



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, OMAHA DISTRICT
1616 CAPITOL AVENUE
OMAHA, NE 68102-4901

JUN 20 2014

Mr. Darrell Vanyo, Chairman
Fargo-Moorhead Diversion Authority
211 9th Street South
PO Box 2806
Fargo, North Dakota 58108-2806

Dear Mr. Vanyo:

Enclosed is Department of the Army Permit No. NWO-2014-0236-BIS, for the construction of the Oxbow, Hickson, Bakke Ring Levee Project. The project is located in Sections 13, 14, 23 and 24, Township 173 North, Range 49 West, Cass County, North Dakota.

General Condition 1 establishes the time limit for completing work (June 20, 2019).

Also enclosed is a Notification of Applicant Options ["NAO"] for the proffered permit. The Final Rule Establishing an Administrative Appeal Process for the Regulatory Program of the Corps of Engineers was issued in the Federal Register on March 9, 1999 and became effective on August 6, 1999. Conditions 1 through 6 on the enclosed ENG Form 1721, as well as any conditions that may be specified in the attached Section 401 Water Quality Certification, are not appealable.

A copy of this letter is being sent to Mr. Aaron Snyder, U.S. Army Corps of Engineers, CEMVP-PM-B, 180th Fifth Street East, Suite 700, St. Paul, Minnesota 55101-1678.

Point of Contact for this authorization is Matt Mikulecky or Daniel Cimarosti, at (701) 255-0015.

Sincerely,

Joel R. Cross
Colonel, Corps of Engineers
District Commander

Enclosure

DEPARTMENT OF THE ARMY PERMIT

Permittee Fargo-Moorhead Diversion Authority

Permit No. NWO-2014-0236-BIS

Issuing Office North Dakota Regulatory Office

NOTE: The term "you" and its derivatives, as used in this permit, means the permittee or any future transferee. The term "this office" refers to the appropriate district or division office of the Corps of Engineers having jurisdiction over the permitted activity or the appropriate official of that office acting under the authority of the commanding officer.

You are authorized to perform work in accordance with the terms and conditions specified below.

Project Description: Construction of the Oxbow, Hickson, Bakke (OHB) Ring Levee element of the Fargo-Moorhead Flood Risk Management Project. The OHB levee alignment will surround the village of Hickson, the Bakke Subdivision, and a portion of the city of Oxbow and have a top of construction grade elevation range of approximately 926-931 (NAVD88), and will have 4H:1V slopes and a 10-foot top width. New residential lots, roads, golf holes, clubhouse and other associated infrastructure will be constructed within the ring levee to mitigate those lost due to the construction of the levee. Infrastructure modifications to existing sanitary sewer systems, water main and storm water sewer system will be constructed to accommodate the ring levee and development areas. Construction will also include grade raises on Cass County Highways 81 and 18 where they intersect the levee. Construction of internal drainage features will include open channel, storm sewer, storm water ponding basins, a storm sewer lift station and storm water outfall in the Red River of the North. The outfall will consist of a single discharge pipe, up to 60-inch diameter Reinforced Concrete Pipe. The pipe outlet will be placed below the ordinary high water mark (OHWM) of the Red River of the North and will have a flared end section with approximately 100 cubic yards of rock riprap erosion protection. The project will discharge approximately 148,747 cubic yards of earthen fill material into 51.31 acres of wetlands for the construction of the levee and roadway embankments. The project will discharge up to 100 cubic yards of riprap into 0.01 acre of the Red River of the North for the construction of the storm water outfall. Project features, typical cross sections and wetland impact areas are shown in ATTACHMENT 1, Pages 1-6. The project includes construction of wetland mitigation in accordance with the approved mitigation plan entitled "Compensatory Wetland Mitigation Plan, Oxbow-Hickson-Bakke Addition Ring Dike and Redevelopment Project, (OHB Ring Levee Project), March, 2014" (ATTACHMENT 2).

Project Location: The project is located in unnamed wetlands and the Red River of the North, in Sections 13, 14, 23 and 24, Township 173 North, Range 49 West, Cass County, North Dakota. (Latitude North: 46.67 / Longitude West: -96.81)

Permit Conditions:

General Conditions:

1. The time limit for completing the work authorized ends on June 20, 2019. If you find that you need more time to complete the authorized activity, submit your request for a time extension to this office for consideration at least one month before the above date is reached.
2. You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition 4 below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification of this permit from this office, which may require restoration of the area.
3. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and state coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

Encl 1

4. If you sell the property associated with this permit, you must obtain the signature of the new owner in the space provided and forward a copy of the permit to this office to validate the transfer of this authorization.
5. If a conditioned water quality certification has been issued for your project, you must comply with the conditions specified in the certification as special conditions to this permit. For your convenience, a copy of the certification is attached if it contains such conditions.
6. You must allow representatives from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of your permit.

Special Conditions: (See pages 4, 5, 6 & 7)

After a detailed and careful review of all of the conditions contained in this permit, the permittee acknowledges that, although said conditions were required by the Corps of Engineers, the permittee nonetheless agreed to those conditions voluntarily to facilitate issuance of the permit and the will comply fully with all the terms of the permit conditions.

Further Information:

1. Congressional Authorities: You have been authorized to undertake the activity described above pursuant to:

(X) Section 10 of the River and Harbors Act of 1899 (33 U.S.C. 403).

(X) Section 404 of the Clean Water Act (33 U.S.C. 1344).

() Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (33 U.S.C. 1413).

2. Limits of this authorization.

- a. This permit does not obviate the need to obtain other Federal, state, or local authorizations required by law.
- b. This permit does not grant any property rights or exclusive privileges.
- c. This permit does not authorize any injury to the property or rights of others.
- d. This permit does not authorize interference with any existing or proposed Federal project.

3. Limits of Federal Liability. In issuing this permit, the Federal Government does not assume any liability for the following:

- a. Damages to the permitted project or uses thereof as a result of other permitted or unpermitted activities or from natural causes.
- b. Damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the United States in the public interest.
- c. Damages to persons, property, or to other permitted or unpermitted activities or structures caused by the activity authorized by this permit.
- d. Design or construction deficiencies associated with the permitted work.
- e. Damage claims associated with any future modification, suspension, or revocation of this permit.

4. Reliance on Applicant's Data: The determination of this office that issuance of this permit is not contrary to the public interest was made in reliance on the information you provided.

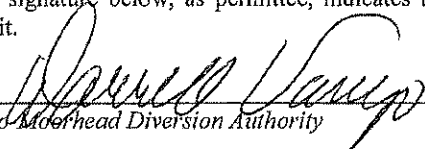
5. Reevaluation of Permit Decision. This office may reevaluate its decision on this permit at any time circumstances warrant. Circumstances that could require a reevaluation include, but are not limited to, the following:

- a. You fail to comply with the terms and conditions of this permit.
- b. The information provided by you in support of your permit application proves to have been false, incomplete, or inaccurate (See 4 above).
- c. Significant new information surfaces which this office did not consider in reaching the original public interest decision.

Such a reevaluation may result in a determination that it is appropriate to use the suspension, modification, and revocation procedures contained in 33 CFR 325.7 or enforcement procedures such as those contained in 33 CFR 326.4 and 326.5. The referenced enforcement procedures provide for the issuance of an administrative order requiring you to comply with the terms and conditions of your permit and for the initiation of legal action where appropriate. You will be required to pay for any corrective measures ordered by this office, and if you fail to comply with such directive, this office may in certain situations (such as those specified in 33 CFR 209.170) accomplish the corrective measures by contract or otherwise and bill you for the cost.

6. Extensions. General condition 1 establishes a time limit for the completion of the activity authorized by this permit. Unless there are circumstances requiring either a prompt completion of the authorized activity or a reevaluation of the public interest decision, the Corps will normally give favorable consideration to a request for an extension of this time limit.


Your signature below, as permittee, indicates that you accept and agree to comply with the terms and conditions of this permit.



Fargo-Moorhead Diversion Authority

6/18/2014
(DATE)

This permit becomes effective when the Federal official, designated to act for the Secretary of the Army, has signed below.



Joel R. Cross
Colonel, Corps of Engineers

6/20/2014
(DATE)

When the structures or work authorized by this permit are still in existence at the time the property is transferred, the terms and conditions of this permit will continue to be binding on the new owner(s) of the property. To validate the transfer of this permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below.

(TRANSFEEE)

(DATE)

SPECIAL CONDITIONS:

Best Management Practices & Construction Conditions

[a] All work or discharges to a watercourse resulting from permitted construction activities, particularly hydraulic dredging, must meet applicable Federal, State, and local water quality and effluent standards on a continuing basis.

[b] Erosion and sediment control measures shall be in place prior to any earthwork. They shall remain in place and be maintained until construction is completed and the area is stabilized. Silt screens or other appropriate measures shall be installed and maintained during the construction of the outfall in the Red River of the North in accordance with the National Pollutant Discharge Elimination System (NPDES) permit. Erosion and sediment control measures shall be removed when construction is complete.

[c] Measures must be adopted to prevent potential pollutants from entering the watercourse. Construction materials and debris, including fuels, oil, and other liquid substances, will not be stored in the construction area in a manner that would allow them to enter the watercourse as a result of spillage, natural runoff, or flooding.

[d] If dredged or excavated material is placed on an upland disposal site (above the ordinary high-water mark), the site must be securely diked or contained by some other acceptable method that prevents the return of potentially polluting materials to the watercourse by surface runoff or by leaching. The containment area, whether bulkhead or upland disposal site, must be fully completed prior to the placement of any dredged material. Authorization would be required to place the material in a water of the United States.

[e] Upon completion of earthwork operations, all exposed slopes, fills, and disturbed areas must be given sufficient protection by appropriate means such as landscaping, or planting and maintaining vegetative cover, to prevent subsequent erosion.

[f] An investigation must be made to identify water intakes or other activities that may be affected by suspended solids and turbidity increases caused by work in the watercourse. Sufficient notice must be given to the owners of property where the activities would take place to allow them to prepare for any changes in water quality.

[g] A contingency plan must be formulated that would be effective in the event of a spill. This requirement is particularly applicable in operations involving the handling of petroleum products. If a spill of any potential pollutant should occur, it is the responsibility of the permittee to remove such material, to minimize any contamination resulting from this spill, and to immediately notify the North Dakota Department of Health, the U.S. Coast Guard at telephone number (800) 424-8802 and the U.S. Army Corps of Engineers, North Dakota Regulatory Office (NDRO).

[h] All work in the waterway will be performed in such a manner so as to minimize increases in suspended solids and turbidity that may degrade water quality and damage aquatic life outside the immediate area of operation.

[i] All areas along the riverbank that are disturbed or created by the construction activity, and which will not be rippedraped, shall be seeded with grasses indigenous to the area.

[j] All trees and shrubbery which are not specifically required to be cleared or removed for construction purposes shall be preserved and shall be protected from any damage by construction operations and equipment.

[k] All temporary fill shall be removed in its entirety and the area restored to its preconstruction contours within 15 days of completion of construction.

[l] The Permittee is responsible for ensuring all contractors or others executing the project authorized by this permit have knowledge of the terms and conditions of the permit; and that a copy of the permit is physically located at the project site during construction operations.

Compensatory Wetland Mitigation Conditions

[m] The Permittee shall carry out compensatory wetland mitigation by providing 30.11 acres of mitigation, as proposed in the attached mitigation and monitoring plan (Plan) entitled "Compensatory Wetland Mitigation Plan, Oxbow-Hickson-Bakke Addition Ring Dike and Redevelopment Project, (OHB Ring Levee Project), March, 2014" (ATTACHMENT 2). The mitigation is necessary to ensure that the authorized fill in waters of the United States does not result in a loss of aquatic resource functions and services. The approved mitigation consists of 2.92 acres of onsite and in-kind mitigation for impacted wetlands located in existing roadside ditch segments; 9.92 acres of high functioning wetland mitigation sites (Forest River and Oxbow Country Club Mitigation Site) and 17.27 acres of wetland mitigation to be secured through the Ducks Unlimited, Inc., North Dakota Aquatic Resource In-Lieu Fee Program (DU-ND-ILF). This mitigation, as proposed, will result in a net gain in aquatic resource functions and services.

[n] The Permittee will secure 17.27 acre credits through the DU-ND-ILF. You must provide this office with a signed and dated Credit Transaction Notification Form within 30 days of the date of this permit. If, for any reason, you are unable to secure the required credits, you must resubmit a revised mitigation plan to the Corps for review and approval prior to continuing project activities in waters of the United States.

[o] Mitigation construction activities at the roadside wetland locations, Forest River and Oxbow Country Club Mitigation Sites shall occur prior to, or concurrent with, project construction. Mitigation construction includes all work conducted in conjunction with implementation of the mitigation plan (e.g., earth moving, grading, plantings).

