissions (kg)	0.02	0.06	0.01	0.02	0.01	0.07	0.02	0.00	0.20
Unserved Vehicles (#)	0	0	0	0	0	0	0	0	0
Vehs dilemma zone (#)	0	0	0	0	0	0	0	0	0

22: TH 61

Lane Group	NBU	NBT	SBU	SBT	All
Future Volume (vph)	77	252	7	273	609
Control Delay / Veh (s/v)	0	0	0	0	0
Queue Delay / Veh (s/v)	0	0	0	0	0
Total Delay / Veh (s/v)	0	0	0	0	0
Total Delay (hr)	0	0	0	0	0
Stops / Veh	0.00	0.00	0.00	0.00	0.00
Stops (#)	0	0	0	0	0
Average Speed (mph)	55	55	55	55	55
Total Travel Time (hr)	0	1	0	1	2
Distance Traveled (mi)	12	39	1	37	89
Fuel Consumed (gal)	0	1	0	1	3
Fuel Economy (mpg)	NA	29.9	NA	29.9	29.9
CO Emissions (kg)	0.03	0.09	0.00	0.09	0.21
NOx Emissions (kg)	0.01	0.02	0.00	0.02	0.04
VOC Emissions (kg)	0.01	0.02	0.00	0.02	0.05
Unserved Vehicles (#)	0	0	0	0	0
Vehs dilemma zone (#)	0	0	0	0	0

23: TH 61

Lane Group	NBT	SBU	SBT	All
Future Volume (vph)	185	74	210	469
Control Delay / Veh (s/v)	0	0	0	0
Queue Delay / Veh (s/v)	0	0	0	0
Total Delay / Veh (s/v)	0	0	0	0
Total Delay (hr)	0	0	0	0
Stops / Veh	0.00	0.00	0.00	0.00
Stops (#)	0	0	0	0
Average Speed (mph)	55	55	55	55
Total Travel Time (hr)	1	0	1	2
Distance Traveled (mi)	51	13	36	99
Fuel Consumed (gal)	2	0	1	3
Fuel Economy (mpg)	29.9	NA	29.9	29.9
CO Emissions (kg)	0.12	0.03	0.08	0.23
NOx Emissions (kg)	0.02	0.01	0.02	0.05
VOC Emissions (kg)	0.03	0.01	0.02	0.05
Unserved Vehicles (#)	0	0	0	0
Vehs dilemma zone (#)	0	0	0	0

28:

Lane Group	EBT	WBT	All
Future Volume (vph)	15	29	44
Control Delay / Veh (s/v)	0	0	0
Queue Delay / Veh (s/v)	0	0	0
Total Delay / Veh (s/v)	0	0	0
Total Delay (hr)	0	0	0
Stops / Veh	0.00	0.00	0.00
Stops (#)	0	0	0
Average Speed (mph)	33	40	36
Total Travel Time (hr)	0	0	1
Distance Traveled (mi)	11	9	19
Fuel Consumed (gal)	0	0	1
Fuel Economy (mpg)	NA	NA	NA
CO Emissions (kg)	0.03	0.02	0.05
NOx Emissions (kg)	0.01	0.00	0.01
VOC Emissions (kg)	0.01	0.00	0.01
Unserved Vehicles (#)	0	0	0
Vehs dilemma zone (#)	0	0	0

Intersection	
Int Delay, s/veh	1.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	2	2	24	3	5	21	23	232	1	12	245	1
Future Vol, veh/h	2	2	24	3	5	21	23	232	1	12	245	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	280	-	265	300	-	250
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	50	50	75	38	62	66	72	85	25	60	69	25
Heavy Vehicles, %	0	3	7	15	0	7	10	12	0	6	12	0
Mvmt Flow	4	4	32	8	8	32	32	273	4	20	355	4

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	600	736	178	557	736	137	359	0	0	277	0	0
Stage 1	395	395	-	337	337	-	-	-	-	-	-	-
Stage 2	205	341	-	220	399	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.56	7.04	7.8	6.5	7.04	4.3	-	-	4.22	-	-
Critical Hdwy Stg 1	6.5	5.56	-	6.8	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.56	-	6.8	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.03	3.37	3.65	4	3.37	2.3	-	-	2.26	-	-
Pot Cap-1 Maneuver	389	343	819	386	349	871	1141	-	-	1254	-	-
Stage 1	607	601	-	616	645	-	-	-	-	-	-	-
Stage 2	784	635	-	726	606	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	356	328	819	355	334	871	1141	-	-	1254	-	-
Mov Cap-2 Maneuver	356	328	-	355	334	-	-	-	-	-	-	-
Stage 1	590	591	-	599	627	-	-	-	-	-	-	-
Stage 2	725	617	-	682	596	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11	11.8	0.9	0.4
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1141	-	-	640	576	1254	-	-
HCM Lane V/C Ratio	0.028	-	-	0.063	0.083	0.016	-	-
HCM Control Delay (s)	8.2	-	-	11	11.8	7.9	-	-
HCM Lane LOS	A	-	-	B	B	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.2	0.3	0	-	-

Intersection	
Int Delay, s/veh	4.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	95	0	0	161	14	168	77	106	189	55
Future Vol, veh/h	0	0	95	0	0	161	14	168	77	106	189	55
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	0	265	-	250	250	-	250
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	71	66	68	69	49	86	65	79	71	65	84	81
Heavy Vehicles, %	36	19	11	10	21	10	13	17	9	7	17	35
Mvmt Flow	0	0	140	0	0	187	22	213	108	163	225	68

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	-	113	-	-	107	293	0	0	321	0	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	7.12	-	-	7.1	4.36	-	-	4.24	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.41	-	-	3.4	2.33	-	-	2.27	-	-
Pot Cap-1 Maneuver	0	0	890	0	0	901	1189	-	-	1200	-	-
Stage 1	0	0	-	0	0	-	-	-	-	-	-	-
Stage 2	0	0	-	0	0	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	-	890	-	-	901	1189	-	-	1200	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.8	10	0.5	3
HCM LOS	A	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1189	-	-	890	901	1200	-	-
HCM Lane V/C Ratio	0.018	-	-	0.157	0.208	0.136	-	-
HCM Control Delay (s)	8.1	-	-	9.8	10	8.5	-	-
HCM Lane LOS	A	-	-	A	B	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.6	0.8	0.5	-	-

Intersection	
Int Delay, s/veh	1.3

Movement	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations														
Traffic Vol, veh/h	77	0	252	0	7	0	273	0	0	0	0	0	0	0
Future Vol, veh/h	77	0	252	0	7	0	273	0	0	0	0	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	-	None	-	-	-	None	-	-	None	-	-	None
Storage Length	-	0	-	-	-	0	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	-	0	-	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-	0	-	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	84	0	274	0	8	0	297	0	0	0	0	0	0	0

Major/Minor	Major1				Major2				Minor2			Minor1		
Conflicting Flow All	297	-	0	-	274	-	-	0	-	-	149	-	-	137
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	6.44	-	-	-	6.44	-	-	-	-	-	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	2.52	-	-	-	2.52	-	-	-	-	-	3.32	-	-	3.32
Pot Cap-1 Maneuver	930	0	-	0	962	0	-	0	0	0	871	0	0	886
Stage 1	-	0	-	0	-	0	-	0	0	0	-	0	0	-
Stage 2	-	0	-	0	-	0	-	0	0	0	-	0	0	-
Platoon blocked, %			-				-							
Mov Cap-1 Maneuver	930	-	-	-	962	-	-	-	-	-	871	-	-	886
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Approach	NB	SB	NE	SW
HCM Control Delay, s	2.2	0.2	0	0
HCM LOS			A	A

Minor Lane/Major Mvmt	NELn1	NBU	NBT	SBU	SBT	SWLn1
Capacity (veh/h)	-	930	-	962	-	-
HCM Lane V/C Ratio	-	0.09	-	0.008	-	-
HCM Control Delay (s)	0	9.3	-	8.8	-	0
HCM Lane LOS	A	A	-	A	-	A
HCM 95th %tile Q(veh)	-	0.3	-	0	-	-

Intersection	
Int Delay, s/veh	1.4

Movement	NBT	NBR	SBU	SBL	SBT	SWL	SWR
Lane Configurations							
Traffic Vol, veh/h	185	0	74	0	210	0	0
Future Vol, veh/h	185	0	74	0	210	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	-	None	-	None
Storage Length	-	-	-	0	-	-	0
Veh in Median Storage, #	0	-	-	-	0	0	-
Grade, %	0	-	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2
Mvmt Flow	201	0	80	0	228	0	0

Major/Minor	Major1		Major2			Minor1	
Conflicting Flow All	0	-	201	-	-	-	101
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.44	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.52	-	-	-	3.32
Pot Cap-1 Maneuver	-	0	1069	0	-	0	935
Stage 1	-	0	-	0	-	0	-
Stage 2	-	0	-	0	-	0	-
Platoon blocked, %	-				-		
Mov Cap-1 Maneuver	-	-	1069	-	-	-	935
Mov Cap-2 Maneuver	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-

Approach	NB	SB	SW
HCM Control Delay, s	0	2.3	0
HCM LOS			A

Minor Lane/Major Mvmt	NBT	SBU	SBT	SWLn1
Capacity (veh/h)	-	1069	-	-
HCM Lane V/C Ratio	-	0.075	-	-
HCM Control Delay (s)	-	8.6	-	0
HCM Lane LOS	-	A	-	A
HCM 95th %tile Q(veh)	-	0.2	-	-

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	15	29	0	0	0
Future Vol, veh/h	0	15	29	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	75	72	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	20	40	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	40	0	-	0	60	40
Stage 1	-	-	-	-	40	-
Stage 2	-	-	-	-	20	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1570	-	-	-	947	1031
Stage 1	-	-	-	-	982	-
Stage 2	-	-	-	-	1003	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1570	-	-	-	947	1031
Mov Cap-2 Maneuver	-	-	-	-	947	-
Stage 1	-	-	-	-	982	-
Stage 2	-	-	-	-	1003	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1570	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

2: TH 61 & CR 10/5th Grant Blvd

Lane Group	EBT	WBT	NBL	NBT	NBR	SBL	SBT	SBR	All
Future Volume (vph)	28	39	23	232	11	12	245	1	591
Control Delay / Veh (s/v)	11	17	8	0	0	8	0	0	2
Queue Delay / Veh (s/v)	0	0	0	0	0	0	0	0	0
Total Delay / Veh (s/v)	11	17	8	0	0	8	0	0	2
Total Delay (hr)	0	0	0	0	0	0	0	0	0
Stops / Veh	1.00	1.00	1.65	0.00	0.00	1.58	0.00	0.00	0.21
Stops (#)	28	39	38	0	0	19	0	0	124
Average Speed (mph)	23	28	42	55	55	42	55	55	48
Total Travel Time (hr)	0	1	0	2	0	0	2	0	5
Distance Traveled (mi)	5	28	10	98	5	5	97	0	247
Fuel Consumed (gal)	1	1	1	3	0	1	3	0	10
Fuel Economy (mpg)	NA	18.7	9.1	29.9	NA	NA	29.9	NA	24.0
CO Emissions (kg)	0.04	0.10	0.07	0.23	0.01	0.04	0.23	0.00	0.72
NOx Emissions (kg)	0.01	0.02	0.01	0.04	0.00	0.01	0.04	0.00	0.14
VOC Emissions (kg)	0.01	0.02	0.02	0.05	0.00	0.01	0.05	0.00	0.17
Unserved Vehicles (#)	0	0	0	0	0	0	0	0	0
Vehs dilemma zone (#)	0	0	0	0	0	0	0	0	0

4: Shields Ave & TH 61

Lane Group	EBR	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Future Volume (vph)	105	161	14	178	77	106	189	65	895
Control Delay / Veh (s/v)	10	10	8	0	0	9	0	0	4
Queue Delay / Veh (s/v)	0	0	0	0	0	0	0	0	0
Total Delay / Veh (s/v)	10	10	8	0	0	9	0	0	4
Total Delay (hr)	0	0	0	0	0	0	0	0	1
Stops / Veh	1.00	1.00	1.64	0.00	0.00	1.70	0.00	0.00	0.52
Stops (#)	105	161	23	0	0	180	0	0	469
Average Speed (mph)	18	30	32	55	55	30	55	55	36
Total Travel Time (hr)	1	2	0	1	0	1	1	0	5
Distance Traveled (mi)	13	55	2	30	13	17	29	10	170
Fuel Consumed (gal)	1	4	1	1	0	4	1	0	13
Fuel Economy (mpg)	9.8	14.2	NA	29.9	NA	4.1	NA	NA	13.5
CO Emissions (kg)	0.09	0.27	0.04	0.07	0.03	0.29	0.07	0.02	0.88
NOx Emissions (kg)	0.02	0.05	0.01	0.01	0.01	0.06	0.01	0.00	0.17
VOC Emissions (kg)	0.02	0.06	0.01	0.02	0.01	0.07	0.02	0.01	0.20
Unserved Vehicles (#)	0	0	0	0	0	0	0	0	0
Vehs dilemma zone (#)	0	0	0	0	0	0	0	0	0

22: TH 61

Lane Group	NBU	NBT	SBU	SBT	All
Future Volume (vph)	77	262	7	283	629
Control Delay / Veh (s/v)	0	0	0	0	0
Queue Delay / Veh (s/v)	0	0	0	0	0
Total Delay / Veh (s/v)	0	0	0	0	0
Total Delay (hr)	0	0	0	0	0
Stops / Veh	0.00	0.00	0.00	0.00	0.00
Stops (#)	0	0	0	0	0
Average Speed (mph)	55	55	55	55	55
Total Travel Time (hr)	0	1	0	1	2
Distance Traveled (mi)	12	41	1	38	92
Fuel Consumed (gal)	0	1	0	1	3
Fuel Economy (mpg)	NA	29.9	NA	29.9	29.9
CO Emissions (kg)	0.03	0.10	0.00	0.09	0.22
NOx Emissions (kg)	0.01	0.02	0.00	0.02	0.04
VOC Emissions (kg)	0.01	0.02	0.00	0.02	0.05
Unserved Vehicles (#)	0	0	0	0	0
Vehs dilemma zone (#)	0	0	0	0	0

23: TH 61

Lane Group	NBT	SBU	SBT	All
Future Volume (vph)	185	84	210	479
Control Delay / Veh (s/v)	0	0	0	0
Queue Delay / Veh (s/v)	0	0	0	0
Total Delay / Veh (s/v)	0	0	0	0
Total Delay (hr)	0	0	0	0
Stops / Veh	0.00	0.00	0.00	0.00
Stops (#)	0	0	0	0
Average Speed (mph)	55	55	55	55
Total Travel Time (hr)	1	0	1	2
Distance Traveled (mi)	51	14	36	101
Fuel Consumed (gal)	2	0	1	3
Fuel Economy (mpg)	29.9	NA	29.9	29.9
CO Emissions (kg)	0.12	0.03	0.08	0.24
NOx Emissions (kg)	0.02	0.01	0.02	0.05
VOC Emissions (kg)	0.03	0.01	0.02	0.05
Unserved Vehicles (#)	0	0	0	0
Vehs dilemma zone (#)	0	0	0	0

28:

Lane Group	EBT	WBT	SBL	All
Future Volume (vph)	25	29	10	64
Control Delay / Veh (s/v)	2	0	9	2
Queue Delay / Veh (s/v)	0	0	0	0
Total Delay / Veh (s/v)	2	0	9	2
Total Delay (hr)	0	0	0	0
Stops / Veh	0.40	0.00	1.00	0.31
Stops (#)	10	0	10	20
Average Speed (mph)	32	40	13	33
Total Travel Time (hr)	1	0	0	1
Distance Traveled (mi)	18	9	1	27
Fuel Consumed (gal)	1	0	0	1
Fuel Economy (mpg)	NA	NA	NA	22.8
CO Emissions (kg)	0.05	0.02	0.01	0.08
NOx Emissions (kg)	0.01	0.00	0.00	0.02
VOC Emissions (kg)	0.01	0.00	0.00	0.02
Unserved Vehicles (#)	0	0	0	0
Vehs dilemma zone (#)	0	0	0	0

Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	2	2	24	13	5	21	23	232	11	12	245	1
Future Vol, veh/h	2	2	24	13	5	21	23	232	11	12	245	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	280	-	265	300	-	250
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	50	50	75	38	62	66	72	85	25	60	69	25
Heavy Vehicles, %	0	3	7	85	0	7	10	12	89	6	12	0
Mvmt Flow	4	4	32	34	8	32	32	273	44	20	355	4

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	600	776	178	557	736	137	359	0	0	317	0	0
Stage 1	395	395	-	337	337	-	-	-	-	-	-	-
Stage 2	205	381	-	220	399	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.56	7.04	9.2	6.5	7.04	4.3	-	-	4.22	-	-
Critical Hdwy Stg 1	6.5	5.56	-	8.2	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.56	-	8.2	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.03	3.37	4.35	4	3.37	2.3	-	-	2.26	-	-
Pot Cap-1 Maneuver	389	325	819	274	349	871	1141	-	-	1211	-	-
Stage 1	607	601	-	468	645	-	-	-	-	-	-	-
Stage 2	784	609	-	571	606	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	356	310	819	252	333	871	1141	-	-	1211	-	-
Mov Cap-2 Maneuver	356	310	-	252	333	-	-	-	-	-	-	-
Stage 1	590	591	-	455	627	-	-	-	-	-	-	-
Stage 2	725	592	-	536	596	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11.1	16.9	0.8	0.4
HCM LOS	B	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1141	-	-	633	377	1211	-	-
HCM Lane V/C Ratio	0.028	-	-	0.063	0.197	0.017	-	-
HCM Control Delay (s)	8.2	-	-	11.1	16.9	8	-	-
HCM Lane LOS	A	-	-	B	C	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.2	0.7	0.1	-	-

Intersection	
Int Delay, s/veh	4.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	105	0	0	161	14	178	77	106	189	65
Future Vol, veh/h	0	0	105	0	0	161	14	178	77	106	189	65
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	0	265	-	250	250	-	250
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	71	66	68	69	49	86	65	79	71	65	84	81
Heavy Vehicles, %	36	19	19	10	21	10	13	22	9	7	17	35
Mvmt Flow	0	0	154	0	0	187	22	225	108	163	225	80

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	-	113	-	-	113	305	0	0	333	0	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	7.28	-	-	7.1	4.36	-	-	4.24	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.49	-	-	3.4	2.33	-	-	2.27	-	-
Pot Cap-1 Maneuver	0	0	867	0	0	893	1177	-	-	1188	-	-
Stage 1	0	0	-	0	0	-	-	-	-	-	-	-
Stage 2	0	0	-	0	0	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	-	867	-	-	893	1177	-	-	1188	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.1	10.1	0.5	3
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1177	-	-	867	893	1188	-	-
HCM Lane V/C Ratio	0.018	-	-	0.178	0.21	0.137	-	-
HCM Control Delay (s)	8.1	-	-	10.1	10.1	8.5	-	-
HCM Lane LOS	A	-	-	B	B	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.6	0.8	0.5	-	-

Intersection	
Int Delay, s/veh	1.2

Movement	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations														
Traffic Vol, veh/h	77	0	262	0	7	0	283	0	0	0	0	0	0	0
Future Vol, veh/h	77	0	262	0	7	0	283	0	0	0	0	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	-	None	-	-	-	None	-	-	None	-	-	None
Storage Length	-	0	-	-	-	0	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	-	0	-	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-	0	-	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	84	0	285	0	8	0	308	0	0	0	0	0	0	0

Major/Minor	Major1				Major2				Minor2			Minor1		
Conflicting Flow All	308	-	0	-	285	-	-	0	-	-	154	-	-	143
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	6.44	-	-	-	6.44	-	-	-	-	-	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	2.52	-	-	-	2.52	-	-	-	-	-	3.32	-	-	3.32
Pot Cap-1 Maneuver	915	0	-	0	946	0	-	0	0	0	864	0	0	879
Stage 1	-	0	-	0	-	0	-	0	0	0	-	0	0	-
Stage 2	-	0	-	0	-	0	-	0	0	0	-	0	0	-
Platoon blocked, %			-				-							
Mov Cap-1 Maneuver	915	-	-	-	946	-	-	-	-	-	864	-	-	879
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Approach	NB	SB	NE	SW
HCM Control Delay, s	2.1	0.2	0	0
HCM LOS			A	A

Minor Lane/Major Mvmt	NELn1	NBU	NBT	SBU	SBT	SWLn1
Capacity (veh/h)	-	915	-	946	-	-
HCM Lane V/C Ratio	-	0.091	-	0.008	-	-
HCM Control Delay (s)	0	9.3	-	8.8	-	0
HCM Lane LOS	A	A	-	A	-	A
HCM 95th %tile Q(veh)	-	0.3	-	0	-	-

Intersection							
Int Delay, s/veh	1.6						

Movement	NBT	NBR	SBU	SBL	SBT	SWL	SWR
Lane Configurations							
Traffic Vol, veh/h	185	0	84	0	210	0	0
Future Vol, veh/h	185	0	84	0	210	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	-	None	-	None
Storage Length	-	-	-	0	-	-	0
Veh in Median Storage, #	0	-	-	-	0	0	-
Grade, %	0	-	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	15	2	2	2	2
Mvmt Flow	201	0	91	0	228	0	0

Major/Minor	Major1		Major2			Minor1	
Conflicting Flow All	0	-	201	-	-	-	101
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.7	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.65	-	-	-	3.32
Pot Cap-1 Maneuver	-	0	1005	0	-	0	935
Stage 1	-	0	-	0	-	0	-
Stage 2	-	0	-	0	-	0	-
Platoon blocked, %	-				-		
Mov Cap-1 Maneuver	-	-	1005	-	-	-	935
Mov Cap-2 Maneuver	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-

Approach	NB	SB	SW
HCM Control Delay, s	0	2.6	0
HCM LOS			A

Minor Lane/Major Mvmt	NBT	SBU	SBT	SWLn1
Capacity (veh/h)	-	1005	-	-
HCM Lane V/C Ratio	-	0.091	-	-
HCM Control Delay (s)	-	8.9	-	0
HCM Lane LOS	-	A	-	A
HCM 95th %tile Q(veh)	-	0.3	-	-

Intersection						
Int Delay, s/veh	2.4					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	10	15	29	0	0	10
Future Vol, veh/h	10	15	29	0	0	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	75	72	92	92	92
Heavy Vehicles, %	95	2	2	2	2	95
Mvmt Flow	11	20	40	0	0	11

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	40	0	-	0	82	40
Stage 1	-	-	-	-	40	-
Stage 2	-	-	-	-	42	-
Critical Hdwy	5.05	-	-	-	6.42	7.15
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	3.055	-	-	-	3.518	4.155
Pot Cap-1 Maneuver	1133	-	-	-	920	819
Stage 1	-	-	-	-	982	-
Stage 2	-	-	-	-	980	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1133	-	-	-	911	819
Mov Cap-2 Maneuver	-	-	-	-	911	-
Stage 1	-	-	-	-	972	-
Stage 2	-	-	-	-	980	-

Approach	EB	WB	SB
HCM Control Delay, s	2.9	0	9.5
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1133	-	-	-	819
HCM Lane V/C Ratio	0.01	-	-	-	0.013
HCM Control Delay (s)	8.2	0	-	-	9.5
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

2: TH 61 & CR 10/5th Grant Blvd

Lane Group	EBT	WBT	NBL	NBT	NBR	SBL	SBT	SBR	All
Future Volume (vph)	21	18	11	155	2	27	176	1	411
Control Delay / Veh (s/v)	10	10	8	0	0	8	0	0	2
Queue Delay / Veh (s/v)	0	0	0	0	0	0	0	0	0
Total Delay / Veh (s/v)	10	10	8	0	0	8	0	0	2
Total Delay (hr)	0	0	0	0	0	0	0	0	0
Stops / Veh	1.00	1.00	1.55	0.00	0.00	1.56	0.00	0.00	0.24
Stops (#)	21	18	17	0	0	42	0	0	98
Average Speed (mph)	24	31	43	55	55	42	55	55	49
Total Travel Time (hr)	0	0	0	1	0	0	1	0	3
Distance Traveled (mi)	3	13	5	65	1	11	70	0	168
Fuel Consumed (gal)	0	1	0	2	0	1	2	0	7
Fuel Economy (mpg)	NA	NA	NA	29.9	NA	9.1	29.9	NA	23.1
CO Emissions (kg)	0.03	0.05	0.03	0.15	0.00	0.08	0.16	0.00	0.51
NOx Emissions (kg)	0.01	0.01	0.01	0.03	0.00	0.02	0.03	0.00	0.10
VOC Emissions (kg)	0.01	0.01	0.01	0.04	0.00	0.02	0.04	0.00	0.12
Unserved Vehicles (#)	0	0	0	0	0	0	0	0	0
Vehs dilemma zone (#)	0	0	0	0	0	0	0	0	0

4: Shields Ave & TH 61

Lane Group	EBR	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Future Volume (vph)	32	152	12	104	66	76	131	81	654
Control Delay / Veh (s/v)	9	10	8	0	0	8	0	0	4
Queue Delay / Veh (s/v)	0	0	0	0	0	0	0	0	0
Total Delay / Veh (s/v)	9	10	8	0	0	8	0	0	4
Total Delay (hr)	0	0	0	0	0	0	0	0	1
Stops / Veh	1.00	1.00	1.58	0.00	0.00	1.59	0.00	0.00	0.50
Stops (#)	32	152	19	0	0	121	0	0	324
Average Speed (mph)	18	27	32	55	55	31	55	55	37
Total Travel Time (hr)	0	1	0	0	0	0	0	0	3
Distance Traveled (mi)	4	36	2	18	11	12	20	13	116
Fuel Consumed (gal)	0	3	0	1	0	3	1	0	9
Fuel Economy (mpg)	NA	11.7	NA	NA	NA	4.3	NA	NA	13.2
CO Emissions (kg)	0.03	0.22	0.03	0.04	0.03	0.19	0.05	0.03	0.61
NOx Emissions (kg)	0.01	0.04	0.01	0.01	0.01	0.04	0.01	0.01	0.12
VOC Emissions (kg)	0.01	0.05	0.01	0.01	0.01	0.04	0.01	0.01	0.14
Unserved Vehicles (#)	0	0	0	0	0	0	0	0	0
Vehs dilemma zone (#)	0	0	0	0	0	0	0	0	0

10:

Lane Group	EBT	WBT	All
Future Volume (vph)	32	18	50
Control Delay / Veh (s/v)	0	0	0
Queue Delay / Veh (s/v)	0	0	0
Total Delay / Veh (s/v)	0	0	0
Total Delay (hr)	0	0	0
Stops / Veh	0.00	0.00	0.00
Stops (#)	0	0	0
Average Speed (mph)	33	40	34
Total Travel Time (hr)	1	0	1
Distance Traveled (mi)	23	5	28
Fuel Consumed (gal)	1	0	1
Fuel Economy (mpg)	NA	NA	25.9
CO Emissions (kg)	0.06	0.01	0.08
NOx Emissions (kg)	0.01	0.00	0.01
VOC Emissions (kg)	0.01	0.00	0.02
Unserved Vehicles (#)	0	0	0
Vehs dilemma zone (#)	0	0	0

22: TH 61

Lane Group	NBU	NBT	SBU	SBT	All
Future Volume (vph)	75	181	10	213	479
Control Delay / Veh (s/v)	0	0	0	0	0
Queue Delay / Veh (s/v)	0	0	0	0	0
Total Delay / Veh (s/v)	0	0	0	0	0
Total Delay (hr)	0	0	0	0	0
Stops / Veh	0.00	0.00	0.00	0.00	0.00
Stops (#)	0	0	0	0	0
Average Speed (mph)	55	55	55	55	55
Total Travel Time (hr)	0	1	0	1	1
Distance Traveled (mi)	12	28	1	29	70
Fuel Consumed (gal)	0	1	0	1	2
Fuel Economy (mpg)	NA	NA	NA	NA	29.9
CO Emissions (kg)	0.03	0.07	0.00	0.07	0.16
NOx Emissions (kg)	0.01	0.01	0.00	0.01	0.03
VOC Emissions (kg)	0.01	0.02	0.00	0.02	0.04
Unserved Vehicles (#)	0	0	0	0	0
Vehs dilemma zone (#)	0	0	0	0	0

23: TH 61

Lane Group	NBT	SBU	SBT	All
Future Volume (vph)	152	30	133	315
Control Delay / Veh (s/v)	0	0	0	0
Queue Delay / Veh (s/v)	0	0	0	0
Total Delay / Veh (s/v)	0	0	0	0
Total Delay (hr)	0	0	0	0
Stops / Veh	0.00	0.00	0.00	0.00
Stops (#)	0	0	0	0
Average Speed (mph)	55	55	55	55
Total Travel Time (hr)	1	0	0	1
Distance Traveled (mi)	42	5	23	70
Fuel Consumed (gal)	1	0	1	2
Fuel Economy (mpg)	29.9	NA	NA	29.9
CO Emissions (kg)	0.10	0.01	0.05	0.16
NOx Emissions (kg)	0.02	0.00	0.01	0.03
VOC Emissions (kg)	0.02	0.00	0.01	0.04
Unserved Vehicles (#)	0	0	0	0
Vehs dilemma zone (#)	0	0	0	0

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	3	3	15	2	1	15	11	155	2	27	176	1
Future Vol, veh/h	3	3	15	2	1	15	11	155	2	27	176	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	280	-	265	300	-	250
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	75	75	65	50	25	58	62	84	50	69	79	25
Heavy Vehicles, %	0	3	7	15	0	7	10	12	0	6	12	0
Mvmt Flow	4	4	23	4	4	26	18	185	4	39	223	4

