BLACK RIVER IMPOUNDMENT PROJECT – RLWD PROJECT #176

Preliminary Engineer's Report

October 10, 2017

Revised: November 16, 2017

Prepared on Behalf of:
Red Lake Watershed District

By:
Houston Engineering, Inc.

HoustonEngineering Inc.

Houston Engineering, Inc.
208 4th St. E
Thief River Falls, MN 56701

I hereby certify that this plan, specification, or 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.

Tony A. Nordby
License No. 51392

10-10-2017
Date

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HoustonEngineering Inc.

Technical Memorandum

To: Red River Watershed Management Board (RRWMB)
Technical Advisory Committee (TAC)

From: Tony A. Nordby, PE
Houston Engineering, Inc.

Subject: RRWMB Step 2 Submittal – TAC Additional Information Request

Date: November 16, 2017

Project: Black River Impoundment Project – Red Lake Watershed District (RLWD) Project #176

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

Tony A. Nordby 11-16-17
Tony A. Nordby Date
Reg. No. 51392

INTRODUCTION

This document is provided in response to the post RRWMB TAC meeting request for the Black River Impoundment Project email written by Henry Van Offelen, dated November 8, 2017. Information provided in this technical memorandum shall be considered an addendum to the Preliminary Engineer's Report Dated October 10, 2017.

Multiple requests were made by the TAC as result of their review and recommendations to the RRWMB for the Step 2 Submittal of the Black River Impoundment Project.

TECHNICIAL ADVISORY COMMITTEE REQUESTS

1. OPERATION PLAN WITH EXISTING DOWNSTREAM SCHIRRICK DAM

The primary operation of the proposed project will be for flood control. The intent of the operation will be to provide flow reductions downstream on the Black River, Red Lake River, and the Red River of the North. The hydrographs shown in Figure 1 represents the 100-year 10-day spring runoff event at the Schirrick Dam with and without the Black River Impoundment project. These hydrographs were created with the Schirrick Dam gates open using the RLWD expanded distributed detention strategy HEC-HMS models, and inputting the 100-year 10-day spring runoff event. With the Black River Impoundment project in operation, the 100-year 10-day peak inflow at the Schirrick Dam decreases by approximately 480 cfs. The inflow rating curve in the Schirrick Dam Engineer's Report for flood gates open would suggest that the peak inflow reduction with the proposed Black River Impoundment Project in place, the water surface elevation of the Schirrick Dam pool would be lowered by approximately 1.5 feet, maintaining a water surface elevation below the Secondary Spillway and providing increased storage capacity potential.

The Black River Impoundment will be operated more frequently than the Schirrick Dam and will be operated based on upstream runoff. See section 4.8 Project Operation of the Engineer's Report for the preliminary operation of the Black River Impoundment. The Schirrick Dam operation is based on gauge triggers downstream and not related to the upstream runoff. The hydrographs in Figure 1 also show that the ungated storage delay from the proposed Black River Impoundment won't have a negative effect on the operation of the Schirrick Dam, but should provide benefit as evident by the reduced inflows throughout the duration of all hydrograph conditions.

2. RED LAKE RIVER @ CROOKSTON

The hydrographs shown in Figure 2 and Figure 3 represent the 100-year 10-day runoff event for the Red Lake River @ Crookston with and without the Black River Impoundment Project in place and the Schirrick Dam gates open. These hydrographs were created using the RLWD expanded distributed detention strategy HEC-HMS models, and inputting the 100-year 10-day runoff event.

The Black River Impoundment project shows a 0.5% peak flow reduction on the Red Lake River @ Crookston for the 100-year 10-day runoff event. Historical documents state that during the 1997 flood event, the Schirrick Dam operation was thought to prevent parts of the City of Crookston from flooding. Considering the flood storage benefits provided from the proposed Black River Impoundment to the Schirrick Dam, it is reasonable to assume that a similar event such as the 1997 flood, would present even lower peak elevations in the City of Crookston.

3. GATED STORAGE INCREASE

Increasing the storage capabilities of the proposed Black River Impoundment site was reviewed. It was determined that the topography and project site characteristics will allow for an additional 1.5 feet of gated storage, while maintaining 3 feet of freeboard between the auxiliary spillway to the top of levee. See the proposed impoundment design below:

Embankment:

Top of Dam Elevation	1023.5
Top Width	12 ft.
Freeboard (Auxiliary Spillway Design Flood)	2.1 ft.
Interior Side Slopes	5:1
Exterior Side Slopes	4:1

Principal Spillway:

Type: 60" RCP with Two-Way Reinforced Concrete Riser	
Flowline @ Inlet	1003.0
Riser Crest Elevation	1019.0

Auxiliary Spillway:

Type: 500-foot excavated earthen spillway	
Crest Elevation	1020.5

Storage:

Gated, to Elev. 1019.0	3,162 A-F (3.53 inches)
Temporary, Elev. 1019.0 to Elev. 1020.5 (Auxiliary Spillway)	902 A-F (1.01 inches)
Total Storage (Gated & Ungated To Auxiliary Spillway)	4,064 A-F (4.54 inches)

Principal Spillway (Riser Crest) Design Flood:

Initial Water Surface Elevation	1019.00
Maximum Water Surface Elevation	1020.27

Auxiliary Spillway Design Flood:

Initial Water Surface Elevation	1019.00
Maximum Water Surface Elevation	1021.40

Freeboard (Top of Dam) Design Flood:

Initial Water Surface Elevation	1019.00
Maximum Water Surface Elevation	1021.57

Technical Release No. 60, "Earth Dams and Reservoirs" (TR-60)[3]

Note: All elevations in this report are given in North American Vertical Datum of 1988 (NAVD 88)

4. DIVERSION DITCHES

The primary purpose of the proposed diversion ditches is to maximize the potential drainage area and divert upstream runoff to the impoundment site that would otherwise bypass the site through existing coulees or road ditches. In total, three inlet channels, a 2.5 mile north-south diversion ditch along County Road (CR) 68, a combination of a 1.5 mile east-west diversion ditch along the northside of CSAH 3 and a 4 mile north-south diversion ditch along CSAH 12, and a 3.7 mile east-west diversion ditch along CR 55 will be constructed to conveying water to the site.

The 2.5 mile north-south diversion ditch along County Road (CR) 68 maximizes the northwest drainage area boundary diverting water to the proposed impoundment site that would otherwise bypass the site through coulees in Section 35 of Bray Township. Constructing this proposed diversion ditch is significant in order to optimize flood storage at the impoundment site.

The 1.5 mile diversion ditch proposed from the impoundment site east along CSAH 3 and 4 miles north along CSAH 12 was added as part of the project to capture an additional 2.4 square miles of drainage area to the north in Sections 8, 17, and 18 of Sanders Township. This ditch will divert water to the proposed impoundment site that would otherwise bypass the site northwest through Sections 10, 11, 13, 14, and 15 of Bray Township where flooding and poor drainage has been documented and identified at landowner and project work team meetings.

The 3.7 mile east-west diversion ditch along CR 55 proposed will divert runoff from the southern drainage boundaries into the impoundment site. A shallow road ditch exists along the north side of CR 55 where the diversion ditch is being proposed, but water currently flows south through CR 55 in the south west corner of Section 2 of Polk Centre Township bypassing the proposed impoundment site. The proposed diversion ditch will direct this flow into the impoundment site instead of continuing south through CR 55. There has also been history of CR 55 overtopping along Section 2 of Polk Centre Township. The proposed ditch will decrease the frequency of overtopping on CR 55 and contain water within the project drainage area optimizing the flood storage capacity of the impoundment site.

5. STAR VALUE CALCULATIONS AND PROJECT ASSESSMENT WORKSHEET

See Figure 4 through Figure 6 for the updated STar Value Hydrograph, Calculations and the Project Assessment Worksheet.

By increasing the gated storage, the STar Value of the Black River Impoundment Project increases to 90,554. Assuming a total project costs of $7.1 million, the Red River Watershed Board cost per STar Value will be approximately $26.14. This corresponds to approximately $18.38/STar Value in year 2000 dollars.

CONCLUSION

All hydrographs, maps, and figures showing results from operation of the Black River Impoundment provided in this technical memorandum include the increased storage that is outlined in Section 3, “Gated Storage Increase.” The preliminary design and information available finds that the project is feasible and provides benefit upstream and downstream from the project site.

Figure 1

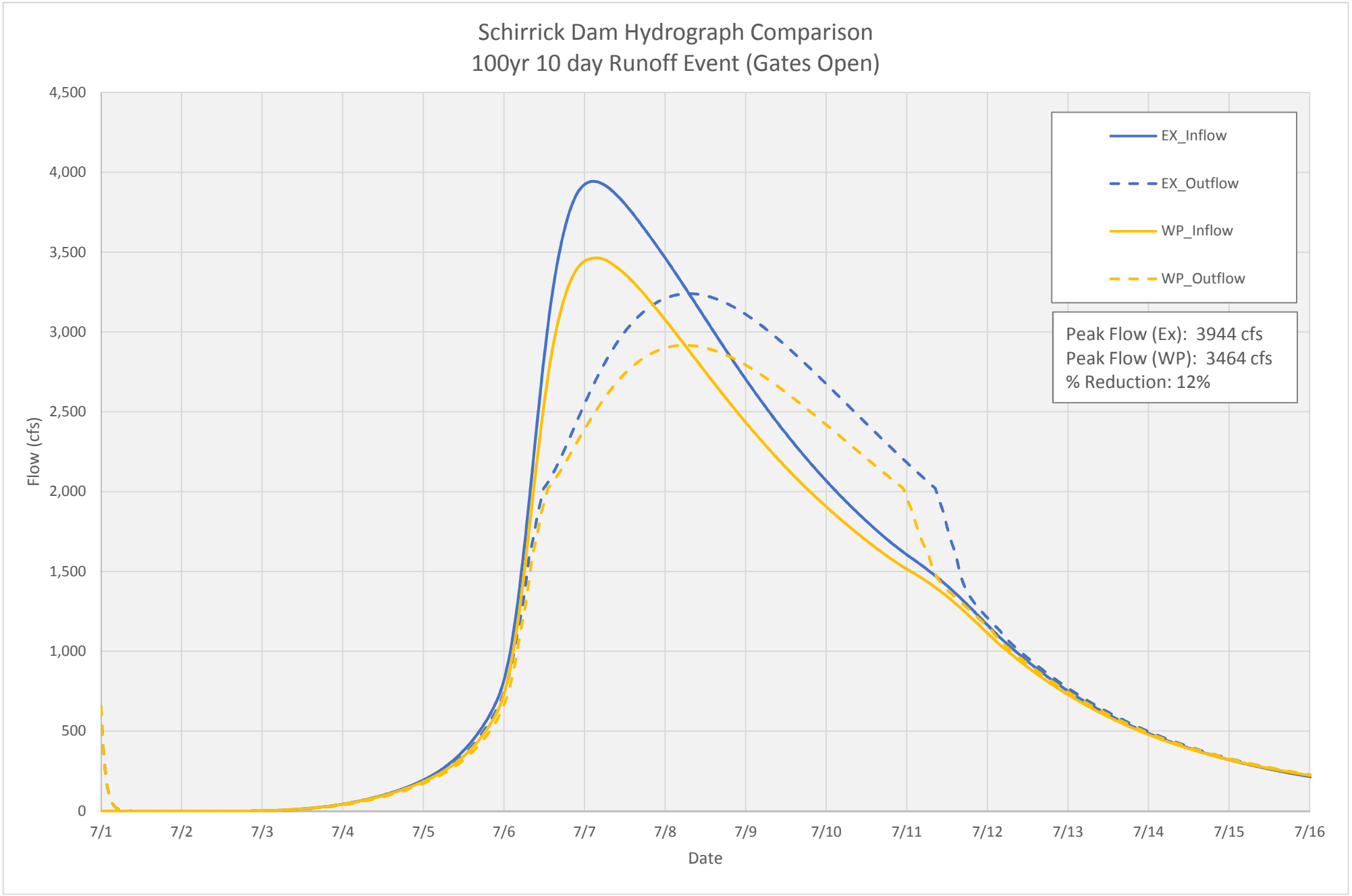
Schirrick Dam Hydrograph Comparison
100yr 10 day Runoff Event (Gates Open)
Flow (cfs)
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
7/1
7/2
7/3
7/4
7/5
7/6
7/7
7/8
7/9
7/10
7/11
7/12
7/13
7/14
7/15
7/16
Date
EX_Inflow
EX_Outflow
WP_Inflow
WP_Outflow
Peak Flow (Ex): 3944 cfs
Peak Flow (WP): 3464 cfs
% Reduction: 12%

Figure 2

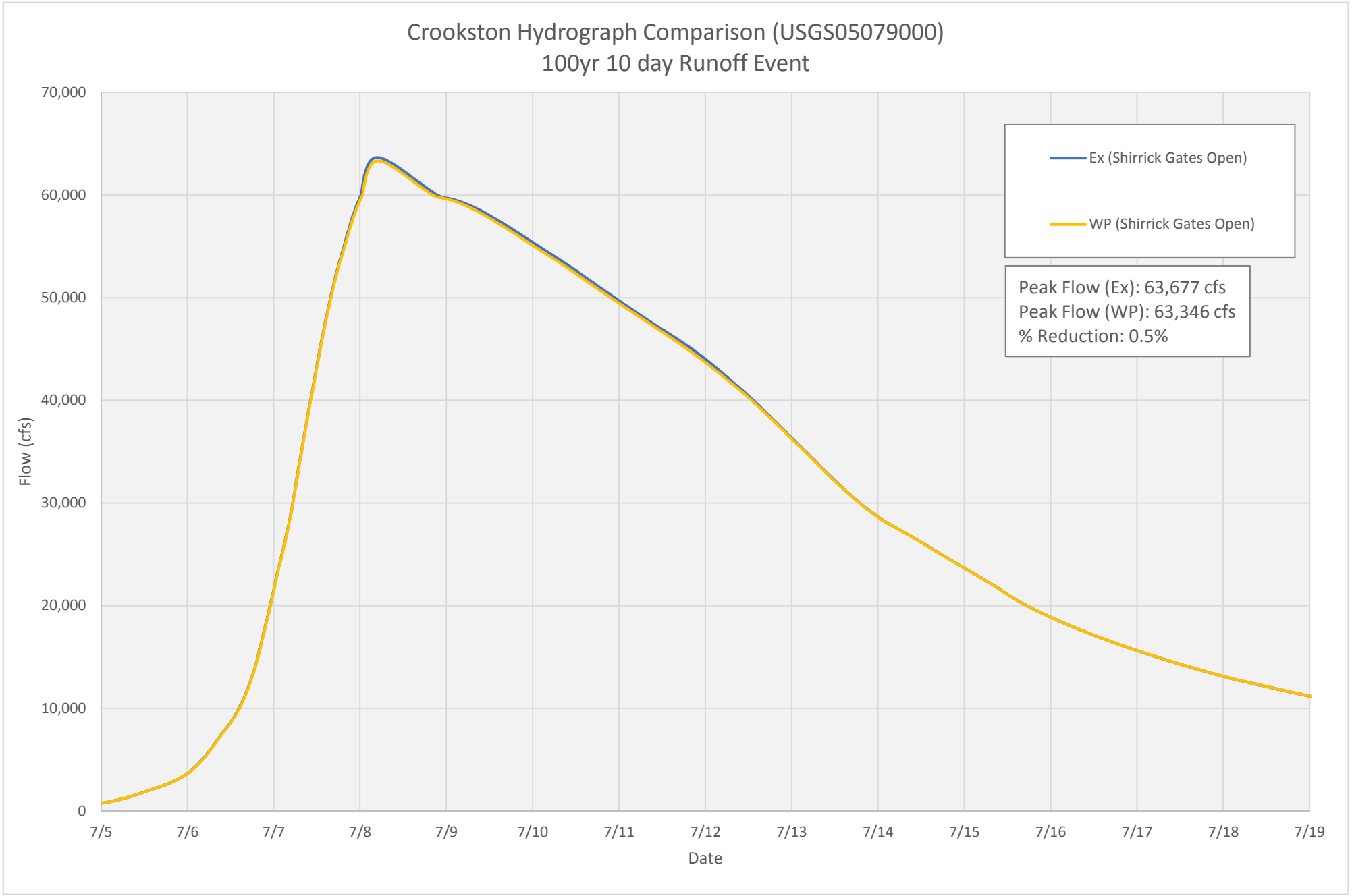
Crookston Hydrograph Comparison (USGS05079000)
100yr 10 day Runoff Event
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
Flow (cfs)
7/5
7/6
7/7
7/8
7/9
7/10
7/11
7/12
7/13
7/14
7/15
7/16
7/17
7/18
7/19
Date
Ex (Shirrick Gates Open)
WP (Shirrick Gates Open)
Peak Flow (Ex): 63,677 cfs
Peak Flow (WP): 63,346 cfs
% Reduction: 0.5%

Figure 3

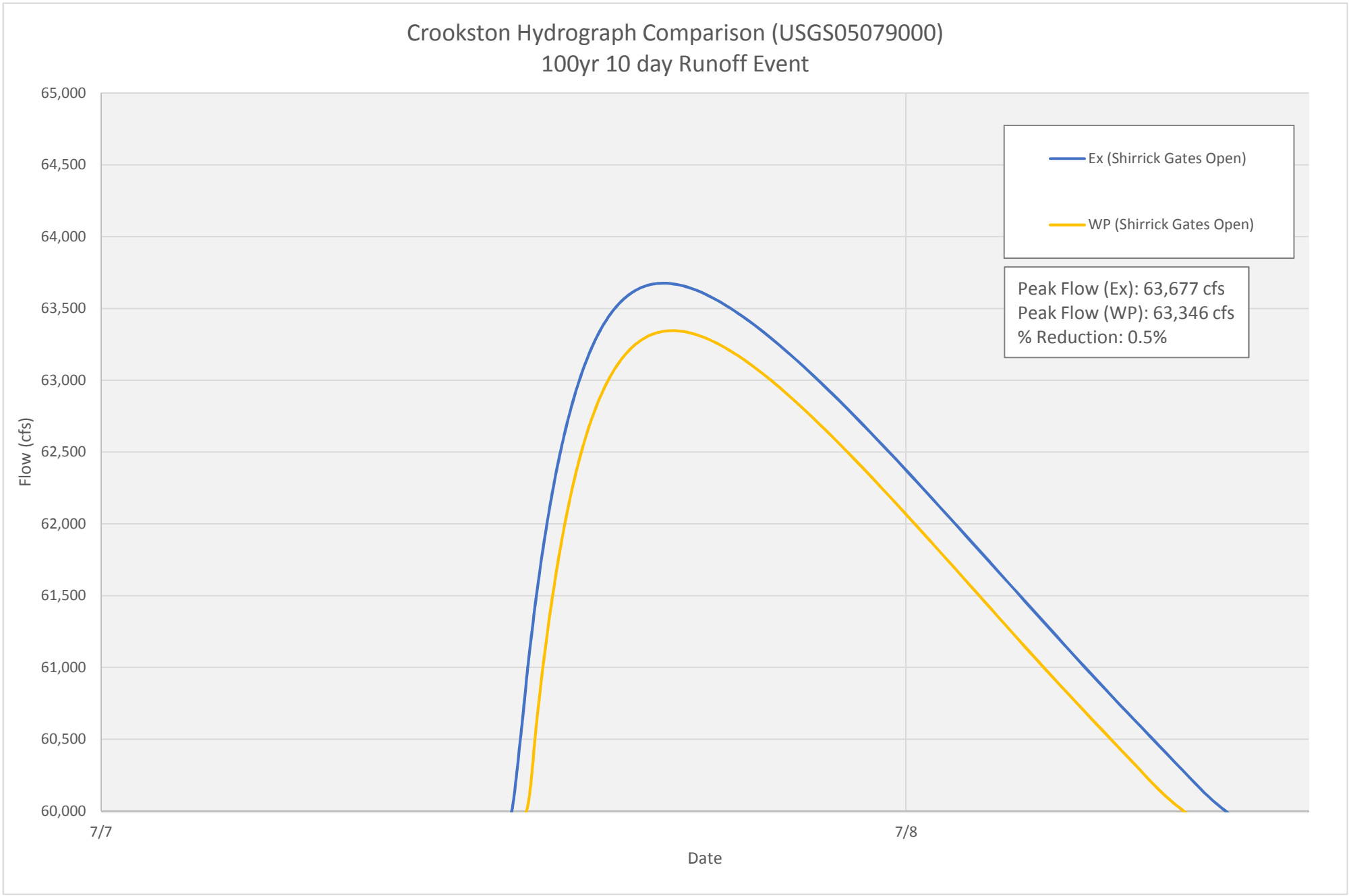
Crookston Hydrograph Comparison (USGS05079000)
100yr 10 day Runoff Event
65,000
64,500
64,000
63,500
63,000
62,500
62,000
61,500
61,000
60,500
60,000
Flow (cfs)
7/7
7/8
Date
Ex (Shirrick Gates Open)
WP (Shirrick Gates Open)
Peak Flow (Ex): 63,677 cfs
Peak Flow (WP): 63,346 cfs
% Reduction: 0.5%

Figure 4

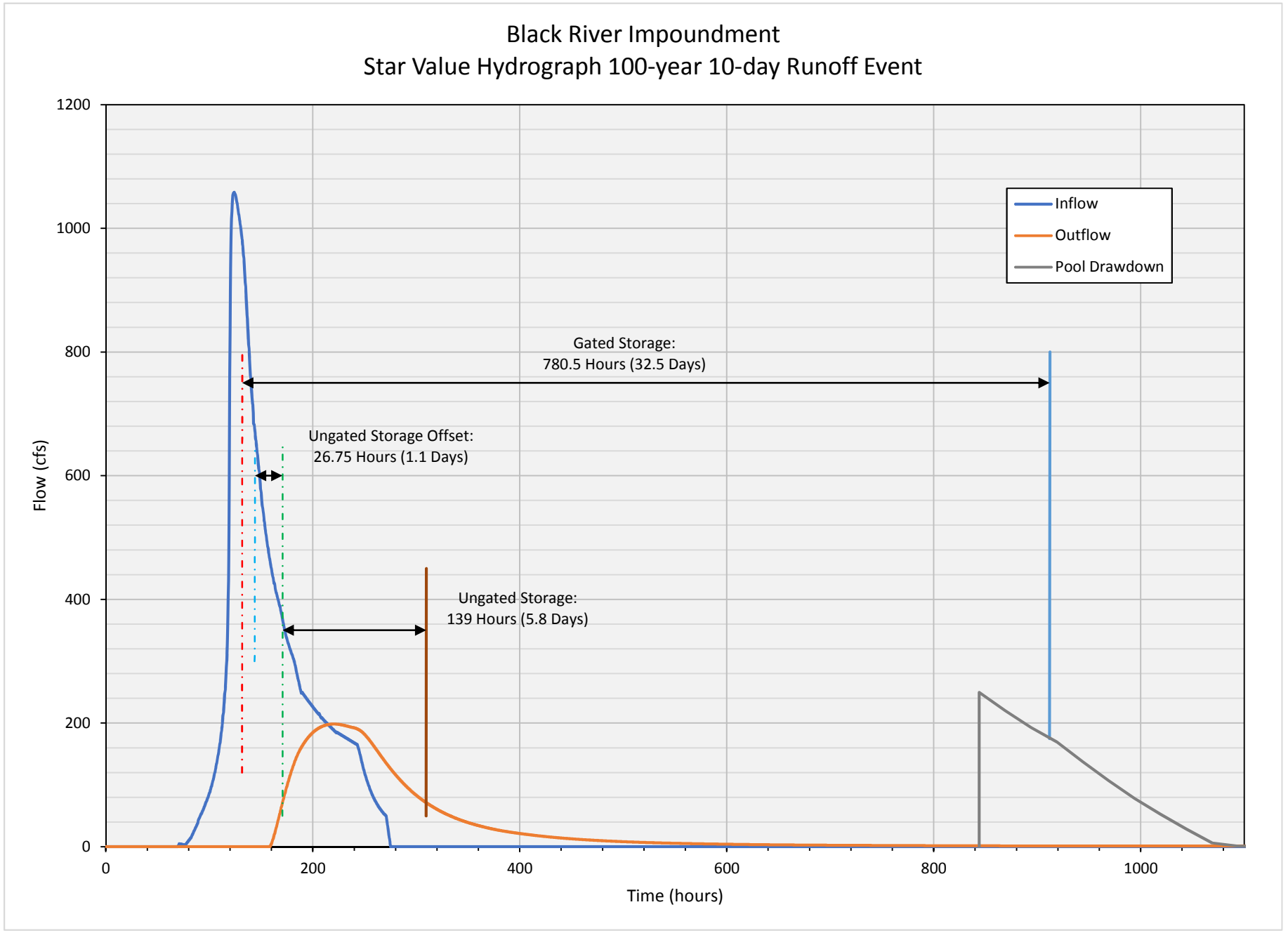
Black River Impoundment
Star Value Hydrograph 100-year 10-day Runoff Event
Flow (cfs)
Time (hours)
0
200
400
600
800
1000
1200
Inflow
Outflow
Pool Drawdown
Gated Storage:
780.5 Hours (32.5 Days)
Ungated Storage Offset:
26.75 Hours (1.1 Days)
Ungated Storage:
139 Hours (5.8 Days)

Figure 5

Star Value Computation Worksheet
Red River Watershed Management Board

Enter values only in the cells that have been shaded. All other values are computed from these values.

Project Name:	**Black River Imoundment**		**Step 2**	Enter Project Name. (Status eg Step)
Watershed District:	**Red Lake**			Enter Name of Watershed District.
Project Location:	**Polk Centre Township**			Enter Project Location.
Estimated Total Cost:	**$ 7,100,000**			Enter the estimated project costs.
RRWMB Cost:	**$ 2,366,667**	CPI (1984=100)	CPI (2017=100)	
Year of Estimate:	**2017**	**244.82**	**100.00**	Ratios of the Consumer price index read from the CPI worksheet.
Adj. to SummaryAll Base Yr:	**2000**	**172.20**	**70.34**	
Drainage Area (square miles)	**16.8**	Enter the drainage area in square miles used to compute the runoff volume.		

Storage Volume(s):	**Acre-feet**	**Inches**	**Adj. Storage (ac-ft)**	
Drawdown	**0**	0.00	0	The adjusted storage is total storage is multiplied by the Volume Adjustment Factor which can reduce the storage. Storage is removed 1st from the ungated storage, 2nd from the gated (2) storage, 3rd from the gated (1) storage and last from the drawdown storage.
Gated (1)	**3,162**	3.53	3,162	
Gated (2)	**0**	0.00	0	
Ungated (to emergency spillway)	**902**	1.01	740	
Total Storage (8.1 inches Max.)	4,064	4.54	3,902	
Volume Adjustment Factor	0.96	162		

Est. of Ungated Detention Time	**Volume (ac-ft)**	**Elevation (ft)**	**Discharge (cfs)**	
Emergency Spillway	**902**	0	0	Note: this section is provided for reference only. The values are not used in the calculations.
10% of Ungated	**90**	0	0	
90% of Ungated Volume	812			
	Average Discharge (cfs)		0	
	Discharge in AF per day		0	
	Average Detention Time (days)		not applicable	

Detention Time:		
Gated (1) from Operation plan	**32.5**	Enter gated detention time for the 1st category of gated storage.
Gated (2) from Operation plan	**0.0**	Enter gated detention time for the 2nd category of gated storage.
UnGated (from Operation Plan or above)	**5.8**	Enter ungated detention time. (Center of Mass to Center of mass)
Ungated Storage Offset	**1.1**	Offset of center of mass of inflow hydrograph to center of mass of storage.

Average Time Interval between Routed Site Peak and Red River Peak (days). (Negative is ahead of peak, positive is after peak)	**1.0**	**Existing Relative T**	0.37	Existing Relative T is based on the average time interval between the routed site peak flows and the RRN.

Calculation of Star Value	**Routed Relative T**	**Adj. Storage (Ac-ft)**	**Star Value**	
Drawdown Storage (30 - 0.43)	29.57	0	0	Routed relative T is the value of the detention times computed using the regression equations given in figure 3. The Existing Relative T is subtracted from the project Relative T.
Gated (1) Storage (27.64 - 0.43)	27.21	3,162	86,032	
Gated (2) Storage (0.43 - 0.43)	0.00	0	0	
Ungated) Storage (6.55 - 0.43)	6.11	740	4,522	
Star Value		**3,902**	**90,554**	STAR VALUE
		2017 dollars	**2000 dollars**	
Total Cost per Star Value		**$ 78.41**	**$ 55.15**	Total Cost divided by STAR Value
RRWMB Cost per Star Value		**$ 26.14**	**$ 18.38**	RRWMB Cost divided by STAR Value

Prepared By:	Tony Nordby (Houston Engineering, Inc.)		Enter name of preparer
Source of Data:	Step 2 Submittal		Enter source data.
Frequency/Date of Preparation:	100yr 10day	16-Nov-17	Enter frequency and date.

Figure 6

RED RIVER WATERSHED MANAGEMENT BOARD
EVALUATION WORKSHEET
for
FLOOD DAMAGE REDUCTION PROJECTS

This worksheet shall be used by Member Watershed Districts in determining the initial feasibility of pursuing a potential site for project development and the District shall provide a completed worksheet for the proposed project's Step I application and a revised worksheet for Step II and Step III applications. The RRWMB shall utilize this form in determining the funding of each proposed project. In addition, the RRWMB and the sponsoring Watershed District shall utilize the Technical Advisory Committee (TAC) recommendation which will include the established "Star Value Method" in making project comparisons. When a proposed project has received Step III approval, the score shall be final. Individual component issues of each project are to be evaluated by using both technical and established policy considerations as adopted in the "Governing Documents" publication.

This document is divided into four separate sections. Each section shall be evaluated individually as deemed appropriate for each proposed flood damage reduction project and collectively in determining the final evaluation for funding from the RRWMB.

SECTION I - ENVIRONMENTAL ENHANCEMENTS ACCOMPLISHED

A. This proposed project has addressed the following natural resource goals as identified in the "Red River Basin Flood Damage Reduction Work Group Agreement" and incorporated the appropriate goal issues into the final engineer's report. Each goal, if incorporated into the final design, shall have an equal value of 2.5. The accumulative value of each goal accomplished in this project shall be the total score for this section.

This section shall be completed by the Watershed District Project Team.

Check each goal that has been incorporated into this project with an X.

__X__ 1. Manage streams for natural characteristics.
__X__ 2. Enhance riparian and/or in-stream habitat.
__X__ 3. Provide diversity of habitats for stable populations to thrive over a long period.

____4. Provide connected, integrated habitat including compatible adjacent land uses.
__X_5. Enhance or provide seasonal flow regimes in streams for water supply, water quality, recreation, and support biotic communities.
__X_6. Provide recreational opportunities.
__X_7. Improve water quality.
__X_8. Protect water quality.
____9. Manage lakes for natural characteristics.

The total score for this category is _17.5_.

The recommended minimum score for this category is 10.

B. WATERSHED DISTRICT'S PROJECT TEAM RECOMMENDATION

The Watershed District's Project Team has fully processed the proposed project through problem identification, alternative evaluation and selection and recommends the following:

0. The proposed project is not a significant contribution to flood damage reduction.

7. The proposed project will provide significant flood damage reduction, but a different alternative should be given further consideration.

14. The proposed project is significant but immediate implementation is not a high priority.

20. The proposed project is very significant and should be implemented at the earliest possible date.

Number _20_ best describes the Project Team recommendation.

The recommended minimum score for this category is 14.

SECTION II - TECHNICAL ADVISORY COMMITTEE RECOMMENDATION

The TAC recommendation shall include the utilization of the "Star Value Method" to determine the RRWMB cost of the storage capability of the proposed project. In addition, the TAC shall provide a written technical narrative providing recommendations and suggestions for changes that would enhance the proposed project and/or an evaluation of the merits of the proposed project in fulfilling the flood damage reduction goals of the RRWMB.

A number of factors determine the effectiveness of a project in reducing flood flows on the Red River mainstem. When implementing individual projects, it is necessary to know how water from any given area will affect downstream flooding. Flooding along the Red River mainstem is substantially affected by runoff timing and volume from upstream areas. Will the peak runoff arrive ahead of, coincident with, or after downstream flood peaks? The design and operating goal should be to store water that would otherwise contribute to downstream flood peaks and to avoid causing damages during the subsequent release of the stored floodwater.

The Flood Damage Reduction Work Group's Technical Paper No. 11 has defined early, middle and late runoff areas within the basin relative to the downstream limit of the Red River Basin in Minnesota at the U.S./Canada border. In relation to maximizing downstream benefits, impoundments are most effectively located in the middle and late areas of the basin. Impoundments located in a late area should be designed to store the early water on the rising limb of the local hydrograph to help reduce mainstem peak flows. Impoundments located in a middle area should be designed to store the peak of the local hydrograph. Impoundments located in the early areas of the basin may also be beneficial to the mainstem if they are designed to store the falling limb of the local hydrograph. This would usually require either a very high capacity storage site to store all the floodwater, or a high capacity gate that can pass the early flows and be closed to store the late flows.

The designed storage volume of a proposed project affects the potential effectiveness in reducing flood flows on the Red River mainstem. Basically, the more volume of floodwater a project can store, the easier it is to operate the structure to optimize storage timing and releases in relation to downstream flooding.

The detention time a project can achieve affects the potential effectiveness in reducing flood flows on the Red River mainstem. Flooding on the mainstem is typically a long-term event, up to and exceeding 30 days for spring flood events. It is imperative that a project be designed to have the capability to store flood volumes for long periods of time so that releases will not add to or prolong flooding downstream.

The Star Value Method is intended to provide a method for the RRWMB to assign a relative value to a floodwater detention project in achieving the goal of reducing peak mainstem flows. It incorporates the factors listed above, is based on parameters that can be determined during early stages of project development and can be kept current as the project moves through various funding steps. The method assigns a value for floodwater detention to a project based on the amount of floodwater storage the project provides and on the length of time it is stored. Storage is adjusted based on reducing the total storage a project provides in excess of 3.6 inches. The length of time the floodwater is stored is adjusted based on the timing of the project watershed's contribution to the Red River peak flow. The difference between the post-project condition and the pre-project condition is the basis for the calculations. The method strongly favors projects designed and operated to achieve relatively long detention times.

The value system utilized to determine the ranking score for potential projects is:

Score	RRWMB Dollar Cost/Star Value
6	>20
10	15.1 to 20
16	10.1 to 15
18	5 to 10
20	0 to 5

The Star Value Method ranking score for this category is: 10

The recommended minimum score for this category is 10.

A score lower than 10 in this section shall cause a Step III application to be returned to the applicant with the reason for rejection and a recommendation for correction before being submitted for funding at a future date.

The technical evaluation narrative and recommendation for this proposed project is as follows:

_____
_____
_____
_____
_____
_____
_____
_____
_____

SECTION III - PROJECT FUNDING AGREEMENT CONDITIONS

This section is to be utilized by the Watershed District's Board of Managers as a guide in seeking the appropriate level of funding for a proposed project and by the RRWMB in determining the level of funding to be awarded. Utilize and fill out only one of the three prioritizing schedules (*) that best applies to the proposed project. Note: "Other interests" means funds received from sources other than RRWMB tax levy that are secured to reduce the RRWMB/WD total commitment.

* The proposed project provides flood damage reduction solely within a minor watershed of the District and funding will be requested from the RRWMB for:

2. Seventy-five percent of the total cost not funded by other interests.
3. Sixty-seven percent of the total cost not funded by other interests.
4. Fifty percent of the total cost not funded by other interests.
6. Twenty-five percent of the total cost not funded by other interests.

* The proposed project provides flood damage reduction downstream to the outlet into the Red River and funding will be requested from the RRWMB for:

10. Seventy-five percent of the total cost not funded by other interests.
12. Sixty-seven percent of the total cost not funded by other interests.
14. Fifty percent of the total cost not funded by other interests.

18. Twenty-five percent of the total cost not funded by other interests.

* The proposed project provides flood damage reduction downstream to the common outlet into the Red River from all contributing Minnesota watersheds and funding will be requested from the RRWMB for:

12. Seventy-five percent of the total cost not funded by other interests.
14. Sixty-seven percent of the total cost not funded by other interests.
16. Fifty percent of the total cost not funded by other interests.
20. Twenty-five percent of the total cost not funded by other interests.

Number 14 (67% 3rd Section) best describes this proposed

project.

The recommended minimum score for this category is 14.

SECTION IV

Section IV is composed of three separate issue-orientated papers. Use form A when it is requested by the RRWMB. Use form B when applying for funding of programs or studies. Use form C for all applications for funding assistance.

A. QUALIFICATIONS FOR A FUNDING APPLICATION

*This section shall be utilized only by the RRWMB in the event that the adopted rating system in sections I-III has resulted in an equal comparative scoring value for projects proposed for funding. This section is not to be utilized by an applicant for funding.

Rationale shall be provided in letter form by the applicant, upon receiving a request from the RRWMB, stating the need for funding assistance which could be described as one of the following:

- The District Construction Account (1/2 RRWMB Levy) has adequate funds but the District feels it is entitled to funds because of prior annual levy allocations.

- The District Construction Account has adequate funds but they are needed for other project development costs. (Must list proposed projects and time line for progressing.)

- The District Construction Account is minimal because of low annual levy receipts.

- The District Construction Account is minimal because of funding previously built flood damage reduction projects. (Must list projects built and funding expenditures.)

B. PRIORITIZATION PROCESS FOR CONSIDERING PROGRAMS AND STUDIES

Consideration for the funding of Programs, Studies or other Flood Damage Reduction Initiatives by Member Watershed Districts shall be ranked for funding eligibility in the following order of priority. The lowest ranking shall be #1 and the highest #7.

1. The initiative is not related to gaining information toward flood damage reduction.

2. The information sought in this initiative is primarily for state or federal agency use, but is needed for gaining information related to flood damage reduction.

3. The information sought in this initiative is primarily for use in the applicant District.

4. The information sought in this initiative is needed by an individual District for their own use, but could be a pilot for establishing a methodology that could be used by all.

5. The information sought in this initiative will be conducted within an individual District, but the information gained can be utilized by all.

6. The information sought in this initiative is being gathered in all cooperating Districts and the information gained is necessary for furthering flood damage reduction initiatives.

7. The information sought in this initiative will be applicable to, and utilized in, all member Districts and is essential for the development of flood damage reduction initiatives within all of the Minnesota portion of the Red River basin.

Number 7 best describes this proposal.

The recommended minimum score for this category is 4.

C. DISTRICT BOARD OF MANAGER'S RECOMMENDATION

The Red Lake Watershed District's Board of Managers have utilized the "Project Evaluation Worksheet" in progressing this proposed project and request funding from the RRWMB for 67% percent of the project's total cost not funded by other sources for an estimated amount of $2,366,667. It is anticipated that construction can be accomplished and therefore funding will be required in:

1. Three to five years.
2. Two to three years.
3. One to two years.
4. Within one year.

This worksheet has been completed for the proposed project known as

Black River Impoundment Project – RLWD Project #176

by the Red Lake Watershed District on this _____ day of _____, 20____.

_____ _____

President Secretary

* Note: The RRWMB shall provide the applicant with a signed form certifying the commitment and shall describe any variation from the "Project Evaluation Worksheet."

1 INTRODUCTION

This report has been prepared at the direction of the Board of Managers of the Red Lake Watershed District (RLWD) to summarize the preliminary design and benefits of constructing a flood management impoundment within the Black River Sub-watershed in the RLWD. The Black River Flood Impoundment Project (Project) is proposed to regulate flood waters from a 16.8 square mile drainage area contributing to the Black River, which is a tributary of the Red Lake River in the Red River Basin.

1.1 BACKGROUND

The Red River Watershed Management Board (RRWMB) funded a comprehensive plan for expanded distributed detention strategies for Minnesota membered watershed districts throughout the Red River Basin. This plan is summarized in the Red River Basin Commission's (RRBC) Long Term Flood Solutions (LTFS) Basin Wide Flow Reduction Strategy Report[4], and it concluded with a goal to reduce the Red River of the North (Red River) peak flow and volume by 20% during a flooding event comparable to the 1997 flood. To accomplish this, the report set forth guidelines while working with each of the watersheds to develop district specific strategies.

The Red Lake Watershed District's Expanded Distributed Detention Strategy[5] recommended 58 locations of off channel retention and 8 locations of on channel retention to help achieve the goals set forth in the RRBC LTFS Basin Wide Flow Reduction Strategy Report. The Black River Sub-Watershed encompasses several of the identified 58 locations. The Location map displayed in Figure 1 shows where the Black River Sub-Watershed lies within the RLWD. To begin the development of a flood control impoundment project, the RLWD investigated preliminary alternatives for the Black River sub-watershed. Four preliminary impoundment site alternatives were reviewed, and are shown as alternatives A through D in Figures 2-5. With cooperation from local landowners, privately owned agricultural lands were made available by either fee title or permanent flowage easements. For this reason, Alternative A was selected to carry forward. The RLWD board subsequently appointed Houston Engineering, Inc. to proceed with further engineering investigation of Alternative A.

1.2 LOCATION

The Black River Impoundment Project is proposed to be located approximately 9 miles west of the City of St. Hilaire, Minnesota in Polk Centre Township of Pennington County, Minnesota. As shown on Figure 6, the site resides on the southerly property immediately adjacent to Pennington County Highway 3 (CSAH 3), just east of the Black River. Currently, most of the projects northerly drainage area flows westward through coulees that directly outlet into the Black River upstream of the project site. The southerly drainage area flows southwest, discharging into the Black River south of the proposed impoundment site. Therefore; multiple diversion ditches will be constructed as part of the project to capture and maximize the drainage area of the proposed impoundment site. In total, three inlet channels, a 2.5 mile north-south diversion ditch along County Road (CR) 68, a 4 mile north-south diversion ditch along CSAH 12, and a 3.7 mile east-west diversion ditch will be constructed along CR 55 to conveying water to the site and an outlet channel approximately 0.5 mile east-west will be constructed to convey water from the site to the Black River. Downstream of the Project, the Black River converges with the Red Lake River approximately 14.5 miles downstream of this proposed project site. The Red Lake River then drains approximately 50 miles to the Red River.

1.3 PURPOSE/FUNCTION

The primary purpose for the project is to reduce flood damages within the Black River sub-watershed. Reducing peak flows will reduce risk of flood damage to local public transportation facilities, erosion of agricultural and private lands upstream and downstream of the storage facility, and improve the operation efficiency of the downstream Schirrick Dam on the Black River, improve hydrologic conditions within the sub-watershed, and improve water quality. The Red Lake River Watershed Restoration and Protection Strategy (WRAPS) Report[10] indicates that dissolved oxygen is a stressor identified in the impairment of the Black River due to a lack of base flow during dry portions of the summer months. The project has the capability of storing peak flows and ability to strategically release those flows over an extended period of time once peaks downstream have subsided. The project will provide a longer duration of base flows, improving the Black Rivers dissolved oxygen impairment. Collection and storage of peak flows from the project drainage area will aid towards addressing the 20% flood damage reduction goals set on the Red River by the RRBC and RRWMB.

An off-channel flood control reservoir will be constructed to store floodwaters from the 16.8 ± square mile drainage area and strategically release the floodwater when downstream channel conditions can accommodate them. The flood pool will be maintained in a dry condition when flooding is not occurring. The storage reservoir will have a total capacity of approximately 3,457 acre-feet (3.86 inches), of which 2,341 acre-feet (2.61 inches) will be gated providing detention times in excess of 30 days if needed. The total capacity of the storage reservoir is measured from the auxiliary spillway height (1019.5) down to the gated outlet invert (1003.0). The surface area of the pool will range from 0 acres (gated outlet invert) at elevation 1003.0 to approximately 599 acres (Auxiliary Spillway crest) at elevation 1019.5.

Details of the secondary benefits have not been specifically identified; however, these benefits will likely include a combination of wetland banking, upland prairie restorations, maintain the tax base, natural resource education, recreation areas, and wildlife habitat.

1.4 PROJECT DESCRIPTION

The Black River Impoundment Project will involve the construction of a flood control reservoir providing storage of floodwaters from the contributing drainage area, and ultimately augmenting floodwater flows in the Black River, improving conveyance abilities of the downstream channel.

The diking system will consist of the main flood pool dike around the north, south, and west sides of the site, tying into natural ground on the east end. The main dike will consist of approximately 3.0 miles of dike around the impoundment. The dike along the west side will be the highest approaching a maximum of 14 feet with an average of 8 to12 feet. The dikes along the north and south sides will be highest at the west end, about 10 to 12 feet. A typical section having a 12-foot top and 4:1 exterior side slope and 5:1 interior side slope will be used for the diking system.

To get runoff into the site, it is anticipated that 3 diversion ditches will be constructed. A 2.5-mile diversion ditch will be constructed in a north-south direction along CR 68. The proposed diversion ditch will begin at the half mile line in Section 24, T153N, R45W and flow in a southerly direction along the east side of CR 68 for approximately 1.5 miles, then crossing over to the west side of CR 68 in the northeast corner of Section 35, T153N, R45W until intersecting with CD 25 and flowing west 0.4 miles and crossing County Road 3 to the storage facility. The second 5.0 mile diversion ditch will be constructed starting

along the east side of CSAH 12 in the northeast corner of Section 18, T153N, R44W and flowing in a southerly direction along the east side of CSAH 12 for approximately 3.8 miles, then crossing over to the west side of CSAH 12 into Section 36 T153N, R45W, then proceeding south approximately 0.2 miles until intersecting with CD 25, then flowing west 1.0 miles along the north side of CSAH 3 in CD 25 to the location where the 2.5 mile diversion ditch along CR 68 enters into CD 25. The third 3.7-mile diversion ditch will begin 0.7 miles east of the southwest corner of Section 5, T152N, R44W, and flow in a westerly direction up to the Black River Church property in the southwest quarter of the southwest quarter, Section 2, T152N, R45W and flows north then west along the church property line before crossing CR 67 and entering the storage facility in Section 3, T152N, R45W.

The water from the diversion ditches will be diverted into the impoundment by constructing an inlet channel along the interior of the storage facility in Section 3 and 4, T152N, R45W to the outlet in the southwest corner of the storage facility.

The proposed outlet of the impoundment will be a gated culvert and riser and an auxiliary spillway for extreme flows. The low flow outlet is sized so that at least 85% of the gated volume will be released in 10 days or less. This is to minimize the opportunity for increased frequency of auxiliary spillway flow due to recurring storms. The auxiliary spillway (emergency spillway) is sized to protect the embankment from overtopping and is proposed to be cut through natural ground on the east end of the south embankment. The principal spillway will be near the southwest corner of the southeast quarter of the southeast quarter of Section 4, T152N, R45W, Polk Centre Township.

The proposed outlet channel will begin in the southwest corner of the southeast quarter of the southeast quarter of Section 4, T152N, R45W, Polk Centre Township, and flow in a westerly direction before out-letting to the Black River. Figure 6 displays the associated project features mentioned here in the project description.

1.5 LAND OWNERSHIP AND LAND USE

The properties affected by the flood pool, diversion ditches, inlet and outlet channels are located in several sections of Polk Centre, Bray, Black River, and Sanders Townships in Pennington County. The flood pool will affect the lands located in Sections 3 and 4, T152N, R45W, Polk Centre Township. The 2.5 mile north-south diversion ditch will affect land located in Sections 24, 25, and 35, T153N, R45W, Bray Township. The 5.0 mile north-south diversion ditch will affect land located in Sections 18, 19, 30, 31 T153N, R44W, Sanders Township and Section 36, T153N, R45W, Bray Township. The 3.7 mile east-west diversion ditch will affect land located in Sections 1 and 2, T152N, R45W, Polk Centre Township and Sections 5 and 6, T152N, R44W, Black River Township. The outlet channel will affect land located in Section 4, T152N, R45W, Polk Centre Township. Preliminary design currently shows the auxiliary spillway using the same outlet channel to the Black River as the principle spillway outlet channel.

Landowners seem willing to work with the RLWD on pursuing this project. The RLWD has negotiated and executed with landowners on buying/obtaining flowage easements within the proposed impoundment site. The RLWD has also had several landowner meetings to discuss the preliminary diversion ditch designs and additional right-of-way needed.

Nearly all of the lands affected are currently used for agricultural purposes. These agricultural purposes consist generally of grain, soy bean, corn, sunflowers and pasture. There are no existing building sites

within the proposed pool area, however the diversion ditches are located directly adjacent to several sites. The lands affected are shown in Figure 7.

2 DATA SUMMARY

This report summarizes the proposed project and has been compiled and displayed for ease of reference in obtaining basic information for areas of specific interest. Table 1 presents the storage capacity of the impoundment. Table 2 presents estimated water surface elevations and discharge rates for applicable design events.

2.1 HYDROLOGY

Contributing Drainage Area	16.8 sq. mi.

Rainfall:

2-year, 24-hour[1]	2.45 in.
5-year, 24-hour[1]	3.11 in.
10-year, 24-hour[1]	3.71 in.
25-year, 24-hour[1]	4.62 in.
50-year, 24-hour[1]	5.38 in.
100-year, 24hour[1]	6.20 in.
Auxiliary Spillway Hydrograph, 24-hour[2]	8.47 in.
Freeboard Hydrograph, 24-hour[2]	14.33 in.
2-year, 10-day[1]	4.22 in.
5-year, 10-day[1]	5.05 in.
10-year, 10-day[1]	5.80 in.
25-year, 10-day[1]	6.91 in.
50-year, 10-day[1]	7.84 in.
100-year, 10-day[1]	8.83 in.
Principal Spillway Hydrograph, 10-day[3]	7.77 in.