[p] The Permittee shall notify the Corps at such time that mitigation activities have been completed so that an on-site inspection by Corps personnel can be made.

[q] The Permittee shall provide monitoring reports to the Corps as described in the attached Plan. Monitoring requirements may be waived, modified or extended at the discretion of the Corps, based upon mitigation success, progress or other applicable circumstances.

[r] The Permittee shall provide a copy of the executed long term mitigation site protection instrument within 90 days of permit execution.

Water Quality Certification Condition

[s] The North Dakota Department of Health (NDDoH) is responsible for water certification for this project to ensure that the project would not violate applicable Federal Water Quality Standards. Individual 401 Water Quality Certification (WQC) was issued by NDDoH by letter dated 24 March 2014. By reference in General Condition 5 and attachment (ATTACHMENT 3), the WQC requirements are conditions of this authorization.

Historic Properties and Cultural Resource Conditions

[t] All fill (including riprap), if authorized under this permit, must consist of suitable material free from toxic pollutants in other than trace quantities. In addition, rock or fill material used for activities dependent upon this permit and obtained by excavation must either be obtained from existing quarries or, if a new borrow site is opened up to obtain fill material, the Corps and the State Historic Preservation Officer (SHPO) must be notified prior to the use of the new site.

[u] If cultural, archaeological, or historical resources are unearthed during activities authorized by this permit, work must be stopped immediately and the Corps and the State Historic Preservation Officer must be contacted for further instruction.

[v] The Permittee shall comply with Stipulation I of the Programmatic Agreement among the U.S. Army Corps of Engineers, St. Paul District, the North Dakota State Historic Preservation Officer, and the Minnesota State Historic Preservation Officer, dated June 29, 2011, as amended by Amendment No. 1, dated November 15, 2012. The Programmatic Agreement and Amendment No. 1 are attached to this permit (ATTACHMENT 4). The Permittee shall indicate the locations to be monitored for buried cultural resources by a qualified archeologist on the construction drawings, with the extent of the monitoring locations defined by control points. Locations within the construction work limits to be monitored during construction earthwork are river floodplains, terraces, and oxbows, and those areas that are within 100 meters (328 feet) of the top of the bank of a river or the outer edge of an oxbow.

Wildlife Resource Protection Conditions

[w] The Permittee is responsible for obtaining any "take" permits required under the U.S. Fish and Wildlife Service's regulations governing compliance with the Migratory Bird Treaty Act or the Bald and Golden Eagle Protection Act. The Permittee should contact the appropriate local office of the U.S. Fish and Wildlife Service to determine if such "take" permits are required for a particular activity.

[x] In order to protect the Northern Long Eared Bat, the Permittee shall not remove trees in the work area from April 1 through September 30 in any year this permit is valid.

[y] The Permittee shall report any threatened or endangered species at the project site. Notification shall be made to the NDRO by the telephone or fax within 24 hours. Written confirmation shall be provided within 48 hours if deemed necessary by the Corps.

[z] Due to fish spawning, no work shall be performed in the Red River between April 15 to July 1.

Engineering and Design Conditions

[aa] That the Permittee shall provide the Corps with a copy of final or as-built plans upon completion.

[bb] The NDRO shall be notified, in writing, of any changes in the project design. No changes in design that impact waters of the United States shall be undertaken without Corps authorization.

Navigation Conditions

[cc] The Permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the Permittee will be required, upon due notice from the Corps, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

[dd] No attempt shall be made by the Permittee to prevent the full and free use by the public of all navigable waters at or adjacent to the activity authorized by this permit.

Notification Conditions

[ee] That the Permittee shall notify the NDRO at what time the activity authorized herein will be commenced and of any suspension of work, if for a period of more than one week, resumption of work and its completion.

[ff] The time limit for completing the work authorized will be **five years** from the effective date. If more time is needed to complete the authorized activity, a request for a time extension must be submitted to the Corps for consideration at least one month before the above date is reached.

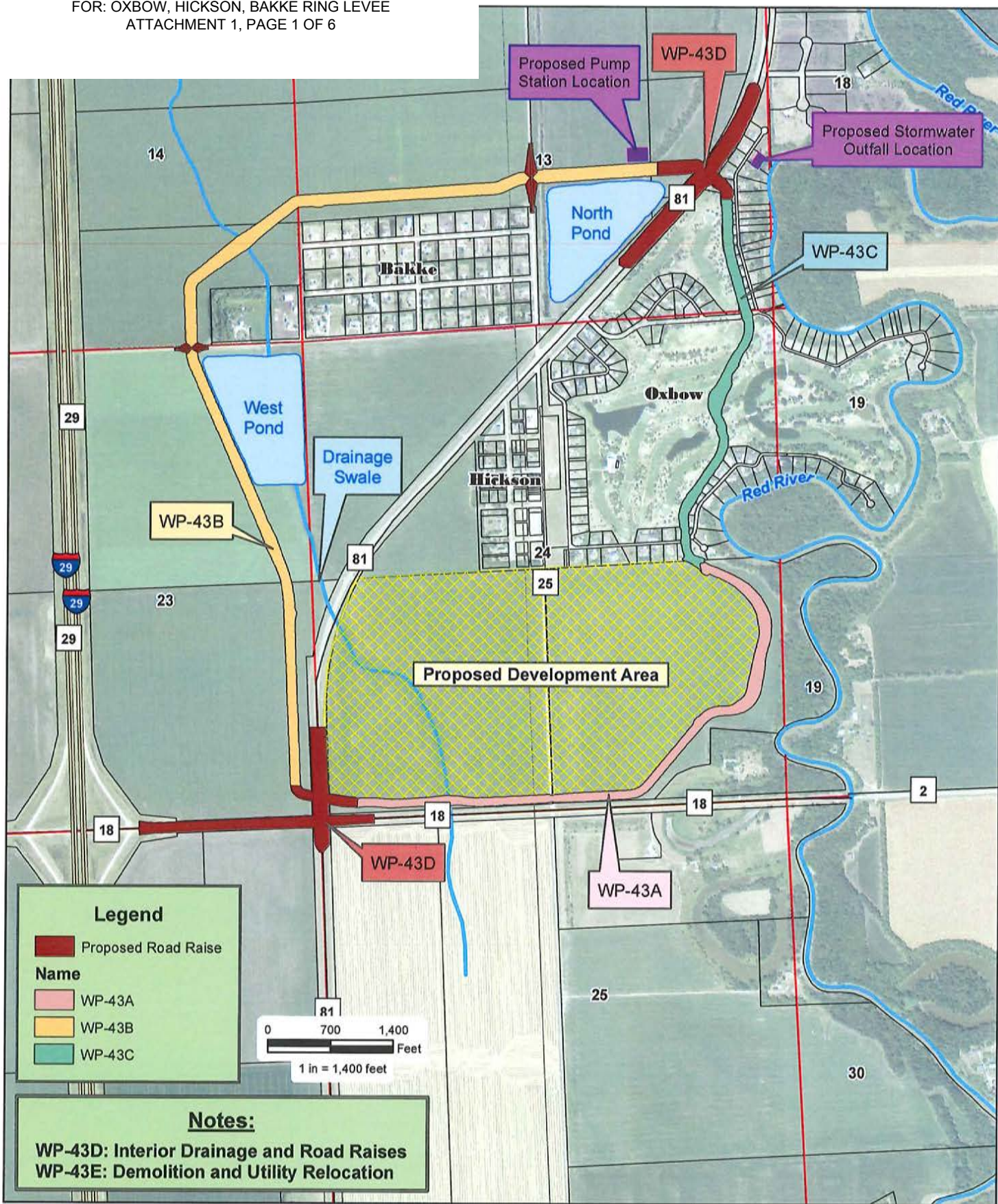
DEPARTMENT OF THE ARMY PERMIT

PERMIT NO. NWO-2014-0236-BIS

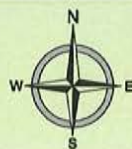
OXBOW, HICKSON, BAKKE RING LEVEE PROJECT

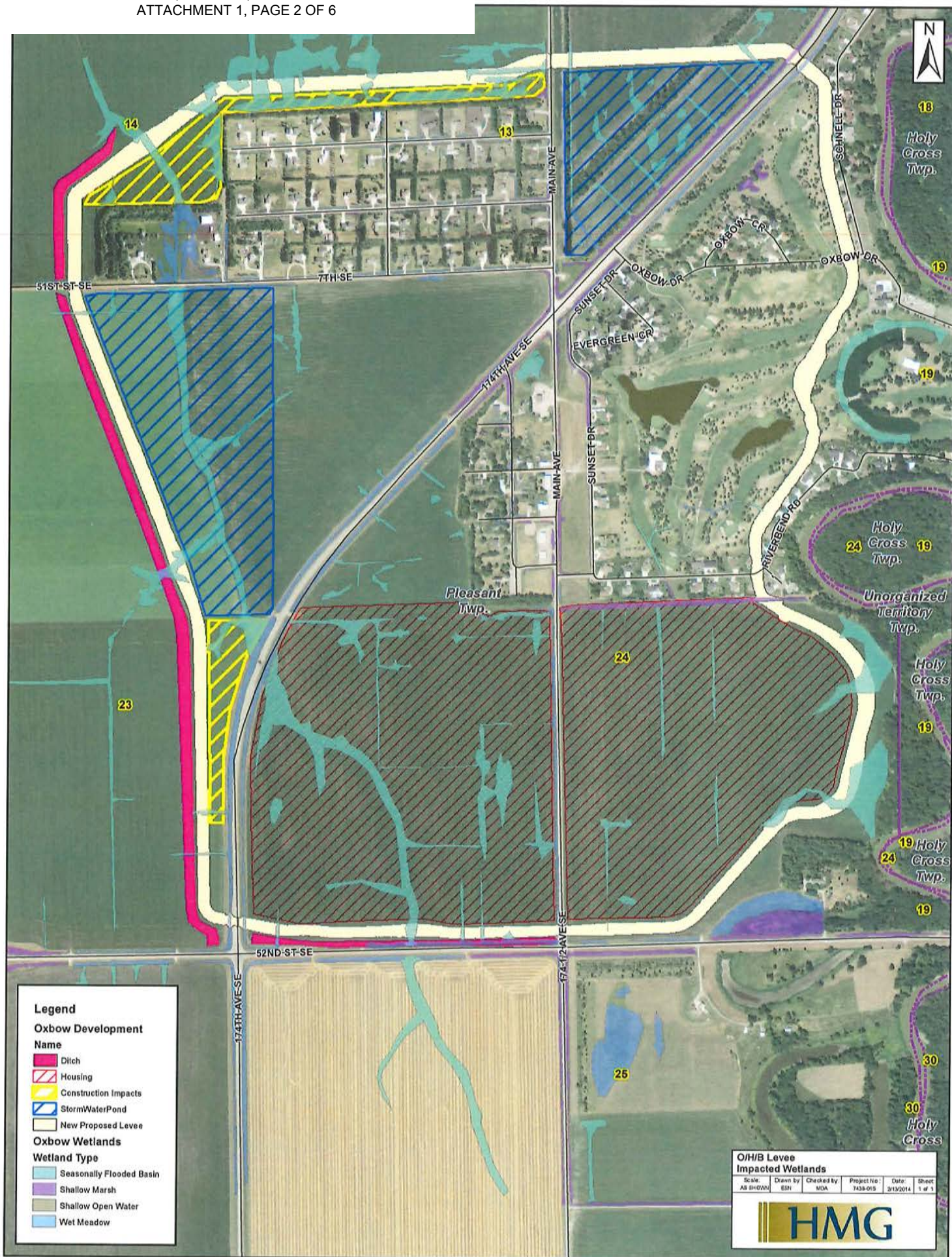
ATTACHMENT 1

PLAN VIEW, IMPACTED WATERS & TYPICAL SECTIONS

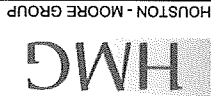


OHB Ring Levee **Oxbow, Hickson and Bakke, North Dakota**





35% SUBMITTAL



HOUSTON - MOORE GROUP

OXBOW, HICKSON, BAKKE RING LEEVE PHASE WP-43C
 RED RIVER OF THE NORTH RIVER BASIN
 FARGO - MOORHEAD FLOOD RISK MANAGEMENT
 CASS COUNTY, NORTH DAKOTA
 TYPICAL SECTIONS