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	432	526	112	413	526	93	227	0	0	189	0	0
Stage 1	301	301	-	221	221	-	-	-	-	-	-	-
Stage 2	131	225	-	192	305	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.56	7.04	7.8	6.5	7.04	4.3	-	-	4.22	-	-
Critical Hdwy Stg 1	6.5	5.56	-	6.8	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.56	-	6.8	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.03	3.37	3.65	4	3.37	2.3	-	-	2.26	-	-
Pot Cap-1 Maneuver	512	453	904	493	460	930	1282	-	-	1354	-	-
Stage 1	689	661	-	725	724	-	-	-	-	-	-	-
Stage 2	865	714	-	755	666	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	478	434	904	461	440	930	1282	-	-	1354	-	-
Mov Cap-2 Maneuver	478	434	-	461	440	-	-	-	-	-	-	-
Stage 1	679	642	-	715	714	-	-	-	-	-	-	-
Stage 2	824	704	-	710	647	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.2	10.1	0.7	1.1
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1282	-	-	721	743	1354	-	-
HCM Lane V/C Ratio	0.014	-	-	0.043	0.046	0.029	-	-
HCM Control Delay (s)	7.8	-	-	10.2	10.1	7.7	-	-
HCM Lane LOS	A	-	-	B	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0.1	0.1	-	-

Intersection	
Int Delay, s/veh	4.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	32	0	0	152	12	104	66	76	131	81
Future Vol, veh/h	0	0	32	0	0	152	12	104	66	76	131	81
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	0	265	-	250	250	-	250
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	38	67	25	50	65	82	50	72	77	80	81	79
Heavy Vehicles, %	36	19	11	10	21	10	13	17	9	7	17	35
Mvmt Flow	0	0	128	0	0	185	24	144	86	95	162	103

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	-	81	-	-	72	265	0	0	230	0	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	7.12	-	-	7.1	4.36	-	-	4.24	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.41	-	-	3.4	2.33	-	-	2.27	-	-
Pot Cap-1 Maneuver	0	0	934	0	0	950	1220	-	-	1299	-	-
Stage 1	0	0	-	0	0	-	-	-	-	-	-	-
Stage 2	0	0	-	0	0	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	-	934	-	-	950	1220	-	-	1299	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.5	9.7	0.8	2.1
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1220	-	-	934	950	1299	-	-
HCM Lane V/C Ratio	0.02	-	-	0.137	0.195	0.073	-	-
HCM Control Delay (s)	8	-	-	9.5	9.7	8	-	-
HCM Lane LOS	A	-	-	A	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.5	0.7	0.2	-	-

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	32	18	0	0	0
Future Vol, veh/h	0	32	18	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	75	71	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	43	25	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	25	0	-	0	68	25
Stage 1	-	-	-	-	25	-
Stage 2	-	-	-	-	43	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1589	-	-	-	937	1051
Stage 1	-	-	-	-	998	-
Stage 2	-	-	-	-	979	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1589	-	-	-	937	1051
Mov Cap-2 Maneuver	-	-	-	-	937	-
Stage 1	-	-	-	-	998	-
Stage 2	-	-	-	-	979	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1589	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	1.6

Movement	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations														
Traffic Vol, veh/h	75	0	181	0	10	0	213	0	0	0	0	0	0	0
Future Vol, veh/h	75	0	181	0	10	0	213	0	0	0	0	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	-	None	-	-	-	None	-	-	None	-	-	None
Storage Length	-	0	-	-	-	0	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	-	0	-	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-	0	-	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	82	0	197	0	11	0	232	0	0	0	0	0	0	0

Major/Minor	Major1				Major2				Minor2			Minor1		
Conflicting Flow All	232	-	0	-	197	-	-	0	-	-	116	-	-	99
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	6.44	-	-	-	6.44	-	-	-	-	-	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	2.52	-	-	-	2.52	-	-	-	-	-	3.32	-	-	3.32
Pot Cap-1 Maneuver	1022	0	-	0	1075	0	-	0	0	0	914	0	0	937
Stage 1	-	0	-	0	-	0	-	0	0	0	-	0	0	-
Stage 2	-	0	-	0	-	0	-	0	0	0	-	0	0	-
Platoon blocked, %			-				-							
Mov Cap-1 Maneuver	1022	-	-	-	1075	-	-	-	-	-	914	-	-	937
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Approach	NB	SB	NE	SW
HCM Control Delay, s	2.6	0.4	0	0
HCM LOS			A	A

Minor Lane/Major Mvmt	NELn1	NBU	NBT	SBU	SBT	SWLn1
Capacity (veh/h)	-	1022	-	1075	-	-
HCM Lane V/C Ratio	-	0.08	-	0.01	-	-
HCM Control Delay (s)	0	8.8	-	8.4	-	0
HCM Lane LOS	A	A	-	A	-	A
HCM 95th %tile Q(veh)	-	0.3	-	0	-	-

Intersection	
Int Delay, s/veh	0.8

Movement	NBT	NBR	SBU	SBL	SBT	SWL	SWR
Lane Configurations							
Traffic Vol, veh/h	152	0	30	0	133	0	0
Future Vol, veh/h	152	0	30	0	133	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	-	None	-	None
Storage Length	-	-	-	0	-	-	0
Veh in Median Storage, #	0	-	-	-	0	0	-
Grade, %	0	-	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2
Mvmt Flow	165	0	33	0	145	0	0

Major/Minor	Major1		Major2			Minor1	
Conflicting Flow All	0	-	165	-	-	-	83
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.44	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.52	-	-	-	3.32
Pot Cap-1 Maneuver	-	0	1126	0	-	0	960
Stage 1	-	0	-	0	-	0	-
Stage 2	-	0	-	0	-	0	-
Platoon blocked, %	-				-		
Mov Cap-1 Maneuver	-	-	1126	-	-	-	960
Mov Cap-2 Maneuver	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-

Approach	NB	SB	SW
HCM Control Delay, s	0	1.5	0
HCM LOS			A

Minor Lane/Major Mvmt	NBT	SBU	SBT	SWLn1
Capacity (veh/h)	-	1126	-	-
HCM Lane V/C Ratio	-	0.029	-	-
HCM Control Delay (s)	-	8.3	-	0
HCM Lane LOS	-	A	-	A
HCM 95th %tile Q(veh)	-	0.1	-	-

2: TH 61 & CR 10/5th Grant Blvd

Lane Group	EBT	WBT	NBL	NBT	NBR	SBL	SBT	SBR	All
Future Volume (vph)	21	28	11	155	12	27	176	1	431
Control Delay / Veh (s/v)	10	12	8	0	0	8	0	0	2
Queue Delay / Veh (s/v)	0	0	0	0	0	0	0	0	0
Total Delay / Veh (s/v)	10	12	8	0	0	8	0	0	2
Total Delay (hr)	0	0	0	0	0	0	0	0	0
Stops / Veh	1.00	1.00	1.55	0.00	0.00	1.56	0.00	0.00	0.25
Stops (#)	21	28	17	0	0	42	0	0	108
Average Speed (mph)	24	31	43	55	55	42	55	55	48
Total Travel Time (hr)	0	1	0	1	0	0	1	0	4
Distance Traveled (mi)	3	20	5	65	5	11	70	0	180
Fuel Consumed (gal)	0	1	0	2	0	1	2	0	8
Fuel Economy (mpg)	NA	19.2	NA	29.9	NA	9.1	29.9	NA	23.0
CO Emissions (kg)	0.03	0.07	0.03	0.15	0.01	0.08	0.16	0.00	0.54
NOx Emissions (kg)	0.01	0.01	0.01	0.03	0.00	0.02	0.03	0.00	0.11
VOC Emissions (kg)	0.01	0.02	0.01	0.04	0.00	0.02	0.04	0.00	0.13
Unserved Vehicles (#)	0	0	0	0	0	0	0	0	0
Vehs dilemma zone (#)	0	0	0	0	0	0	0	0	0

4: Shields Ave & TH 61

Lane Group	EBR	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Future Volume (vph)	42	152	12	114	66	76	131	91	684
Control Delay / Veh (s/v)	10	10	8	0	0	8	0	0	4
Queue Delay / Veh (s/v)	0	0	0	0	0	0	0	0	0
Total Delay / Veh (s/v)	10	10	8	0	0	8	0	0	4
Total Delay (hr)	0	0	0	0	0	0	0	0	1
Stops / Veh	1.00	1.00	1.58	0.00	0.00	1.61	0.00	0.00	0.49
Stops (#)	42	152	19	0	0	122	0	0	335
Average Speed (mph)	18	27	32	55	55	31	55	55	37
Total Travel Time (hr)	0	1	0	0	0	0	0	0	3
Distance Traveled (mi)	5	36	2	19	11	12	20	14	120
Fuel Consumed (gal)	1	3	0	1	0	3	1	0	9
Fuel Economy (mpg)	NA	11.6	NA	NA	NA	4.3	NA	NA	13.3
CO Emissions (kg)	0.04	0.22	0.03	0.05	0.03	0.19	0.05	0.03	0.63
NOx Emissions (kg)	0.01	0.04	0.01	0.01	0.01	0.04	0.01	0.01	0.12
VOC Emissions (kg)	0.01	0.05	0.01	0.01	0.01	0.05	0.01	0.01	0.15
Unserved Vehicles (#)	0	0	0	0	0	0	0	0	0
Vehs dilemma zone (#)	0	0	0	0	0	0	0	0	0

10:

Lane Group	EBT	WBT	SBL	All
Future Volume (vph)	42	18	10	70
Control Delay / Veh (s/v)	1	0	8	2
Queue Delay / Veh (s/v)	0	0	0	0
Total Delay / Veh (s/v)	1	0	8	2
Total Delay (hr)	0	0	0	0
Stops / Veh	0.24	0.00	1.00	0.29
Stops (#)	10	0	10	20
Average Speed (mph)	33	40	14	33
Total Travel Time (hr)	1	0	0	1
Distance Traveled (mi)	30	5	1	36
Fuel Consumed (gal)	1	0	0	2
Fuel Economy (mpg)	23.9	NA	NA	23.3
CO Emissions (kg)	0.09	0.01	0.01	0.11
NOx Emissions (kg)	0.02	0.00	0.00	0.02
VOC Emissions (kg)	0.02	0.00	0.00	0.03
Unserved Vehicles (#)	0	0	0	0
Vehs dilemma zone (#)	0	0	0	0

22: TH 61

Lane Group	NBU	NBT	SBU	SBT	All
Future Volume (vph)	75	191	10	223	499
Control Delay / Veh (s/v)	0	0	0	0	0
Queue Delay / Veh (s/v)	0	0	0	0	0
Total Delay / Veh (s/v)	0	0	0	0	0
Total Delay (hr)	0	0	0	0	0
Stops / Veh	0.00	0.00	0.00	0.00	0.00
Stops (#)	0	0	0	0	0
Average Speed (mph)	55	55	55	55	55
Total Travel Time (hr)	0	1	0	1	1
Distance Traveled (mi)	12	30	1	30	73
Fuel Consumed (gal)	0	1	0	1	2
Fuel Economy (mpg)	NA	NA	NA	29.9	29.9
CO Emissions (kg)	0.03	0.07	0.00	0.07	0.17
NOx Emissions (kg)	0.01	0.01	0.00	0.01	0.03
VOC Emissions (kg)	0.01	0.02	0.00	0.02	0.04
Unserved Vehicles (#)	0	0	0	0	0
Vehs dilemma zone (#)	0	0	0	0	0

23: TH 61

Lane Group	NBT	SBU	SBT	All
Future Volume (vph)	152	40	133	325
Control Delay / Veh (s/v)	0	0	0	0
Queue Delay / Veh (s/v)	0	0	0	0
Total Delay / Veh (s/v)	0	0	0	0
Total Delay (hr)	0	0	0	0
Stops / Veh	0.00	0.00	0.00	0.00
Stops (#)	0	0	0	0
Average Speed (mph)	55	55	55	55
Total Travel Time (hr)	1	0	0	1
Distance Traveled (mi)	42	7	23	71
Fuel Consumed (gal)	1	0	1	2
Fuel Economy (mpg)	29.9	NA	NA	29.9
CO Emissions (kg)	0.10	0.02	0.05	0.17
NOx Emissions (kg)	0.02	0.00	0.01	0.03
VOC Emissions (kg)	0.02	0.00	0.01	0.04
Unserved Vehicles (#)	0	0	0	0
Vehs dilemma zone (#)	0	0	0	0

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	3	3	15	12	1	15	11	155	12	27	176	1
Future Vol, veh/h	3	3	15	12	1	15	11	155	12	27	176	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	280	-	265	300	-	250
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	75	75	65	50	25	58	62	84	50	69	79	25
Heavy Vehicles, %	0	3	7	15	0	7	10	12	0	6	12	0
Mvmt Flow	4	4	23	24	4	26	18	185	24	39	223	4

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	432	546	112	413	526	93	227	0	0	209	0	0
Stage 1	301	301	-	221	221	-	-	-	-	-	-	-
Stage 2	131	245	-	192	305	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.56	7.04	7.8	6.5	7.04	4.3	-	-	4.22	-	-
Critical Hdwy Stg 1	6.5	5.56	-	6.8	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.56	-	6.8	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.03	3.37	3.65	4	3.37	2.3	-	-	2.26	-	-
Pot Cap-1 Maneuver	512	441	904	493	460	930	1282	-	-	1330	-	-
Stage 1	689	661	-	725	724	-	-	-	-	-	-	-
Stage 2	865	700	-	755	666	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	478	422	904	461	440	930	1282	-	-	1330	-	-
Mov Cap-2 Maneuver	478	422	-	461	440	-	-	-	-	-	-	-
Stage 1	679	642	-	715	714	-	-	-	-	-	-	-
Stage 2	824	690	-	710	647	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.3	11.5	0.6	1.1
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1282	-	-	716	605	1330	-	-
HCM Lane V/C Ratio	0.014	-	-	0.043	0.089	0.029	-	-
HCM Control Delay (s)	7.8	-	-	10.3	11.5	7.8	-	-
HCM Lane LOS	A	-	-	B	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0.3	0.1	-	-

Intersection												
Int Delay, s/veh	4.5											
Movement	**EBL**	**EBT**	**EBR**	**WBL**	**WBT**	**WBR**	**NBL**	**NBT**	**NBR**	**SBL**	**SBT**	**SBR**
Lane Configurations												
Traffic Vol, veh/h	0	0	42	0	0	152	12	114	66	76	131	91
Future Vol, veh/h	0	0	42	0	0	152	12	114	66	76	131	91
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	0	265	-	250	250	-	250
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	38	67	25	50	65	82	50	72	77	80	81	79
Heavy Vehicles, %	36	19	30	10	21	10	13	24	9	7	17	35
Mvmt Flow	0	0	168	0	0	185	24	158	86	95	162	115

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	-	81	-	-	79	277	0	0	244	0	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	7.5	-	-	7.1	4.36	-	-	4.24	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.6	-	-	3.4	2.33	-	-	2.27	-	-
Pot Cap-1 Maneuver	0	0	879	0	0	940	1207	-	-	1284	-	-
Stage 1	0	0	-	0	0	-	-	-	-	-	-	-
Stage 2	0	0	-	0	0	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	-	879	-	-	940	1207	-	-	1284	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.1	9.8	0.7	2.1
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1207	-	-	879	940	1284	-	-
HCM Lane V/C Ratio	0.02	-	-	0.191	0.197	0.074	-	-
HCM Control Delay (s)	8	-	-	10.1	9.8	8	-	-
HCM Lane LOS	A	-	-	B	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.7	0.7	0.2	-	-

Intersection						
Int Delay, s/veh	1.9					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	10	32	18	0	0	10
Future Vol, veh/h	10	32	18	0	0	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	75	71	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	43	25	0	0	11

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	25	0	-	0	90	25
Stage 1	-	-	-	-	25	-
Stage 2	-	-	-	-	65	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1589	-	-	-	910	1051
Stage 1	-	-	-	-	998	-
Stage 2	-	-	-	-	958	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1589	-	-	-	904	1051
Mov Cap-2 Maneuver	-	-	-	-	904	-
Stage 1	-	-	-	-	991	-
Stage 2	-	-	-	-	958	-

Approach	EB	WB	SB
HCM Control Delay, s	1.5	0	8.5
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1589	-	-	-	1051
HCM Lane V/C Ratio	0.007	-	-	-	0.01
HCM Control Delay (s)	7.3	0	-	-	8.5
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	1.5

Movement	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations														
Traffic Vol, veh/h	75	0	191	0	10	0	223	0	0	0	0	0	0	0
Future Vol, veh/h	75	0	191	0	10	0	223	0	0	0	0	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	-	None	-	-	-	None	-	-	None	-	-	None
Storage Length	-	0	-	-	-	0	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	-	0	-	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-	0	-	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	82	0	208	0	11	0	242	0	0	0	0	0	0	0

Major/Minor	Major1				Major2				Minor2			Minor1		
Conflicting Flow All	242	-	0	-	208	-	-	0	-	-	121	-	-	104
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	6.44	-	-	-	6.44	-	-	-	-	-	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	2.52	-	-	-	2.52	-	-	-	-	-	3.32	-	-	3.32
Pot Cap-1 Maneuver	1007	0	-	0	1058	0	-	0	0	0	908	0	0	931
Stage 1	-	0	-	0	-	0	-	0	0	0	-	0	0	-
Stage 2	-	0	-	0	-	0	-	0	0	0	-	0	0	-
Platoon blocked, %			-				-							
Mov Cap-1 Maneuver	1007	-	-	-	1058	-	-	-	-	-	908	-	-	931
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Approach	NB	SB	NE	SW
HCM Control Delay, s	2.5	0.4	0	0
HCM LOS			A	A

Minor Lane/Major Mvmt	NELn1	NBU	NBT	SBU	SBT	SWLn1
Capacity (veh/h)	-	1007	-	1058	-	-
HCM Lane V/C Ratio	-	0.081	-	0.01	-	-
HCM Control Delay (s)	0	8.9	-	8.4	-	0
HCM Lane LOS	A	A	-	A	-	A
HCM 95th %tile Q(veh)	-	0.3	-	0	-	-

Intersection	
Int Delay, s/veh	1

Movement	NBT	NBR	SBU	SBL	SBT	SWL	SWR
Lane Configurations							
Traffic Vol, veh/h	152	0	40	0	133	0	0
Future Vol, veh/h	152	0	40	0	133	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	-	None	-	None
Storage Length	-	-	-	0	-	-	0
Veh in Median Storage, #	0	-	-	-	0	0	-
Grade, %	0	-	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2
Mvmt Flow	165	0	43	0	145	0	0

Major/Minor	Major1		Major2			Minor1	
Conflicting Flow All	0	-	165	-	-	-	83
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.44	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.52	-	-	-	3.32
Pot Cap-1 Maneuver	-	0	1126	0	-	0	960
Stage 1	-	0	-	0	-	0	-
Stage 2	-	0	-	0	-	0	-
Platoon blocked, %	-				-		
Mov Cap-1 Maneuver	-	-	1126	-	-	-	960
Mov Cap-2 Maneuver	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-

Approach	NB	SB	SW
HCM Control Delay, s	0	1.9	0
HCM LOS			A

Minor Lane/Major Mvmt	NBT	SBU	SBT	SWLn1
Capacity (veh/h)	-	1126	-	-
HCM Lane V/C Ratio	-	0.039	-	-
HCM Control Delay (s)	-	8.3	-	0
HCM Lane LOS	-	A	-	A
HCM 95th %tile Q(veh)	-	0.1	-	-

2: TH 61 & CR 10/5th Grant Blvd

Lane Group	EBT	WBT	NBL	NBT	NBR	SBL	SBT	SBR	All
Future Volume (vph)	30	32	27	254	1	13	267	1	625
Control Delay / Veh (s/v)	12	14	8	0	0	8	0	0	2
Queue Delay / Veh (s/v)	0	0	0	0	0	0	0	0	0
Total Delay / Veh (s/v)	12	14	8	0	0	8	0	0	2
Total Delay (hr)	0	0	0	0	0	0	0	0	0
Stops / Veh	1.00	1.00	1.67	0.00	0.00	1.62	0.00	0.00	0.20
Stops (#)	30	32	45	0	0	21	0	0	128
Average Speed (mph)	22	30	42	55	55	42	55	55	49
Total Travel Time (hr)	0	1	0	2	0	0	2	0	5
Distance Traveled (mi)	5	23	11	107	0	5	106	0	259
Fuel Consumed (gal)	1	1	1	4	0	1	4	0	11
Fuel Economy (mpg)	NA	19.1	9.0	29.9	NA	NA	29.9	NA	24.0
CO Emissions (kg)	0.04	0.08	0.09	0.25	0.00	0.04	0.25	0.00	0.75
NOx Emissions (kg)	0.01	0.02	0.02	0.05	0.00	0.01	0.05	0.00	0.15
VOC Emissions (kg)	0.01	0.02	0.02	0.06	0.00	0.01	0.06	0.00	0.17
Unserved Vehicles (#)	0	0	0	0	0	0	0	0	0
Vehs dilemma zone (#)	0	0	0	0	0	0	0	0	0

4: Shields Ave & TH 61

Lane Group	EBR	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Future Volume (vph)	104	176	15	206	80	120	227	60	988
Control Delay / Veh (s/v)	10	10	8	0	0	9	0	0	4
Queue Delay / Veh (s/v)	0	0	0	0	0	0	0	0	0
Total Delay / Veh (s/v)	10	10	8	0	0	9	0	0	4
Total Delay (hr)	0	1	0	0	0	0	0	0	1
Stops / Veh	1.00	1.00	1.67	0.00	0.00	1.75	0.00	0.00	0.52
Stops (#)	104	176	25	0	0	210	0	0	515
Average Speed (mph)	18	30	32	55	55	30	55	55	37
Total Travel Time (hr)	1	2	0	1	0	1	1	0	5
Distance Traveled (mi)	13	60	3	35	14	19	35	9	188
Fuel Consumed (gal)	1	4	1	1	0	5	1	0	14
Fuel Economy (mpg)	9.8	14.1	NA	29.9	NA	3.9	29.9	NA	13.4
CO Emissions (kg)	0.09	0.30	0.04	0.08	0.03	0.33	0.08	0.02	0.98
NOx Emissions (kg)	0.02	0.06	0.01	0.02	0.01	0.06	0.02	0.00	0.19
VOC Emissions (kg)	0.02	0.07	0.01	0.02	0.01	0.08	0.02	0.01	0.23
Unserved Vehicles (#)	0	0	0	0	0	0	0	0	0
Vehs dilemma zone (#)	0	0	0	0	0	0	0	0	0

22: TH 61

Lane Group	NBU	NBT	SBU	SBT	All
Future Volume (vph)	81	301	7	326	715
Control Delay / Veh (s/v)	0	0	0	0	0
Queue Delay / Veh (s/v)	0	0	0	0	0
Total Delay / Veh (s/v)	0	0	0	0	0
Total Delay (hr)	0	0	0	0	0
Stops / Veh	0.00	0.00	0.00	0.00	0.00
Stops (#)	0	0	0	0	0
Average Speed (mph)	55	55	55	55	55
Total Travel Time (hr)	0	1	0	1	2
Distance Traveled (mi)	13	47	1	44	105
Fuel Consumed (gal)	0	2	0	1	4
Fuel Economy (mpg)	NA	29.9	NA	29.9	29.9
CO Emissions (kg)	0.03	0.11	0.00	0.10	0.24
NOx Emissions (kg)	0.01	0.02	0.00	0.02	0.05
VOC Emissions (kg)	0.01	0.03	0.00	0.02	0.06
Unserved Vehicles (#)	0	0	0	0	0
Vehs dilemma zone (#)	0	0	0	0	0

23: TH 61

Lane Group	NBT	SBU	SBT	All
Future Volume (vph)	221	80	251	552
Control Delay / Veh (s/v)	0	0	0	0
Queue Delay / Veh (s/v)	0	0	0	0
Total Delay / Veh (s/v)	0	0	0	0
Total Delay (hr)	0	0	0	0
Stops / Veh	0.00	0.00	0.00	0.00
Stops (#)	0	0	0	0
Average Speed (mph)	55	55	55	55
Total Travel Time (hr)	1	0	1	2
Distance Traveled (mi)	61	14	43	117
Fuel Consumed (gal)	2	0	1	4
Fuel Economy (mpg)	29.9	NA	29.9	29.9
CO Emissions (kg)	0.14	0.03	0.10	0.27
NOx Emissions (kg)	0.03	0.01	0.02	0.05
VOC Emissions (kg)	0.03	0.01	0.02	0.06
Unserved Vehicles (#)	0	0	0	0
Vehs dilemma zone (#)	0	0	0	0

28:

Lane Group	EBT	WBT	All
Future Volume (vph)	17	32	49
Control Delay / Veh (s/v)	0	0	0
Queue Delay / Veh (s/v)	0	0	0
Total Delay / Veh (s/v)	0	0	0
Total Delay (hr)	0	0	0
Stops / Veh	0.00	0.00	0.00
Stops (#)	0	0	0
Average Speed (mph)	33	40	36
Total Travel Time (hr)	0	0	1
Distance Traveled (mi)	12	9	22
Fuel Consumed (gal)	0	0	1
Fuel Economy (mpg)	NA	NA	NA
CO Emissions (kg)	0.03	0.02	0.06
NOx Emissions (kg)	0.01	0.00	0.01
VOC Emissions (kg)	0.01	0.01	0.01
Unserved Vehicles (#)	0	0	0
Vehs dilemma zone (#)	0	0	0

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	3	3	24	3	6	23	27	254	1	13	267	1
Future Vol, veh/h	3	3	24	3	6	23	27	254	1	13	267	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	280	-	265	300	-	250
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	50	50	75	38	62	66	72	85	25	60	69	25
Heavy Vehicles, %	0	3	7	85	0	7	10	12	89	6	12	0
Mvmt Flow	6	6	32	8	10	35	38	299	4	22	387	4

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	662	810	194	616	810	150	391	0	0	303	0	0
Stage 1	431	431	-	375	375	-	-	-	-	-	-	-
Stage 2	231	379	-	241	435	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.56	7.04	9.2	6.5	7.04	4.3	-	-	4.22	-	-
Critical Hdwy Stg 1	6.5	5.56	-	8.2	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.56	-	8.2	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.03	3.37	4.35	4	3.37	2.3	-	-	2.26	-	-
Pot Cap-1 Maneuver	351	311	799	243	316	854	1109	-	-	1226	-	-
Stage 1	578	579	-	438	621	-	-	-	-	-	-	-
Stage 2	757	610	-	551	584	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	316	295	799	221	300	854	1109	-	-	1226	-	-
Mov Cap-2 Maneuver	316	295	-	221	300	-	-	-	-	-	-	-
Stage 1	558	569	-	423	600	-	-	-	-	-	-	-
Stage 2	690	589	-	514	573	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	12.1	13.4	0.9	0.4
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1109	-	-	554	482	1226	-	-
HCM Lane V/C Ratio	0.034	-	-	0.079	0.109	0.018	-	-
HCM Control Delay (s)	8.4	-	-	12.1	13.4	8	-	-
HCM Lane LOS	A	-	-	B	B	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.3	0.4	0.1	-	-

Intersection												
Int Delay, s/veh	4.3											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	104	0	0	176	15	206	80	120	227	60
Future Vol, veh/h	0	0	104	0	0	176	15	206	80	120	227	60
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	0	265	-	250	250	-	250
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	71	66	68	69	49	86	65	79	71	65	84	81
Heavy Vehicles, %	36	19	11	10	21	10	13	17	9	7	17	35
Mvmt Flow	0	0	153	0	0	205	23	261	113	185	270	74

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	-	135	-	-	131	344	0	0	374	0	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	7.12	-	-	7.1	4.36	-	-	4.24	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.41	-	-	3.4	2.33	-	-	2.27	-	-
Pot Cap-1 Maneuver	0	0	861	0	0	869	1136	-	-	1146	-	-
Stage 1	0	0	-	0	0	-	-	-	-	-	-	-
Stage 2	0	0	-	0	0	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	-	861	-	-	869	1136	-	-	1146	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.1	10.4	0.5	3.1
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1136	-	-	861	869	1146	-	-
HCM Lane V/C Ratio	0.02	-	-	0.178	0.236	0.161	-	-
HCM Control Delay (s)	8.2	-	-	10.1	10.4	8.7	-	-
HCM Lane LOS	A	-	-	B	B	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.6	0.9	0.6	-	-

Intersection	
Int Delay, s/veh	1.2

Movement	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations														
Traffic Vol, veh/h	81	0	301	0	7	0	326	0	0	0	0	0	0	0
Future Vol, veh/h	81	0	301	0	7	0	326	0	0	0	0	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	-	None	-	-	-	None	-	-	None	-	-	None
Storage Length	-	0	-	-	-	0	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	-	0	-	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-	0	-	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	88	0	327	0	8	0	354	0	0	0	0	0	0	0

Major/Minor	Major1				Major2				Minor2			Minor1		
Conflicting Flow All	354	-	0	-	327	-	-	0	-	-	177	-	-	164
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	6.44	-	-	-	6.44	-	-	-	-	-	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	2.52	-	-	-	2.52	-	-	-	-	-	3.32	-	-	3.32
Pot Cap-1 Maneuver	856	0	-	0	890	0	-	0	0	0	835	0	0	852
Stage 1	-	0	-	0	-	0	-	0	0	0	-	0	0	-
Stage 2	-	0	-	0	-	0	-	0	0	0	-	0	0	-
Platoon blocked, %			-				-							
Mov Cap-1 Maneuver	856	-	-	-	890	-	-	-	-	-	835	-	-	852
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Approach	NB	SB	NE	SW
HCM Control Delay, s	2.1	0.2	0	0
HCM LOS			A	A