Snowmelt Runoff:

10-year, 10-day[4]	3.63 in.	(3,252 A-F)
25-year, 10-day[4]	4.40 in.	(3,942 A-F)
50-year, 10-day[4]	4.95 in.	(4,435 A-F)
100-year, 10-day[4]	5.50 in.	(4,928 A-F)

Notes:

1. Rainfall depths obtained from NOAA Atlas 14 Volume 8, Version 2
2. An areal reduction (TR-60 Figure 2-3) was applied to the Auxiliary Spillway and Freeboard Hydrographs for a drainage area of 16.8 square miles.
3. A principal spillway volume adjustment (TR-60 Table 2-3) was applied to the Principal Spillway Hydrograph
4. Minnesota Hydrology Guide (Using Figure 1-12[2])

2.2 IMPOUNDMENT DESIGN

Embankment:

Top of Dam Elevation	1022.5
Top Width	12 ft.
Freeboard (Auxiliary Spillway Design Flood)	2.05 ft.
Interior Side Slopes	5:1
Exterior Side Slopes	4:1

Principal Spillway:

Type: 60" RCP with Two-Way Reinforced Concrete Riser

Flowline @ Inlet	1009.0
Riser Crest Elevation	1017.5

Auxiliary Spillway:

Type: 500-foot excavated earthen spillway

Crest Elevation	1019.5

Storage:

Gated, to Elev. 1017.5	2,341 A-F (2.61 inches)
Temporary, Elev. 1017.5 to Elev. 1022.5 (Top of Dam)	2,980 A-F (3.33 inches)

Principal Spillway (Riser Crest) Design Flood:

Initial Water Surface Elevation	1017.50
Maximum Water Surface Elevation	1018.83

Auxiliary Spillway Design Flood:

Initial Water Surface Elevation	1017.50
Maximum Water Surface Elevation	1020.45

Freeboard (Top of Dam) Design Flood:

Initial Water Surface Elevation	1017.50
Maximum Water Surface Elevation	1020.69

Technical Release No. 60, "Earth Dams and Reservoirs" (TR-60)[3]

Note: All elevations in this report are given in North American Vertical Datum of 1988 (NAVD 88)

Table 1: Impoundment Site Storage Capacity

Elevation	Description	Surface Area (acres)	Storage Volume (acre-feet)	Runoff (inches)
1003	Pipe Invert	0	0	0.00
1004		1.0	0.4	0.00
1005		2.5	2.1	0.00
1006		4.5	5.6	0.01
1007		6.4	11	0.01
1008		8.6	19	0.02
1009		11	28	0.03
1010		17	42	0.05
1010.5		37	54	0.06
1011		88	84	0.09
1011.5		144	142	0.16
1012		196	228	0.25
1012.5		248	338	0.38
1013		299	476	0.53
1013.5		338	636	0.71
1014		365	812	0.91
1014.5		389	1,000	1.12
1015		409	1,200	1.34
1015.5		425	1,408	1.57
1016		444	1,626	1.81
1016.5		466	1,853	2.07
1017		487	2,091	2.33
1017.5	Riser Crest	510	2,341	2.61
1018		535	2,601	2.90
1018.5		561	2,875	3.21
1019		583	3,162	3.53
1019.5	Auxiliary Spillway	599	3,457	3.86
1020		607	3,759	4.20
1020.5		614	4,064	4.54
1021		622	4,373	4.88
1021.5		629	4,686	5.23
1022		635	5,002	5.58
1022.5	Top of Dam	639	5,321	5.94

Note: Storage Capacities were derived from LiDAR

Table 2: Hydraulic Summary

Storm Event	Rainfall (in.)	Inflow (cfs)	Reservoir Outflow (cfs)	Percent Reduction (%)	Max. Pool Elevation (ft)	Max. Storage Volume (ac-ft)	*Max. Pool Depth (ft)	Pool Surface Area (acre)	Starting Reserviour Storage	Gate Position
24-hour Storm Simulations										
2YR-24hr	2.45	94	0	100%	1012.29	292	3.3	226	Empty	Closed
5YR-24hr	3.11	214	0	100%	1013.27	562	4.3	320	Empty	Closed
10YR-24hr	3.71	387	0	100%	1014.13	861	5.1	371	Empty	Closed
25YR-24hr	4.62	708	0	100%	1015.44	1383	6.4	423	Empty	Closed
50YR-24hr	5.38	969	0	100%	1016.53	1867	7.5	468	Empty	Closed
100YR-24hr	6.2	1211	5	100%	1017.63	2408	8.6	516	Empty	Closed
ASH-24hr	8.66	1464	967	34%	1020.45	4034	11.5	613	@Riser	Closed
FBH-24hr	14.33	1614	1393	14%	1020.69	4182	11.7	617	@Riser	Closed
4-day Storm Simulations										
2YR-4day	3.22	93	0	100%	1012.71	396	3.7	269	Empty	Closed
5YR-4day	4.02	220	0	100%	1013.77	731	4.8	353	Empty	Closed
10YR-4day	4.75	383	0	100%	1014.72	1088	5.7	397	Empty	Closed
25YR-4day	5.83	703	0	100%	1016.18	1707	7.2	452	Empty	Closed
50YR-4day	6.74	935	0	100%	1017.35	2266	8.4	503	Empty	Closed
100YR-4day	7.70	1225	54	96%	1018.09	2651	9.1	539	Empty	Closed
10-day Storm Simulations										
2YR-10day	4.22	72	0	100%	1012.54	349	3.5	252	Empty	Closed
5YR-10day	5.05	114	0	100%	1013.46	623	4.5	335	Empty	Closed
10YR-10day	5.8	205	0	100%	1014.30	925	5.3	379	Empty	Closed
25YR-10day	6.91	420	0	100%	1015.58	1443	6.6	428	Empty	Closed
50YR-10day	7.84	629	0	100%	1016.66	1929	7.7	473	Empty	Closed
100YR-10day	8.83	873	11	99%	1017.70	2445	8.7	520	Empty	Closed
PSH-50YR-10day	7.77	602	186	69%	1018.83	3064	9.8	575	@Riser	Closed

Note: *Max Pool Elevation Measured from Natural Ground within the Impoundment Site

3 EXISTING CONDITIONS

3.1 LAND USE

The Red Lake Watershed District is primarily composed of agricultural lands in the western side and forest, grasslands, and wetlands toward the east. According to data collected from the National Land Cover Database (NLCD) 2011[6], the district land use is categorized as follows:

32.2 %	Agricultural – Cultivated Crops
41.8 %	Water and Wetland
12.7 %	Forest
9.3 %	Prairie/Grassland
3.4 %	Development - Urban/Rural
0.6%	Barren/Shrub-Scrub Lands

In comparison, the 16.8 square mile Project drainage area is predominately agricultural land and is better described as follows:

70.9 %	Agricultural – Cultivated Crops
12.7 %	Water and Wetland
10.4 %	Forest
0.4 %	Prairie/Grassland
5.3 %	Development - Urban/Rural
0.3%	Barren/Shrub-Scrub Lands

3.2 GEOLOGY AND SUBSURFACE SOILS

Per the United States Department of Agriculture Web Soil Survey[7], the primary soil types within the impoundment include combinations of Borup, Glyndon, Roliss, and Vallers complexes. In addition, there are also scattered locations of other types of loams, mucks, and sands. Soil types for the proposed impoundment site are illustrated in Figure 8. Based on preliminary soil review, it is anticipated that soils within the impoundment site should be adequate for embankment construction pending the results of geotechnical investigation and design. Currently no soil borings have been taken at the project site, but they are being planned for the middle of October once all the crops are harvested.

3.3 FISH, WILDLIFE, AND ECOLOGICALLY SENSITIVE RESOURCES

A. Upland Habitat Resources

The existing land use within the proposed project area is comprised primarily of agricultural and riparian wetland areas. The agricultural lands consist generally of small grain, beans, or corn/sunflowers. Approximately 95% of the land within the proposed project storage site is currently tillable acres. The

remaining (non-tilled) areas are comprised of wetland and shrub-scrub lands. Currently, there are only minimal environmental impacts foreseen for this project.

Approximately 640 acres will exist within the proposed impoundment site. Approximately 516 acres will be inundated by the 100-year 24-hour flood pool. However, the remaining 124 acres will be outside the 100-year 24-hour pool and the RLWD is currently exploring avenues for possible wetland banking or project site-specific mitigation in these areas. If wetland banking or project site-specific mitigation is performed, a net change in land use will be a loss of tillable land and a gain of wetlands.

B. Existing Wetland Resources, Impacts, and Potential Mitigation

A wetland inventory was conducted within areas impacted by the proposed embankments, within the maximum flood pool elevation, and proposed ditches. Offsite wetland inventory work was conducted using U.S. Fish and Wildlife Service National Wetland Inventory (NWI 2011) [8], county digital soil surveys (USDA-NRCS, 2011), as well as current and historical aerial photography. Two wetland inventory/delineations were conducted, a Field Wetland Inventory Report published in December of 2016 Appendix D and an Aquatic Resource Delineation Report for the diversion ditches was published in September 2017 Appendix E.

As a result of the Field Wetland Inventory Report, the extents of the wetland areas within the proposed impoundment site were identified using GPS and are shown in Figure 9. In general, very few wetlands exist within the impoundment site and it is anticipated that less than 0.1 acres will be impacted due to the construction foot print of the proposed dike and interior ditch. These wetland complexes primarily consist of both emergent and scrub-shrub species. These areas are small in size and are mainly located along the periphery of the main flood pool. The riparian areas where the project will likely empty to the Black River were also evaluated for the presence of wetlands. No riparian wetlands were identified. Upland vegetation was present to the top of the riverbanks.

As a result of the Aquatic Resource Delineation Report, existing wetland areas were identified within and adjacent to the existing ditch bottoms where the proposed diversion ditches are being proposed for deepening, 10-foot bottom width, and 4:1 sideslopes. These existing wetlands are being temporarily impacted by the construction of the improved diversion ditches, but will be reintroduced once construction of the proposed diversion ditches is completed.

Any wetland disturbance during construction will have to be mitigated and permitted. As part of final plans and prior to construction, wetland impacts will be delineated, permit applications will be submitted, and a mitigation plan will be developed. Figure 10 overlays the preliminary project layout over the project delineated wetlands to provide estimated wetland impacts for the project. See Appendix D and Appendix E for a more detailed review of the project delineated wetlands.

C. Biological Resources

1. Existing Inventories of Biological Resources

The available databases of Threatened and Endangered Species (T and E) were evaluated to determine if rare biological resources were present within the project area. No biological resources were identified within the project site by the available databases,

however T and E (community) occurrences are present within a mile of the proposed diversion ditch in Section 5, T152N, R44W. T and E data is shown on the map in Figure 11.

2. **Project Impacts to Biological Resources**

The project is expected to produce a net gain in biological resources due to the addition of new permanent vegetative cover within the impoundment site that is currently agricultural lands. Buffer strips will be seeded along all constructed interior ditches and diversion ditches.

3.4 ENVIRONMENTAL REVIEW AND ASSESSMENTS

It was investigated whether an Environmental Assessment Worksheet (EAW) would be required for this project. The Minnesota Department of Natural Resources (MnDNR) performed an environmental review need determination on the proposed project. The project was identified to include elements that could trigger an EAW in five different categories listed in Minnesota Rules 4410.4300. They are Subpart 24.B, Subpart 24.C, Subpart 26, Subpart 27.A, and Subpart 36.A. DNR is the Responsible Government Unit (RGU) for Subparts 24.B and 24.C and made a determination that the project does not meet the thresholds requiring an EAW in these Subparts. The Red Lake Watershed is RGU for Subpart 26, 27.A, and 36.A. and made a determination that the project does not meet the thresholds requiring an EAW in these Subparts. See Appendix C for the Environmental Review Need Determination.

3.5 ARCHAEOLOGICAL RESOURCES

There has not been a reconnaissance survey of the project area. However, the project area has been disturbed by farming practices, and as a result it is considered unlikely that significant archaeological would be located in the project area.

3.6 WATER QUALITY

According to the Red Lake River Watershed Total Maximum Daily Load (TMDL) Report[11], the Black River is impaired for dissolved oxygen, E. coli, Fish IBI, and M-IBI and the Red Lake River is impaired for turbidity/total suspended solids. Surface water flow is intermittent and comes from a heavily farmed watershed. Most of the water is conveyed via the existing legal ditch systems. It is anticipated that portions of the impoundment will be converted to permanent grass and buffers along channels. This should result in an overall improvement of the existing water quality leaving the site. In addition, the reduction in the flood peaks on the downstream channel should also reduce bank erosion during flood events and subsequent downstream turbidity.

4 PROPOSED PROJECT DESIGN

4.1 PRELIMINARY PROJECT DESIGN

The preliminary project design layout is shown in Figure 6. Final construction plans will be completed this winter to include plan and profiles, cross sections, details of the project design (i.e. structural design, erosion and sediment control plan, …).

4.2 HYDROLOGY

A. Hydrology Model of the Basin

Inflow hydrology to the impoundment site was developed using the Hydrologic Engineering Center Hydrologic Modeling System (HEC-HMS) for developing rainfall to runoff relationships and hydrograph routing through the impoundment site.

Although flooding from spring snowmelt is oftentimes more severe than flooding caused by summer rainfalls, the spring floods do not typically affect agricultural production like a summer flood would when crops are vulnerable during the growing season. Therefore, the hydrology developed for this study focuses on summer rainfall events to evaluate the potential damages on maturing crops. Three rainfall durations were used to identify the critical storm producing the larges discharges in the sub-watershed. The modeled durations include 24-hour, 4-day, and 10-day storms and the associated average rainfall depths from NOAA Atlas 14 are presented in Table 3.

Table 3: Atlas 14 Rainfall Depths

Return Period	24-Hour Rainfall (in.)	4-Day Rainfall (in.)	10-Day Rainfall (in.)
2 – year	2.45	3.22	4.22
5 – year	3.11	4.02	5.05
10 – year	3.71	4.75	5.80
25 – year	4.62	5.83	6.91
50 – year	5.38	6.74	7.84
100 – year	6.20	7.70	8.83

The synthetic rainfall events analyzed included the 2-, 5-, 10-, 25-, 50-, 100-, and 500-year recurrence intervals characterized using a SCS Type II rainfall distribution.

For predicting the rainfall to runoff relationship in the hydrology model, an NRCS (SCS) Runoff Curve Number (CN) was generated using National Land Cover Data (NLCD) and Hydrologic Soil Groups (HSG).

The NLCD, developed in 2011, was used to assess land use within the sub-watershed. This dataset was updated with the 2015 National Agricultural Statistics Service (NASS) to verify the land use classifications. The HSGs define the soil characteristics related to moisture retention and runoff potential. Much of the soils in the watershed exhibit dual classifications based on their ability to be drained and the resulting effect on the runoff. In these situations, it was assumed that the soil would not be drained which makes a soil with dual classification (ex. A/D soil) display runoff characteristics like a D soil.

Antecedent moisture describes the moisture condition of the soil prior to the major storm event which is to be studied. Three antecedent moisture conditions may be chosen to describe a dry, average, or wet soil. For the purposes of this analysis, an antecedent moisture condition II, or average condition, was selected for the analysis. Although not used in this study, an Antecedent Moisture Condition I, or dry condition, would produce runoff of lesser magnitude than the normal condition. An Antecedent Moisture Condition III, or wet condition, would produce a greater runoff than the normal condition.

B. Design Storms

Several different magnitudes and durations of precipitation events were analyzed for utilization as design storms and performance evaluation storms for the project.

The point rainfall values analyzed for the Design and Evaluation Storms originate from NOAA Atlas 14.

1. Principal Spillway Design Storm

Utilizing a conservative approach assuming the impoundment would be considered a Significant Hazard Dam, per TR-60 Table 2-2, the principal spillway was sized using a 50-year, 10-day rainfall. To accommodate the back to back storm criteria, the event was simulated allowing no outflow below the riser crest while starting with the flood pool full to the riser crest.

The 10-day 50-year rainfall event from NOAA Atlas 14 is 7.85". The principal spillway volume adjustments (TR-60 Table 2-3) suggests that for a watershed of 16.8 sq. mi. (Black River Impoundment Project Drainage Area) a ratio of 0.990 be used to adjust the rainfall amount in correlation to the watershed size. Therefore, the following computations were made to calculate the principal spillway design storm.

Principal Spillway Design Storm = 7.85" (NOAA Atlas 14) * 0.990 (TR-60 Table 2-3) = **7.77"**

The principal spillway design storm produced a water surface elevation of 1018.83, which is lower than the design auxiliary spillway elevation of 1019.50.

The TR-60 design methods recommend follow-up storms for detention structures which do not empty 85 percent of their retarding volume after 10 days. The principal spillway design requires less than 10 days to drawdown the flood pool from the riser crest to the 85 percent level with the gate fully open. Therefore, the principal spillway meets the drawdown requirements.

2. Auxiliary Spillway Design Storm

The design storm for the auxiliary spillway was determined as recommended in TR-60:

$$P_{100} + 0.12(PMP - P_{100}) = 6.21" + 0.12*(28.0" - 6.21") = \mathbf{8.82"}$$

TR60 Figure 2-3 suggests that for a watershed of 16.8 sq. mi. (Black River Impoundment Project Drainage Area) an adjustment of 0.96 be made to the auxiliary spillway design storm. Therefore, the following computations were made to calculate the 24-hour auxiliary spillway design storm.

Auxiliary Spillway Design Storm = 8.82" * 0.96 = **8.47"**

The auxiliary spillway storm event corresponds to an 8.47-inch rainfall with a duration of 24 hours. This storm was modeled assuming the pool was at the riser crest elevation of 1017.5 at the beginning of the storm with the gate closed.

3. Freeboard Design Storm

The free board design storm was determined as recommended in TR-60:

$$P_{100} + 0.40(PMP - P_{100}) \text{ = 6.21" + 0.40*(28.0" - 6.21") = } \mathbf{14.93"}$$

TR-60 Figure 2-3 suggests that for a watershed of 16.8 sq. mi. (Black River Detention Project Drainage Area) an adjustment of 0.96 be made to the freeboard hydrograph. Therefore, the following computations were made to calculate the 24-hour freeboard hydrograph.

Freeboard Design Storm = 14.93" * 0.96 = **14.33"**

The freeboard design storm event corresponds to a 14.33-inch rainfall with a duration of 24 hours. Routing this event through the structure serves to set a minimum top of dam elevation. The TR-60 recommends that the minimum vertical separation between the top of dam and auxiliary spillway crest elevations should be 3 feet. The effective top of dam is set at 1022.5 and the Auxiliary Spillway elevation is 1019.5. The storm was modeled assuming the pool was at the riser crest elevation of 1017.5 at the beginning of the storm with the gate closed.

4. Project Evaluation Storms

For flood management purposes, twenty-four (24) hour, four (4) day, ten (10) day storms and ten (10) day runoff events were analyzed to evaluate various structure design configurations.

4.3 HYDRAULIC DESIGN OF FLOOD CONTROL STRUCTURE

A. General Spillway Design

Spillways are provided for detention dams to release surplus or flood water that cannot be contained in the allotted storage space in a controlled manner. Ordinarily, the excess is drawn from the top of the pool created by the dam and conveyed through an artificial waterway back to the river or channel. The designs outlined in this report make use of a principal spillway system and an auxiliary spillway.

The basic data required for the spillway design includes flood pool surface area versus elevation and flood pool storage versus elevation, shown on Figure 12 and Figure 13, respectively; and spillway discharge versus elevation curves, shown on Figure 14.

Also required are inflow hydrographs for the various storms and runoffs upon which the spillway design is based. The Principal Spillway Design inflow/outflow hydrographs are shown on Figure 15 for the 50-year 10-day storm event. Figure 16 shows the inflow/outflow hydrographs for the Auxiliary Spillway Event under different operation scenarios.

B. Principal Spillway Design

The required capacity of a principal spillway is dependent on the amount of storage provided, the type of auxiliary spillway, downstream channel capacity and stability, potential damage downstream from prolonged high outflow rates, possibility of substantial runoff from two or more storms in the time required to empty the reservoir, and flood flows during construction.

For this site, maximizing benefits for events of equal to or less than the 10-yr events was a priority. In addition, the ability to maintain longer detention time on the order of 30-days for spring flooding events and 14-days during summer flooding events to reduce downstream flooding was also a priority.

The principal spillway design proposed in this report has three main components: a 60-inch diameter low-stage gated inlet pipe, a 15-foot by 5-foot riser (inside dimensions) and a 60-inch diameter outlet pipe. The capacity of the impoundment is slightly less than the 100-year, 24-hour rainfall event. If the inlet gate is closed and the flood pool is empty at the beginning of the 100-year, 24 hour rainfall event, water is just beginning to flow over the riser by approximately 0.1 feet, releasing approximately 5 cubic-feet per second from the impoundment through the principle spillway.

Under the gate-closed condition, the principal spillway has the capacity to handle the principal spillway design storm (7.77 in.) starting with the flood pool full to the riser crest while preventing water from reaching the auxiliary spillway. The peak flood pool elevation was used as a basis for establishing the auxiliary spillway crest. In addition, if the flood pool is empty at the beginning of the storm event with the gate closed, the impoundment can contain a single 100-year, 10-day storm event without reaching the auxiliary spillway crest.

Figure 17 and Figure 18 show reservoir pool elevation versus time for the principal spillway hydrograph and the Auxiliary Spillway hydrograph, respectively. These graphs show how reservoir elevations versus time differ based on the flood pool elevation at the onset of the storm event. The lower curve shows elevations expected if the flood pool is empty at the onset of the storm, while the higher curve shows flood pool elevations expected if the flood pool is full to the riser crest at the beginning of the storm.

C. Auxiliary Spillway Design

Auxiliary spillways are provided to convey excess water through, over, or around a dam. The auxiliary spillway is provided to protect the dam even at the expense of possible flood damage below the structure, should a flood occur larger than that for which the dam was designed. The designed auxiliary spillway for the flood pool is a 500-foot excavated and vegetated open channel with crest elevation at 1019.50. The crest elevation is set such that no discharge will occur through the auxiliary spillway during a principal spillway design event starting with the flood pool full to the riser crest.

In addition, the auxiliary spillway is designed so it will pass the freeboard design storm (14.33 inches in 24-hours) at a safe velocity and without the water in the reservoir reaching the top of dam.

D. Top of Dam Elevation

The designed top of dam was set at 1022.50 which provides a minimum of 3-feet between the auxiliary spillway and design top of dam. This allows for 2.05 feet of freeboard over and above the pool elevation resultant of the Auxiliary Spillway storm and 1.81 feet of freeboard during the Freeboard Hydrograph event.

E. Detention Capacity

The storage capacity of the proposed structure below the auxiliary spillway crest elevation is approximately 3,457 acre-feet. This volume can detain approximately 3.86 inches of runoff from the contributing drainage area. Of this, approximately 2,341 acre-feet (2.61 inches) will be gated allowing for controlled detention until downstream flooding has receded. Therefore, the proposed flood control structure will provide significant runoff control from the contributing drainage area. Figures 19, 20, & 21 show the proposed project design inundation depths within the pool for the 10, 25, and 100-year – 24-hour rainfall events.

4.4 PROJECT PERFORMANCE/DOWNSTREAM BENEFITS

The proposed floodwater storage facility will serve to reduce flood peaks primarily by use of gated storage with additional temporary storage above the riser structure. When the dam is empty at the beginning of the storm, discharges are essentially eliminated on the 2, 5, 10, 25, 50, and 100-year 24-hr storm events, with 96% reduction in peak flow on larger events such as the 100-year 4-day storm event. As a result, the project essentially cuts off the 16.8 square mile drainage area from the downstream basin for the 24-hr, 4-day, and 10-day rainfall events less than the 100-year frequency.

In the immediate downstream area, the construction of the proposed site is expected to provide peak flow reductions on the 100-year – 24-hr, 4-day, and 10-day events of approximately 24%, 36%, and 24% respectively at the confluence of the proposed outlet and the Black River (57 sq. mi.), and 19%, 32%, 18% at the confluence with the Red Lake River and the Black River (145 sq. mi.). See Figure 22 for tabulated flow reductions at various locations downstream of the proposed project.

The 16.8 square mile drainage area of the proposed impoundment project makes up approximately 30% of the drainage area upstream of the proposed project outlet location and the Black River (57 sq. mi.), and 11.6% of the drainage area of the entire Black River sub-watershed (145 sq. mi.).

4.5 UPSTREAM IMPACTS

The off-channel impoundment site resulting from the proposed project will reduce peak water surface elevations upstream on the Black River from the proposed project outlet. The proposed project diversion ditches will capture runoff within the project drainage area that currently flows west through coulees and road ditches into the Black River upstream of the project site. The proposed site is an off-channel storage site of the Black River and negligible upstream negative impacts are foreseen from this project.

4.6 DAM DESIGN HAZARD CRITERIA AND CLASSIFICATION

It is generally accepted practice to classify dams according to their hazard potential downstream. Consideration is given to the damage that might occur to existing and future developments should the dam suddenly release large quantities of water downstream due to a breach, failure or landslide into the reservoir. The stability of the spillway materials, the physical characteristics of the site, downstream valley, and the relationship of the site to industrial and residential areas, including controls of future development, all have a bearing on the amount of potential damage in the event of a failure.

Minnesota Rules, parts 6115.0300 through 6115.0520 govern the state Dam Safety Program. The rules define which dams are subject to state jurisdiction, and establishes three dam hazard classes.

Proposed dams are generally classified by the DNR commissioner into the following three hazard classes as listed below:

1. Low Hazard, Class III: dams located in rural or agricultural areas where failure may damage farm buildings, agricultural land, or township and country roads.

2. Significant Hazard, Class II: dams located in predominantly rural or agricultural areas where failure may damage isolated homes, main highways or minor railroads, or cause interruption of use or service of relatively important public utilities.

3. High Hazard, Class I: dams located where failure may cause loss of life, serious damage to homes, industrial and commercial buildings, important public utilities, main highways, or railroads.

An early inspection of the downstream reaches from the proposed project indicated a rural or agricultural area where failure may damage agricultural cropland, township or county roads. In addition, there are farmsteads along the downstream projected watercourse. However, most of these farmsteads appear to be above any elevation that would subject them to endangerment from a potential dam breach. Future development downstream of the project is minimal to non-existent. A downstream breach analysis will be performed and the potential for serious damage will be evaluated. However, based on our preliminary analysis, it is our opinion the proposed structure would be determined a Low Hazard, Class III or Significant Hazard, Class II. For the preliminary design, we are using the Significant Hazard, Class II criteria for worst case scenario.

It is recommended that the RLWD coordinate with Pennington County Zoning Boards in establishing zoning requirements downstream from the project to limit the degree of development in the future. It is anticipated that this action would mainly involve the granting of building permits. The same type of controls should also be utilized upstream from the dam and adjacent to the maximum reservoir elevation.

4.7 RIGHT-OF-WAY

The RLWD has negotiated and executed with landowners on buying or obtaining land rights for flowage easements within the proposed impoundment site. The RLWD has also had several landowner meetings to discuss the preliminary diversion and outlet ditch designs and additional easements needed to construct those ditches. Negotiations with individual landowners along these proposed ditches will continue as design efforts proceed.

Approximately 250 acres within the impoundment site where land rights for flowage easements were executed will have the ability to be farmed by the current landowner. Farming will be permitted on these areas; however, the landowner will accept all risk associated with crop or other related damages. Land use options on the remaining 390 acres within the impoundment site that the RLWD purchased on fee title is still being explode.

The designed diversion ditches will be the source for water entering the impoundment site. The lands along these diversion ditches are currently used for agricultural production. Part of this project will install permanent grassed buffer strips along the field side of these ditches to aid in sediment control from adjacent fields.

4.8 PROJECT OPERATION

The primary operation of the proposed project will be for flood control. The intent of the operation will be to provide flow reductions downstream on the Black River, Red Lake River, and the Red River of the North. The operation plan will vary depending on the time of the year as outlined below. Note that this operation should be considered preliminary and is subject to change based on final project design and analysis.

A. Spring Operation – Typically April 1st – May 15th

The following procedure will be utilized in operating the gate/spillways for the project during spring runoff events:

1. Initiate gate closure on April 1st or upon the onset of significant spring snow melt and runoff.
2. The gate on this site will be fully closed allowing no outflow, except over the riser crest.
3. The gate will be open when all the following have occurred, or upon 30-days to allow evacuation of the reservoir:
    a. Red Lake River at Crookston recedes below flood stage of 22 feet.
    b. Red River of the North at Grand Forks recedes below flood stage 36 feet.
    c. Red River of the North at Oslo flow has crested and is receding.

B. Summer/Fall Operation – Typically May 15th – November 15th

The following procedure will be utilized in operating the gate/spillways for the project during the remainder of the growing season, following spring runoff:

1. Initiate gate closure when either of the following occurs:
    a. Significantly heavy rainfall is forecasted or has occurred within the sub-watershed.
    b. Red Lake River at Crookston exceeds flood stage.
    c. Red River of the North at Oslo exceeds flood stage.
2. Initiate gate opening when all the following have occurred to allow evacuation of the reservoir:
    a. Red Lake River at Crookston recedes below flood stage of 22 feet.
    b. Red River of the North at Grand Forks recedes below flood stage 36 feet.
    c. Red River of the North at Oslo flow has crested and is receding.
3. During times when the gate is not being operated, the gate shall remain in a partially closed position to allow for automatic operation and reduction of flood peaks.

4.9 REQUIRED PERMITS

Table 4 lists known permits that may be required for the project.

Table 4 - Permits

Unit of Government	Type of Application	Status
FEDERAL: USACE	Section 404	Application to be developed (minimal environmental impact)
STATE: MnDNR	Dam Safety Protected Waters	Application to be developed. Application to be developed (minimal impact)
MN Historical Society	Approval	Request to be developed
MPCA	Storm Water Permit for Construction	Application to be developed
LOCAL: County/Township	WCA Permit (for wetland impacts)	Application to be developed
	Highway Construction (Culvert Upgrades)	Application to be developed
	County Shoreland Zoning	Application to be developed

5 COMPATIBILITY WITH EXISTING PLANS

5.1 RLWD WATERSHED MANAGEMENT PLAN

The project is in conformance with the Red Lake Watershed District 10-Year Comprehensive Plan[9]. The 10-Year Comprehensive Plan was published in May 2006, specifically lists the Lower Red Lake River sub-watershed as an FDR strategy to be pursued.

The Black River sub-watershed was also identified for retention locations recognized in RLWD's Expanded Distributed Detention Strategy Study published in November 2013. The retention within Black River sub-watershed would work towards the Red River 20% peak flow reduction goals.

5.2 RED RIVER WATERSHED MANAGEMENT BOARD

The mission statement of the Red River Watershed Management Board is *"to institute, coordinate, and finance projects and programs to alleviate flooding and assure the beneficial use of water in the watershed of the Red River of the North and its tributaries."*

The Black River Impoundment Project is in conformance with the Board's mission statement, as well as the goals and objectives as listed in Chapter 1 of the Red River Watershed Management Board Governing Documents. According to these documents, the principal objective of the Red River Watershed

Management Board is to *"assist member Watershed Districts with the implementation of water related projects and programs. The purpose of these projects and programs is the reduction of local and main stem flood damages, and also to enhance environmental and water resource management. Projects and programs must be of benefit to the Red River Basin and its member watershed districts in order to qualify for RRWMB funding".* This project will provide flood damage reduction and other benefits to the Red River Basin, Lower Red Lake River Basin, and Black River sub-watershed.

The details of the secondary purposes of the proposed project have not been identified explicitly, however could include a combination of the following; wetland banking, land set-aside, prairie restorations, maintain a tax base, research area for wetlands impacted by fluctuating water levels, education and recreation area, and others. The Black River Impoundment Project may also function to address the following supporting objectives of the Red River Watershed Management Board.

- Coordination
- Financial Support
- Basin Planning
- Water Quantity
- Water Quality
- Erosion and Sedimentation
- Education
- Research

The STar Value computation is intended to provide a quick and easy method for the Red River Watershed Management Board to estimate the value of a project in achieving the goal of reducing peak mainstem flows. It is based on parameters that can be determined during early stages of project development and which can be kept up-to-date as the project moves through various funding steps. The method strongly favors projects which are designed and operated to achieve long detention times. The STar value equation, as presently stands is:

STar Value = S * T

Where:

S = adjusted storage volume in acre-feet

T = relative value of the retention time in days

In the process of developing this method, the RRWMB has established the following average lag times between the routed tributary peak and the Red River Main Stem peaks based on historic flooding analysis. As shown in Table 5, the gage at Crookston on the Red Lake River generally has a peak that coincides within 1 day of the peaks on the Red River of the North Main Stem and the gage at Red Lake Falls on the Clearwater has a peak that coincides approximately 2 days of the peak on the Red River of the North Main Stem. The HEC-HMS model created for the Red Lake Watershed District's Expanded Distributed Detention Strategy[5] was used to correlate the peak discharge times for various locations along the Black River with the two known gage locations mentioned above. Modeling results showed that the Black River Impoundment Site Project has a peak that coincides approximately 1 day after the peak on the Red River of the North Main Stem.

Table 5- Average Time Interval Between the Tributary Peak and the Red River Main Stem Peak

Gage Location	Days before (-) Days after (+) the Peak
Bois de Sioux nr White Rock	15
South Branch Buffalo River @ Sabin	-3
Buffalo River nr Hawley	-3
Buffalo River nr Dilworth	-3
Wild Rice @ Twin Valley	0
Wild Rice River @ Hendrum	0
Marsh River nr Shelly	-1
Sandhill River @ Climax	0
Red Lake River @ Highlanding	5
Thief River @ TRF	5
Clearwater @ Plummer	6
Lost River @ Oklee	3
Clear Water @ Red Lake Falls	2
Red Lake River @ Crookston	0
Middle River @ Argyle	-6
Two River @ Lake Bronson	-6

The STar Value of the Black River Impoundment Project is estimated to be 68,446. Assuming a total project cost of $6.9 million, the Red River Watershed Board cost per STar Value will be approximately $33.60. This corresponds to approximately $24.11/STar Value in year 2000 dollars.

5.3 RED RIVER BASIN FLOOD DAMAGE REDUCTION WORK GROUP AGREEMENT AND RED LAKE WATERSHED DISTRICT PROJECT TEAM

The project supports the Group's goals for flood damage reduction and natural resources. The project will reduce the risk of flood damage within the project area to farmland and public infrastructure. The project will also aid in improving water quality, reduce erosion damage to the Black River caused by flooding, and overall reduce social and economic damages to the project area.

5.4 PENNINGTON COUNTY COMPREHENSIVE LOCAL WATER PLANS

The project is in conformance with the Pennington County Comprehensive Local Water Plans. The RLWD has similar goals and objective in water resources as other local government agencies within the county such as the Pennington County Soil and Water Conservation District (SWCD) and Pennington County Highway Department. They all have similar goals and objectives of water quality, flood damage reduction, water erosion. In recent years these agencies have collaborated in two applications for performing a One Watershed One Plan on two different river systems within the county. The goal of the One Watershed One Plan effort is to have a collaborating water plan for all entities to follow.

6 ALTERNATIVES CONSIDERED

The RLWD is continuously looking for methods to reduce flood damages and improve natural resources within the district. The Red Lake Watershed District's Expanded Distributed Detention Strategy[6] identified the Black River sub-watershed as a location to implement flood damage reduction strategies. To begin the development of a flood control impoundment project, the RLWD investigated conceptual alternatives for the Black River sub-watershed. Four conceptual impoundment site alternatives were reviewed, and are shown as alternatives A through D in Figures 2 through 5. Conceptual design was performed on these alternatives to determine storage capabilities, drainage areas, length of diversion ditches, and levee elevations. After reviewing the conceptual alternatives for their flood damage reduction capabilities and cooperation from local landowners, privately owned agricultural lands were made available by either fee title or permanent flowage easements for the Alternative A impoundment site and was selected for further engineering investigation. This impoundment site also provided adequate storage capacity, drainage area, minimal foreseen environmental impacts, and willing landowners for an impoundment site location on existing agricultural land.

7 FINANCING AND RECOMMENDATIONS

7.1 OPINION OF PROBABLE COST

An opinion of probable cost has been determined to be approximately $6.9 million. An itemization of the opinion of probable cost is shown in Figure 23.

7.2 PROJECT FUNDING/FINANCING

Funding has not been secured from any source at this time. The RLWD applied for state funding for the fiscal year 2018, but didn't' qualify due to other projects within the state being earmarked for funding and city protection for flood damage reduction taking a higher priority. The RLWD is planning to apply for state funding again for the fiscal year 2019. In evaluating the project's feasibility, based on typical funding patterns for similar projects in the past, we have assumed the following:

- $3,450,000 - State of Minnesota Flood Damage Reduction Program (50%)
- $2,300,000 - Red River Watershed Management Board (33.33%)
- $1,150,000 - Red Lake Watershed District and Other Sources (16.67%)

The funding identified as from the Red Lake Watershed District and Other Sources may come from RLWD assessments, water management district fees, natural resource agencies or other organizations.

7.3 RECOMMENDATION

The establishment of the Black River Impoundment Project will provide flood damage reduction and natural resources benefits. The preliminary design and information available finds that the project is feasible and recommends the RLWD to take the necessary steps to continue the development of the project.

8 REFERENCES

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[3] USDA-NRCS, Technical Release No. 60, "Earth Dams and Reservoirs" (TR-60), (Issued July 2005).

[4] Red River Basin Commission, Long Term Flood Solutions for the Red River Basin, September 2011.

[5] HDR Engineering, Inc. (2013) Red Lake Watershed Expanded Distributed Detention Strategy, Thief River Falls, MN, Red Lake Watershed District.

[6] Homer, C.G., Dewitz, J.A., Yang, L., Jin, S., Danielson, P., Xian, G., Coulston, J., Herold, N.D., Wickham, J.D., and Megown, K., 2015, *Completion of the 2011 National Land Cover Database for the conterminous United States-Representing a decade of land cover change information*. Photogrammetric Engineering and Remote Sensing, v. 81, no. 5, p. 345-354

[7] USDA-NRCS. 2011, Soil Survey of Minnesota by County (Pennington County). http://websoilsurvey.nrcs.usda.gov/app/ (Accessed March 2017)

[8] U. S. Fish and Wildlife Service. National Wetlands Inventory website. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. http://www.fws.gov/wetlands

[9] HDR Engineering, Inc. (2006) Red Lake Watershed District 10-Year Comprehensive Plan, Thief River Falls, MN, Red Lake Watershed District.

[10] MPCA-RLWD, (2017), Red Lake River Watershed Restoration and Protection Strategy Report.

[11] MPCA-RLWD, (Draft 2017), Red Lake River Watershed Total Maximum Daily Load Report.

FIGURES

Project Location

N

0 12.5 25 Miles

Sources: Esri, HERE, DeLorme, Inte… METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Figure 1 – Location Map
Black River Impoundment Project
RLWD Project #176

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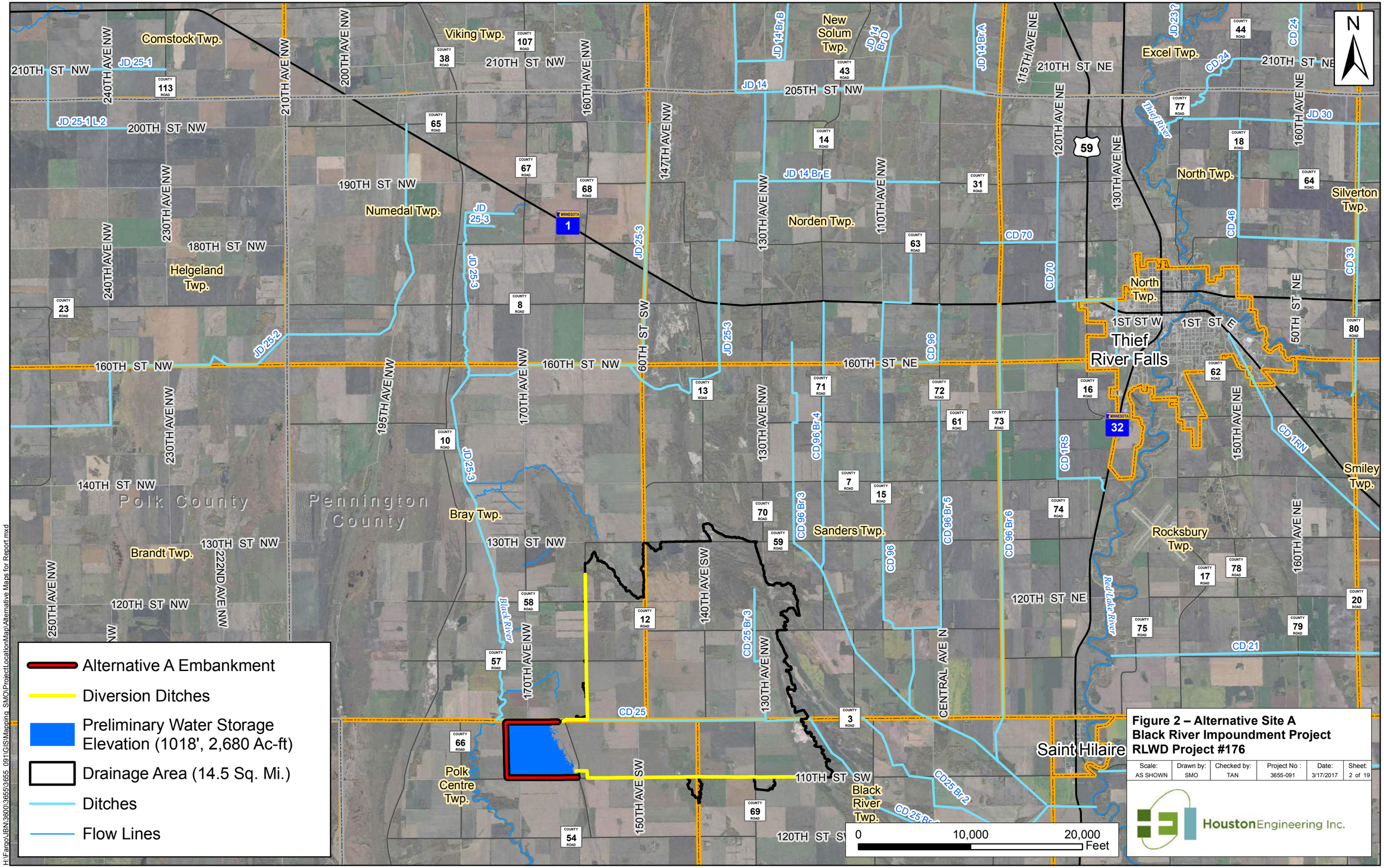

Figure 2 – Alternative Site A
Black River Impoundment Project
RLWD Project #176

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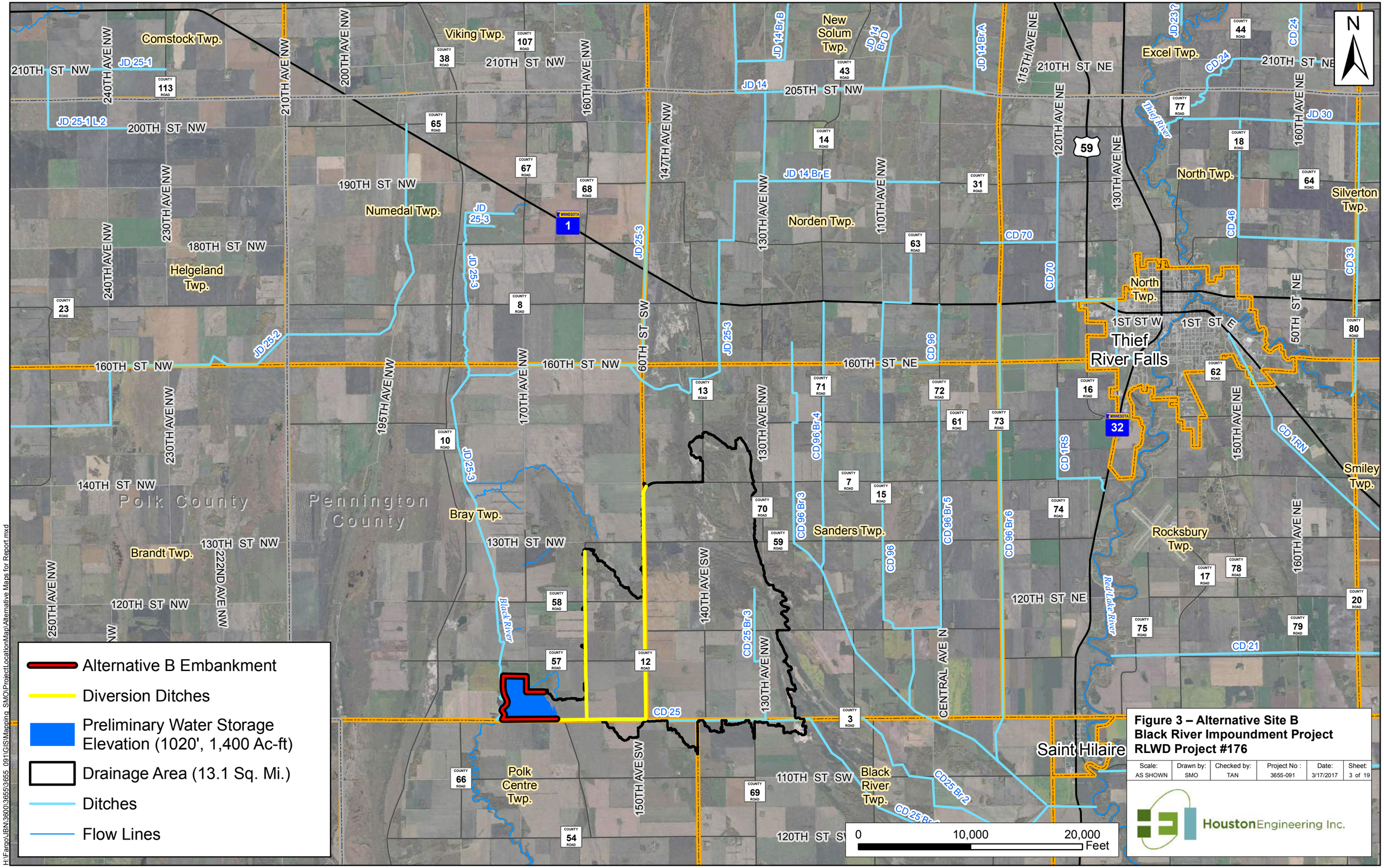

Figure 3 – Alternative Site B
Black River Impoundment Project
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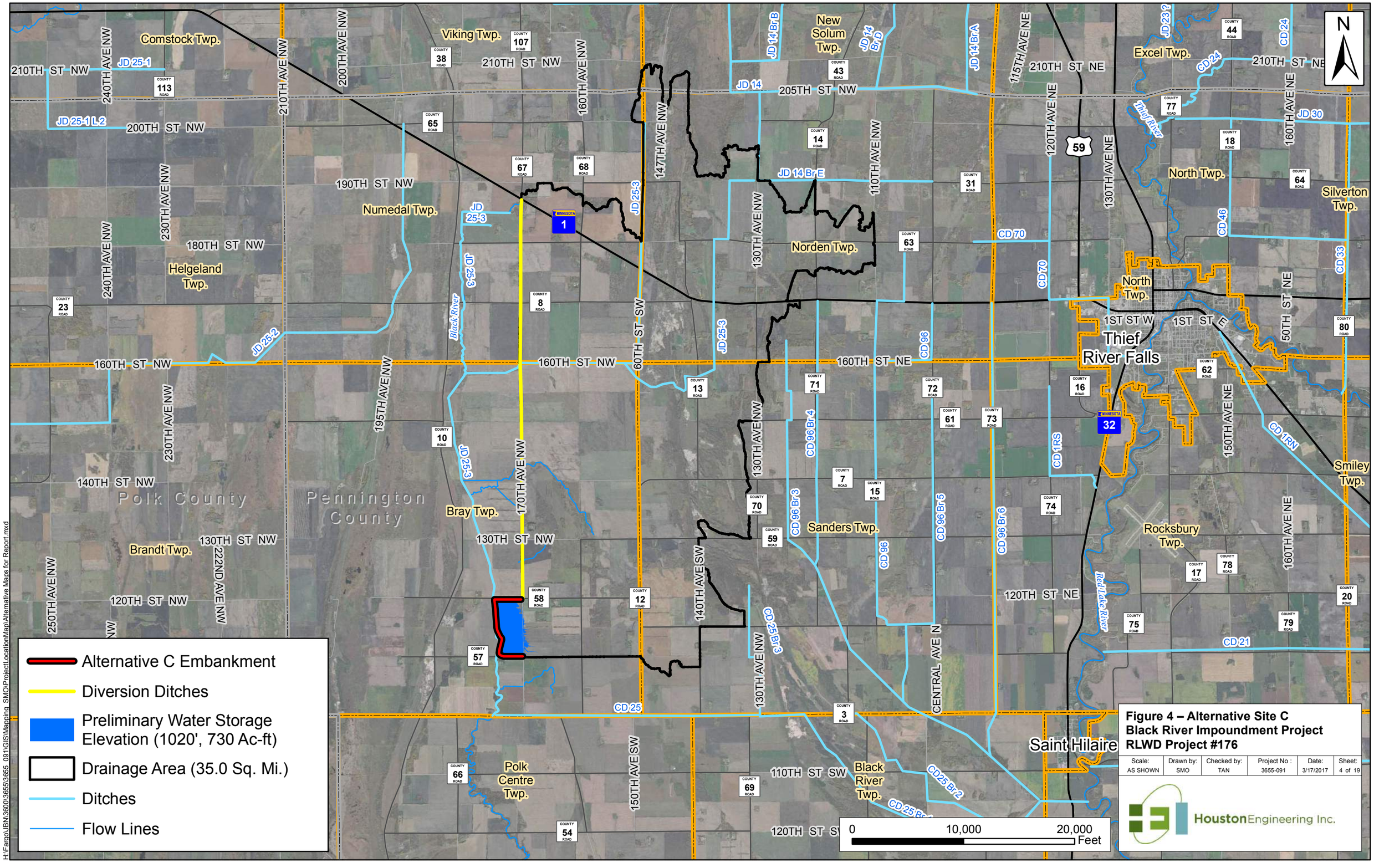

Figure 4 – Alternative Site C
Black River Impoundment Project
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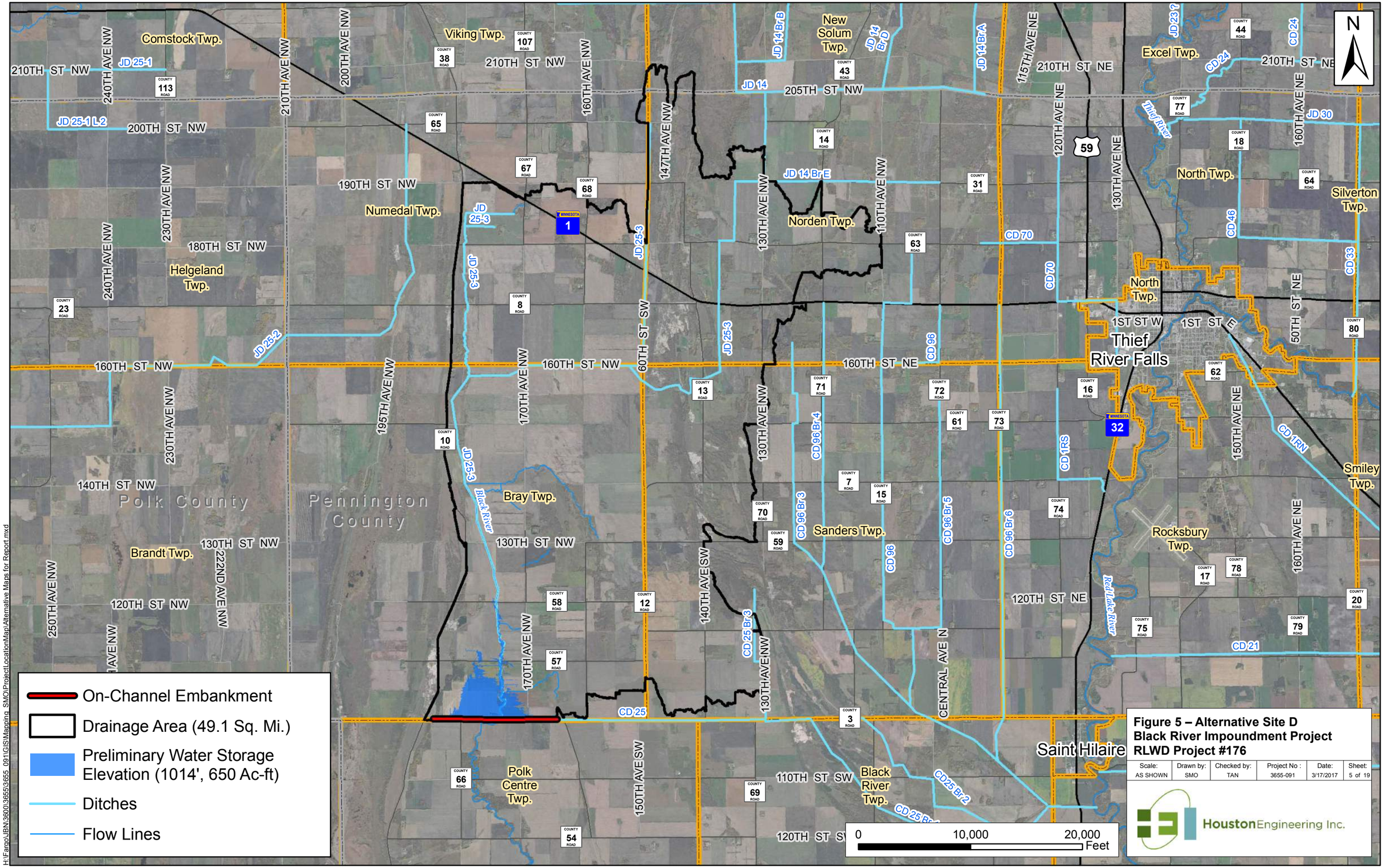

Figure 5 – Alternative Site D
Black River Impoundment Project
RLWD Project #176

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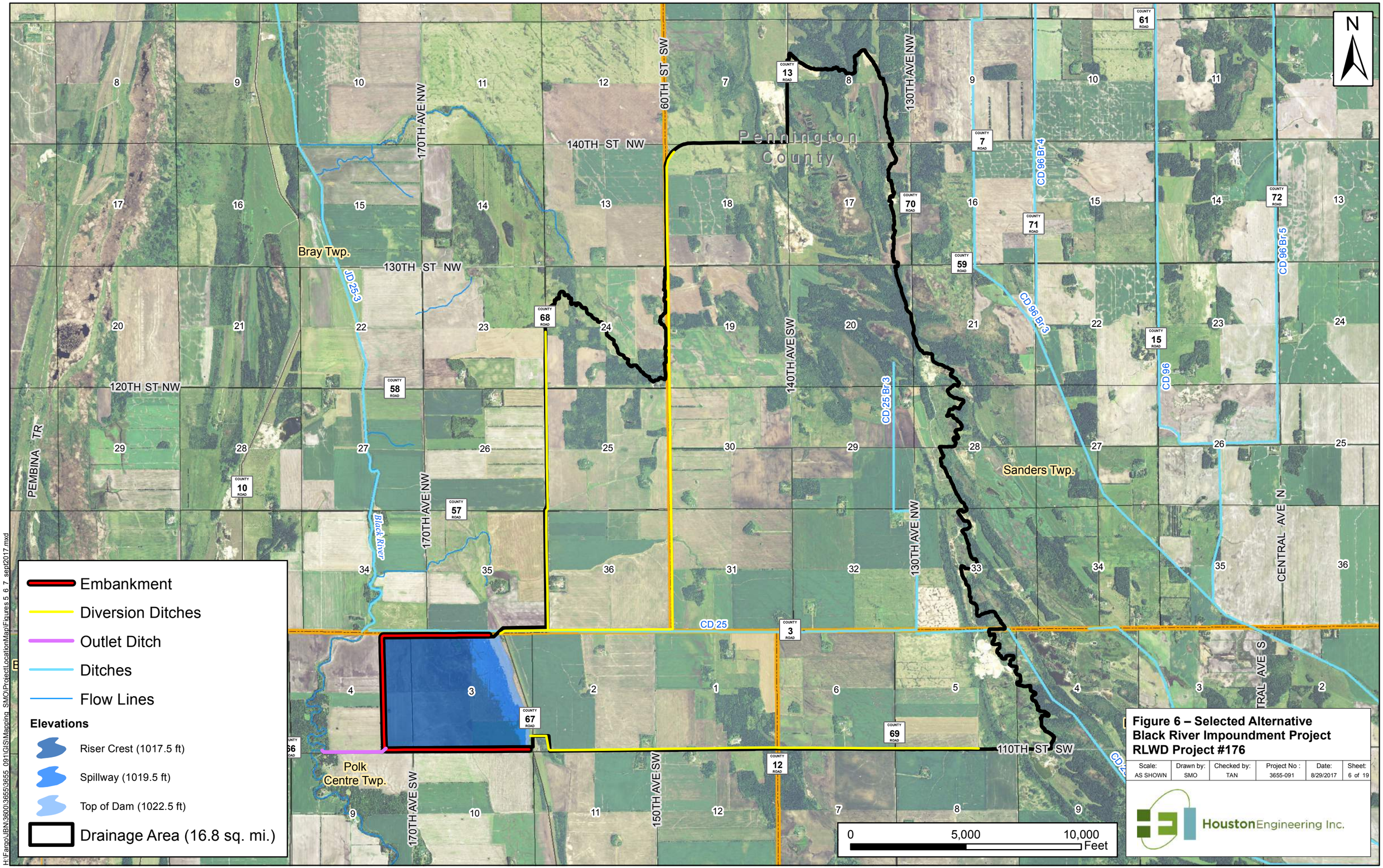

Figure 6 – Selected Alternative
Black River Impoundment Project
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- Embankment
- Diversion Ditches
- Outlet Ditch
- Parcels
- Ditches
- Flow Lines

Elevations

- Riser Crest (1017.5 ft)
- Spillway (1019.5 ft)
- Top of Dam (1022.5 ft)
- Drainage Area (16.8 sq. mi.)