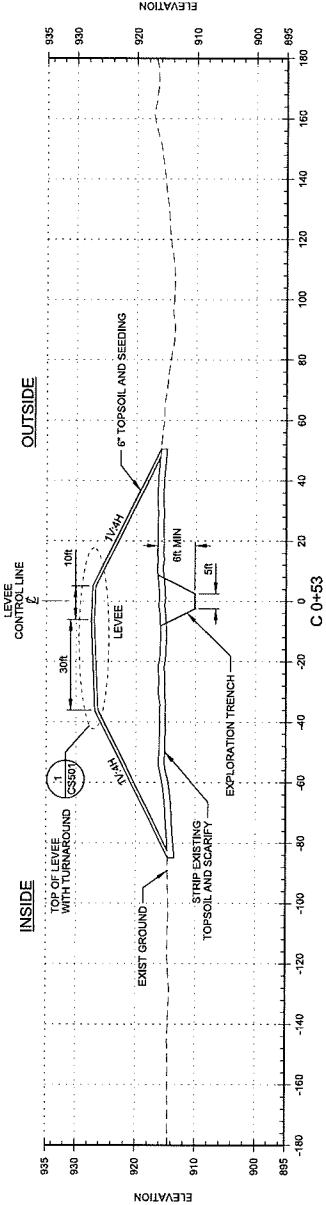
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DESIGNED BY:	
CHECKED BY:	
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PROJECT NAME:	CS301
FILE NAME:	
DESIGNED BY:	
CHECKED BY:	
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FILE NAME:	

CS301

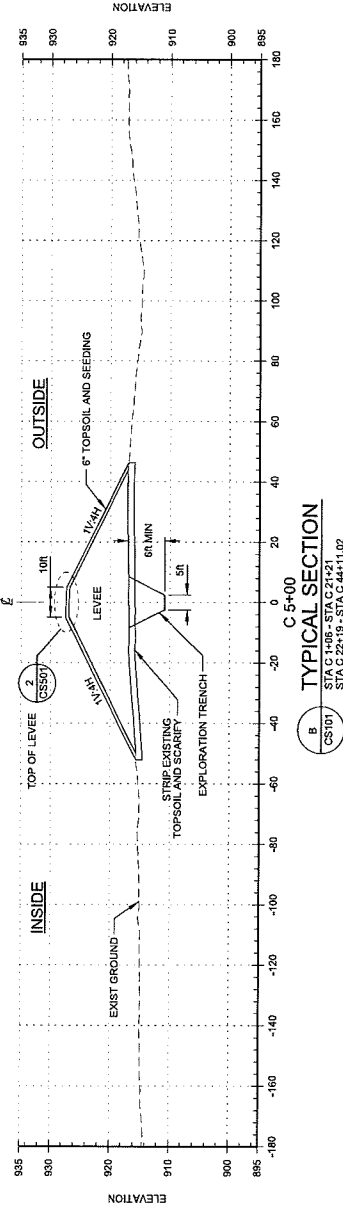
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 (GEOID 99)
 HORIZONTAL SCALE: 1" = 40'
 VERTICAL SCALE: 1" = 20'

NOTES:

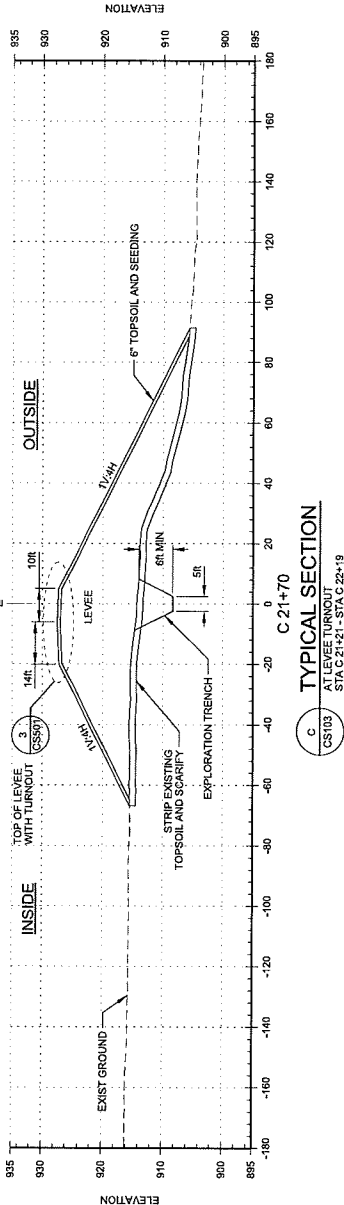
1. CONTRACTOR TO DETERMINE EXPLORATION TRENCH SLOPES. THE EXPLORATION TRENCH SLOPES SHOULD BE STABLE, MEET OSHA CRITERIA, BUT IN NO CASE BE STEEPER THAN 1V ON 1H.
2. OXBOW COUNTRY CLUB FINISHED GRADE IS SHOWN FOR REFERENCE. FINISHED GRADE FOR OXBOW COUNTRY CLUB FINISHED GRADE SHALL BE DONE BY SEPARATE CONTRACT.



A TYPICAL SECTION
 AT LEEVEE TURNAROUND
 STA C 0+00 - STA C 1+00

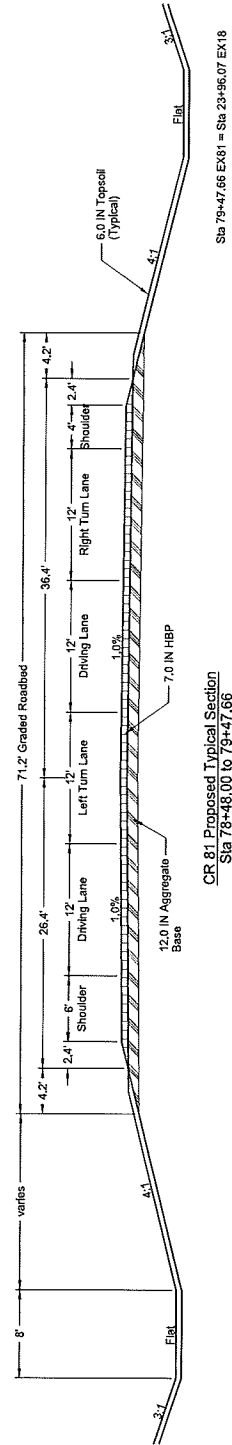
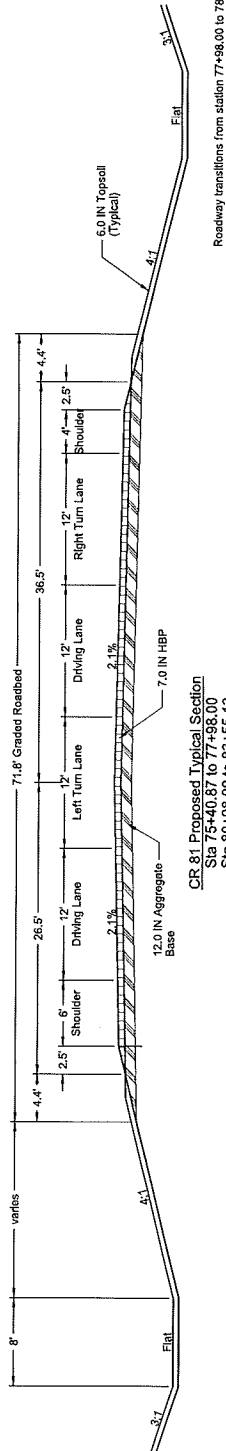
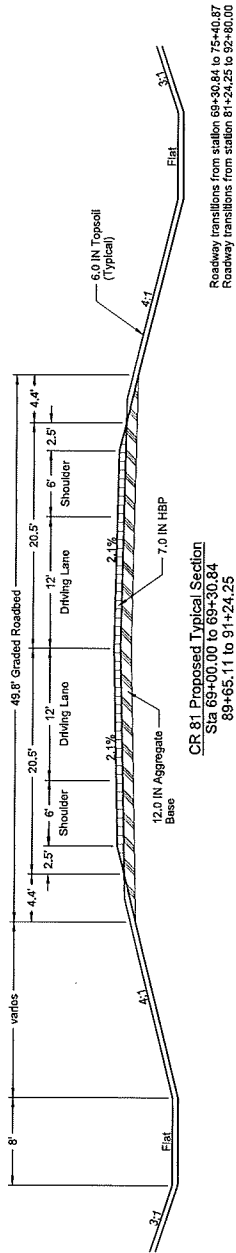


B TYPICAL SECTION
 STA C 1+00 - STA C 2+21



C TYPICAL SECTION
 AT LEEVEE TURNAROUND
 STA C 2+21 - STA C 2+19

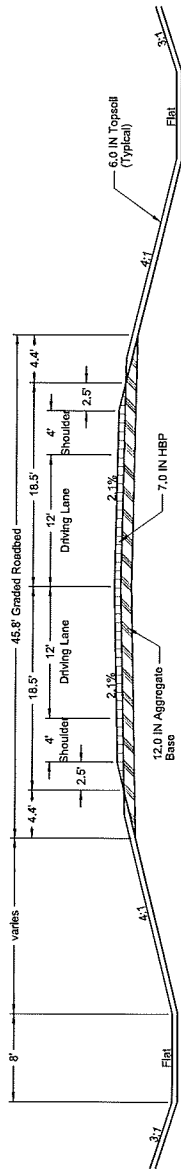
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	WP-43D.4	30	2



This document
is preliminary
and not for
construction or
implementation
purposes.

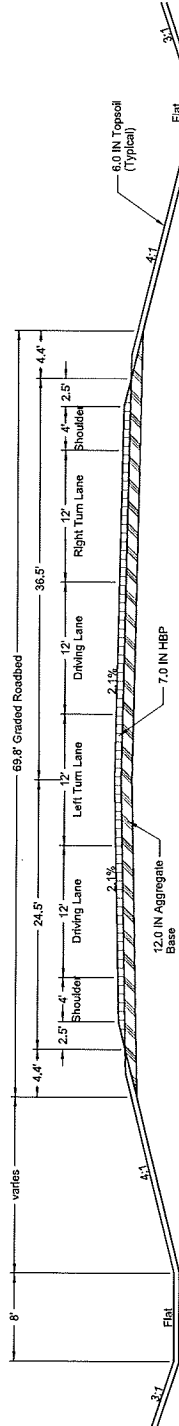
FMM Diversion
OHB Levee
County Road 81
Proposed Typical Section

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	WP-43D.4	30	4



CR 18 Proposed Typical Section
Sta 3+65.00 to 13+76.85

Roadway transitions from station 13+76.85 to 19+86.87



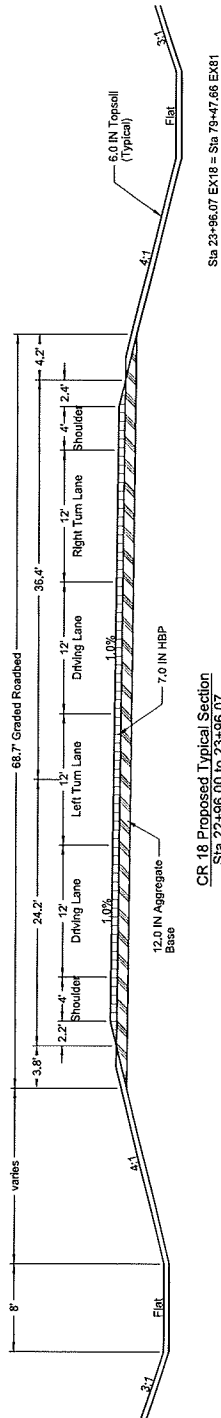
CR 18 Proposed Typical Section
Sta 19+86.87 to 21+46.00

Roadway cross slope transitions from station 21+46.00 to 22+56.00

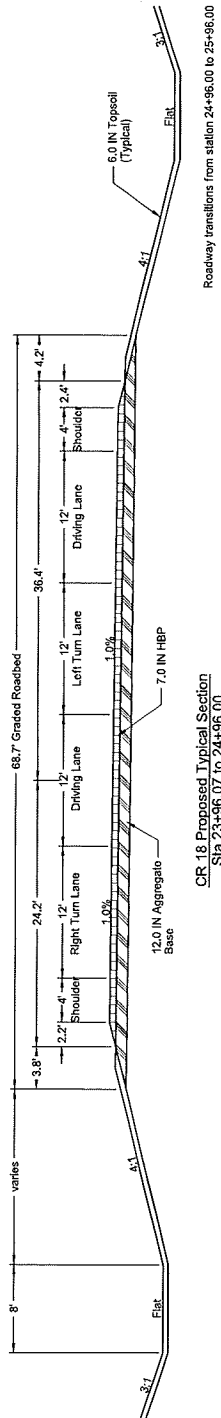
This document
is preliminary
and not for
construction or
implementation
purposes.