Minor Lane/Major Mvmt	NELn1	NBU	NBT	SBU	SBT	SWLn1
Capacity (veh/h)	-	856	-	890	-	-
HCM Lane V/C Ratio	-	0.103	-	0.009	-	-
HCM Control Delay (s)	0	9.7	-	9.1	-	0
HCM Lane LOS	A	A	-	A	-	A
HCM 95th %tile Q(veh)	-	0.3	-	0	-	-

Intersection	
Int Delay, s/veh	1.3

Movement	NBT	NBR	SBU	SBL	SBT	SWL	SWR
Lane Configurations							
Traffic Vol, veh/h	221	0	80	0	251	0	0
Future Vol, veh/h	221	0	80	0	251	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	-	None	-	None
Storage Length	-	-	-	0	-	-	0
Veh in Median Storage, #	0	-	-	-	0	0	-
Grade, %	0	-	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	15	2	2	2	2
Mvmt Flow	240	0	87	0	273	0	0

Major/Minor	Major1		Major2			Minor1	
Conflicting Flow All	0	-	240	-	-	-	120
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.7	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.65	-	-	-	3.32
Pot Cap-1 Maneuver	-	0	948	0	-	0	909
Stage 1	-	0	-	0	-	0	-
Stage 2	-	0	-	0	-	0	-
Platoon blocked, %	-				-		
Mov Cap-1 Maneuver	-	-	948	-	-	-	909
Mov Cap-2 Maneuver	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-

Approach	NB		SB			SW	
HCM Control Delay, s	0		2.2			0	
HCM LOS						A	

Minor Lane/Major Mvmt	NBT	SBU	SBT	SWLn1
Capacity (veh/h)	-	948	-	-
HCM Lane V/C Ratio	-	0.092	-	-
HCM Control Delay (s)	-	9.2	-	0
HCM Lane LOS	-	A	-	A
HCM 95th %tile Q(veh)	-	0.3	-	-

Intersection						
Int Delay, s/veh	0					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	17	32	0	0	0
Future Vol, veh/h	0	17	32	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	75	72	92	92	92
Heavy Vehicles, %	95	2	2	2	2	95
Mvmt Flow	0	23	44	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	44	0	-	0	67	44
Stage 1	-	-	-	-	44	-
Stage 2	-	-	-	-	23	-
Critical Hdwy	5.05	-	-	-	6.42	7.15
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	3.055	-	-	-	3.518	4.155
Pot Cap-1 Maneuver	1129	-	-	-	938	814
Stage 1	-	-	-	-	978	-
Stage 2	-	-	-	-	1000	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1129	-	-	-	938	814
Mov Cap-2 Maneuver	-	-	-	-	938	-
Stage 1	-	-	-	-	978	-
Stage 2	-	-	-	-	1000	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1129	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

2: TH 61 & CR 10/5th Grant Blvd

Lane Group	EBT	WBT	NBL	NBT	NBR	SBL	SBT	SBR	All
Future Volume (vph)	30	42	27	254	11	13	267	1	645
Control Delay / Veh (s/v)	12	19	8	0	0	8	0	0	2
Queue Delay / Veh (s/v)	0	0	0	0	0	0	0	0	0
Total Delay / Veh (s/v)	12	19	8	0	0	8	0	0	2
Total Delay (hr)	0	0	0	0	0	0	0	0	0
Stops / Veh	1.00	1.00	1.67	0.00	0.00	1.62	0.00	0.00	0.21
Stops (#)	30	42	45	0	0	21	0	0	138
Average Speed (mph)	22	28	42	55	55	42	55	55	48
Total Travel Time (hr)	0	1	0	2	0	0	2	0	6
Distance Traveled (mi)	5	30	11	107	5	5	106	0	270
Fuel Consumed (gal)	1	2	1	4	0	1	4	0	11
Fuel Economy (mpg)	NA	18.5	9.0	29.9	NA	NA	29.9	NA	23.8
CO Emissions (kg)	0.04	0.11	0.09	0.25	0.01	0.04	0.25	0.00	0.79
NOx Emissions (kg)	0.01	0.02	0.02	0.05	0.00	0.01	0.05	0.00	0.15
VOC Emissions (kg)	0.01	0.03	0.02	0.06	0.00	0.01	0.06	0.00	0.18
Unserved Vehicles (#)	0	0	0	0	0	0	0	0	0
Vehs dilemma zone (#)	0	0	0	0	0	0	0	0	0

4: Shields Ave & TH 61

Lane Group	EBR	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Future Volume (vph)	114	176	15	216	80	120	227	70	1018
Control Delay / Veh (s/v)	10	10	8	0	0	9	0	0	4
Queue Delay / Veh (s/v)	0	0	0	0	0	0	0	0	0
Total Delay / Veh (s/v)	10	10	8	0	0	9	0	0	4
Total Delay (hr)	0	1	0	0	0	0	0	0	1
Stops / Veh	1.00	1.00	1.67	0.00	0.00	1.76	0.00	0.00	0.52
Stops (#)	114	176	25	0	0	211	0	0	526
Average Speed (mph)	18	30	32	55	55	30	55	55	36
Total Travel Time (hr)	1	2	0	1	0	1	1	0	5
Distance Traveled (mi)	14	60	3	37	14	19	35	11	192
Fuel Consumed (gal)	1	4	1	1	0	5	1	0	14
Fuel Economy (mpg)	9.8	14.1	NA	29.9	NA	3.9	29.9	NA	13.5
CO Emissions (kg)	0.10	0.30	0.04	0.09	0.03	0.33	0.08	0.03	1.00
NOx Emissions (kg)	0.02	0.06	0.01	0.02	0.01	0.06	0.02	0.00	0.19
VOC Emissions (kg)	0.02	0.07	0.01	0.02	0.01	0.08	0.02	0.01	0.23
Unserved Vehicles (#)	0	0	0	0	0	0	0	0	0
Vehs dilemma zone (#)	0	0	0	0	0	0	0	0	0

22: TH 61

Lane Group	NBU	NBT	SBU	SBT	All
Future Volume (vph)	81	311	7	336	735
Control Delay / Veh (s/v)	0	0	0	0	0
Queue Delay / Veh (s/v)	0	0	0	0	0
Total Delay / Veh (s/v)	0	0	0	0	0
Total Delay (hr)	0	0	0	0	0
Stops / Veh	0.00	0.00	0.00	0.00	0.00
Stops (#)	0	0	0	0	0
Average Speed (mph)	55	55	55	55	55
Total Travel Time (hr)	0	1	0	1	2
Distance Traveled (mi)	13	49	1	46	108
Fuel Consumed (gal)	0	2	0	2	4
Fuel Economy (mpg)	NA	29.9	NA	29.9	29.9
CO Emissions (kg)	0.03	0.11	0.00	0.11	0.25
NOx Emissions (kg)	0.01	0.02	0.00	0.02	0.05
VOC Emissions (kg)	0.01	0.03	0.00	0.02	0.06
Unserved Vehicles (#)	0	0	0	0	0
Vehs dilemma zone (#)	0	0	0	0	0

23: TH 61

Lane Group	NBT	SBU	SBT	All
Future Volume (vph)	221	90	251	562
Control Delay / Veh (s/v)	0	0	0	0
Queue Delay / Veh (s/v)	0	0	0	0
Total Delay / Veh (s/v)	0	0	0	0
Total Delay (hr)	0	0	0	0
Stops / Veh	0.00	0.00	0.00	0.00
Stops (#)	0	0	0	0
Average Speed (mph)	55	55	55	55
Total Travel Time (hr)	1	0	1	2
Distance Traveled (mi)	61	15	43	119
Fuel Consumed (gal)	2	1	1	4
Fuel Economy (mpg)	29.9	NA	29.9	29.9
CO Emissions (kg)	0.14	0.04	0.10	0.28
NOx Emissions (kg)	0.03	0.01	0.02	0.05
VOC Emissions (kg)	0.03	0.01	0.02	0.06
Unserved Vehicles (#)	0	0	0	0
Vehs dilemma zone (#)	0	0	0	0

28:

Lane Group	EBT	WBT	SBL	All
Future Volume (vph)	27	32	10	69
Control Delay / Veh (s/v)	2	0	9	2
Queue Delay / Veh (s/v)	0	0	0	0
Total Delay / Veh (s/v)	2	0	9	2
Total Delay (hr)	0	0	0	0
Stops / Veh	0.37	0.00	1.00	0.29
Stops (#)	10	0	10	20
Average Speed (mph)	33	40	13	34
Total Travel Time (hr)	1	0	0	1
Distance Traveled (mi)	19	9	1	29
Fuel Consumed (gal)	1	0	0	1
Fuel Economy (mpg)	NA	NA	NA	23.1
CO Emissions (kg)	0.06	0.02	0.01	0.09
NOx Emissions (kg)	0.01	0.00	0.00	0.02
VOC Emissions (kg)	0.01	0.01	0.00	0.02
Unserved Vehicles (#)	0	0	0	0
Vehs dilemma zone (#)	0	0	0	0

Intersection	
Int Delay, s/veh	2.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	3	3	24	13	6	23	27	254	11	13	267	1
Future Vol, veh/h	3	3	24	13	6	23	27	254	11	13	267	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	280	-	265	300	-	250
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	50	50	75	38	62	66	72	85	25	60	69	25
Heavy Vehicles, %	0	3	7	85	0	7	10	12	89	6	12	0
Mvmt Flow	6	6	32	34	10	35	38	299	44	22	387	4

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	662	850	194	616	810	150	391	0	0	343	0	0
Stage 1	431	431	-	375	375	-	-	-	-	-	-	-
Stage 2	231	419	-	241	435	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.56	7.04	9.2	6.5	7.04	4.3	-	-	4.22	-	-
Critical Hdwy Stg 1	6.5	5.56	-	8.2	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.56	-	8.2	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.03	3.37	4.35	4	3.37	2.3	-	-	2.26	-	-
Pot Cap-1 Maneuver	351	294	799	243	316	854	1109	-	-	1184	-	-
Stage 1	578	579	-	438	621	-	-	-	-	-	-	-
Stage 2	757	586	-	551	584	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	315	279	799	220	300	854	1109	-	-	1184	-	-
Mov Cap-2 Maneuver	315	279	-	220	300	-	-	-	-	-	-	-
Stage 1	558	568	-	423	600	-	-	-	-	-	-	-
Stage 2	690	566	-	514	573	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	12.2	18.5	0.8	0.4
HCM LOS	B	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1109	-	-	546	344	1184	-	-
HCM Lane V/C Ratio	0.034	-	-	0.081	0.229	0.018	-	-
HCM Control Delay (s)	8.4	-	-	12.2	18.5	8.1	-	-
HCM Lane LOS	A	-	-	B	C	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.3	0.9	0.1	-	-

Intersection	
Int Delay, s/veh	4.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	114	0	0	176	15	216	80	120	227	70
Future Vol, veh/h	0	0	114	0	0	176	15	216	80	120	227	70
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	0	265	-	250	250	-	250
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	71	66	68	69	49	86	65	79	71	65	84	81
Heavy Vehicles, %	36	19	22	10	21	10	13	22	9	7	17	35
Mvmt Flow	0	0	168	0	0	205	23	273	113	185	270	86

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	-	135	-	-	137	356	0	0	386	0	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	7.34	-	-	7.1	4.36	-	-	4.24	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.52	-	-	3.4	2.33	-	-	2.27	-	-
Pot Cap-1 Maneuver	0	0	829	0	0	862	1124	-	-	1134	-	-
Stage 1	0	0	-	0	0	-	-	-	-	-	-	-
Stage 2	0	0	-	0	0	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	-	829	-	-	862	1124	-	-	1134	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.4	10.5	0.5	3
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1124	-	-	829	862	1134	-	-
HCM Lane V/C Ratio	0.021	-	-	0.202	0.237	0.163	-	-
HCM Control Delay (s)	8.3	-	-	10.4	10.5	8.8	-	-
HCM Lane LOS	A	-	-	B	B	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.8	0.9	0.6	-	-

Intersection	
Int Delay, s/veh	1.2

Movement	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations														
Traffic Vol, veh/h	81	0	311	0	7	0	336	0	0	0	0	0	0	0
Future Vol, veh/h	81	0	311	0	7	0	336	0	0	0	0	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	-	None	-	-	-	None	-	-	None	-	-	None
Storage Length	-	0	-	-	-	0	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	-	0	-	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-	0	-	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	88	0	338	0	8	0	365	0	0	0	0	0	0	0

Major/Minor	Major1				Major2				Minor2			Minor1		
Conflicting Flow All	365	-	0	-	338	-	-	0	-	-	183	-	-	169
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	6.44	-	-	-	6.44	-	-	-	-	-	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	2.52	-	-	-	2.52	-	-	-	-	-	3.32	-	-	3.32
Pot Cap-1 Maneuver	843	0	-	0	876	0	-	0	0	0	828	0	0	845
Stage 1	-	0	-	0	-	0	-	0	0	0	-	0	0	-
Stage 2	-	0	-	0	-	0	-	0	0	0	-	0	0	-
Platoon blocked, %			-				-							
Mov Cap-1 Maneuver	843	-	-	-	876	-	-	-	-	-	828	-	-	845
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Approach	NB	SB	NE	SW
HCM Control Delay, s	2	0.2	0	0
HCM LOS			A	A

Minor Lane/Major Mvmt	NELn1	NBU	NBT	SBU	SBT	SWLn1
Capacity (veh/h)	-	843	-	876	-	-
HCM Lane V/C Ratio	-	0.104	-	0.009	-	-
HCM Control Delay (s)	0	9.8	-	9.1	-	0
HCM Lane LOS	A	A	-	A	-	A
HCM 95th %tile Q(veh)	-	0.3	-	0	-	-

Intersection	
Int Delay, s/veh	1.5

Movement	NBT	NBR	SBU	SBL	SBT	SWL	SWR
Lane Configurations							
Traffic Vol, veh/h	221	0	90	0	251	0	0
Future Vol, veh/h	221	0	90	0	251	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	-	None	-	None
Storage Length	-	-	-	0	-	-	0
Veh in Median Storage, #	0	-	-	-	0	0	-
Grade, %	0	-	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	15	2	2	2	2
Mvmt Flow	240	0	98	0	273	0	0

Major/Minor	Major1		Major2			Minor1	
Conflicting Flow All	0	-	240	-	-	-	120
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.7	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.65	-	-	-	3.32
Pot Cap-1 Maneuver	-	0	948	0	-	0	909
Stage 1	-	0	-	0	-	0	-
Stage 2	-	0	-	0	-	0	-
Platoon blocked, %	-				-		
Mov Cap-1 Maneuver	-	-	948	-	-	-	909
Mov Cap-2 Maneuver	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-

Approach	NB	SB	SW
HCM Control Delay, s	0	2.4	0
HCM LOS			A

Minor Lane/Major Mvmt	NBT	SBU	SBT	SWLn1
Capacity (veh/h)	-	948	-	-
HCM Lane V/C Ratio	-	0.103	-	-
HCM Control Delay (s)	-	9.2	-	0
HCM Lane LOS	-	A	-	A
HCM 95th %tile Q(veh)	-	0.3	-	-

Intersection						
Int Delay, s/veh	2.2					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	10	17	32	0	0	10
Future Vol, veh/h	10	17	32	0	0	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	75	72	92	92	92
Heavy Vehicles, %	95	2	2	2	2	95
Mvmt Flow	11	23	44	0	0	11

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	44	0	-	0	89	44
Stage 1	-	-	-	-	44	-
Stage 2	-	-	-	-	45	-
Critical Hdwy	5.05	-	-	-	6.42	7.15
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	3.055	-	-	-	3.518	4.155
Pot Cap-1 Maneuver	1129	-	-	-	912	814
Stage 1	-	-	-	-	978	-
Stage 2	-	-	-	-	977	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1129	-	-	-	903	814
Mov Cap-2 Maneuver	-	-	-	-	903	-
Stage 1	-	-	-	-	968	-
Stage 2	-	-	-	-	977	-

Approach	EB	WB	SB
HCM Control Delay, s	2.7	0	9.5
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1129	-	-	-	814
HCM Lane V/C Ratio	0.01	-	-	-	0.013
HCM Control Delay (s)	8.2	0	-	-	9.5
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

LEAST SQUARES WORKSHEET **SEGMENT A1**

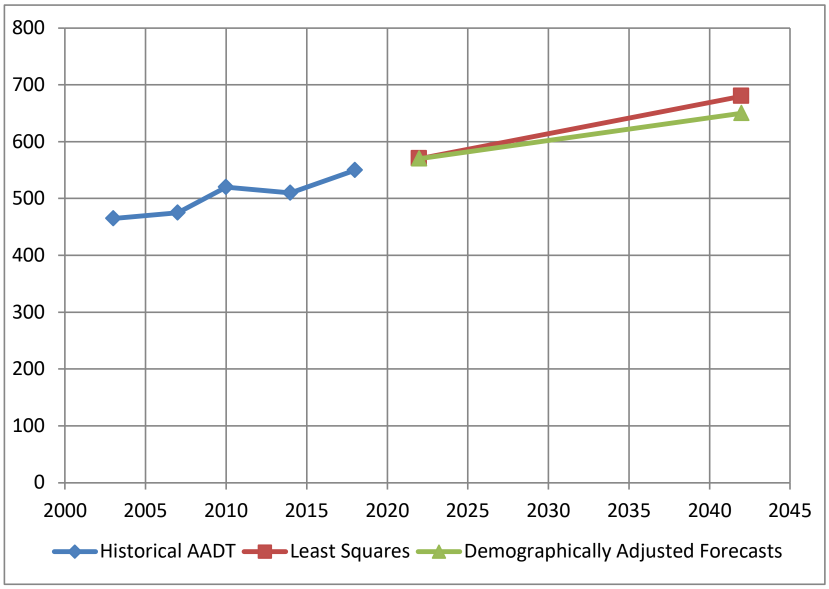
ROUTE: ______ **SP#:** ______ **DATE** 11/28/22

LOCATION: CR 10 at Hwy 61 **Miles :**

BASE YEAR: 2022 **FORECAST YEAR:** 2042 **Seq #**

# of lanes 1

YEAR	FLOW MAP AADT (SEG A)
2003	465
2007	475
2010	520
2014	510
2018	550



LEAST SQUARES BASED FORECASTS:

Year	AADT	Calc	ADT Calc
2018	546	4	550
2022	568		572
2042	677		682

Statistics	AADT
R 2	0.86
SLOPE	5.48
INTERCEPT	-10515
N	5

Raw Least Squares Forecasts

YEAR	AADT
2018	550
2022	570
2042	680

Slope Over Base Year
0.96%

Demographically Adjusted Forecasts

YEAR	AADT
2018	550
2022	570
2042	650

Slope Over Base Year
0.70%

NOTE:

County Adjustment Factors were developed to Apply to Projected AADT. They are based on 1992-2007 VMT, Population, Labor Force, Household, and Employment Data.

COUNTY	COUNTY FACTOR	GROWTH PROFILE
WABASHA	0.82	LOW GROWTH AREA

LEAST SQUARES WORKSHEET **SEGMENT A1**

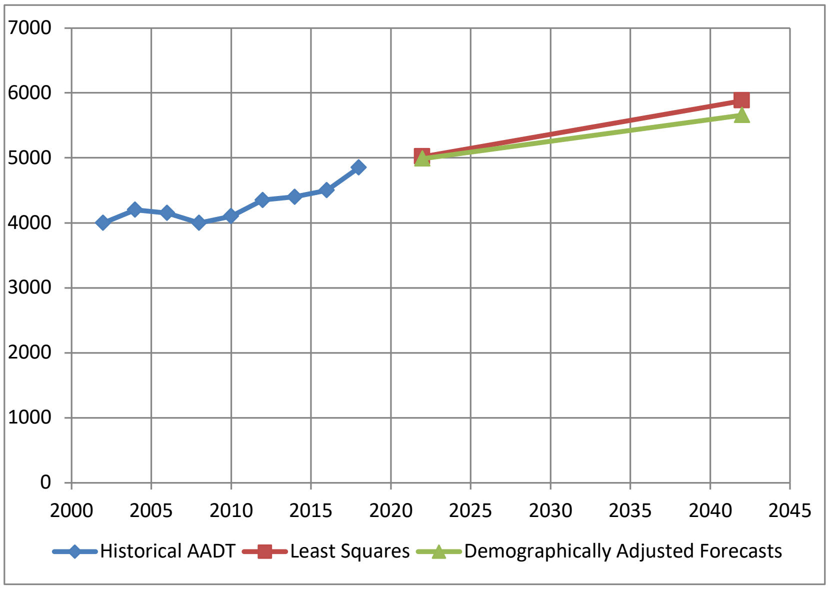
ROUTE: ______ **SP#:** ______ **DATE** 11/28/22

LOCATION: Hwy 61 At Shields Ave **Miles :**

BASE YEAR: 2022 **FORECAST YEAR:** 2042 **Seq #**

# of lanes 2

YEAR	FLOW MAP AADT (SEG A)
2002	4000
2004	4200
2006	4150
2008	4000
2010	4100
2012	4350
2014	4400
2016	4500
2018	4850



LEAST SQUARES BASED FORECASTS:

Year	AADT	Calc	ADT Calc
2018	4627	223	4850
2022	4798		5022
2042	5657		5880

Statistics	AADT
R 2	0.73
SLOPE	42.92
INTERCEPT	-81979
N	9

Raw Least Squares Forecasts	
YEAR	AADT
2018	4850
2022	5020
2042	5880
Slope Over Base Year 0.85%	

Demographically Adjusted Forecasts	
YEAR	AADT
2018	4850
2022	4990
2042	5660
Slope Over Base Year 0.67%	

NOTE:

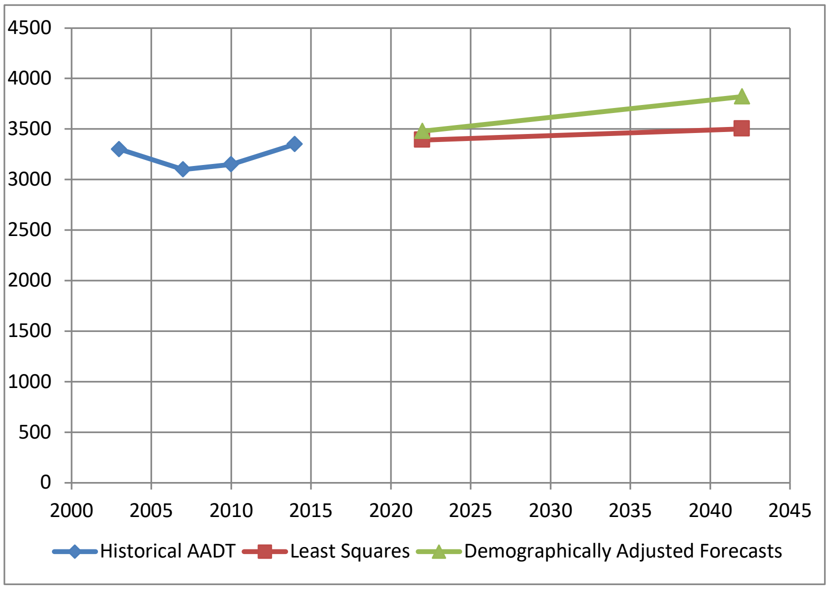
County Adjustment Factors were developed to Apply to Projected AADT. They are based on 1992-2007 VMT, Population, Labor Force, Household, and Employment Data.

COUNTY	COUNTY FACTOR	GROWTH PROFILE
WABASHA	0.82	LOW GROWTH AREA

LEAST SQUARES WORKSHEET **SEGMENT A1**

ROUTE:		**SP#:**		**DATE**	11/28/22
LOCATION:	Shields Ave at Hwy 61			**Miles :**	
BASE YEAR:	2022	**FORECAST YEAR:**	2042	**Seq #**	
				# of lanes	1

YEAR	FLOW MAP AADT (SEG A)
2003	3300
2007	3100
2010	3150
2014	3350



LEAST SQUARES BASED FORECASTS:

Year	AADT	Calc	ADT Calc
2014	3255	95	3350
2022	3298		3393
2042	3405		3501

Statistics	AADT
R 2	0.04
SLOPE	5.38
INTERCEPT	-7590
N	4

Raw Least Squares Forecasts

YEAR	AADT
2014	**3350**
2022	**3390**
2042	**3500**

Slope Over Base Year
0.16%

Demographically Adjusted Forecasts

YEAR	AADT
2014	**3350**
2022	**3480**
2042	**3820**

Slope Over Base Year
0.49%

NOTE:

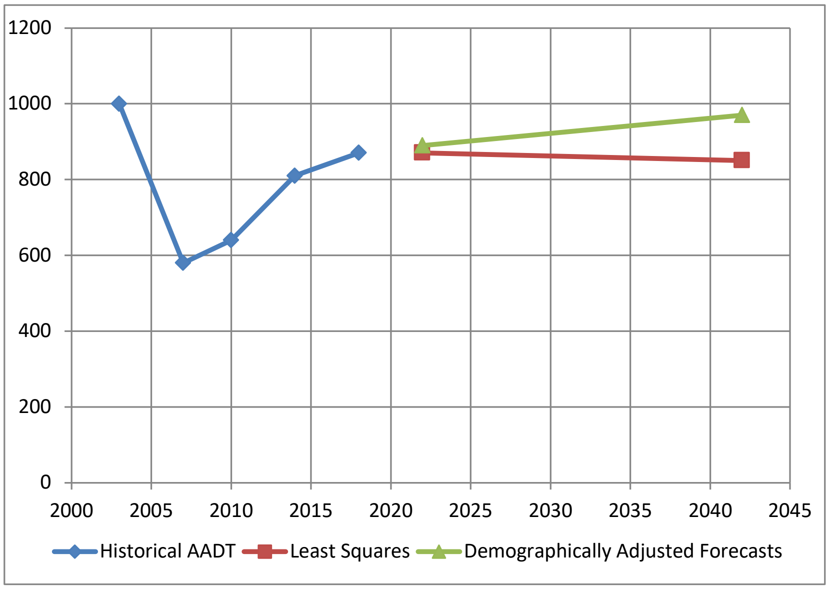
County Adjustment Factors were developed to Apply to Projected AADT. They are based on 1992-2007 VMT, Population, Labor Force, Household, and Employment Data.

COUNTY	COUNTY FACTOR	GROWTH PROFILE
WABASHA	**0.82**	**LOW GROWTH AREA**

LEAST SQUARES WORKSHEET **SEGMENT A1**

ROUTE:		**SP#:**		**DATE**	11/28/22
LOCATION:	5th Grant Blvd at Barge Site			**Miles :**	
BASE YEAR:	2022	**FORECAST YEAR:**	2042	**Seq #**	
				# of lanes	1

YEAR	FLOW MAP AADT (SEG A)
2003	1000
2007	580
2010	640
2014	810
2018	870



LEAST SQUARES BASED FORECASTS:

Year	AADT	Calc	ADT Calc
2018	774	96	870
2022	772		867
2042	757		853

Statistics	AADT
R 2	0.00
SLOPE	-0.73
INTERCEPT	2245
N	5

Raw Least Squares Forecasts

YEAR	AADT
2018	**870**
2022	**870**
2042	**850**

Slope Over Base Year
-0.08%

Demographically Adjusted Forecasts

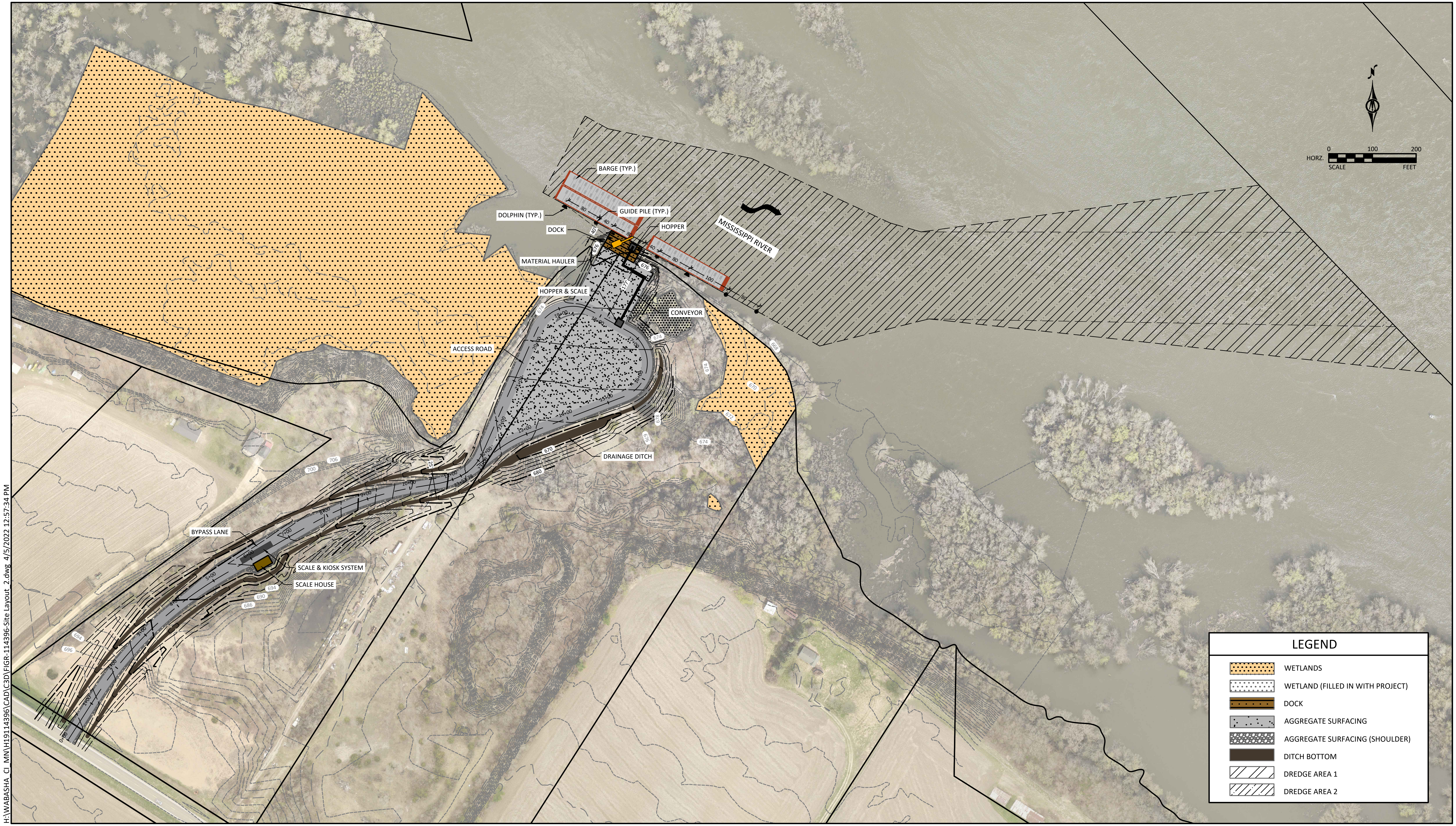
YEAR	AADT
2018	**870**
2022	**890**
2042	**970**

Slope Over Base Year
0.45%

NOTE:

County Adjustment Factors were developed to Apply to Projected AADT. They are based on 1992-2007 VMT, Population, Labor Force, Household, and Employment Data.