0 5,000 10,000 Feet

Figure 7 – Lands Affected
Black River Impoundment Project
RLWD Project #176

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Soils

- Berner, Rosewood, and Strathcona soils, seepy, 0 to 2 percent slopes
- Borup loam, 0 to 1 percent slopes
- Fluvaquents,frequently flooded-Hapludolls complex, 0 to 30 percent slopes
- Foxhome sandy loam, 0 to 3 percent slopes
- Glyndon loam, Aspen Parkland, 0 to 2 percent slopes
- Grimstad fine sandy loam, 0 to 3 percent slopes
- Hamre muck, 0 to 1 percent slopes
- Kittson loam, wet, 0 to 2 percent slopes
- Mavie fine sandy loam, 0 to 2 percent slopes
- Roliss loam, 0 to 2 percent slopes
- Sandberg-Radium complex, 1 to 6 percent slopes
- Strathcona fine sandy loam, 0 to 2 percent slopes
- Ulen fine sandy loam, Aspen Parkland, 0 to 2 percent slopes
- Vallers loam, 0 to 2 percent slopes
- Embankment
- Interior Ditch

Bray Twp.

170TH AVE NW

COUNTY 3 ROAD

COUNTY 68 ROAD

Pennington County

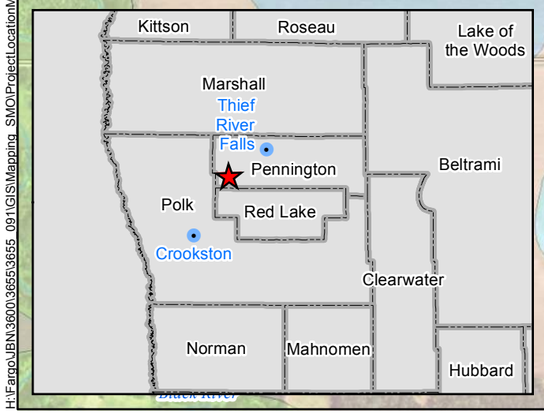
3

Polk Centre Twp.

COUNTY 67 ROAD

COUNTY 55 ROAD

Black River



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0 1,000 2,000 Feet

Figure 8 – Soils Map
Black River Impoundment Project
RLWD Project #176

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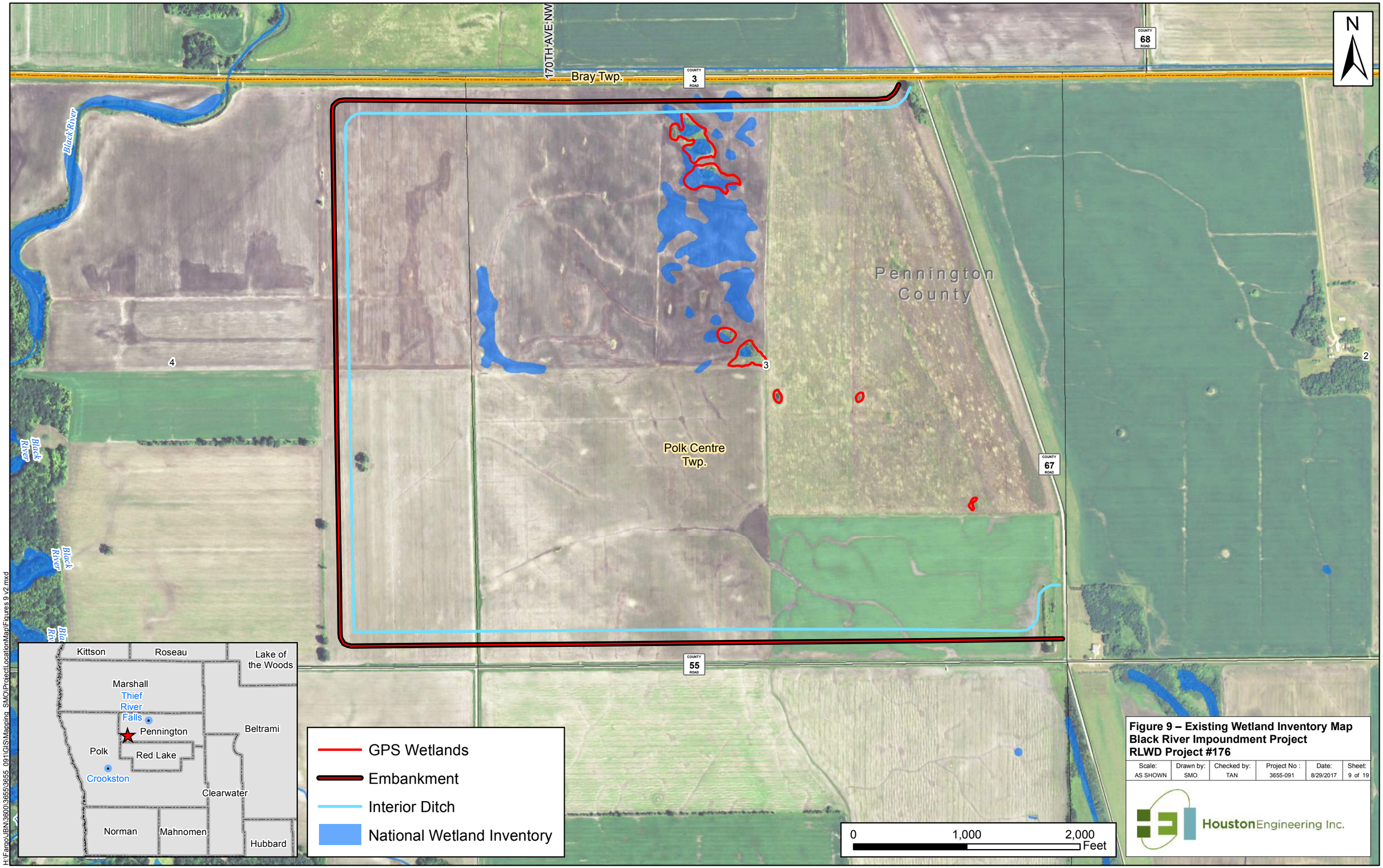

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Figure 9 – Existing Wetland Inventory Map
Black River Impoundment Project
RLWD Project #176

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N

Wetland Boundaries
Embankment
Ditches
Flow Lines
Drainage Area (16.8 sq. mi.)
Diversion Ditches

0 4,000 8,000 Feet

Figure 10 – Delineated Project Wetlands
Black River Impoundment Project
RLWD Project #176

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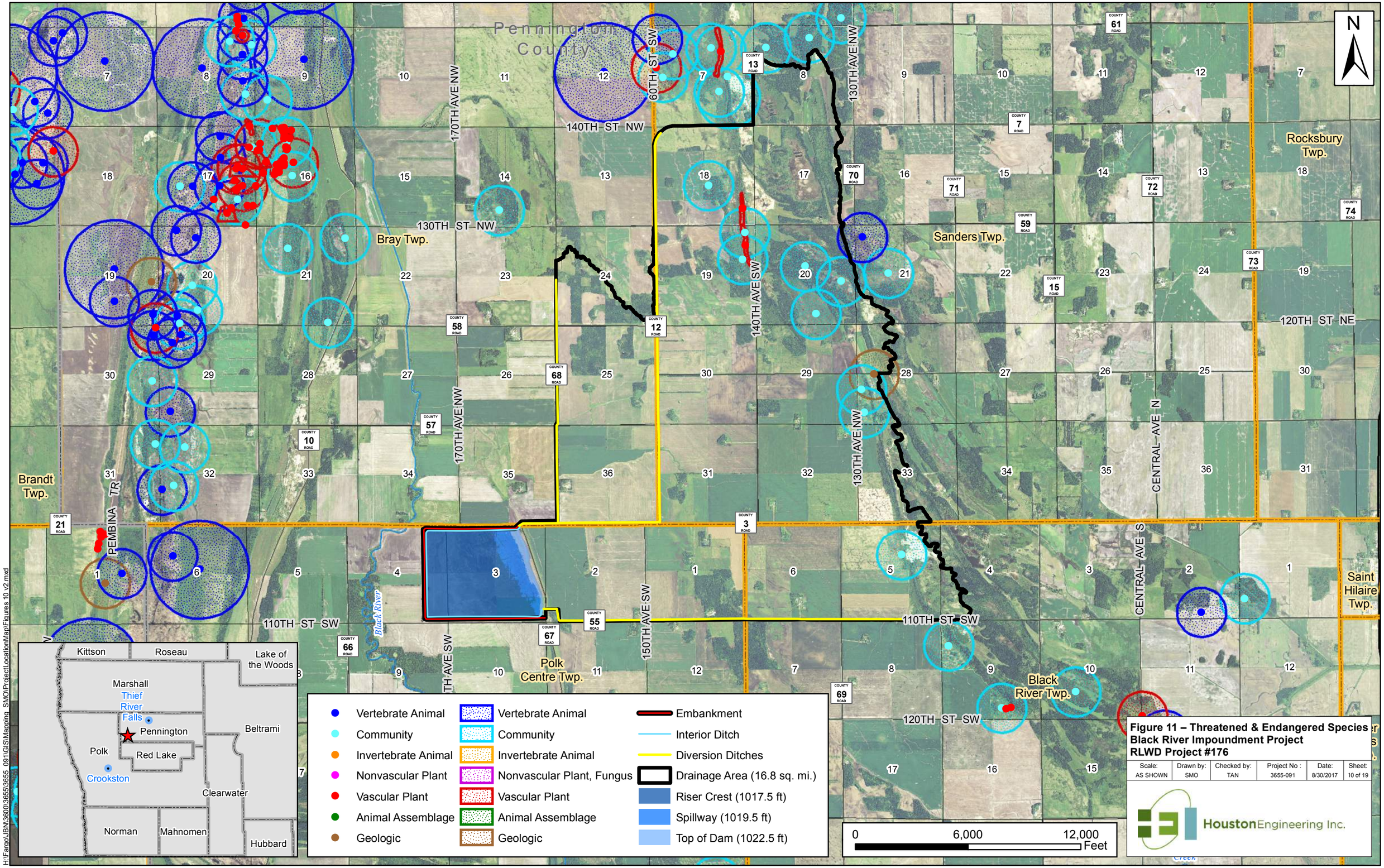

Figure 11 – Threatened & Endangered Species
Black River Impoundment Project
RLWD Project #176

Scale:	Drawn by:	Checked by:	Project No :	Date:	Sheet:
AS SHOWN	SMO	TAN	3655-091	8/30/2017	10 of 19

Houston Engineering Inc.

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Figure 12 - Black River Impoundment Project
Flood Pool Elevation and Surface Area Relationship

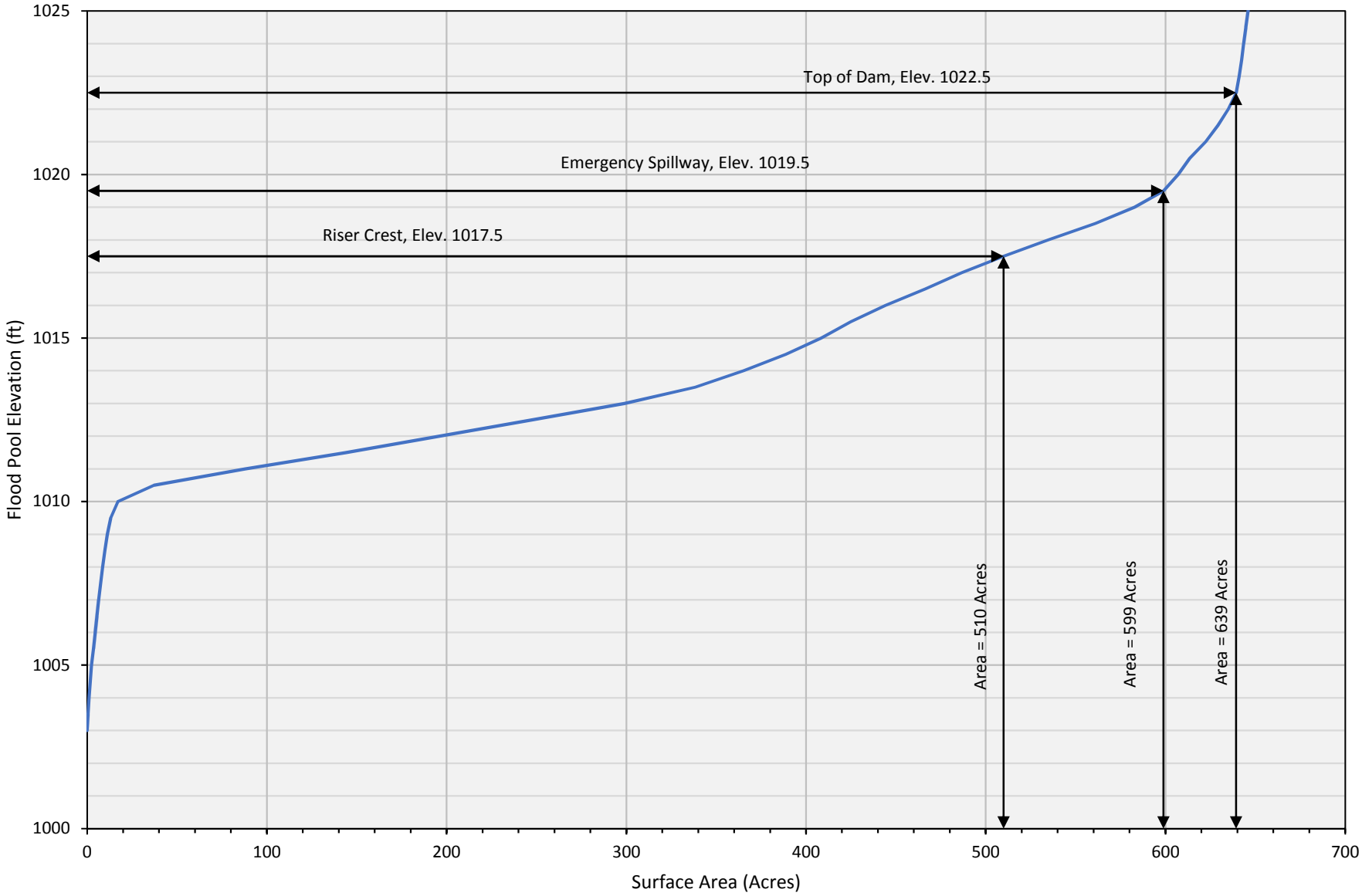


Figure 13 - Black River Impoundment Project
Flood Pool Elevation and Volume Relationship

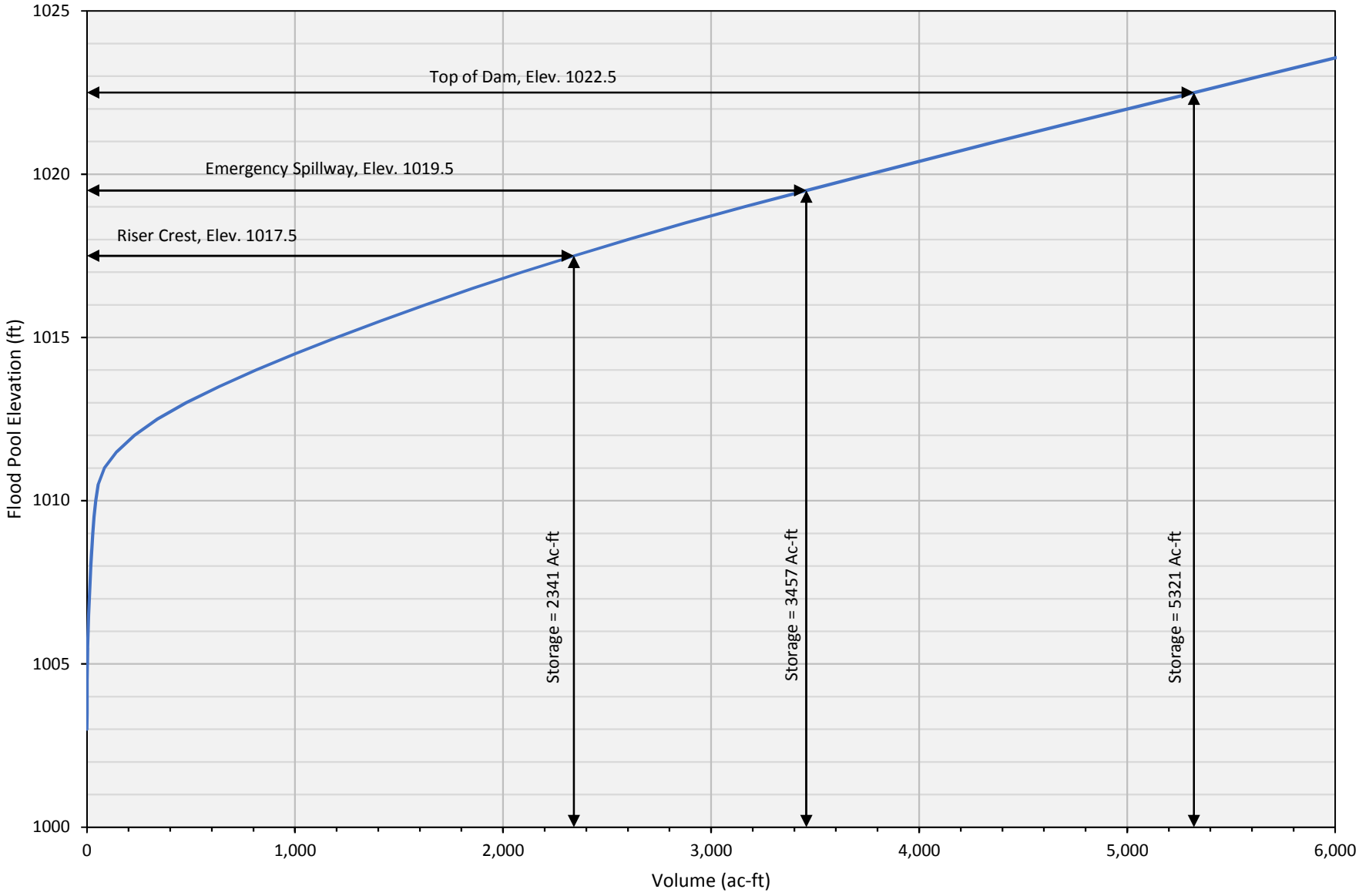


Figure 14 - Black River Impoundment Project
Flood Pool Elevation and Discharge Relationship
(Stage-Discharge Curve)

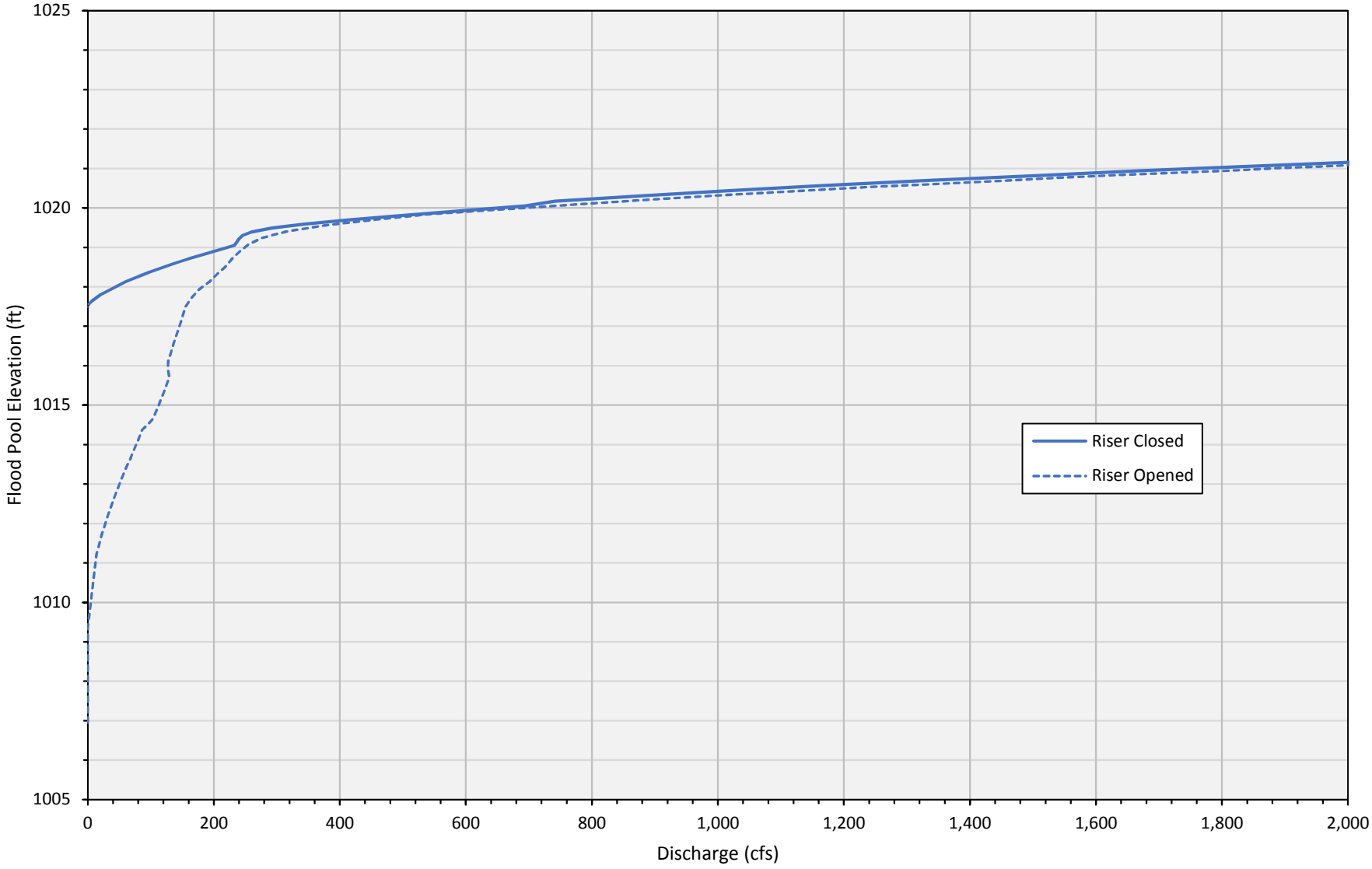


Figure 15 - Black River Impoundment Project
Principal Spillway Design, 50 Year, 10 Day Storm Event
Discharge vs. Duration

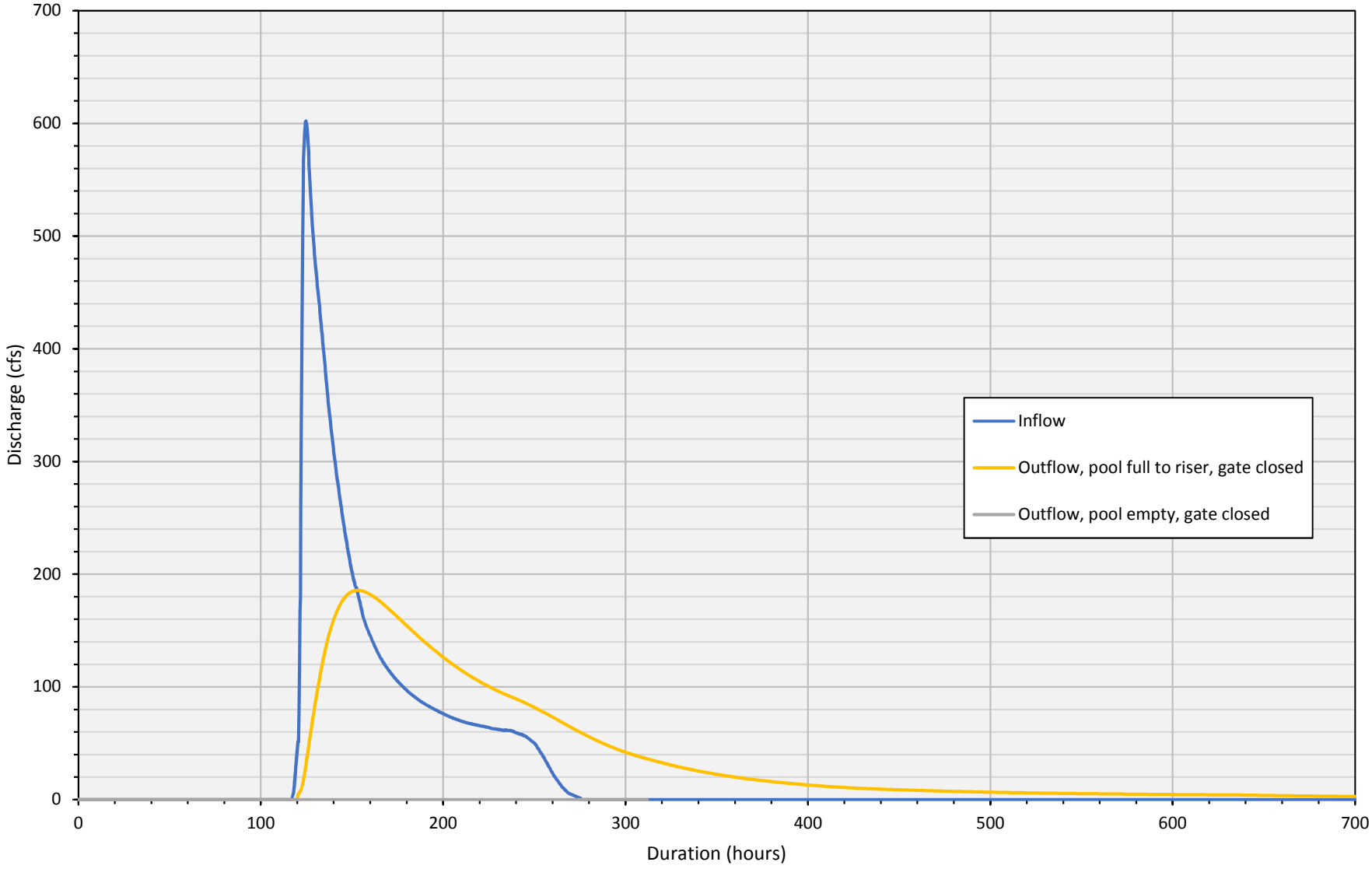


Figure 16 - Black River Impoundment Project
Auxiliary Spillway Hydrograph
Inflow/Outlow vs. Duration

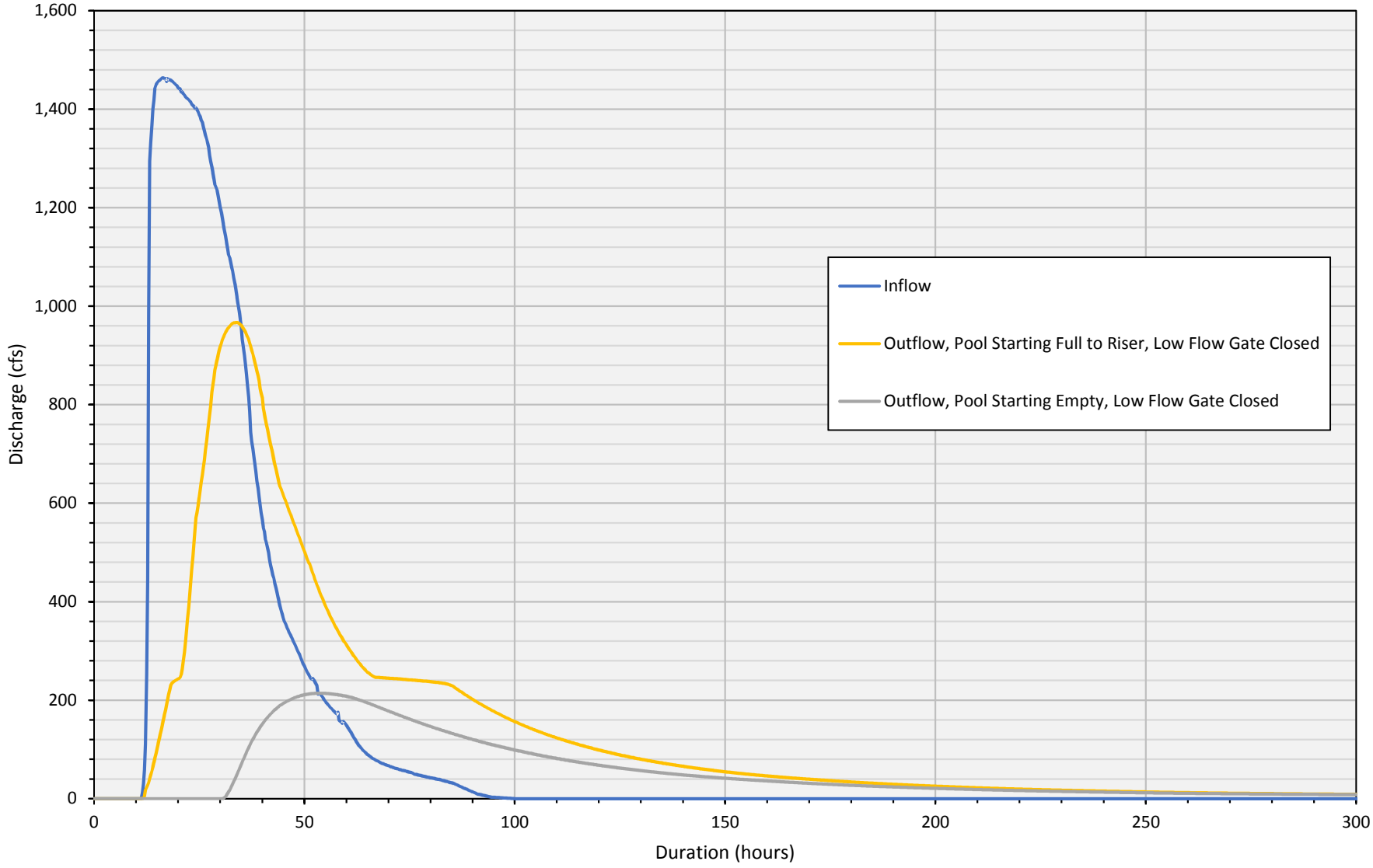


Figure 17 - Black River Impoundment Project
Principal Spillway Design, 50-Year, 10-Day Storm Event
Elevation vs. Duration

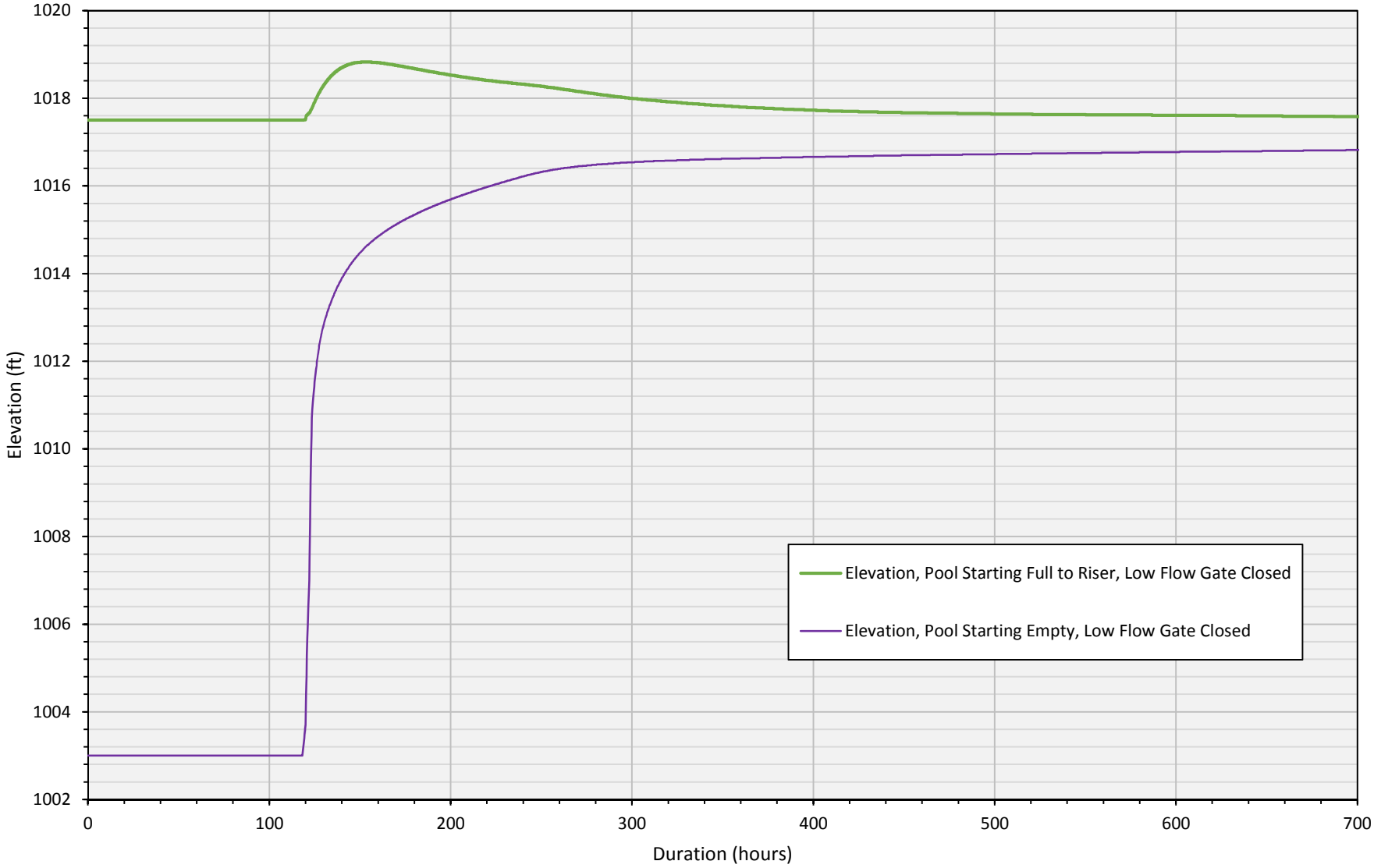
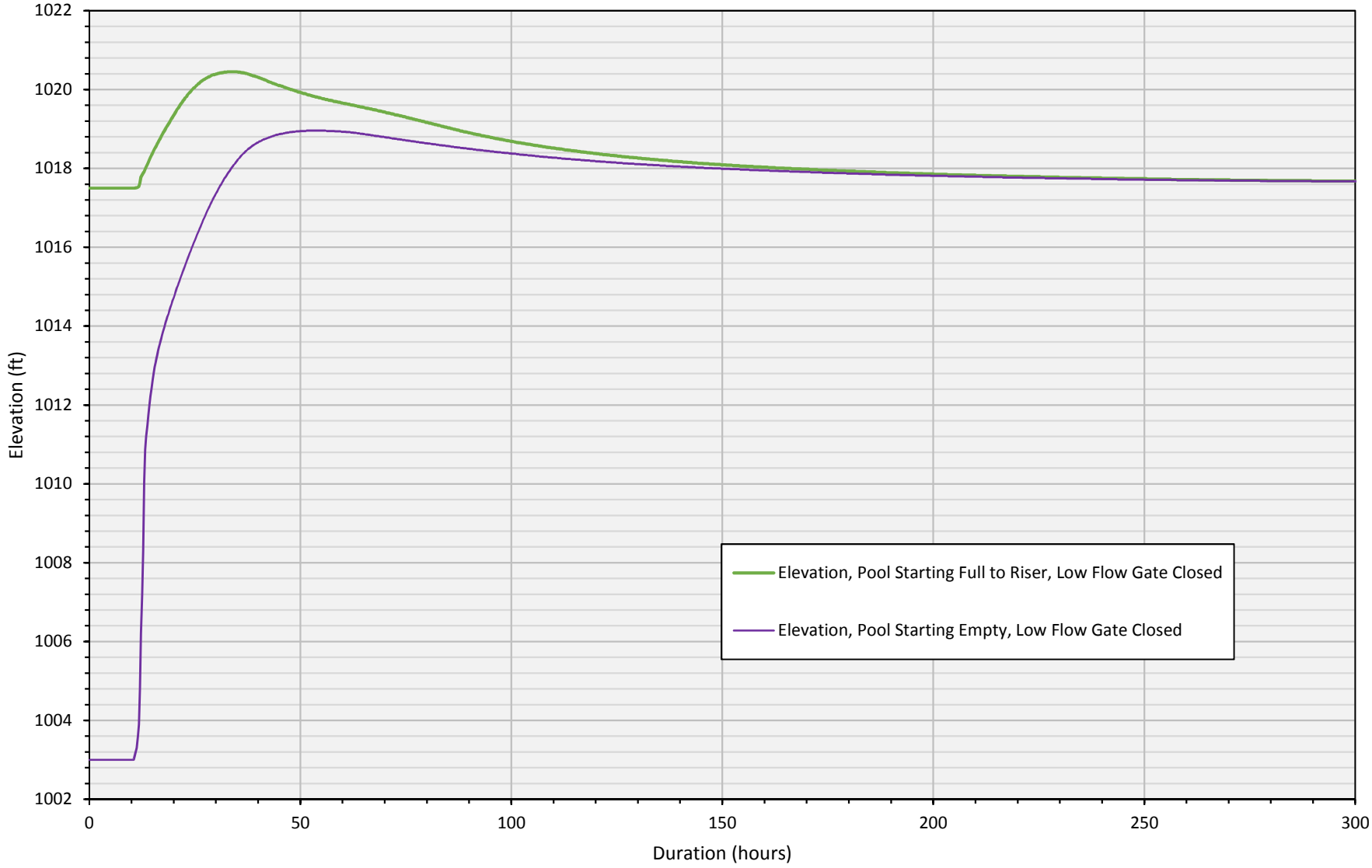


Figure 18 - Black River Impoundment Project
Auxiliary Spillway Hydrograph
Elevation vs. Duration



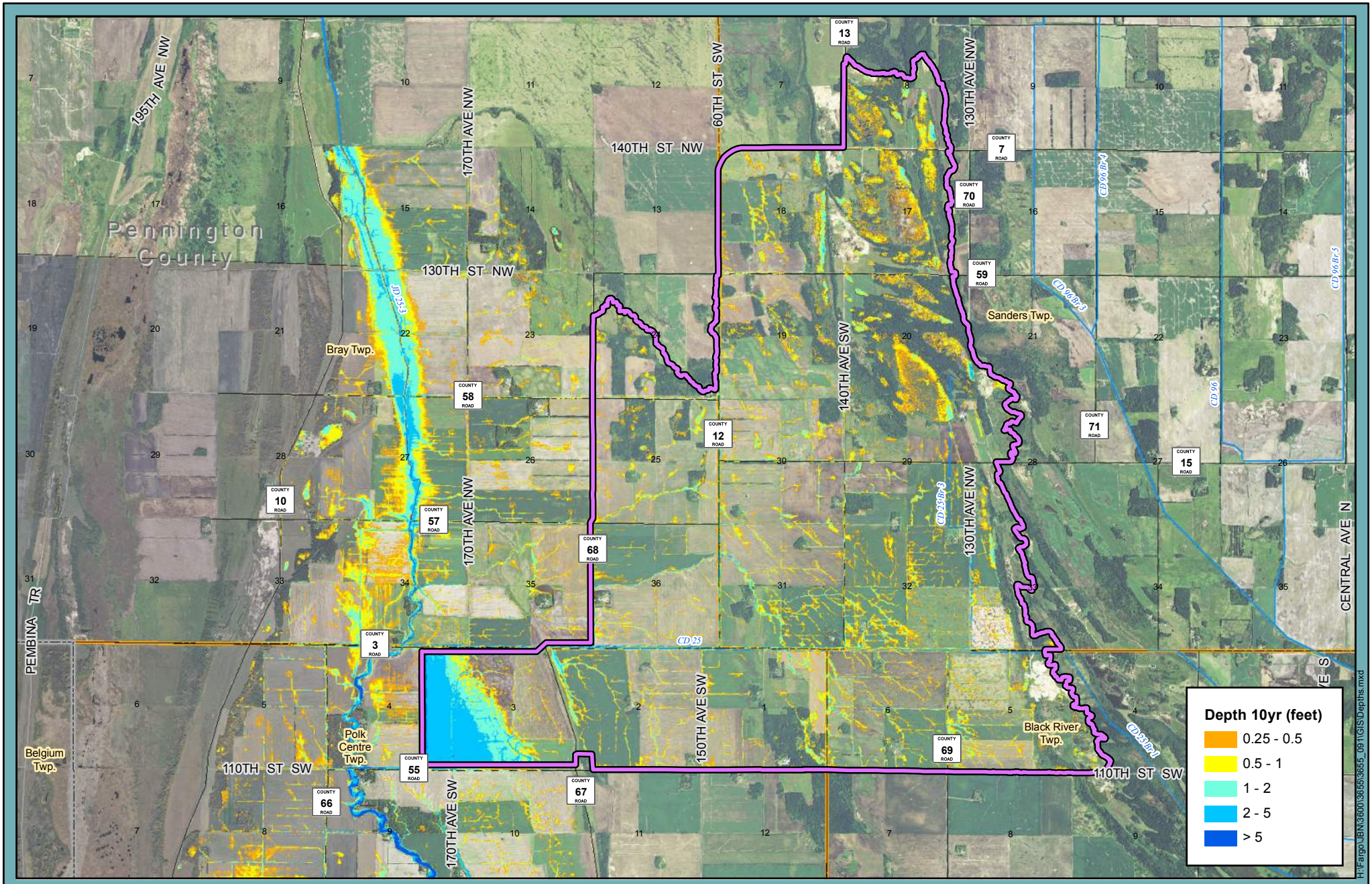


Figure 19: Proposed Design 10-Year -- 24-Hour Inundation Map

Black River Impoundment
Red Lake Watershed District

N W E S

0 0.5 1 2 Miles

Houston Engineering Inc.

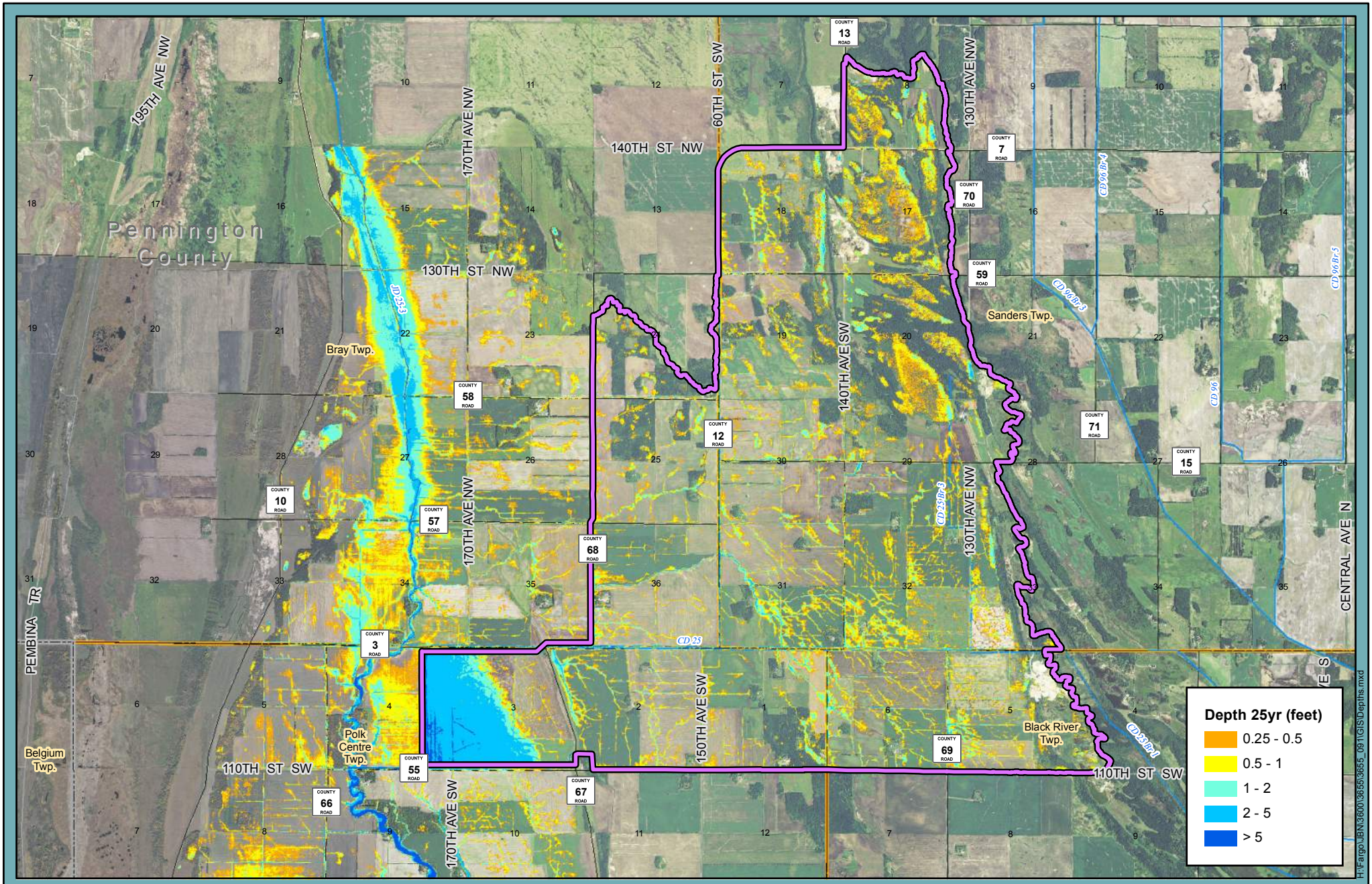


Figure 20: Proposed Design 25-Year -- 24-Hour Inundation Map

Black River Impoundment
Red Lake Watershed District

N W E S

0 0.5 1 2 Miles

Houston Engineering Inc.