FMM Diversion
OHB Levee
County Road 18
Proposed Typical Section

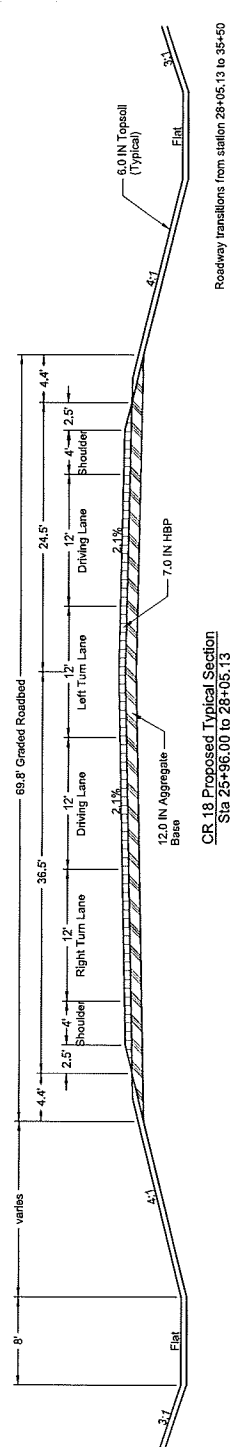
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	WP-43D.4	30	5



Sta 23+96.07 EX18 = Sta 79+47.66 EX81



Roadway transitions from station 24+96.00 to 25+96.00



Roadway transitions from station 28+05.13 to 35+50

This document is preliminary and not for construction or implementation purposes.

FMM Diversion
OHB Levee
County Road 18
Proposed Typical Section

DEPARTMENT OF THE ARMY PERMIT

PERMIT NO. NWO-2014-0236-BIS

OXBOW, HICKSON, BAKKE RING LEVEE PROJECT

ATTACHMENT 2

COMPENSATORY WETLAND MITIGATION PLAN



Great Plains Regional Office
2525 River Road
Bismarck, ND 58503-9011
(701) 355-3500 fax (701) 355-3575
www.ducks.org

RECEIVED

MAY 27 2014

May 22, 2014

~~CASS COUNTY COMMISSION~~

Keith Berndt
FM Diversion Authority
211 9th Street South
PO Box 2806
Fargo, ND 58108

RE: Credit Availability in the Red River Service Area of the Ducks Unlimited North Dakota In-Lieu Fee Program

Dear Mr. Berndt:

Per your letter dated April 30, 2014, you are in need of 17.27 acres of wetland credits for the Oxbow-Hickson-Bakke (OHB) Ring Levee Project. This development project south of Fargo is in the Red River Basin Service Area. This letter is to notify you that the required credits are available for purchase.

The next step in the purchase process is for you to provide this letter to the Corps Project Manager as proof that the required credits are available. Once the permit is issued with the In-Lieu Fee payment as the mitigation requirement in the special conditions, payment can be made to Ducks Unlimited. Please reference in your payment the Corps permit number and date of issue. Upon receipt of payment, Ducks Unlimited will issue a "Credit Sale Letter" to the Corps and the Cass County Joint Water Resource District. When the credit sale letter has been issued, you will have satisfied your mitigation needs.

Thank you for working with Ducks Unlimited and please don't hesitate to call if you have any questions or concerns (701) 355-3566.

Sincerely,

Tim McNaboe, PE
Mitigation Specialist

Compensatory Wetland Mitigation Plan

Oxbow-Hickson-Bakke Addition Ring Dike and Redevelopment Project

(OHB Ring Levee Project)

March, 2014

Mitigation Site Descriptions

Multiple mitigation sites are proposed as replacement for unavoidable impacts to wetlands for the Oxbow-Hickson-Bakke Ring Levee Project (OHB Project). Project impacts are shown on Exhibit #1. Two mitigation sites have been identified near the project site. They include the Forest River Wetland Mitigation Site and the Oxbow County Club Mitigation Site, see Exhibit #2. The remaining mitigation sites will be developed through the North Dakota In-Lieu fee wetland replacement process (ILF) through Ducks Unlimited. The In-Lieu Fee Program is established to provide compensatory mitigation through Ducks Unlimited, based upon a comprehensive planning framework for the Red River Regional Service Area. Mitigation carried out through the ILF is designed to address watershed health and deficiencies and offset impacts to the aquatic environment. Ducks Unlimited would be responsible for insuring that purchased mitigation credits are achieved and meet performance standards.

Future local mitigation sites may be developed by the project sponsors; however they would be reviewed and approved by the United States Army Corps of Engineers (USACE) prior to use as replacement for this project. The mitigation sites are proposed as replacement for the permanent wetland losses with the exceptions of the impacts associated with the roadway improvements. These impacts will be replaced on site by the construction of the new roadway ditches. The local mitigation sites will be developed to replace the wetland types of the resourced impacted. They will be developed into Palustrine Emergent (PEM) wetland basins with wet meadow, seasonally flooded basin and shallow marsh vegetative communities. The mitigation sites will have permanent vegetative cover with permanent upland buffers. The two local sites will have upland buffers that include native grasses and floodplain forest species.

Objectives of the Replacement Wetlands

The objective is to create shallow, seasonally and temporarily flooded PEM wetlands that replace the functions and values of the wetlands permanently impacted by the project. Table 1 show the permanent wetland losses for each project feature. Most of the impacted wetlands have a low ecological function. This is because they lack permanent vegetation and vegetative upland buffers, they receive agricultural runoff and they are influenced by surface drainage. The replacement wetlands will be of higher quality and produce higher wetland ecological functions. These differences have been documented using a wetland functional model, the Minnesota Routine Assessment Method (MNRAM), see Table 2.

Table 1. Wetland Impacts to be Replaced Off Site

	Seasonally Flooded Basin - Poor Quality	Wet Meadow Road Ditch	Shallow Marsh Road Ditch	total
Ring Dike Impacts (acres)	5.54	0.18	0.25	5.96
Road Raise Impacts (acres)	0.00	0.00	0.00	0.00
Redevelopment Impacts (acres)	19.47		1.30	20.77
Drainage reroute (west side) Impacts (acres)	0.42	0.99		1.41
Stormwater Pond Impacts (acres)	10.26	0.21		10.47
Construction Impacts (acres)	6.71			6.71
total	42.40	1.37	1.55	45.32

Site selection

The applicants have proposed two mitigation sites within close proximity to the OHB Project. Typically, onsite and in-kind mitigation is the most preferred type of mitigation. All impacted wetlands and mitigation sites are anticipated to be located within the Red River Basin Regional Service Area. The Oxbow Mitigation Site is located adjacent to the project while the Forest River Mitigation Site is located approximately six miles north of the project site.

Site Protection

The local mitigation sites will be located within properties owned by the Local Units of Government (LGU's) sponsoring the project. These LGU's include Cass County and the City of Oxbow. These entities will provide that these mitigation sites will be protected in perpetuity. Ducks Unlimited will provide that the remaining mitigation areas will be protected in perpetuity. All of the mitigation sites will be protected by a permanent protection instrument such as an easement or deed restriction. Copies of the protection instrument will be provided to the USACE within 90 days of execution.

Baseline information

Forest River Site

Earthwork and the native grass seeding have been completed at the Forest River Mitigation Site. A copy of the design plans is located in Exhibit #3. Exhibit #3 also shows the project location and size of the created wetlands. Once the native grasses are established the tree plantings will be completed. Currently the trees are not planted to allow for cover management techniques such as spot clipping and herbicide applications.

Oxbow Country Club Mitigation Site

These areas are currently part of the existing golf course. This portion of the golf course will be abandoned following construction of the OHB Project. The new wetland areas will be constructed as an extension of an existing river oxbow and the existing vegetation will be replaced with native grasses and floodplain forest species. This will provide that the mitigation site be constructed in a manner consistent with the fluvial topography of the Red River System. Mitigation Plans are shown in Exhibit #4.

Determination of credits

The MNRAM analysis shows most functional categories of the impacted wetlands with a "low" rating and the replacement wetlands with a "high" rating. The MNRAM wetland functional

assessment ratings are shown in Table 2. The replacement wetlands will compensate for unavoidable impacts to 45.32 acres of wetlands. The replacement wetlands will offset the unavoidable loss of functions and values to these aquatic resources by providing new wetland areas and by provided higher quality wetland areas. Considering the condition of the impacted wetlands and the corresponding functional assessments, 27 acres of wetlands is proposed to be created or restored as replacement for the OHB Project. One of the local project sites, the Forest River Site is mostly constructed, while the other will be constructed prior to or concurrently with the OHB Project.

Three different wetland categories were used for the MNRAM assessment on the impacted wetlands. These include Seasonally Flooded Basins – Poor Quality, Wet Meadow – Roadway Ditch and Shallow Marsh – Roadway Ditch. All of the wetlands permanently impacted by the project could be grouped into these three categories. It was determined that any minor differences would not result in a significant difference in MNRAM scores.

Table 2. MNRAM Functional Assessment Table

Wetland Type- Function	Acres	MNRAM Scores									
		Hydrologic Regime	Flood Storage	Downstream Water Quality	Wetland Water Quality	Shoreline Protection	Wildlife Habitat	Fishery Habitat	Amphibian Habitat	Aesthetics, Recreation, Education	Commercial
Seasonally Flooded Basin - Poor Quality	42.40	Low	Mod	Mod	Low	N/A	Low	N/A	N/A	Low	N/A
Wet Meadow - Road Ditch	1.37	Low	Mod	Mod	Low	N/A	Low	N/A	N/A	Low	N/A
Shallow Marsh - Road Ditch	1.55	Low	Mod	Mod	Low	N/A	Low	N/A	N/A	Low	N/A
Forest River/Oxbow Mitigation	9.92	High	High	High	High	N/A	High	High	High	High	N/A
Ducks Unlimited Wetland Restorations	17.27										

The mitigation sites were grouped into one category for MNRAM assessment because the projects are anticipated to be constructed in a similar way and will have similar characteristics. The MNRAM summary sheets for these categories are included in Exhibit #5.

Mitigation Work Plan (Local Mitigation Sites)

The Oxbow Mitigation Site will be constructed by excavating and grading a variable depth. The areas will be graded with a gradual transition from the finished depth to the existing grade and contours of the adjacent uplands surrounding the mitigation site. Wetland soils from permanently impacted areas may be used at the creation site with the final grade matching the existing wetland if determined to be feasible. If wetland soil is not available for the entire mitigation site, the following wetland seed mix will be used:

Table 3. Wetland Seed Mix

Grass			Full Seeding Rate PLS lbs./Acre	% Species in Mix	PLS lbs./Ac
Common Name	Scientific Name	Variety			
Prairie Cord Grass	<i>Spartina pectinata</i>	Red River	7.0	15	1.1
American Slough Grass	<i>Beckmannia syzigachne</i>	Common	0.9	20	0.2
Virginia Wild-rye	<i>Elymus virginicus</i>	Omaha	10.0	20	2.0
Fowl Blue Grass	<i>Poa palustris</i>	Common	1.0	20	0.2
Fox Sedge	<i>Carex vulpinoidea</i>	Common	1.0	15	0.2
American Manna Grass	<i>Glyceria grandis</i>	Common	1.5	10	0.2
Fowl Manna Grass	<i>Glyceria striata</i>	Common	1.0	10	0.1
Bluejoint Grass	<i>Calamagrostis canadensis</i>	Common	1.0	10	0.1
			Total	120	3.9

Disturbed areas, created wetlands (if viable wetland soil is not available) and buffer, will be seeded with upland warm and cool season native grasses that typically occur in these soils. Existing seeds and root matter in the donor wetland topsoil will help to establish vegetation for

the creation areas. If wetland topsoil from the donor wetland is stockpiled more than 30 days the contractor will seed the creation area with the identified wetland seed mix. BMPs will be installed to prevent erosion and sedimentation within the site. BMPs will be removed from the mitigation site upon the establishment of vegetative cover. After completion of the mitigation site designated photo points will be developed. Monitoring reports will be provided yearly until success criteria are met. As-built plans will be submitted to the USACE only if changes in the design plan occur. The Forest River Mitigation Site has been constructed; plans are located in Exhibit #3.

Maintenance plan

The local sites will be maintained by the project sponsors along with other properties owned by the corresponding LGU's. Site management activities will be determined through mitigation site monitoring activities and reports for the first few years. After that maintenance activities such as noxious weed control will be conducted by LGU staff. The site will be maintained to meet the success criteria outlined in the performance standards.

Performance Standards

Success criteria will be met at each site when the hydrology exists at the site for sufficient time periods to support a prevalence of vegetation typically adapted for life in saturated soil conditions. Performance standards are met when the mitigation meets wetland criteria for hydrology and hydrophytic vegetation as outlined in the *1987 Corps of Engineers Wetland Delineation Manual and Great Plains Regional Supplement (Version 2.0)*, and the mitigation sites will be evaluated using the MNRAM Assessment at the end of the monitoring period to document that the wetland functions and values gained have met the levels outlined in the permit application.