COUNTY	COUNTY FACTOR	GROWTH PROFILE
WABASHA	**0.82**	**LOW GROWTH AREA**



H:\WABASHA_CI_MN\H19114396\CAD\C3D\FIGR-114396-Site Layout_2.dwg 4/5/2022 12:57:34 PM

APPENDIX I

Scoping EAW

SCOPING DOCUMENT
WABASHA BARGE FACILITY

Wabasha County

Barge facility on the Mississippi River to facilitate dredged material storage and transportation of agricultural products and shipping containers.

June 2022

Prepared by: Bolton & Menk, Inc.
Prepared for: Wabasha Port Authority

WABASHA BARGE FACILITY SCOPING DOCUMENT

Table of Contents

Tables

Appendices

Appendix A: Figures

List of Acronyms and Abbreviations

AADT	Average Annual Daily Traffic
BMP	Best Management Practices
BWSR	Minnesota Board of Water and Soil Resources
CWA	Clean Water Act
DWSMA	Drinking Water Supply Management Area
EAW	Environmental Assessment Worksheet
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
EQB	Environmental Quality Board
FEMA	Federal Emergency Management Agency
LGU	Local Government Unit
MARAD	Maritime Administration
MDH	Minnesota Department of Health
MGS	Minnesota Geologic Survey
MnDNR	Minnesota Department of Natural Resources
MN	State of Minnesota
MnDOT	Minnesota Department of Transportation
MPCA	Minnesota Pollution Control Agency
MPCA WIMN	Minnesota Pollution Control Agencies What's in My Neighborhood website
NHIS	Natural Heritage Information System
NLCD	National Land Cover Database
NPDES	National Pollutant Discharge Elimination System
NRCS	National Resource Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetland Inventory
PWI	Public Waters Inventory
RGU	Responsible Governmental Unit
SHPO	State Historic Preservation Office
SSURGO	Soil Survey Geographic Database
SWPPP	Storm Water Pollution Prevention Plan
TH	Trunk Highway
TMDL	Total Maximum Daily Load
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
WCA	Wetland Conservation Act
WIDNR	Wisconsin Department of Natural Resources

Scoping EAW Document

This EAW form is being used to identify issues or potential concerns for the Wabasha Barge Facility Environmental Impact Statement (EIS). Comments submitted to the Responsible Government Unit (RGU) during the 30-day public comment period will be reviewed and addressed in the Draft and Final EIS.

1 Project Title

Wabasha Barge Facility

2 Proposer

Organization:	Wabasha Port Authority
Contact person:	Caroline Gregerson
Title:	City Administrator
Address:	900 Hiawatha Drive E
City, State, ZIP:	Wabasha, MN 55981
Phone:	651-565-4568
Email:	cityadmin@wabasha.org

3 RGU

Organization:	Same as Proposer
Contact person:	
Title:	
Address:	
City, State, ZIP:	
Phone:	
Email:	

4 Reason for EAW Preparation

Required:	**Discretionary:**
☒ EIS Scoping	☐ Citizen petition
4410.4400 Subp. 17, Barge Fleeting Facility	☐ RGU discretion
☐ Mandatory EAW	☐ Proposer initiated

5 Project Location

County	Wabasha County
City/Township	Wabasha

County	Wabasha County		
PLS Location (¼, ¼, Section, Township, Range):	**Section**	**Township**	**Range**
Sect-30 Twp-111 Range-010 13.60 AC EX HWY ESMT, OUT LOTS 4 & 5	30	111N	010W
Sect-30 Twp-111 Range-010 13.15 AC EX SWLY 12.85 AC, OUT LOT 6	30	111N	010W

Watershed (82 major watershed scale):

GPS Coordinates (UTM): 44.3913760, -92.0536705

Tax Parcel Number: R27.00004.00 and R27.00005.03

See **Appendix A** for a series of figures depicting the project location and existing/proposed site conditions.

6 Project Description

a. EQB Monitor Description

Provide the brief project summary to be published in the EQB Monitor, (approximately 50 words).

This Scoping Document addresses a proposed barge facility in Wabasha, MN that will serve to transport sand from Mississippi River navigation channel dredging operations from the river to offsite locations for beneficial re-use. The project area encompasses 54.0 acres and will include infrastructure construction, including access channel dredging, a sheet pile dock wall, barge mooring and maneuvering facilities, conveyors and hoppers for material management, temporary storage area for transported dredge material, sewer and water utilities, internal access road, a weighing station, and a small operations structure (see **Appendix A** for a series of location maps and existing/proposed site condition maps). Facility operations will involve the transfer of sand from river barges to trucks for transport to off-site facilities for use as reclamation material for existing sand and gravel mines or other potential beneficial reuse.

b. Complete Description

Give a complete description of the proposed project and related new construction, including infrastructure needs. If the project is an expansion include a description of the existing facility. Emphasize: 1) construction, operation methods and features that will cause physical manipulation of the environment or will produce wastes, 2) modifications to existing equipment or industrial processes, 3) significant demolition, removal or remodeling of existing structures, and 4) timing and duration of construction activities.

Project Description (Including Context/Need)

The City of Wabasha, in cooperation with the Wabasha Port Authority, is proposing to construct a barge terminal on the Mississippi River in Wabasha, MN (UMR Mile 760). The site will be used to to facilitate the transfer of approximately 270,000 CY of sand that is annually dredged from the Mississippi River within a roughly 6-mile reach of the river centered on Wabasha. This material is dredged by the US Army Corps of Engineers (USACE) to maintain a 9-foot navigable channel along this stretch of the

Mississippi River. The Wabasha barge terminal site will facilitate the transfer of sand from river barges to trucks for transport to off-site facilities for use as reclamation material for existing sand and gravel mines or other potential beneficial reuse.

Upon environmental clearance and acquisition of all required permits, the work elements to be completed as part of the project include:

- Dredging the existing access channel on the Mississippi River to the proposed dock area
- Dredging an area to accommodate barge maneuvering and docking
- The dredged material will be used as fill material on the barge terminal site to raise the storage area above the 100-year flood elevation
- Construct the barge terminal pad and access road
- Construct a sheet pile dock face and upstream/downstream steel pipe pile clusters for barge mooring and maneuvering system
- Construct footings for conveyors and hoppers for material handling and loadout
- Install a loading truck scale and construct a scale house/field office building
- Install sewer and water utilities for field office building
- Install electrical utilities for the site

Timing and Duration of Construction Activities

Detailed construction plans have not been completed. Site design documents are anticipated to be completed in Fall/Winter 2022. The proposed letting date for construction is Summer 2023. Construction is proposed to be complete with site operations commencing in Spring 2024.

Proposed Treatment of Topic in EIS

The EIS will include a complete project description.

c. Project Magnitude

Table 1: Project Magnitude

Total Project Acreage	54.0 acres
Linear project length	NA
Aggregate mining acreage	NA
Number and type of residential units	NA
Commercial building area (square feet)	NA
Industrial building area (square feet)	<1,000 sq/ft (scale house)
Institutional building area (square feet)	NA
Other uses – specify (acres)	3,200 sq/ft dock area 3.35 ac. aggregate surface (storage pad and access roads)
Structure height(s)	<20’

d. Project Purpose

Explain the project purpose; if the project will be carried out by a governmental unit, explain the need for the project and identify its beneficiaries.

The proposed barge terminal site is planned to facilitate the transfer of dredged material from the river to land as an alternative to previously proposed transfer facility locations that would have been in close proximity to and would have routed relatively high volumes of truck traffic through, residential neighborhoods in the City of Wabasha. The proposed Wabasha barge terminal is a cost-effective strategy to allow dredged material to be moved from the river to land while minimizing impacts to residential neighborhoods in the community.

Proposed Treatment of Topic in EIS

The EIS will include a complete project purpose and need statement.

e. Future Development

Are future phases of this development including development on any other property planned or likely to happen?

☐ *Yes* ☒ *No*

If yes, briefly describe future phases, relationship to present project, timeline and plans for environmental review.

f. Previous Development

Is this project a subsequent stage of an earlier project? ☐ *Yes* ☒ *No*

If yes, briefly describe the past development, timeline and any past environmental review. N/A

7 Cover Types

Estimate the acreage of the site with each of the following cover types before and after development:

The conceptual site plan, including project construction and disturbance limits, was used to define the area footprint in **Table 2** below.

Table 2: Cover Types

	Before*	After*		Before*	After*
Wetlands	16.1	15.7	Lawn/landscaping	0	0
Deep water/streams	12.5	12.5	Impervious surface	4.5**	7.8**
Wooded/forest	9.0	6.3	Stormwater Pond/Ditch	0	0.6
Brush/Grassland	7.5	6.6	Other (barge docking area)		0.1
Cropland	4.4	4.4			
			TOTAL	**54.0**	**54.0**

*Existing and proposed cover type acreage estimates are based on the National Land Cover Database (NLCD), aerial photo interpretation, wetland delineations, and the conceptual site layout. Acreages are estimates and subject to change based on further site planning and project development.

** The existing gravel driveway, which is classified as "Developed" in the NLCD, was considered an impervious surface. The proposed condition assumed the aggregate surfaces associated shown on the proposed site plan along with the remaining portions of the existing gravel driveway are consider impervious for the "After" condition.

Proposed Treatment of Topic in EIS

The EIS will provide analysis of cover type impacts within respective sections of the EIS. For example, changes in the acres of cropland or forested areas on the site will be discussed in the Farmland section and Vegetation section, respectively. Cover types that do not exist within the study area, and will not result from the proposed project, will not be discussed in the EIS (e.g., urban/suburban land). The proposed barge terminal facility site plan will be utilized to determine areas for cover type conversions, areas that may remain unaltered, stormwater treatment sites, and potential impervious surfaces.

8 Permits & Approvals Required

List all known local, state and federal permits, approvals, certifications and financial assistance for the project. Include modifications of any existing permits, governmental review of plans and all direct and indirect forms of public financial assistance including bond guarantees, Tax Increment Financing and infrastructure. All these final decisions are prohibited until all appropriate environmental review has been completed. See Minnesota Rules, Chapter 4410.3100.

Permits and Approvals

All known permits at state, federal, and local levels necessitated by the project are listed in **Table 3**, below. Public financial assistance is anticipated from the State of Minnesota through its PDAP and from the federal Department of Transportation Maritime Administration (MARAD) PIDP grant.

Table 3. Required Permits & Approvals

Government Agency	Type of Application/Permit	Status
Federal Agencies		
U.S. Army Corps of Engineers	Clean Water Act (CWA) Notification	To be updated*
	Section 10 Rivers & Harbors Appropriation Act	To be updated*
State Agencies		
Minnesota Department of Natural Resources	Public Waters Work Permit	To be updated*
Minnesota Board of Water and Soil Resources (BWSR)	Minnesota Wetland Conservation Act (WCA) Notification	To be updated*
Minnesota Pollution Control Agency (MPCA)	National Pollutant Discharge Elimination System (NPDES) Construction General Storm Water Permit	To be updated
Local Agencies		
City of Wabasha	Stormwater Permit	To be updated*
	Conditional Use Permit	To be updated*

**To be updated*: permit requirement is anticipated and will be applied for prior to project or specific phase commencing.

Proposed Treatment of Topic in EIS

The EIS will include a list of all potential agency approvals and permits potentially required for the project.

9 Land Use

a. Existing Land Use

Description

Existing land use of the site as well as areas adjacent to and near the site, including parks, trails, prime or unique farmlands.

Located on the northwestern outskirts of the City of Wabasha, the City's 2016-2035 Comprehensive Plan lists the 54.0-acre project site's existing land use as Vacant. The project site is primarily comprised of vacant woodland and appears to have been used for the dumping or storage of scrap metal, construction material, and various vehicle parts.

According to historic aerial imagery—which is available for limited years from 1939 to the present—gravel mining occurred on the project site, beginning in earnest in 1949 and continuing into the early 1970s. By 2010, gravel mining had ended, and trees have reclaimed the filled gravel pits.

As shown on **Appendix A, Figure 3, "Existing Conditions,"** the project site is bounded by the Mississippi River to the north and agricultural land to the east and west. 5th Grant Boulevard West (Wabasha County Road 59), which borders the project site to the south, provides connection to downtown Wabasha and Highway 61.

Additional agricultural land is located south of the project site, across 5th Grant Boulevard West. Some of the agricultural lots adjacent to the project site contain houses, however the nearest lots to the project site that are primarily of residential use are located approximately 0.25 miles southeast of the project site.

The Riverview Cemetery is located beyond the agricultural land west of the project site, approximately 250 feet from the proposed project. An active freight railroad line operated by Canadian Pacific Railway is approximately 300 feet southwest of the project site. A small rail yard is located approximately 400 feet southeast of the project site. The Gunderson St. Elizabeth's Hospital is located approximately 0.40 miles southeast of the project site.

As shown on **Appendix A, Figure 10, "Outdoor Recreation,"** there are no identified parks, trails, or recreational resources located within the project site. The closest outdoor recreational resources are the State of Wisconsin's Nelson-Trevino Bottoms State Natural Area, located across the Mississippi River approximately 0.25 miles northeast of the project site, and the City of Wabasha's Beach Park, located approximately 0.60 miles southeast of the project site.

In July 2020, Bolton & Menk, Inc., conducted a wetland delineation that identified 16.1 acres of Type 1 Seasonally Flooded Wetlands located within the northernmost portions of the project site.

A Phase I Environmental Site Assessment was completed in January 2020 and determined that there is no potential risk for contamination due to recognized environmental conditions, current land uses, and previous land uses on the project site.

Local Plans

Describe planned land use as identified in comprehensive plan (if available) and any other applicable plan for land use, water, or resources management by a local, regional, state, or federal agency.

The current Wabasha Comprehensive Plan (2016-2035), last amended July 6, 2021, lists the future land use of the project site as “Industrial.” Furthermore, Section 7.0 (Economic Development & Historic Preservation) discusses Wabasha’s unique location and opportunity for development of a commercial river port facility that would be used in the ongoing efforts by the Corps of Engineers in maintaining the 9-foot navigable river channel.

Zoning

Zoning, including special districts or overlays such as shoreland, floodplain, wild and scenic rivers, critical area, agricultural preserves, etc.

The two parcels that comprise the project site are both zoned R-1, “Low-Density Residential.” R-1 zoning districts are intended to allow for the use and development of residential structures, yards, and directly related complimentary uses at a lower density than traditionally developed in the originally platted cities. The parcels bordering the project site to the east and west are also zoned R-1. The parcels located across 5th Grant Boulevard West, south of the project site, are zoned I, “Industrial.”

The project site is also located in a S1 Shoreland Overlay Zone. Shoreland Overlay Zoning Ordinances typically contain a variety of provisions that guide land development and activity in shorelands with the goal of protecting surface water quality, near-shore habitat, and shoreland aesthetics. S1 Shoreland Overlay Zones are intended to provide standards for shoreland areas within the city that are primarily undeveloped.

The project site is located within FEMA 100-Year Floodplain. The project site is not located within a Drinking Water Management Supply Area (DWSMA)—however, the lots directly south of the project site, across 5th Grant Boulevard West, are located within a DWSMA.

b. Project Compatibility

Discuss the project’s compatibility with nearby land uses, zoning, and plans listed in Item 9a above, concentrating on implications for environmental effects.

As discussed in Item 9a, the proposed project is compatible with the nearby industrial land uses and zoning and is aligned with the industrial development goals outlined in the City of Wabasha’s 2016-2035 Comprehensive Plan.

c. Project Incompatibility

Identify measures incorporated into the proposed project to mitigate any potential incompatibility as discussed in Item 9b above.

No incompatibility issues exist for the project, as discussed in Item 9a.

Proposed Treatment of Topic in EIS

The EIS will verify and summarize the existing land uses identified within the Wabasha Barge Terminal study area. The EIS will also address existing land uses adjacent to the site within a half-mile buffer area of the site. This half-mile buffer will serve as a guideline to evaluate land use compatibility and identifying environmental impacts within an area of potential impact resulting from the proposed barge terminal operations. No additional analysis is planned for the EIS regarding the description of land uses within the project area. A series of mitigation strategies will be explored to avoid and minimize impacts from the proposed operations on land uses within the area of impact.

10 Geology, Soils, & Topography/Landforms

a. Geology

Describe the geology underlying the project area and identify and map any susceptible geologic features such as sinkholes, shallow limestone formations, unconfined/shallow aquifers, or karst conditions. Discuss any limitations of these features for the project and any effects the project could have on these features. Identify any project designs or mitigation measures to address effects to geologic features.

Bedrock Geology

According to the Geologic Atlas of Wabasha County, C-14, Plate 2, bedrock geology beneath the project site consists of the Eau Claire Formation which consists of sandstone, siltstone, and shale interbedded in thin to medium beds. The sandstone is very fine grained to fine grained. The sandstone and siltstone are light to yellowish gray, variably glauconitic, and commonly contain gray to black brachiopod shell fragments. The shale is greenish gray. Unit coarsens upward, with siltstone and shale replaced in abundance by sandstone. Uppermost 10–20 feet is mostly very fine grained sandstone and minor amounts of siltstone. The unit is 125–150 feet thick. A tongue in the uppermost part of the Eau Claire Formation crops out near Wabasha. [1]

Surficial Geology

The Geologic Atlas of Wabasha County, C-14, Plate 3, shows the surficial geology consists of floodplain alluvium, West Campus Formation, and Grey Cloud terrace. Floodplain alluvium is mainly fine sand and silt on floodplains; includes sand and gravel that infills modern river channels. Some depressions have been filled with thick silty to clayey sediment. Includes minor lakeshore sediment along Lake Pepin. Contacts with other map units are commonly scarps. The West Campus formation is comprised of Sand

[1] Mossler, John H. 2001. C-14 Geologic Atlas of Wabasha County, Minnesota. Plate 2-Bedrock Geology. Retrieved from University of Minnesota Digital Conservancy. Available at: https://conservancy.umn.edu/handle/11299/58557.

and gravelly sand; coarsens to cobbly gravel in places. The sediment is largely reworked from the Mississippi valley train; deposited during early, high stages of the Mississippi River and preserved in terraces above the modern floodplain. The West Campus formation is mapped at three major terrace levels in Wabasha County. The Grey Cloud terrace is 40–50 feet (12–15 m) above Lake Pepin and the present floodplain level. The terrace elevation is 700–710 feet (214–216 m) in Lake City and Wabasha. Most contacts with other map units are scarps.[2]

The pollution sensitivity of near surface materials has a high rating across the majority of the project site. The sensitivity to pollution of near-surface materials is an estimate of the time it takes for water to infiltrate the land surface to a depth of 10 feet. Generally, areas of course-grained material have a higher sensitivity to pollution compared to areas of fine-grained material, except where special conditions (karst, bedrock at or near the surface, mining, and peatlands) occur. No special conditions are mapped within the project site.[3]

While Wabasha County is located in a karst region, the project area consists of non-karsted bedrock, with Cambrian sandstones and shales as the uppermost bedrock layers. Karsted bedrock can be found in close proximity to the project area, both south and west.[4]

Aquifers

Minnesota is divided into six groundwater provinces based on bedrock and glacial geology. The aquifers within these provinces occur in two general geologic settings: bedrock, and unconsolidated sediments deposited by glaciers, streams, and lakes. The project site is located in the East-Central Province. The East-Central Province has surficial and buried sand and gravel aquifers that are common. The East-Central Province's aquifers are underlain by thick and extensive sandstone and carbonate (Paleozoic) and (Precambrian) sandstone aquifers.[5]

Geologic conditions and groundwater information can be seen in **Appendix A, Figure 6, "Geologic Conditions/Groundwater."**

Proposed Treatment of Topic in EIS

The EIS will include an evaluation of the geologic conditions at the Wabasha Barge study area, including an assessment of potential impacts to bedrock geology, surficial geology and underlying aquifers. The EIS will also include a detailed floodplain assessment.

[2] Hobbs, Howard C. 2001. C-14 Geologic Atlas of Wabasha County, Minnesota. Plate 3-Surficial Geology. Retrieved from University of Minnesota Digital Conservancy. https://conservancy.umn.edu/handle/11299/58557.

[3] Adams, Roberta. 2016. Pollution sensitivity of near-surface materials: St. Paul, Minnesota Department of Natural Resources, Minnesota Hydrogeology Atlas Series HG-02, report and plate. Available at: https://www.dnr.state.mn.us/waters/programs/gw_section/mapping/platesum/mha_ps-ns.html.

[4] Tipping, R., Green, J., & Alexander, E. 2001. C-14 Geological Atlas of Wabasha County, Minnesota. Plate 5 – Karst Features. https://conservancy.umn.edu/bitstream/handle/11299/58557/plate5%5b1%5d.pdf?sequence=5&isAllowed=y

[5] MNDNR. 2021. Groundwater Provinces of Minnesota. Available at: https://files.dnr.state.mn.us/waters/groundwater_section/provinces/2021-provinces.pdf

b. Soils & Topography

Describe the soils on the site, giving NRCS (SCS) classifications and descriptions, including limitations of soils. Describe topography, any special site conditions relating to erosion potential, soil stability or other soils limitations, such as steep slopes, highly permeable soils. Provide estimated volume and acreage of soil excavation and/or grading. Discuss impacts from project activities (distinguish between construction and operational activities) related to soils and topography. Identify measures during and after project construction to address soil limitations including stabilization, soil corrections or other measures. Erosion/sedimentation control related to stormwater runoff should be addressed in response to Item 11.b.ii.

United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Soil Maps were reviewed within and around the proposed project footprint. A soils map of the proposed site can be seen in **Appendix A, Figure 5, "Soils."**

The predominant soil types and soil component names within the proposed development area are listed in the table below. Additional information regarding the soil hydrologic classification provides insights regarding potential runoff and erosion control measures that may be needed during construction.

Table 4: Soil Types within the Project Area[6]

Map Unit Symbol	Map Unit Key	Component Name	Soils Label	Hydric Rating	Estimated Percentage of Study Area
N646A	1946882	Ceresco	N646A, Ceresco	No	18.8
N648A	1946885	Kalmarville	N648A, Kalmarville	Yes	13.9
MdA	2216395	Meridian	MdA, Meridian	No	2.4
DmA	2216322	Mt. Carroll	DmA, Mt. Carroll	No	3.8
ThA	2216437	Tell	ThA, Tell	No	1.9
Ts	2216441	Terrace escarpments, sandy	Terrace escarpments, sandy	No	3.9
GP	2216134	Udipsamments	GP, Udipsamments	No	49.7
W	2216215	Water	W, Water		5.6

Soils in Wabasha County are generally characterized in the soil survey as silty loam developed on alluvium and sedimentary bedrock. The river terrace and floodplain alluvium is composed of sand and gravel and is about 180 feet thick. This body of sand and gravel is underlain by lower permeability sedimentary bedrock.[7]

The Soil Survey Geographic Database (SSURGO) lists almost half of the project area soil as gravel pit and udipsamments. The udipsamments complex has a 0-25 percent slope, is excessively drained, and has sandy and gravelly outwash parent material. The next largest soil types within the project area are Ceresco and Kalmarville, respectively, which are somewhat poorly drained and poorly drained. The majority of the project area has minimal slopes, except for the portion listed as Ts – terrace escarpments, sandy. This soil type is listed as having steep slopes, with a slope range of 15-60 percent.

[6] Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Soil Survey Geographic (SSURGO) Database. Available online at https://sdmdataaccess.sc.egov.usda.gov.

[7] City of Wabasha. 2018. Hydrogeologic Assessment of the Drinking Water Source and Wells for the City of Wabasha, Part I.

The NRCS classifies soils into hydrologic soil groups, A – D:

- Group A – Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands.
- Group B – Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately course texture.
- Group C – Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture.
- Group D – Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays with high swelling potential, soils with a permanent high-water table, soils with a claypan or clay layer at or near the surface, and shallow soils over nearly impervious material.
- Group "/D" – Soils with a high-water table, but if drained conform to the first letter listed before "/D" (for example, A/D, B/D).

See *Item 11.b.ii*. for a discussion of erosion/sedimentation control measures related to stormwater runoff.

Project activities during the construction phase that will impact soils include the dredging of river bottom sediment to create a navigable passage and construction of roads, weighing station, small operations structure, and barge fleeting area. Dredged sediment will be brought to an upland area of the site.

Operational activities of the proposed project will not further impact the soils and topography of the site beyond the temporary placement of transported goods on the site prior to being hauled off-site.

Topography/Land Forms

Elevations on the site range between 668 to 708 feet above mean sea level.[8] Two-foot contour mapping shows the lowest elevations along the Mississippi River, with a steep bluff along the edge of the floodplain. A USGS topographic map of the proposed site can be seen in **Appendix A, Figure 2.**

Proposed Treatment of Topic in EIS

The EIS will include a discussion of site geology, soils, and topography, as well as a more complete assessment of potential impacts of the site layout and operations of the barge terminal facilities.

[8] Elevations taken from MnTOPO. http://arcgis.dnr.state.mn.us/maps/mntopo/.

11 Water Resources

a. Surface Water & Groundwater Features

Describe surface water and groundwater features on or near the site.

Surface Water

Describe lakes, streams, wetlands, intermittent channels, and county/judicial ditches. Include any special designations such as public waters, trout stream/lake, wildlife lakes, migratory waterfowl feeding/resting lake, and outstanding resource value water. Include water quality impairments or special designations listed on the current MPCA 303d Impaired Waters List that are within 1 mile of the project. Include DNR Public Waters Inventory number(s), if any.

Public Waters – One Mile Search Area

The project site is within the Buffalo-Whitewater watershed (HUC8: 07040003).

Table 5. Impaired and Public Waters Within One Mile of Wabasha Barge Facility

AUID	Name	Impaired Use**	Additional Impairments	Distance to Project Area
07-0400-03-627	Mississippi River - U.S. Lock & Dam #4 Pool	-	Mercury in fish tissue PCB in fish tissue	adjacent
NA	Brewery Creek	NA	NA	~0.25 mile

Appendix A, Figure 7 "Surface Waters" illustrates the surface waters within close proximity of the study area.