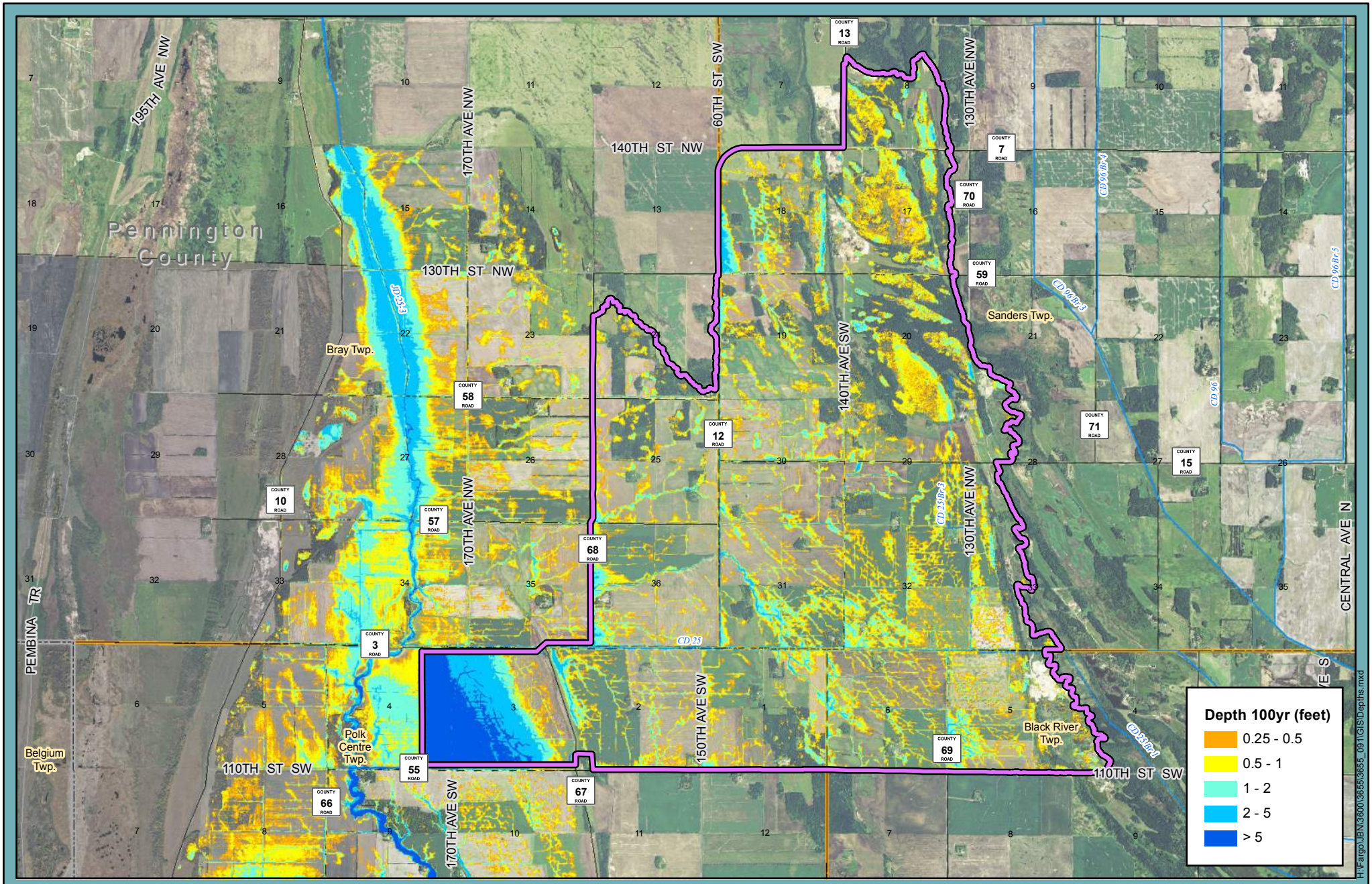


Figure 21: Proposed Design 100-Year -- 24-Hour Inundation Map

Black River Impoundment
Red Lake Watershed District

N W E S

0 0.5 1 2 Miles

Houston Engineering Inc.

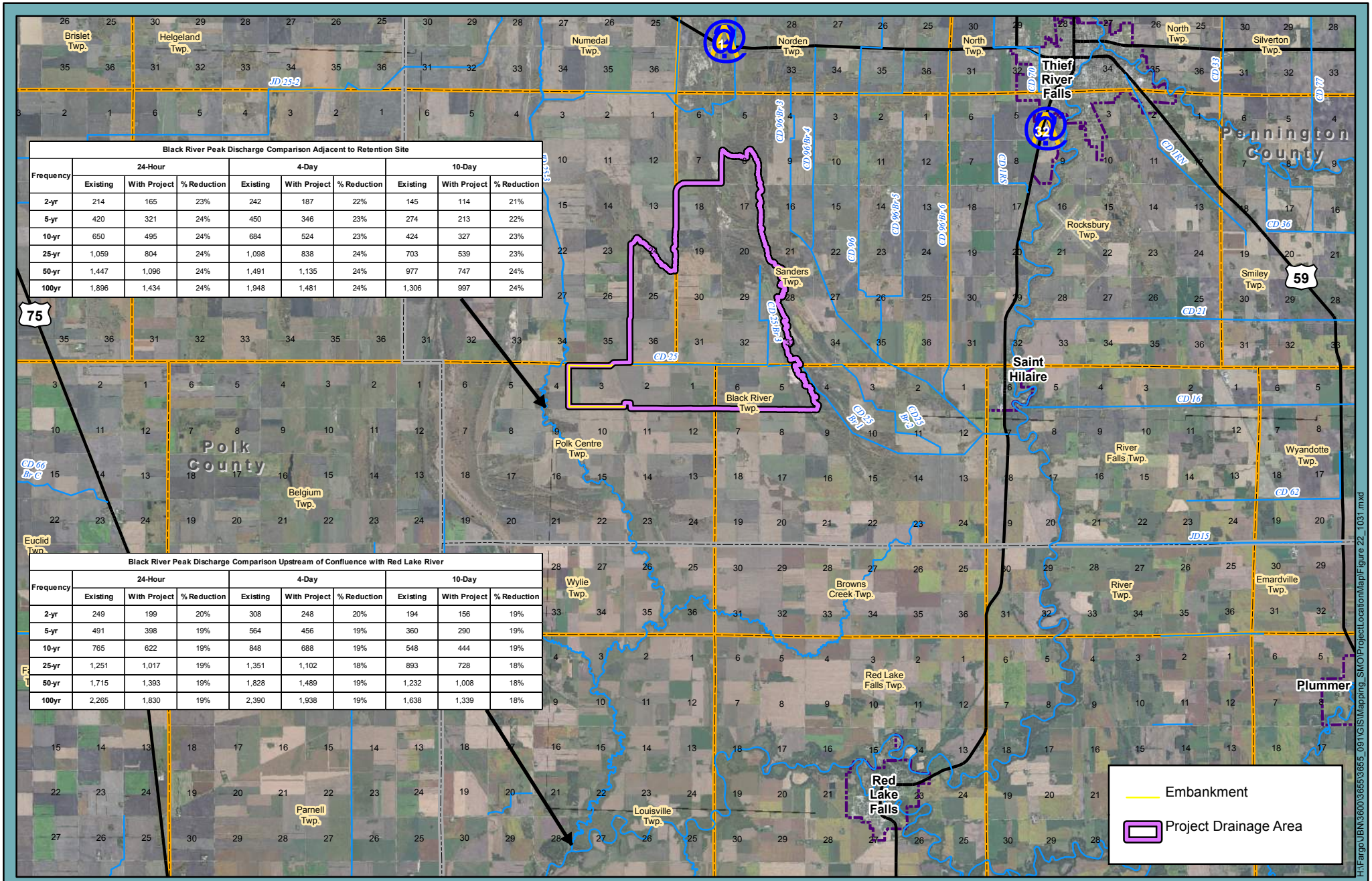


Figure 22: Downstream Flood Reduction Map

Black River Impoundment
Red Lake Watershed District

FIGURE 23
OPINION OF PROBABLE COST
BLACK RIVER IMPOUNDMENT PROJECT - RLWD PROJECT #176
RED LAKE WATERSHED DISTRICT

No.	Item	Unit	Quantity	Unit Price	Ditch System Costs
1	MOBILIZATION	Lump Sum	1	$ 100,000.00	$ 100,000
2	COMMON EXCAVATION (DIV/OUTLET DITCH)	C.Y.	407,800	$ 2.00	$ 815,600
3	EMBANKMENT	C.Y.	444,525	$ 3.00	$ 1,333,575
4	CLEARING AND GRUBBING	Acre	4.00	$ 1,500.00	$ 6,000
5	REMOVE PIPE CULVERT	Lin. Ft.	1,500	$ 5.00	$ 7,500
6	RIPRAP CLASS II	C.Y.	400	58.00	$ 23,200
7	RIPRAP CLASS III	C.Y.	3,290	58.00	$ 190,820
8	RIPRAP CLASS IV	C.Y.	600	58.00	$ 34,800
9	PAVEMENT REMOVAL	SY	110	6.00	$ 660
10	TYPE SP 12.5 WEARING COURSE MIXTURE (2,B)	TON	120	100.00	$ 12,000
11	CLASS 5 AGGREGATE BASE (CV) P	CY (P)	300	20.00	$ 6,000
12	GRANULAR BEDDING (CV)	CY (P)	975	14.50	$ 14,138
13	CLASS 1 SHOULDERING (CV)	CY (P)	60	25.00	$ 1,500
14	CLASS 1 AGGREGATE SURFACING (CV)	CY (P)	825	10.00	$ 8,250
15	18" CSP (16 GA.)	Lin. Ft.	2,500	25.00	$ 62,500
16	18" CSP Steel Flap Gates	Each	50	275.00	$ 13,750
17	24" CSP (16 GA.)	Lin. Ft.	500	30.00	$ 15,000
18	24" CMP Steel Flap Gates	Each	10	300.00	$ 3,000
19	35 x 24 CSPA	Lin. Ft.	150	65.00	$ 9,750
20	42 x 29 CSPA	Lin. Ft.	150	72.00	$ 10,800
21	57 X 38 CSPA	Lin. Ft.	100	100.00	$ 10,000
22	64 X 43 CSPA	Lin. Ft.	150	110.00	$ 16,500
23	71 X 47 CSPA	Lin. Ft.	150	170.00	$ 25,500
24	73 X 55 CSPA	Lin. Ft.	150	175.00	$ 26,250
25	87 X 63 CSPA	Lin. Ft.	200	185.00	$ 37,000
26	95 X 67 CSPA	Lin. Ft.	50	195.00	$ 9,750
27	103 X 71 CSPA	Lin. Ft.	130	250.00	$ 32,500
28	117 X 79 CSPA (BEVELED ENDS)	Lin. Ft.	150	305.00	$ 45,750
29	142 X 91 CSPA (BEVELED ENDS)	Lin. Ft.	100	400.00	$ 40,000
30	35 x 24 GS APRON	Each	6	455.00	$ 2,730
31	42 x 29 GS APRON	Each	6	470.00	$ 2,820
32	57 X 38 GS APRON	Each	4	635.00	$ 2,540
33	64 X 43 GS APRON	Each	6	990.00	$ 5,940
34	71 X 47 GS APRON	Each	6	1,100.00	$ 6,600
35	73 X 55 GS APRON	Each	6	1,300.00	$ 7,800
36	87 X 63 GS APRON	Each	8	2,000.00	$ 16,000
37	95 X 67 GS APRON	Each	2	2,500.00	$ 5,000
38	103 X 71 GS APRON	Each	4	3,000.00	$ 12,000
39	4' x 4' RC BOX CULVERT	Lin. Ft.	80	450.00	$ 36,000
40	12' x 5' RC BOX CULVERT	Lin. Ft.	80	725.00	$ 58,000
41	14' x 7' RC BOX CULVERT	Lin. Ft.	100	800.00	$ 80,000
42	4' x 4' RC BOX CULVERT END SECTIONS	Each	2	4,500.00	$ 9,000
43	12' x 5' RC BOX CULVERT END SECTIONS	Each	2	7,200.00	$ 14,400
44	14' x 7' RC BOX CULVERT END SECTIONS	Each	2	9,500.00	$ 19,000
45	PRINCIPLE OUTLET STRUCTURE (PIPE, RISER)	Lump Sum	1	175,000.00	$ 175,000
46	TRAFFIC CONTROL	Lump Sum	1	5,000.00	$ 5,000
47	SEEDING	Acre	300.0	55.00	$ 16,500
48	SEED, MIXTURE 25-141	Pound	17,700	2.75	$ 48,675
49	MULCH MATERIAL, TYPE 1	Ton	600.0	75.00	$ 45,000
50	DISK ANCHORING	Acre	300.0	18.00	$ 5,400
51	EROSION AND SILTATION CONTROL	L.S.	1	6,000.00	$ 6,000
52	FERTILIZER, TYPE 1	Ton	37.5	800.00	$ 30,000
Construction Total *					**$ 3,521,500**
	Contingencies (10%)				352,150
	Engineering (Design, Construction Staking and Observation)				595,000
	Materials Testing				25,000
	Environmental Mitigation				70,000
	Legal Costs				45,000
	Utilities (Telephone, Power)				200,000
	Administration (includes Board and Viewers' Costs)				25,000
	Impoundment Fee Title & Flowage Easement				1,849,615
	Permanent Ditch Easement, 95 acres @$2050/acre				194,750
	Temporary Construction Easement, 103 acres @ $300/acre				30,900
TOTAL PROJECT COSTS *					**$ 6,908,920**

APPENDIX A

RRWMB Prioritization Worksheet

RED RIVER WATERSHED MANAGEMENT BOARD
PRIORITIZATION WORKSHEET
for
FLOOD DAMAGE REDUCTION PROJECTS

This worksheet shall be used by Member Watershed Districts in determining the initial feasibility of pursuing a potential site for project development and shall provide a completed form for the proposed project's Step II application. The RRWMB shall utilize this form in determining the priority for funding of each proposed project. In addition, the RRWMB and the sponsoring Watershed District shall utilize the Technical Advisory Committee (TAC) recommendation which will include the established "Star Value Method" in making project comparisons. The final ranking of each project may be changed periodically based on the ranking of newly proposed projects. When a proposed project has received Step III approval, the ranking score shall be final. Individual component issues of each project are to be ranked by using both technical and established policy consideration as adopted in the "Governing Documents" publication.

This document is divided into five separate sections. Each section shall be evaluated individually as deemed appropriate for each proposed flood damage reduction project and collectively in determining the final prioritization ranking for funding from the RRWMB.

BLACK RIVER IMPOUNDMENT PROJECT - RLWD

SECTION I

Choose the description option that best describes the proposed project in each of the following categories and place that ranking number in the blank provided. Then add the rankings for issues A through E to provide the total score.

The ranking score for this project in Section I is: _92__.

A. DOWNSTREAM PEAK-FLOW TIMING ANALYSIS

0. The proposed project will not reduce downstream peak flows on the tributary stream.

10. The proposed project will reduce downstream peak flows on the tributary stream.

18. The proposed project will reduce peak flows on the Red River.

20. The proposed project will reduce peak flows at that point on the Red River that includes the flow contribution from all Minnesota tributaries.

Number __20___ best describes this proposed project.

B. DESIGNED STORAGE VOLUME
(Calculated up to emergency spillway elevation.)

4. One year (Spring runoff storage capacity.)
8. Five year "
12. Ten year "
16. Twenty-five year "
18. Fifty year "
20. One hundred year "

Number 12 (3.9") best describes this proposed project.

C. LOCATION OF PROPOSED PROJECT
(Ability to control flow.)

This location will allow for the construction of the following designed projects:

4. Off channel automatic draw-down. (Diversion of flood peaks only.)
8. Off channel automatic draw-down. (Capable of 100% flow diversion.)
8. On channel automatic draw-down.
16. Off channel gated draw-down. (Diversion of flood peaks only.)
20. Off channel gated draw-down. (Capable of 100% flow diversion.)
20. On channel gated draw-down.

Number 20 best describes this proposed project.

D. RETENTION TIME CAPABILITY

2. The subject watershed's average flow detention time will be less than 5 days.

4. The subject watershed's average flow detention time will be 5-10 days.

10. The subject watershed's average flow detention time will be 10-15 days.

16. The subject watershed's average flow detention time will be 15-20 days.

20. The subject watershed's average flow detention time will be 20-30 days.

Number 20 best describes this proposed project.

E. PROPOSED OUTLET DESIGN

4. Automatic draw-down storage pool with an identified downstream protected area within a minor watershed that is a tributary to the primary watershed of the District.

6. Gated draw-down storage pool with identified downstream protected area within a minor watershed that is a tributary to the primary watershed of the District.

10. Automatic draw-down storage pool with an identified protected area that extends downstream through the District's primary watershed terminating at the Red River.

12. Gated draw-down storage pool with an identified protected area that extends downstream through the District's primary watershed terminating at the Red River.

18. Automatic draw-down storage pool with an identified downstream protected area that includes the minor, primary and Red River watersheds.

20. Gated draw-down storage pool with an identified protected area that includes the minor, primary and Red River watersheds.

(Protected area means: The area that would be provided a measurable degree of flood damage reduction.)

Number __20___ best describes this proposed project.

SECTION II - ENVIRONMENTAL ENHANCEMENTS ACCOMPLISHED

A. This proposed project has addressed the following natural resource goals as identified in the "Red River Basin Flood Damage Reduction Work Group Agreement" and incorporated the appropriate goal issues into the final engineers report. Each goal, if incorporated into the final design, shall have an equal value of 2.5. The accumulative value of each goal accomplished in this project shall be the total score for this section.

This section shall be completed by the Watershed District Project Team.

Check each goal that has been incorporated into this project with an X.

__X__ 1. Manage streams for natural characteristics.
__X__ 2. Enhance riparian and in-stream habitat.
__X__ 3. Provide diversity of habitats for stable populations to thrive over a long period.
__X__ 4. Provide connected, integrated habitat including compatible adjacent land uses.

__X__ 5. Enhance or provide seasonal flow regimes in streams for water supply, water quality, recreation, and support biotic communities.
__X__ 6. Provide recreational opportunities.
__X__ 7. Improve water quality.
__X__8. Protect water quality.
____ 9. Manage lakes for natural characteristics.

The total score for this category is _20___.

B. DISTRICT'S MEDIATION PROJECT TEAM RECOMMENDATION

The District Project Team has fully processed the proposed project through problem identification, alternative evaluation and selection and recommends the following:

0. The proposed project is not a significant contribution to flood damage reduction.

14. The proposed project is significant but immediate implementation is not a high priority.

20. The proposed project is very significant and should be implemented at the earliest possible date.

Number _20___ best describes the Project Team recommendation.

SECTION III - TECHNICAL ADVISORY COMMITTEE RECOMMENDATION

Note: The TAC recommendation shall include the utilization of the "Star Value Method" to determine the RRWMB cost of the storage capability of the proposed project and an evaluation of issues A through G of this worksheet with a ranking score for each issue. In addition, the TAC shall provide a written technical narrative providing suggestions for changes that would enhance the proposed project and/or an evaluation of the merits of the proposed project in fulfilling the flood damage reduction goals of the RRWMB.

The Star Value Method ranking score for this project is: __10____

The value system utilized to determine the ranking score for potential projects is:

Score	**RRWMB Dollar Cost/Star Value**
2	100 to 200
6	40 to 100

10……..…20.1 to 40
16…….10.1 to 20
18……..5 to 10
20……..0 to 5

The TAC ranking scores for the issue sections of this prioritization worksheet are as follows:

____ A.
____ B.
____ C.
____ D.
____ E.
____ F.

The technical evaluation narrative for this proposed project is as follows:

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

SECTION IV - PROJECT FUNDING AGREEMENT CONDITIONS

A. This section is to be utilized by the Watershed District's Board of Managers as a guide in seeking the appropriate level of funding for a proposed project and by the RRWMB in determining the level of funding to be awarded. Utilize and fill out only one of the three prioritizing schedules (*) that best applies to the proposed project. Note: "Other interests" means funds received from sources other than RRWMB tax levy that are secured to reduce the RRWMB/WD total commitment.

* The proposed project provides flood damage reduction solely within a minor watershed of the District and funding will be requested from the RRWMB for:

2. Seventy-five percent of the total cost not funded by other interests.
4. Fifty percent of the total cost not funded by other interests.

6. Twenty-five percent of the total cost not funded by other interests.

* The proposed project provides flood damage reduction downstream to the outlet into the Red River and funding will be requested from the RRWMB for:

10. Seventy-five percent of the total cost not funded by other interests.
14. Fifty percent of the total cost not funded by other interests.
18. Twenty-five percent of the total cost not funded by other interests.

* The proposed project provides flood damage reduction downstream to the common outlet into the Red River from all contributing Minnesota watersheds and funding will be requested from the RRWMB for:

12. Seventy-five percent of the total cost not funded by other sources.
16. Fifty percent of the total cost not funded by other interests.
20. Twenty-five percent of the total cost not funded by other interests.

Number _14 (66.67% 3rd Section)___ best describes this proposed project.

B. PROJECT LOCATION PROPERTY ACQUISITION

The proposed project's required construction/pool land area will be acquired by:

2. Purchase with ownership title held be an entity other than the Watershed District.
4. Purchase with ownership title held by the Watershed District.
6. Purchase held by the Watershed District with prescribed total financial recovery.
8. Permanent easement by the Watershed District on privately owned land.
10. Permanent agreement and/or easement (no local cost) on State or Federal land.

Number _4 & 8___ best describes this proposed project.

SECTION V

Section V is composed of three separate issue-orientated papers. Use form A when it is requested by the RRWMB. Use form B when applying for funding of programs or studies. Use form C for all applications for funding assistance.

A. QUALIFICATIONS FOR A FUNDING APPLICATION

*This section shall be utilized only by the RRWMB in the event that the adopted rating system in sections I-IV has resulted in an equal comparative scoring value for projects proposed for funding. This section is not to be utilized by an applicant for funding.

Rationale shall be provided in letter form by the applicant, upon receiving a request from the RRWMB, stating the need for funding assistance which could be described as one of the following:

The District Construction Account (1/2 RRWMB Levy) has adequate funds but the District feels it is entitled to funds because of prior annual levy allocations.

The District Construction Account has adequate funds but they are needed for other project development costs. (Must list proposed projects and time line for progressing.)

The District Construction Account is minimal because of low annual levy receipts.

The District Construction Account is minimal because of funding previously built flood damage reduction projects. (Must list projects built and funding expenditures.)

B. PRIORITIZATION PROCESS FOR CONSIDERING PROGRAMS AND STUDIES

Consideration for the funding of Programs, Studies or other Flood Damage Reduction Initiatives by Member Watershed Districts shall be ranked for funding eligibility in the following order of priority. The lowest ranking shall be #1 and the highest #7.

1. The initiative is not related to gaining information toward flood damage reduction.

2. The information sought in this initiative is primarily for state or federal agency use, but is needed for gaining information related to flood damage reduction.

3. The information sought in this initiative is primarily for use in the applicant District.

4. The information sought in this initiative is needed by an individual District for their own use, but could be a pilot for establishing a methodology that could be used by all.

5. The information sought in this initiative will be conducted within an individual District, but the information gained can be utilized by all.

6. The information sought in this initiative is being gathered in all cooperating Districts and the information gained is necessary for furthering flood damage reduction initiatives.

7. The information sought in this initiative will be applicable to, and utilized in, all member Districts and is essential for the development of flood damage reduction initiatives within all of the Minnesota portion of the Red River Basin.

Number _____ best describes this proposal.

C. DISTRICT BOARD OF MANAGER'S RECOMMENDATION

The ___Red Lake_____ Watershed District's

Board of Mangers have utilized the "Project Prioritization Worksheet" in

progressing this proposed project and have fully evaluated all aspects of the

proposed project request funding from the RRWMB for _66.67%____ percent of the

project's total cost not funded by other sources. It is anticipated that construction

can be accomplished and therefore funding will be required in:

1. Three to five years.
2. Two to three years.
X - 3. One to two years.
4. Within one year.

This worksheet has been completed for the proposed project known as

___Black River Impoundment Project – RLWD Project #176_____

by the ___Red Lake_____Watershed District.

on this ____ day of _____, 20 ___.

_____ _____

President Secretary

* Note: The RRWMB shall provide the applicant with a signed form certifying the commitment and shall describe any variation from the "Project Evaluation Manual."

APPENDIX B

Star Value Computation

Star Value Computation Worksheet
Red River Watershed Management Board

Enter values only in the cells that have been shaded. All other values are computed from these values.

Project Name:	**Black River Imoundment**		**Step 2**	Enter Project Name. (Status eg Step)
Watershed District:	**Red Lake**			Enter Name of Watershed District.
Project Location:	**Polk Centre Township**			Enter Project Location.
Estimated Total Cost:	**$ 6,900,000**			Enter the estimated project costs.
RRWMB Cost:	**$ 2,300,000**	CPI (1984=100)	CPI (2016=100)	
Year of Estimate:	**2016**	**240.01**	**100.00**	Ratios of the Consumer price index read from the CPI worksheet.
Adj. to SummaryAll Base Yr:	**2000**	**172.20**	**71.75**	
Drainage Area (square miles)	**16.8**	Enter the drainage area in square miles used to compute the runoff volume.		

Storage Volume(s):	**Acre-feet**	**Inches**	**Adj. Storage (ac-ft)**	
Drawdown	**0**	0.00	0	The adjusted storage is total storage is multiplied by the Volume Adjustment Factor which can reduce the storage. Storage is removed 1st from the ungated storage, 2nd from the gated (2) storage, 3rd from the gated (1) storage and last from the drawdown storage.
Gated (1)	**2,341**	2.61	2,341	
Gated (2)	**0**	0.00	0	
Ungated (to emergency spillway)	**1,116**	1.25	1,087	
Total Storage (8.1 inches Max.)	3,457	3.86	3,428	
Volume Adjustment Factor	0.99	29		

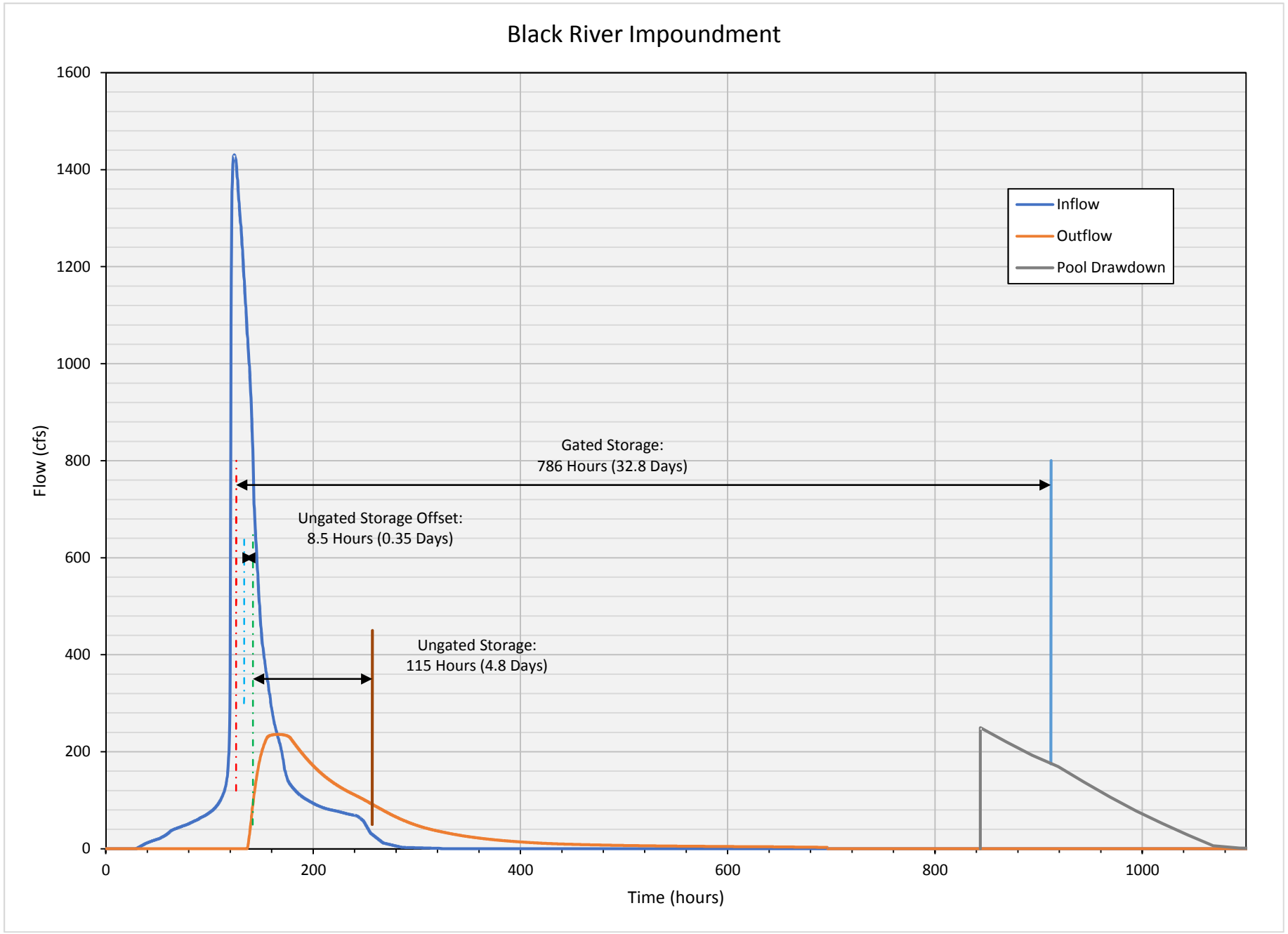
Est. of Ungated Detention Time	**Volume (ac-ft)**	**Elevation (ft)**	**Discharge (cfs)**	
Emergency Spillway	**1,116**	0	0	Note: this section is provided for reference only. The values are not used in the calculations.
10% of Ungated	**112**	0	0	
90% of Ungated Volume	1,004			
	Average Discharge (cfs)		0	
	Discharge in AF per day		0	
	Average Detention Time (days)		not applicable	

Detention Time:		
Gated (1) from Operation plan	**33.0**	Enter gated detention time for the 1st category of gated storage.
Gated (2) from Operation plan	**0.0**	Enter gated detention time for the 2nd category of gated storage.
UnGated (from Operation Plan or above)	**4.8**	Enter ungated detention time. (Center of Mass to Center of mass)
Ungated Storage Offset	**0.4**	Offset of center of mass of inflow hydrograph to center of mass of storage.

Average Time Interval between Routed Site Peak and Red River Peak (days). (Negative is ahead of peak, positive is after peak)	**1.0**	**Existing Relative T**	0.37	Existing Relative T is based on the average time interval between the routed site peak flows and the RRN.

Calculation of Star Value	**Routed Relative T**	**Adj. Storage (Ac-ft)**	**Star Value**	
Drawdown Storage (30 - 0.43)	29.57	0	0	Routed relative T is the value of the detention times computed using the regression equations given in figure 3. The Existing Relative T is subtracted from the project Relative T.
Gated (1) Storage (27.76 - 0.43)	27.33	2,341	63,973	
Gated (2) Storage (0.43 - 0.43)	0.00	0	0	
Ungated) Storage (4.55 - 0.43)	4.12	1,087	4,473	
Star Value		**3,428**	**68,446**	STAR VALUE
		2016 dollars	**2000 dollars**	
Total Cost per Star Value		**$ 100.81**	**$ 72.33**	Total Cost divided by STAR Value
RRWMB Cost per Star Value		**$ 33.60**	**$ 24.11**	RRWMB Cost divided by STAR Value

Prepared By:	Tony Nordby (Houston Engineering, Inc.)		Enter name of preparer
Source of Data:	Step 2 Submittal		Enter source data.
Frequency/Date of Preparation:	100yr 10day	3-Oct-17	Enter frequency and date.


Black River Impoundment
1600
1400
1200
1000
800
600
400
200
0
Flow (cfs)
0
200
400
600
800
1000
Time (hours)
Inflow
Outflow
Pool Drawdown
Gated Storage:
786 Hours (32.8 Days)
Ungated Storage Offset:
8.5 Hours (0.35 Days)
Ungated Storage:
115 Hours (4.8 Days)

APPENDIX C

MNDNR Environmental Review Need Determination

DEPARTMENT OF NATURAL RESOURCES

Memo

Date: **07/27/2017**

To: **Tony Nordby, Houston Engineering**

From: **Kate Fairman, Planning Director**
Environmental Review Unit, Minnesota Department of Natural Resources

RE: Environmental Review Need Determination for Black River Impoundment Project – Red Lake Watershed District

Project Background

The Red Lake Watershed District is proposing to develop an impoundment to divert seasonal flows and minimize potential downstream flooding. The impoundment would be located within Polk Centre Township and the drainage area would be from approximately 14 square miles. The project would be composed of diversion ditches, an embankment, the impoundment and the project drainage area (see Attachment 1: Black River Project Embankment and Drainage Area). The impoundment would be used seasonally as needed and would otherwise be operated as a dry impoundment that does not propose to maintain a pool larger than 160 acres year round.

The embankment proposed as part of the project would create a dam subject to Minnesota Department of Natural Resources (DNR) Dam Safety Permitting. The DNR Dam Safety Permitting program has preliminarily identified the proposed embankment as a Class 2 hazard dam, since there are existing residences downstream. The total proposed capacity for the embankment would be for 3,519 acre feet, with a maximum water height of 14 feet behind the embankment.

The purpose of this memo is to:

1. Determine responsibilities for environmental review document preparation and review. And
2. Determine the environmental review requirements associated with the Project.

Responsible Governmental Unit (RGU) Determination

Minnesota Rules Chapter 4410, which defines the environmental review program as overseen by the Environmental Quality Board, was reviewed to determine if the project based on the information provided was exempt from environmental review, requires mandatory EAW preparation, or requires mandatory EIS preparation. A Responsible Government Unit (RGU) is defined by Minnesota Rules 4410.0200 as the governmental unit that is responsible for preparation and review of environmental documents (e.g., EAW, EIS). In the review of the mandatory EAW categories, mandatory EIS categories, and exemptions, the

project was identified to include elements that could trigger an EAW in one or more of the following categories listed in Minnesota Rules 4410.4300:

- Subpart 24.B. For a new permanent impoundment of water creating additional water surface of 160 or more acres or for an additional permanent impoundment of water creating additional water surface of 160 or more acres, the DNR shall be the RGU.

- Subpart 24.C. For construction of a dam with an upstream drainage area of 50 square miles or more, the DNR shall be the RGU.

- Subpart 26. Stream diversion. For a diversion, realignment, or channelization of any designated trout stream, or affecting greater than 500 feet of natural watercourse with a total drainage area of ten or more square miles unless exempted by part 4410.4600, subpart 14, item E, or 17, the local government unit shall be the RGU.

- Subpart 27.A. For projects that will change or diminish the course, current, or cross-section of one acre or more of any public water or public waters wetland except for those to be drained without a permit pursuant to Minnesota Statutes, chapter 103G, the local government unit shall be the RGU.

- Subpart 36. A. For golf courses, residential development where the lot size is less than five acres, and other projects resulting in the permanent conversion of 80 or more acres of agricultural, native prairie, forest, or naturally vegetated land, the local government unit shall be the RGU, except that this subpart does not apply to agricultural land inside the boundary of the Metropolitan Urban Service Area established by the Metropolitan Council.

Since this project is not proposed by a state agency, the applicable RGU is listed within each mandatory category. Subparts 26, 27.A, and 36.A identify the LGU as the RGU. Subparts 24.B. and 24.C. identify the DNR as the RGU, so DNR must make a determination on the need for an EAW regarding the thresholds in Subparts 24, parts B and C. Since DNR does not have RGU responsibilities for Subparts 26, 27.A, and 36.A for this project, the application of these categories and determination of environmental review need is the responsibility of the appropriate LGU.

EAW Need Determination

Subpart 24.B. Threshold: For the project to meet the threshold, it must be determined whether the proposed impoundment will be "permanent" and whether it will create an additional water surface of 160 acres or more.

- "Permanent": Minnesota Rules 4410.0200 do not include a definition for "permanent," or "permanent impoundment." However, Minnesota Rules chapter 6115, governing public water resources, includes several references to "temporary" uses of water resources, which routinely indicate that uses shorter than two years constitute "temporary" uses. Therefore, since the project

is proposed to be an impoundment which would store water for less than two years per event, and would otherwise be operated as a dry impoundment, it would not likely exceed the surrogate definition of "temporary," and therefore is not a "permanent impoundment." The project therefore does not meet this component of the threshold.

- Water surface area: The total proposed project area would be approximately 800 acres, but is only proposed to be used on a seasonal basis. Additionally, it is not proposed to create surface water area greater than 160 acres on a year-round basis. The DNR Dam Safety permit requirements will include the development of an Operation and Maintenance Plan that can include restrictions on water storage and usage, which can ensure that surface water area is not greater than 160 acres on a year-round basis. The project therefore does not meet this component of the threshold.

Subpart 24.C. Threshold: For the project to meet the threshold, it must be determined if the project constitutes the "construction of a dam" and what the upstream drainage area of the project would be.

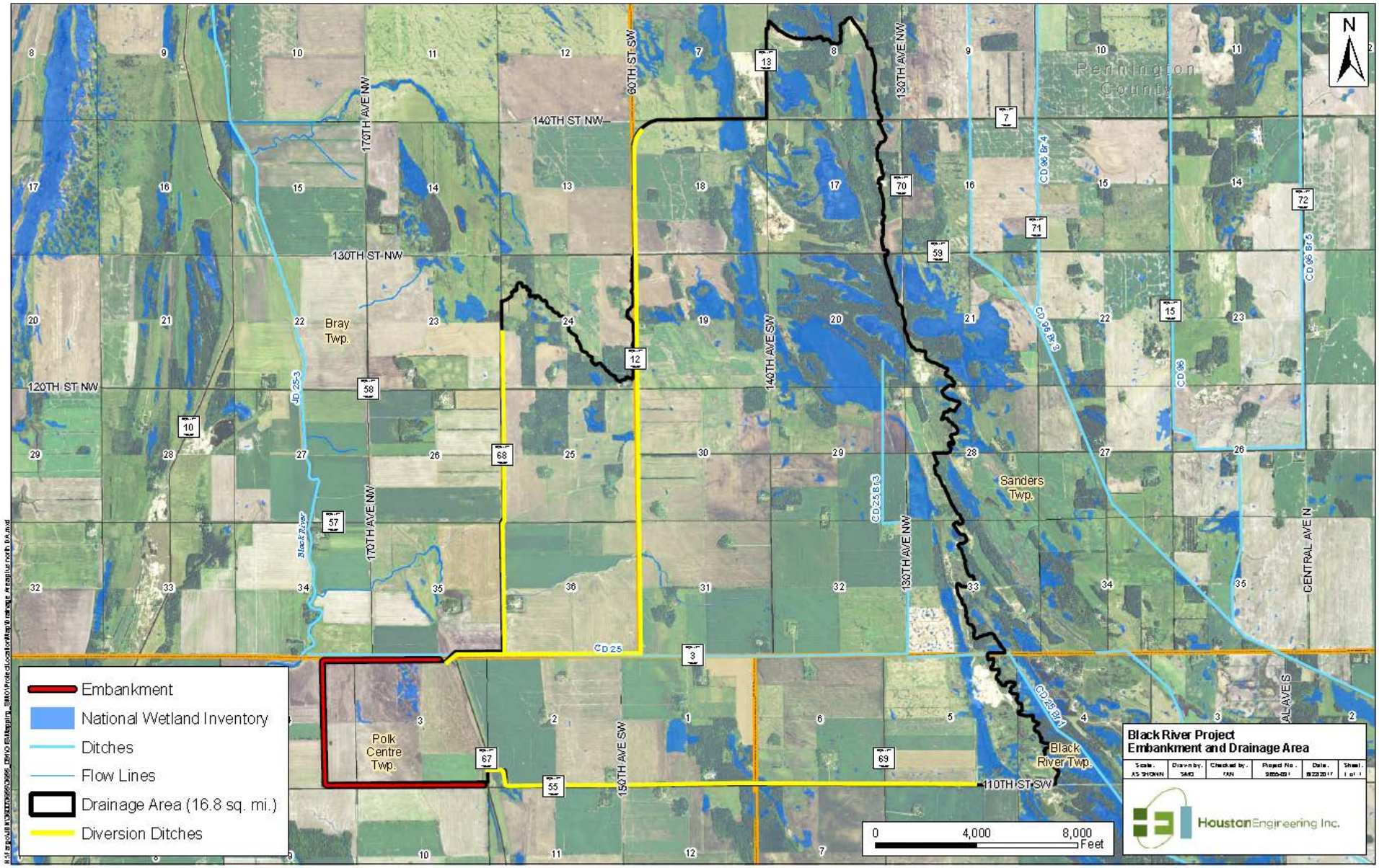
- "Construction of a dam": The proposed project includes the construction of an embankment that has been preliminarily identified as a Class 2 hazard dam and therefore must receive a Dam Safety permit. The proposed project meets this component of the threshold.

- Upstream drainage area: The proposed project has an upstream drainage area of 14 square miles, which does not meet the 50 square mile threshold. The project therefore does not meet this component of the threshold.

Based on the above analysis, the project does not meet the thresholds in Subparts 24.B or 24.C. It is recommended that the project proposer contact the LGU for a determination of environmental review need based on the other potentially applicable categories.

Please feel free to contact me with questions or additional details that could change this environmental review need determination.

Cc:
Larry Kramka, Houston Engineering
Randall Doneen, DNR
Stephanie Klamm, DNR
Theresa Olson, DNR
Jason Boyle, DNR
Myron Jesme, Red Lake Watershed District



Attachment 1: Black River Project Embankment and Drainage Area

APPENDIX D

Field Wetland Inventory Report
(Proposed Impoundment Site)

FIELD WETLAND INVENTORY REPORT

Black River Impoundment, Pennington County, MN

Prepared for:

The Red Lake Watershed District

1000 Pennington Ave

Thief River Falls, Minnesota

I hereby certify that this report was prepared by me or under my direct supervision.

Mark D. Aanenson, CWD

Houston Engineering Inc.

Date: December 13, 2016

HEI project no. 3655-091

HoustonEngineering Inc.

EXECUTIVE SUMMARY

Staff from Houston Engineering, Inc. (Houston Engineering) completed the components of a field investigation of the subject area to identify and delineate areas meeting wetland criteria for a project on behalf of the Red Lake Watershed District. The subject property is in Township 152N Range 45W Sections 3 and 4, in Pennington County, Minnesota. Results of the field wetland inventory indicate there are seven wetland areas located within the project footprint. The total area of wetlands inventoried is 5.59 acres. Most these wetlands are natural depressions or groundwater seeps of the PSS1B type (palustrine, scrub-shrub, saturated), (Cowardin et al. 1979). The outlet for the project will be the Black River located just west of the main project footprint.

1 INTRODUCTION

Staff from Houston Engineering, Inc. completed a field investigation in accordance with the 1987 Army Corps of Engineers Wetland Delineation Manual, and the Midwest Supplement Delineation Manual. The purpose of this report is to identify the wetlands and water resources that could be impacted by a project. This investigation was completed on November 16, 2016. This is outside of the growing season; consequently, additional fieldwork may be necessary if field delineation is necessary for compensatory mitigation purposes.

2 LOCATION

The subject property is in Section 3 and 4 of T152N R45W in Pennington County, Minnesota, (**Appendix A: Location Map**). The project site is about 9 miles west of Saint Hilaire, located on the south side of County Highway 3. The area consists generally of pastureland, cultivated agricultural land and some forested lands.

3 METHODS

For the wetland inventory work we followed the methods described in the 1987 Manual for “routine” delineations. Additionally, methodology from the Great Plains Regional Supplement to the Corps of Engineers Wetland Delineation Manual. Prior to the field delineation, offsite resources were reviewed to identify potential wetland habitats and provide guidance for the field investigation of wetlands at the project site. These included the U.S. Fish and Wildlife Service National Wetland Inventory (NWI 2011) and the county digital soil surveys (USDA-NRCS, 2011), as well as current and historical aerial photography.

The following procedures used to determine wetland habitats:

- We sampled vegetation to determine whether or not greater than 50% of the dominant plant species were classified as either obligate wetland, facultative wetland, or facultative plants.
- We sampled the soil using a soil probe to identify soil morphology, redoximorphic features and soil texture. We determined the hydric soil indicators according to Field Indicators of Hydric Soils in the United States; Guide for Identifying and Delineating Hydric Soils, Version 7.0 (USDA-NRCS, 2010).
- We determined wetland hydrology through on-site by observation of hydrologic indicators (US Army Corps of Engineers, 2010). The wetland hydrology determination uses the criteria of the presence of water within 12 inches of the surface for 14 days during the growing season, or within 24 inches of the surface during the dry part of the growing season. We also used aerial photography to assist hydrologic assessment.

Staff from Houston Engineering (Donna Jacob and Mark D. Aanenson) performed fieldwork on November 16, 2016. We marked the wetland boundaries and sample locations using a Trimble Geo 7X handheld GPS unit with centimeter accuracy for those representative plant communities present along the wetland boundaries. Sample points included observations of dominant vegetation, soil profiling including color and texture, and indications of hydrology. We also used additional, undocumented sample points throughout the delineation to verify vegetation, hydric soils, and hydrology. We recorded our observations using data forms and geolocated photographs.

4 RESULTS

The entire site was evaluated in the field for the presence of hydrology and hydrophytic vegetation. The areas identified as wetlands were the only areas that contained hydrophytic vegetation, hydrology indicators and hydric soils. The remaining areas were tilled and impacted by surface ditches. Hydric soils generally extended beyond the wetland boundaries at all the wetland sites. Wetland boundaries were determined using a combination of vegetation lines, tillage lines, and topography. This is evident in Wetlands 5 and 6. The boundary of Wetland 5 does not extend east to the tillage line because the vegetation no longer meets wetland criteria, and the boundary of Wetland 6 does extend east of the tillage line into the field. Volunteer wetland species were observed within the tilled field and the topography was similar to the remaining part of the wetland basin.

The riparian areas where the project will likely empty to the Black River were also evaluated for the presence of wetlands. No riparian wetlands were identified. Upland vegetation was present to the top of the riverbanks. These areas are clearly shown in Appendix B, Site Photography. The wetlands identified are shown on the map in (Appendix C: Wetland Inventory Map). The wetland types and sizes are also listed below in Table 1.

Table 1: Inventoried Wetlands and their Characteristics

Wetland Number	Wetland type (Cowardin et al. 1979)	NWI Listing	Wetland Area (acres)
1	PSS1/EMB	PSS1B	0.38
2	PSS1B	-	1.0
3	PSS1/EMC	-	0.14
4	PEMC	-	0.09
5	PSS1B	-	0.07
6	PSS1B	PSS1B	1.96
7	PSS1B	PSS1B	1.95
		total	5.59

Soil descriptions:

Dominant soils within the project site areas are poorly drained and are formed in till, coarse-silty glaciolacustrine deposits and glaciolacustrine deposits over till. The project area is composed of a variety of soil types with slopes ranging between zero to six percent (**Appendix D: Soil Hydric Rating Map**). The most dominant soil is Roliss loam (Hydric rating: 95) and the next prevalent soils are Glyndon loam, Aspen Parkland (Hydric rating: 15) and Strathcona fine sandy loam (Hydric rating: 95). Soil profiles that were taken for each wetland are given in **Appendix E, Wetland Summary Tables**.

Vegetation descriptions:

Both emergent and scrub-shrub species were frequently encountered in the wetland areas inventoried. Shrub species commonly found included red twig dogwood (*Cornus alba*), pussy willow (*Salix discolor*), and meadow willow (*Salix petiolaris*). Emergent species commonly found include curled dock (*Rumex crispis*), cord grass (*Spartina pectinata*), reed canary grass (*Phalaris arundinacea*), and giant goldenrod (*Solidago gigantea*). Vegetative species in the wetland areas are listed for each wetland area in **Appendix E, Wetland Summary** Tables. The wetland indicators and native/introduced status is also listed.

5 REFERENCES

Cowardin L M, V Carter, FC Golet, ET LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. U. S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. http://www.npwrc.usgs.gov/resource/1998/classwet/classwet.htm (Version 04DEC98).

Lichvar, R.W., D.L. Banks, W.N. Kirchner, and N.C. Melvin. 2016. The National Wetland Plant List: 2016 wetland ratings. Phytoneuron 2016-30: 1-17. Published 28 April 2016. ISSN 2153 733X

MN State Climatology Office (2016) Antecedent Precipitation Worksheet. http://climate.umn.edu/gridded_data/precip/wetland/wetland.asp (Accessed December 2016).

Shaw S P, Fredine CG. 1971. Wetlands of the United States. U.S. Fish Wildlife Service. Circular 39. 67 pp.

U.S. Army Corps of Engineers. 1987. Wetlands Delineation Manual. Wetlands Research Program. Technical Report Y-87-1. Department of the Army, Waterways Experiment Station, US Army Corps of Engineers. Vicksburg, Mississippi, USA.