Monitoring Requirements

The project sponsors or responsible agency will submit a mitigation monitoring report to the North Dakota Regulatory Office (NDRO) at the end of each of the first three growing seasons occurring immediately following construction of the mitigation site and a final report following the end of the fifth growing season. Onsite monitoring will be conducted from June 15th to the end of the growing season. This requirement may be waived, extended or modified depending on the success of wetland development. The monitoring reports will include the following:

1. USACE Permit Number.
2. Name and contact information of permittee, point of contact and consultant (if one is used), as well as the dates the inspection(s) was conducted.
3. Directions to the mitigation/project site.
4. Log or timeline reflecting the construction and development of the compensatory wetland mitigation, including the completion date for construction of all mitigation, remedial actions (if any), plantings, monitoring dates, etc., as well as the date the site meets full success criteria (meeting all performance standards).
5. Photographic and narrative summary of the mitigation site's development, specifically including the following:
 - a. Photographs of the mitigation site prior to construction, encompassing the entire mitigation area.
 - b. Photographs and narrative summary of the mitigation site's progress and development into meeting wetland criteria as identified in the Great Plains Regional Supplement to the 1987 Manual.
 - c. Photographs taken from a minimum of two fixed points and directions for each wetland mitigation area. Photo location and points must be sufficiently spaced to provide visual depiction of the entire site's development.
 - d. Photograph(s) and description(s) of problem areas, if any are identified.
 - e. Recommendations for any additional corrective or remedial actions (if needed).
6. A wetland delineation Exhibit identifying proposed wetland mitigation boundary and actual wetland boundary.

7. MNRAM Scores of the Wetland Mitigation Sites for years 3, 4 and 5.
8. Monitoring requirements may be waived by the NDRO once performance standards are met or a determination is made that the site adequately offsets the authorized impacts.

Monitoring reports will be sent to the North Dakota Regulatory Office, 1513 South 12th Street, Bismarck, North Dakota, 58504.

Long-term management plan

The project sponsors or responsible agency will continue to ensure that the sites are managed with noxious weed control, periodic mowing if necessary, and litter removal. The project sponsors or responsible agency will inform the USACE if any significant corrective measures are needed.

Adaptive management plan

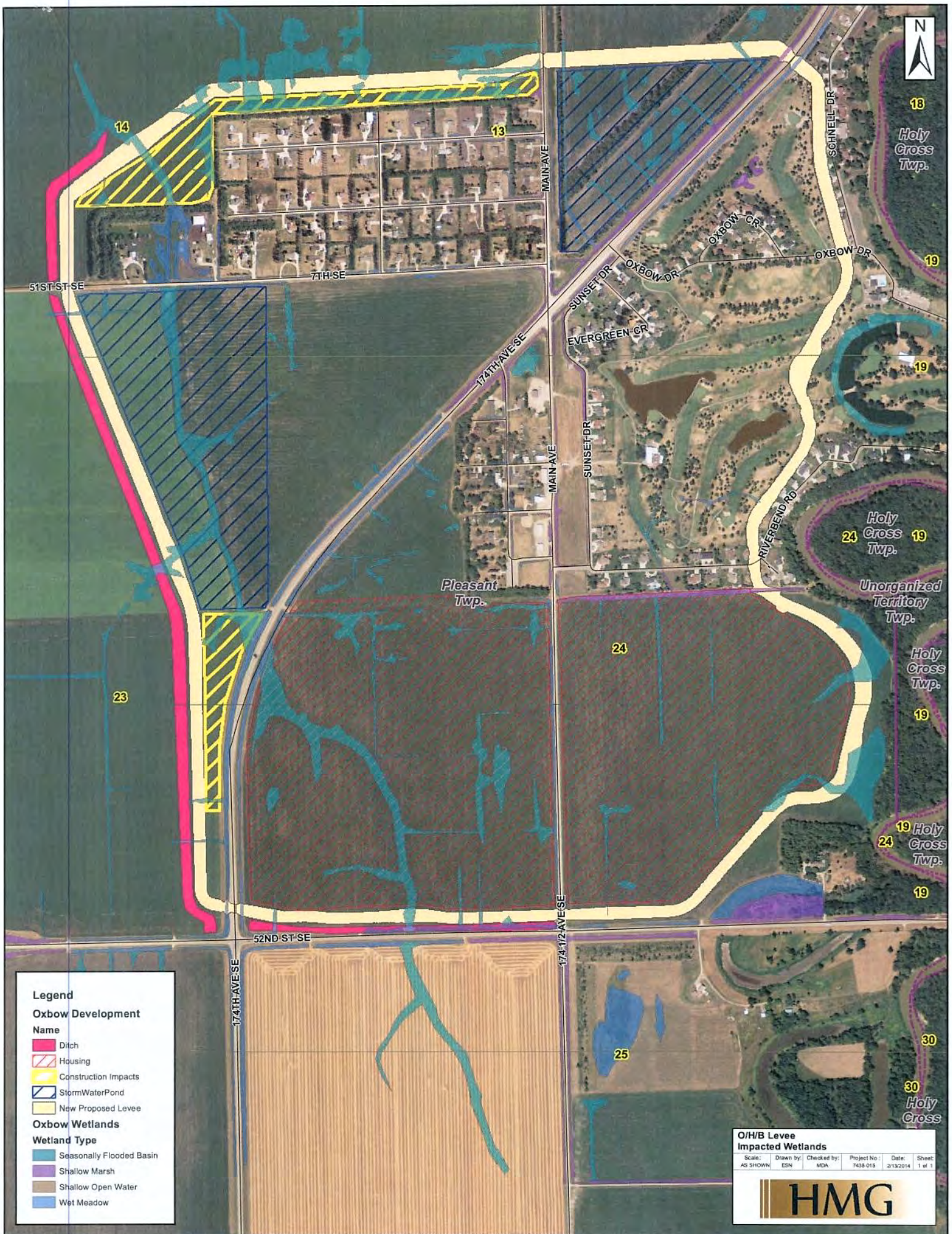
The project sponsors or responsible agency will continue to manage the site to maintain its full functional condition and repair of any structures to original construction specification. The project sponsors or responsible agency will inform the USACE of any adaptive management needs. Deficiencies or other event will be coordinated with the USACE for potential remedial actions and appropriate approval.

Financial assurances

The LGU's that will retain ownership of the local mitigation sites have taxing authority and have an annual budget for maintenance activities on city and county owned properties. Financial assurances regarding the North Dakota In-Lieu Fee Program is coordinated between the Resource Agencies involved in the program.

Exhibit 1






Wetlands Impacted by the OHB Project



Legend





Oxbow Development

Name

-  Ditch
-  Housing
-  Construction Impacts
-  StormWaterPond
-  New Proposed Levee

Oxbow Wetlands

Wetland Type

-  Seasonally Flooded Basin
-  Shallow Marsh
-  Shallow Open Water
-  Wet Meadow

**O/H/B Levee
Impacted Wetlands**

Scale: AS SHOWN	Drawn by: ESN	Checked by: MDA	Project No.: 7438-015	Date: 2/13/2014	Sheet: 1 of 1
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Exhibit 2

Wetland Mitigation Project Locations



Horace

Briarwood

Forest River
Mitigation Site

Oxbow Country Club
Mitigation Site

Legend

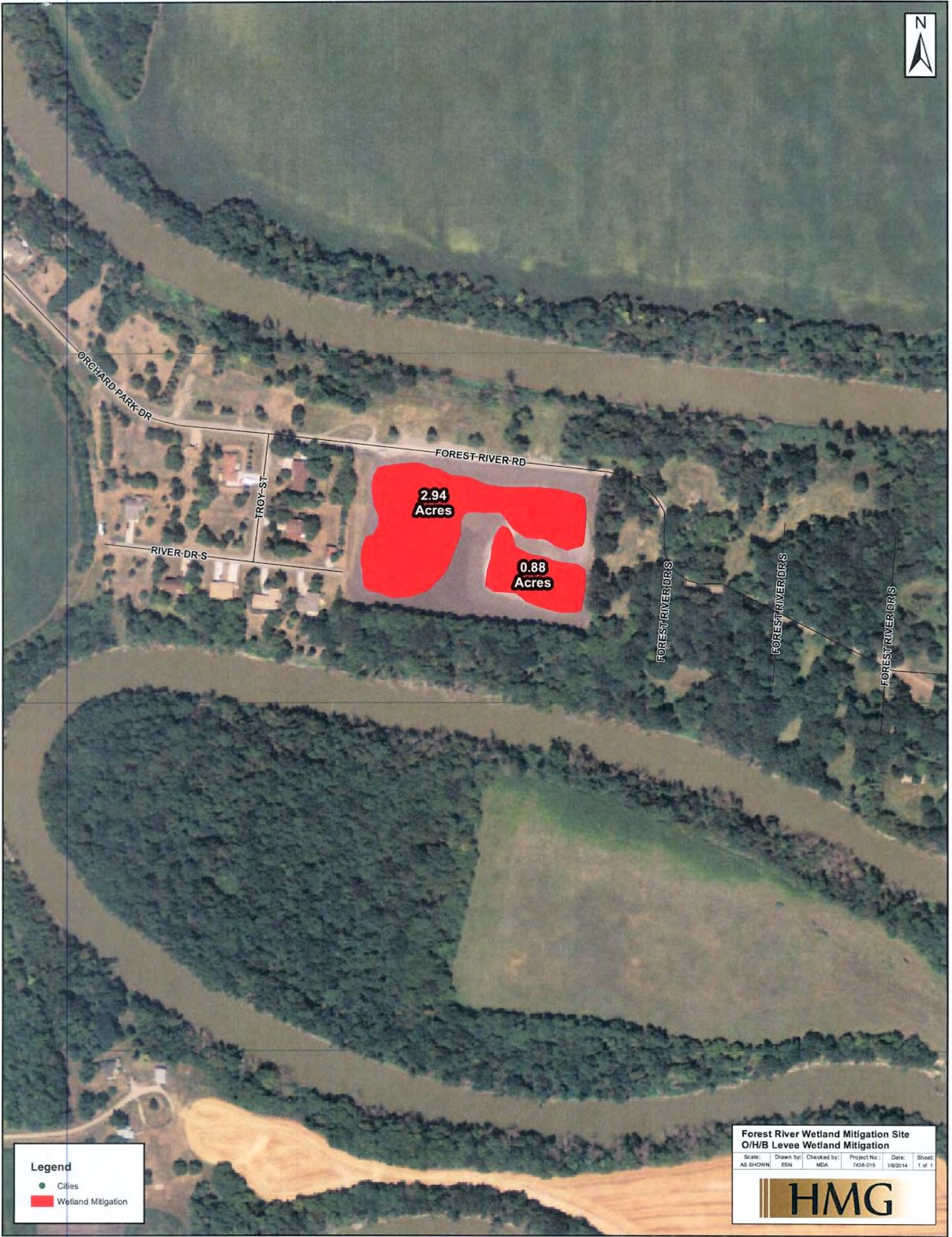
- Cities
- Wetland Mitigation

Location Map
O/H/B Levee
Wetland Mitigation Sites

Scale: AS SHOWN	Drawn by: EDW	Checked by: MDA	Project No.: 1438-019	Date: 2/13/2014	Sheet: 1 of 1
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Exhibit 3
Forest River Mitigation Site Plans



Legend

- Cities
- Wetland Mitigation

Forest River Wetland Mitigation Site
O/H/B Levee Wetland Mitigation

Scale: AS SHOWN	Drawn by: ESN	Checked by: MDA	Project No.: 7438-015	Date: 1/5/2014	Sheet: 1 of 1
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HMG

1401 21st Avenue North Fargo ND 58102



HoustonEngineering Inc.

September 16, 2010

VIA EMAIL

Keith Berndt, P.E.
Cass County Engineer
1201 West Main Avenue
West Fargo, ND 58078

**Subject: Forest River Wetland Creation
H.E. Project No. 6006_019**

Dear Keith:

You have requested us to provide a conceptual design to convert an existing borrow area to a wetland in the Forest River Subdivision (Section 18, T138N, R48W) just south of the City of Fargo. The attached report and figures will provide this information.

Please contact me if you have any questions.

Sincerely,

HOUSTON ENGINEERING, IINC.

Rick R. St. Germain, PE

RRS:gz
Encl.

Z:\6000\6006\09_6006_019 Forest River Wetland\Deliverables\Report 9-16-2010.doc

CONCEPTUAL DESIGN AND OPINION OF FEASIBILITY

FOREST RIVER WETLAND CREATION

Forest River Subdivision (Section 18, T138N, R48W)
Cass County, North Dakota

September 16, 2010



HoustonEngineering Inc.