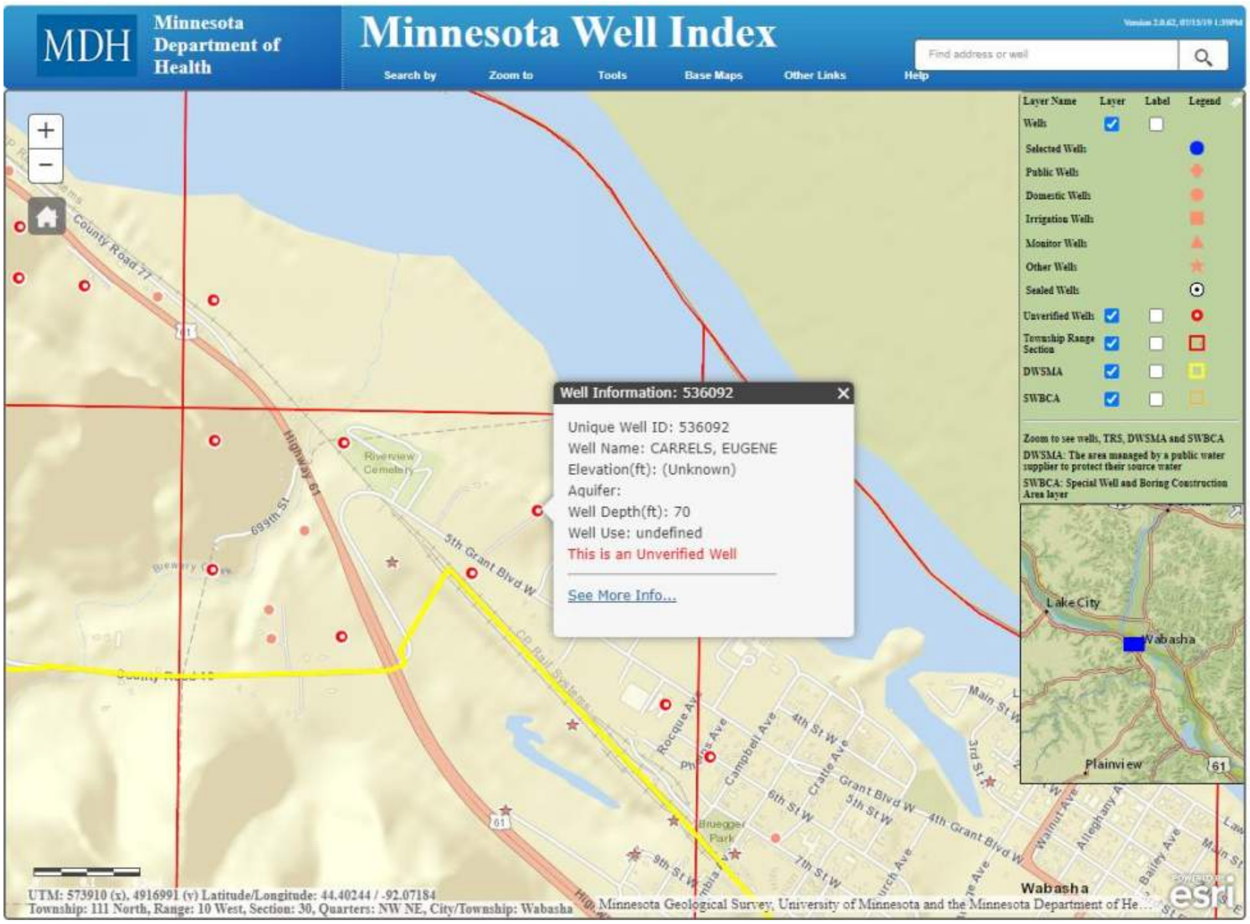
Wetlands

Wetland delineations were completed in June 2020. The field investigation was performed to evaluate and verify the existence and boundary of any aquatic resources located within the project area. The field investigation found four wetland basins within the study area. In addition to the field investigation, an off-site hydrology assessment was performed to identify locations within agricultural field that may possess wetland signatures. Eight years of aerial imagery was reviewed, only one site was identified and reviewed. According to the off-site hydrology decision matrix, the site was not considered wetland.

Ground Water

Describe aquifers, springs, seeps. Include: 1) depth to groundwater; 2) if project is within a MDH wellhead protection area; 3) identification of any onsite and/or nearby wells, including unique numbers and well logs if available. If there are no wells known on site or nearby, explain the methodology used to determine this.

Groundwater data for the project area was obtained from the MNDNR. The site is located within the East-Central (1) Minnesota Groundwater Province and within the Quaternary water-table and buried unconfined aquiver. No springs are currently identified onsite by the MNDNR Spring Inventory. Depth to groundwater within the site is generally 0-20 ft[9]. The project site is not within an existing DWSMA or a wellhead protection area (see **Appendix A, Figure 6, "Geologic Conditions/Groundwater"**) but there are DWSMA and Wellhead protection areas located nearby. There is an existing unverified well onsite, Well ID: 536092 (see ***Minnesota Well Index*** image below).



b. Project Effects & Mitigations

Describe effects from project activities on water resources and measures to minimize or mitigate the effects in Item b.i. through Item b.iv. below.

Any wells encountered on site will be sealed in accordance with Minnesota Department of Health's (MDH) requirements.

[9] Peterson, Todd A. 2005. C-14 Geologic Atlas of Wabasha County, Minnesota. Part B, Plate 8 – Hydrogeology of the Unconsolidated and Bedrock Aquifers. Retrieved from MNDNR. https://www.dnr.state.mn.us/waters/programs/gw_section/mapping/platesum/wabacga.html.

i. Wastewater

For each of the following, describe the sources, quantities and composition of all sanitary, municipal/domestic and industrial wastewater produced or treated at the site.

If the wastewater discharge is to a publicly owned treatment facility, identify any pretreatment measures and the ability of the facility to handle the added water and waste loadings, including any effects on, or required expansion of, municipal wastewater infrastructure.

Sanitary (domestic) wastewater generated by employees at the barge terminal facility will collected and conveyed to the City of Wabasha wastewater treatment facility (WWTF) where it will be treated. No pretreatment measures are necessary for domestic wastewater and the City's WWTF has adequate capacity to handle the minor amount of additional flow from the proposed facility.

If the wastewater discharge is to a subsurface sewage treatment systems (SSTS), describe the system used, the design flow, and suitability of site conditions for such a system.

N/A

If the wastewater discharge is to surface water, identify the wastewater treatment methods and identify discharge points and proposed effluent limitations to mitigate impacts. Discuss any effects to surface or groundwater from wastewater discharges.

N/A

ii. Stormwater

Describe the quantity and quality of stormwater runoff at the site prior to and post construction. Include the routes and receiving water bodies for runoff from the site (major downstream water bodies as well as the immediate receiving waters). Discuss any environmental effects from stormwater discharges. Describe stormwater pollution prevention plans including temporary and permanent runoff controls and potential BMP site locations to manage or treat stormwater runoff. Identify specific erosion control, sedimentation control or stabilization measures to address soil limitations during and after project construction.

Stormwater Quantity

The project site and surrounding surface waters are not located within a defined watershed district or watershed management organization area. The project is located within the Buffalo-Whitewater watershed (HUC 07040003), which is part of the larger Mississippi River Watershed.

Stormwater runoff flows within the project limits north towards the Mississippi River. Ditches will be constructed around the perimeter of the active operations area to collect, store, and treat runoff prior to discharging to the Mississippi River. Areas not part of the facility operations will remain in natural habitat. Runoff from these areas should have no change from current water quantity and quality conditions, thereby causing negligible impact to receiving waters.

Stormwater Quality

During construction, the contractor will follow stormwater and erosion control best management practices as dictated by the MPCA NPDES Permit. The EPA-approved impairments for the Mississippi

River are considered non-construction related and do not require any additional best management practices or plan review for compliance with the NPDES construction stormwater permit.

The project is not located within a defined Watershed District or watershed management area, therefore NPDES guidelines for permanent stormwater treatment will be followed. The project will generate more than one acre of new impervious surfaces. Per the NPDES construction stormwater permit, a water quality volume equal to one-inch time the net increase of impervious surfaces needs to be treated by permanent stormwater treatment systems constructed as a part of the project.

iii. Water Appropriation

Describe if the project proposes to appropriate surface or groundwater (including dewatering). Describe the source, quantity, duration, use and purpose of the water use and if a DNR water appropriation permit is required. Describe any well abandonment. If connecting to an existing municipal water supply, identify the wells to be used as a water source and any effects on, or required expansion of, municipal water infrastructure. Discuss environmental effects from water appropriation, including an assessment of the water resources available for appropriation. Identify any measures to avoid, minimize, or mitigate environmental effects from the water appropriation.

A DNR water appropriations permit is not anticipated for operations of the proposed barge terminal facility. An extension of City watermain to serve the facility and a water service connection to the watermain system will be constructed as a part of the project.

iv. Surface Waters

Describe any anticipated physical effects or alterations to wetland features such as draining, filling, permanent inundation, dredging and vegetative removal. Discuss direct and indirect environmental effects from physical modification of wetlands, including the anticipated effects that any proposed wetland alterations may have to the host watershed. Identify measures to avoid (e.g., available alternatives that were considered), minimize, or mitigate environmental effects to wetlands. Discuss whether any required compensatory wetland mitigation for unavoidable wetland impacts will occur in the same minor or major watershed and identify those probable locations.

Wetlands

Figure 8, located in Appendix A, "Wetlands", illustrates the NWI areas and approved delineated wetland boundaries within and surrounding the project area. On June 18 and 25, of 2020, a field investigation was performed to evaluate and verify the existence and boundary of any aquatic resources located within the Wabasha Barge Terminal project area. The field investigation found a total of four wetlands within the study area. In addition to the field investigation, an off-site hydrology assessment was performed to identify locations within agricultural field that may possess wetland signatures. Eight years of aerial imagery was reviewed, only one site was identified and reviewed. According to the off-site hydrology decision matrix, the site was not considered wetland.

Permitting and Sequencing Information

Impacts to the delineated wetlands are proposed as part of the proposed barge facility. Approximately 0.4 acres of impacts will occur and are considered to be permanent. These impacts result from fill being placed in the area adjacent to the barge/dock and off-loading area, which contains the material hauler, hopper, scale, and conveyor system. These impacts will be permitted.

Impact Avoidance

Early in the planning process, several scenarios to avoid wetland impacts were identified. A no-build alternative would not impact wetlands but would not address the need for this facility.

Other site plans alternatives included additional impacts as a result of the access road and placement of other ancillary uses (e.g., scale house and kiosk system). Due to these additional impacts, the preferred site plan was redesigned to avoid wetland impacts to the extent practicable.

Minimization

Minimization will be achieved by limiting disturbance limits within wetlands to the greatest extent allowable and ensuring appropriate erosion control measures are in place to prevent sedimentation of non-impacted wetlands and any receiving waters. Impacts were further minimized by avoiding impacts to the approximately 14 acre wetland found on the western portion of the project area.

Mitigation

The proposed project will impact a total of up to 0.4 acres of wetland within Bank Service Area (BSA) 7 and the Mississippi River Watershed. It is anticipated mitigation for these impacts at a minimum of a 2:1 ratio (i.e., 0.8 acres of wetland replacement for every acre of wetland impact) through a purchase of wetland credits within BSA 7. All mitigation efforts will be completed in accordance with local, state and federal regulations. The proposer will work closely with agency staff to identify requirements and ensure all potential concerns are addressed. Permits and all required plans will be submitted for review to appropriate state and federal agencies prior to proposed wetland impacts.

Other Surface Waters

Describe any anticipated physical effects or alterations to surface water features (lakes, streams, ponds, intermittent channels, county/judicial ditches) such as draining, filling, permanent inundation, dredging, diking, stream diversion, impoundment, aquatic plant removal and riparian alteration. Discuss direct and indirect environmental effects from physical modification of water features. Identify measures to avoid, minimize, or mitigate environmental effects to surface water features, including in-water Best Management Practices that are proposed to avoid or minimize turbidity/sedimentation while physically altering the water features. Discuss how the project will change the number or type of watercraft on any water body, including current and projected watercraft usage.

Proposed Treatment of Topic in EIS

The EIS will include a discussion and further assessment of both surface and groundwater resources. An impact analysis of the proposed site layout will include an assessment of floodplain impacts and a discussion of existing jurisdictional wetlands on the site, avoidance alternatives, minimization measures considered, wetland impacts and proposed mitigation. Impacts of the barge terminal facility on the water table, and impacts associated with other surface waters (e.g., dredging in Mississippi River) will also be conducted and discussed in the EIS.

12 Contamination/Hazardous Materials/Wastes

a. Pre-project Site Conditions

Describe existing contamination or potential environmental hazards on or in close proximity to the project site such as soil or ground water contamination, abandoned dumps, closed landfills, existing or abandoned storage tanks, and hazardous liquid or gas pipelines. Discuss any potential environmental effects from pre-project site conditions that would be caused or exacerbated by project construction and operation. Identify measures to avoid, minimize or mitigate adverse effects from existing contamination or potential environmental hazards. Include development of a Contingency Plan or Response Action Plan.

According to the MPCA's "What's in My Neighborhood" interactive mapping database, there are six existing potential environmental hazards within ½-mile of the project area. Table 6 and **Figure 11, located in Appendix A, "Potentially Contaminated Sites"** identifies those uses within a half-mile radius from the proposed site.

Table 6: MPCA "What's In My Neighborhood" Sites within 1/2-mile

Site Number	Site Name	Distance of Proposed Site
No Number Available	J & S Storage	0.4 miles
SP 079-070-010	No Information Available	0.3 miles
No Number Available	Wabasha 2019 New Storage Building	0.3 miles
No Number Available	KP RUS Cardinal Health	0.35 miles
No Number Available	Timm Lawn Care	0.45 miles
No Number Available	Gunderson St. Elizabeth Medical Center	0.35 miles

A Phase I Environmental Site Assessment was completed in January 2020 and determined that there is no potential risk for contamination due to recognized environmental conditions and previous land uses on the project site. The potential for impacts to the proposed site are considered as a low potential for encountering contaminated materials during project operations. Any potentially contaminated materials encountered during construction and operations will be handled and treated in accordance with applicable federal, state and local regulations. A Phase II Environmental Site Assessment was not recommended for the project site.

b. Project Related Generation/Storage of Solid Wastes

Describe solid wastes generated/stored during construction and/or operation of the project. Indicate method of disposal. Discuss potential environmental effects from solid waste handling, storage and disposal. Identify measures to avoid, minimize or mitigate adverse effects from the generation/storage of solid waste including source reduction and recycling.

Debris from clearing land prior to operating the Wabasha Barge Facility will be disposed of in compliance with local and state regulations.

No solid wastes will be generated or stored at the site during construction and/or operations of the facility.

c. Project Related Use/Storage of Hazardous Materials

Describe chemicals/hazardous materials used/stored during construction and/or operation of the project including method of storage. Indicate the number, location and size of any above or below ground tanks to store petroleum or other materials. Discuss potential environmental effects from accidental spill or release of hazardous materials. Identify measures to avoid, minimize or mitigate adverse effects from the use/storage of chemicals/hazardous materials including source reduction and recycling. Include development of a spill prevention plan.

The site operator's equipment will require fuel (diesel and/or gasoline) and oils (lubricating and hydraulic). If it is determined that these products will be stored onsite, a Spill Prevention and Response Plan will be prepared to address accidental spills or the release of any hazardous material or petroleum products. The plan would be required to include the following measures to avoid and/or minimize spills:

- Fueling and equipment maintenance would not be allowed within 100 feet of the river's edge without deploying spill capture methods.
- The site operator shall maintain fuel spill containment kits and trained spill response personnel on the site at all times.
- Any spill or release of a hazardous material or petroleum products would be reported to the site supervisor who would take immediate action to minimize the potential for groundwater or surface water pollution.
- In the event of a spill or release of a hazardous material or a petroleum product, the project site supervisor would immediately deploy on-site supplies and equipment to contain the spill and contact the DNR, MPCA and the Minnesota Duty Officer, according to emergency procedures identified in Minnesota Rules, 7045.0574.
- Temporary, above ground, on-site fuel storage would not be allowed within the 100-year floodplain.
- Below ground storage tanks would not be allowed.

d. Project Related Generation/Storage of Hazardous Wastes

Describe hazardous wastes generated/stored during construction and/or operation of the project. Indicate method of disposal. Discuss potential environmental effects from hazardous waste handling, storage, and *disposal. Identify measures to avoid, minimize or mitigate adverse effects from the generation/storage of hazardous waste including source reduction and recycling.*

Please see Items 12b and 12c.

Proposed Treatment of Topic in EIS

The EIS will verify and summarize known contaminated/hazardous sites in the study area. The EIS will evaluate the extent of hazardous materials being used and/or stored onsite and will include a discussion of mitigation measures that may be employed to address potential impacts should remedial action be necessary.

13 Fish, Wildlife, Plant Communities, & Sensitive Ecological Resources (Rare Features)

a. Resources/Habitats/Vegetation

Describe fish and wildlife resources as well as habitats and vegetation on or near the site.

The proposed project area is located at (URM Mile 760) within the Lower Pool 4 of the Mississippi River. This stretch of the river, which is 44 miles long, extends from Lock and Dam 3 at Red Wing, MN to Lock and Dam 4 at Alma, WI, and includes Lake Pepin. Pool 4 features a wide variety of aquatic habitats including fast flowing main channels, variable width and depth side channels, and backwater areas. In 2007, the Upper Mississippi River Restoration Program conducted a long-term fish collection effort from Pool 4. Over 15,342 fish were sampled, representing 59 species and two hybrids. Commonly sampled sport fish included walleye, sauger, yellow perch, white bass, bluegill, black crappie, smallmouth bass, largemouth bass, northern pike, channel catfish, and freshwater drum.[10]

Lower Pool 4 of the Mississippi River also hosts large assemblages of aquatic invertebrates and mussels. Invertebrate diversity can be attributed to the variety of habitats found in the area. Specialized invertebrates that rely on running water can be found in a range of water velocities near the project area. Several mussel surveys have been completed within Lower Pool 4, many of which were associated with channel maintenance and dredging activities. In 2002, 2015, and 2021, the Corps of Engineers completed mussel skimmer dredge transects along the stretch of the river located immediately adjacent to the Barge Terminal Facility. According to the Corps mussel survey data, only two live mussels of two common species (Threehorn Wartyback and Threeridge) were found in 2002. No live mussels were found in this stretch of the Mississippi River during the 2015 or 2021 surveys.

The Wisconsin Department of Natural Resources (WIDNR) conducted a survey of unionid mussels throughout the Upper Mississippi River. Findings concluded that 115 specimens were collected in the

[10] https://www.umesc.usgs.gov/reports_publications/ltrmp/fish/2007/pool_4/summary_p4.html

Lower Pool 4, of which 15 species were documented, the most abundant being Threeridge, Pigtoe, and Pimpleback[11].

In addition to the construction of dock and barge facilities within and along the river, access roads, stock piling facilities, and a terminal pad are proposed at the site. Much of the terrestrial portion of the project area has been substantially disturbed by historic mining activities. Site observations indicate that reclamation of the site never took place and remains largely disturbed, to this day large stockpiles, abandoned equipment, and debris litter the upland portion of the site. A large portion of the site, northwest area, is a seasonally flooded wetland, and is dominated by silver maple, black willow, and green ash. These seasonally flooded backwaters provide habitat for a variety of species including racoon, muskrat, beaver, mink, river otter, white -tailed deer, reptile species, amphibian species, and numerous waterfowl/migratory bird species.

b. Rare Features

*Describe rare features such as state-listed (endangered, threatened or special concern) species, native plant communities, Minnesota County Biological Survey Sites of Biodiversity Significance, and other sensitive ecological resources on or within proximity to the site. Provide the license agreement number (**LA-1069**) and/or correspondence number (ERDB XXXX) from which the data were obtained and attach the Natural Heritage letter from the DNR. Indicate if any additional habitat or species survey work has been conducted within the site and describe the results.*

A query of the Natural Heritage Information System (NHIS) database was completed to assess the potential presence of state-listed threatened, endangered, and species of special concern within a one-mile radius of the project area. The review identified several occurrences of invertebrate animals, vascular plants, and vertebrate animals, including the following:

State Listed Species

- Black Sandshell Mussel *(Ligumia recta*) – Special Concern
- Butterfly Mussel *(Ellipsaria lineolate*) – Threatened
- Monkeyface Mussel *(Theliderma metanevra*) – Threatened
- Mucket Mussel *(Actinonaias ligamentina*) – Threatened
- Purple Wartyback Mussel *(Cyclonaias tuberculate*) – Endangered
- Round Pigtoe Mussel *(Pleurobema sintoxia*) – Special Concern
- Sheepnose Mussel *(Plethobasus cyphyus*) – Endangered
- Spectaclecase Mussel *(Cumberlandia mondonta*) – Endangered
- Spike Mussel *(Euryna dilatate*) – Threatened
- Wartyback Mussel *(Quadrula nodulata*) – Threatened
- Cattail Sedge *(Carex typhina*) – Special Concern
- Gray's Sedge *(Carex grayi*) – Special Concern
- Green Dragon *(Arisaema dracontium*) – Special Concern
- Muskingum Sedge *(Carex muskingumensis*) – Special Concern

[11] Thiel, P. A. (1981). *A Survey of Unionid Mussels in the Upper Mississippi River (Pools 3 through 11).* Madison: Wisconsin Department of Natural Resources .

- American Eel *(Anguilla rostrata*) – Special Concern
- Blue Sucker *(Cycleptus elongatus*) – Special Concern
- Mississippi Silvery Minnow *(Hybognathus nuchalis*) – Special Concern
- Paddlefish *(Polyodon spathula*) – Threatened
- Peregrine Falcon *(Falco peregrinus*) – Special Concern
- Pirate Perch *(Aphredoderus sayanus*) – Special Concern
- Timber Rattlesnake *(Crotalus horridus*) - Threatened

In addition to the NHIS query, a regulatory review for federally-listed species surrounding the project area was conducted using the U.S. Fish and Wildlife Service's (USFWS) Information for Planning and Consultation (IPaC) tool. The following species and migratory birds were identified during the review:

<u>USFWS - Federally Listed Species</u>

- Northern Long-eared Bat *(Myotis septentrionalis) – Threatened*
- Higgins Eye Mussel *(Lampsilis higginsii*) - Endangered
- Spectaclecase Mussel *(Cumberlandia monodonta*) - Endangered

<u>Migratory Birds</u>

- Bald Eagle *(Haliaeetus leucocephalus*) - Protected
- Black-billed Cuckoo *(Coccyzus erythropthalmus*)
- Golden Eagle *(Aqulla chrysaetos*) - Protected
- Lesser Yellowlegs *(Tringa flaviper*)
- Red-headed Woodpecker *Melanerpes erythrocephalus*)
- Rusty Blackbird *(Euphagus carolinus*)
- Short-billed Dowitcher *(Limnodromus griseus*)

c. Project Effects

Discuss how the identified fish, wildlife, plant communities, rare features and ecosystems may be affected by the project. Include a discussion on introduction and spread of invasive species from the project construction and operation. Separately discuss effects to known threatened and endangered species.

The project is expected to impact existing habitat areas on site and within the Mississippi River. Based on the information provided by the Corps of Engineers, live mussel species in the area appear to be limited based on the 2015 and 2021 surveys.

Any existing mussel species may experience direct mortality and short-term impacts because of the proposed project (dredging activities). Ongoing coordination with Corps of Engineers and MnDNR staff will determine if further mussel surveys are needed as part of the EIS. Other rare feature impact assessments will further describe details of potential direct impacts (e.g., vegetation loss and direct mortality) and indirect impacts (e.g., noise, dust) on rare species. As needed, mitigation measures will be proposed in the Draft EIS.

Transportation of construction equipment and materials associated with the project site carries the risk of spreading invasive plant species. Preventing the spread of invasive species during construction and operation of the barge terminal facility will occur as part of BMPs measures that will be put in place to control and appropriately manage vegetation and any invasive species. Disturbed areas on the site will primarily be replaced with gravel surfaces (access road, loading and stockpile areas). Reseeding and landscaping materials will predominantly be native seed mixes and free of invasive plants or plant parts.

d. Control Measures

Identify measures that will be taken to avoid, minimize, or mitigate adverse effects to fish, wildlife, plant communities, and sensitive ecological resources.

While no substantial impacts are anticipated, the project site plan may be modified to reduce potential impacts identified during the EIS process. Minimizing areas of disturbance, including natural vegetation and tree removals, will be limited to the extent possible.

Erosion control BMPs will be used on newly exposed soils. These may include the use of wildlife friendly natural fiber, erosion control blankets, silt fencing, synthetic fiber-free hydro-mulch, and rock checks; specifications for BMPs and allowed materials would be included in construction contracts and specifications. Exposed areas of sediment would be stabilized as soon as possible and seeded with an approved seed mix to establish vegetative cover. Invasive plant species would be monitored and managed to ensure success of native species establishment.

Additional coordination with MnDNR will occur in order to determine the potential for impacts and/or takings of state-protected mussel species in the Mississippi River dredge areas. If impacts are identified, a qualified surveyor would conduct a mussel survey and or/relocation in any potential mussel habitat prior to disturbance within these habitats. No work in the riverbed would occur until potential impacts to mussels have been resolved. In addition, if mussels are found, they would be relocated to an area of the river that is not impacted by the construction and activities associated with the barge terminal facility.

Proposed Treatment of Topic in EIS

The EIS will address impacts of the project on state and/or federal threatened and endangered species, rare plant communities and other sensitive ecological resources. The EIS will use species range and distribution maps, scientific literature, and site survey information to determine whether these resources are present in the Wabasha Barge Terminal Facility study area, and if present, the extent of and potential impact to the resource.

14 Historic Properties

Describe any historic structures, archeological sites, and/or traditional cultural properties on or in close proximity to the site. Include: 1) historic designations, 2) known artifact areas, and 3) architectural features. Attach letter received from the State Historic Preservation Office (SHPO). Discuss any anticipated effects to historic properties during project construction and operation. Identify measures that will be taken to avoid, minimize, or mitigate adverse effects to historic properties.

A Phase 1A Archaeological Literature Review has been completed for the study area. The Phase 1A reviewed existing literature, historic imagery, and historic maps available through July 2021. The findings of the report include a recommendation for a Phase I archaeological reconnaissance survey for areas of the site with the potential to contain intact Holocene spoils, namely in areas not previously disturbed from the mining operation that previously occupied the site.

Early notification information was submitted to the State Historic Preservation Office (SHPO) in July 2021 and a response was received on September 20, 2021, recommending a Phase 1 archaeological survey be completed (SHPO No. 2021-2509) for areas identified in the Phase 1A literature review.

Proposed Treatment of Topic in EIS

A review of the site layout and recommended limits of the Phase 1 survey will be conducted during the development of the Draft EIS. If the site plan encroaches on previously undisturbed areas, the EIS will include the results of the Phase 1 survey and any additional findings and recommendations.

15 Visual

Describe any scenic views or vistas on or near the project site. Describe any project related visual effects such as vapor plumes or glare from intense lights. Discuss the potential visual effects from the project. Identify any measures to avoid, minimize, or mitigate visual effects.

The existing visual aesthetic of the project site is primarily woodlands with an assortment of left behind construction equipment and materials (scrap metal and various vehicle parts) that were abandoned following the mining operation that previously occupied this site.

The northern and northwestern portions of the project site contain wetlands and provide views of the Mississippi River. The eastern, western, and southern borders of the project site provide views of the surrounding agricultural land and the forested hillside located west of US Highway 61.

The proposed project would alter the existing visual aesthetic of the project site with the introduction of trucks, barges, other industrial equipment, storage facilities, and the temporary introduction of construction vehicles and equipment. This altered visual aesthetic would be visible from neighboring parcels, roadways, the Mississippi River, and from the surrounding hillside.

Proposed Treatment of Topic in EIS

The EIS will evaluate and summarize the extent of visual impacts associated with the proposed project on adjacent land uses and lines of sight. Mitigation measures will address site design and landscaping measures to reduce visual impacts over the course of the project’s lifespan.

16 Air

a. Stationary Source Emissions

Describe the type, sources, quantities and compositions of any emissions from stationary sources such as boilers or exhaust stacks. Include any hazardous air pollutants, criteria pollutants, and any greenhouse gases. Discuss effects to air quality including any sensitive receptors, human health or applicable regulatory criteria. Include a discussion of any methods used assess the project's effect on air quality and the results of that assessment. Identify pollution control equipment and other measures that will be taken to avoid, minimize, or mitigate adverse effects from stationary source emissions.

Construction and facility operations have the potential to create air emissions, particularly fugitive dust sources, as described in Item 16c below. Stationary processing equipment and associated activities will be primarily located along the northern boundary of the site and will be in conjunction with the barge/dock unloading area. The initiation of site activities will result in a slight increase of emissions from dredge material transport equipment/operations (dredge material haulers/hoppers, and conveyors and vehicle hauling, but is not anticipated to be excessive or at level of concern.

Site owners will assess the air emissions relative to proposed operations and apply for an MPCA Air Emissions Permit, if needed and as required by state regulations. Pending current or future requirements, this permit would regulate operating parameters and require routine performance tests, record keeping, and monitoring to ensure compliance with State and Federal ambient air standards.

b. Vehicle Emissions

Describe the effect of the project's traffic generation on air emissions. Discuss the project's vehicle-related emissions effect on air quality. Identify measures (e.g., traffic operational improvements, diesel idling minimization plan) that will be taken to minimize or mitigate vehicle-related emissions.

There are no vehicle-related emissions generated on the existing project site. The proposed project would include no more than ten parking spaces for employee and operator parking. The site would generate less than 500 daily trips, and the construction and operation of the site is not anticipated to adversely impact traffic conditions at intersections within or near the study area.

Construction-related vehicle emissions from the proposed project would be minor and temporary in nature, generated by the use of construction vehicles and equipment, as well as barges, during the construction of the barge terminal dock, storage pad, access road, dock/mooring piles, truck loading area, and scale house/field office building.

Vehicle-related emissions during the operation of the proposed project would be generated from trucks and barges used to transport dredged material to and from the project site, as well as from the personal vehicles of employees traveling to and from the project site.

All construction vehicles and equipment, trucks, and barges would meet MPCA and EPA emission standards. Construction-related emissions would meet the conformity requirements under Section 176 (c) of the Clean Air Act and 40 CFR 93.153.

c. Dust & Odors

Describe sources, characteristics, duration, quantities, and intensity of dust and odors generated during project construction and operation. (Fugitive dust may be discussed under item 16a). Discuss the effect of dust and odors in the vicinity of the project including nearby sensitive receptors and quality of life. Identify measures that will be taken to minimize or mitigate the effects of dust and odors.

As described in *Item 9* above**,** the project site is currently of vacant land use. There are no activities currently occurring on the project site that contribute existing dust- or odor-related effects.