U.S. Army Corps of Engineers. 2010. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains Region (Version 2.0), ed. J. S. Wakeley, R. W. Lichvar, and C. V. Noble. ERDC/EL TR-10-1. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

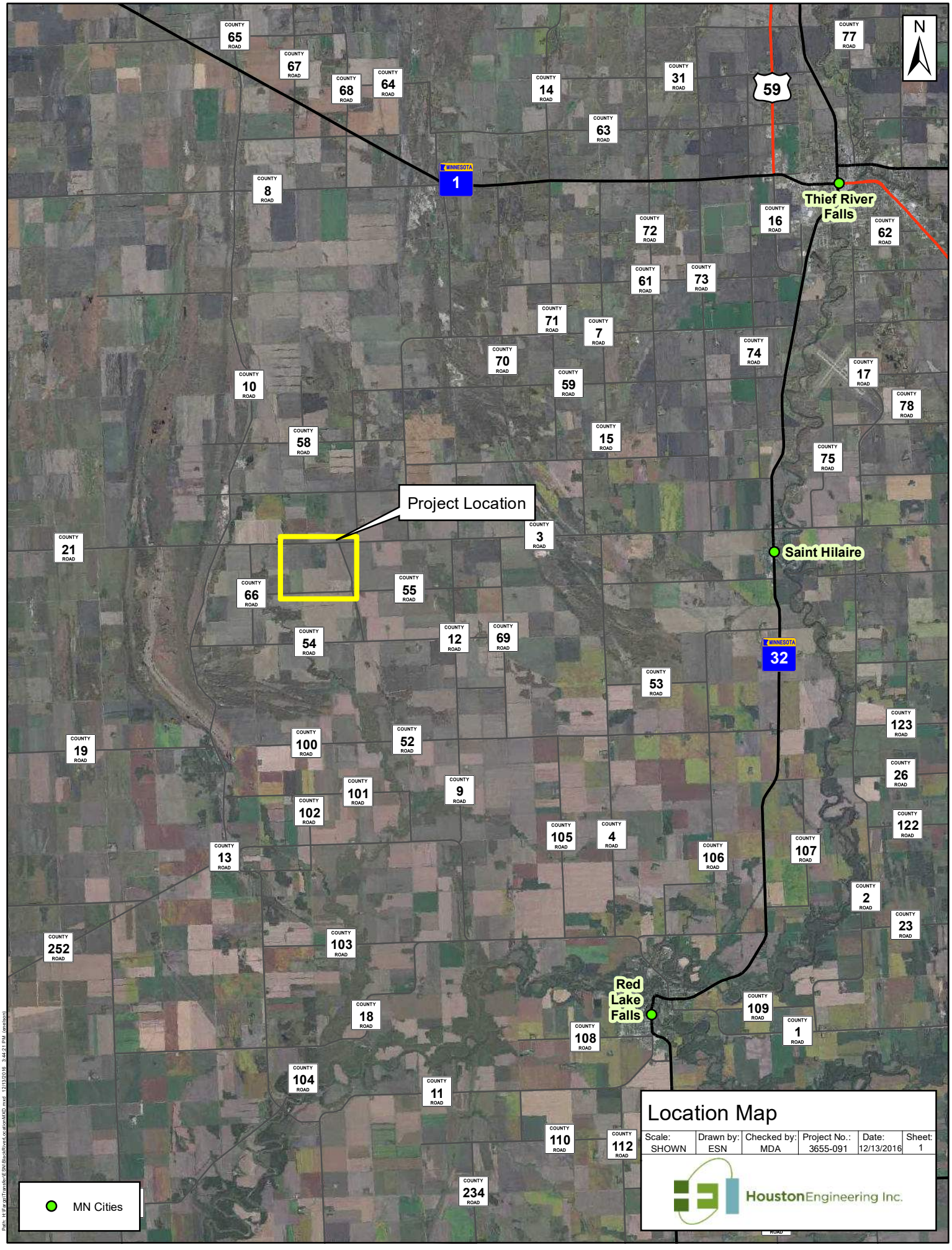
USDA-NRCS. 2010. Field Indicators of Hydric Soils in the United States – Guide for identifying and delineating Hydric Soils, Version. 7.0 in G.W. Hurt, L.M. Vasilas, and C.V. Noble, editors. USDA – NRCS in cooperation with the National Technical Committee for Hydric Soils.

USDA-NRCS. 2011, Soil Survey of Minnesota by County (Pennington County). http://websoilsurvey.nrcs.usda.gov/app/ (Accessed November 2016).

USFWS. 2011. United States Fish and Wildlife Service. National Wetlands Inventory. http://www.fws.gov/wetlands/Data/Mapper.html (Accessed October 2016).

Appendix A

Location Map


N
Project Location
Thief River Falls
Saint Hilaire
Red Lake Falls
MINNESOTA 1
MINNESOTA 32
59
COUNTY 65 ROAD
COUNTY 67 ROAD
COUNTY 68 ROAD
COUNTY 64 ROAD
COUNTY 14 ROAD
COUNTY 31 ROAD
COUNTY 77 ROAD
COUNTY 63 ROAD
COUNTY 8 ROAD
COUNTY 16 ROAD
COUNTY 62 ROAD
COUNTY 72 ROAD
COUNTY 61 ROAD
COUNTY 73 ROAD
COUNTY 71 ROAD
COUNTY 7 ROAD
COUNTY 74 ROAD
COUNTY 70 ROAD
COUNTY 17 ROAD
COUNTY 10 ROAD
COUNTY 59 ROAD
COUNTY 78 ROAD
COUNTY 58 ROAD
COUNTY 15 ROAD
COUNTY 75 ROAD
COUNTY 21 ROAD
COUNTY 3 ROAD
COUNTY 66 ROAD
COUNTY 55 ROAD
COUNTY 54 ROAD
COUNTY 12 ROAD
COUNTY 69 ROAD
COUNTY 53 ROAD
COUNTY 123 ROAD
COUNTY 19 ROAD
COUNTY 100 ROAD
COUNTY 52 ROAD
COUNTY 26 ROAD
COUNTY 101 ROAD
COUNTY 9 ROAD
COUNTY 102 ROAD
COUNTY 122 ROAD
COUNTY 105 ROAD
COUNTY 4 ROAD
COUNTY 107 ROAD
COUNTY 13 ROAD
COUNTY 106 ROAD
COUNTY 2 ROAD
COUNTY 23 ROAD
COUNTY 252 ROAD
COUNTY 103 ROAD
COUNTY 109 ROAD
COUNTY 18 ROAD
COUNTY 108 ROAD
COUNTY 1 ROAD
COUNTY 104 ROAD
COUNTY 11 ROAD
COUNTY 110 ROAD
COUNTY 112 ROAD
COUNTY 234 ROAD
MN Cities
Location Map
Scale: SHOWN
Drawn by: ESN
Checked by: MDA
Project No.: 3655-091
Date: 12/13/2016
Sheet: 1
HoustonEngineering Inc.
Path: H:\Fargo\Transfer\ESN\BlackRiver\LocationMXD.mxd 12/13/2016 3:44:21 PM (eneilson)

Appendix B

Site Photography

Wetland #1

Wetland #2

Wetland #3

Wetland #4

Wetland #5

Wetland #6

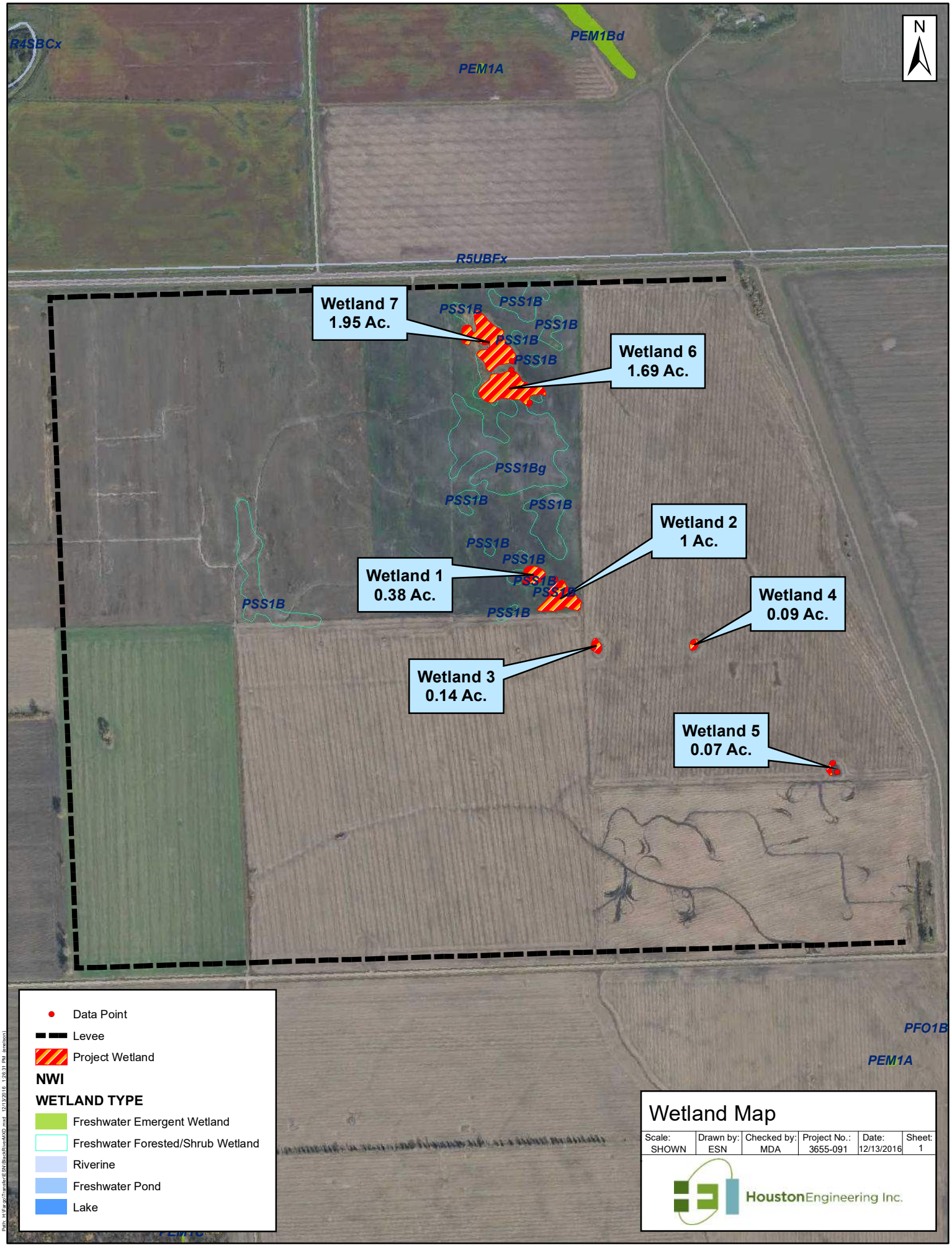
Wetland #7

River Channel

River Channel

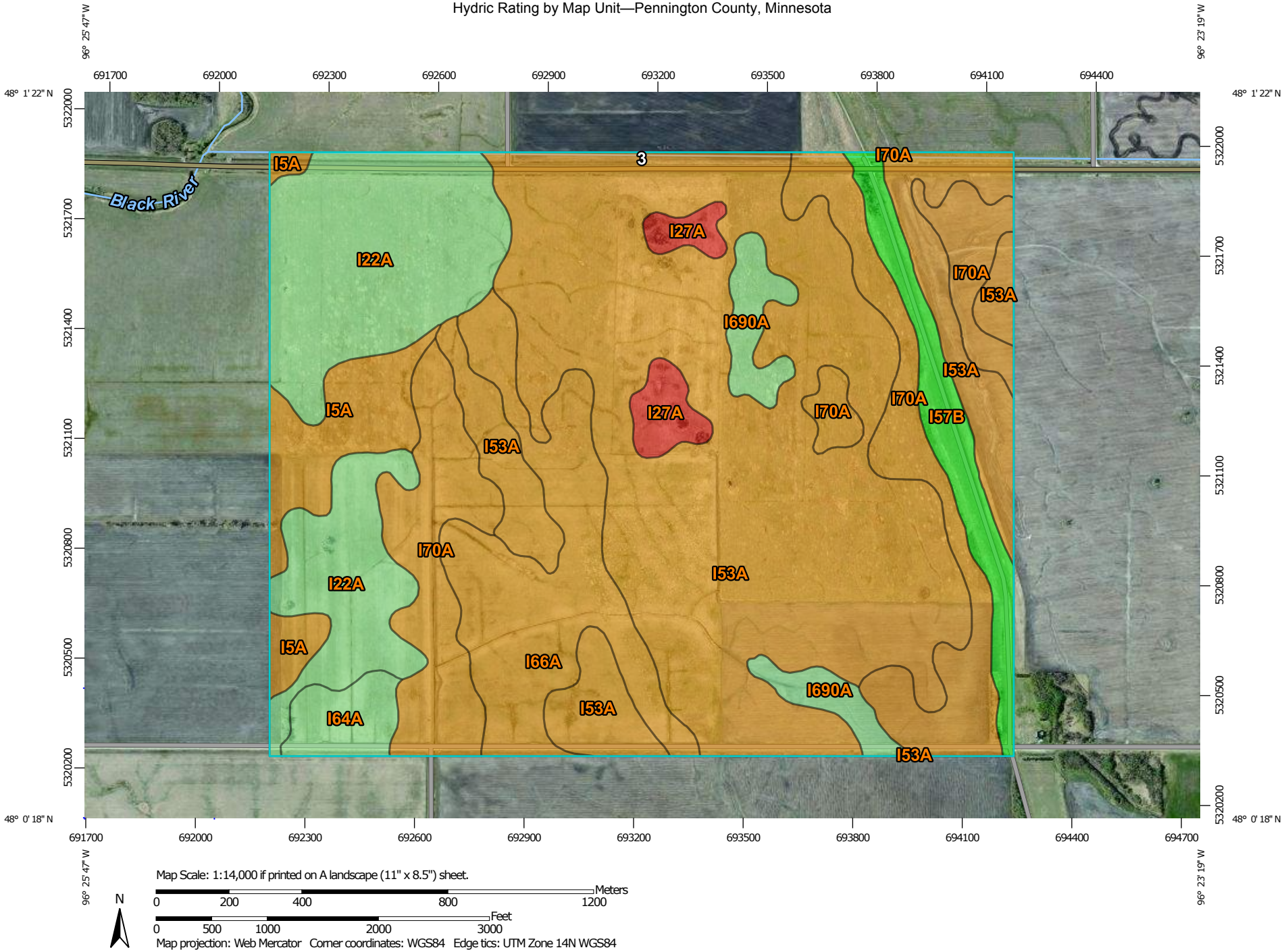
Appendix C

Wetland Inventory Map


R4SBCx
PEM1Bd
PEM1A
R5UBFx
Wetland 7
1.95 Ac.
PSS1B
Wetland 6
1.69 Ac.
PSS1Bg
Wetland 2
1 Ac.
Wetland 1
0.38 Ac.
Wetland 4
0.09 Ac.
Wetland 3
0.14 Ac.
Wetland 5
0.07 Ac.
PFO1B
PEM1A
N
Data Point
Levee
Project Wetland
NWI
WETLAND TYPE
Freshwater Emergent Wetland
Freshwater Forested/Shrub Wetland
Riverine
Freshwater Pond
Lake
Wetland Map
Scale: SHOWN
Drawn by: ESN
Checked by: MDA
Project No.: 3655-091
Date: 12/13/2016
Sheet: 1
HoustonEngineering Inc.

Appendix D

Soils Map



Map Scale: 1:14,000 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 200 400 800 1200

Feet: 0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 14N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)
- Not rated or not available

Soil Rating Lines
- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)
- Not rated or not available

Soil Rating Points
- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)
- Not rated or not available

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 1:12,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
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: Pennington County, Minnesota
Survey Area Data: Version 12, Sep 19, 2016

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 15, 2011—May 18, 2011

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.

Hydric Rating by Map Unit

Hydric Rating by Map Unit— Summary by Map Unit — Pennington County, Minnesota (MN113)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
I5A	Borup loam, 0 to 1 percent slopes	92	38.0	4.6%
I22A	Glyndon loam, Aspen Parkland, 0 to 2 percent slopes	15	127.9	15.3%
I27A	Hamre muck, 0 to 1 percent slopes	100	15.2	1.8%
I53A	Roliss loam, 0 to 2 percent slopes	95	379.0	45.5%
I57B	Sandberg-Radium complex, 1 to 6 percent slopes	0	32.0	3.8%
I64A	Ulen fine sandy loam, Aspen Parkland, 0 to 2 percent slopes	14	14.6	1.7%
I66A	Vallers loam, 0 to 2 percent slopes	91	82.2	9.9%
I70A	Strathcona fine sandy loam, 0 to 2 percent slopes	95	122.3	14.7%
I690A	Kittson loam, wet, 0 to 2 percent slopes	5	22.8	2.7%
Totals for Area of Interest			**834.0**	**100.0%**

Description

This rating indicates the percentage of map units that meets the criteria for hydric soils. Map units are composed of one or more map unit components or soil types, each of which is rated as hydric soil or not hydric. Map units that are made up dominantly of hydric soils may have small areas of minor nonhydric components in the higher positions on the landform, and map units that are made up dominantly of nonhydric soils may have small areas of minor hydric components in the lower positions on the landform. Each map unit is rated based on its respective components and the percentage of each component within the map unit.

The thematic map is color coded based on the composition of hydric components. The five color classes are separated as 100 percent hydric components, 66 to 99 percent hydric components, 33 to 65 percent hydric components, 1 to 32 percent hydric components, and less than one percent hydric components.

In Web Soil Survey, the Summary by Map Unit table that is displayed below the map pane contains a column named 'Rating'. In this column the percentage of each map unit that is classified as hydric is displayed.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). Under natural conditions, these soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 2002). These criteria are used to identify map unit components that normally are associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (Soil Survey Staff, 1999) and "Keys to Soil Taxonomy" (Soil Survey Staff, 2006) and in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils are specified in "Field Indicators of Hydric Soils in the United States" (Hurt and Vasilas, 2006).

References:

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436.

Soil Survey Staff. 2006. Keys to soil taxonomy. 10th edition. U.S. Department of Agriculture, Natural Resources Conservation Service.

Rating Options

Aggregation Method: Percent Present

Component Percent Cutoff: *None Specified*

Tie-break Rule: Lower

Appendix E

Wetland Summary Tables

Black River Impoundment Site, Pennington County, Minnesota – Great Plains Region

Fieldwork Date : November 16, 2016

Wetland Site 1

Species	Indicator Status	Native/Non-native
Herbs:		
Ambrosia artemisiifolia	FACU	Native
Asclepias incarnata	FACW	Native
Bromus ciliatus	FAC	Native
Bromus inermis	UPL	Introduced (invasive)
Carex atherodes	OBL	Native
Cirsium arvense	FACU	Introduced (invasive)
Epilobium ciliatum	FACW	Native
Helianthus grosseserratus	FACW	Native
Phalaris arundinacea	FACW	Introduced (naturalized)
Poa pratensis	FACU	Introduced (invasive)
Rumex crispus	FAC	Introduced (naturalized)
Solidago gigantea	FAC	Native
Spartina pectinata	FACW	Native
Symphyotrichum lanceolatum	FACW	Native
Toxicodendron radicans	FACU	Native
Typha sp.	OBL	Native
Shrubs:		
Rhamnus cathartica	FACU	Introduced (invasive)
Salix discolor	FACW	Native
Salix petiolaris	OBL	Native
Cornus alba	FACW	Native

Mapped Soil Unit – I27A Hamre muck

Sampled Soil Profile

	Matrix		Redox Features				
Depth (inches)	Color (moist)	%	Color (moist)	%	Type	Location	Texture
0-12	10YR 2/1	100					CL
12-16	2.5Y 5/2	85	2.5Y 4/6	15	C	M	C

Wetland Site 2

Species	Indicator Status	Native/Non-native
Herbs:		
Carex atherodes	OBL	Native
Cirsium arvense	FACU	Introduced (invasive)
Cycloloma atriplicifolium	FACU	Native
Fragaria virginiana (vesca)	FACU (UPL)	Native
Helianthus grosseserratus	FACW	Native
Lycopus americanus	OBL	Native
Persicaria amphibia	OBL	Native
Phalaris arundinacea	FACW	Introduced (naturalized)
Poa pratensis	FACU	Introduced (invasive)
Rumex crispus	FAC	Introduced (naturalized)
Solidago gigantea	FAC	Native
Sonchus arvensis	FAC	Introduced (naturalized)
Spartina pectinata	FACW	Native
Symphyotrichum ericoides	FACU	Native
Symphyotrichum laeve	FACU	Native
Toxicodendron radicans	FACU	Native
Trees:		
Populus tremuloides	FAC	Native
Shrubs:		
Cornus alba	FACW	Native
Salix discolor	FACW	Native
Salix petiolaris	OBL	Native
Vines:		
Smilax lasioneura	UPL	Native

Mapped Soil Unit – I27A Hamre muck

Sampled Soil Profile

	Matrix		Redox Features				
Depth (inches)	Color (moist)	%	Color (moist)	%	Type	Location	Texture
0-3	10YR 2/1	100					CL
3-17	2.5Y 6/2	95	10YR 5/6	5	C	M	CL

Wetland Site 3

Species	Indicator Status	Native/Non-native
Herbs:		
Ambrosia artemisiifolia	FACU	Native
Asclepias syriaca	UPL	Native
Cirsium arvense	FACU	Introduced (invasive)
Cycloloma atriplicifolium	FACU	Native
Eleocharis sp.	OBL	Native
Elymus repens	FACU	Introduced (invasive)
Melilotus officinalis	FACU	Introduced (invasive)
Phalaris arundinacea	FACW	Introduced (naturalized)
Poa pratensis	FACU	Introduced (invasive)
Setaria pumila	FACU	Introduced (naturalized)
Solidago canadensis	FACU	Native
Spartina pectinata	FACW	Native
Symphyotrichum laeve	FACU	Native
Typha sp.	OBL	Native
Shrubs:		
Salix interior	FACW	Native
Salix discolor	FACW	Native
Cornus alba	FACW	Native

Mapped Soil Unit – I53A Roliss loam

Sampled Soil Profile

	Matrix		Redox Features				
Depth (inches)	Color (moist)	%	Color (moist)	%	Type	Location	Texture
0-3	10YR 2/1	100					CL
3-15	2.5Y 6/2	90	10YR 5/6	10	C	M	CL

Wetland Site 4

Species	Indicator Status	Native/Non-native
Herbs:		
Ambrosia artemisiifolia	FACU	Native
Beckmannia syzigachne	OBL	Native
Cirsium arvense	FACU	Introduced (invasive)
Epilobium ciliatum	FACW	Native
Poa compressa	FACU	Introduced (invasive)
Rumex crispus	FAC	Introduced (naturalized)
Typha sp.	OBL	Native
Urtica dioica	FAC	Native
Shrubs:		
Salix sp.	---	---

Mapped Soil Unit – I53A Roliss loam

Soils – difficult to sample – rocks and boulders.

Wetland Site 5

Species	Indicator Status	Native/Non-native
Herbs:		
Asclepias syriaca	UPL	Native
Bromus ciliatus	FAC	Native
Cirsium arvense	FACU	Introduced (invasive)
Epilobium ciliatum	FACW	Native
Phalaris arundinacea	FACW	Introduced (naturalized)
Rumex crispus	FAC	Introduced (naturalized)
Setaria pumila	FACU	Introduced (naturalized)
Solidago gigantea	FAC	Native
Sonchus arvensis	FAC	Introduced (naturalized)
Spartina pectinata	FACW	Native
Typha sp.	OBL	Native
Urtica dioica	FAC	Native
Shrubs:		
Salix interior	FACW	Native
Symphoricarpos albus	UPL	Native

Mapped Soil Unit – I53A Roliss loam

Sampled Soil Profile

	Matrix		Redox Features				
Depth (inches)	Color (moist)	%	Color (moist)	%	Type	Location	Texture
0-8	10YR 2/1	100					CL
8-15	2.5Y 5/2	90	2.5Y 5/6	10	C	M	CL

Wetland Site 6

Species	Indicator Status	Native/Non-native
Herbs:		
Alisma gramineum (subcordatum)	OBL	Native
Ambrosia artemisiifolia	FACU	Native
Apocynum cannabinum	FAC	Native
Asclepias incarnata	FACW	Native
Asclepias syriaca	UPL	Native
Beckmannia syzigachne	OBL	Native
Bromus ciliatus	FAC	Native
Carex atherodes	OBL	Native
Cirsium arvense	FACU	Introduced (invasive)
Echinochloa crus-gali	FAC	Introduced
Epilobium ciliatum	FACW	Native
Geum canadense	FAC	Native
Helianthus grosseserratus	FACW	Native
Phalaris arundinacea	FACW	Introduced (naturalized)
Poa pratensis	FACU	Introduced (invasive)
Rosa arkansana	FACU	Native
Rumex crispus	FAC	Introduced (naturalized)
Schoenoplectus fluviatilis	OBL	Native
Scirpus atrovirens	OBL	Native
Solidago canadensis	FACU	Native
Solidago gigantea	FAC	Native
Spartina pectinata	FACW	Native
Symphyotrichum ericoides	FACU	Native
Symphyotrichum lanceolatum	FACW	Native
Tridens flavus	UPL	Native
Typha sp.	OBL	Native
Shrubs:		
Cornus alba	FACW	Native
Populus tremuloides	FAC	Native
Salix petiolaris	OBL	Native

Mapped Soil Unit – I53A Roliss loam

Sampled Soil Profile

	Matrix		Redox Features				
Depth (inches)	Color (moist)	%	Color (moist)	%	Type	Location	Texture
0-9	10YR 2/1	100					CL
9-16	2.5Y 5/2	90	10YR 5/6	10	C	M	CL

Wetland Site 7

Species	Indicator Status	Native/Non-native
Herbs:		
Apocynum cannabinum	FAC	Native
Asclepias incarnata	FACW	Native
Bromus inermis	UPL	Introduced (Invasive)
Chamaecrista faciculata	FACU	Native
Helianthus grosseserratus	FACW	Native
Panicum virgatum	FAC	Native
Phalaris arundinacea	FACW	Introduced (naturalized)
Poa pratensis	FACU	Introduced (Invasive)
Pycnanthemum virginianum	FAC	Native
Rosa arkansana		Native
Rumex crispus	FAC	Introduced (naturalized)
Solidago gigantea	FAC	Native
Sonchus arvensis	FAC	Introduced (naturalized)
Spartina pectinata	FACW	Native
Symphyotrichum ericoides	FACU	Native
Symphyotrichum laeve	FACU	Native
Toxicodendron radicans	FACU	Native
Urtica dioica	FAC	Native
Viburnum opulus	FAC	Native (introduced)
Shrubs:		
Alnus incannata	FACW	Native
Cornus alternifolia	FACU	Native
Cornus alba	FACW	Native
Crataegus chrysocarpa		Native
Lonicera dioica	FACU	Native
Prunus americana	UPL	Native
Rhamnus cathartica	UPL	Introduced (invasive)
Salix discolor	FACW	Native
Salix petiolaris	OBL	Native
Populus tremuloides	FAC	Native
Trees:		
Ulmus americana	FAC	Native

Mapped Soil Unit – I27A Hamre muck

Sampled Soil Profile

	Matrix		Redox Features				
Depth (inches)	Color (moist)	%	Color (moist)	%	Type	Location	Texture
0-1	10YR 2/1	100					CL
1-12	2.5Y 7/2	80	2.5Y 5/6	20	C	M	C

APPENDIX E

Aquatic Resource Delineation Report (Diversion Ditches)

AQUATIC RESOURCE DELINEATION REPORT

Black River Diversion Ditches, Pennington County, MN

Prepared for:

Red Lake Watershed District

1000 Pennington Ave S

Thief River Falls, MN 56701

I hereby certify that this report was prepared by me or under my direct supervision.

Mark D. Aanenson
Houston Engineering Inc.
CWD Certification No. 1001

Date: September 29, 2017

HEI project no. 3655-091

HoustonEngineering Inc.

EXECUTIVE SUMMARY

Staff from Houston Engineering, Inc. (Houston Engineering) completed the components of a field investigation of the subject area to identify and delineate aquatic resources for a project on behalf of the Red Lake Watershed District. The subject property is located in Townships 153N and 152N near St. Hilaire, in Pennington County, Minnesota. The delineation was conducted in accordance with the 1987 Corps of Engineers Wetland Delineation Manual, and the Great Plains Regional Supplement (2010). Results of the field delineations indicate there are 17 wetland areas (total 23.16 acres) located in the 2216.08 acre survey area. The wetlands are either road ditch wetlands or natural depressions. Some of the wetlands are classified by the National Wetlands Inventory (NWI) as PEM1C (palustrine, emergent, persistent, seasonally flooded) or R5UBFx (riverine, unconsolidated bottom, semi-permanently flooded, excavated) (Cowardin et al. 1979). The general condition of the aquatic resources is fair.

1 INTRODUCTION

Staff from Houston Engineering, Inc. (Houston Engineering) completed a field investigation in accordance with the 1987 Army Corps of Engineers Wetland Delineation Manual, and the Great Plains Regional Supplement. The proposed construction includes construction of an impoundment with diversion ditches. The purpose of this report is to identify the wetlands and water resources that could be impacted by the project.

2 LOCATION

The project is located in Townships 153N and 152N near the town of St. Hilaire in Pennington County, Minnesota (general latitude: 48.030481, longitude: -96.376425, **Appendix A: Location Map**). All of the project boundaries are along roads. The project is 7.8 miles west of St. Hilaire, MN (driving directions: from St. Hilaire, head south on Broadway Avenue toward Ash St. (110th St SW); turn right onto Ash/110th St SW; continue on Ash/110th St SW for 4.7 miles where the southern stretch of the project area begins). The project corridor consists of four lengths along 110th St SW (3.67 miles), Center St W (1.38 miles), 160th Ave NW (2.43 miles), and 150th Ave NW (3.94 miles) (**Appendix B: Wetland Maps with NWI**).

3 METHODS

For the delineation, we followed the methods described in the 1987 Manual for “routine” delineations. Additionally, we followed methodology specific to the Great Plains Regional Supplement (2010). Prior to the field delineation to identify potential wetland habitats and provide guidance for the investigation of wetlands at the project site, we reviewed the U.S. Fish and Wildlife Service NWI, and the county digital soil surveys (USDA-NRCS), as well as current and historical aerial photography.

The following procedures were used to determine wetland habitats:

- We surveyed vegetation to determine the proportion of the dominant plant species classified as either obligate wetland, facultative wetland, or facultative plants; or if other indicators of wetland vegetation were present.
- We sampled the soil using a soil probe to identify soil morphology, redoximorphic features and soil texture. We determined the hydric soil indicators according to Field Indicators of Hydric Soils in the United States; Guide for Identifying and Delineating Hydric Soils, Version 7.0 (USDA-NRCS, 2010).
- We determined wetland hydrology on-site by observation of primary and secondary hydrologic indicators (US Army Corps of Engineers, 2010). The wetland hydrology determination uses the criteria of the presence of water within 12 inches of the surface for 14 days during the growing season, or within 24 inches of the surface during the dry part of the growing season. We also used aerial photography to assist hydrologic assessment.

Staff from Houston Engineering (Donna Jacob and Mark D. Aanenson) performed fieldwork on August 23rd and 24th, 2017. We marked the wetland boundaries and sample locations using a Trimble Geo 7X handheld GPS unit with centimeter accuracy for those representative plant communities present along the wetland boundaries. Sample points included observations of dominant vegetation, soil profiling including color and texture, and indications of hydrology. We also used additional, undocumented sample points throughout the delineation to verify vegetation, hydric soils, and hydrology. We recorded our observations using data forms and geolocated photographs.

4 EXISTING CONDITIONS

Landscape Setting:

The project area is located in the Lake Agassiz ecological province, Aspen Parklands subsection (AP). The AP subsection consists of level to gently rolling topography, as it was formed in the basin of Glacial Lake Agassiz. The soil features of this area are characteristic of glacial lake deposits including sandy, loamy, and clay/silt deposits. This area of the AP subsection drains to the southeast to the Black River, which flows south (**Appendix C: LiDAR Maps**). Pre-settlement vegetation had been highly influenced by variations in the water table and by natural burning events, which created a complex mosaic of ecological communities. The project is located in the southern half of the subsection where agriculture dominates the present land use (MN DNR 1999).

Climatic Conditions:

The weather conditions at the time of the delineation were good. The climatic conditions in the area were drier than normal because of decreased precipitation in the months before (Fig. 1 Antecedent Precipitation, MN State Climatology Office, 2016).

Figure 1: Antecedent precipitation

values are in inches A 'R' following a monthly total indicates a provisional value derived from radar-based estimates.	first prior month: **July 2017**	second prior month: **June 2017**	third prior month: **May 2017**
estimated precipitation total for this location:	**1.07R**	**4.26R**	**2.09R**
there is a 30% chance this location will have less than:	2.26	2.86	1.81
there is a 30% chance this location will have more than:	4.82	5.28	3.69
type of month: dry normal wet	**dry**	**normal**	**normal**
monthly score	**3 * 1 = 3**	**2 * 2 = 4**	**1 * 2 = 2**
multi-month score: 6 to 9 (dry) 10 to 14 (normal) 15 to 18 (wet)	**9 (Dry)**		

Aquatic Resources: Results of the field wetland delineation indicate there are 17 wetland areas located within in the 2216.08 acre project area. Some of the wetlands are listed in the NWI **(Table 1, Appendix B: Wetland Maps with NWI)**. Most of the wetlands were formed with the construction of the road ditches. These are mostly PEM1C wetlands (palustrine, emergent, persistent, seasonally flooded) (see **Appendix D: Site Photographs**).

Site descriptions:

Wetland 1: road ditch wetland not classified by the NWI.

Wetland 2: road ditch wetland not classified by the NWI.

Wetland 3: road ditch wetland not classified by the NWI. Wetland 3 connects to a field drain exiting the field to the east, and also connects with three natural depression areas that extend beyond the project boundary in an agricultural field to the east. These depressions are not classified by the NWI.

Wetland 4: road ditch wetland not classified by the NWI.

Wetland 5: natural depression classified by the NWI as PEM1C.

Wetland 6: road ditch wetland not classified by the NWI.

Wetland 7: road ditch wetland not classified by the NWI.

Wetland 8: road ditch wetland classified as R5UBFx by the NWI.

Wetland 9: road ditch wetland not classified by the NWI.

Wetland 10: road ditch wetland not classified by the NWI. Wetland 10 extends into a depression in an agricultural field to the east.

Wetland 11: road ditch wetland not classified by the NWI.

Wetland 12: road ditch wetland not classified by the NWI.

Wetland 13: road ditch wetland not classified by the NWI.

Wetland 14: road ditch wetland not classified by the NWI.

Wetland 15: road ditch wetland not classified by the NWI. Wetland 15 connects with a natural depression that is classified as PEM1Cd by the NWI.

Wetland 16: road ditch wetland not classified by the NWI. Wetland 16 connects with a field drain from the agricultural field to the north, and with a natural wetland that is classified as PEM1B/SS1Ad.

Wetland 17: road ditch wetland not classified by the NWI.

Table 1: Delineated Wetlands and their characteristics (data limited to project boundary only)

Wetland Number	NWI Listing	Wetland type			Wetland area (acres)	Latitude (center)	Longitude (center)
		Cowardin et al. 1979	Circular 39 (Shaw and Fredine 1959)	Eggers and Reed (2015)			
1	Upland	PEM1Cd	Type 3	Shallow Marsh	0.25	48.076838	-96.370874
2	Upland	PEM1Cd	Type 3	Shallow Marsh	1.77	48.069628	-96.371098
3	Upland	PEM1Cd	Type 3	Shallow Marsh	8.48	48.052157	-96.371018
4	Upland	PEM1Cd	Type 3	Shallow Marsh	0.33	48.048128	-96.392845
5	PEMC	PEM1Cd	Type 3	Shallow Marsh	0.32	48.039930	-96.370992
6	Upland	PEM1Cd	Type 3	Shallow Marsh	0.03	48.035974	-96.392791
7	Upland	PEM1Cd	Type 3	Shallow Marsh	0.06	48.034341	-96.393006
8	R5UBFx	PEM1Cd	Type 3	Shallow Marsh	3.43	48.006917	-96.430458
9	Upland	PEM1Cd	Type 3	Shallow Marsh	0.51	48.031987	-96.370545
10	Upland	PEM1Cd	Type 3	Shallow Marsh	0.22	48.030521	-96.370978
11	Upland	PEM1Cd	Type 3	Shallow Marsh	0.09	48.025175	-96.392919
12	Upland	PEM1Cd	Type 3	Shallow Marsh	0.08	48.021193	-96.387047
13	Upland	PEM1Cd	Type 3	Shallow Marsh	0.01	48.006915	-96.363686
14	Upland	PEM1Cd	Type 3	Shallow Marsh	0.11	48.006925	-96.381892
15	PEM1Cd	PEM1Cd	Type 3	Shallow Marsh	0.72	48.006698	-96.326324
16	PEMB/SS1B	PEM1Cd/SS1B	Type2/6	Wet Meadow/ Shrub Swamp	6.45	48.006929	-96.358624
17	Upland	PEM1Cd	Type 3	Shallow Marsh	0.30	48.006930	-96.430427
total acres within project boundary					23.16		

Hydrology description:

Most of the road ditch wetlands in this area receive runoff from the surrounding agricultural fields with drainage ditches, and some connect with natural depression wetlands. The project area drains to the southwest toward Black River.

Soil descriptions:

Dominant soils within the project site areas are well to excessively drained and are formed in till, coarse-silty glaciolacustrine deposits, and glaciolacustrine deposits over till. The project area is composed of a variety of soil types with slopes ranging between 0-30% (**Appendix E: Hydric Soil Maps**). The dominant soil include Roliss loam (hydric rating: 95%).

Vegetation descriptions:

Dominant species in the wetland areas within the project area (**Appendix F: Plant List** and **Appendix G: Data Forms**) represent tree, shrub, and herb strata. There is one wetland dominant tree species, *Acer negundo* (ash-leaf maple), and one wetland dominant shrub species, *Salix petiolaris* (meadow willow). A wide variety of wetland herbs are present with the more frequent species including *Agrostis stolonifera* (spreading bent), *Beckmannia syzigachne* (American slough-grass), *Equisetum palustre* (marsh horsetail), *Phalaris arundinacea* (reed-canary grass), and *Typha sp.* (cattail).

Commerce:

There are no evident commerce activities associated with this wetland.

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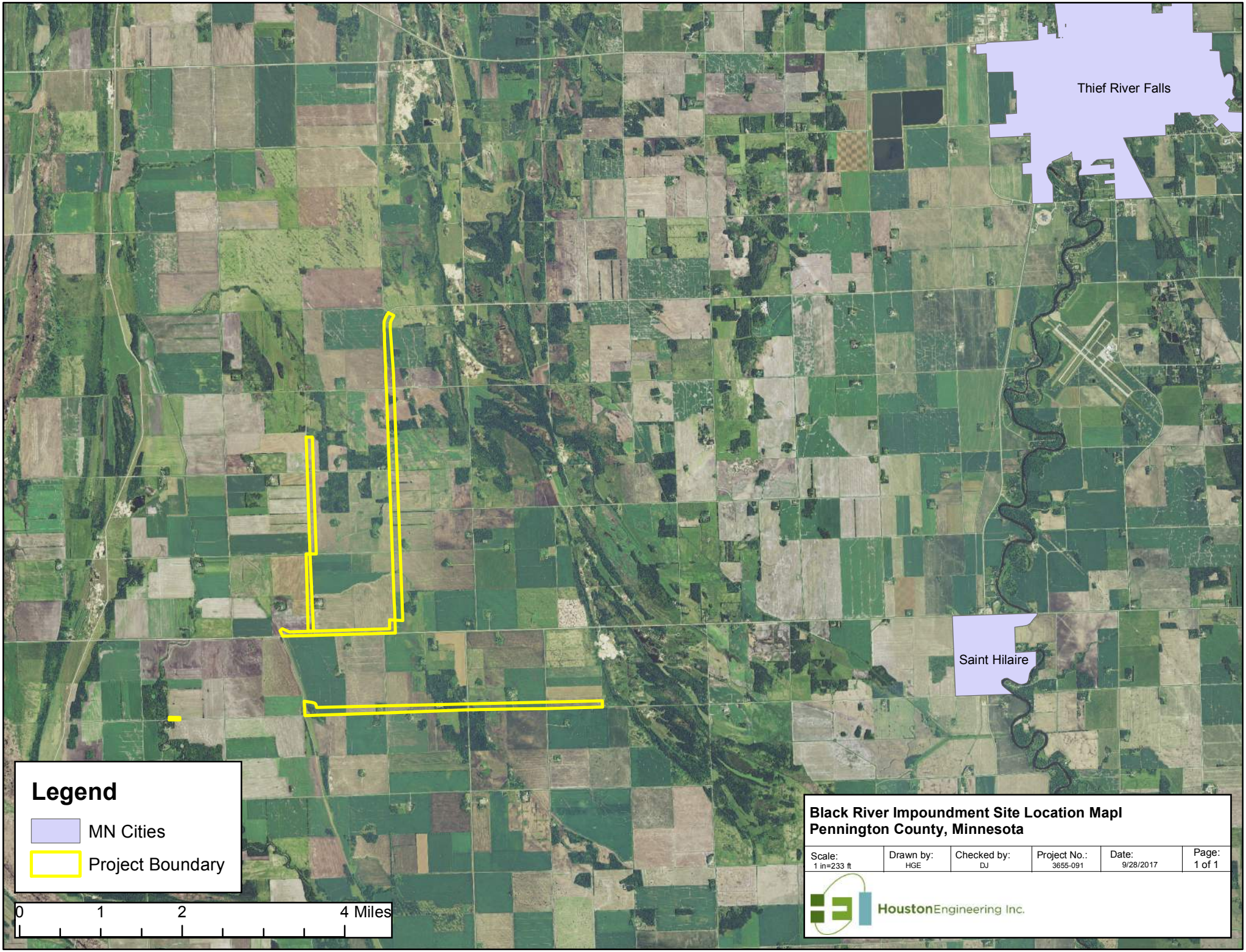
Appendix A

Location Map



Black River Impoundment Site Location Mapl
Pennington County, Minnesota

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Appendix B

Wetland Maps with NWI

with

Index Reference Map

Black River Impoundment Index Reference Map
Pennington County, Minnesota

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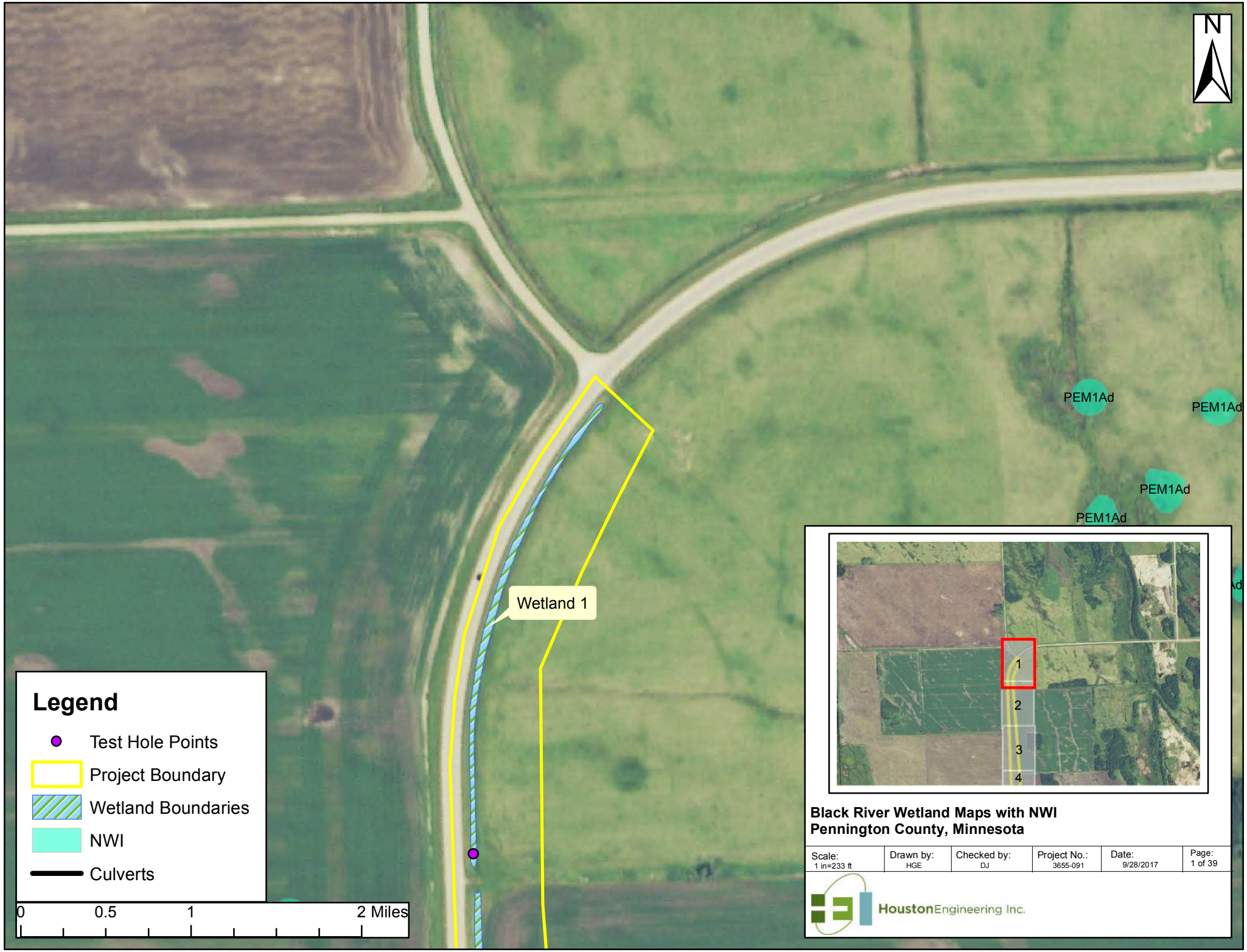

Black River Wetland Maps with NWI
Pennington County, Minnesota

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Black River Wetland Maps with NWI
Pennington County, Minnesota

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Black River Wetland Maps with NWI
Pennington County, Minnesota

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Black River Wetland Maps with NWI
Pennington County, Minnesota

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Black River Wetland Maps with NWI
Pennington County, Minnesota

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Black River Wetland Maps with NWI
Pennington County, Minnesota

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Black River Wetland Maps with NWI
Pennington County, Minnesota

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Black River Wetland Maps with NWI
Pennington County, Minnesota

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Black River Wetland Maps with NWI
Pennington County, Minnesota

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Black River Wetland Maps with NWI
Pennington County, Minnesota

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Pennington County, Minnesota

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Black River Wetland Maps with NWI
Pennington County, Minnesota

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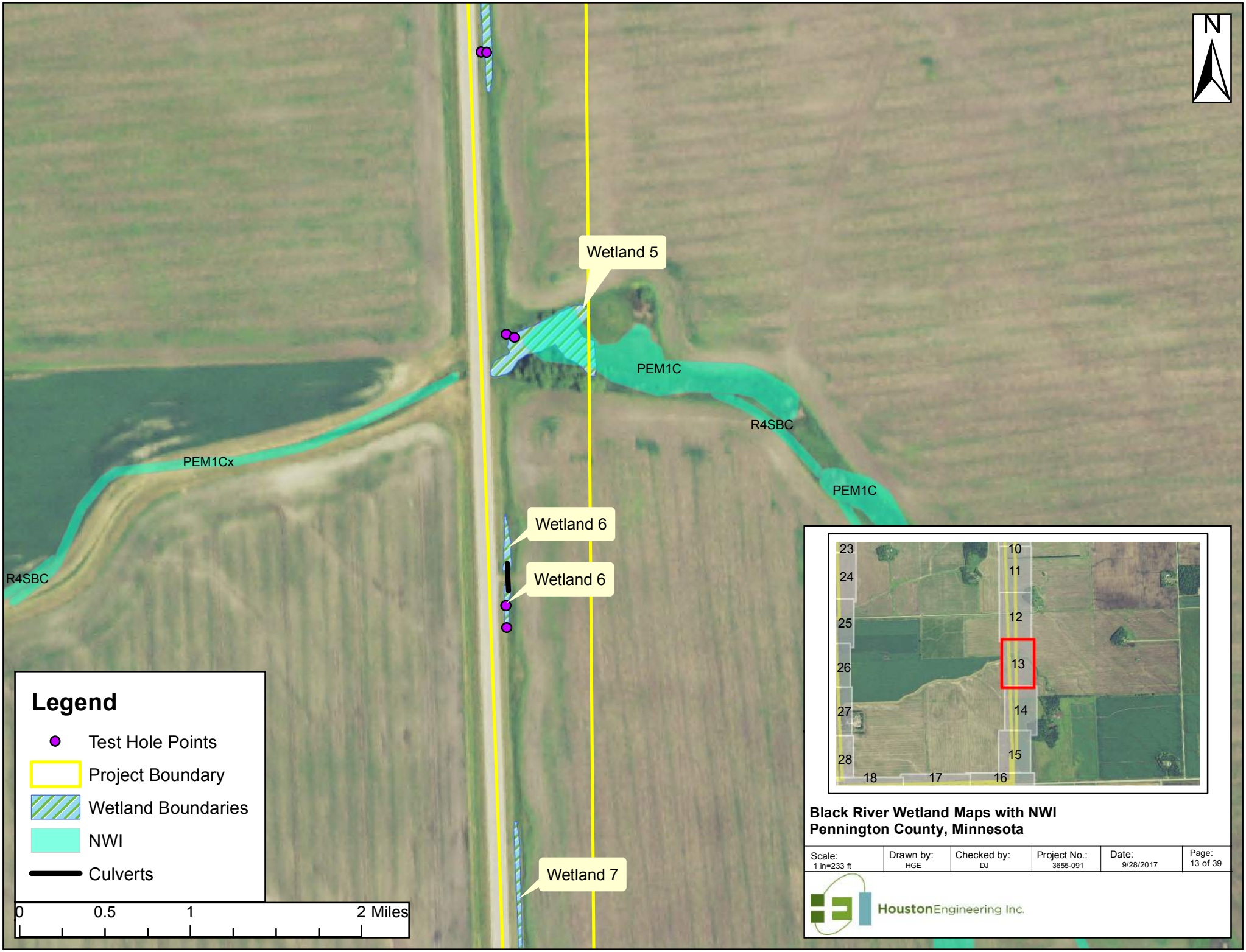

Black River Wetland Maps with NWI
Pennington County, Minnesota

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Black River Wetland Maps with NWI
Pennington County, Minnesota

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Black River Wetland Maps with NWI
Pennington County, Minnesota