CONCEPTUAL DESIGN AND OPINION OF FEASIBILITY

FOREST RIVER WETLAND CREATION

Forest River Subdivision (Section 18, T138N, R48W)

Cass County, North Dakota

September 16, 2010

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 Engineer under the laws of the State of North Dakota.

Rick R. St. Germain

Rick R. St. Germain, P.E.

License No. 3348

Date: Sept. 16, 2010

Houston Engineering Inc.

1401 21st Avenue North

Fargo, ND 58102

Ph. (701) 237-5065

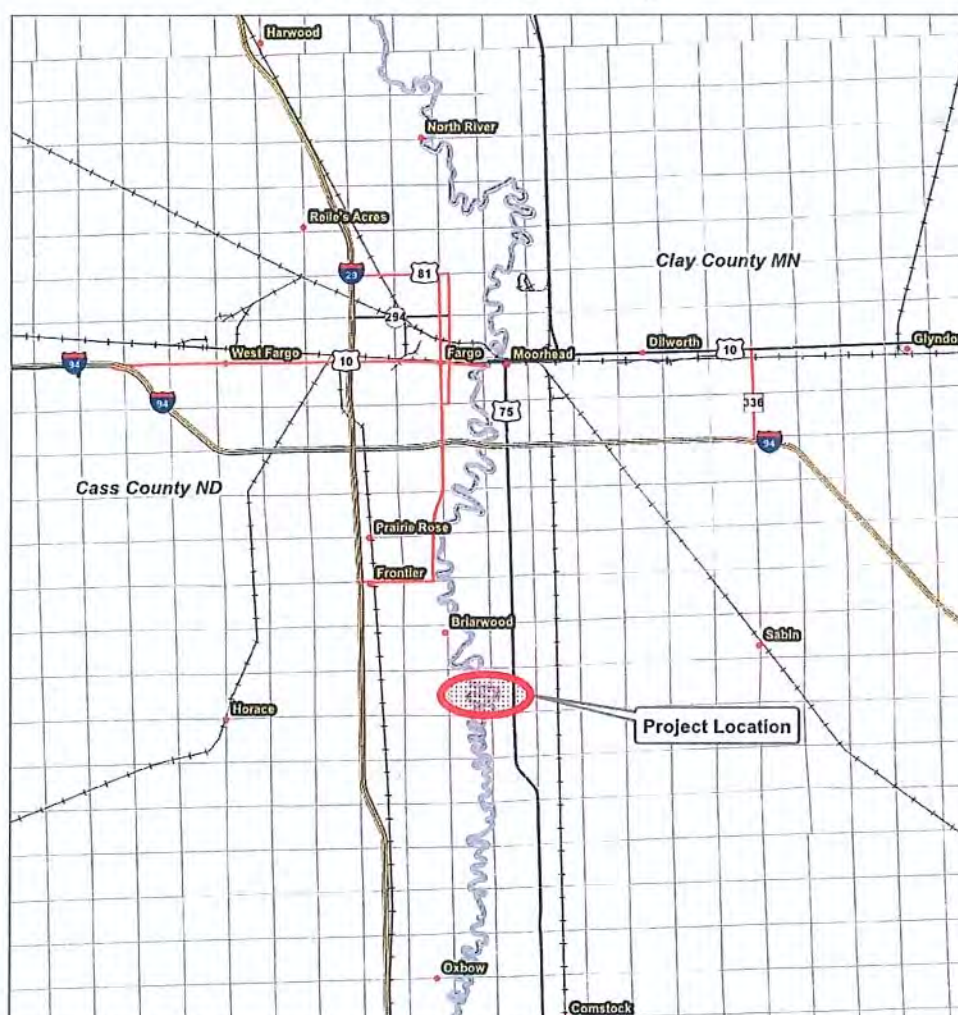
HE Project No. 6170_001

Forest River Wetland Creation Conceptual Design and Opinion of Feasibility

Background

A rectangular piece of land in the Forest River Subdivision of Cass County, measuring roughly 700' x 400' (approximately 7 acres) had a past history of agriculture. In the spring of 2009, the site was used as a source of borrow for clay levees that were constructed to prevent flood damage. Since that time, the site has remained mostly unchanged, except for some minor leveling of spoil piles. The borrow site was roughly divided into two main pits. The pits have filled with water and will be referred to as the West Pond and East Pond. The bottom of the West Pond is near elevation 891, while the bottom of the East Pond is near elevation 894. The natural ground in the area was close to elevation 905 before being disturbed.

General Location Map



Forest River Wetland Creation
Conceptual Design and Opinion of Feasibility



West Pond Looking Southeast on August 18, 2010



East Pond Looking Southeast on August 18, 2010

The high water from the Red River flood of 2009 was approximately at elevation 911. Elevations of the water in the ponds were taken in June and August of 2010 and are shown in Table 1. The pond bottoms were surveyed and the volume of water in the ponds was calculated. The existing ponds are shown on Sheet 1 of the attached plans.

TABLE 1 - Existing Pond Elevations and Volumes

Date	West Pond Elevation	East Pond Elevation	Volume in West Pond (Ac-Ft)	Volume in East Pond (Ac-Ft)	Total Volume in Ponds (Ac-Ft)
6/19/2010	903.08	902.40	5.88	7.27	13.14
8/18/2010	903.39	901.42	6.17	6.02	12.20

Hydrology

The ponds were initially filled from the Red River flood in the spring of 2009. The ponds have held water ever since. High water information obtained from the City of Fargo indicates that the ponds were flooded again by the Red River in the spring of 2010. The estimated high water elevation was approximately 907.



Forest River Area on March 21, 2010

The drainage area to the ponds is approximately 9 acres when there is no influence from the Red River. We expect the levels of the proposed wetlands to fluctuate with the seasons and climate conditions. Occasional drying of the wetlands can have positive consequences. Recycling of the nutrients from plants to the soil can make the wetland more productive and diverse. Wetlands at a constant elevation tend to become a monoculture as one plant species becomes dominant.

The US Army Corps of Engineers (USACOE) has been modeling this area of the river as part of their FM (Fargo Moorhead) Metro Feasibility Study. An unsteady HEC-RAS model, dated July 27, 2010, was used to determine the probability of the wetlands being inundated by the Red River. The results of the modeling are shown in Table 2.

Table 2 - Elevation and Flood Frequency of Red River at Forest River

Frequency	Elevation	Discharge
10-year	905.45	16,300
50-year	909.71	31,300
100-year	910.06	35,500

The conceptual wetland complex would have a spill elevation at approximately 903.5. At this elevation, water from the Red River would begin entering the complex. The water would continue to rise with the flood, then peak, and then fall to elevation 903.5 as the river recedes. By extrapolation of the frequency data presented in Table 2, the probability of the Red River reaching 903.5 in any year is 20%. We would expect the complex to be flooded an average of once every five years.

General Wetland Characteristics

The conceptual wetlands have been designed to look natural and have varying depths to induce biodiversity. The wetlands are irregular in shape and have relatively flat and varying side slopes. During periods of high water (above elevation 902), the wetlands would be connected and appear as one body of water. As the water recedes, the complex will divide into three wetlands with some islands. The conceptual wetlands are shown on Sheet 2 of the attached plans.

A comparison of the existing ponds and conceptual wetlands was made and is shown in Table 3.

Table 3 - Existing Ponds and Conceptual Wetlands Characteristics

Elevation	Surface Area of Existing Ponds (Acres)	Volume of Existing Ponds (Ac-Ft)	Surface Area of Concept Wetlands (Acres)	Volume of Concept Wetlands (Ac-Ft)
893	0.11	0.09	0.00	0.00
895	0.45	0.56	0.00	0.00
897	1.41	2.47	0.00	0.00
899	1.79	5.72	0.79	0.53
901	2.02	9.56	2.20	3.54
902	2.13	11.65	3.01	6.04
903	2.63	13.98	3.66	9.36
904	3.02	15.44	3.92	11.25

This comparison shows that the existing ponds and conceptual wetlands have similar characteristics. The conceptual wetlands have slightly more surface area and are generally shallower as expected. With shallower depths, we can expect more emergent vegetation to become established.

General Soil Properties

The soils at the project site are mapped as Fargo silty clay, (Web Soil Survey August 2010). These soils are typically very deep, poorly drained soils with low permeability rates, (NRCS March 2005). Native vegetation for these soils is typically grasses, however in the riparian areas of river systems woody vegetation is common. The surface water levels have remained relatively unchanged since the floods of 2009 and 2010. This is consistent with the slow permeability of the Fargo soils and the precipitation amounts in the past two years.

Existing Vegetation

A field visit conducted May 5, 2010 showed cattails are beginning to become established in the fringe areas of the ponds. Cottonwood seedlings are also numerous in the shallower areas at the site. Reed canary grass does not appear to be present. The upland areas are rough exposed spoil piles and are dominated with pennycress, burdock, thistle and other weeds.

Table 4. Existing Vegetation on the Project Site

Common Name	Scientific Name	Vegetative Layer
Common Dandelion	<i>Taraxacum officinale</i>	Herb
Canada Thistle	<i>Cirsium arvense</i>	Herb
Cattail	<i>Typha sp.</i>	Herb
Field pennycress	<i>Thlaspi arvense</i>	Herb
Plumeless thistle	<i>Carduus acanthoides</i>	Herb
Burrdock	<i>Arctium minus</i>	Herb
Brome grass	<i>Bromis inermis</i>	Herb
Yellow Foxtail	<i>Setaria glauca</i>	Herb
Bluegrass	<i>Poa sp.</i>	Herb
Stinging Nettle	<i>Urtica dioica</i>	Herb
Quackgrass	<i>Agropyron repens</i>	Herb
Eastern Cottonwood	<i>Populus deltoides</i>	Shrub
Willow	<i>Salix sp.</i>	Shrub
Boxelder	<i>Acer negundo</i>	Shrub

Construction - Weed Control and Earth Moving

After erosion control measures are in place, the water from the existing ponds should be pumped dry. The soils should be managed during construction by conserving the previously stockpiled topsoil. The existing topsoil piles should be left in place or moved as necessary so the earth moving can be done while minimizing the mixing of topsoil and subsoil. Typical earth moving equipment is expected to work well for the construction as long as the construction period is dry. The topsoil should be spread on the upland and transitional areas of the site after the primary wetland features are constructed.

The site is susceptible to flooding from the Red River but more likely could be flooded from runoff directly from its drainage area. Adequately sized pumps should be available and used as necessary to complete the earth moving. We do not recommend a temporary drainage channel be constructed below the grade of the site. This would increase the chances for seepage and erosion.

Seed Bed Preparation

The topsoil spread after the earth moving will contain a host of seeds from undesirable species. This seed bank should be allowed to germinate and begin growing. After the new growth, the vegetation should be sprayed with a Glyphosate type of herbicide. After two weeks, the dead plant matter should be removed from the site and the area should be tilled or heavily worked to a minimum depth of 6 inches. Then the vegetation should again be

allowed to begin growing and then the site should be sprayed a second time. The seedbed should be smooth and firm and free of large amounts of dead vegetation or debris.

Seeding

The upland and transitional areas should be seeded to a native wet grass prairie mix. The prairie mix should be well established, (approximately 3-4 years) prior to any tree planting activities. A recommended seed mix is shown below in Table 5. Seeding dates should be May 1st to August 1st. A fall seeding can be effect but due to the risk of flooding a fall seeding is not recommended for this site. The grass seed should be broadcast preferably by hand or with a hand held spreader and then the seedbed should be lightly raked to ensure good seed to soil contact. Broadleaf species (wildflowers) should be seeded after the grass has been established. Species in Table 5 include Blue Vervain, Black-eyed Susan and Golden Alexanders. This can be done when the tree planting occurs (3-4 years after the grass seeding). This will allow more intensive management of the grasses the first few years. This may be necessary due to the potential disturbance of the site from flood events. The vegetation plan is shown on Sheet 3 of the attachment.

Table 5. Example Seed Mix

Common Name	Scientific Name	% of Mix
Big Bluestem	<i>Adropogon gerardi</i>	43
Canada Wild Rye	<i>Elymus canadensis</i>	12
Switch Grass	<i>Panicum virgatum</i>	8
Indian Grass	<i>Sorphastrum nutans</i>	6
Little Bluestem	<i>Schizachyrium scoparium</i>	3
Prairie Cord Grass	<i>Spartina pectinata</i>	10
Wool Grass	<i>Scirpus cyperinus</i>	0.5
Green Bulrush	<i>Scirpus atrovirens</i>	1.0
Annual Ryegrass	<i>Lolium italicum</i>	15
Blue Vervain	<i>Verbena hastata</i>	0.3
Black-eyed Susan	<i>Rudbeckia hirta</i>	0.4
Golden Alexanders	<i>Zizia aurea</i>	0.4
		100% by bulk weight
Seeding Rate – 4lbs PLS / 10,000 ft ² (Broadcast Method)		

Tree Planting

It is recommended that bare root stock trees be planted in the early spring (typically during the Month of May), or as soon as the frost is gone from the soil. This will allow for the newly planted species to develop a good root system before energy is allocated to leaf growth. This will also assist in keeping the plant from drying out in the hot summer months. This is especially important for bare root species, which if handled improperly will have a high mortality rate. Mulch or some other form of ground protection may be used for water retention. It is also recommended that a portion of the site be dedicated to planting a number of filler tree species to replace those species inevitably lost to death. Example species are listed below in Table 6.

Weed control adjacent to the trees may be accomplished through a number of options. Matting, tillage or chemical weed control may be used. Volunteer woody vegetation should be evaluated during the establishment period to determine the acceptability within the desired plant community. Undesirable species such as buckthorn (*Rhamnus sp.*) should be removed; however native floodplain forest species should be allowed to become part of the vegetative community.

Table 6. Example Tree Species for Hand Planting

Common Name	Scientific Name	Minimum Spacing From other trees (feet)
Burr Oak	<i>Quercus macrocarpa</i>	40
Hackberry	<i>Celtis occidentalis</i>	30
Green Ash	<i>Fraxinus pennsylvanica</i>	30
Chokecherry	<i>Prunus virginiana</i>	25
Basswood	<i>Tilia americana</i>	40

Opinion of Cost

Table 7 provides an opinion of estimated of costs to establish this wetland complex. The total estimated cost of the wetland complex is approximately \$58,000.

**Table 7 - Opinion of Probable Cost
Forest River Wetland Complex**

Item	Unit	Quantity	Unit Price	Total Price
Clearing and Grubbing and Tree Removal	LS	1	\$2,000	\$2,000
Erosion Control - Silt Fence	LF	2,200	\$2.00	\$4,400
Topsoiling (Salvage, Stockpile and Spread)	CY	6,000	\$1.00	\$6,000
Embankment	CY	18,000	\$1.00	\$18,000
Seed Bed Prep - Part 1 (weed killer and tillage)	AC	3	\$500.00	\$1,500
Seed Bed Prep - Part 2 (weed killer)	AC	3	\$200.00	\$600
Native Prairie Seeding	AC	3.8	\$500.00	\$1,900
Tree and Wild Flower Planting	AC	1.4	\$1,400	\$1,960
Construction Subtotal				\$36,360
Contingencies (15%)				\$5,454
Total Construction Cost				\$41,814
Engineering, Permitting and Banking				\$14,000
Legal and Administrative				\$2,000
Total Estimated Project Cost				\$57,814

Conclusion

As with any cultivation endeavor, weather will play a key role in how successful the wetland becomes established with the desirable species. We do believe there is very good probability that if the weather brings normal to above normal precipitation, we'd expect to ultimately achieve approximately 3.8 acres of wetland and 3.0 acres of adjacent upland.

The County has inquired about the feasibility of creating a wetland area from an existing borrow area. Our investigation has shown that the project would be feasible and in our opinion would provide a significant aesthetic and environmental improvement.


Fargo	701.237.5065	1401 21st Avenue North Fargo ND 58102
Bismarck	701.323.0200	3712 Lockport Street Bismarck ND 58503
Maple Grove	763.493.4522	6901 East Fish Lake Road Suite 140 Maple Grove MN 56369
Minot	701.852.7931	720 Western Avenue Minot ND 58701
Thief River Falls	218.681.2951	208 4th Street East Thief River Falls MN 56701




HoustonEngineering Inc.



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		 Houston Engineering Inc.	Fargo P: 701.237.5065 F: 701.237.5101	Drawn by CEQ	Date 8-20-10	FOREST RIVER WETLAND CASS COUNTY HIGHWAY DEPT CASS COUNTY, NORTH DAKOTA	EXISTING WETLAND PROJECT NO. 6006-019	SHEET 1 of 3
No.	Revision			Checked by RRS	Scale AS SHOWN			
		Date	By					



				 Houston Engineering Inc.	Fargo P: 701.237.5065 F: 701.237.5101	Drawn by CEQ	Date 8-30-10	FOREST RIVER WETLAND CASS COUNTY HIGHWAY DEPT CASS COUNTY, NORTH DAKOTA	PROPOSED WETLAND PROJECT NO. 6006-019	SHEET 2 of 3
No.	Revision	Date	By				Checked by RRS	Scale AS SHOWN		

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LEGEND

TREE PLANTING AREAS

SEEDED PRAIRIE MIX

No.	Revision	Date	By

Houston Engineering Inc.

Fargo
P: 701.237.5065
F: 701.237.5101

Drawn by
CEQ

Checked by
ENG

Date
9-20-10

Scale
AS SHOWN

FOREST RIVER WETLAND
CASS COUNTY HIGHWAY DEPT
CASS COUNTY, NORTH DAKOTA

VEGETATION PLAN
PROJECT NO. 6006-019

SHEET
3 of 3

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Site Photography – Forest River Mitigation Site

March 19, 2014







Exhibit 4
Oxbow Wetland Mitigation Site Plans



Legend

- Cities
- Wetland Mitigation

**Oxbow Wetland Mitigation Site
O/H/B Levee Wetland Mitigation**

Scale: As SHOWN	Drawn by: ESN	Checked by: MDA	Project No.: 7438-015	Date: 2/13/2014	Sheet: 1 of 1
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HMG

Technical Memorandum

Conceptual Design and Opinion of Feasibility

Oxbow Country Club Wetland Mitigation

Location: Section 19, T137N, R48W; Section 24, T137N, R49W

Date: 2/10/2014

Project: Fargo-Moorhead Diversion

1.0 Background

The wetland mitigation site consists of an oxbow along the Red River located in Oxbow, ND. This area has historically been undeveloped wooded river corridor until the area was converted to a golf course. Historical imagery shows golfing fairways developed on the oxbow by 1975. The western half of the oxbow was filled with water and remains as a water trap/reservoir for the golf course. Additionally a smaller area on the east edge of the oxbow was used as a water trap/reservoir sometime after the development of the west pond. A culvert exists on the south eastern portion of the oxbow that allows excess water in the existing oxbow reservoirs to flow into the Red River. According to LiDAR data, the water surface elevation of the oxbow ponds is at approximately 892.5' and 894.25' for the east and west ponds, respectively (all elevations reference the vertical datum NAVD 1988). The Oxbow Country Club house and residential neighborhoods are adjacent to the project site, although these facilities will be relocated as part of the Oxbow-Hickson-Bakke addition ring dike and redevelopment project (OHB Project).

2.0 General

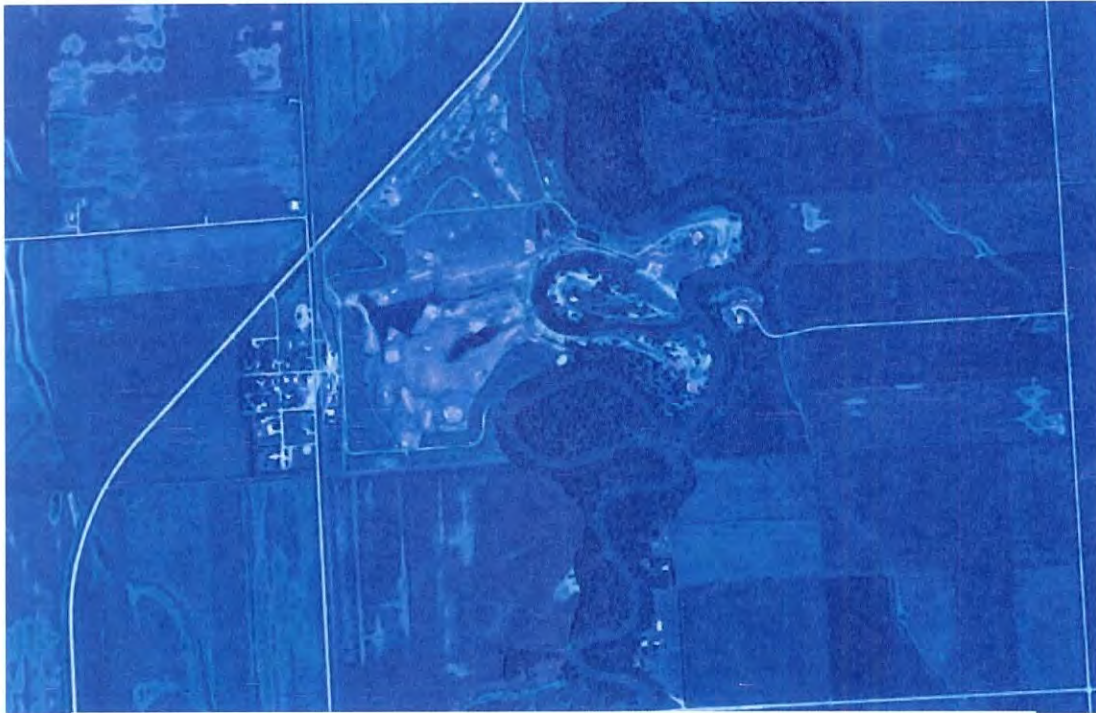


Location Map



3.0 Hydrology

Historical imagery shows that the proposed wetland site has been drained of surface water. This area remains drained today. The northern proposed wetland site flows to the existing pond on the east side. Excess water from the western pond flows through a culvert to the area of the southern proposed wetland. From the area of the southern proposed wetland, water flows through another culvert into the Red River. Before development of the area occurred, the water level of the oxbow likely raised and lowered with the river. Currently an earthen levee keeps water from flooding into the oxbow when the river is flowing at higher than normal depths.



Fairway and pond development of oxbow [Oxbow, ND 7-13-1975]

The drainage area to the oxbow is approximately 101 acres when there is no influence from the Red River. The levels of the proposed wetlands are expected to fluctuate with the seasons and climate conditions. However, occasional drying of the wetlands can have positive consequences. Recycling of nutrients from plants to the soil can make the wetland more productive and diverse. Wetlands at a constant elevation tend to become a monoculture as one plant species becomes dominant.



Table 1 - Elevation and Flood Frequency of Red River at Hickson, ND

Frequency**	Discharge (cfs)**	Elevation*
2-year	4,000	897.30
5-year	7,000	905.59

*Elevation data found using USGS Stage Curve at Hickson, ND

**Flow frequency data found using FM Diversion Feasibility Study – Phase 4

The conceptual wetland complex has a design spill elevation at approximately 897.5. At this elevation, water from the Red River would begin entering the complex. The water would continue to rise with the flood, then peak, and then fall to elevation 897.5 as the river recedes. Table 1 above, shows elevations from a USGS rating curve at Hickson, ND, and discharges from Flow-Frequency curve at Hickson, ND. The Flow Frequency curve was obtained from Volume 2, Appendix A of the Fargo-Moorhead Metro Flood Risk Management Project – Feasibility study – Phase 4 (April, 2011). Using the rating curve for the Red River at Hickson, ND, a water elevation of 897.5 corresponds to a flow of 4070 cfs. Using the flow frequency curve presented in the Feasibility Study, at 4070 cfs, the probability of the Red River reaching 897.5 in any year is approximately 45%. The wetland complex would likely be flooded due to the Red River discharge once within any given 2.2 year period.

4.0 General Wetland Characteristics

Due to the area's fluvial geomorphology, the conceptual wetlands will be designed consistent with a typical river oxbow. They will have varying depths to induce biodiversity and will have a shape and side slopes consistent with the existing portion of the oxbow. Under design conditions the wetlands would be connected to appear as one body of water. The conceptual wetlands are shown on attachment 1.



Table 2 displays the design depth and surface area profile of the proposed wetlands.

Table 2 - Conceptual Wetlands Characteristics

Elevation	Depth of North Wetland (Feet)*	Depth of South Wetland (Feet)*	Surface Area of North Wetland (Acres)	Surface Area of South Wetland (Acres)
897.5	4.5	6.0	2.34	3.84
897.0	4.0	5.5	1.98	3.45
896.5	3.5	5.0	1.52	3.22
896.0	3.0	4.5	1.22	2.96
895.5	2.5	4.0	0.86	2.69
895.0	2.0	3.5	0.43	2.40
894.5	1.5	3.0	0.15	2.05
894.0	1.0	2.5	0.05	1.60
893.5	0.5	2.0	<0.01	1.13
893.0	0.0	1.5	N/A	0.76
892.5	N/A	1.0	N/A	0.48
892.0	N/A	0.5	N/A	0.20
891.5	N/A	0.0	N/A	0.00

*Denotes depth to lowest design elevation of the wetland bottom.

5.0 General Soil Properties

The soils at the project site are mapped as Wahpeton-Cashel Silty Clays, Wooded, 1 to 15 percent slopes, occasionally flooded (Web Soil Survey January 2014). These soils are listed as moderately well drained yet have a moderately low saturated hydraulic conductivity. Additionally, these soils have an occasional frequency of flooding. The NRCS has identified this soil as being hydric which is conducive to a productive wetland. Depth to the water table should be between 36 to 60 inches. Native vegetation for these soils is tall prairie grasses, mixed hardwoods and shrubs.

6.0 Existing Vegetation

Currently, a field visit has not been conducted to evaluate the existing vegetation due to seasonal limitations. It is likely that the currently vegetation is turf grasses and ornamental trees and shrubs.

7.0 Construction - Weed Control and Earth Moving

After erosion control measures are in place, the water from the existing ponds should be pumped dry. The soils should be managed during construction by conserving the previously stockpiled topsoil. The existing topsoil piles should be left in place or moved as necessary so the earth moving



can be done while minimizing the mixing of topsoil and subsoil. Typical earth moving equipment is expected to work well for the construction as long as the construction period is dry. The topsoil should be spread on the upland and transitional areas of the site after the primary wetland features are constructed.

The site is susceptible to flooding from the Red River but more likely could be flooded from runoff directly from its drainage area. Adequately sized pumps should be available and used as necessary to complete the earth moving. We do not recommend a temporary drainage channel be constructed below the grade of the site. This would increase the chances for seepage and erosion.

8.0 Seed Bed Preparation

The areas to be seeded may initially contain a host of seeds from undesirable species. This seed bank should be allowed to germinate and begin growing. After the new growth, the vegetation should be sprayed with a Glyphosate type of herbicide. After two weeks, the dead plant matter should be removed from the site and the area should be tilled or heavily worked to a minimum depth of 6 inches. Then the vegetation should again be allowed to begin growing and then the site should be sprayed a second time. The seedbed should be smooth and firm and free of large amounts of dead vegetation or debris.

9.0 Seeding

The upland and transitional areas should be seeded to a native wet grass prairie mix. The prairie mix should be well established, (approximately 3-4 years) prior to any tree planting activities. A recommended seed mix is shown below in Table 3. Seeding dates should be May 1st to August 1st. A fall seeding can be effect but due to the risk of flooding a fall seeding is not recommended for this site. The grass seed should be broadcast preferably by hand or with a hand held spreader and then the seedbed should be lightly raked to ensure good seed to soil contact. Broadleaf species (wildflowers) should be seeded after the grass has been established. Species in Table 3 include Blue Vervain, Black-eyed Susan and Golden Alexanders. This can be done when the tree planting occurs (3-4 years after the grass seeding). This will allow more intensive management of the grasses the first few years. This may be necessary due to the potential disturbance of the site from flood events. The vegetation plan is shown on Sheet 3 of the attachment.



Table 3. Example Seed Mix

Common Name	Scientific Name	% of Mix
Big Bluestem	<i>Adropogon gerardi</i>	43
Canada Wild Rye	<i>Elymus canadensis</i>	12
Switch Grass	<i>Panicum virgatum</i>	8
Indian Grass	<i>Sorphastrum nutans</i>	6
Little Bluestem	<i>Schizachyrium scoparium</i>	3
Prairie Cord Grass	<i>Spartina pectinata</i>	10
Wool Grass	<i>Scirpus cyperinus</i>	0.5
Green Bulrush	<i>Scirpus atrovirens</i>	1.0
Annual Ryegrass	<i>Lolium italicum</i>	15
Blue Vervain	<i>Verbena hastata</i>	0.3
Black-eyed Susan	<i>Rudbeckia hirta</i>	0.4
Golden Alexanders	<i>Zizia aurea</i>	0.4
		100% by bulk weight
Seeding Rate – 4lbs PLS / 10,000 ft ² (Broadcast Method)		



10.0 Tree Planting

It is recommended that bare root stock trees be planted in the early spring (typically during the Month of May), or as soon as the frost is gone from the soil. This will allow for the newly planted species to develop a good root system before energy is allocated to leaf growth. This will also assist in keeping the plant from drying out in the hot summer months. This is especially important for bare root species, which if handled improperly will have a high mortality rate. Mulch or some other form of ground protection may be used for water retention. It is also recommended that a portion of the site be dedicated to planting a number of filler tree species to replace those species inevitably lost to death. Example species are listed below in Table 4.

Weed control adjacent to the trees may be accomplished through a number of options. Matting, tillage or chemical weed control may be used. Volunteer woody vegetation should be evaluated during the establishment period to determine the acceptability within the desired plant community. Undesirable species such as buckthorn (*Rhamnus sp.*) should be removed; however native floodplain forest species should be allowed to become part of the vegetative community.

Table 4. Example Tree Species for Hand Planting

Common Name	Scientific Name	Minimum Spacing From other trees (feet)
Burr Oak	<i>Quercus macrocarpa</i>	40
Hackberry	<i>Celtis occidentalis</i>	30
Green Ash	<i>Fraxinus pennsylvanica</i>	30
Chokecherry	<i>Prunus virginiana</i>	25
Basswood	<i>Tilia americana</i>	40





Exhibit 5

MNRAM Information

Minnesota Routine Assessment Method (MNRAM)

Summary of Scores

Seasonally Flooded Basin – Poor Quality

(SFB - Poor Quality)

Wetland Functional Assessment Summary

Wetland Functional Assessment Summary						Maintenance of Hydrologic Regime	Flood/ Stormwater/ Attenuation	Downstream Water Quality	Maintenance of Wetland Water Quality	Shoreline Protection
Wetland Name	Hydrogeomorphology									
#41	Depressional/Tributary (outlet but no perennial inlet or drainage entering from upstream subwatershed)					0.10	0.50	0.46	0.20	0.00
						Low	Moderate	Moderate	Low	Not Applicable
	Additional Information									
Wetland Name	Maintenance of Characteristic Wildlife Habitat Structure	Maintenance of Characteristic Fish Habitat	Maintenance of Characteristic Amphibian Habitat	Aesthetics/ Recreation/ Education/ Cultural	Commercial Uses	Ground-Water Interaction	Wetland Restoration Potential	Wetland Sensitivity to Stormwater and Urban Development	Additional Stormwater Treatment Needs	
#41	0.20	0.00	0.00	0.10	0.00	Combination Discharge, Recharge	0.00	0.10	0.20	
	Low	Not Applicable	Not Applicable	Low	Not Applicable		Not Applicable	Exceptional	Low	

Wetland Community Summary

Wetland Community Summary		Vegetative Diversity/Integrity							
Wetland Name	Location	Community						Average Wetland Rating	Weighted Average Wetland Rating
		Cowardin Classification	Circular Plant 39	Plant Community	Wetland Proportion	Individual Community Rating	Highest Wetland Rating		
#41			Type 1	Seasonally Flooded Basin	100	0.1	0.10	0.10	0.10
							Low	Low	Low
					100		0.10	0.10	0.10

☑ Denotes incomplete calculation data.

Minnesota Routine Assessment Method (MNRAM)

Summary of Scores

Wet Meadow – Road Ditch

(WM – Road Ditch)

Wetland Functional Assessment Summary

Wetland Functional Assessment Summary						Maintenance of Hydrologic Regime	Flood/ Stormwater/ Attenuation	Downstream Water Quality	Maintenance of Wetland Water Quality	Shoreline Protection
Wetland Name	Hydrogeomorphology									
WM Ditch	Depressional/Flow-through (apparent inlet and outlet), Depressional/Flow-through (apparent inlet and outlet)					0.10	0.56	0.44	0.25	0.00
						Low	Moderate	Moderate	Low	Not Applicable
	Additional Information									
Wetland Name	Maintenance of Characteristic Wildlife Habitat Structure	Maintenance of Characteristic Fish Habitat	Maintenance of Characteristic Amphibian Habitat	Aesthetics/ Recreation/ Education/ Cultural	Commercial Uses	Ground-Water Interaction	Wetland Restoration Potential	Wetland Sensitivity to Stormwater and Urban Development	Additional Stormwater Treatment Needs	
WM Ditch	0.22	0.00	0.00	0.21	0.00	Combination Discharge, Recharge	0.00	0.10	0.25	
	Low	Not Applicable	Not Applicable	Low	Not Applicable		Not Applicable	Moderate	Low	

Wetland Community Summary

		Vegetative Diversity/Integrity							
Wetland Name	Location	Community							
		Cowardin Classification	Circular Plant Community		Wetland Proportion	Individual Community Rating	Highest Wetland Rating	Average Wetland Rating	Weighted Average Wetland Rating
			39	Community					
WM Ditch			Type 2	Fresh (Wet) Meadow	100	0.1	0.10	0.10	0.10
							Low	Low	Low
					100		0.10	0.10	0.10

☒ Denotes incomplete calculation data.

Minnesota Routine Assessment Method (MNRAM)

Summary of Scores

Shallow Marsh – Road Ditch

(SM – Road Ditch)

Wetland Functional Assessment Summary

Wetland Functional Assessment Summary					Maintenance of Hydrologic Regime	Flood/ Stormwater/ Attenuation	Downstream Water Quality	Maintenance of Wetland Water Quality	Shoreline Protection
Wetland Name	Hydrogeomorphology								
SM Ditch	Depressional/Flow-through (apparent inlet and outlet), Depressional/Flow-through (apparent inlet and outlet)				0.10	0.56	0.44	0.25	0.00
					Low	Moderate	Moderate	Low	Not Applicable
						Additional Information			
Wetland Name	Maintenance of Characteristic Wildlife Habitat Structure	Maintenance of Characteristic Fish Habitat	Maintenance of Characteristic Amphibian Habitat	Aesthetics/ Recreation/ Education/ Cultural	Commercial Uses	Ground-Water Interaction	Wetland Restoration Potential	Wetland Sensitivity to Stormwater and Urban Development	Additional Stormwater Treatment Needs
SM Ditch	0.20	0.00	0.00	0.21	0.00	Combination Discharge, Recharge	0.00	0.10	0.25
	Low	Not Applicable	Not Applicable	Low	Not Applicable		Not Applicable	Moderate	Low

Wetland Community Summary

		Vegetative Diversity/Integrity							
		Community							
Wetland Name	Location	Cowardin Classification	Circular 39	Plant Community	Wetland Proportion	Individual Community Rating	Highest Wetland Rating	Average Wetland Rating	Weighted Average Wetland Rating
SM Ditch			Type 3	Shallow Marsh	100	0.1	0.10	0.10	0.10
							Low	Low	Low
					100		0.10	0.10	0.10

☒ Denotes incomplete calculation data.

Minnesota Routine Assessment Method (MNRAM)

Summary of Scores

Forest River Wetland Mitigation Site

Anticipated Scores for 64th Ave Site and Future Oxbow
Wetland Mitigation Sites

(Forest River/64th/Oxbow Mitigation)

Wetland Functional Assessment Summary

Wetland Name	Hydrogeomorphology	Maintenance of Hydrologic Regime	Flood/Stormwater/Attenuation	Downstream Water Quality	Maintenance of Wetland Water Quality	Shoreline Protection
Forest River	Floodplain (outside waterbody banks)	1.00	0.79	0.84	1.00	0.00
		High	High	High	High	Not Applicable

					Additional Information				
Wetland Name	Maintenance of Characteristic Wildlife Habitat Structure	Maintenance of Characteristic Fish Habitat	Maintenance of Characteristic Amphibian Habitat	Aesthetics/Recreation/Education/Cultural	Commercial Uses	Ground-Water Interaction	Wetland Restoration Potential	Wetland Sensitivity to Stormwater and Urban Development	Additional Stormwater Treatment Needs
Forest River	0.79	0.70	0.85	0.81	0.00	Combination Discharge, Recharge	0.00	1.00	1.00
	High	High	High	High	Not Applicable		Not Applicable	High	High

Wetland Community Summary

		Vegetative Diversity/Integrity							
		Community							
Wetland Name	Location	Cowardin Classification	Circular 39	Plant Community	Wetland Proportion	Individual Community Rating	Highest Wetland Rating	Average Wetland Rating	Weighted Average Wetland Rating
Forest River		PEMC	Type 3	Shallow Marsh	75	1	1.00	1.00	1.00
							High	High	High
		PEMF	Type 4	Deep Marsh	25	1	1.00	1.00	1.00
							High	High	High
					100		1.00	1.00	1.00

☒ Denotes incomplete calculation data.