The proposed project may generate minor dust-related impacts during construction and operation because of vehicles operating within the site along internal roads. Dust may also be generated from the offloading of materials, transportation, and processing operations. All dust-related impacts are anticipated to be minor and typical of an industrial facility located in a rural setting.

The proposed project is not anticipated to generate any nauseous odors during construction or operation.

Proposed Treatment of Topic in EIS

The EIS will review the proposed project's detailed construction plans to confirm the project's effect on air quality and anticipated vehicle-related emissions. As appropriate, mitigation measures will be utilized during the construction and operation of the proposed project.

The EIS will include an assessment and discussion of dust-related impacts based on the detailed construction plans and introduce mitigation measures, including a potential Wet Dust Suppression Plan, to be utilized during the construction or operation of the project. Odors will not be further addressed in the EIS.

17 Noise

Describe sources, characteristics, duration, quantities, and intensity of noise generated during project construction and operation. Discuss the effect of noise in the vicinity of the project including 1) existing noise levels/sources in the area, 2) nearby sensitive receptors, 3) conformance to state noise standards, and 4) quality of life. Identify measures that will be taken to minimize or mitigate the effects of noise.

a. Existing Noise

Existing sources of noise in the vicinity of the proposed project include vehicle traffic on 5th Grant Boulevard West (County Road 59), noise from farming located on parcels adjacent to the project site, and an active freight railroad line located approximately 300 feet south of the project site.

The project site is bounded by the Mississippi River to the north and active agricultural land to the south, east, and west. Some of the agricultural lots adjacent to the project site contain houses, however the nearest lots to the project site that are primarily of residential use are located approximately 0.25 miles southeast of the project site. Additional noise receptors in the vicinity of the proposed project include: the Riverview Cemetery, approximately 250 feet west of the project site; the Gunderson St.

Elizabeth Hospital, approximately 2,000 feet east of the project site; and a couple rural residents south of 5th Grant Blvd (County Road 59), approximately 1,600 and 1,750 feet south.

b. Operational Noise

Construction-related noise effects from the proposed project would be minor and temporary in nature, generated by the use of construction vehicles and equipment, as well as barges, during the construction of the barge terminal pad, access road, dock/mooring piles, barge staging winch system, loading truck scale, and scale house/field office building. See ***Table 7, "Typical Construction Equipment Noise Levels at 50 Feet,"*** for typical noise levels of construction equipment measured at 50 feet.

Table 7: Typical Construction Equipment Noise Levels at 50 Feet

Equipment	Manufacturers Sampled	Total Number of Models in Sample	Peak Noise Level (dBA*)	
			Range	Average
Backhoes	5	6	74-92	83
Front Loaders	5	30	75-96	85
Dozers	8	41	65-95	85
Graders	3	15	72-92	84
Scrapers	2	27	76-98	87
Pile Drivers	N/A	N/A	95-105	101

* Units of "A-weighted decibels"

Source: United States Environmental Protection Agency and Federal Highway Administration

Noise resulting from the proposed project's operational activities would be generated by the loading and unloading of barges and trucks, from trucks and barges used to transport dredged material to and from the project site, as well as from the personal vehicles of employees traveling to and from the project site, and internal site operations equipment (e.g., material haulers: hoppers, conveyors, etc.).

The State of Minnesota rules (MN Statute 7030.0020) define daytime hours as 7am to 10pm, and nighttime hours as 10pm to 7am. All construction and operational activities associated with the proposed project would conform with the State of Minnesota noise standards listed in ***Table 8, "Noise Standards (MN Statute 7030.0040)."***

Table 8: Noise Standards (MN Statute 7030.0040)

Noise Area Classification	Daytime		Nighttime	
	L_{50}	L_{10}	L_{50}	L_{10}
1 (Residential)	60	65	50	55
2 (Commercial)	65	70	65	70
3 (Industrial)	75	80	75	80

*L_{10} is the sound level, expressed in dBA, which is exceeded 10% of the time for one hour

*L_{50} is the sound level, expressed in dBA, which is exceeded 50% of the time for one hour

c. Traffic Noise

The proposed project would generate traffic-related noise from trucks hauling construction materials during the construction of the proposed project, trucks hauling dredged materials during the operation of the proposed project, and from employees using personal vehicles to travel to and from the project site. However, because the proposed project would include no more than ten parking spaces for employee and operator parking and would generate less than 250 vehicle trips during peak hour operations and less than 2,500 daily trips, traffic congestion and traffic-related noise are not anticipated to adversely affect surrounding areas or sensitive receptors.

Proposed Treatment of Topic in EIS

A detailed noise analysis will not be completed as part of the Draft EIS. However, the EIS will assess potential noise-related impacts of the proposed project and discuss any associated mitigation measures that could be utilized during the construction or operation of the project.

18 Transportation

a. Project-Related Traffic

Describe traffic-related aspects of project construction and operation. Include: 1) existing and proposed additional parking spaces, 2) estimated total average daily traffic generated, 3) estimated maximum peak hour traffic generated and time of occurrence, 4) indicate source of trip generation rates used in the estimates, and 5) availability of transit and/or other alternative transportation modes.

Existing and Proposed Parking Spaces

The project site does not presently include any parking spaces. It is anticipated the proposed project location will incorporate no more than ten parking spaces for employee and operator parking.

Existing Traffic

Transport roads to and from the proposed project location include Wabasha County Road 59 (Grant Blvd), State Trunk Highway (TH) 61, and County Road 10. Existing (2018) annual average daily traffic (AADT) for these roadways are as follows:

- 5th Grant Blvd (County Road 59): AADT ranges from 870 trips near the site entrance to 2,050 trips to the south near the Gundersen St. Elizabeth Hospital
- TH 61: this segment of state highway has approximately 4,850 daily trips
- County Road 10: near the intersection with TH 61 has 550 trips

The facility operations will cause traffic to increase in each direction on these roads, including an increase in heavy commercial truck traffic. Traffic will be generated by employees; haul trucks, and miscellaneous supply trucks/vehicles. A traffic study will be completed as part of the Draft EIS that will further analyze the impact of the proposed project on the local and regional transportation network.

b. Potential Congestion

Discuss the effect on traffic congestion on affected roads and describe any traffic improvements necessary. The analysis must discuss the project's impact on the regional transportation system. If the peak hour traffic generated exceeds 250 vehicles or the total daily trips exceeds 2,500, a traffic impact study must be prepared as part of the EAW. Use the format and procedures described in the Minnesota Department of Transportation's Access Management Manual, Chapter 5 (available at: http://www.dot.state.mn.us/accessmanagement/resources.html) or a similar local guidance,

A detailed traffic impact study has not been prepared as the proposed operations are not anticipated to exceed 250 vehicles during peak hour operations or exceed 2,500 trips per day during peak hauling operations. The number of daily trips, during summer operating peaks, is anticipated to be less than 500 per day. Winter hauling to/from the site is anticipated to be minimal as river barge operations would halt during winter months. A traffic analysis is planned to be completed as part of the Draft EIS, however due to the rural nature of the study area and proximity to 5th Grant Blvd (County Road 59) and Highway 61, traffic congestion on the local and regional transportation system is not anticipated to be a concern for the project as proposed.

<u>Proposed Treatment of Topic in EIS</u>

The EIS will include a discussion of the traffic analysis and results of the traffic study. Intersection and roadway operations and safety conditions will be addressed in the Draft EIS along with any identified mitigation measures (e.g., geometric improvements, cautionary signage, etc.) that may be needed.

Ongoing coordination with the Wabasha County Highway Department and MnDOT will occur through the preparation of the Draft and Final EIS.

19 Cumulative Potential Effects

a. Geographic Scales & Timeframes

Describe the geographic scales and timeframes of the project related environmental effects that could combine with other environmental effects resulting in cumulative potential effects.

It is currently estimated that the barge facility operations will operate for at least 20 years and continue to facilitate the transfer of dredged material from USACE channel maintenance activities on the Mississippi River within a stretch of the river near the City of Wabasha. Throughout the life of the site, it is expected that dredged material will be transported offsite for use as reclamation material for existing sand and gravel mines and other beneficial reuse, outside the geographic boundary of this cumulative potential effects analysis.

b. Future Projects

Describe any reasonably foreseeable future projects (for which a basis of expectation has been laid) that may interact with environmental effects of the proposed project within the geographic scales and timeframes identified above.

Cumulative potential effects may include private land use developments in portions of the city planned for future development and redevelopment. Transportation projects are likely to be planned and programmed for construction may involve safety, capacity, pavement preservation, and active transportation modes (ped/bike). These projects will be carried out by MnDOT, Wabasha County, or the city.

c. Discussion/Summary of Cumulative Potential Effects

Discuss the nature of the cumulative potential effects and summarize any other available information relevant to determining whether there is potential for significant environmental effects due to these cumulative effects.

Impacts may include changes in land cover type (e.g., increased impervious and vegetation/habitat loss), impacts to wetlands and other water resources, increases in traffic volumes and changes in demand for non-motorized transportation options. While not anticipated to involve significant social, economic, or environmental effects, all future projects would be subject to applicable local, state, and federal environmental reviews and permitting.

Proposed Treatment of Topic in EIS

The EIS will include a discussion of cumulative potential effects. Additional research and coordination with local and state agencies will occur to identify specific projects, including timing, magnitude and estimated impacts.

20 Other Potential Environmental Effects

If the project may cause any additional environmental effects not addressed by items 1 to 19, describe the effects here, discuss the how the environment will be affected, and identify measures that will be taken to minimize and mitigate these effects.

None

RGU CERTIFICATION

*The Environmental Quality Board will only accept **SIGNED** Environmental Assessment Worksheets for public notice in the EQB Monitor.*

I hereby certify that:

- The information contained in this document is accurate and complete to the best of my knowledge.
- The EAW describes the complete project; there are no other projects, stages or components other than those described in this document, which are related to the project as connected actions or phased actions, as defined at Minnesota Rules, parts 4410.0200, subparts 9c and 60, respectively.
- Copies of this EAW are being sent to the entire EQB distribution list.

Signature Caroline Gregerson Date 6/7/2022

Title Caroline Gregerson

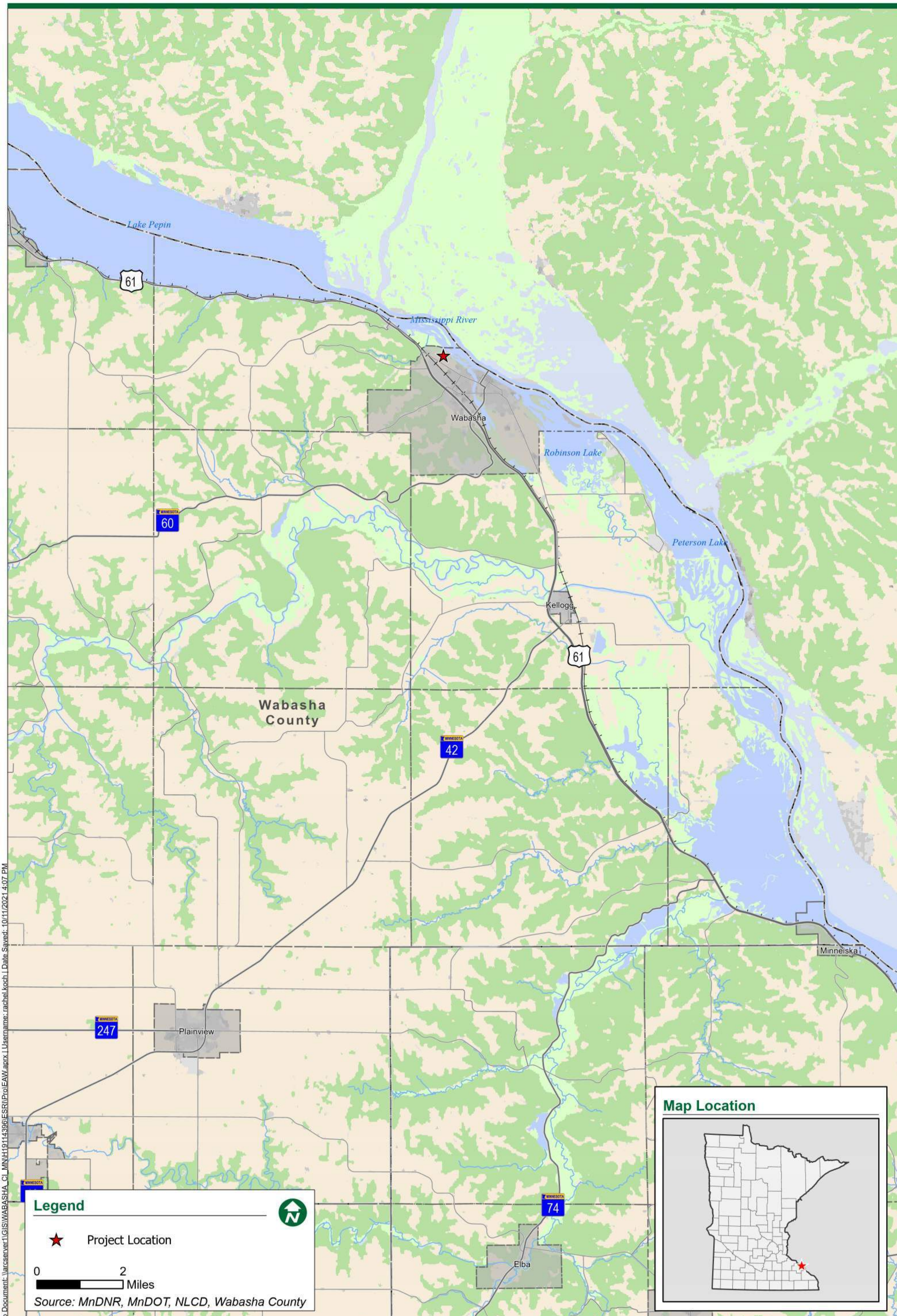
Appendix A: Figures

Proposed Barge Terminal

Environmental Assessment Worksheet

Figure 1: Regional Location

October 2021



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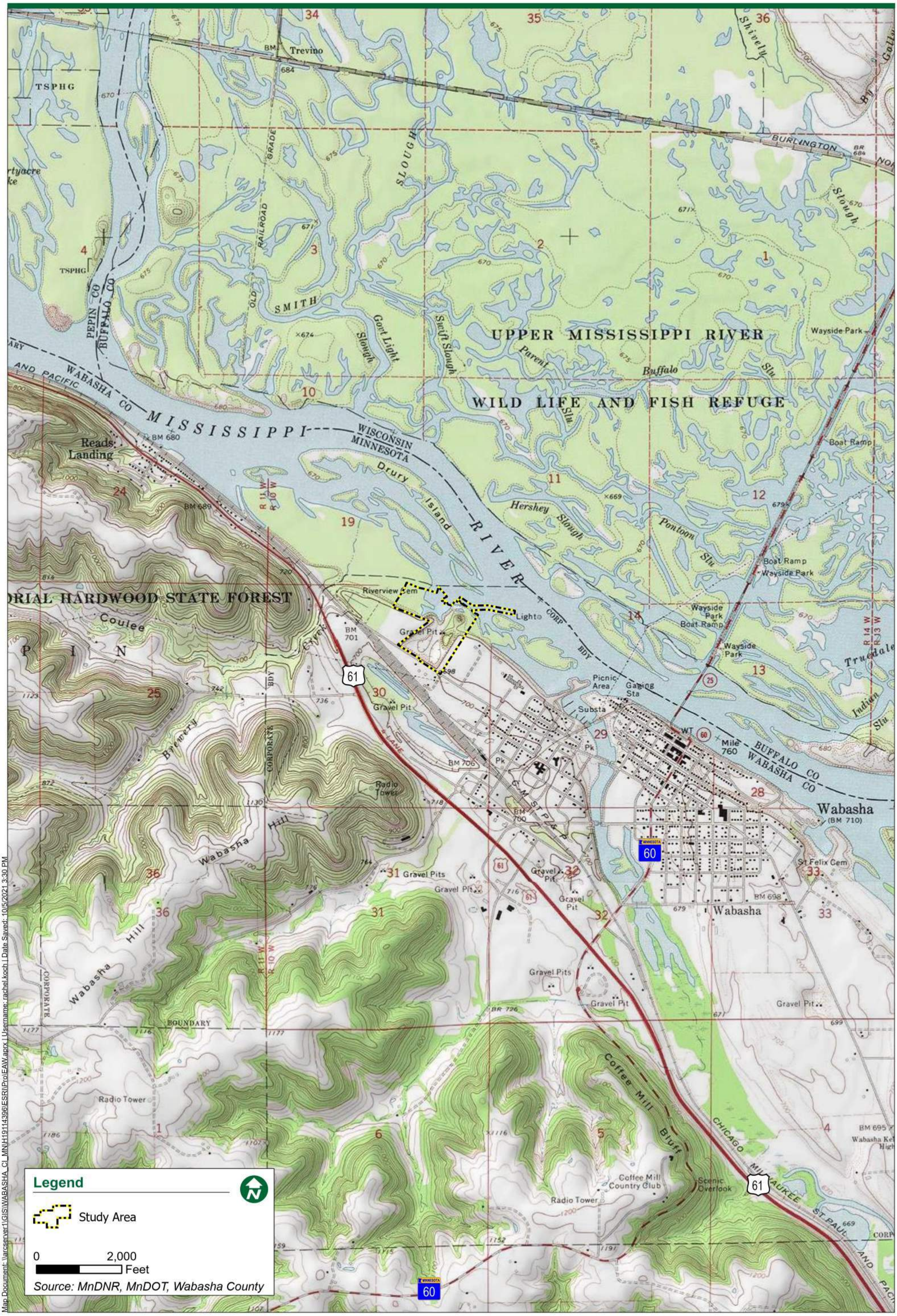

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Proposed Barge Terminal
Environmental Assessment Worksheet

Figure 3: Existing Conditions

October 2021

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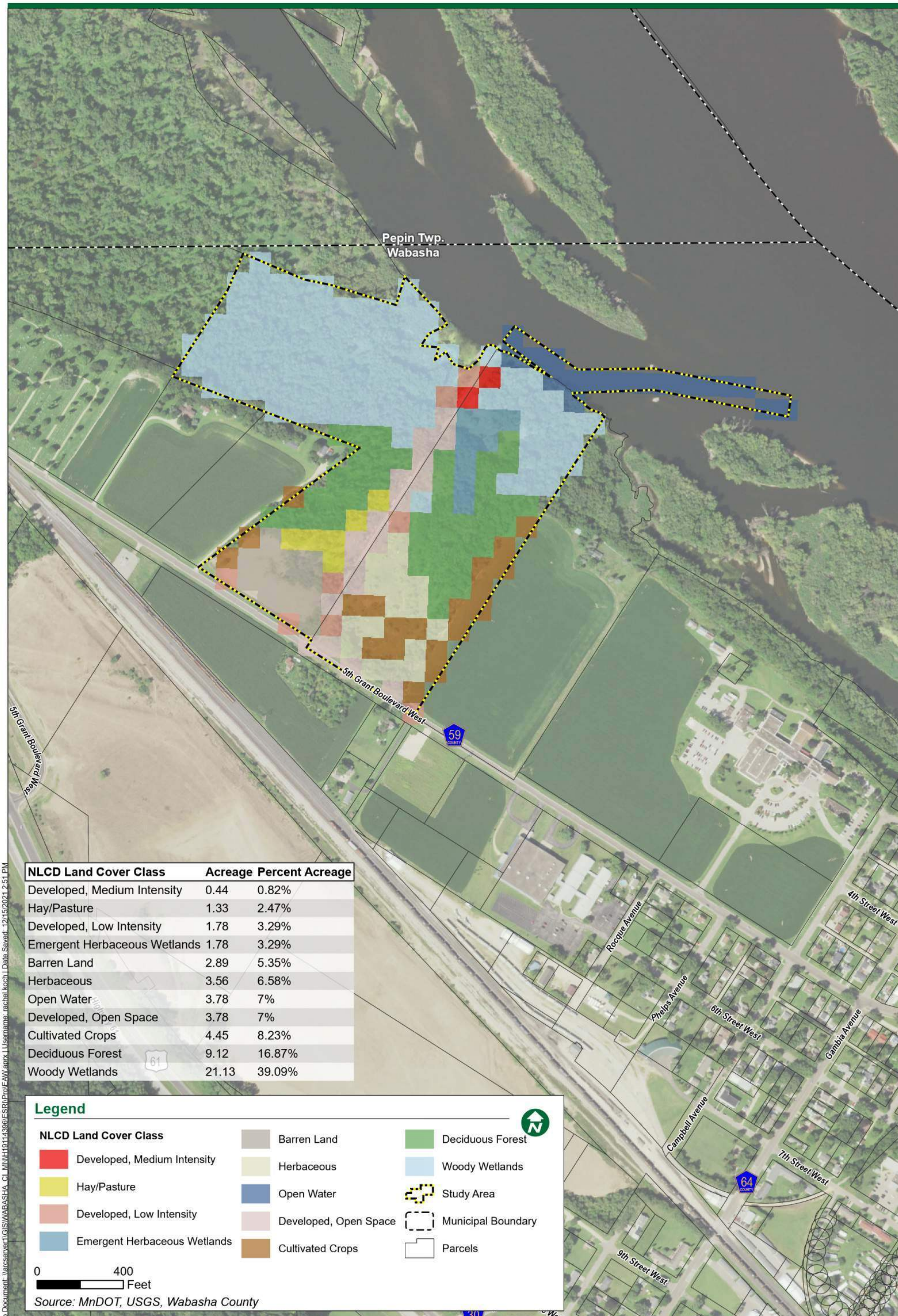

NLCD Land Cover Class	Acreage	Percent Acreage
Developed, Medium Intensity	0.44	0.82%
Hay/Pasture	1.33	2.47%
Developed, Low Intensity	1.78	3.29%
Emergent Herbaceous Wetlands	1.78	3.29%
Barren Land	2.89	5.35%
Herbaceous	3.56	6.58%
Open Water	3.78	7%
Developed, Open Space	3.78	7%
Cultivated Crops	4.45	8.23%
Deciduous Forest	9.12	16.87%
Woody Wetlands	21.13	39.09%

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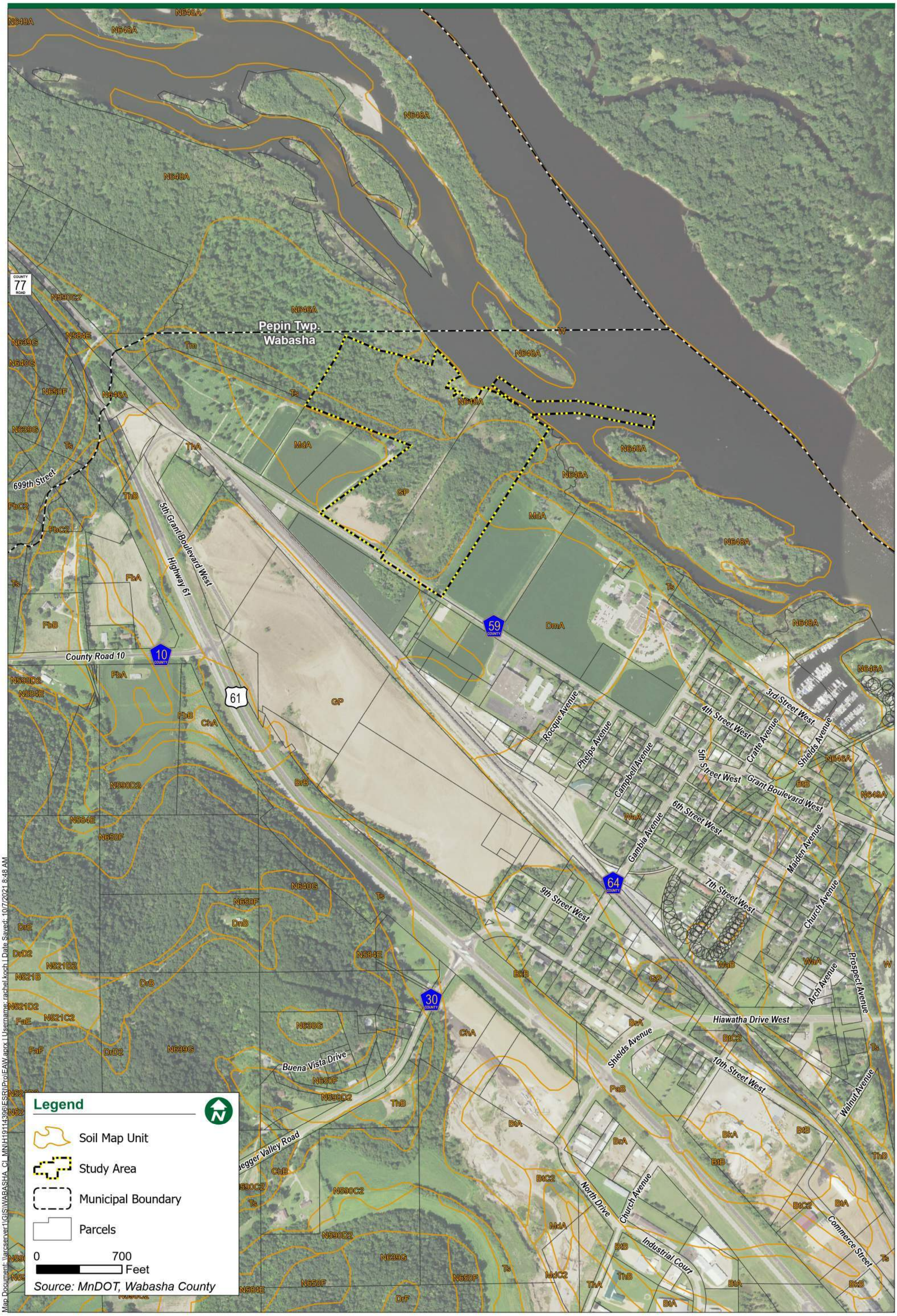
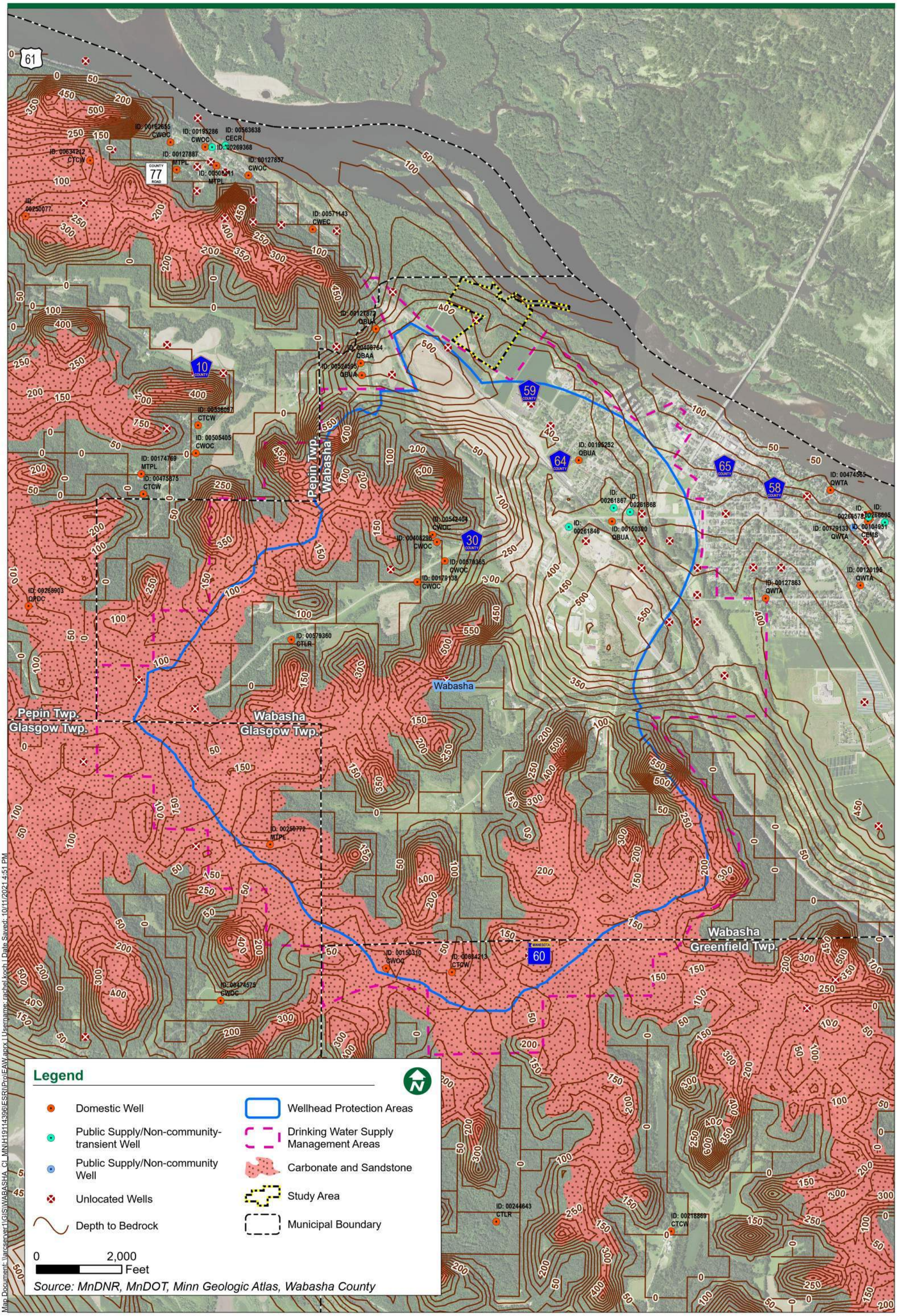