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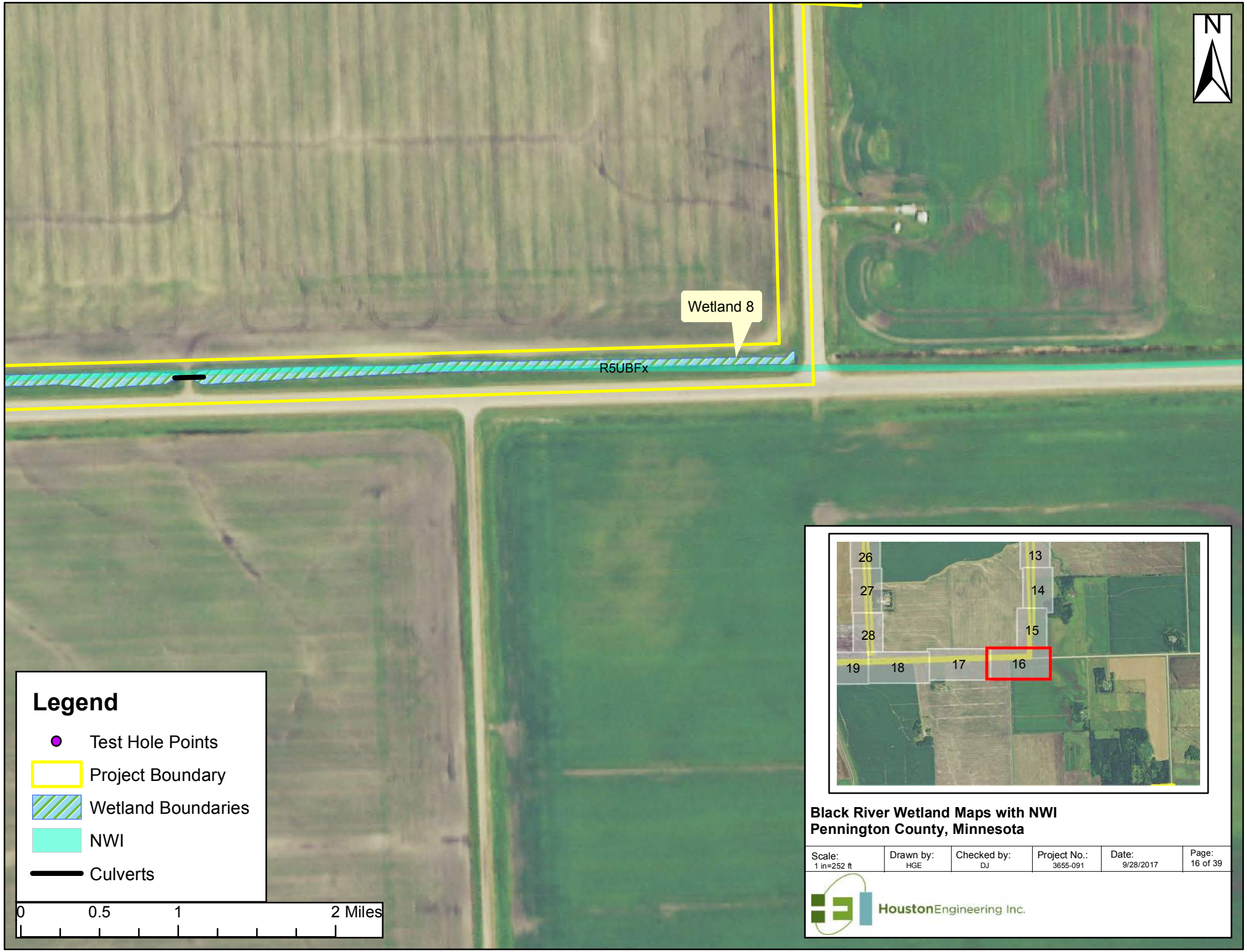

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Pennington County, Minnesota

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Black River Wetland Maps with NWI
Pennington County, Minnesota

Scale:	Drawn by:	Checked by:	Project No.:	Date:	Page:
1 in=252 ft	HGE	DJ	3655-091	9/28/2017	17 of 39

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Black River Wetland Maps with NWI
Pennington County, Minnesota

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Pennington County, Minnesota

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Pennington County, Minnesota

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Pennington County, Minnesota

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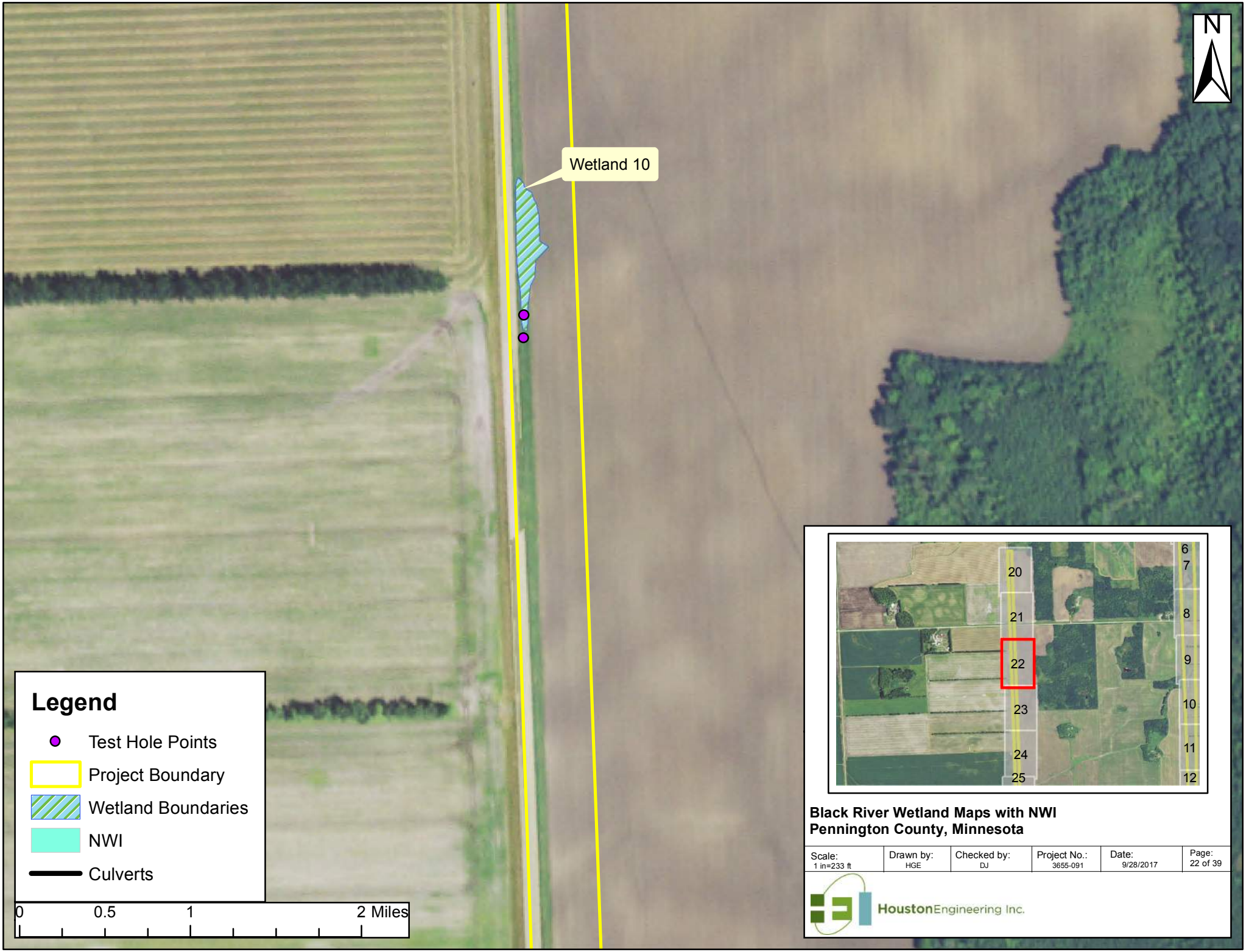

Black River Wetland Maps with NWI
Pennington County, Minnesota

Scale:	Drawn by:	Checked by:	Project No.:	Date:	Page:
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Black River Wetland Maps with NWI
Pennington County, Minnesota

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1 in=233 ft	HGE	DJ	3655-091	9/28/2017	23 of 39

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Black River Wetland Maps with NWI
Pennington County, Minnesota

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1 in=233 ft	HGE	DJ	3655-091	9/28/2017	24 of 39

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Black River Wetland Maps with NWI
Pennington County, Minnesota

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Black River Wetland Maps with NWI
Pennington County, Minnesota

Scale:	Drawn by:	Checked by:	Project No.:	Date:	Page:
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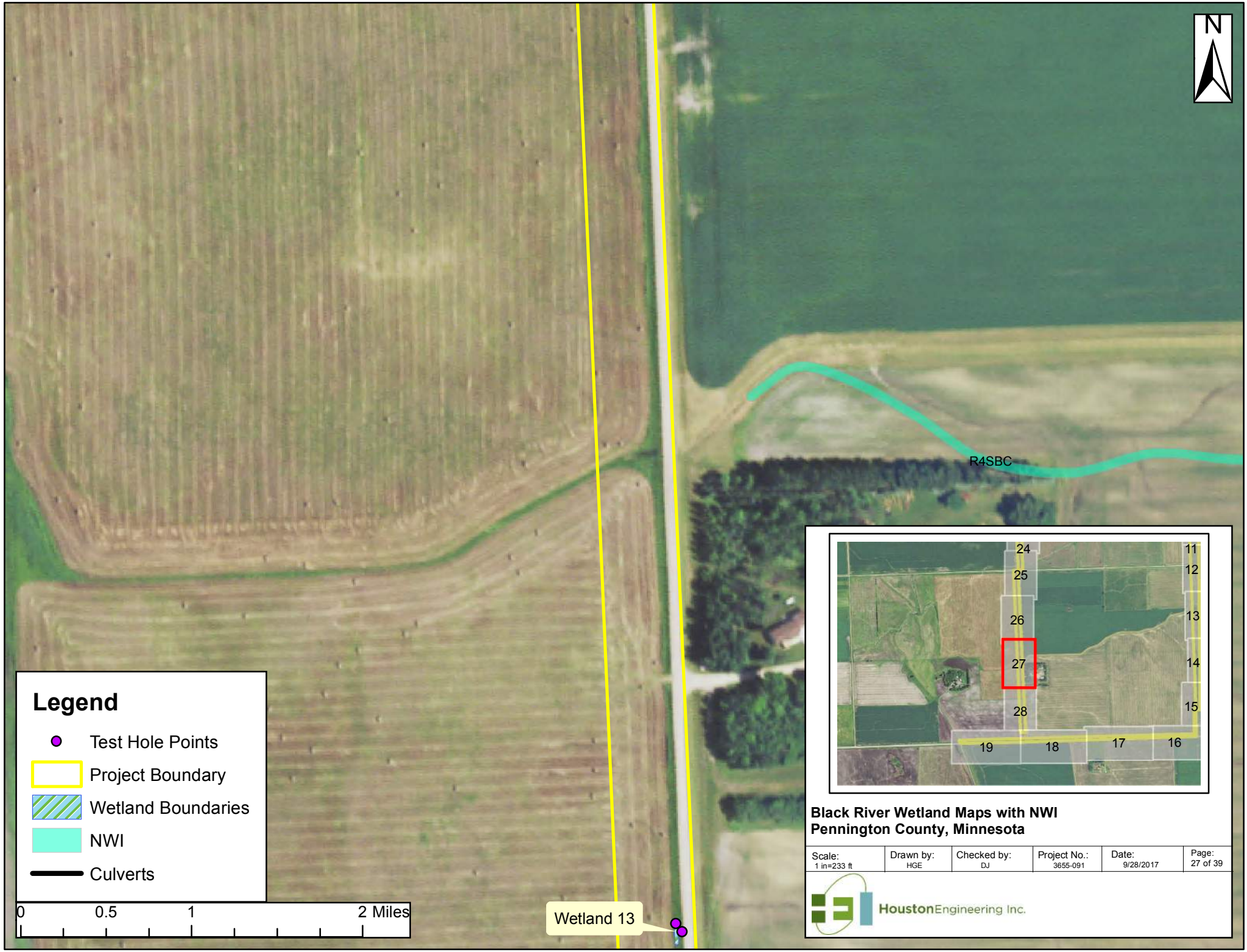
HoustonEngineering Inc.



Black River Wetland Maps with NWI
Pennington County, Minnesota

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Black River Wetland Maps with NWI
Pennington County, Minnesota

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1 in=233 ft	HGE	DJ	3655-091	9/28/2017	28 of 39

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Black River Wetland Maps with NWI
Pennington County, Minnesota

Scale:	Drawn by:	Checked by:	Project No.:	Date:	Page:
1 in=254 ft	HGE	DJ	3655-091	9/28/2017	29 of 39

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N
PEM1Ad
PEM1Ad
PEM1Ad
PEM1Ad
PEM1Ad
PEM1A
PEM1A
PEM1A
PEM1A
Wetland 15
Legend
Test Hole Points
Project Boundary
Wetland Boundaries
NWI
Culverts
0
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1
2 Miles
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32
31
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29
Black River Wetland Maps with NWI
Pennington County, Minnesota
Scale: 1 in=253 ft
Drawn by: HGE
Checked by: DJ
Project No.: 3655-091
Date: 9/28/2017
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PEM1Ad
PEM1Ad
PEM1Ad
PEM1Ad
PEM1Ad
Legend
Test Hole Points
Project Boundary
Wetland Boundaries
NWI
Culverts
0
0.5
1
2 Miles
34
33
32
31
30
29
Black River Wetland Maps with NWI
Pennington County, Minnesota
Scale: 1 in=252 ft
Drawn by: HGE
Checked by: DJ
Project No.: 3655-091
Date: 9/28/2017
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Black River Wetland Maps with NWI
Pennington County, Minnesota

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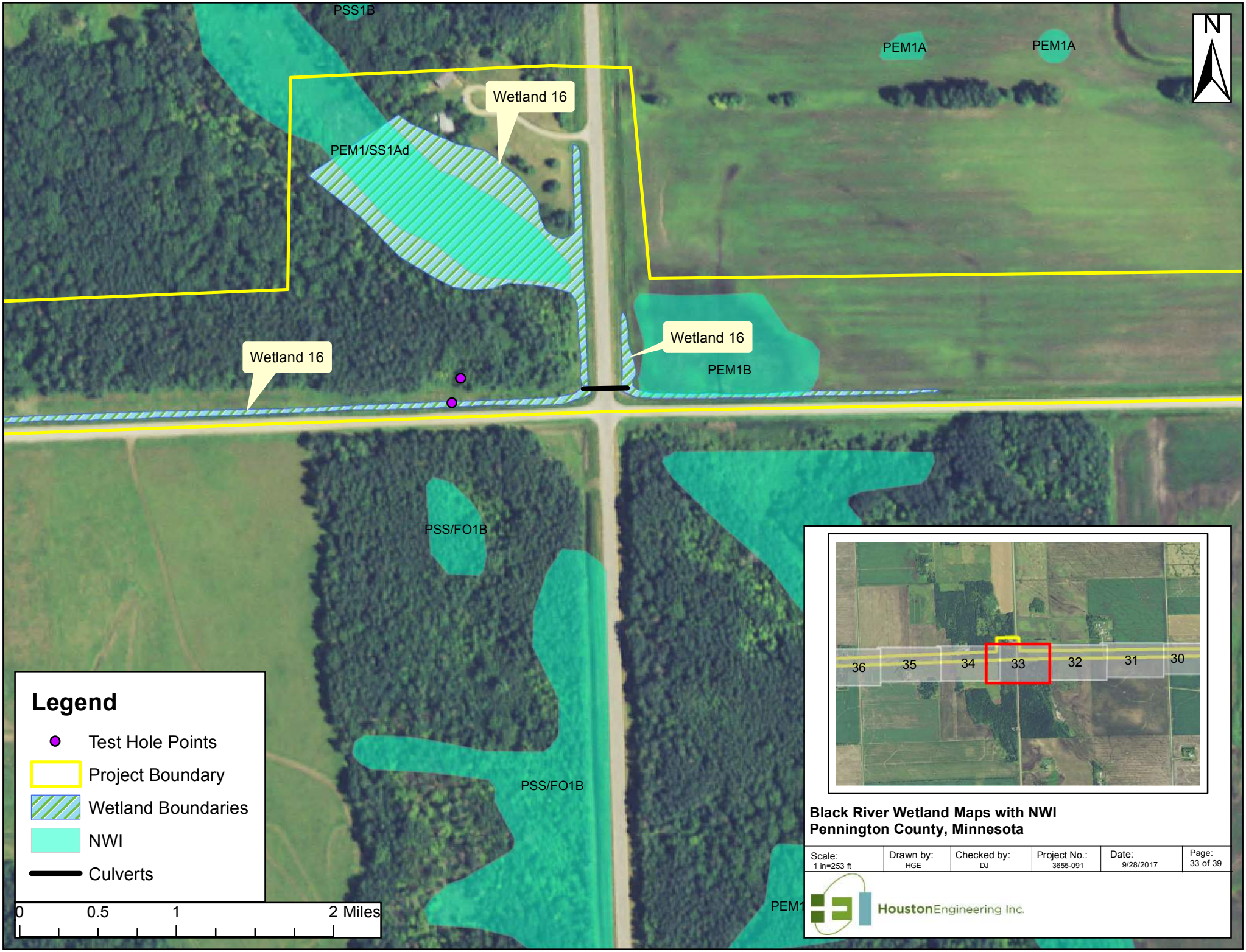

Black River Wetland Maps with NWI
Pennington County, Minnesota

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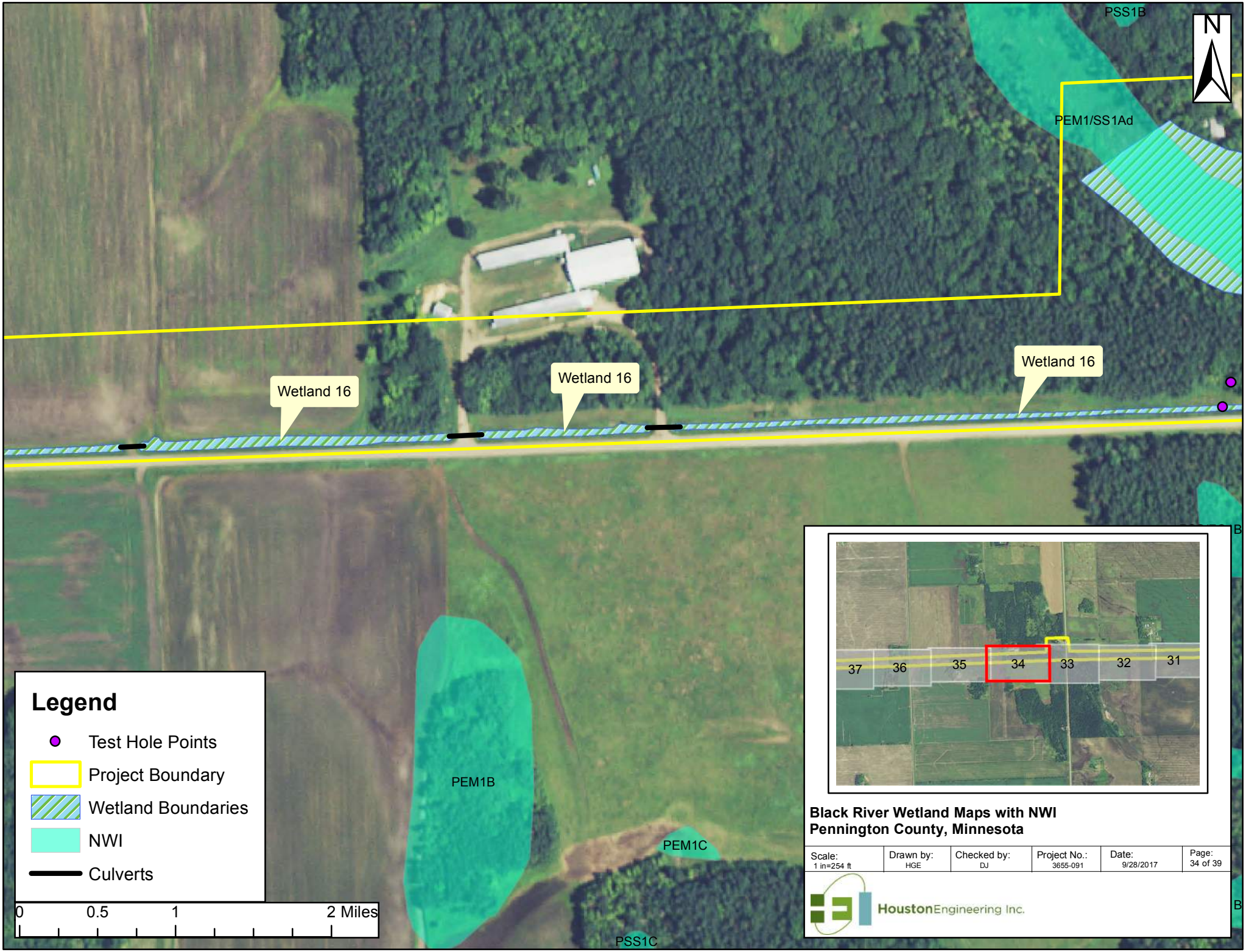
PSS1B
N
PEM1/SS1Ad
Wetland 16
Wetland 16
Wetland 16
PEM1B
PEM1C
PSS1C
Legend
Test Hole Points
Project Boundary
Wetland Boundaries
NWI
Culverts
0
0.5
1
2 Miles
37
36
35
34
33
32
31
Black River Wetland Maps with NWI
Pennington County, Minnesota
Scale: 1 in=254 ft
Drawn by: HGE
Checked by: DJ
Project No.: 3655-091
Date: 9/28/2017
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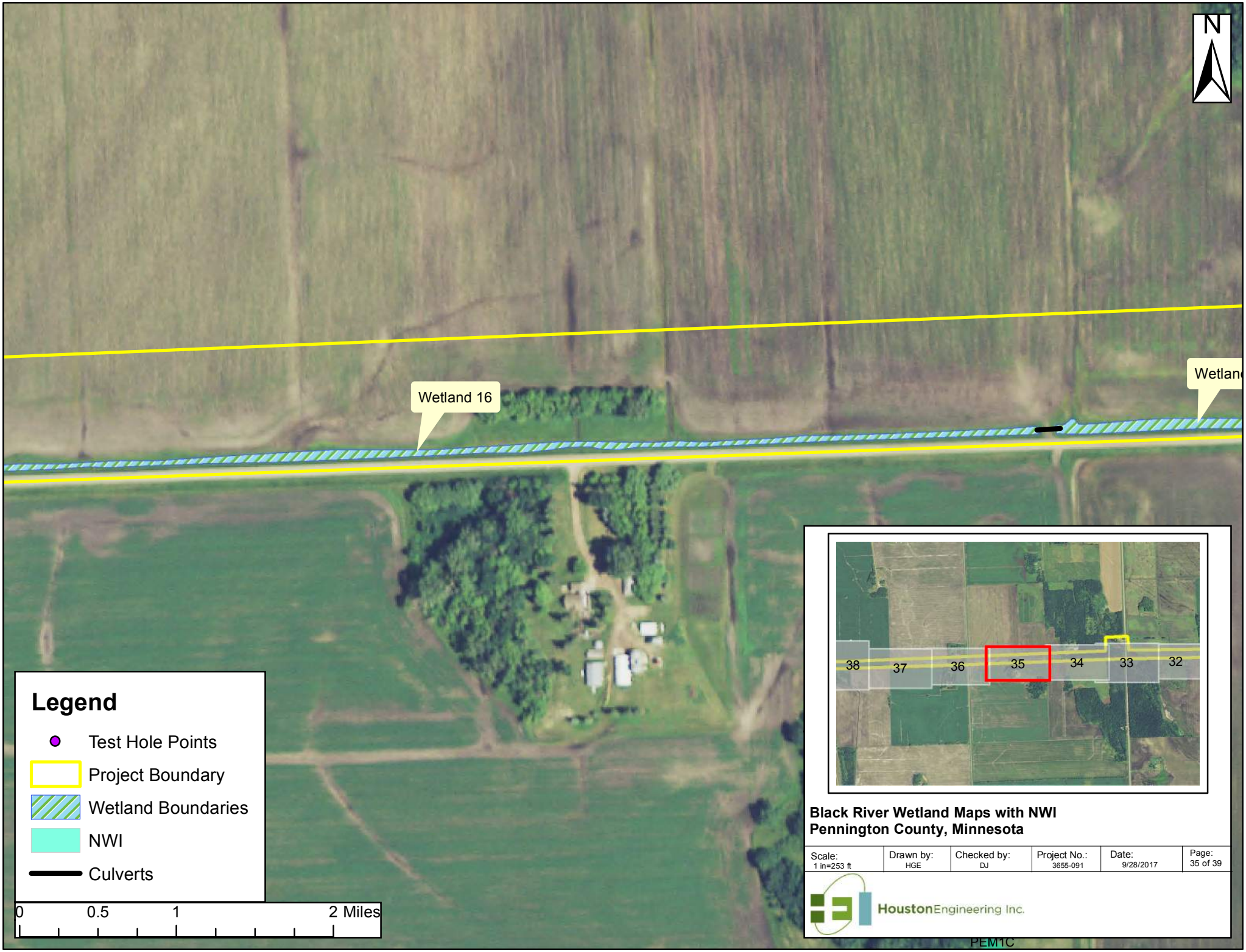

Black River Wetland Maps with NWI
Pennington County, Minnesota

Scale:	Drawn by:	Checked by:	Project No.:	Date:	Page:
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Black River Wetland Maps with NWI
Pennington County, Minnesota

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1 in=253 ft	HGE	DJ	3655-091	9/28/2017	36 of 39

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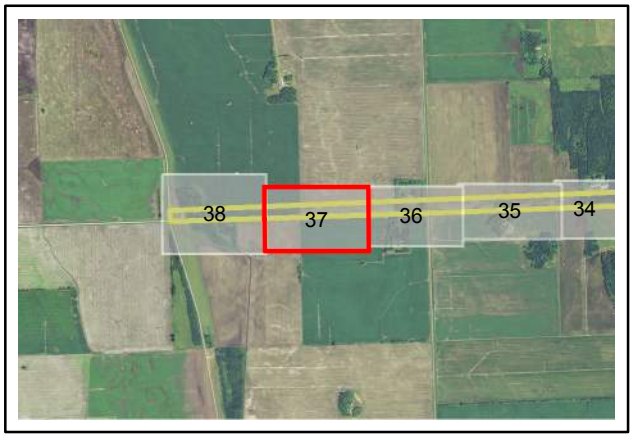
PSS1Bd

Wetland 16

N



Black River Wetland Maps with NWI
Pennington County, Minnesota

Scale:	Drawn by:	Checked by:	Project No.:	Date:	Page:
1 in=254 ft	HGE	DJ	3655-091	9/28/2017	37 of 39

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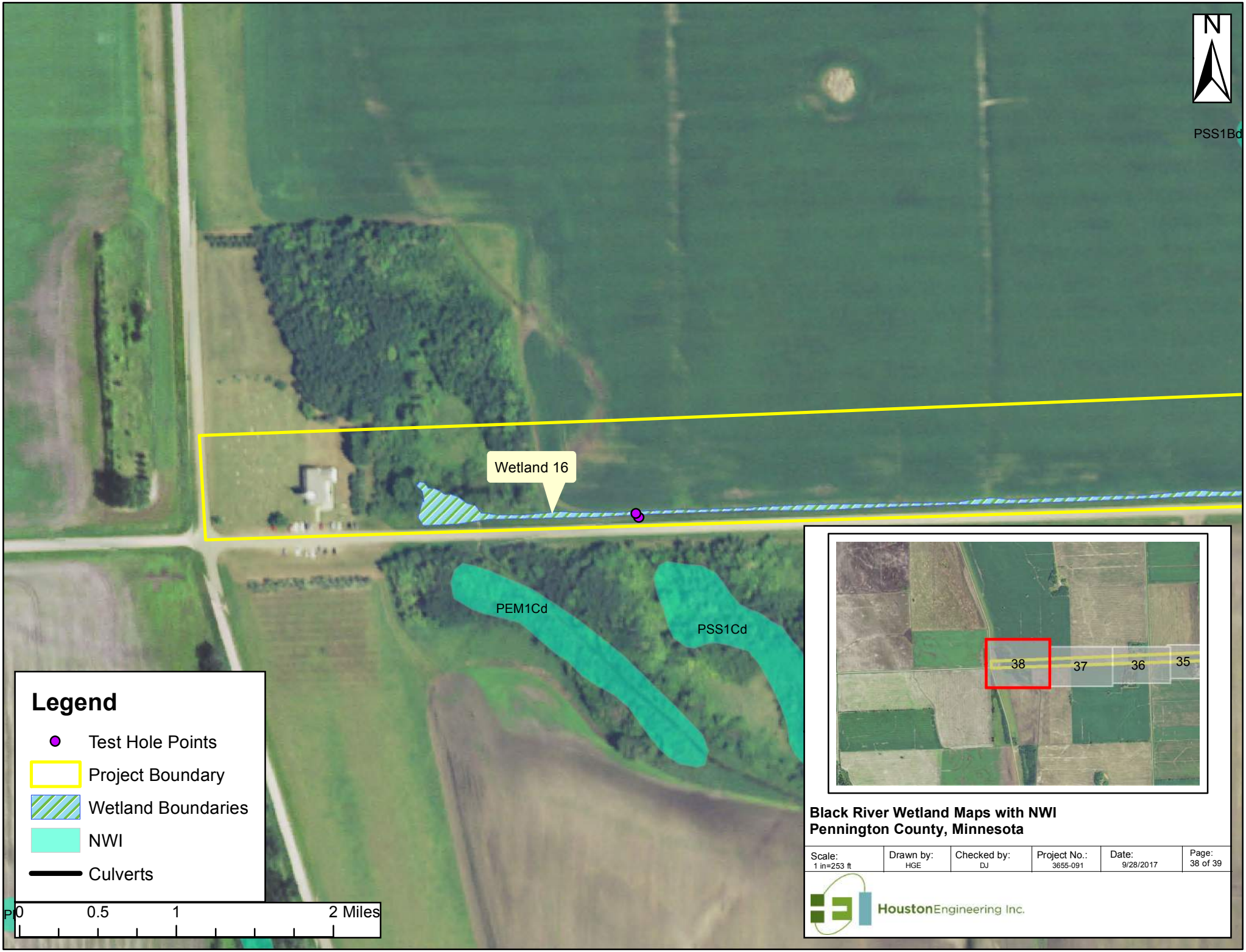
Legend

- Test Hole Points
- Project Boundary
- Wetland Boundaries
- NWI
- Culverts

0 0.5 1 2 Miles



Black River Wetland Maps with NWI
Pennington County, Minnesota

Scale:	Drawn by:	Checked by:	Project No.:	Date:	Page:
1 in=253 ft	HGE	DJ	3655-091	9/28/2017	38 of 39

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Black River Wetland Maps with NWI
Pennington County, Minnesota

Scale:	Drawn by:	Checked by:	Project No.:	Date:	Page:
1 in=241 ft	HGE	DJ	3655-091	9/28/2017	39 of 39

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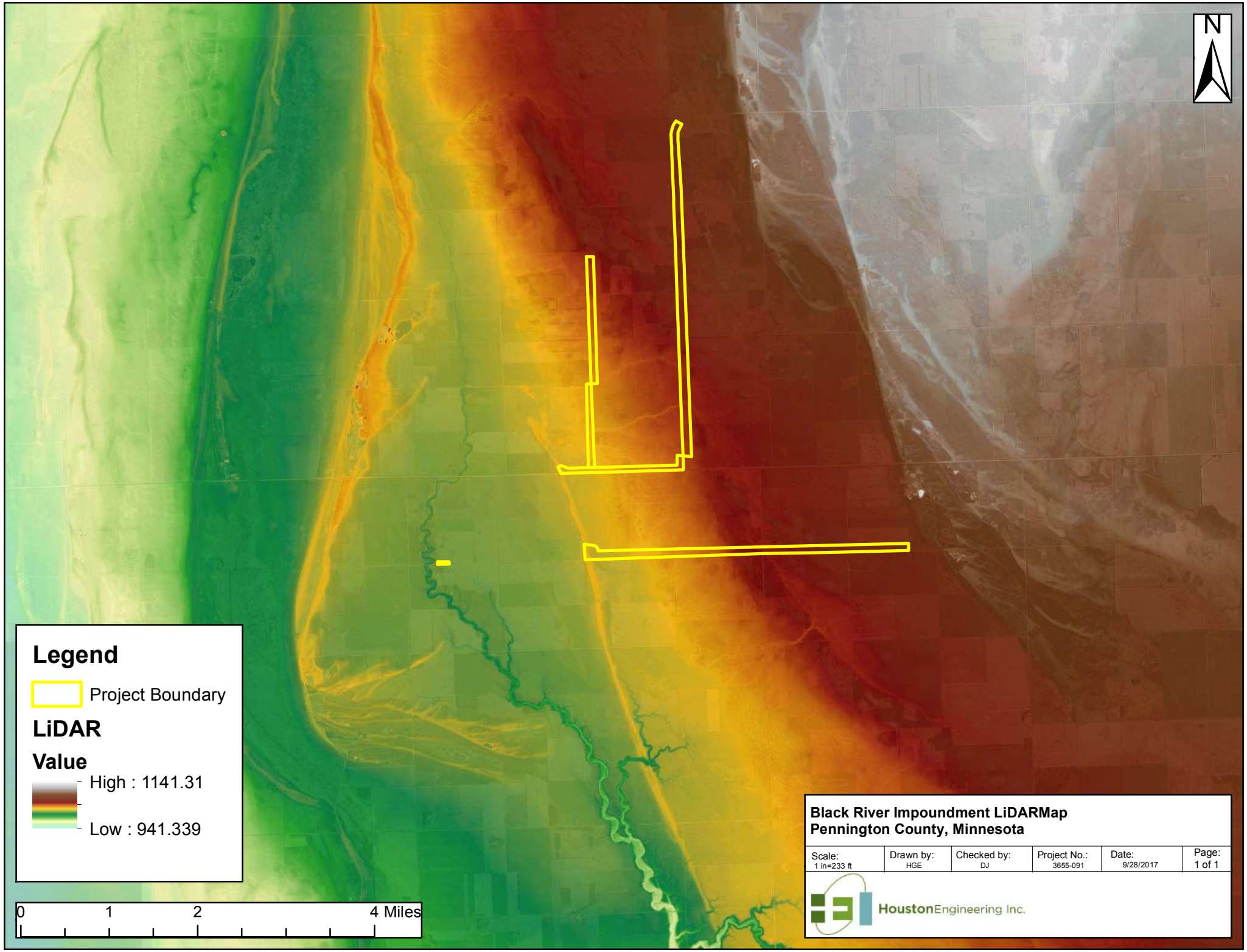
Appendix C

LiDAR map



Black River Impoundment LiDARMap
Pennington County, Minnesota

Scale:	Drawn by:	Checked by:	Project No.:	Date:	Page:
1 in=233 ft	HGE	DJ	3655-091	9/28/2017	1 of 1

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Appendix D

Site Photographs

Wetland 1, view W

Wetland 2, view SW

Wetland 3, view N

Wetland 3, view N

Wetland 4, view NE

Wetland 5, view NE

Wetland 6, view E

Wetland 7, view E

Wetland 8, view SW

Wetland 9, view S

Wetland 9, view W

Wetland 10, view NW

Wetland 11, view N

Wetland 12, view W

Wetland 13, view W

Wetland 14, view NW

Wetland 15, view S

Wetland 16, view SE

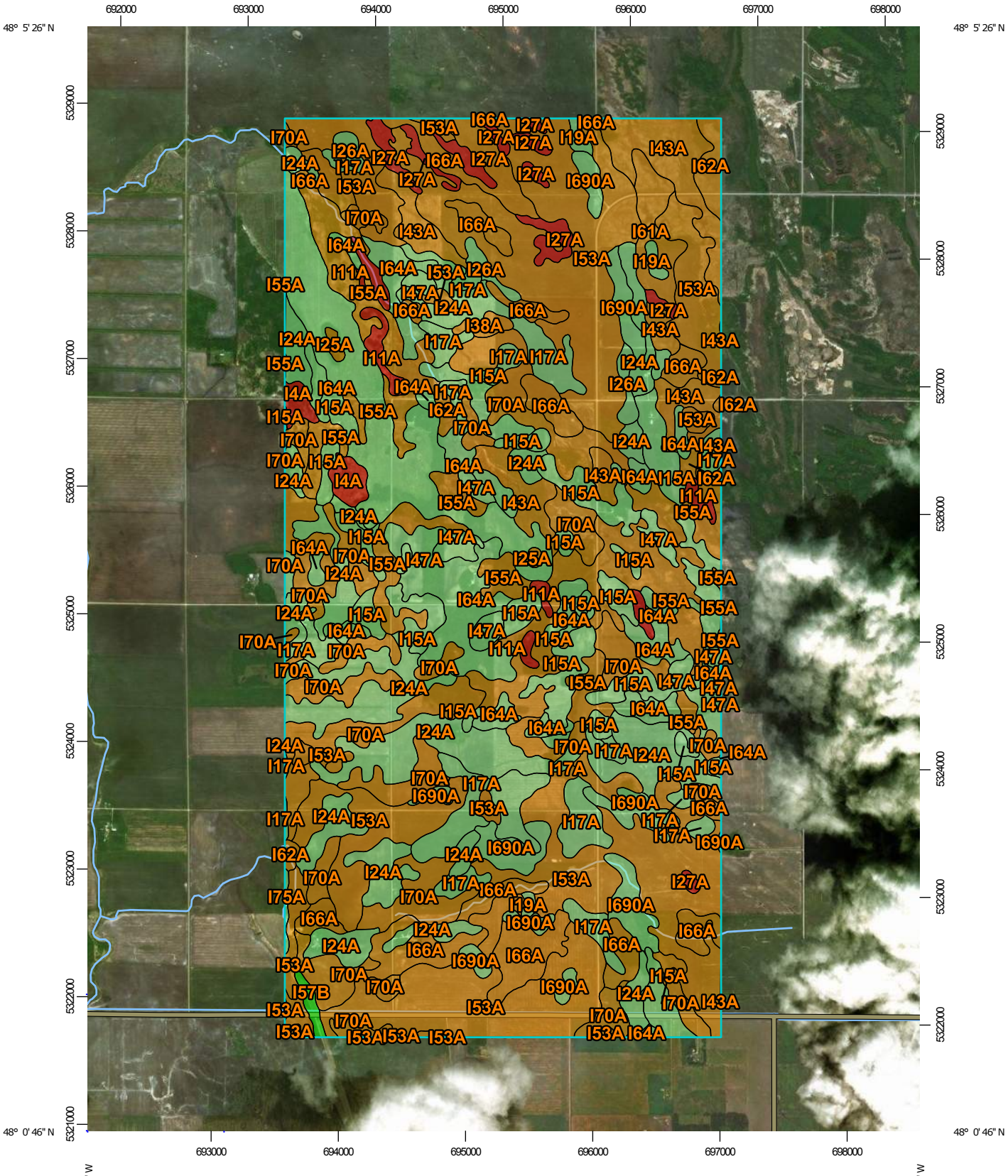
Wetland 16, view S

Wetland 17, view NE

Appendix E

Hydric soil maps

Hydric Rating by Map Unit—Pennington County, Minnesota
(Northern Project Area (160th Ave NW and 150th Ave NW))



Map Scale: 1:42,100 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 500 1000 2000 3000

Feet
0 2000 4000 8000 12000

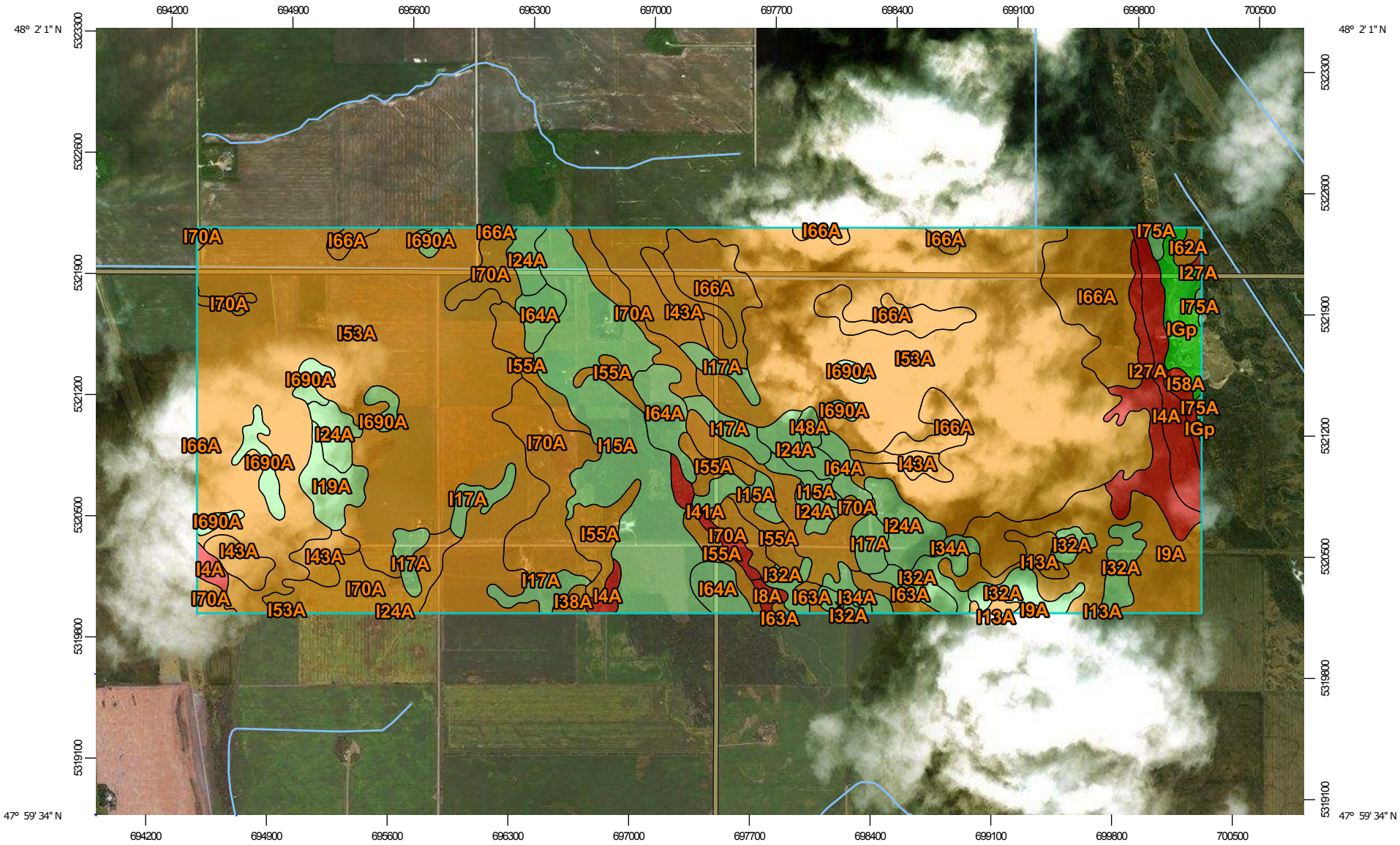
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 14N WGS84

Hydric Rating by Map Unit

Hydric Rating by Map Unit— Summary by Map Unit — Pennington County, Minnesota (MN113)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
I4A	Berner, Rosewood, and Strathcona soils, seepy, 0 to 2 percent slopes	100	38.7	0.6%
I11A	Deerwood muck, 0 to 1 percent slopes	100	65.8	1.1%
I15A	Hecla loamy fine sand, 0 to 2 percent slopes	5	722.1	11.8%
I17A	Foldahl fine sandy loam, loamy till substratum, 0 to 3 percent slopes	16	302.7	4.9%
I19A	Foxhome sandy loam, 0 to 3 percent slopes	15	54.5	0.9%
I24A	Grimstad fine sandy loam, 0 to 3 percent slopes	14	696.5	11.4%
I25A	Hamar loamy fine sand, Aspen Parkland, 0 to 1 percent slopes	90	10.6	0.2%
I26A	Hamerly loam, 0 to 2 percent slopes	16	39.6	0.6%
I27A	Hamre muck, 0 to 1 percent slopes	100	93.4	1.5%
I38A	Kratka fine sandy loam, loamy till substratum, 0 to 1 percent slopes	94	13.5	0.2%
I43A	Mavie fine sandy loam, 0 to 2 percent slopes	95	266.2	4.3%
I47A	Poppleton fine sand, 0 to 2 percent slopes	3	75.1	1.2%
I53A	Roliss loam, 0 to 2 percent slopes	95	1,366.0	22.3%
I55A	Rosewood fine sandy loam, Aspen Parkland, 0 to 1 percent slopes	90	527.0	8.6%
I57B	Sandberg-Radium complex, 1 to 6 percent slopes	0	11.2	0.2%
I61A	Strandquist loam, 0 to 2 percent slopes	96	60.6	1.0%
I62A	Syrene sandy loam, 0 to 2 percent slopes	95	48.9	0.8%

Hydric Rating by Map Unit— Summary by Map Unit — Pennington County, Minnesota (MN113)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
I64A	Ulen fine sandy loam, Aspen Parkland, 0 to 2 percent slopes	14	412.8	6.7%
I66A	Vallers loam, 0 to 2 percent slopes	91	378.7	6.2%
I70A	Strathcona fine sandy loam, 0 to 2 percent slopes	95	745.3	12.2%
I75A	Radium-Sandberg-Garborg complex, 0 to 3 percent slopes	5	4.2	0.1%
I690A	Kittson loam, wet, 0 to 2 percent slopes	5	189.1	3.1%
Totals for Area of Interest			**6,122.3**	**100.0%**

Hydric Rating by Map Unit—Pennington County, Minnesota
(Southeast Project Area (110th St NW and Center St W))



Map Scale: 1:32,000 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 450 900 1800 2700

Feet: 0 1500 3000 6000 9000

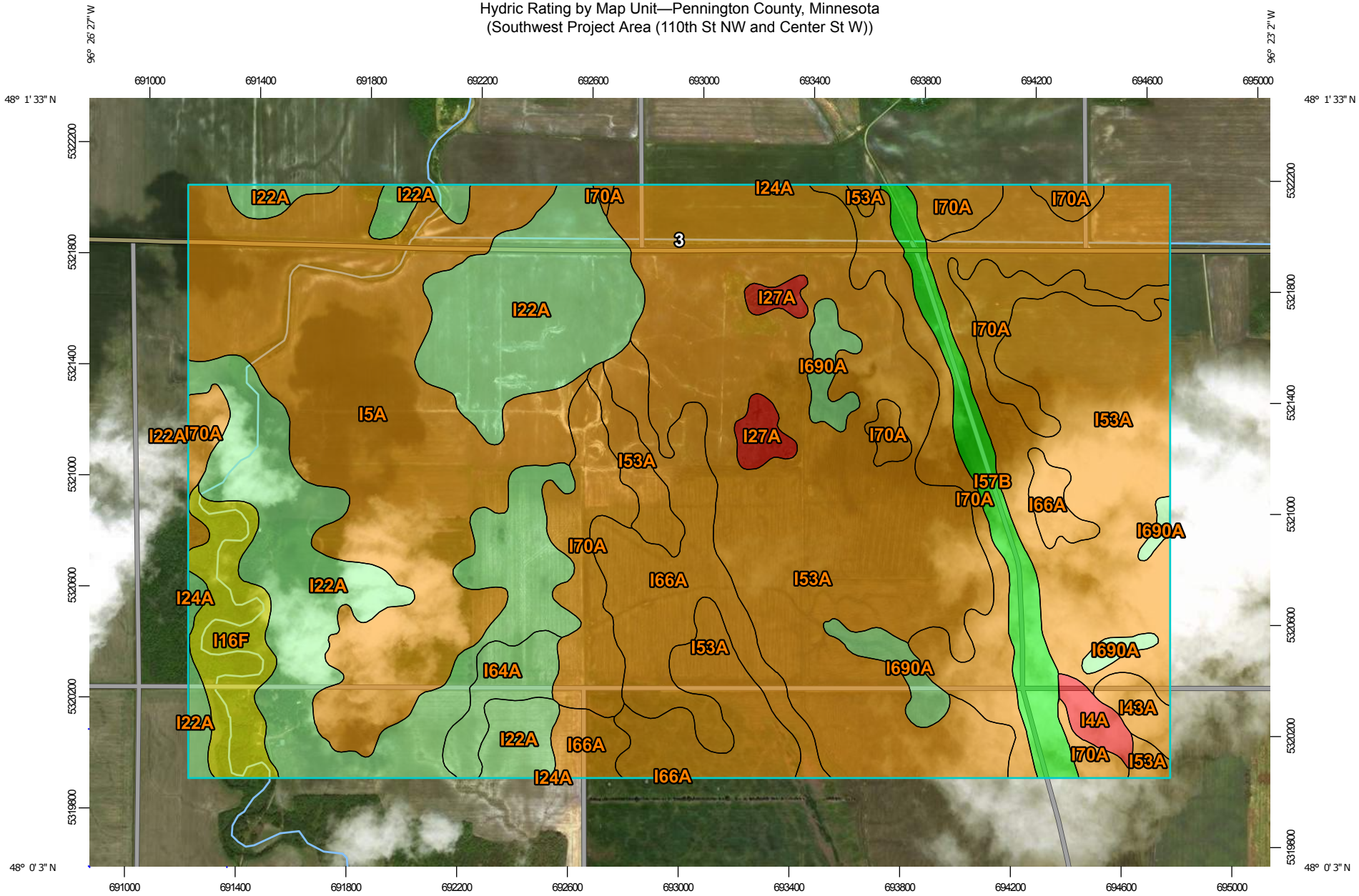
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 14N WGS84

Hydric Rating by Map Unit

Hydric Rating by Map Unit— Summary by Map Unit — Pennington County, Minnesota (MN113)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
I4A	Berner, Rosewood, and Strathcona soils, seepy, 0 to 2 percent slopes	100	61.6	1.9%
I8A	Cathro muck, 0 to 1 percent slopes	100	5.2	0.2%
I9A	Clearwater clay, 0 to 2 percent slopes	98	124.7	3.9%
I13A	Espelie fine sandy loam, till substratum, 0 to 2 percent slopes	93	27.3	0.8%
I15A	Hecla loamy fine sand, 0 to 2 percent slopes	5	252.3	7.8%
I17A	Foldahl fine sandy loam, loamy till substratum, 0 to 3 percent slopes	16	84.6	2.6%
I19A	Foxhome sandy loam, 0 to 3 percent slopes	15	28.7	0.9%
I24A	Grimstad fine sandy loam, 0 to 3 percent slopes	14	96.1	3.0%
I27A	Hamre muck, 0 to 1 percent slopes	100	56.9	1.8%
I32A	Hilaire fine sandy loam, clayey till substratum, 0 to 3 percent slopes	16	78.9	2.5%
I34A	Huot fine sandy loam, clayey till substratum, 0 to 3 percent slopes	15	27.8	0.9%
I38A	Kratka fine sandy loam, loamy till substratum, 0 to 1 percent slopes	94	5.5	0.2%
I41A	Markey muck, 0 to 1 percent slopes	100	15.9	0.5%
I43A	Mavie fine sandy loam, 0 to 2 percent slopes	95	63.2	2.0%
I48A	Radium loamy sand, 0 to 2 percent slopes	5	6.2	0.2%
I53A	Roliss loam, 0 to 2 percent slopes	95	1,475.0	45.8%
I55A	Rosewood fine sandy loam, Aspen Parkland, 0 to 1 percent slopes	90	108.3	3.4%

Hydric Rating by Map Unit— Summary by Map Unit — Pennington County, Minnesota (MN113)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
I58A	Seelyeville muck, 0 to 1 percent slopes	100	9.9	0.3%
I62A	Syrene sandy loam, 0 to 2 percent slopes	95	6.2	0.2%
I63A	Thiefriver fine sandy loam, clayey till substratum, 0 to 2 percent slopes	94	17.0	0.5%
I64A	Ulen fine sandy loam, Aspen Parkland, 0 to 2 percent slopes	14	78.6	2.4%
I66A	Vallers loam, 0 to 2 percent slopes	91	214.2	6.7%
I70A	Strathcona fine sandy loam, 0 to 2 percent slopes	95	279.3	8.7%
I75A	Radium-Sandberg-Garborg complex, 0 to 3 percent slopes	5	6.5	0.2%
I690A	Kittson loam, wet, 0 to 2 percent slopes	5	50.7	1.6%
IGp	Pits, gravel and sand	0	39.2	1.2%
Totals for Area of Interest			**3,219.6**	**100.0%**

Hydric Rating by Map Unit—Pennington County, Minnesota
(Southwest Project Area (110th St NW and Center St W))



Map Scale: 1:19,500 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 250 500 1000 1500

Feet: 0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 14N WGS84

Hydric Rating by Map Unit

Hydric Rating by Map Unit— Summary by Map Unit — Pennington County, Minnesota (MN113)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
I4A	Berner, Rosewood, and Strathcona soils, seepy, 0 to 2 percent slopes	100	10.6	0.6%
I5A	Borup loam, 0 to 1 percent slopes	92	334.3	17.8%
I16F	Fluvaquents,frequently flooded-Hapludolls complex, 0 to 30 percent slopes	58	54.8	2.9%
I22A	Glyndon loam, Aspen Parkland, 0 to 2 percent slopes	15	327.4	17.4%
I24A	Grimstad fine sandy loam, 0 to 3 percent slopes	14	2.8	0.2%
I27A	Hamre muck, 0 to 1 percent slopes	100	15.2	0.8%
I43A	Mavie fine sandy loam, 0 to 2 percent slopes	95	11.5	0.6%
I53A	Roliss loam, 0 to 2 percent slopes	95	700.8	37.3%
I57B	Sandberg-Radium complex, 1 to 6 percent slopes	0	55.8	3.0%
I64A	Ulen fine sandy loam, Aspen Parkland, 0 to 2 percent slopes	14	23.4	1.2%
I66A	Vallers loam, 0 to 2 percent slopes	91	123.1	6.5%
I70A	Strathcona fine sandy loam, 0 to 2 percent slopes	95	187.3	10.0%
I690A	Kittson loam, wet, 0 to 2 percent slopes	5	34.2	1.8%
Totals for Area of Interest			**1,881.2**	**100.0%**

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)
- Not rated or not available

Soil Rating Lines

- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)
- Not rated or not available

Soil Rating Points

- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)
- Not rated or not available

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 1:12,000.