Pepin Twp.
Wabasha
County Road 10
5th Grant Boulevard West
Highway 61
699th Street
Rocque Avenue
Phelps Avenue
Campbell Avenue
Gambia Avenue
4th Street West
3rd Street West
Crate Avenue
Shields Avenue
5th Street West
Grant Boulevard West
6th Street West
Maiden Avenue
7th Street West
Church Avenue
9th Street West
Prospect Avenue
Arch Avenue
Hiawatha Drive West
10th Street West
Walnut Avenue
Buena Vista Drive
North Drive
Industrial Court
Commerce Street
N648A
Tm
Ts
ThA
MdA
GP
DmA
N590C2
N584E
N639G
N650F
FbA
FbB
ChA
BrB
WaA
WaB
BtA
BtB
BtC2
PaB
Legend
Soil Map Unit
Study Area
Municipal Boundary
Parcels
0
700
Feet
Source: MnDOT, Wabasha County

Proposed Barge Terminal

Environmental Assessment Worksheet

Figure 6: Geologic Conditions/Groundwater

October 2021



Proposed Barge Terminal

Environmental Assessment Worksheet

Figure 7: Surface Water

October 2021

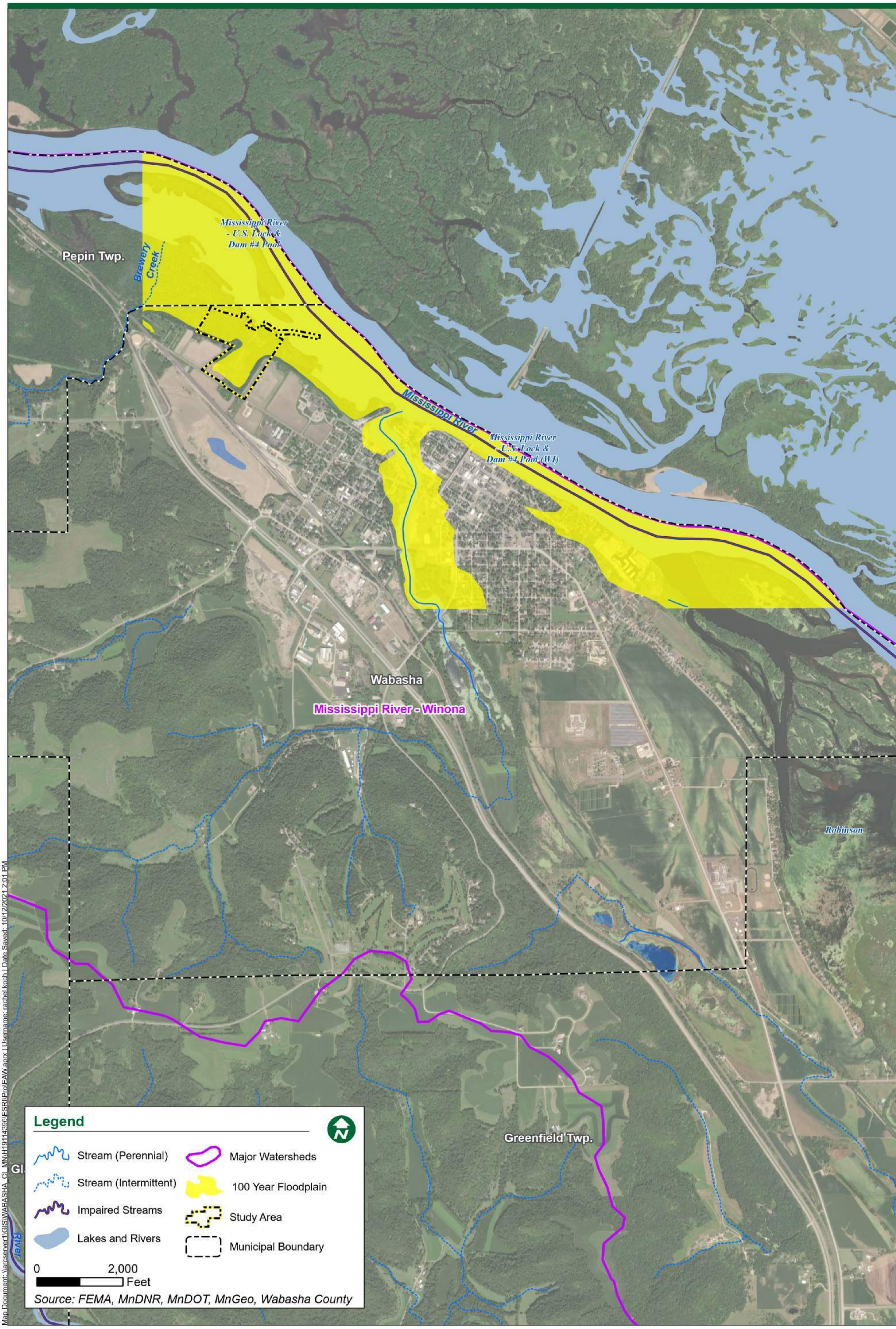


Figure 8: Wetlands

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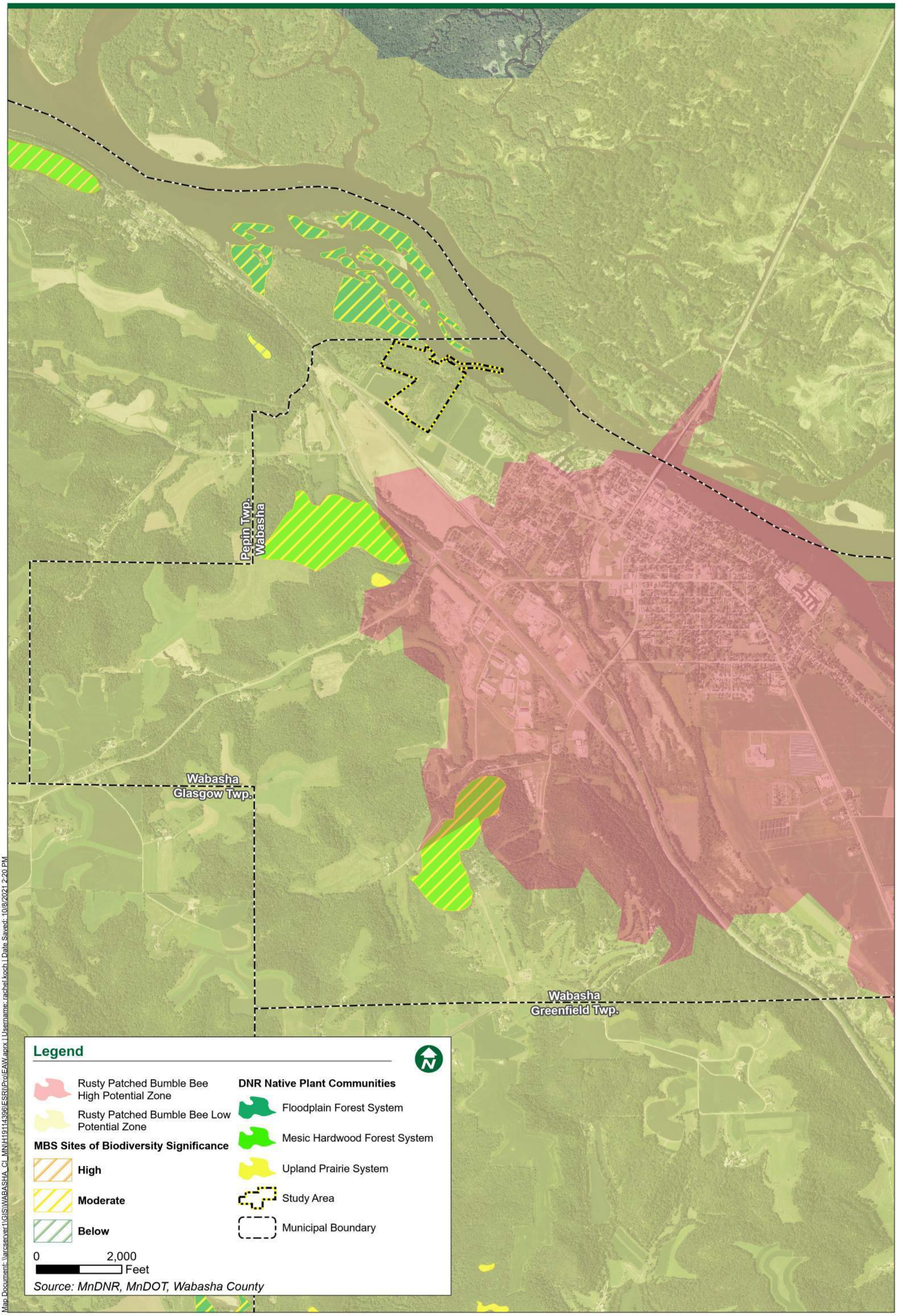

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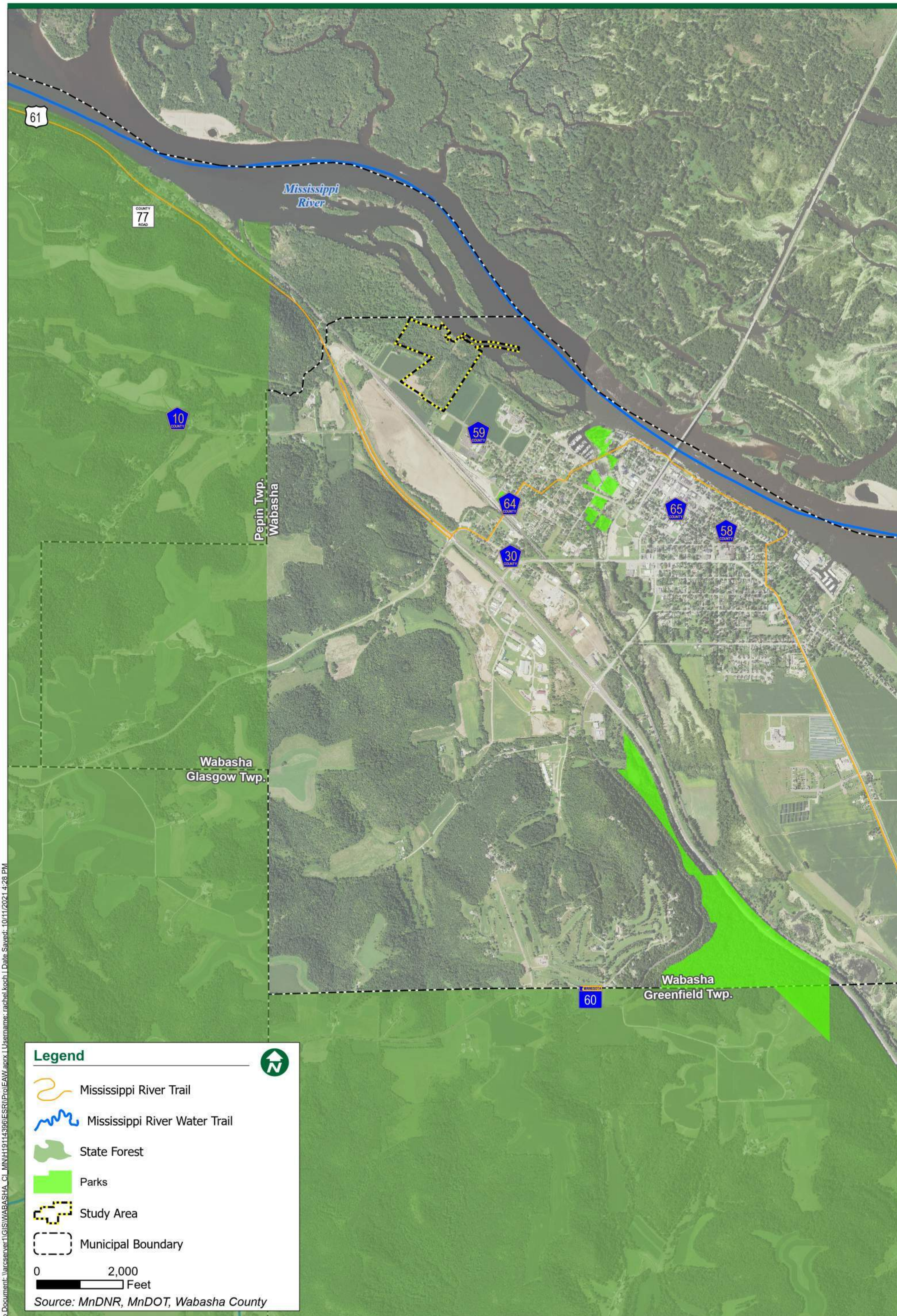
Figure 10: Outdoor Recreation

October 2021

BOLTON & MENK



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Wabasha Barge Facility
City of Wabasha, MN

Figure 12: Site Plan
May 2022

APPENDIX J

Comments Received on Scoping EAW

DEPARTMENT OF NATURAL RESOURCES

Division of Ecological and Water Resources
Region 3 Headquarters
1200 Warner Road
Saint Paul, MN 55106

July 21, 2022

Caroline Gregerson, City Administrator
Wabasha Port Authority
900 Hiawatha Drive E
Wabasha, Minnesota 55981

Dear Ms. Gregerson:

Thank you for the opportunity to review the Wabasha Barge Facility Scoping Environmental Assessment Worksheet (SEAW) and Wabasha Barge Terminal Draft Scoping Decision Document (DSDD). The Minnesota Department of Natural Resources (DNR) recognizes the challenges inherent to dredged material management and the importance of maintaining a safe and reliable 9-foot navigation channel on the Upper Mississippi River. It is in this context that we offer these comments and express DNR's commitment to continuing to work with the Wabasha Port Authority as the Responsible Governmental Unit (RGU) on this important environmental review.

Purpose, Need and Alternatives Analysis

The purpose and need for this project appears to be limited to the need to transport dredged material generated by the U.S. Army Corps of Engineers (USACE). It is important to both the environmental review process as well as for DNR's subsequent consideration of a Public Waters Work permit application that the purpose and need be clearly articulated and not be so narrow as to preclude the analysis of meaningful alternatives. More specifically, the Minnesota Environmental Policy Act (Minn. Stat. § 116D.04, subd. 6) precludes "state actions significantly affecting the quality of the environment" if there is a "feasible and prudent alternative consistent with the reasonable requirement of the public health, safety, and welfare of the state's paramount concern for the protection of its air, water, land, and other natural resources from pollution, impairment, or destruction." Courts have consistently ruled that the statement of need and purpose cannot be so narrow and vague as to undermine any meaningful review of alternatives, particularly where the project is a government project. Courts have also noted that the statement of need and purpose should not sanction a specific project plan but rather should focus on the general goal of the project, which here seems to be delivering dredged material to the storage site. If there is an additional purpose and need for this project, that is unclear from the DSDD.

If the primary or exclusive purpose and need for the project is to transfer dredged material to the storage site, there appear to be other alternatives that should be considered. These alternatives might include the use of hydraulic dredging with a pipeline to the storage site (such as that proposed at Read's Landing), that could minimize environmental impacts.

The DNR also observes that, if a barge facility is the selected alternative, that alternative will require a Public Waters Work Permit from the DNR. For the reasons outlined below, that unless the Environmental Impact Statement (EIS) evaluates project alternatives, the document will likely be of limited use in the permit review process. Therefore, the importance of a clearly articulated purpose and need statement that then informs the identification and evaluation of project alternatives extends beyond the environmental review process to the consideration of permit applications.

Scoping EAW Comments

1. Page 2, Project Description. The impetus for the project seems to be entirely for the purpose of aiding the USACE in the storage of dredged material. No other purpose or use for the barge facility is provided. It is, therefore, our understanding that the sole purpose of this project is for the storage of dredged material generated by USACE and that, after that work is completed, this facility will be closed and restored. If this understanding is correct, a restoration plan will be required, consistent with the requirements for other USACE dredged material placement sites, and should be described or referenced within the EIS. Alternatively, if there is an intent by the City to use this facility after dredging has ceased, the environmental review document should so state and articulate the general need of the City for the facility.
2. Page 3, Project Description. This section states that dredging will occur in an "existing access channel." Anecdotally available information indicates there might not be an existing access channel, despite previous dredging in this area in 1982, some 40 years ago. This might be better worded as "Dredging an access channel within the footprint of the 1982 dredged access channel impact area," or similar.
3. Page 3, Project Description and Alternatives Analysis. This section states that the proposer will "dredge an area to accommodate barge maneuvering and docking." We realize that final plans are not yet available, but final plans are not a prerequisite to crafting a statement of a project need and purpose that meets MEPA standards. The need should reflect the project's general goals, objective and needs (i.e., addresses why this project is needed) to allow identification and analysis of the full range of alternatives. Additionally, please include as much information as possible to facilitate a comprehensive evaluation of potential alternatives. Examples of useful additional information would include: a description of how many barges would be needed to transport the dredged material, a description of how many barges would need to dock at the facility at any one time, whether the project purpose requires that there be fleeting or mooring areas, and whether there are less impactful solutions than construction of a barge facility to transport dredge material to the dredge storage site.

4. Page 4, Previous Development. This site is identified as one of several sites within the USACE's Lower Pool 4 Dredged Material Management Plan (DMMP), which is a federal Environmental Assessment document, and should be mentioned as previous environmental review.
5. Page 5, Permits and Approvals. Under Local Agencies, City of Wabasha on Table 3, "Floodplain Permit" should be added as a Type of Application/Permit.
6. Page 5, Permits and Approvals. The City is currently working through the rare species survey process for its proposed project with DNR. This analysis will need to be undertaken for all of the proposed alternatives analyzed during environmental review. For any alternative analyzed, a DNR Permit to Take may be needed for any state-listed threatened and endangered species that cannot be avoided. Thus, a DNR Permit to Take should be listed on Table 3.
7. Page 5, Permits and Approvals. If during the construction of the proposed facility, or any project alternative, it is necessary to appropriate water, including for construction site dewatering during the installation of utilities, and the volume of water taken exceeds 10,000 gallons per day, or one million gallons per year, then a DNR Water Appropriation Permit would be required. Thus, a DNR Water Appropriation Permit should also be listed on Table 3.
8. Page 5, Permits and Approvals. Part of the proposed storage site is currently included under the USACE's approved Channel Maintenance Management Plan and Dredged Material Management Plan. Based on these plans, the DNR has authorized the USACE to deposit dredge material at part of this site under DNR's General Permit 1994-5082. The EIS should clearly identify dredge spoil authorizations between City and USACE jurisdictions.
9. Page 6, Land Use. This section states that for the City's preferred alternative "there are no identified parks, trails or recreational resources within the project site." This area of the Upper Mississippi River has a substantial amount of fishing and boating activities. Small boats frequently use this area to access the side channel to the west of Drury Island and there are also primitive camping sites on the interior of the island complex.

   There is no mention in the Land Use section of the U.S. Fish and Wildlife Service (USFWS) property associated with the Upper Mississippi River National Wildlife Refuge (NWR) that is located immediately adjacent to the preferred alternative project parcel. The Paragraph referencing "Appendix A, Figure 3 "Existing Conditions"" and the figure itself would lead the reader to believe that USFWS refuge lands bordering the property are agricultural in nature instead of federal refuge lands. Similarly, the paragraph referencing "Appendix A, Figure 10, "Outdoor Recreation"" and the figure itself would lead the reader to believe that the USFWS lands are not publicly accessible recreational resources.

   In general, the scoping document appears to downplay the amount of recreational use that occurs in the vicinity. The proposed facility will have an effect on recreational opportunities and these impacts should be addressed in greater detail. As part of the required MEPA analysis of project alternatives, the EIS should identify each alternative's potential impacts on recreation and consider differences among them.
10. Page 15, Stormwater. If more than one acre of new impervious surfaces will be installed, will a Stormwater Pollution Prevention Plan (SWPPP) be developed for the various alternatives for the project?

11. Page 16, Wetlands. The proposed project is within a site identified by the Minnesota Biological Survey (MBS) as a Site of Moderate Biodiversity Significance. Sites of Biodiversity Significance have varying levels of native biodiversity and are ranked based on the relative significance of this biodiversity at a statewide level. Sites ranked as Moderate contain occurrences of rare species and/or moderately disturbed native plant communities, and/or landscapes that have a strong potential for recovery. Green dragon (*Arisaema dracontium*), Gary's sedge (*Carex grayi*), and cattail sedge (*Carex typhina*), all state-listed plant species of special concern, have been documented within the site and may be adversely affected by this project. As part of the required MEPA analysis of project alternatives, the EIS should identify each alternative's potential impacts on these wetland resources and consider differences among the alternatives in terms of their potential to avoid or minimize wetland impacts. This analysis should consider the quality of the wetland plant community being impacted, as well as the potential to degrade plant communities within close proximity to the facility that could be effected by sedimentation, barge traffic, and the introduction of invasive species.

12. Page 19, Rare Features. Please see the enclosed DNR Natural Heritage Review (NHIS) letter dated, July 8, 2022, which contains an assessment of rare features and species that may be adversely affected by the proposed project. Please note that this letter contains required avoidance measures for state-listed species known to occur within the project area, including in-water work restriction dates, as well as instructions regarding a required mussel survey. A robust alternative analysis of locations, technology and site design is needed to document consideration of avoidance measures. Minnesota's Endangered Species Statute (*Minnesota Statutes*, section 84.0895) and associated Rules (*Minnesota Rules*, part 6212.1800 to 6212.2300 and chapter 6134) prohibit the take of threatened or endangered species without a permit. Therefore, no project work may proceed until potential impacts to state-listed rare species have been addressed, either via approved avoidance measures or a DNR Permit to Take.

13. Page 19, Rare Species. The fish community description appears incomplete and outdated. Notably, it cites Long Term Resource Monitoring (LTRM) data from 2007. The LTRM Upper Mississippi River Restoration Program has done annual sampling from 1993 to present. The EAW states that 59 fish species are present in Pool 4; however, over the history of this program, 87 species have been collected in Pool 4. Furthermore, Pitlo 1995 indicates that there are 99 species present in Pool 4, and there is new information from the Upper Mississippi River Conservation Committee (UMRCC) Fisheries Compendium 4th edition by Schlesser 2020 that shows status and distribution of fishes. The EIS should use the most complete and current information available to assess potential impacts to the fish population within Lower Pool 4 from the proposed project and all project alternatives evaluated. This assessment should include all fish Species of Greatest Conservation Need (SGCN).

14. Page 21, Rare Features. The river corridor is one of the most significant migratory routes in North America. The project directly borders the Audubon Society's Upper Mississippi River National Wildlife Refuge Important Bird Area (IBA). Please reference the Audubon Society's site report for a full list of migratory birds that utilize the project area. A robust alternatives analysis is needed to avoid and minimize impacts to this important area.

15. Page 21 Rare Features. This section should also describe rare plant communities and ecological features including Minnesota Biological Survey (MBS) Sites of Biodiversity Significance, Lakes of

Outstanding Biological Significance, and DNR Native Plant Communities. The proposed project's proximity to the Upper Mississippi River National Wildlife Refuge and all of the species that depend upon it should be discussed comprehensively within the EIS, including identifications of alternatives to avoid or minimize impacts. Please see the list of recommendations in the enclosed July 8, 2022 DNR NHIS letter regarding work within an MBS Site.

16. Page 21, Project Effects. This section should thoroughly consider the potential impacts of all of the project alternatives, including the impact of all alternatives to each state-listed and federally-listed species. Section 13.d. Control Measures, should address what measures will be taken for each alternative to avoid impacting these species. Please see the enclosed NHIS letter for requirements and avoidance measures pertaining to the Timber rattlesnake, mussels, and rare fish species. The EIS should also include a detailed discussion of avoidance and mitigation measures for each alternative.
17. Page 23, Visual. Given the proximity to the Upper Mississippi River National Wildlife Refuge and the Audubon Society's IBA, any proposed lighting associated with any of the alternatives analyzed could impact migratory birds and other wildlife present in the area. Lighting for each alternative should be described in greater detail within the EIS.
18. Page 27, Traffic. This section focuses solely on land-based transportation impacts of one alternative (the City's preferred alternative). Each of the alternatives should be analyzed for impacts on both land-based and water-based transportation.
19. Page 28, Cumulative Potential Effects. For each alternative, the SEAW and future EIS process should address the potential loss of fish spawning habitat, disruption of fish movement to the side channel, the resuspension of sediments as barges are maneuvered, and possible entrainment of fish in barge propellers. It is likely that the proposed project and any other project alternatives involving dredging will also require future dredging to maintain functionality of the site. As a result, the impacts of sedimentation and future site disturbance should be described for each alternative involving dredging.

    The narrative of what appears to be the City's preferred alternative would be enhanced by including a description of the previous wetland violation and restoration that occurred at this site.

DNR Work in Public Waters Permitting Needs

One of the fundamental purposes of the EIS is to inform entities that will ultimately need to make permitting decisions of the environmental impacts of the proposed project and its alternatives. Under Minnesota law, the bar for obtaining a DNR Public Waters Work Permit for a new barge facility within such a sensitive and valuable natural resource is high, making the alternatives analysis a particularly important part of this EIS and any subsequent permitting process.

As proposed, this project would require a DNR Public Waters Work Permit to dredge a channel, create a barging facility, and deposit spoils below the Ordinary High Water Level (OHWL) of the Mississippi River. Any project alternatives identified and evaluated may also have elements requiring a DNR Public Waters Work Permit. The DNR is required to evaluate an application for a Public Waters Work Permit for consistency with *Minnesota Statutes* 103G and *Minnesota Rules* 6115.0150 through 6115.0280. Therefore, the EIS should address:

1. For any proposed filling, the EIS should address the criteria in Minn. Rules 6115.0190 and 6115.0191.
2. For any proposed excavation, the EIS should address the criteria in Minn. Rules 6115.0200 and 6115.0201.
3. For any proposed barge facility, the EIS should address the requirements in Minn. Rules 6115.0210 and 6115.0211.
4. The permit application, when submitted, must be consistent with Minn. Rule 6115.0240. To inform permit decision-making, the EIS should discuss project alternatives and address how the proposed project is the minimum impact solution with respect to all other alternatives.
5. The City must meet the 'who may apply' requirements of Minn. Rule 6115.0240 Subp.2, requiring that the City obtain any necessary property rights.
6. The DNR permit decision must be consistent with Minn. Rule 6115.0250. If the project is consistent with all public waters requirements and a permit is issued, it must include requirements for mitigation. Therefore, to inform permit decision-making, the EIS should address mitigation strategies.

Thank you again for the opportunity to review these documents. We look forward to further coordination with the City of Wabasha and the US Army Corps of Engineers. Please let me know if you have any questions.

Sincerely,

Katie Smith

Digitally signed by Katie Smith
Date: 2022.07.21 16:09:58 -05'00'

Enclosure: July, 8 2022 DNR Natural Heritage Letter

Equal Opportunity Employer

DEPARTMENT OF NATURAL RESOURCES

Minnesota Department of Natural Resources
Division of Ecological & Water Resources
500 Lafayette Road, Box 25
St. Paul, MN 55155-4025

July 8, 2022
Correspondence # MCE 2022-00127

Robert Rogers
Bolton & Menk, Inc.

RE: Natural Heritage Review of the proposed Wabasha Barge Terminal Project,
T111N R10W Section 30; Wabasha County

Dear Robert Rogers,

As requested, the Minnesota Natural Heritage Information System has been reviewed to determine if the proposed project has the potential to impact any rare species or other significant natural features. Based on the project details provided with the request, the following rare features may be impacted by the proposed project:

Ecologically Significant Areas

- The proposed project is within a site identified by the Minnesota Biological Survey (MBS) as a Site of *Moderate* Biodiversity Significance. Sites of Biodiversity Significance have varying levels of native biodiversity and are ranked based on the relative significance of this biodiversity at a statewide level. Sites ranked as *Moderate* contain occurrences of rare species and/or moderately disturbed native plant communities, and/or landscapes that have a strong potential for recovery. Green dragon (*Arisaema dracontium*), Gary's sedge (*Carex grayi*), and cattail sedge (*Carex typhina*), all state-listed plant species of special concern, have been documented within this Site and may be impacted by this project.

  We encourage you to consider project alternatives that would avoid or minimize disturbance to this ecologically significant area. Actions to minimize disturbance may include, but are not limited to, the following recommendations:
  - Minimize vehicular disturbance in the MBS Site (allow only vehicles/equipment necessary for construction activities);
  - Do not park equipment or stockpile supplies in the MBS Site;
  - Do not place spoil within MBS Site or other sensitive areas;

- Retain a buffer between proposed activities and the MBS Site;
    - If possible, conduct the work under frozen ground conditions;
    - Use effective erosion prevention and sediment control measures;
    - Inspect and clean all equipment prior to bringing it to the site to prevent the introduction and spread of invasive species;
    - As much as possible, operate within already-disturbed areas;
    - Revegetate disturbed soil with native species suitable to the local habitat as soon after construction as possible; and
    - Use only weed-free mulches, topsoils, and seed mixes. Of particular concern are birdsfoot trefoil (Lotus corniculatus) and crown vetch (Coronilla varia), two invasive species that are sold commercially and are problematic in prairies and disturbed open areas.

  MBS Sites of Biodiversity Significance and DNR Native Plant Communities community can be viewed using the Minnesota Conservation Explorer or their GIS shapefiles can be downloaded from the MN Geospatial Commons. Please contact me if you do not have access to the appropriate mapping services. For information on interpreting the data, reference the MBS Site Biodiversity Significance and Native Plant Community websites.

- Pool 4 of the Mississippi River has been identified as a Lake of *Outstanding* Biological Significance. Lakes of Biological Significance were ranked as *Outstanding, High, or Moderate* based on unique plant and animal presence. It is important that effective erosion prevention and sediment control practices be implemented and maintained near lakes throughout the project. Indirect impacts, such as the introduction or spread of invasive species, should also be considered and minimized.

State-listed Species

- Several state-listed fish including paddlefish (*Polyodon spathula*), a state-listed threatened fish species have been documented in the Mississippi River near the proposed project. In Minnesota, paddlefish spawn in the spring in temporarily flooded tributaries to the large rivers. Minnesota's Endangered Species Statute (Minnesota Statutes, section 84.0895) and associated Rules (Minnesota Rules, part 6212.1800 to 6212.2300 and 6134) prohibit the take of threatened or endangered species without a permit. To protect this species, **work within the water needs to be avoided from April to mid-June.** Contact the DNR Endangered Species Environmental Review Coordinator, Lisa Joyal (Lisa.Joyal@state.mn.us or 651-259-5109) if this is not feasible as additional action may be needed.

- Timber rattlesnakes (*Crotalus horridus)*, a state-listed threatened species, have been reported from the vicinity of the proposed project and may be encountered on site. In Minnesota, the ideal habitat for this species is forested bluffs, south-facing rock outcrops, and bluff prairies, particularly in the Mississippi River Valley. Nearby forests, prairies, and agricultural lands are used as summer feeding grounds. Two necessary habitat components are open areas for thermoregulation, and dens for overwintering. The dens are often located on steep, south or west-facing hillsides with rock outcroppings and ledges. Timber rattlesnakes emerge from their dens in late April to early May and return to them in late September to early October. In the spring and fall, timber rattlesnakes are active during the day; while during the hottest months of summer, they are mostly active at night.

Timber rattlesnake mortality in Minnesota is most commonly caused by poaching, vehicle collisions, and habitat destruction. The loss of a single adult, especially a female, can impact the population significantly. As such, crews working in the area should be advised that if they encounter any snakes, the snakes should not be disturbed. The use of erosion control blanket shall be limited to 'bio-netting' or 'naturalnetting' types, and specifically not products containing plastic mesh netting or other plastic components. Also, be aware that hydro-mulch products may contain small synthetic (plastic) fibers to aid in their matrix strength. These loose fibers could potentially re-suspend and make their way into Public Waters. As such, please review mulch products and not allow any materials with synthetic (plastic) fiber additives in areas that drain into Public Waters. Be aware, that there are also other species of snakes in the area that will mimic rattlesnakes. Contact the DNR Regional Nongame Wildlife Specialist, Bridgette Timm (952-207-9769 or bridgette.timm@state.mn.us) if timber rattlesnakes are encountered on-site or if you have any questions regarding this species.

- Please visit the DNR Rare Species Guide for more information on the habitat use of these species and recommended measures to avoid or minimize impacts. For further assistance with these species, please contact the appropriate DNR Regional Nongame Specialist or Regional Ecologist.

Federally Protected Species

- Several federally and state-listed mussels, including the sheepnose (*Plethobasus cyphyus*), a federally and state-listed endangered species, have been documented in the Mississippi River in the vicinity of the proposed project, some as recently as 2021. As mussels are particularly vulnerable to deterioration in water quality, especially increased siltation, it is important that effective erosion prevention and sediment control practices be implemented and maintained near the river.

  Minnesota's Endangered Species Statute (Minnesota Statutes, section 84.0895) and associated Rules (Minnesota Rules, part 6212.1800 to 6212.2300 and chapter 6134) prohibit the take of threatened or endangered species without a permit. In order to determine the potential for a take of state-protected mussels, **a qualified surveyor (see attached list) will need to conduct a mussel survey and/or relocation in any potential mussel habitat prior to construction within these habitats**.

  The surveyor will need to obtain a permit from the DNR Endangered Species Coordinator, Bridget Henning-Randa (Bridget.Henning-Randa@state.mn.us or 651-259-5073) before conducting any mussel surveys and will need to follow the mussel survey and relocation protocol. The extent of the mussel survey should include all areas of the riverbed that will be directly impacted by excavation, pile driving, placing of fill or riprap, driving of equipment, or dewatering; as well as any areas downstream that will receive sediment from project activities. Please send the results of all survey work to the DNR Endangered Species Environmental Review Coordinator, Lisa Joyal. **No work in the riverbed shall occur until potential impacts to mussels have been resolved** to the satisfaction of the DNR's Endangered Species Coordinator, Bridget Henning-Randa.

- To ensure compliance with federal law, conduct a federal regulatory review using the U.S. Fish and Wildlife Service's (USFWS) online Information for Planning and Consultation (IPaC) tool.

Environmental Review and Permitting

- Please include a copy of this letter and the MCE-generated Final Project Report in any state or local license or permit application. Please note that measures to avoid or minimize disturbance to the above rare features may be included as restrictions or conditions in any required permits or licenses.

The Natural Heritage Information System (NHIS), a collection of databases that contains information about Minnesota's rare natural features, is maintained by the Division of Ecological and Water Resources, Department of Natural Resources. The NHIS is continually updated as new information becomes available, and is the most complete source of data on Minnesota's rare or otherwise significant species, native plant communities, and other natural features. However, the NHIS is not an exhaustive inventory and thus does not represent all of the occurrences of rare features within the state. Therefore, ecologically significant features for which we have no records may exist within the project area. If additional information becomes available regarding rare features in the vicinity of the project, further review may be necessary.

For environmental review purposes, the results of this Natural Heritage Review are valid for one year; the results are only valid for the project location and project description provided with the request. If project details change or the project has not occurred within one year, please resubmit the project for review within one year of initiating project activities.

The Natural Heritage Review does not constitute project approval by the Department of Natural Resources. Instead, it identifies issues regarding known occurrences of rare features and potential impacts to these rare features. Visit the Natural Hertiage Review website for additional information regarding this process, survey guidance, and other related information. For information on the environmental review process or other natural resource concerns, you may contact your DNR Regional Environmental Assessment Ecologist.

Thank you for consulting us on this matter, and for your interest in preserving Minnesota's rare natural resources.

Sincerely,

Samantha Bump

Samantha Bump
Natural Heritage Review Specialist
Samantha.Bump@state.mn.us

James Drake

James Drake
Natural Heritage Review Specialist
James.F.Drake@state.mn.us

Cc: Melissa Collins, Bridgette Timm, and Bridget Henning-Randa

MINNESOTA POLLUTION CONTROL AGENCY

520 Lafayette Road North | St. Paul, Minnesota 55155-4194 | 651-296-6300

800-657-3864 | Use your preferred relay service | info.pca@state.mn.us | Equal Opportunity Employer

July 20, 2022

Caroline Gregerson
City Administrator
Wabasha Port Authority
900 Hiawatha Drive East
Wabasha, MN 55981

Re: Wabasha Barge Facility Environmental Assessment Worksheet

Dear Caroline Gregerson:

Thank you for the opportunity to review and comment on the Scoping Environmental Assessment Worksheet (EAW) for the Wabasha Barge Facility project (Project) located in Wabasha, Wabasha County, Minnesota. The Project consists of a new barge facility for the transfer of sand from Mississippi River channel dredging activities. Regarding matters for which the Minnesota Pollution Control Agency (MPCA) has regulatory responsibility and other interests, the MPCA staff has the following comments for your consideration.

Permits and Approvals (Item 8)

- This section indicates that a Clean Water Act (CWA) Section 404 Permit from the U.S. Army Corps of Engineers (USACE) for project related wetland impacts may be necessary. The EIS (Environmental Impact Statement) should clarify that if a USACE Section 404 Individual Permit is required for any Project activity, then an MPCA CWA Section 401 Water Quality Certification or waiver must also be obtained as part of the permitting process. You can find additional information about the MPCA's 401 Certification process at: https://www.pca.state.mn.us/water/clean-water-act-section-401-water-quality-certifications. For further information about the 401 Water Quality Certification process, please contact Bill Wilde at 651-757-2825 or William.wilde@state.mn.us.
- Please note that the project may require a State Disposal System Permit for the use/disposal of dredged material in upland areas depending on how this is completed and who is doing the work. More information regarding a permit can be found at: http://www.pca.state.mn.us/water/dredgedmaterials.html. Questions regarding disposal of dredged material should be directed to Emily Schnick at 651-757-2699.

Soils and Topography (Item 10)

- As stated above, the access dredging for the barge facility may need a permit depending on how that is completed and who is doing the work. It is not clear if this dredging will be conducted by the USACE as part of their permit or another entity. This should be clarified in the EIS.
- Additional information should be provided in the EIS regarding the access dredging volume and how will it be reused or disposed.
- The Scoping EAW states that the dredged material will be brought to an upland area of the site but is not clear if this is for dewatering or reuse and if there is any sampling data on this material. Since this is not part of the navigational channel, it is assumed that the material is silty and would require sampling. This should be discussed in the EIS.

- It is not clear if this new site will have dredge storage and dewatering activities and if so, what is planned. This may require the Wabasha Port Authority to obtain a permit for the management of dredged material separate from the USACE permit. Please clarify in the EIS.

Water Resources (Item 11)

Surface Water

- The EIS should clarify that if the USACE Section 404 permit or the Section 10 permit is required and in accordance with Minnesota Statutes, the Project should include the MPCA as a regulator of all surface waters as defined by Minn. Stat. § 115.01, subd. 22 Waters of the state. Even though there may be surface waters that are determined to be USACE non-jurisdictional or exempt from the Wetland Conservation Act, all surface waters are regulated by the MPCA, and any surface water impact needs to be described in the application and may require mitigation.
- In addition, if any of the USACE permitting vehicles are required, the 401 Water Quality Certification must also be included and becomes an enforceable component of the associated federal license or permit, issued under either Section 404 of the Clean Water Act or Section 10 of the Rivers and Harbors Act. The scope of a Clean Water Act Section 401 certification is limited to assuring that a discharge from a federally licensed or permitted activity will comply with water quality requirements. In addition, the Project proposer must also submit to the MPCA the Antidegradation Assessment in accordance with water quality standards Minn R. 7050.0265 and should review the Antidegradation requirements in 7050.0285.

Stormwater

- It appears the Project location is on a reach of the Mississippi River that does not have a construction-related impairment, therefore additional best management practices (BMPs) are not required. However, since the Project borders the river and several wetlands are also located within the project area, the MPCA National Pollutant Discharge Elimination System/State Disposal System (NPDES/SDS) Construction Stormwater Permit (CSW Permit) requires redundant down gradient sediment controls if soil disturbance will encroach within the existing 50 feet of natural buffer to any of the waterbodies.
- The planned permanent stormwater management for new impervious surface will consist of ditches constructed around the perimeter of the site. Please note that the CSW Permit requires use of a volume reduction method, such as infiltration, to treat the first 1 inch of stormwater volume that is not discharged to the receiving water. If infiltration is not feasible due to prohibitions at the site, the Project proposer can also consider stormwater reuse or other method to limit stormwater discharges from the site. Questions regarding Construction Stormwater Permit requirements should be directed to Roberta Getman at 507-206-2629 or Roberta.Getman@state.mn.us.

We appreciate the opportunity to review this Project. Please provide your specific responses to our comments and notice of decision on the need for an Environmental Impact Statement. Please be aware that this letter does not constitute approval by the MPCA of any or all elements of the Project for the purpose of pending or future permit action(s) by the MPCA. Ultimately, it is the responsibility of the Project proposer to secure any required permits and to comply with any requisite permit conditions. If you have any questions concerning our review of this EAW, please contact me by email at Karen.kromar@state.mn.us or by telephone at 651-757-2508.

Sincerely,

Karen Kromar

This document has been electronically signed.

Karen Kromar
Planner Principal
Environmental Review Unit
Resource Management and Assistance Division

KK:rs

cc: Dan Card, MPCA, St. Paul
Bill Wilde, MPCA, St. Paul
Emily Schnick, MPCA, St. Paul
Roberta Getman, MPCA, Rochester
Wayne Cords, MPCA, Mankato

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Upper Mississippi River National Wildlife and Fish Refuge
102 Walnut Street, Suite 204
Winona, Minnesota 55987

July 20, 2022

Caroline Gregerson
Wabasha Port Authority
900 Hiawatha Drive East
Wabasha, MN 55981

RE: Scoping Document, Wabasha Barge Facility, Wabasha County; and
Wabasha Barge Terminal, Draft Scoping Decision Document

Dear Ms. Gregerson,

This letter serves as transmittal for comments regarding the two referenced documents related to the Wabasha Port Authority's Barge Terminal proposal. Comments are listed below and reference enclosures attached to this letter.

The Draft Scoping Decision Document "Modified Designs or Layouts" section includes a statement that "modified design or layout alternatives were evaluated… along with the location, size, and orientation of the dredge material storage areas were considered." Neither referenced document nor the Site Plan map address dredge material storage by location or quantity. Material storage has the potential to significantly impact the site and must be addressed. Additionally, the cover page of the Scoping Document lists "transportation of agricultural products and shipping containers" neither of which are discussed.

The following comments reference only the Scoping Document.

On Page 2, the Scoping Document states this is a City of Wabasha Port Authority project though the tax parcel numbers identified within the Project Area are owned by the Kohner Sand and Gravel Company and account for 26.75 acres of the 54.0 acre Study Area. The remaining 27.25 acres are assumed to be the areas outlined within the backwaters of the Mississippi River, however, the Site Plan appears to encompass a much smaller acreage. There needs to be clarity regarding what features and uses are being evaluated and ownership of the parcels included in the evaluation (private, City, State, Federal). Documentation as to the ownership of the river shoreline and river bottom in the areas planned for dredging will be required.

On Page 6 - Outdoor Recreation, the discussion and corresponding maps have completely overlooked the U.S. Fish and Wildlife Service's (FWS) Upper Mississippi River National Wildlife and Fish Refuge (Refuge) which is the adjacent land owner to this project (Attachments 1 and 2) and manages nearly 14,000 acres in Lower Pool 4. The Nelson-Trevino Bottoms is also owned in fee-title by the FWS not the Wisconsin Department of Natural Resources as stated in the document.

On Page 7 – Zoning, the project is located within an area zoned for Low-Density Residential as well as a S1 Shoreland Overlay Zone which has, among others, the goal of protecting surface water quality which is in direct contradiction to this project. However, 9b Project Compatibility, states that the proposed project is compatible with the zoning. An explanation of this compatibility declaration will be needed.

On Page 12 – Wetlands, in addition to the four wetland basins delineated on the upland, the entire area to be dredged for access is a wetland and impacts to this area need to be accounted for in the document.

On Page 14 – Stormwater, the description of stormwater quantity states that the water will be treated prior to release to the Mississippi River. A description of how and where that treatment will occur is needed.

On Pages 19-21 – Fish, Wildlife, Plant Communities, & Sensitive Ecological Resources, this section provides no discussion regarding aquatic plant communities, eagle nests, or the nearby great blue heron nesting colony. Although not all are active, there are approximately 60 bald eagle nests in Lower Pool 4 with three in the general vicinity of this project. Additional surveys will be required prior to beginning this project to determine nesting activity in the immediate area. In the "Rare Features" section there is reference to conducting a regulatory review through the FWS Ecological Services (ES) office utilizing the Information for Planning and Consultation (IPaC) system. While this consultation is adequate for a determination on properties located outside of the Refuge boundary, the findings are not sufficient for determinations or for obtaining a Special Use Permit (SUP) for activities within the Refuge boundary.

Finally, as was addressed in comments to USACE regarding the Pool 4 Dredge Material Management Plan (DMMP) the use of this property was identified and evaluated as the "Carrels Site" which has led to confusion on this project. The DMMP noted that 18 acres of this Project Area are approved in the Channel Maintenance Management Plan (CMMP) (Attachment 3). A discussion regarding how this pre-determined use will impact the development of a barge terminal needs to be addressed. As was expressed to USACE, the Refuge has concern over the development of a barge terminal at this location. As indicated on your Site Plan there is limited area for barges to maneuver and an expectation that they will enter the terminal at an angle. It is likely that the island directly in-front (riverward) of the proposed terminal, which is FWS fee-title, will become a point for barges to nose-in which leads to damaged or downed trees and erosion which will be exaggerated by propwash from barges turning and passing.

We look forward to future involvement with the team preparing the Wabasha Barge Facility Environmental Impact Statement (EIS) for this project. Please do not hesitate to contact Winona District Manager Mary Stefanski at mary_stefanski@fws.gov or 507-494-6229 if there are questions.

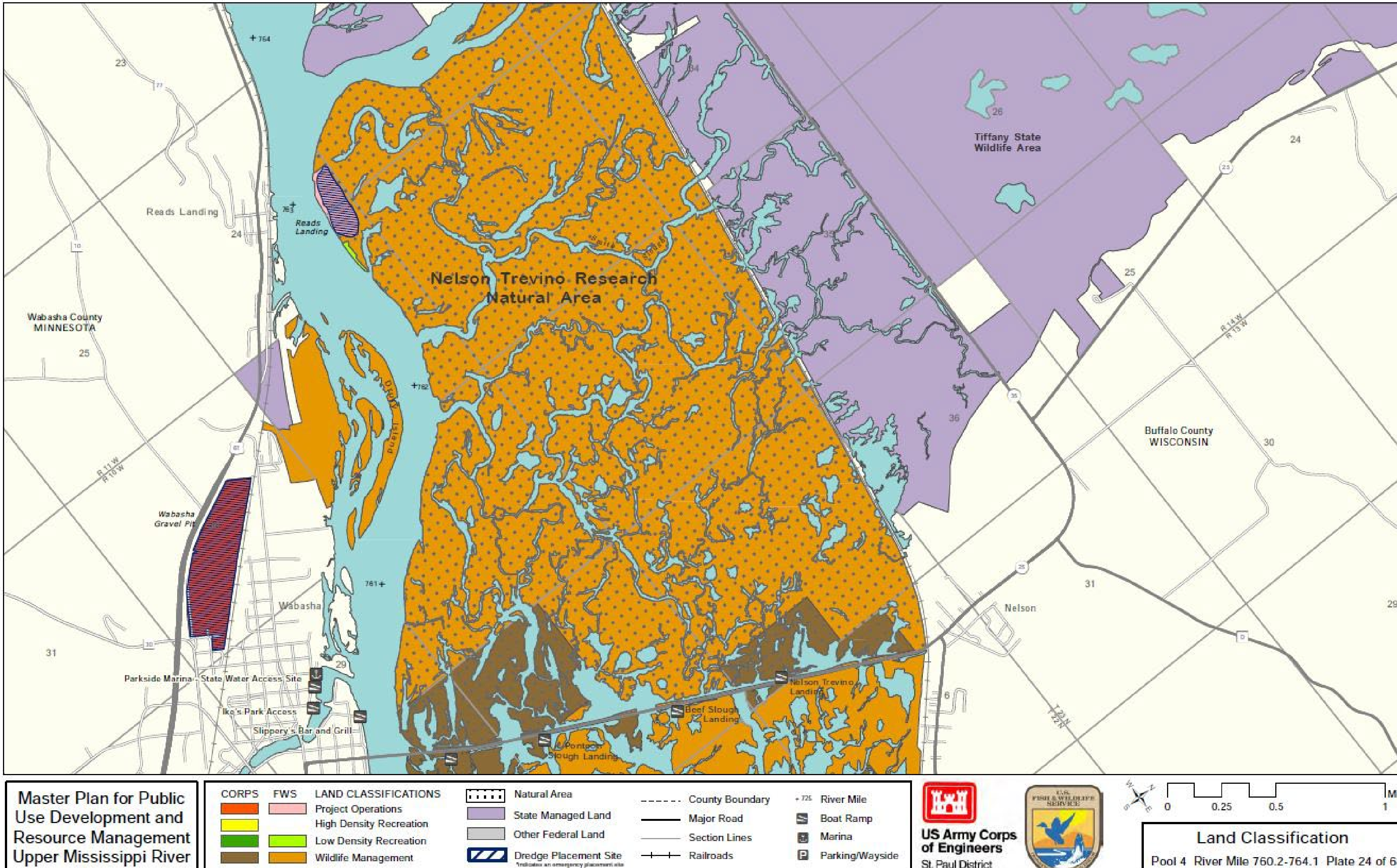
Sincerely,

Sabrina Chandler

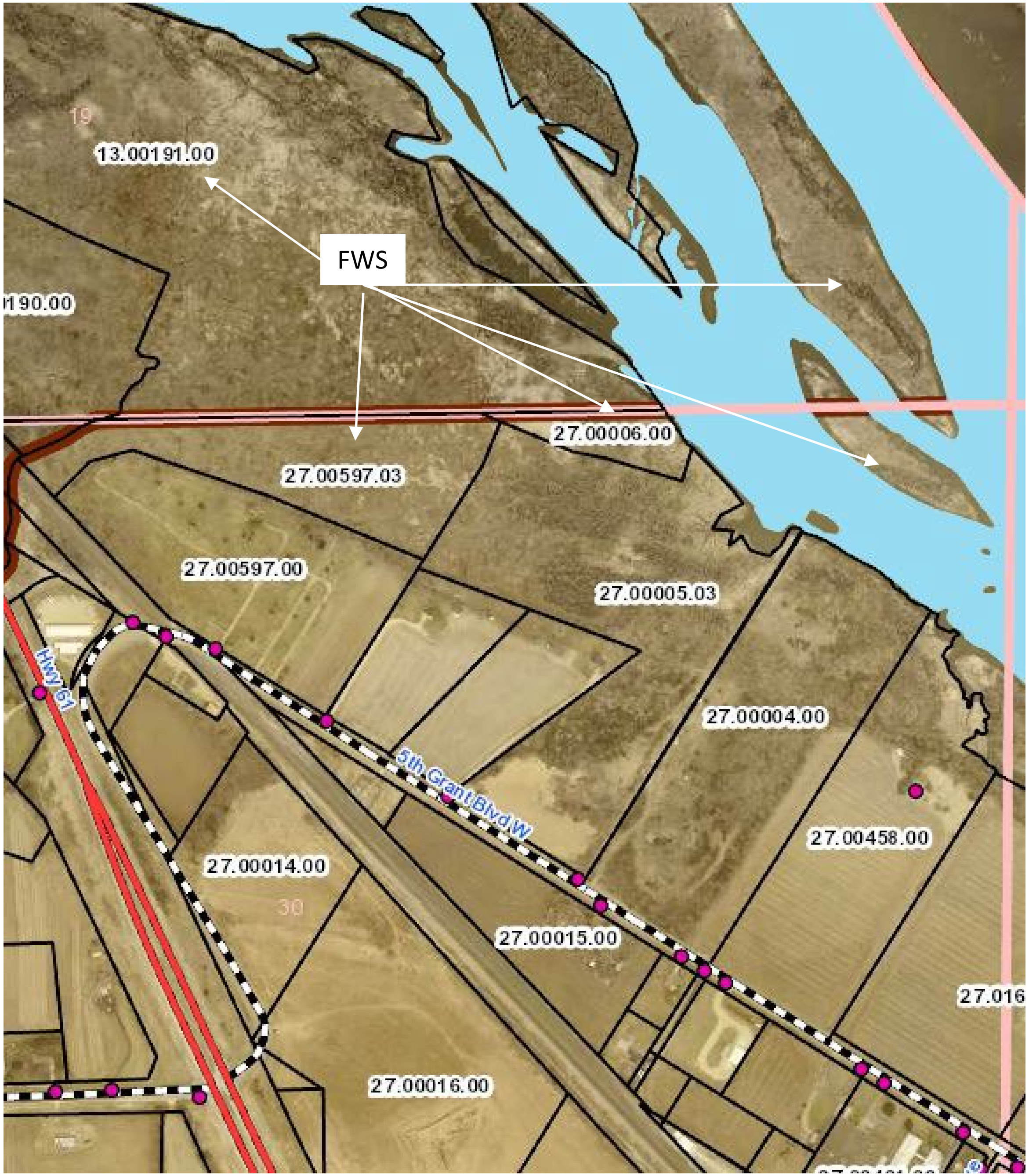
Sabrina Chandler
Refuge Manager

Enclosures

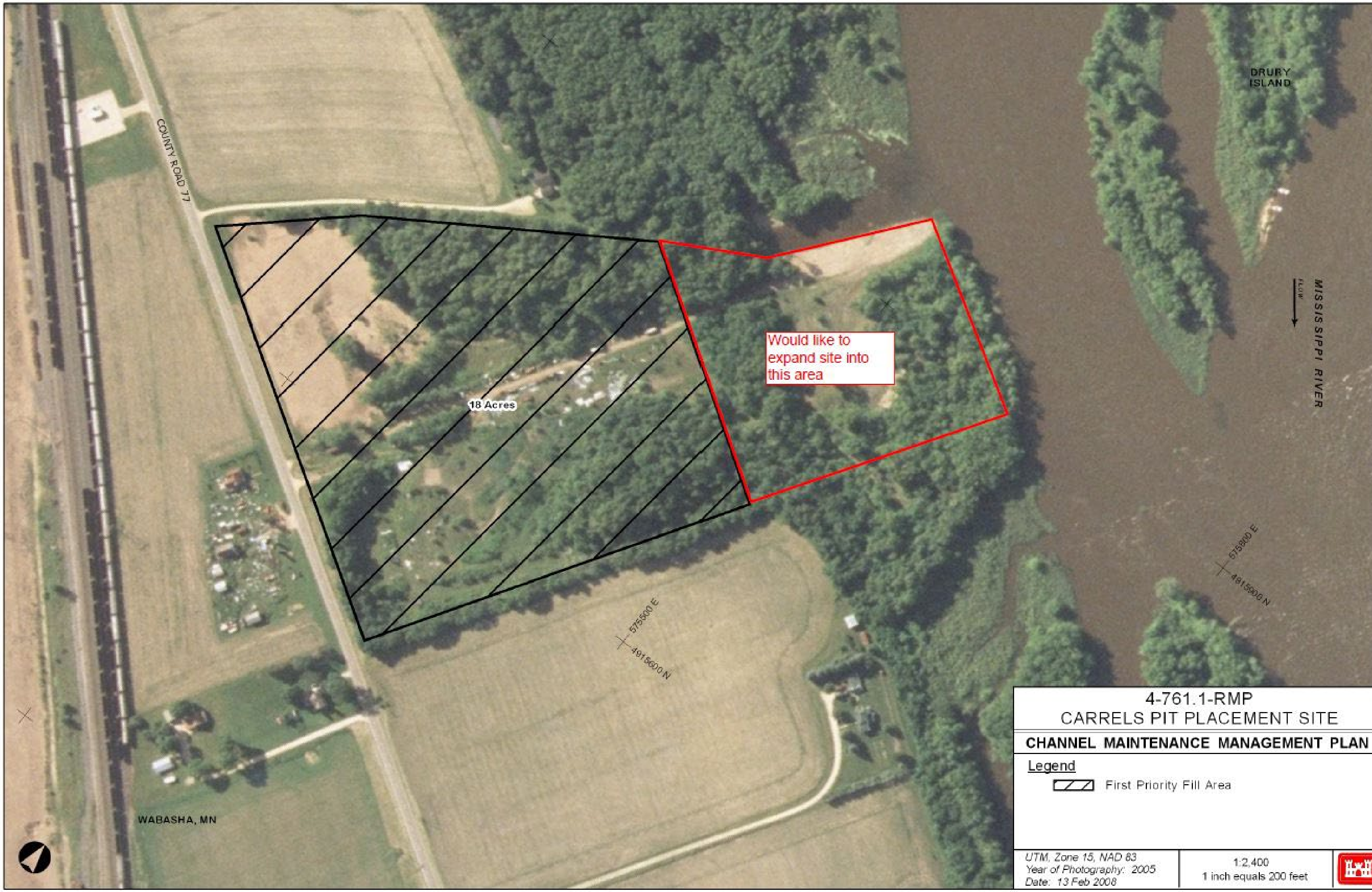
Attachment 1. Land ownership and classification.



Attachment 2.
FWS ownership.



Attachment 3. Drawing from the 2008 CMMP showing location for dredged material placement.



From: BJRaney <brianjraney@gmail.com>
Sent: Thursday, July 21, 2022 6:09 PM
To: Caroline Gregerson <cityadmin@wabasha.org>
Subject: Comments on Proposed Wabasha Terminal Facility

To Whom It May Concern,
I have two concerns with the proposed Wabasha Barge Facility.
The first concern, though somewhat addressed in the reduction of traffic and congestion in other Wabasha neighborhoods, has to do with cost/benefit: how much will this cost, who pays for it, and what's the return on this investment? Particularly, if the Army Corps of Engineers chooses not to use it. Their recent dredging plan did not lock them into using the facility, it only mentions it as a potential option.
My next concern is with the dredging material itself. I don’t see much discussion of the pollutants that might be in the material, and thus exposed to the citizens of Wabasha via this facility. Unfortunately, for many years the Mississippi has been a convenient dumping place for cities and companies that are along it. Though much of this has been stopped, the dredge material could still be holding it. This can contain what we are recently finding more and more as water contamination, Per- and polyfluoroalkyl substances (PFAS), also known as “forever chemicals.” They are resistant to breakdown, and linger in the environment “forever.” PFAS has been linked to a number of health issues. PFAS compounds have been found in dust accumulations, even in indoor spaces. My concern is by bringing this dredging material to shore where such pollutants can become airborne, that we increase this risk to our community. Will there be a plan in place to sample the dredge material for these and other pollutants, and an appropriate action plan to address their discovery?

Brian Raney