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: Pennington County, Minnesota
Survey Area Data: Version 12, Sep 19, 2016

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 6, 2014—Mar 31, 2016

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.

Description

This rating indicates the percentage of map units that meets the criteria for hydric soils. Map units are composed of one or more map unit components or soil types, each of which is rated as hydric soil or not hydric. Map units that are made up dominantly of hydric soils may have small areas of minor nonhydric components in the higher positions on the landform, and map units that are made up dominantly of nonhydric soils may have small areas of minor hydric components in the lower positions on the landform. Each map unit is rated based on its respective components and the percentage of each component within the map unit.

The thematic map is color coded based on the composition of hydric components. The five color classes are separated as 100 percent hydric components, 66 to 99 percent hydric components, 33 to 65 percent hydric components, 1 to 32 percent hydric components, and less than one percent hydric components.

In Web Soil Survey, the Summary by Map Unit table that is displayed below the map pane contains a column named 'Rating'. In this column the percentage of each map unit that is classified as hydric is displayed.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). Under natural conditions, these soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 2002). These criteria are used to identify map unit components that normally are associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (Soil Survey Staff, 1999) and "Keys to Soil Taxonomy" (Soil Survey Staff, 2006) and in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils are specified in "Field Indicators of Hydric Soils in the United States" (Hurt and Vasilas, 2006).

References:

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436.

Soil Survey Staff. 2006. Keys to soil taxonomy. 10th edition. U.S. Department of Agriculture, Natural Resources Conservation Service.

Rating Options

Aggregation Method: Percent Present

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

Appendix F

Plant List

Genus/Species	Common Name	Indicator Status*	Dominant Wetland plants	Dominant Upland Plants	Stratum
Acer negundo	ash-leaf maple	FAC	x		tree
Agrostis stolonifera	spreading bent	FACW	x		herb
Alisma subcordatum	American water-plantain	OBL			herb
Ambrosia artemisiifolia	annual ragweed	FACU			herb
Anemone canadensis	round-leaf thimbleweed	FACW			herb
Apocynum cannabinum	Indian-hemp	FAC			herb
Arctium minus	lesser burrdock	FACU			herb
Asclepias syriaca	common milkweed	UPL			herb
Beckmannia syzigachne	American slough grass	OBL	x		herb
Bromus inermis	smooth brome	UPL		x	herb
Carex pellita	woolly sedge	OBL	x		herb
Cirsium arvense	Canadian thistle	FACU		x	herb
Cornus alba	red osier	FACW		x	shrub
Cyperus esculentus	chufa	FACW			herb
Eleocharis palustris	common spike-rush	OBL			herb
Elymus repens	creeping wild rye	FACU	x		herb
Epilobium ciliatum	fringed willowherb	FACW	x		herb
Equisetum hyemale	tall scouring-rush	FACW	x		herb
Equisetum palustre	marsh horsetail	FACW	x		herb
Gentiana andrewsii	closed bottle gentian	FAC			herb
Hordeum jubatum	fox-tail barley	FACW	x		herb
Juncus balticus	Baltic rush	FACW			herb
Lithospermum latifolium	American stoneseed	NL/UPL			herb
Lotus corniculatus	garden bird's-foot-trefoil	FACU		x	herb
Lycopus virginicus	Virginia water-horehound	OBL			herb
Melilotus officinalis	yellow sweet-clover	FACU	x	x	herb
Panicum virgatum	wand panic grass	FAC		x	herb
Persicaria amphibia	water smartweed	OBL			herb
Persicaria maculosa	spotted lady's-thumb	FACW			herb
Phalaris arundinacea	reed canary grass	FACW	x	x	herb
Phleum pratense	common timothy	FACU			herb
Plantago major	great plantain	FAC			herb
Poa pratensis	Kentucky blue grass	FACU		x	herb
Populus balsamifera	balsam poplar	FACW		x	shrub
Populus tremuloides	quaking aspen	FAC		x	tree/shrub
Prunus virginiana	choke cherry	FACU		x	shrub
Quercus macrocarpa	burr oak	FACU		x	tree
Ranunculus pensylvanicus	Pennsylvania buttercup	FACW	x		herb
Rosa arkansana	prairie rose	FACU			herb
Rumex crispus	curly dock	FAC	x		herb
Salix petiolaris	meadow willow	OBL	x		shrub
Schizachyrium scoparium	little false bluestem	FACU		x	herb
Setaria pumila	yellow bristle grass	FACU			herb
Sium suave	water parsnip	OBL	x		herb
Solidago canadensis	Canadian goldenrod	FACU			herb
Solidago gigantea	late goldenrod	FAC			herb
Sonchus arvensis	field sow-thistle	FAC			herb
Spartina pectinata	freshwater cord grass	FACW	x		herb
Sphagnum sp.	Sphagnum moss		x		herb

Symphoricarpos albus	common snowberry	UPL			herb
Symphyotrichum lanceolatum	white panicled American-aster	FACW			herb
Symphyotrichum novae-angliae	New England American-aster	FACW			herb
Symphyotrichum puniceum	purple-stem American-aster	OBL			herb
Taraxacum officinale	common dandelion	FACU			herb
Thalictrum dioicum	early meadow-rue	FACW			herb
Toxicodendron radicans	eastern poison ivy	FACU		x	herb
Trifolium hybridum	alsike clover	FACU			herb
Typha sp.	cattail	OBL	x		herb
Urtica dioica	stinging nettle	FAC			herb
Viburnum opulus	highbush-cranberry	FAC		x	shrub
Vicia Americana	American purple vetch	FACU			herb
Zizia aurea	golden alexanders	FAC			herb

* Lichvar RW, Banks DL, Kirchner WN, Melvin NC (2016) The National Wetland Plant List: 2016 wetland ratings. Phytoneuron 2016-30: 1-17. 28 April 2016. ISSN 2153 733X

Appendix G

Aquatic Resource Data Forms

Table: Wetland number and corresponding data form

Wetland Number	Data form test hole number
1	19
2	18
3	16
	17
4	15
5	14
6	13
7	12
8	1
9	10
	11
10	9
11	7
12	5
13	3
14	2
15	22
16	20
	21
17	24

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project Site: Black River Impoundment Site City/County: Pennington Sampling Date: 8-23-2017

Applicant/Owner: Houston Engineering, Inc. State: MN Sampling Point: 1u

Investigator(s): Donna Jacob and Mark D Aanenson Section, Township, Range: S35-T153N-R45W

Landform (hillslope, terrace, etc.): ditch slope Local relief (concave, convex, none): none Slope (%): 15

Subregion (LRR): F Lat: 48.021253 Long: -96.400914 Datum: NAD1983

Soil Map Unit Name: Sandberg-Radium complex NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☒, or Hydrology ☒, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☐	No ☒		
Hydric Soil Present?	Yes ☐	No ☒		
Wetland Hydrology Present?	Yes ☐	No ☒	**Is the Sampling Area within a Wetland?**	**Yes ☐ No ☒**

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot Size:)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot Size: **5' radius**)			
1. **Bromus inermis**	100	x	UPL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100	= Total Cover	
Woody Vine Stratum (Plot Size:)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **0** (A)

Total Number of Dominant Species Across All Strata: **1** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **0** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x1 =	
FACW species		x2 =	
FAC species		x3 =	
FACU species		x4 =	
UPL species		x5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

1 – Rapid Test for Hydrophytic Vegetation

2 - Dominance Test is >50%

3 – Prevalence Index is ≤3.0[1]

4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☐ No ☒

Remarks:

SOIL Sampling Point: 1u

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-15	10YR 2/2	100					CS	

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR F**)
- ☐ 1 cm Muck (A9) (**LRR F, G, H**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 CM Mucky Peat or Peat (S2)(**LRR G, H**)
- ☐ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR I, J**)
- ☐ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ☐ Dark Surface (S7) (**LRR G**)
- ☐ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (Inches): _____

Hydric Soils Present? Yes ☐ No ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one 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)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where not tilled**)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where tilled**)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches):

Water Table Present? Yes ☐ No ☒ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches):

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project Site: Black River Impoundment Site City/County: Pennington Sampling Date: 8-23-2017

Applicant/Owner: Houston Engineering, Inc. State: MN Sampling Point: 1w

Investigator(s): Donna Jacob and Mark D Aanenson Section, Township, Range: S35-T153N-R45W

Landform (hillslope, terrace, etc.): ditch bottom Local relief (concave, convex, none): concave Slope (%): 3

Subregion (LRR): F Lat: 48.021212 Long: -96.400780 Datum: NAD1983

Soil Map Unit Name: Sandberg-Radium complex NWI classification: R5UBFx

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☒, or Hydrology ☒, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐		
Hydric Soil Present?	Yes ☒	No ☐		
Wetland Hydrology Present?	Yes ☒	No ☐	**Is the Sampling Area within a Wetland?**	**Yes ☒ No ☐**

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot Size:)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot Size: **4' x 6'**)			
1. **Equisetum palustre**	80	x	FACW
2. **Alisma subcordatum**	5		OBL
3. **Phalaris arundinacea**	5		FACW
4. **Solidago gigantea**	5		FAC
5. **Arctium minus**	5		FACU
6.			
7.			
8.			
9.			
10.			
	100	= Total Cover	
Woody Vine Stratum (Plot Size:)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: (A)

Total Number of Dominant Species Across All Strata: (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x1 =	
FACW species		x2 =	
FAC species		x3 =	
FACU species		x4 =	
UPL species		x5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

x 1 – Rapid Test for Hydrophytic Vegetation

2 - Dominance Test is >50%

3 – Prevalence Index is ≤3.0[1]

4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 1w

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	N2.5/0	100					Muck	
3-14	2.5Y 6/2	75	2.5Y 5/6	5	C	M	CL	
			10Y 5/0	20	RM	M		

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR F**)
- ☐ 1 cm Muck (A9) (**LRR F, G, H**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 CM Mucky Peat or Peat (S2)(**LRR G, H**)
- ☐ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☒ Loamy Gleyed Matrix (F2)
- ☒ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR I, J**)
- ☐ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ☐ Dark Surface (S7) (**LRR G**)
- ☐ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (Inches): _____

Hydric Soils Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one 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)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where not tilled**)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where tilled**)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☒ Geomorphic Position (D2)
- ☒ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present?	Yes	☒	No	☐	Depth (inches):	2
Water Table Present?	Yes	☒	No	☐	Depth (inches):	0
Saturation Present? (includes capillary fringe)	Yes	☒	No	☐	Depth (inches):	0

Wetland Hydrology Present? Yes ☒ **No** ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project Site: Black River Impoundment Site City/County: Pennington Sampling Date: 8-23-2017

Applicant/Owner: Houston Engineering, Inc. State: MN Sampling Point: 2u

Investigator(s): Donna Jacob and Mark D Aanenson Section, Township, Range: S35-T153N-45W

Landform (hillslope, terrace, etc.): ditch slope Local relief (concave, convex, none): none Slope (%): 5

Subregion (LRR): F Lat: 48.022506 Long: -96.392829 Datum: NAD1983

Soil Map Unit Name: Strathcona fine sandy loam NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☒, or Hydrology ☒, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☐	No ☒		
Hydric Soil Present?	Yes ☒	No ☐		
Wetland Hydrology Present?	Yes ☐	No ☒	**Is the Sampling Area within a Wetland?**	**Yes ☐ No ☒**

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot Size:)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot Size: **3' x 6'**)			
1. **Poa pratensis**	45	x	FACU
2. **Bromus inermis**	45	x	UPL
3. **Rosa arkansana**	10		FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100	= Total Cover	
Woody Vine Stratum (Plot Size:)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum

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:		Multiply by:	
OBL species		x1 =	
FACW species		x2 =	
FAC species		x3 =	
FACU species		x4 =	
UPL species		x5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

1 – Rapid Test for Hydrophytic Vegetation

2 - Dominance Test is >50%

3 – Prevalence Index is ≤3.0[1]

4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☐ No ☒

Remarks:

Mowed.

SOIL

Sampling Point: 2u

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	2.5Y 2/1	100					L	
10-19	2.5Y 4/1	98	2.5Y 4/4	2	C	M	C	

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR F**)
- ☐ 1 cm Muck (A9) (**LRR F, G, H**)
- ☒ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 CM Mucky Peat or Peat (S2)(**LRR G, H**)
- ☐ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR I, J**)
- ☐ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ☐ Dark Surface (S7) (**LRR G**)
- ☐ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (Inches): _____

Hydric Soils Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one 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)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where not tilled**)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where tilled**)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present?	Yes	☐	No	☒	Depth (inches):
Water Table Present?	Yes	☐	No	☒	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes	☐	No	☒	Depth (inches):

Wetland Hydrology Present? **Yes** ☐ **No** ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project Site: Black River Impoundment Site City/County: Pennington Sampling Date: 8-23-2017

Applicant/Owner: Houston Engineering, Inc. State: MN Sampling Point: 2w

Investigator(s): Donna Jacob and Mark D Aanenson Section, Township, Range: S35-T153N-45W

Landform (hillslope, terrace, etc.): ditch bottom Local relief (concave, convex, none): concave Slope (%): 1

Subregion (LRR): F Lat: 48.022515 Long: -96.392865 Datum: NAD1983

Soil Map Unit Name: Strathcona fine sandy loam NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☒, or Hydrology ☒, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐		
Hydric Soil Present?	Yes ☒	No ☐		
Wetland Hydrology Present?	Yes ☒	No ☐	**Is the Sampling Area within a Wetland?**	**Yes ☒ No ☐**

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot Size:)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot Size: **4' x 6'**)			
1. **Phalaris arundinacea**	30	x	FACW
2. **Spartina pectinata**	30	x	FACW
3. **Typha sp.**	20	x	OBL
4. **Rumex crispus**	10		FAC
5. **Poa pratensis**	10		FACU
6.			
7.			
8.			
9.			
10.			
	100	= Total Cover	
Woody Vine Stratum (Plot Size:)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: (A)

Total Number of Dominant Species Across All Strata: (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x1 =	
FACW species		x2 =	
FAC species		x3 =	
FACU species		x4 =	
UPL species		x5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

x 1 – Rapid Test for Hydrophytic Vegetation

2 - Dominance Test is >50%

3 – Prevalence Index is ≤3.0[1]

4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL Sampling Point: 2w

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-14	2.5Y 6/2	80	2.5Y 5/6	20	C	M	CL	

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR F**)
- ☐ 1 cm Muck (A9) (**LRR F, G, H**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 CM Mucky Peat or Peat (S2)(**LRR G, H**)
- ☐ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☒ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR I, J**)
- ☐ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ☐ Dark Surface (S7) (**LRR G**)
- ☐ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (Inches): _____

Hydric Soils Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one 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)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where not tilled**)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where tilled**)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☒ Geomorphic Position (D2)
- ☒ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present?	Yes	☐	No	☒	Depth (inches):
Water Table Present?	Yes	☐	No	☒	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes	☐	No	☒	Depth (inches):

Wetland Hydrology Present? **Yes** ☒ **No** ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project Site: Black River Impoundment Site City/County: Pennington Sampling Date: 8-23-2017

Applicant/Owner: Houston Engineering, Inc. State: MN Sampling Point: 3u

Investigator(s): Donna Jacob and Mark D Aanenson Section, Township, Range: S35-T153N-45W

Landform (hillslope, terrace, etc.): ditch slope Local relief (concave, convex, none): none Slope (%): 5

Subregion (LRR): F Lat: 48.025167 Long: -96.392869 Datum: NAD1983

Soil Map Unit Name: Vallers loam NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☒, or Hydrology ☒, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☐	No ☒		
Hydric Soil Present?	Yes ☐	No ☒		
Wetland Hydrology Present?	Yes ☐	No ☒	**Is the Sampling Area within a Wetland?**	**Yes ☐ No ☒**

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot Size:)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot Size: **2' x 6'**)			
1. **Elymus repens**	70	x	FACU
2. **Poa pratnesis**	10		FACU
3. **Phleum pratense**	10		FACU
4. **Cirsium arvense**	5		FACU
5. **Bromus inermis**	5		UPL
6.			
7.			
8.			
9.			
10.			
	100	= Total Cover	
Woody Vine Stratum (Plot Size:)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **0** (A)

Total Number of Dominant Species Across All Strata: **1** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **0** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x1 =	
FACW species		x2 =	
FAC species		x3 =	
FACU species		x4 =	
UPL species		x5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

1 – Rapid Test for Hydrophytic Vegetation

2 - Dominance Test is >50%

3 – Prevalence Index is ≤3.0[1]

4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☐ No ☒

Remarks:

SOIL Sampling Point: 3u

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	2.5Y 2/1	100					L	
12-18	2.5Y 5/3	100					FS	

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR F**)
- ☐ 1 cm Muck (A9) (**LRR F, G, H**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 CM Mucky Peat or Peat (S2)(**LRR G, H**)
- ☐ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR I, J**)
- ☐ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ☐ Dark Surface (S7) (**LRR G**)
- ☐ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (Inches): _____

Hydric Soils Present? Yes ☐ No ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one 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)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where not tilled**)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where tilled**)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches):

Water Table Present? Yes ☐ No ☒ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches):

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project Site: Black River Impoundment Site | City/County: Pennington | Sampling Date: 8-23-2017

Applicant/Owner: Houston Engineering, Inc. | State: MN | Sampling Point: 3w

Investigator(s): Donna Jacob and Mark D Aanenson | Section, Township, Range: S35-T153N-45W

Landform (hillslope, terrace, etc.): ditch bottom | Local relief (concave, convex, none): concave | Slope (%): 1

Subregion (LRR): F | Lat: 48.025215 | Long: -96.392919 | Datum: NAD1983

Soil Map Unit Name: Vallers loam | NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☒, or Hydrology ☒, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐		
Hydric Soil Present?	Yes ☒	No ☐		
Wetland Hydrology Present?	Yes ☒	No ☐	**Is the Sampling Area within a Wetland?**	**Yes ☒ No ☐**

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot Size:)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot Size: **2' x 6'**)			
1. **Phalaris arundinacea**	30	x	FACW
2. **Beckmannia syzigachne**	30	x	OBL
3. **Elymus repens**	20	x	FACU
4. **Rumex crispus**	5		FAC
5. **Phleum pratense**	5		FACU
6.			
7.			
8.			
9.			
10.			
	90	= Total Cover	
Woody Vine Stratum (Plot Size:)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum **10**

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:		Multiply by:	
OBL species		x1 =	
FACW species		x2 =	
FAC species		x3 =	
FACU species		x4 =	
UPL species		x5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

_____ 1 – Rapid Test for Hydrophytic Vegetation

x 2 - Dominance Test is >50%

_____ 3 – Prevalence Index is ≤3.0[1]

_____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

_____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 3w

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	2.5Y 2/1	100					L	
4-14	2.5Y 5/2	60	2.5Y 8/2	30	D	M	SL	
			2.5Y 5/6	10	C	M		

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR F**)
- ☐ 1 cm Muck (A9) (**LRR F, G, H**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 CM Mucky Peat or Peat (S2)(**LRR G, H**)
- ☐ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☒ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR I, J**)
- ☐ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ☐ Dark Surface (S7) (**LRR G**)
- ☐ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (Inches): _____

Hydric Soils Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one 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)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where not tilled**)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where tilled**)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☒ Geomorphic Position (D2)
- ☒ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present?	Yes	☐	No	☒	Depth (inches):
Water Table Present?	Yes	☐	No	☒	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes	☐	No	☒	Depth (inches):

Wetland Hydrology Present? **Yes** ☒ **No** ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project Site: Black River Impoundment Site City/County: Pennington Sampling Date: 8-23-2017

Applicant/Owner: Houston Engineering, Inc. State: MN Sampling Point: 4u

Investigator(s): Donna Jacob and Mark D Aanenson Section, Township, Range: S35-T153N-R45W

Landform (hillslope, terrace, etc.): ditch slope Local relief (concave, convex, none): none Slope (%): 5

Subregion (LRR): F Lat: 48.033301 Long: 48.025167 Datum: NAD1983

Soil Map Unit Name: Grimstad find sandy loam NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☒, or Hydrology ☒, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐		
Hydric Soil Present?	Yes ☐	No ☒		
Wetland Hydrology Present?	Yes ☐	No ☒	**Is the Sampling Area within a Wetland?**	**Yes ☐ No ☒**

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot Size:)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot Size: **3' x 6'**)			
1. **Phalaris arundinacea**	40	x	FACW
2. **Agrostis stolonifera**	40	x	FACW
3. **Rumex crispus**	10		FAC
4. **Typha sp.**	10		OBL
5.			
6.			
7.			
8.			
9.			
10.			
	100	= Total Cover	
Woody Vine Stratum (Plot Size:)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: (A)

Total Number of Dominant Species Across All Strata: (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x1 =	
FACW species		x2 =	
FAC species		x3 =	
FACU species		x4 =	
UPL species		x5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

x 1 – Rapid Test for Hydrophytic Vegetation

2 - Dominance Test is >50%

3 – Prevalence Index is ≤3.0[1]

4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL Sampling Point: 4u

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-14	2.5Y 2/1	100					SL	
14+	2.5Y 6/4	100					S	

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR F**)
- ☐ 1 cm Muck (A9) (**LRR F, G, H**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 CM Mucky Peat or Peat (S2)(**LRR G, H**)
- ☐ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR I, J**)
- ☐ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ☐ Dark Surface (S7) (**LRR G**)
- ☐ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (Inches): _____

Hydric Soils Present? Yes ☐ No ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one 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)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where not tilled**)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where tilled**)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☒ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches):

Water Table Present? Yes ☐ No ☒ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches):

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project Site: Black River Impoundment Site City/County: Pennington Sampling Date: 8-23-2017

Applicant/Owner: Houston Engineering, Inc. State: MN Sampling Point: 5u

Investigator(s): Donna Jacob and Mark D Aanenson Section, Township, Range: S35-T153N-R45W

Landform (hillslope, terrace, etc.): ditch slope Local relief (concave, convex, none): none Slope (%): 5

Subregion (LRR): F Lat: _____ Long: _____ Datum: NAD1983

Soil Map Unit Name: Roliss loam NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☒, or Hydrology ☒, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☐	No ☒		
Hydric Soil Present?	Yes ☐	No ☒		
Wetland Hydrology Present?	Yes ☐	No ☒	**Is the Sampling Area within a Wetland?**	**Yes ☐ No ☒**

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
	_____	= Total Cover	
Sapling/Shrub Stratum (Plot Size: _____)			
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
	_____	= Total Cover	
Herb Stratum (Plot Size: **3' x 6'**)			
1. **Bromus inermis**	65	x	UPL
2. **Crisium arvense**	20	x	FACU
3. **Taraxacum officinale**	5	_____	FACU
4. **Sonchus arvensis**	5	_____	FAC
5. **Asclepias syriaca**	5	_____	UPL
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
10. _____	_____	_____	_____
	100	= Total Cover	
Woody Vine Stratum (Plot Size: _____)			
1. _____	_____	_____	_____
2. _____	_____	_____	_____
	_____	= Total Cover	

% Bare Ground in Herb Stratum _____

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:		Multiply by:	
OBL species	_____	x1 =	_____
FACW species	_____	x2 =	_____
FAC species	_____	x3 =	_____
FACU species	_____	x4 =	_____
UPL species	_____	x5 =	_____
Column Totals:	_____ (A)		_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

_____ 1 – Rapid Test for Hydrophytic Vegetation

_____ 2 - Dominance Test is >50%

_____ 3 – Prevalence Index is ≤3.0[1]

_____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

_____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☐ No ☒

Remarks:

SOIL

Sampling Point: 5u

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-5	2.5Y 2/1	100					SiL	
5-13	2.5Y 6/3	99	2.5Y 5/6	1	C	M	SiL	

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR F**)
- ☐ 1 cm Muck (A9) (**LRR F, G, H**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 CM Mucky Peat or Peat (S2)(**LRR G, H**)
- ☐ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR I, J**)
- ☐ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ☐ Dark Surface (S7) (**LRR G**)
- ☐ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (Inches): _____

Hydric Soils Present? Yes ☐ No ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one 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)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where not tilled**)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where tilled**)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present?	Yes	☐	No	☒	Depth (inches):
Water Table Present?	Yes	☐	No	☒	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes	☐	No	☒	Depth (inches):

Wetland Hydrology Present? **Yes** ☐ **No** ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project Site: Black River Impoundment Site City/County: Pennington Sampling Date: 8-23-2017

Applicant/Owner: Houston Engineering, Inc. State: MN Sampling Point: 5w

Investigator(s): Donna Jacob and Mark D Aanenson Section, Township, Range: S35-T153N-R45W

Landform (hillslope, terrace, etc.): ditch bottom Local relief (concave, convex, none): concave Slope (%): 1

Subregion (LRR): F Lat: 48.034164 Long: -96.393003 Datum: NAD1983

Soil Map Unit Name: Roliss loam NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☒, or Hydrology ☒, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐		
Hydric Soil Present?	Yes ☒	No ☐		
Wetland Hydrology Present?	Yes ☒	No ☐	**Is the Sampling Area within a Wetland?**	**Yes ☒ No ☐**

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot Size:)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot Size: **3' x 6'**)			
1. **Phalaris arundinacea**	60	x	FACW
2. **Rumex crispus**	20	x	FAC
3. **Typha sp.**	20	x	OBL
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100	= Total Cover	
Woody Vine Stratum (Plot Size:)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum

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:		Multiply by:	
OBL species		x1 =	
FACW species		x2 =	
FAC species		x3 =	
FACU species		x4 =	
UPL species		x5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- 1 – Rapid Test for Hydrophytic Vegetation
- **x** 2 - Dominance Test is >50%
- 3 – Prevalence Index is ≤3.0[1]
- 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL Sampling Point: 5w

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 2/1	100					CL	
8-15	2.5Y 7/2	80	2.5Y 5/6	20	C	M	CL	

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR F**)
- ☐ 1 cm Muck (A9) (**LRR F, G, H**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 CM Mucky Peat or Peat (S2)(**LRR G, H**)
- ☐ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☒ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR I, J**)
- ☐ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ☐ Dark Surface (S7) (**LRR G**)
- ☐ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (Inches): _____

Hydric Soils Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one 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)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where not tilled**)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where tilled**)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☒ Geomorphic Position (D2)
- ☒ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches):

Water Table Present? Yes ☐ No ☒ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches):

Wetland Hydrology Present? Yes ☒ **No** ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project Site: Black River Impoundment Site City/County: Pennington Sampling Date: 8-23-2017

Applicant/Owner: Houston Engineering, Inc. State: MN Sampling Point: 6u

Investigator(s): Donna Jacob and Mark D Aanenson Section, Township, Range: S25-T153N-R45W

Landform (hillslope, terrace, etc.): ditch slope Local relief (concave, convex, none): none Slope (%): 5

Subregion (LRR): F Lat: 48.036936 Long: -96.392788 Datum: NAD1983

Soil Map Unit Name: Strathcona fine sandy loam NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☒, or Hydrology ☒, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐		
Hydric Soil Present?	Yes ☐	No ☒		
Wetland Hydrology Present?	Yes ☐	No ☒	**Is the Sampling Area within a Wetland?**	**Yes ☐ No ☒**

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot Size:)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot Size: **4' x 6'**)			
1. **Phalaris arundinacea**	70	x	FACW
2. **Agrostis stolonifera**	5		FACW
3. **Elymus repens**	5		FACU
4. **Anemone canadensis**	5		FACW
5. **Apocynum cannabinum**	5		FAC
6. **Bromus inermis**	5		UPL
7. **Symphyotrichum lanceolatum**	5		FACW
8.			
9.			
10.			
	100	= Total Cover	
Woody Vine Stratum (Plot Size:)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: (A)

Total Number of Dominant Species Across All Strata: (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x1 =	
FACW species		x2 =	
FAC species		x3 =	
FACU species		x4 =	
UPL species		x5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

x 1 – Rapid Test for Hydrophytic Vegetation

2 - Dominance Test is >50%

3 – Prevalence Index is ≤3.0[1]

4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL Sampling Point: 6u

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	2.5Y 2/1	100						
6-13	2.5Y 6/3	95	2.5Y 5/6	5	C	M		

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR F**)
- ☐ 1 cm Muck (A9) (**LRR F, G, H**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 CM Mucky Peat or Peat (S2)(**LRR G, H**)
- ☐ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR I, J**)
- ☐ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ☐ Dark Surface (S7) (**LRR G**)
- ☐ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (Inches): _____

Hydric Soils Present? Yes ☐ No ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one 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)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where not tilled**)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where tilled**)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☒ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present?	Yes	☐	No	☒	Depth (inches):
Water Table Present?	Yes	☐	No	☒	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes	☐	No	☒	Depth (inches):

Wetland Hydrology Present? **Yes** ☒ **No** ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project Site: Black River Impoundment Site City/County: Pennington Sampling Date: 8-23-2017

Applicant/Owner: Houston Engineering, Inc. State: MN Sampling Point: 7u

Investigator(s): Donna Jacob and Mark D Aanenson Section, Township, Range: S25-T153N-R45W

Landform (hillslope, terrace, etc.): ditch slope Local relief (concave, convex, none): none Slope (%): 1

Subregion (LRR): F Lat: 48.036164 Long: -96.392839 Datum: NAD1983

Soil Map Unit Name: Strathcona fine sandy loam NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☒, or Hydrology ☒, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐		
Hydric Soil Present?	Yes ☐	No ☒		
Wetland Hydrology Present?	Yes ☐	No ☒	**Is the Sampling Area within a Wetland?**	**Yes ☐ No ☒**

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot Size:)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot Size: **4' x 6'**)			
1. **Phalaris arundinacea**	70	x	FACW
2. **Agrostis stolonifera**	5		FACW
3. **Elymus repens**	5		FACU
4. **Anemone canadensis**	5		FACW
5. **Apocynum cannabinum**	5		FAC
6. **Bromus inermis**	5		UPL
7. **Symphyotrichum lanceolatum**	5		FACW
8.			
9.			
10.			
	100	= Total Cover	
Woody Vine Stratum (Plot Size:)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: (A)

Total Number of Dominant Species Across All Strata: (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x1 =	
FACW species		x2 =	
FAC species		x3 =	
FACU species		x4 =	
UPL species		x5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

x 1 – Rapid Test for Hydrophytic Vegetation

2 - Dominance Test is >50%

3 – Prevalence Index is ≤3.0[1]

4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL Sampling Point: 7u

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	2.5Y 2/1	100						
6-13	2.5Y 6/3	95	2.5Y 5/6	5	C	M		

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR F**)
- ☐ 1 cm Muck (A9) (**LRR F, G, H**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 CM Mucky Peat or Peat (S2)(**LRR G, H**)
- ☐ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR I, J**)
- ☐ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ☐ Dark Surface (S7) (**LRR G**)
- ☐ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (Inches): _____

Hydric Soils Present? Yes ☐ No ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one 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)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where not tilled**)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where tilled**)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☒ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches):

Water Table Present? Yes ☐ No ☒ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches):

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project Site: Black River Impoundment Site City/County: Pennington Sampling Date: 8-23-2017

Applicant/Owner: Houston Engineering, Inc. State: MN Sampling Point: 7w

Investigator(s): Donna Jacob and Mark D Aanenson Section, Township, Range: S25-T153N-R45W

Landform (hillslope, terrace, etc.): ditch bottom Local relief (concave, convex, none): concave Slope (%): 1

Subregion (LRR): F Lat: 48.036180 Long: -96.392797 Datum: NAD1983

Soil Map Unit Name: Strathcona fine sandy loam NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☒, or Hydrology ☒, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐		
Hydric Soil Present?	Yes ☒	No ☐		
Wetland Hydrology Present?	Yes ☒	No ☐	**Is the Sampling Area within a Wetland?**	**Yes ☒ No ☐**

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot Size:)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot Size: **4' x 6'**)			
1. **Phalaris arundinacea**	80	x	FACW
2. **Spartina pectinata**	10		FACW
3. **Symphyotrichum lanceolatum**	5		FACW
4. **Apocynum cannabinum**	5		FAC
5.			
6.			
7.			
8.			
9.			
10.			
	100	= Total Cover	
Woody Vine Stratum (Plot Size:)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: (A)

Total Number of Dominant Species Across All Strata: (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x1 =	
FACW species		x2 =	
FAC species		x3 =	
FACU species		x4 =	
UPL species		x5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

x 1 – Rapid Test for Hydrophytic Vegetation

2 - Dominance Test is >50%

3 – Prevalence Index is ≤3.0[1]

4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL Sampling Point: 7w

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 2/1	100					L	
2-13	10YR 6/2	98	10YR 5/6	2	C	M	CL	

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR F**)
- ☐ 1 cm Muck (A9) (**LRR F, G, H**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 CM Mucky Peat or Peat (S2)(**LRR G, H**)
- ☐ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☒ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR I, J**)
- ☐ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ☐ Dark Surface (S7) (**LRR G**)
- ☐ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (Inches): _____

Hydric Soils Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one 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)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where not tilled**)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where tilled**)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☒ Geomorphic Position (D2)
- ☒ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches):

Water Table Present? Yes ☐ No ☒ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches):

Wetland Hydrology Present? Yes ☒ **No** ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project Site: Black River Impoundment Site City/County: Pennington Sampling Date: 8-23-2017

Applicant/Owner: Houston Engineering, Inc. State: MN Sampling Point: 8u

Investigator(s): Donna Jacob and Mark D Aanenson Section, Township, Range: S25-T153N-R45W

Landform (hillslope, terrace, etc.): ditch slope Local relief (concave, convex, none): none Slope (%): 5

Subregion (LRR): F Lat: 48.038978 Long: -96.392771 Datum: NAD1983

Soil Map Unit Name: Grimstad fine sandy loam NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☒, or Hydrology ☒, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐		
Hydric Soil Present?	Yes ☐	No ☒		
Wetland Hydrology Present?	Yes ☐	No ☐	**Is the Sampling Area within a Wetland?**	**Yes ☐ No ☒**

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot Size:)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot Size: **5' radius**)			
1. **Phalaris arundinacea**	60	x	FACW
2. **Spartina pectinata**	20		FACW
3. **Apocynum cannabinum**	10		FAC
4. **Symphyotrichum lanceolatum**	10		FACW
5. **Elymus repens**	5		FACU
6.			
7.			
8.			
9.			
10.			
	105	= Total Cover	
Woody Vine Stratum (Plot Size:)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: (A)

Total Number of Dominant Species Across All Strata: (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x1 =	
FACW species		x2 =	
FAC species		x3 =	
FACU species		x4 =	
UPL species		x5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

x 1 – Rapid Test for Hydrophytic Vegetation

2 - Dominance Test is >50%

3 – Prevalence Index is ≤3.0[1]

4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL Sampling Point: 8u

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	2.5Y 2/1	100					L	
2-13	2.5Y 5/1	100					FS	
13-16	2.5Y 5/2	100					S	
16+	2.5Y 6/2	90	2.5Y 5/4	10	C	M	CL	

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR F**)
- ☐ 1 cm Muck (A9) (**LRR F, G, H**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 CM Mucky Peat or Peat (S2)(**LRR G, H**)
- ☐ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR I, J**)
- ☐ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ☐ Dark Surface (S7) (**LRR G**)
- ☐ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (Inches): _____

Hydric Soils Present? Yes ☐ No ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one 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)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where not tilled**)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where tilled**)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☒ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches):

Water Table Present? Yes ☐ No ☒ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches):

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project Site: Black River Impoundment Site City/County: Pennington Sampling Date: 8-23-2017

Applicant/Owner: Houston Engineering, Inc. State: MN Sampling Point: 9u

Investigator(s): Donna Jacob and Mark D Aanenson Section, Township, Range: S25-T153N-R45W

Landform (hillslope, terrace, etc.): ditch slope Local relief (concave, convex, none): none Slope (%): 5

Subregion (LRR): F Lat: 48.047546 Long: -96.392845 Datum: NAD1983

Soil Map Unit Name: Strathcona fine sandy loam NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☒, or Hydrology ☒, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☐	No ☒		
Hydric Soil Present?	Yes ☐	No ☒		
Wetland Hydrology Present?	Yes ☐	No ☒	**Is the Sampling Area within a Wetland?**	**Yes ☐ No ☒**

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot Size:)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot Size: **5' radius**)			
1. **Bromus inermis**	70	x	UPL
2. **Ambrosia artemisiifolia**	10		FACU
3. **Agrostis stolonifera**	10		FACW
4. **Setaria pumila**	5		FACU
5. **Elymus repens**	5		FACU
6. **Persicaria masculosa**	5		FACW
7.			
8.			
9.			
10.			
	105	= Total Cover	
Woody Vine Stratum (Plot Size:)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **0** (A)

Total Number of Dominant Species Across All Strata: **1** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **0** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x1 =	**0**
FACW species	**15**	x2 =	**30**
FAC species	**0**	x3 =	**0**
FACU species	**20**	x4 =	**80**
UPL species	**70**	x5 =	**350**
Column Totals:	**105** (A)		**460** (B)

Prevalence Index = B/A = **4.4**

Hydrophytic Vegetation Indicators:

_____ 1 – Rapid Test for Hydrophytic Vegetation

_____ 2 - Dominance Test is >50%

_____ 3 – Prevalence Index is ≤3.0[1]

_____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

_____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☐ No ☒

Remarks:

SOIL Sampling Point: 9u

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	2.5Y 2/1	100					SL	
2-5	2.5Y 3/1	100					LS	
5-13	2.5Y 5/2	90	2.5Y 5/6	10	C	M	S	

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR F**)
- ☐ 1 cm Muck (A9) (**LRR F, G, H**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 CM Mucky Peat or Peat (S2)(**LRR G, H**)
- ☐ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR I, J**)
- ☐ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ☐ Dark Surface (S7) (**LRR G**)
- ☐ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (Inches): _____

Hydric Soils Present? Yes ☐ No ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one 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)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where not tilled**)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where tilled**)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches):

Water Table Present? Yes ☐ No ☒ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches):

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project Site: Black River Impoundment Site City/County: Pennington Sampling Date: 8-23-2017

Applicant/Owner: Houston Engineering, Inc. State: MN Sampling Point: 9w

Investigator(s): Donna Jacob and Mark D Aanenson Section, Township, Range: S25-T153N-R45W

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____

Subregion (LRR): _____ Lat: 48.047678 Long: -96.392824 Datum: NAD1983

Soil Map Unit Name: Strathcona fine sandy loam NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☐ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☐, or Hydrology ☐, significantly disturbed? Are "Normal Circumstances" present? Yes ☐ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐		
Hydric Soil Present?	Yes ☒	No ☐		
Wetland Hydrology Present?	Yes ☒	No ☐	**Is the Sampling Area within a Wetland?**	**Yes ☒ No ☐**

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
	_____	= Total Cover	
Sapling/Shrub Stratum (Plot Size: _____)			
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
	_____	= Total Cover	
Herb Stratum (Plot Size: **3' x 6'**)			
1. **Beckmannia syzigachne**	30	x	OBL
2. **Phalaris arundinacea**	20	x	FACW
3. **Ambrosia artemisiifolia**	10	_____	FACU
4. **Rumex crispus**	10	_____	FAC
5. **Spartina pectinata**	10	_____	FACW
6. **Symphyotrichum lanceolatum**	5	_____	FACW
7. **Typha sp.**	5	_____	OBL
8. **Hordeum jubatum**	5	_____	FACW
9. _____	_____	_____	_____
10. _____	_____	_____	_____
	95	= Total Cover	
Woody Vine Stratum (Plot Size: _____)			
1. _____	_____	_____	_____
2. _____	_____	_____	_____
	_____	= Total Cover	

% Bare Ground in Herb Stratum **5**

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	_____	x1 =	_____
FACW species	_____	x2 =	_____
FAC species	_____	x3 =	_____
FACU species	_____	x4 =	_____
UPL species	_____	x5 =	_____
Column Totals:	_____ (A)		_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

x 1 – Rapid Test for Hydrophytic Vegetation

_____ 2 - Dominance Test is >50%

_____ 3 – Prevalence Index is ≤3.0[1]

_____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

_____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

vegetation had been sprayed with herbicide

SOIL

Sampling Point: 9w

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-14	10YR 2/1	100					L	
14-19	10YR 5/1	100					SL	
19-24	2.5Y 6/2	95	2.5Y 5/6	5	C	M	SiL	

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR F**)
- ☐ 1 cm Muck (A9) (**LRR F, G, H**)
- ☐ Depleted Below Dark Surface (A11)
- ☒ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 CM Mucky Peat or Peat (S2)(**LRR G, H**)
- ☐ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR I, J**)
- ☐ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ☐ Dark Surface (S7) (**LRR G**)
- ☐ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (Inches): _____

Hydric Soils Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one 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)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where not tilled**)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where tilled**)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☒ Geomorphic Position (D2)
- ☒ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present?	Yes	☐	No	☒	Depth (inches):
Water Table Present?	Yes	☐	No	☒	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes	☐	No	☒	Depth (inches):

Wetland Hydrology Present? **Yes** ☒ **No** ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project Site: Black River Impoundment Site City/County: Pennington Sampling Date: 8-23-2017

Applicant/Owner: Houston Engineering, Inc. State: MN Sampling Point: 10u

Investigator(s): Donna Jacob and Mark D Aanenson Section, Township, Range: S24-T153N-R45W

Landform (hillslope, terrace, etc.): ditch slope Local relief (concave, convex, none): none Slope (%): 5

Subregion (LRR): F Lat: 48.050174 Long: -96.392832 Datum: NAD1983

Soil Map Unit Name: Hecla loamy fine sand NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☒, or Hydrology ☒, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☐	No ☒		
Hydric Soil Present?	Yes ☐	No ☒		
Wetland Hydrology Present?	Yes ☐	No ☒	**Is the Sampling Area within a Wetland?**	**Yes ☐ No ☒**

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot Size:)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot Size: **5' radius**)			
1. **Schizachyrium scoparium**	60	x	FACU
2. **Panicum virgatum**	20	x	FAC
3. **Vicia americana**	5		FACU
4. **Gentiana andrewsii**	5		FAC
5. **Zizia aurea**	5		FAC
6. **Solidago canadensis**	5		FACU
7.			
8.			
9.			
10.			
	100	= Total Cover	
Woody Vine Stratum (Plot Size:)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **1** (A)

Total Number of Dominant Species Across All Strata: **2** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **50** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x1 =	**0**
FACW species	**0**	x2 =	**0**
FAC species	**25**	x3 =	**75**
FACU species	**70**	x4 =	**280**
UPL species	**0**	x5 =	**0**
Column Totals:	**95** (A)		**355** (B)

Prevalence Index = B/A = **3.7**

Hydrophytic Vegetation Indicators:

____ 1 – Rapid Test for Hydrophytic Vegetation

____ 2 - Dominance Test is >50%

____ 3 – Prevalence Index is ≤3.0[1]

____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☐ No ☒

Remarks:

SOIL Sampling Point: 10u

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	2.5Y 4/2	100					FS	
4-24	2.5Y 6/4	100					S	

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR F**)
- ☐ 1 cm Muck (A9) (**LRR F, G, H**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 CM Mucky Peat or Peat (S2)(**LRR G, H**)
- ☐ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR I, J**)
- ☐ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ☐ Dark Surface (S7) (**LRR G**)
- ☐ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (Inches): _____

Hydric Soils Present? Yes ☐ No ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one 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)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where not tilled**)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where tilled**)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches):

Water Table Present? Yes ☐ No ☒ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches):

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project Site: Black River Impoundment Site City/County: Pennington Sampling Date: 8-23-2017

Applicant/Owner: Houston Engineering, Inc. State: MN Sampling Point: 10w

Investigator(s): Donna Jacob and Mark D Aanenson Section, Township, Range: S24-T153N-R45W

Landform (hillslope, terrace, etc.): ditch bottom Local relief (concave, convex, none): concave Slope (%): 1

Subregion (LRR): F Lat: 48.050145 Long: -96.392832 Datum: NAD1983

Soil Map Unit Name: Hecla loamy fine sand NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☒, or Hydrology ☒, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐		
Hydric Soil Present?	Yes ☒	No ☐		
Wetland Hydrology Present?	Yes ☒	No ☐	**Is the Sampling Area within a Wetland?**	**Yes ☒ No ☐**

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot Size:)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot Size: **5' radius**)			
1. **Typha sp.**	30	x	OBL
2. **Ranunculus pensylvanicus**	20	x	FACW
3. **Epilobium ciliatum**	20	x	FACW
4. **Cyperus esculentes**	15		FACW
5. **Rumex crispus**	5		FAC
6. **Ambrosia artemisiifolia**	5		FACU
7. **Equisetum palustre**	5		FACW
8.			
9.			
10.			
	100	= Total Cover	
Woody Vine Stratum (Plot Size:)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: (A)

Total Number of Dominant Species Across All Strata: (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x1 =	
FACW species		x2 =	
FAC species		x3 =	
FACU species		x4 =	
UPL species		x5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

1 – Rapid Test for Hydrophytic Vegetation

2 - Dominance Test is >50%

3 – Prevalence Index is ≤3.0[1]

4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 10w

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 2/2	100					L	
4-13	2.5Y 6/2	90	2.5Y 5/4	10	C	M	S	

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR F**)
- ☐ 1 cm Muck (A9) (**LRR F, G, H**)
- ☒ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 CM Mucky Peat or Peat (S2)(**LRR G, H**)
- ☐ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR I, J**)
- ☐ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ☐ Dark Surface (S7) (**LRR G**)
- ☐ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (Inches): _____

Hydric Soils Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one 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)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where not tilled**)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where tilled**)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☒ Geomorphic Position (D2)
- ☒ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present?	Yes	☐	No	☒	Depth (inches):
Water Table Present?	Yes	☐	No	☒	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes	☐	No	☒	Depth (inches):

Wetland Hydrology Present? **Yes** ☒ **No** ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project Site: Black River Impoundment Site City/County: Pennington Sampling Date: 8-23-2017

Applicant/Owner: Houston Engineering, Inc. State: MN Sampling Point: 11w

Investigator(s): Donna Jacob and Mark D Aanenson Section, Township, Range: S24-T153N-R45W

Landform (hillslope, terrace, etc.): ditch bottom Local relief (concave, convex, none): concave Slope (%): 1

Subregion (LRR): F Lat: 48.050358 Long: -96.386330 Datum: NAD1983

Soil Map Unit Name: Ulen fine sandy loam, Aspen Parkland NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☒, or Hydrology ☒, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐		
Hydric Soil Present?	Yes ☒	No ☐		
Wetland Hydrology Present?	Yes ☒	No ☐	**Is the Sampling Area within a Wetland?**	**Yes ☒ No ☐**

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot Size:)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot Size: **3' x 6'**)			
1. **Equisetum hyemale**	95	x	FACW
2. **Asclepias syriaca**	5		UPL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100	= Total Cover	
Woody Vine Stratum (Plot Size:)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: (A)

Total Number of Dominant Species Across All Strata: (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x1 =	
FACW species		x2 =	
FAC species		x3 =	
FACU species		x4 =	
UPL species		x5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

x 1 – Rapid Test for Hydrophytic Vegetation

2 - Dominance Test is >50%

3 – Prevalence Index is ≤3.0[1]

4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL Sampling Point: 11w

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-11	2.5Y 7/2	85	2.5Y 6/6	15	C	M	S	

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR F**)
- ☐ 1 cm Muck (A9) (**LRR F, G, H**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 CM Mucky Peat or Peat (S2)(**LRR G, H**)
- ☐ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☒ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR I, J**)
- ☐ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ☐ Dark Surface (S7) (**LRR G**)
- ☐ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (Inches): _____

Hydric Soils Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one 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)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where not tilled**)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where tilled**)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☒ Geomorphic Position (D2)
- ☒ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches):

Water Table Present? Yes ☐ No ☒ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches):

Wetland Hydrology Present? Yes ☒ **No** ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project Site: Black River Impoundment Site City/County: Pennington Sampling Date: 8-23-2017

Applicant/Owner: Houston Engineering, Inc. State: MN Sampling Point: 12u

Investigator(s): Donna Jacob and Mark D Aanenson Section, Township, Range: S31-T153N-R44W

Landform (hillslope, terrace, etc.): ditch slope Local relief (concave, convex, none): none Slope (%): 5

Subregion (LRR): F Lat: 48.028426 Long: -96.370972 Datum: NAD1983

Soil Map Unit Name: Roliss loam NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☒, or Hydrology ☒, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☐	No ☒		
Hydric Soil Present?	Yes ☒	No ☐		
Wetland Hydrology Present?	Yes ☐	No ☒	**Is the Sampling Area within a Wetland?**	**Yes ☐ No ☒**

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot Size:)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot Size: **5' radius**)			
1. **Bromus inermis**	70	x	UPL
2. **Lotus corniculatus**	10		FACU
3. **Cirsium arvense**	5		FACU
4. **Poa pratensis**	5		FACU
5. **Taraxacum officinale**	5		FACU
6. **Typha sp.**	5		OBL
7.			
8.			
9.			
10.			
	100	= Total Cover	
Woody Vine Stratum (Plot Size:)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **0** (A)

Total Number of Dominant Species Across All Strata: **1** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **0** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x1 =	
FACW species		x2 =	
FAC species		x3 =	
FACU species		x4 =	
UPL species		x5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

1 – Rapid Test for Hydrophytic Vegetation

2 - Dominance Test is >50%

3 – Prevalence Index is ≤3.0[1]

4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☐ No ☒

Remarks:

SOIL

Sampling Point: 12u

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	2.5Y 2/1	100					CL	
3-12	2.5Y 5/1	70	2.5Y 5/4	30	C	M	C	

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR F**)
- ☐ 1 cm Muck (A9) (**LRR F, G, H**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 CM Mucky Peat or Peat (S2)(**LRR G, H**)
- ☐ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR I, J**)
- ☐ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ☐ Dark Surface (S7) (**LRR G**)
- ☐ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (Inches): _____

Hydric Soils Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one 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)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where not tilled**)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where tilled**)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present?	Yes	☐	No	☒	Depth (inches):
Water Table Present?	Yes	☐	No	☒	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes	☐	No	☒	Depth (inches):

Wetland Hydrology Present? **Yes** ☐ **No** ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project Site: Black River Impoundment Site City/County: Pennington Sampling Date: 8-23-2017

Applicant/Owner: Houston Engineering, Inc. State: MN Sampling Point: 12w

Investigator(s): Donna Jacob and Mark D Aanenson Section, Township, Range: S31-T153N-R44W

Landform (hillslope, terrace, etc.): ditch bottom Local relief (concave, convex, none): concave Slope (%): 1

Subregion (LRR): F Lat: 48.028526 Long: -96.370961 Datum: NAD1983

Soil Map Unit Name: Roliss loam NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☒, or Hydrology ☒, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐		
Hydric Soil Present?	Yes ☒	No ☐		
Wetland Hydrology Present?	Yes ☒	No ☐	**Is the Sampling Area within a Wetland?**	**Yes ☒ No ☐**

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot Size:)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot Size: **4' x 6'**)			
1. **Rumex crispus**	20	x	FAC
2. **Typha sp.**	10	x	OBL
3. **Hordeum jubatum**	10	x	FACW
4. **Beckmannia syzigachne**	10	x	OBL
5. **Eleocharis palustris**	5		OBL
6. **Alisma subcordatum**	5		OBL
7.			
8.			
9.			
10.			
	60	= Total Cover	
Woody Vine Stratum (Plot Size:)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum **40**

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:		Multiply by:	
OBL species		x1 =	
FACW species		x2 =	
FAC species		x3 =	
FACU species		x4 =	
UPL species		x5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ____ 1 – Rapid Test for Hydrophytic Vegetation
- **x** 2 - Dominance Test is >50%
- ____ 3 – Prevalence Index is ≤3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 12w

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	2.5Y 2/1	100					L	
6-12	2.5Y 6/2	90	2.5Y 5/6	10	C	M	CL	

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR F**)
- ☐ 1 cm Muck (A9) (**LRR F, G, H**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 CM Mucky Peat or Peat (S2)(**LRR G, H**)
- ☐ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☒ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR I, J**)
- ☐ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ☐ Dark Surface (S7) (**LRR G**)
- ☐ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (Inches): _____

Hydric Soils Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one 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)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where not tilled**)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where tilled**)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☒ Geomorphic Position (D2)
- ☒ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches):

Water Table Present? Yes ☐ No ☒ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches):

Wetland Hydrology Present? Yes ☒ **No** ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project Site: Black River Impoundment Site City/County: Pennington Sampling Date: 8-23-2017

Applicant/Owner: Houston Engineering, Inc. State: MN Sampling Point: 13u

Investigator(s): Donna Jacob and Mark D Aanenson Section, Township, Range: S31-T153N-R44W

Landform (hillslope, terrace, etc.): ditch slope Local relief (concave, convex, none): none Slope (%): 5

Subregion (LRR): F Lat: 48.030392 Long: -96.370995 Datum: NAD1983

Soil Map Unit Name: Roliss loam NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☒, or Hydrology ☒, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☐	No ☒		
Hydric Soil Present?	Yes ☒	No ☐		
Wetland Hydrology Present?	Yes ☐	No ☒	**Is the Sampling Area within a Wetland?**	**Yes ☐ No ☒**

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot Size:)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot Size: **5' radius**)			
1. **Bromus inermis**	75	x	UPL
2. **Poa pratensis**	10		FACU
3. **Lotus corniculatus**	5		FACU
4. **Spartina pectinata**	5		FACW
5. **Equisetum hyemale**	5		FACW
6.			
7.			
8.			
9.			
10.			
	100	= Total Cover	
Woody Vine Stratum (Plot Size:)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **0** (A)

Total Number of Dominant Species Across All Strata: **1** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **0** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x1 =	**0**
FACW species	**15**	x2 =	**30**
FAC species	**0**	x3 =	**0**
FACU species	**10**	x4 =	**40**
UPL species	**75**	x5 =	**375**
Column Totals:	**100** (A)		**445** (B)

Prevalence Index = B/A = **4.5**

Hydrophytic Vegetation Indicators:

_____ 1 – Rapid Test for Hydrophytic Vegetation

_____ 2 - Dominance Test is >50%

_____ 3 – Prevalence Index is ≤3.0[1]

_____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

_____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☐ No ☒

Remarks:

SOIL

Sampling Point: 13u

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-7	2.5Y 2/1	100					L	
7-13	2.5Y 6/1	90	2.5Y 5/6	10	C	M	C	

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR F**)
- ☐ 1 cm Muck (A9) (**LRR F, G, H**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 CM Mucky Peat or Peat (S2)(**LRR G, H**)
- ☐ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☒ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR I, J**)
- ☐ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ☐ Dark Surface (S7) (**LRR G**)
- ☐ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (Inches): _____

Hydric Soils Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one 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)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where not tilled**)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where tilled**)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches):

Water Table Present? Yes ☐ No ☒ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches):

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project Site: Black River Impoundment Site City/County: Pennington Sampling Date: 8-23-2017

Applicant/Owner: Houston Engineering, Inc. State: MN Sampling Point: 13w

Investigator(s): Donna Jacob and Mark D Aanenson Section, Township, Range: S31-T153N-R44W

Landform (hillslope, terrace, etc.): ditch bottom Local relief (concave, convex, none): concave Slope (%): 1

Subregion (LRR): F Lat: 48.030535 Long: -96.371006 Datum: NAD1983

Soil Map Unit Name: Roliss loam NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☒, or Hydrology ☒, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐		
Hydric Soil Present?	Yes ☒	No ☐		
Wetland Hydrology Present?	Yes ☒	No ☐	**Is the Sampling Area within a Wetland?**	**Yes ☒ No ☐**

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot Size:)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot Size: **5' radius**)			
1. **Typha sp.**	50	x	OBL
2. **Spartina pectinata**	20	x	FACW
3. **Poa pratensis**	10		FACU
4. **Taraxacum officinale**	10		FACU
5. **Bromus inermis**	5		UPL
6. **Persicaria amphibia**	5		OBL
7.			
8.			
9.			
10.			
	100	= Total Cover	
Woody Vine Stratum (Plot Size:)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: (A)

Total Number of Dominant Species Across All Strata: (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x1 =	
FACW species		x2 =	
FAC species		x3 =	
FACU species		x4 =	
UPL species		x5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

x 1 – Rapid Test for Hydrophytic Vegetation

2 - Dominance Test is >50%

3 – Prevalence Index is ≤3.0[1]

4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 13w

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-5	10YR 2/1	100					CL	
5-13	2.5Y 5/1	90	2.5Y 5/4	10	C	M	C	

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR F**)
- ☐ 1 cm Muck (A9) (**LRR F, G, H**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 CM Mucky Peat or Peat (S2)(**LRR G, H**)
- ☐ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☒ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR I, J**)
- ☐ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ☐ Dark Surface (S7) (**LRR G**)
- ☐ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (Inches): _____

Hydric Soils Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one 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)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where not tilled**)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where tilled**)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☒ Geomorphic Position (D2)
- ☒ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present?	Yes	☐	No	☒	Depth (inches):
Water Table Present?	Yes	☐	No	☒	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes	☐	No	☒	Depth (inches):

Wetland Hydrology Present? **Yes** ☒ **No** ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project Site: Black River Impoundment Site City/County: Pennington Sampling Date: 8-23-2017

Applicant/Owner: Houston Engineering, Inc. State: MN Sampling Point: 14u

Investigator(s): Donna Jacob and Mark D Aanenson Section, Township, Range: S31-T153N-R44W

Landform (hillslope, terrace, etc.): ditch slope Local relief (concave, convex, none): none Slope (%): 5

Subregion (LRR): F Lat: 48.028236 Long: -96.360243 Datum: NAD1983

Soil Map Unit Name: Roliss loam NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☒, or Hydrology ☒, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☐	No ☒		
Hydric Soil Present?	Yes ☐	No ☒		
Wetland Hydrology Present?	Yes ☐	No ☒	**Is the Sampling Area within a Wetland?**	**Yes ☒ No ☐**

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot Size:)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot Size: **5' radius**)			
1. **Bromus inermis**	95	x	UPL
2. **Asclepias syriaca**	5		UPL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100	= Total Cover	
Woody Vine Stratum (Plot Size:)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **0** (A)

Total Number of Dominant Species Across All Strata: **1** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **0** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x1 =	
FACW species		x2 =	
FAC species		x3 =	
FACU species		x4 =	
UPL species		x5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

1 – Rapid Test for Hydrophytic Vegetation

2 - Dominance Test is >50%

3 – Prevalence Index is ≤3.0[1]

4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☐ No ☒

Remarks:

Mowed.

SOIL

Sampling Point: 14u

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-5	10YR 2/1	100					L	
5-13	2.5Y 4/2	100					SL	

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR F**)
- ☐ 1 cm Muck (A9) (**LRR F, G, H**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 CM Mucky Peat or Peat (S2)(**LRR G, H**)
- ☐ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR I, J**)
- ☐ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ☐ Dark Surface (S7) (**LRR G**)
- ☐ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (Inches): _____

Hydric Soils Present? Yes ☐ No ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one 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)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where not tilled**)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where tilled**)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches):

Water Table Present? Yes ☐ No ☒ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches):

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project Site: Black River Impoundment Site | City/County: Pennington | Sampling Date: 8-23-2017

Applicant/Owner: Houston Engineering, Inc. | State: MN | Sampling Point: 14w

Investigator(s): Donna Jacob and Mark D Aanenson | Section, Township, Range: S31-T153N-R44W

Landform (hillslope, terrace, etc.): fringe wetland | Local relief (concave, convex, none): none | Slope (%): 10

Subregion (LRR): F | Lat: 48.028236 | Long: -96.360243 | Datum: NAD1983

Soil Map Unit Name: Roliss loam | NWI classification: PEM1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☒, or Hydrology ☒, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐		
Hydric Soil Present?	Yes ☒	No ☐		
Wetland Hydrology Present?	Yes ☒	No ☐	**Is the Sampling Area within a Wetland?**	**Yes ☒ No ☐**

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot Size: **10" radius**)			
1. **Acer negundo**	5	x	FAC
2.			
3.			
4.			
5.			
	5	= Total Cover	
Herb Stratum (Plot Size: **5' radius**)			
1. **Phalaris arundinacea**	80	x	FACW
2. **Urtica dioica**	20		FAC
3. **Typha sp.**	10		OBL
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	110	= Total Cover	
Woody Vine Stratum (Plot Size:)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum

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:		Multiply by:	
OBL species		x1 =	
FACW species		x2 =	
FAC species		x3 =	
FACU species		x4 =	
UPL species		x5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ____ 1 – Rapid Test for Hydrophytic Vegetation
- **x** 2 - Dominance Test is >50%
- ____ 3 – Prevalence Index is ≤3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL Sampling Point: 14w

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	2.5Y 2/1	50					SL	
	2.5Y 4/1	50						
10-15	2.5Y 4/1	98	2.5Y 5/4	2	C	M	S/O. Peat	
15+	2.5Y 2/1	100					S/O. Peat	

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR F**)
- ☐ 1 cm Muck (A9) (**LRR F, G, H**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 CM Mucky Peat or Peat (S2)(**LRR G, H**)
- ☐ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☒ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR I, J**)
- ☐ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ☐ Dark Surface (S7) (**LRR G**)
- ☐ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (Inches): _____

Hydric Soils Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one 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)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where not tilled**)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where tilled**)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☒ Geomorphic Position (D2)
- ☒ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes ☐ No ☐ Depth (inches):

Water Table Present? Yes ☐ No ☐ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ☐ No ☐ Depth (inches):

Wetland Hydrology Present? Yes ☒ **No** ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project Site: Black River Impoundment Site City/County: Pennington Sampling Date: 8-23-2017

Applicant/Owner: Houston Engineering, Inc. State: MN Sampling Point: 15u

Investigator(s): Donna Jacob and Mark D Aanenson Section, Township, Range: S31-T153N-R44W

Landform (hillslope, terrace, etc.): ditch slope Local relief (concave, convex, none): none Slope (%): 5

Subregion (LRR): F Lat: 48.033528 Long: -96.371043 Datum: NAD1983

Soil Map Unit Name: Foldahl fine sandy loam NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☒, or Hydrology ☒, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☐	No ☒		
Hydric Soil Present?	Yes ☐	No ☒		
Wetland Hydrology Present?	Yes ☐	No ☒	**Is the Sampling Area within a Wetland?**	**Yes ☐ No ☒**

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot Size:)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot Size: **5' radius**)			
1. **Poa pratensis**	60	x	FACU
2. **Lotus corniculatus**	20	x	FACU
3. **Bromus inermis**	10		UPL
4. **Taraxacum officinale**	5		FACU
5. **Phalaris arundinacea**	5		FACW
6.			
7.			
8.			
9.			
10.			
	100	= Total Cover	
Woody Vine Stratum (Plot Size:)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum

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:		Multiply by:	
OBL species	**0**	x1 =	**0**
FACW species	**0**	x2 =	**0**
FAC species	**85**	x3 =	**225**
FACU species	**5**	x4 =	**20**
UPL species	**10**	x5 =	**50**
Column Totals:	**100** (A)		**325** (B)

Prevalence Index = B/A = **3.3**

Hydrophytic Vegetation Indicators:

_____ 1 – Rapid Test for Hydrophytic Vegetation

_____ 2 - Dominance Test is >50%

_____ 3 – Prevalence Index is ≤3.0[1]

_____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

_____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☐ No ☒

Remarks:

Mowed.

SOIL

Sampling Point: 15u

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	2.5Y 2/1	100					L	
4-14	2.5Y 2/1	50					SL	
	2.5Y 7/3	50						

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR F**)
- ☐ 1 cm Muck (A9) (**LRR F, G, H**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 CM Mucky Peat or Peat (S2)(**LRR G, H**)
- ☐ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR I, J**)
- ☐ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ☐ Dark Surface (S7) (**LRR G**)
- ☐ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (Inches): _____

Hydric Soils Present? Yes ☐ No ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one 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)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where not tilled**)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where tilled**)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches):

Water Table Present? Yes ☐ No ☒ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches):

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project Site: Black River Impoundment Site City/County: Pennington Sampling Date: 8-23-2017

Applicant/Owner: Houston Engineering, Inc. State: MN Sampling Point: 15w

Investigator(s): Donna Jacob and Mark D Aanenson Section, Township, Range: S31-T153N-R44W

Landform (hillslope, terrace, etc.): ditch bottom Local relief (concave, convex, none): concave Slope (%): 1

Subregion (LRR): F Lat: 48.033530 Long: -96.370992 Datum: NAD1983

Soil Map Unit Name: Foldahl fine sandy loam NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☒, or Hydrology ☒, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐		
Hydric Soil Present?	Yes ☒	No ☐		
Wetland Hydrology Present?	Yes ☒	No ☐	**Is the Sampling Area within a Wetland?**	**Yes ☒ No ☐**

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot Size:)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot Size: **5' radius**)			
1. **Phalaris arundinacea**	100	x	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100	= Total Cover	
Woody Vine Stratum (Plot Size:)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: (A)

Total Number of Dominant Species Across All Strata: (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x1 =	
FACW species		x2 =	
FAC species		x3 =	
FACU species		x4 =	
UPL species		x5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

x 1 – Rapid Test for Hydrophytic Vegetation

2 - Dominance Test is >50%

3 – Prevalence Index is ≤3.0[1]

4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

Mowed.

SOIL

Sampling Point: 15w

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	2.5Y 2/2	50					C	
	2.5Y 6/2	50						
6-14	2.5Y 6/2	90	2.5Y 5/4	10	C	M	C	

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR F**)
- ☐ 1 cm Muck (A9) (**LRR F, G, H**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 CM Mucky Peat or Peat (S2)(**LRR G, H**)
- ☐ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☒ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR I, J**)
- ☐ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ☐ Dark Surface (S7) (**LRR G**)
- ☐ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (Inches): _____

Hydric Soils Present? Yes ☒ No ☐

Remarks:

Can't go further than 14"

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one 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)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where not tilled**)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where tilled**)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes ☐ No ☐ Depth (inches):

Water Table Present? Yes ☐ No ☐ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ☐ No ☐ Depth (inches):

Wetland Hydrology Present? **Yes** ☐ **No** ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project Site: Black River Impoundment Site City/County: Pennington Sampling Date: 8-23-2017

Applicant/Owner: Houston Engineering, Inc. State: MN Sampling Point: 16u

Investigator(s): Donna Jacob and Mark D Aanenson Section, Township, Range: S30-T153N-R44W

Landform (hillslope, terrace, etc.): ditch slope Local relief (concave, convex, none): none Slope (%): 5

Subregion (LRR): F Lat: 48.036284 Long: -96.371002 Datum: NAD1983

Soil Map Unit Name: Kittson loam NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☒, or Hydrology ☒, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☐	No ☒		
Hydric Soil Present?	Yes ☒	No ☐		
Wetland Hydrology Present?	Yes ☐	No ☒	**Is the Sampling Area within a Wetland?**	**Yes ☐ No ☒**

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot Size:)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot Size: **5' radius**)			
1. **Poa pratensis**	40	x	FACU
2. **Bromus inermis**	20	x	UPL
3. **Spartina pectinata**	15		FACW
4. **Lotus corniculatus**	10		FACU
5. **Phalaris arundinacea**	5		FACW
6. **Cirsium arvense**	5		FACU
7. **Plantago major**	5		FAC
8.			
9.			
10.			
	100	= Total Cover	
Woody Vine Stratum (Plot Size:)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum

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:		Multiply by:	
OBL species	**0**	x1 =	**0**
FACW species	**55**	x2 =	**110**
FAC species	**0**	x3 =	**0**
FACU species	**20**	x4 =	**80**
UPL species	**20**	x5 =	**100**
Column Totals:	**100** (A)		**290** (B)

Prevalence Index = B/A = **3.1**

Hydrophytic Vegetation Indicators:

_____ 1 – Rapid Test for Hydrophytic Vegetation

_____ 2 - Dominance Test is >50%

_____ 3 – Prevalence Index is ≤3.0[1]

_____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

_____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☐ No ☒

Remarks:

Mowed.

SOIL

Sampling Point: 16u

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-5	2.5Y 2/1	100					SL	
5-13	2.5Y 5/6	90	2.5Y 6/2	10	C	M	CL	

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR F**)
- ☐ 1 cm Muck (A9) (**LRR F, G, H**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 CM Mucky Peat or Peat (S2)(**LRR G, H**)
- ☐ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☒ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR I, J**)
- ☐ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ☐ Dark Surface (S7) (**LRR G**)
- ☐ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (Inches): _____

Hydric Soils Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one 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)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where not tilled**)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where tilled**)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches):

Water Table Present? Yes ☐ No ☒ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches):

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project Site: Black River Impoundment Site City/County: Pennington Sampling Date: 8-23-2017

Applicant/Owner: Houston Engineering, Inc. State: MN Sampling Point: 16w

Investigator(s): Donna Jacob and Mark D Aanenson Section, Township, Range: S30-T153N-R44W

Landform (hillslope, terrace, etc.): ditch bottom Local relief (concave, convex, none): concave Slope (%): 1

Subregion (LRR): F Lat: 48.036525 Long: -96.371004 Datum: NAD1983

Soil Map Unit Name: Kittson loam NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☒, or Hydrology ☒, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐		
Hydric Soil Present?	Yes ☒	No ☐		
Wetland Hydrology Present?	Yes ☒	No ☐	**Is the Sampling Area within a Wetland?**	**Yes ☒ No ☐**

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot Size:)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot Size: **5' radius**)			
1. **Phalaris arundinacea**	60	x	FACW
2. **Spartina pectinata**	20	x	FACW
3. **Typha sp.**	5		OBL
4. **Apocynum cannabinum**	5		FAC
5.			
6.			
7.			
8.			
9.			
10.			
	90	= Total Cover	
Woody Vine Stratum (Plot Size:)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: (A)

Total Number of Dominant Species Across All Strata: (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x1 =	
FACW species		x2 =	
FAC species		x3 =	
FACU species		x4 =	
UPL species		x5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

x 1 – Rapid Test for Hydrophytic Vegetation

2 - Dominance Test is >50%

3 – Prevalence Index is ≤3.0[1]

4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

Mowed.

SOIL

Sampling Point: 16w

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-5	2.5Y 2/1	100					SL	
5-13	2.5Y 6/2	90	2.5Y 5/6	10	C	M	CL	

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR F**)
- ☐ 1 cm Muck (A9) (**LRR F, G, H**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 CM Mucky Peat or Peat (S2)(**LRR G, H**)
- ☐ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☒ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR I, J**)
- ☐ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ☐ Dark Surface (S7) (**LRR G**)
- ☐ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (Inches): _____

Hydric Soils Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one 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)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where not tilled**)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where tilled**)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☒ Geomorphic Position (D2)
- ☒ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present?	Yes	☐	No	☒	Depth (inches):
Water Table Present?	Yes	☐	No	☒	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes	☐	No	☒	Depth (inches):

Wetland Hydrology Present? **Yes** ☒ **No** ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project Site: Black River Impoundment Site City/County: Pennington Sampling Date: 8-23-2017

Applicant/Owner: Houston Engineering, Inc. State: MN Sampling Point: 17w

Investigator(s): Donna Jacob and Mark D Aanenson Section, Township, Range: S19-T153N-R44W

Landform (hillslope, terrace, etc.): ditch bottom Local relief (concave, convex, none): concave Slope (%): 1

Subregion (LRR): F Lat: 48.063652 Long: -96.371057 Datum: NAD1983

Soil Map Unit Name: Roliss loam NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☒, or Hydrology ☒, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐		
Hydric Soil Present?	Yes ☒	No ☐		
Wetland Hydrology Present?	Yes ☒	No ☐	**Is the Sampling Area within a Wetland?**	**Yes ☒ No ☐**

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot Size:)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot Size: **5' radius**)			
1. **Spartina pectinata**	85	x	FACW
2. **Eleocharis palustris**	10		OBL
3. **Juncus balticus**	5		FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100	= Total Cover	
Woody Vine Stratum (Plot Size:)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: (A)

Total Number of Dominant Species Across All Strata: (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x1 =	
FACW species		x2 =	
FAC species		x3 =	
FACU species		x4 =	
UPL species		x5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

x 1 – Rapid Test for Hydrophytic Vegetation

2 - Dominance Test is >50%

3 – Prevalence Index is ≤3.0[1]

4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

Mowed.

SOIL

Sampling Point: 17w

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-5	2.5Y 2/1	100					SL	
5-13	2.5Y 6/2	90	2.5Y 65/6	10	C	M	CL	

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR F**)
- ☐ 1 cm Muck (A9) (**LRR F, G, H**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 CM Mucky Peat or Peat (S2)(**LRR G, H**)
- ☐ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☒ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR I, J**)
- ☐ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ☐ Dark Surface (S7) (**LRR G**)
- ☐ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (Inches): _____

Hydric Soils Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one 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)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where not tilled**)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where tilled**)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☒ Geomorphic Position (D2)
- ☒ FAC-Neutral Test (D5)
- ☒ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches):

Water Table Present? Yes ☐ No ☒ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches):

Wetland Hydrology Present? Yes ☒ **No** ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project Site: Black River Impoundment Site City/County: Pennington Sampling Date: 8-23-2017

Applicant/Owner: Houston Engineering, Inc. State: MN Sampling Point: 18u

Investigator(s): Donna Jacob and Mark D Aanenson Section, Township, Range: S18-T153N-R44W

Landform (hillslope, terrace, etc.): ditch slope Local relief (concave, convex, none): none Slope (%): 5

Subregion (LRR): F Lat: 48.064617 Long: -96.371137 Datum: NAD1983

Soil Map Unit Name: Roliss loam NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☒, or Hydrology ☒, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☐	No ☒		
Hydric Soil Present?	Yes ☒	No ☐		
Wetland Hydrology Present?	Yes ☐	No ☒	**Is the Sampling Area within a Wetland?**	**Yes ☐ No ☒**

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot Size:)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot Size: **5' radius**)			
1. **Bromus inermis**	45	x	UPL
2. **Poa pratensis**	45	x	FACU
3. **Rosa arkansana**	5		FACU
4. **Taraxacum officinale**	5		FACU
5.			
6.			
7.			
8.			
9.			
10.			
	100	= Total Cover	
Woody Vine Stratum (Plot Size:)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum

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:		Multiply by:	
OBL species		x1 =	
FACW species		x2 =	
FAC species		x3 =	
FACU species		x4 =	
UPL species		x5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

1 – Rapid Test for Hydrophytic Vegetation

2 - Dominance Test is >50%

3 – Prevalence Index is ≤3.0[1]

4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☐ No ☒

Remarks:

SOIL Sampling Point: 18u

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	2.5Y 2/1	100					mucky L	
6-14	2.5Y 6/2	90	2.5 5/6	10	C	M	C	

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR F**)
- ☐ 1 cm Muck (A9) (**LRR F, G, H**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 CM Mucky Peat or Peat (S2)(**LRR G, H**)
- ☐ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☒ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR I, J**)
- ☐ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ☐ Dark Surface (S7) (**LRR G**)
- ☐ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (Inches): _____

Hydric Soils Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one 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)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where not tilled**)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where tilled**)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present?	Yes	☐	No	☒	Depth (inches):
Water Table Present?	Yes	☐	No	☒	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes	☐	No	☒	Depth (inches):

Wetland Hydrology Present? **Yes** ☐ **No** ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project Site: Black River Impoundment Site | City/County: Pennington | Sampling Date: 8-23-2017

Applicant/Owner: Houston Engineering, Inc. | State: MN | Sampling Point: 18w

Investigator(s): Donna Jacob and Mark D Aanenson | Section, Township, Range: S18-T153N-R44W

Landform (hillslope, terrace, etc.): ditch bottom | Local relief (concave, convex, none): concave | Slope (%): 1

Subregion (LRR): F | Lat: 48.064598 | Long: -96.371093 | Datum: NAD1983

Soil Map Unit Name: Roliss loam | NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☒, or Hydrology ☒, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐		
Hydric Soil Present?	Yes ☒	No ☐		
Wetland Hydrology Present?	Yes ☒	No ☐	**Is the Sampling Area within a Wetland?**	**Yes ☒ No ☐**

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot Size:)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot Size: **5' radius**)			
1. **Typha sp.**	15	x	OBL
2. **Sium suave**	10	x	OBL
3. **Rumex crispus**	5		FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	30	= Total Cover	
Woody Vine Stratum (Plot Size:)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum **60**

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: ____ (A)

Total Number of Dominant Species Across All Strata: ____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: ____ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x1 =	
FACW species		x2 =	
FAC species		x3 =	
FACU species		x4 =	
UPL species		x5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

x 1 – Rapid Test for Hydrophytic Vegetation

____ 2 - Dominance Test is >50%

____ 3 – Prevalence Index is ≤3.0[1]

____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

Difinitive shells.

SOIL

Sampling Point: 18w

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	2.5Y 2/1	100					mucky L	
6-14	10Y 6/1	90	2.5Y 5/6	10	C	M	C	

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR F**)
- ☐ 1 cm Muck (A9) (**LRR F, G, H**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 CM Mucky Peat or Peat (S2)(**LRR G, H**)
- ☐ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☒ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR I, J**)
- ☐ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ☐ Dark Surface (S7) (**LRR G**)
- ☐ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (Inches): _____

Hydric Soils Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one 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)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☒ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where not tilled**)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where tilled**)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☒ Geomorphic Position (D2)
- ☒ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present?	Yes	☐	No	☒	Depth (inches):
Water Table Present?	Yes	☐	No	☒	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes	☐	No	☒	Depth (inches):

Wetland Hydrology Present? **Yes** ☒ **No** ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project Site: Black River Impoundment Site City/County: Pennington Sampling Date: 8-23-2017

Applicant/Owner: Houston Engineering, Inc. State: MN Sampling Point: 19w

Investigator(s): Donna Jacob and Mark D Aanenson Section, Township, Range: S18-T153N-R44W

Landform (hillslope, terrace, etc.): ditch bottom Local relief (concave, convex, none): concave Slope (%): 1

Subregion (LRR): F Lat: 48.075433 Long: -96.371139 Datum: NAD1983

Soil Map Unit Name: Roliss loam NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☒, or Hydrology ☒, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐		
Hydric Soil Present?	Yes ☒	No ☐		
Wetland Hydrology Present?	Yes ☒	No ☐	**Is the Sampling Area within a Wetland?**	**Yes ☒ No ☐**

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot Size:)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot Size:)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	= Total Cover		
Woody Vine Stratum (Plot Size:)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: (A)

Total Number of Dominant Species Across All Strata: (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x1 =	
FACW species		x2 =	
FAC species		x3 =	
FACU species		x4 =	
UPL species		x5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- 1 – Rapid Test for Hydrophytic Vegetation
- 2 - Dominance Test is >50%
- 3 – Prevalence Index is ≤3.0[1]
- 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- x Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

Mowed, cannot identify anything. Hydrophytic vegetation is present.

Remnants of Apocynum cannabinum(FAC), Eleocharis palustris(OBL), Agrostis stolonifera(FACW), Phleum pratense(FACU), Phalaris arundinacea(FACW), and Carex sp. (likely FACW or OBL)

SOIL

Sampling Point: 19w

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	2.5Y 2/1	100					L	
6-14	2.5Y 6/2	90	2.5Y 5/6	10	C	M	C	

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR F**)
- ☐ 1 cm Muck (A9) (**LRR F, G, H**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 CM Mucky Peat or Peat (S2)(**LRR G, H**)
- ☐ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☒ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR I, J**)
- ☐ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ☐ Dark Surface (S7) (**LRR G**)
- ☐ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (Inches): _____

Hydric Soils Present? Yes ☒ No ☐

Remarks:

Too hard to go further than 14"

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one 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)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where not tilled**)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where tilled**)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☒ Geomorphic Position (D2)
- ☒ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present?	Yes	☐	No	☒	Depth (inches):
Water Table Present?	Yes	☐	No	☒	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes	☐	No	☒	Depth (inches):

Wetland Hydrology Present? **Yes** ☒ **No** ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project Site: Black River Impoundment Site City/County: Pennington Sampling Date: 8-24-2017

Applicant/Owner: Houston Engineering, Inc. State: MN Sampling Point: 20u

Investigator(s): Donna Jacob and Mark D Aanenson Section, Township, Range: S2-T152N-R45W

Landform (hillslope, terrace, etc.): ditch slope Local relief (concave, convex, none): none Slope (%): 5

Subregion (LRR): F Lat: 48.006889 Long: -96.391960 Datum: NAD1983

Soil Map Unit Name: Mavie fine sandy loam NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☒, or Hydrology ☒, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☐	No ☒		
Hydric Soil Present?	Yes ☒	No ☐		
Wetland Hydrology Present?	Yes ☐	No ☒	**Is the Sampling Area within a Wetland?**	**Yes ☐ No ☒**

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot Size:)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot Size: **5' radius**)			
1. **Bromus inermis**	30	x	UPL
2. **Cirsium arvense**	30	x	FACU
3. **Poa pratensis**	20		FACU
4. **Ambrosia artemisiifolia**	20		FACU
5. **Rumex crispus**	5		FAC
6. **Apocynum cannabinum**	5		FAC
7.			
8.			
9.			
10.			
	110	= Total Cover	
Woody Vine Stratum (Plot Size:)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum

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:		Multiply by:	
OBL species		x1 =	
FACW species		x2 =	
FAC species		x3 =	
FACU species		x4 =	
UPL species		x5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

1 – Rapid Test for Hydrophytic Vegetation

2 - Dominance Test is >50%

3 – Prevalence Index is ≤3.0[1]

4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☐ No ☒

Remarks:

SOIL

Sampling Point: 20u

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	2.5Y 2/1	100					L	
8-13	2.5Y 7/2	100					SiL	

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR F**)
- ☐ 1 cm Muck (A9) (**LRR F, G, H**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 CM Mucky Peat or Peat (S2)(**LRR G, H**)
- ☐ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☒ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR I, J**)
- ☐ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ☐ Dark Surface (S7) (**LRR G**)
- ☐ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (Inches): _____

Hydric Soils Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one 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)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where not tilled**)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where tilled**)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present?	Yes	☐	No	☒	Depth (inches):
Water Table Present?	Yes	☐	No	☒	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes	☐	No	☒	Depth (inches):

Wetland Hydrology Present? **Yes** ☐ **No** ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project Site: Black River Impoundment Site City/County: Pennington Sampling Date: 8-24-2017

Applicant/Owner: Houston Engineering, Inc. State: MN Sampling Point: 20w

Investigator(s): Donna Jacob and Mark D Aanenson Section, Township, Range: S2-T152N-R45W

Landform (hillslope, terrace, etc.): ditch bottom Local relief (concave, convex, none): concave Slope (%): 1

Subregion (LRR): F Lat: 48.006908 Long: -96.391970 Datum: NAD1983

Soil Map Unit Name: Mavie fine sandy loam NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☒, or Hydrology ☒, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐		
Hydric Soil Present?	Yes ☒	No ☐		
Wetland Hydrology Present?	Yes ☒	No ☐	**Is the Sampling Area within a Wetland?**	**Yes ☒ No ☐**

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot Size:)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot Size: **4' x 6'**)			
1. **Sphagnum sp.**	60	x	OBL
2. **Typha sp.**	10		OBL
3. **Beckmannia syzigachne**	10		OBL
4. **Rumex crispus**	10		FAC
5. **Taraxacum officinale**	10		FACU
6.			
7.			
8.			
9.			
10.			
	100	= Total Cover	
Woody Vine Stratum (Plot Size:)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: (A)

Total Number of Dominant Species Across All Strata: (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x1 =	
FACW species		x2 =	
FAC species		x3 =	
FACU species		x4 =	
UPL species		x5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

x 1 – Rapid Test for Hydrophytic Vegetation

2 - Dominance Test is >50%

3 – Prevalence Index is ≤3.0[1]

4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 20w

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	2.5Y 2/1	100					L	
4-12	2.5Y 6/2	90	2.5Y 5/6	10	C	M	VFS	

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR F**)
- ☐ 1 cm Muck (A9) (**LRR F, G, H**)
- ☒ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 CM Mucky Peat or Peat (S2)(**LRR G, H**)
- ☐ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR I, J**)
- ☐ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ☐ Dark Surface (S7) (**LRR G**)
- ☐ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (Inches): _____

Hydric Soils Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one 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)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where not tilled**)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where tilled**)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☒ Geomorphic Position (D2)
- ☒ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present?	Yes	☐	No	☒	Depth (inches):
Water Table Present?	Yes	☐	No	☒	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes	☐	No	☒	Depth (inches):

Wetland Hydrology Present? **Yes** ☒ **No** ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project Site: Black River Impoundment Site | City/County: Pennington | Sampling Date: 8-24-2017

Applicant/Owner: Houston Engineering, Inc. | State: MN | Sampling Point: 21u

Investigator(s): Donna Jacob and Mark D Aanenson | Section, Township, Range: S1-T152N-R45W

Landform (hillslope, terrace, etc.): ditch slope | Local relief (concave, convex, none): none | Slope (%): 5

Subregion (LRR): F | Lat: 48.007077 | Long: -96.353733 | Datum: NAD1983

Soil Map Unit Name: Rosewood fine sandy loam, Aspen Parkland | NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☒, or Hydrology ☒, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☐	No ☒		
Hydric Soil Present?	Yes ☐	No ☒		
Wetland Hydrology Present?	Yes ☐	No ☒	**Is the Sampling Area within a Wetland?**	**Yes ☐ No ☒**

Remarks:

Forest

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size: **15' radius**)	Absolute % Cover	Dominant Species?	Indicator Status
1. **Quercus macrocarpa**	**10**	**x**	**FACU**
2. **Populus tremuloides**	10	x	FACU
3. _____	_____	_____	_____
4. _____	_____	_____	_____
	20	= Total Cover	
Sapling/Shrub Stratum (Plot Size: **10' radius**)			
1. **Prunus virginiana**	15	x	FACU
2. **Cornus alba**	5	x	FACW
3. **Populus balsamifera**	5	x	FACW
4. **Viburnum opulus**	5	x	FAC
5. **Symphoricarpos albus**	5	x	UPL
	35	= Total Cover	
Herb Stratum (Plot Size: **5' radius**)			
1. **Elymus repens**	35	x	FACU
2. **Toxicodendron radicans**	25	x	FACU
3. **Poa pratensis**	10	_____	FACU
4. **Elymus canadensis**	10	_____	FACU
5. **Solidago canadensis**	5	_____	FACU
6. **Symphyotrichum novae-angliae**	5	_____	FACW
7. **Lithospermum latifolium**	5	_____	UPL
8. _____	_____	_____	_____
9. _____	_____	_____	_____
10. _____	_____	_____	_____
	95	= Total Cover	
Woody Vine Stratum (Plot Size: _____)			
1. _____	_____	_____	_____
2. _____	_____	_____	_____
	_____	= Total Cover	

% Bare Ground in Herb Stratum _____

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	**3**	(A)
Total Number of Dominant Species Across All Strata:	**9**	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	**30**	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x1 =	**0**
FACW species	**15**	x2 =	**30**
FAC species	**0**	x3 =	**0**
FACU species	**120**	x4 =	**480**
UPL species	**15**	x5 =	**75**
Column Totals:	**150** (A)		**585** (B)

Prevalence Index = B/A = **3.9**

Hydrophytic Vegetation Indicators:

_____ 1 – Rapid Test for Hydrophytic Vegetation

_____ 2 - Dominance Test is >50%

_____ 3 – Prevalence Index is ≤3.0[1]

_____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

_____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☐ No ☒

Remarks:

SOIL Sampling Point: 21u

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	2.5Y 2/1	100					LS	
12-15	2.5Y 4/1	100					LS	

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR F**)
- ☐ 1 cm Muck (A9) (**LRR F, G, H**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 CM Mucky Peat or Peat (S2)(**LRR G, H**)
- ☐ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR I, J**)
- ☐ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ☐ Dark Surface (S7) (**LRR G**)
- ☐ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (Inches): _____

Hydric Soils Present? Yes ☐ No ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one 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)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where not tilled**)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where tilled**)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches):

Water Table Present? Yes ☐ No ☒ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches):

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project Site: Black River Impoundment Site City/County: Pennington Sampling Date: 8-24-2017

Applicant/Owner: Houston Engineering, Inc. State: MN Sampling Point: 21w

Investigator(s): Donna Jacob and Mark D Aanenson Section, Township, Range: S1-T152N-R45W

Landform (hillslope, terrace, etc.): ditch bottom Local relief (concave, convex, none): concave Slope (%): 1

Subregion (LRR): F Lat: 48.006931 Long: -96.353810 Datum: NAD1983

Soil Map Unit Name: Rosewood fine sandy loam, Aspen Parkland NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☒, or Hydrology ☒, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐		
Hydric Soil Present?	Yes ☒	No ☐		
Wetland Hydrology Present?	Yes ☒	No ☐	**Is the Sampling Area within a Wetland?**	**Yes ☒ No ☐**

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot Size:)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot Size: **4' x 6'**)			
1. **Equisetum hyemale**	20	x	FACW
2. **Typha sp.**	5		OBL
3. **Phalaris arundinacea**	5		FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	30	= Total Cover	
Woody Vine Stratum (Plot Size:)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum **75**

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: ____ (A)

Total Number of Dominant Species Across All Strata: ____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: ____ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x1 =	
FACW species		x2 =	
FAC species		x3 =	
FACU species		x4 =	
UPL species		x5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

x 1 – Rapid Test for Hydrophytic Vegetation

____ 2 - Dominance Test is >50%

____ 3 – Prevalence Index is ≤3.0[1]

____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

Herbicide.

SOIL

Sampling Point: 21w

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	2.5Y 2/1	100					SiL	
4-7	2.5Y 5/3	100					S	
7-15	2.5Y 6/1	100					S	
15+	2.5Y 6/1	100					C	

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR F**)
- ☐ 1 cm Muck (A9) (**LRR F, G, H**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 CM Mucky Peat or Peat (S2)(**LRR G, H**)
- ☐ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☒ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR I, J**)
- ☐ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ☐ Dark Surface (S7) (**LRR G**)
- ☐ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (Inches): _____

Hydric Soils Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one 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)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where not tilled**)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where tilled**)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☒ FAC-Neutral Test (D5)
- ☒ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches):

Water Table Present? Yes ☐ No ☒ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches):

Wetland Hydrology Present? Yes ☒ **No** ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project Site: Black River Impoundment Site City/County: Pennington Sampling Date: 8-24-2017

Applicant/Owner: Houston Engineering, Inc. State: MN Sampling Point: 22u

Investigator(s): Donna Jacob and Mark D Aanenson Section, Township, Range: S5-T152N-R44W

Landform (hillslope, terrace, etc.): ditch slope Local relief (concave, convex, none): none Slope (%): 5

Subregion (LRR): F Lat: 48.006635 Long: -96.322195 Datum: NAD1983

Soil Map Unit Name: Clearwater day NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☒, or Hydrology ☒, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☐	No ☒		
Hydric Soil Present?	Yes ☒	No ☐		
Wetland Hydrology Present?	Yes ☐	No ☒	**Is the Sampling Area within a Wetland?**	**Yes ☐ No ☒**

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot Size:)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot Size: **5' radius**)			
1. **Elymus repens**	40	x	FACU
2. **Cirsium arvense**	20	x	FACU
3. **Asclepias syriaca**	5		UPL
4. **Melilotus officinalis**	5		FACU
5. **Solidago canadensis**	5		FACU
6. **Solidago gigantea**	5		FAC
7. **Sonchus arvensis**	5		FAC
8. **Poa pratensis**	5		FACU
9. **Thalictrum dioicum**	5		FACW
10. **Symphyotrichum lanceolatum**	5		FACW
	100	= Total Cover	
Woody Vine Stratum (Plot Size:)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum

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:		Multiply by:	
OBL species	**0**	x1 =	**0**
FACW species	**10**	x2 =	**20**
FAC species	**10**	x3 =	**30**
FACU species	**75**	x4 =	**300**
UPL species	**5**	x5 =	**25**
Column Totals:	**100** (A)		**375** (B)

Prevalence Index = B/A = **3.75**

Hydrophytic Vegetation Indicators:

_____ 1 – Rapid Test for Hydrophytic Vegetation

_____ 2 - Dominance Test is >50%

_____ 3 – Prevalence Index is ≤3.0[1]

_____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

_____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☐ No ☒

Remarks:

SOIL

Sampling Point: 22u

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	2.5Y 2/2	100					SL	
4-14	2.5Y 5/2	95	2.5Y 4/4	5	C	M	CL	

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR F**)
- ☐ 1 cm Muck (A9) (**LRR F, G, H**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 CM Mucky Peat or Peat (S2)(**LRR G, H**)
- ☐ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☒ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR I, J**)
- ☐ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ☐ Dark Surface (S7) (**LRR G**)
- ☐ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (Inches): _____

Hydric Soils Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one 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)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where not tilled**)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where tilled**)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present?	Yes	☐	No	☒	Depth (inches):
Water Table Present?	Yes	☐	No	☒	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes	☐	No	☒	Depth (inches):

Wetland Hydrology Present? **Yes** ☐ **No** ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project Site: Black River Impoundment Site City/County: Pennington Sampling Date: 8-24-2017

Applicant/Owner: Houston Engineering, Inc. State: MN Sampling Point: 22w

Investigator(s): Donna Jacob and Mark D Aanenson Section, Township, Range: S5-T152N-R44W

Landform (hillslope, terrace, etc.): ditch bottom Local relief (concave, convex, none): concave Slope (%): 1

Subregion (LRR): F Lat: 48.006670 Long: -96.322177 Datum: NAD1983

Soil Map Unit Name: Clearwater day NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☒, or Hydrology ☒, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐		
Hydric Soil Present?	Yes ☒	No ☐		
Wetland Hydrology Present?	Yes ☒	No ☐	**Is the Sampling Area within a Wetland?**	**Yes ☒ No ☐**

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot Size: **10' radius**)			
1. **Salix petiolaris**	5	x	OBL
2.			
3.			
4.			
5.			
	5	= Total Cover	
Herb Stratum (Plot Size: **5' radius**)			
1. **Carex pellita**	40	x	OBL
2. **Typha sp.**	20	x	OBL
3. **Calamagrostis stricta**	20	x	FACW
4. **Juncus balticus**	10		FACW
5. **Carex atherodes**	5		OBL
6. **Lycopus virginicus**	5		OBL
7.			
8.			
9.			
10.			
	100	= Total Cover	
Woody Vine Stratum (Plot Size:)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: (A)

Total Number of Dominant Species Across All Strata: (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x1 =	
FACW species		x2 =	
FAC species		x3 =	
FACU species		x4 =	
UPL species		x5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

x 1 – Rapid Test for Hydrophytic Vegetation

2 - Dominance Test is >50%

3 – Prevalence Index is ≤3.0[1]

4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL Sampling Point: 22w

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-13	2.5Y 6/1	90	2.5Y 4/4	10	C	M	CL	

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR F**)
- ☐ 1 cm Muck (A9) (**LRR F, G, H**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 CM Mucky Peat or Peat (S2)(**LRR G, H**)
- ☐ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☒ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR I, J**)
- ☐ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ☐ Dark Surface (S7) (**LRR G**)
- ☐ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (Inches): _____

Hydric Soils Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one 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)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where not tilled**)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where tilled**)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☒ Geomorphic Position (D2)
- ☒ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present?	Yes	☐	No	☒	Depth (inches):
Water Table Present?	Yes	☐	No	☒	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes	☐	No	☒	Depth (inches):

Wetland Hydrology Present? **Yes** ☒ **No** ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project Site: Black River Impoundment Site | City/County: Pennington | Sampling Date: 8-24-2017

Applicant/Owner: Houston Engineering, Inc. | State: MN | Sampling Point: 24u

Investigator(s): Donna Jacob and Mark D Aanenson | Section, Township, Range: S4-T152N-R45W

Landform (hillslope, terrace, etc.): ditch slope | Local relief (concave, convex, none): none | Slope (%): 5

Subregion (LRR): F | Lat: 48.006912 | Long: -96.429102 | Datum: NAD1983

Soil Map Unit Name: Borup loam | NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☒, or Hydrology ☒, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☐	No ☒		
Hydric Soil Present?	Yes ☒	No ☐		
Wetland Hydrology Present?	Yes ☐	No ☒	**Is the Sampling Area within a Wetland?**	**Yes ☐ No ☒**

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot Size:)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot Size: **5' radius**)			
1. **Melilotus officinalis**	40	x	FACU
2. **Elymus repens**	20	x	FACU
3. **Spartina pectinata**	10		FACW
4. **Ambrosia artemisiifolia**	10		FACU
5. **Agrostis gigantea**	10		FACW
6. **Agrostis stolonifera**	5		FACW
7.			
8.			
9.			
10.			
	95	= Total Cover	
Woody Vine Stratum (Plot Size:)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum **5**

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:		Multiply by:	
OBL species	**0**	x1 =	**0**
FACW species	**25**	x2 =	**50**
FAC species	**0**	x3 =	**0**
FACU species	**70**	x4 =	**280**
UPL species	**0**	x5 =	**0**
Column Totals:	**95** (A)		**330** (B)

Prevalence Index = B/A = **3.5**

Hydrophytic Vegetation Indicators:

_____ 1 – Rapid Test for Hydrophytic Vegetation

_____ 2 - Dominance Test is >50%

_____ 3 – Prevalence Index is ≤3.0[1]

_____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

_____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☐ No ☒

Remarks:

SOIL

Sampling Point: 24u

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	2.5Y 2/1	100					SL	
6-14	2.5Y 7/2	90	2.5Y 5/4	10	C	M	FS	

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR F**)
- ☐ 1 cm Muck (A9) (**LRR F, G, H**)
- ☒ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 CM Mucky Peat or Peat (S2)(**LRR G, H**)
- ☐ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR I, J**)
- ☐ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ☐ Dark Surface (S7) (**LRR G**)
- ☐ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (Inches): _____

Hydric Soils Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one 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)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where not tilled**)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where tilled**)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present?	Yes	☐	No	☒	Depth (inches):
Water Table Present?	Yes	☐	No	☒	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes	☐	No	☒	Depth (inches):

Wetland Hydrology Present? **Yes** ☐ **No** ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project Site: Black River Impoundment Site | City/County: Pennington | Sampling Date: 8-24-2017

Applicant/Owner: Houston Engineering, Inc. | State: MN | Sampling Point: 24w

Investigator(s): Donna Jacob and Mark D Aanenson | Section, Township, Range: S4-T152N-R45W

Landform (hillslope, terrace, etc.): ditch bottom | Local relief (concave, convex, none): concave | Slope (%): 1

Subregion (LRR): F | Lat: 48.006919 | Long: -96.429223 | Datum: NAD1983

Soil Map Unit Name: Borup loam | NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☒, or Hydrology ☒, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐		
Hydric Soil Present?	Yes ☒	No ☐		
Wetland Hydrology Present?	Yes ☒	No ☐	**Is the Sampling Area within a Wetland?**	**Yes ☒ No ☐**

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot Size: **10' radius**)			
1. **Salix petiolaris**	5	x	OBL
2.			
3.			
4.			
5.			
	5	= Total Cover	
Herb Stratum (Plot Size: **5' radius**)			
1. **Agrostis stolonifera**	30	x	FACW
2. **Spartina pectinata**	30	x	FACW
3. **Melilotus officinalis**	20	x	FACU
4. **Symphyotrichum puniceum**	5		OBL
5. **Trifolium hybridum**	5		FACU
6.			
7.			
8.			
9.			
10.			
	90	= Total Cover	
Woody Vine Stratum (Plot Size:)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum **10**

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:		Multiply by:	
OBL species		x1 =	
FACW species		x2 =	
FAC species		x3 =	
FACU species		x4 =	
UPL species		x5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- 1 – Rapid Test for Hydrophytic Vegetation
- **x** 2 - Dominance Test is >50%
- 3 – Prevalence Index is ≤3.0[1]
- 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 24w

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	2.5Y 2/1	100					SL	
8-16	2.5Y 7/2	90	2.5Y 5/4	10	C	M	FS	

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR F**)
- ☐ 1 cm Muck (A9) (**LRR F, G, H**)
- ☒ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 CM Mucky Peat or Peat (S2)(**LRR G, H**)
- ☐ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR I, J**)
- ☐ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ☐ Dark Surface (S7) (**LRR G**)
- ☐ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (Inches): _____

Hydric Soils Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one 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)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where not tilled**)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where tilled**)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☒ Geomorphic Position (D2)
- ☒ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present?	Yes	☐	No	☒	Depth (inches):
Water Table Present?	Yes	☐	No	☒	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes	☐	No	☒	Depth (inches):

Wetland Hydrology Present? Yes ☒ **No** ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: