# State of North Dakota
## Office of the State Engineer

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July 8, 2016

Keith Berndt, P.E.
Cass County Administrator
Flood Diversion Board of Authority
211 Ninth Street South
P.O. Box 2806
Fargo, ND 58103-2806

RE: Fargo Moorhead Metro Area Flood Risk Management Project Dam Construction Permit

Dear Mr. Berndt,

The Office of the State Engineer has reviewed Construction Permit Application No. 2489 and the application materials submitted, pursuant to North Dakota Century Code section 61-16.1-38. The State Engineer has approved the application and signed Construction Permit No. 2489 based on the the approval memo dated July 8, 2016, both enclosed.

The permit issued is subject to the conditions listed on the permit.

If you have any questions, please contact me at 701-328-4813 or by email at acarranza@nd.gov

Sincerely,

Aaron Carranza, P.E., CFM
Chief, Engineering and Permitting Section
Regulatory Division

Enclosure: Permit to Construct or Modify No. 2489
Interoffice Memo recommending approval of Application No. 2489

**interoffice**
**MEMORANDUM**

**TO:** Garland Erbele, P.E., State Engineer
John Paczkowski, P.E., Director, Regulatory Division

**FROM:** AC Aaron Carranza, P.E., Chief, Engineering and Permitting Section

**SUBJECT:** Construction Permit Application No. 2489
Fargo-Moorhead Flood Control Project Dam (Diversion Inlet Control Structure)

**DATE:** July 8, 2016

## Summary

On May 20, 2016, the Office of the State Engineer (OSE) received the Flood Diversion Board of Authority's (Applicant) Application to Construct or Modify a Dam, Dike, Ring Dike, or Other Water Resource Facility No. 2489 (Application) for the Fargo Moorhead Metropolitan Area Flood Risk Management Project (FM Diversion Project) Dam (Dam). The Application was received in accordance with North Dakota Century Code (N.D.C.C.) § 61-16.1-38. The Dam has a total length of 16 miles, of which approximately 6 miles are to be constructed in Clay County Minnesota. The North Dakota portion of the Dam is to be located in the N ½ of Section 6, Township 137 North, Range 48 West; the N ½ of Sections 1, 2, 3, 4, 5, and the W ½ of Sections 5, 8, 17, and 20, Township 137 North, Range 49 West; and the SE ¼ of Section 31, S ½ of Section 32, Township 138 North, Range 49 West, Cass County. The Dam is comprised of a Diversion Inlet Control Structure (Inlet), Wild Rice and Red River Control Structures (Gates), an east to west embankment (Southern Embankment), and a north to south embankment (Limited Service Spillway) as identified in Figure 1.

The purpose of the project is to provide the storage necessary to stage floodwaters prior to discharging flows into a channel that diverts the floodwaters west and north around the City of Fargo (City).

The Dam was designed in cooperation with the Houston-Moore Group (HMG) and the St. Paul District of the United States Army Corps of Engineers (USACE) under the supervision of Michael Bart, Chief of the Engineering and Construction Division.

The Application pertains to the first phase (Inlet) of Dam construction only.

## Fargo Moorhead Flood Risk Management Project

The FM Diversion Project is a multi-faceted flood mitigation initiative. According to the Applicant, the stated purpose of the FM Diversion Project is as follows:

1. Reduce flood risk from North Dakota tributaries to the Red River.
2. Qualify substantial portions of the Fargo-Moorhead metropolitan area for FEMA 100-year flood accreditation.

3. Protection from the 100-year flood with the ability to flood fight for floods greater than the 100-year flood.

In general, the FM Diversion Project involves 3 components: a staging area created by the Dam, a diversion channel, and in-town flood protection measures. As a result of being located in the staging area created by the Dam, a ring dike protecting the communities of Oxbow, Hickson, and the Bakke Subdivision was proposed and approved (OSE Construction Permit Nos. 2427 and 2429).

**Comments Received**

The 45-day comment period for the Application, per N.D.C.C. § 61-16.1-38, began on May 25, 2016. The Southeast Cass County Water Resource District (District) commented in a letter received June 8, 2016, stating that the District fully supports the FM Diversion Project and recommended approval of Application No. 2489. The District suggested the following two conditions for the OSE's consideration regarding Application No. 2489:

> With regard to any project component or phase that will impact any (District) WRD Facility or will otherwise require modification of any (District) WRD Facility, USACE should submit all engineering designs and construction plans to the District.
>
> USACE should consult with the District to ensure acceptable mitigation of impacts to drainage as a result of construction or operation of the inlet structure; USACE should otherwise ensure the inlet structure does not impede or inhibit drainage.

As the District is tasked with the management of local water resources within the District's jurisdiction, incorporating the above suggested conditions as part of a final permit is reasonable.

The North Dakota Department of Health (NDDoH) also provided comments to the OSE in a letter dated June 12, 2016. The NDDoH stated that the Standards (Standards) for Water Quality (N.D.C.C. ch. 61-28 and N.D.C.C. § 33-16-02.1) will be reasonably supported if the following conditions are met:

> Obtain a Construction General Permit from the North Dakota Department of Health and follow all requirements.
>
> Maintain and protect to the maximum extent possible, all existing water uses during construction of the water control structures or any other activity that will divert or interrupt ordinary water flows throughout the duration of the project.
>
> Remove, stockpile, and contain any river bed material excavated or dredged in a manner that prevents runoff of water or sediments back into any river. Streambed material and material below the ordinary high water mark may not be placed back into the stream or stream bank. It can, however, be used for fill in areas without the potential to drain back into the Wild Rice or Red Rivers or their tributaries.

All spills of fuels, lubricants, antifreeze, hydraulic fluids, petroleum products, and hazardous and potentially hazardous materials that occur during construction must be submitted to the North Dakota Department of Health through the online Environmental Incident Reports portal.

When working in or near any river or an area likely to drain into a river, develop a secure upland staging area or areas for the storage of equipment, fuel, petroleum products, and hazardous materials when not in use. The staging area(s) are to be located at or constructed in such a way that a spill will not enter any state waters.

When working in or next to the Wild Rice or Red River, have containment booms or absorbent materials on site. The number, type, and length of booms or absorbent materials must be sufficient to address the types and volumes of materials on site.

Prior to allowing any equipment to work on, in, or along a river bank it must be inspected for oil, gas, diesel, antifreeze, hydraulic fluid, and other petroleum leaks. Properly repair all such leaks, and clean equipment prior to allowing it on the site. Equipment leaks that occur during the project must be fixed within 24 hours, or the equipment must be removed from the project area where any might leak into state water(s). Equipment is not allowed to continue operating once a leak is discovered.

Clean and inspect all equipment, temporary bridge materials, watercraft, barges, and tools before and after use for Aquatic Nuisance Species.

Remove and dispose of, or store at an upland site, any vegetation, debris, or other organic river bank material removed during construction of the diversion structure, such that it cannot reenter the river during high water or precipitation events. Wetland and river bank soils from above the ordinary high water mark may be reused.

All exposed riparian areas are to be revegetated with native species immediately following completion of work.

Protect upland, riparian, and adjacent vegetation, except where it is being removed.

The OSE appreciates the importance of protecting the quality of the State of North Dakota's water resources. To that end, the Permit will be conditioned on obtaining a Construction General Permit (General Permit) from the NDDoH. The NDDoH's General Permit will provide the necessary guidance to ensure the Applicant is in compliance with the Standards.

## A History of Flooding

The City is located along the banks of the Red River of the North (Red River) in Cass County North Dakota. Due to the potential for the synchronization of a spring thaw with runoff from a spring storm, an expansively shallow floodplain from Glacial Lake Agassiz, and a river gradient of approximately 0.00008 ft/ft, the City is highly susceptible to riverine flooding (Schwert, 2009). Additionally, major tributaries to the Red River, including the Maple, Sheyenne, and Wild Rice Rivers, discharge into the Red River in close proximity to the City.

The Red River, both through the available period of record as well as forensic analysis of historic floods, has a well-documented record of large-scale flood events. The City experienced the modern day flood of record in 2009, which included a peak Red River flow of 29,400 cfs, which caused a peak river stage of 40.84 feet.

The 2009 flood of record, coupled with significant flooding events in 1997, 2010, and 2011, required a tremendous amount of resources to protect the City. As a result of these frequent and large-scale flooding events, a long-term flood risk management solution was explored for the Fargo-Moorhead metropolitan area (FM area).

## Expanding FEMA Regulatory Floodplain

Over a 13-year period, the City and eastern Cass County have been working towards updating the Federal Emergency Management Agency's (FEMA) National Flood Insurance Program (NFIP) Flood Insurance Rate Map (FIRM) for the region. With updated hydrologic and hydraulic modeling, significant portions of the City have been included in the newly delineated 100-year floodplain Special Flood Hazard Area (SFHA), which went effective on January 16, 2015. A particular concern of the City is the mandatory requirement for the purchase of flood insurance for structures that are financed by a federally secured mortgage identified in the FIRM to be within the SFHA.

As a result of the 2015 effective FIRM, approximately 1,400 additional insurable structures were shown to be located within the NFIP SFHA. As the City continues to experience job and population growth (Greater Fargo/Moorhead Economic Development Corporation, 2016), removing properties from the SFHA has become an additional consideration for long-term flood risk management.

## Long-term Solution

In 2008, the USACE began work on the Fargo-Moorhead Metro Feasibility Study and Environmental Impact Statement (Study) to analyze multiple strategies that could provide long-term flood risk management to the FM area. The Study analyzed the following measures for flood risk mitigation in the FM area:

- No action, emergency levees constructed as needed
- Non-structural measures
- Flood Barriers, including levees and floodwalls

- Increase conveyance, including diversion channels
- Flood Storage

In the USACE December 2009 Alternatives Screening Document, two alternatives were selected to be further reviewed: a North Dakota and Minnesota diversion channel. The May 2010 Draft Study explored the selected alternatives in greater detail. In Minnesota, 6 diversion channel variations were analyzed, with design diversion flows from 20,000 cfs to 45,000 cfs. In North Dakota, a diversion channel with a design flow of 35,000 cfs was analyzed.

In March 2010, the non-federal sponsors (City of Fargo, City of Moorhead, Cass County, Clay County) requested that the North Dakota alignment (Locally Preferred Plan or LPP) be chosen as the selected plan as it best met the needs of the local community. On April 28, 2010, the Assistant Secretary of the Army for Civil Works approved the request.

In September 2010, USACE hydraulic modeling indicated that the LPP would have substantial downstream impacts. As a result, the USACE April 2011 Supplemental Study proposed a 50,000 acre-foot storage area and a 150,000 acre-foot upstream staging area to minimize downstream impacts. The USACE July 2011 Study recommended that a modified LPP, one with a diversion channel capacity of 20,000 cfs, with a 150,000 acre-foot upstream staging area and 50,000 acre-foot storage area, be authorized as a federal project.

Ultimately, after release of the Study, the HMG and USACE design team modified the LPP by moving the embankment south to its proposed location, eliminating the need for the 50,000 acre-foot storage area.

**Phased Dam Construction**

Due to the scope of the project, the Applicant is proposing to construct the Dam in phases. As the plans and specifications are completed for each subsequent phase, an updated OSE construction permit application must be submitted to the OSE for review. Each application must include updated plans and specifications, land acquisition schedule, parcel map, and land rights for the footprint of the proposed phase. Prior to the OSE's consideration of the construction application for the final phase of the Dam (currently the Limited Service Spillway), land rights must be obtained for all lands affected by the Dam as measured from the top of the Limited Service Spillway. The anticipated phases and expected dates for the OSE permits for the Dam are listed below:

- May 2016 Diversion Inlet Control Structure (this Application)
- April 2018 Wild Rice River Control Structure and I-29 Road Rise
- April 2019 Red River Control Structure and County Road 81 Road Rise
- April 2021 Southern Embankment
- April 2022 Limited Service Spillway

On June 3, 2016, the Applicant provided the OSE evidence establishing a property right for the lands required for the footprint of the Inlet.

Concurrent with the permitting and construction of the Dam, the selected P3 contractor will be designing and constructing a 36-mile Diversion Channel that accepts the flows released from the Inlet. Phases 2 and 3 (out of 3) of the Diversion Channel design, expected to be permitted with the OSE in October 2018 and October 2019, respectively, could influence the height of the Southern Embankment and Limited Service Spillway. It is anticipated that any P3-contractor-influenced changes to the Dam will be fully realized once the construction permit application for Phase 3 of the Diversion Channel is submitted to the OSE.

According to N.D.A.C. § 89-08-02-03.1, construction must be completed within two years from the date of final approval. Given the size and complexity of the Dam, removing the two-year construction requirement is reasonable.

**FM Diversion Project Dam Operation**

The FM Diversion Project Dam is designed to work in coordination with in-town flood reduction measures, as well as the 36-mile long diversion channel. As described in the Application, below is the proposed sequencing of events that would lead to operation of the Dam.

- Flood stage below 35 feet at the USGS Fargo Red River Gage (Fargo Gage)
    - Gates to remain fully open. Inlet to remain fully closed.
- Flood stage at the Fargo Gage expected to exceed 35 feet (measurement based)
    - Once the sum of the USGS Enloe Red River and Abercrombie Wild Rice River Gages reaches 17,000 cfs (resulting in a Fargo Gage reading of 35 feet), Gates will be operated.
    - Gates begin operation by closing partially, causing water to accumulate upstream of the Dam.
- Expected Red River peak flow of less than or equal to the 1-percent annual exceedance probability (AEP) flow of 34,700 cfs
    - Discharge from Gates into City to be held at 17,000 cfs.
    - Target stage at Fargo Gage held to 35.0 feet.
    - Maximum flow into the Inlet to be held at 20,000 cfs.
    - Peak stage of 922.5 ft North American Vertical Datum of 1988 (NAVD 88) is expected just upstream of Gates.
- Expected Red River peak flow of more than 34,700 cfs up to 0.2-percent AEP flow of 61,700 cfs.
    - Target stage at Fargo Gage moves from 35.0 to 40.0 feet.
        - Emergency flood fighting measures are expected in the City.
    - Maximum flow through the Inlet to be 25,000 cfs.
- Expected peak flows greater than 61,700 cfs up to staging area elevation of 925 ft NAVD 88.
    - Target stage at Fargo Gage held to 40.0 feet.
    - Inlet flows allowed to exceed 25,000 cfs up to 50,000 cfs.
    - Staging area elevation allowed to raise above 922.5 ft NAVD 88 to a maximum elevation of 925 ft NAVD 88.
    - Minimum acceptable freeboard for Southern Embankment is 5 feet (925 ft NAVD 88).

- Staging area elevation of 925 ft NAVD 88.
    - Evacuation order issued for the FM area as minimum acceptable freeboard is approached.
    - Gates opened to maintain minimum acceptable freeboard.
    - Fargo Gage allowed to increase above 40.0 feet.

As previously noted, the final design elevation of the Dam, and subsequently the expected upstream staging area elevation, is subject to the final design of the Diversion Channel by the selected P3 contractor. The P3 design is currently expected to be finalized by October 2019.

**Land Acquisition Plan**

As requested in a March 17, 2016 letter from the OSE to the Applicant, the Applicant was to provide a "realistic plan for the procurement of the necessary property rights" required to construct and operate the FM Diversion Project Dam.

In an April 21, 2016 memorandum with attachments (Plan), the City's attorney, Erik Johnson, outlined the process and authority by which the Authority, through the Cass County Joint Water Resource District, intends to procure property rights for the project. The Plan included processes for both Cass and Richland counties. For property owners that reject a parcel purchase offer, the Plan proposed using both traditional and quick take eminent domain to secure property rights to those properties that are anticipated to be impacted by the operation or construction of the FM Diversion Project Dam.

In a May 5, 2016 response on behalf of the OSE Assistant Attorney General, Jennifer Verleger, stated that the provided documentation in the Plan must be part of the construction permit application for the Dam. Ms. Verleger noted that the State will take no position regarding the legal validity of the Plan, which includes the stated right to exercise eminent domain in Richland County.

Ms. Verleger also required the Applicant to submit a formal commitment from the Cass County Joint Water Resource District to exercise the powers of eminent domain, as described in the Plan. The minutes from a Cass County Joint Water Resource District meeting held on May 12, 2016, were submitted with the Application and appear to satisfy this requirement.

**Dam Design and Safety Considerations**

The Dam's Southern Embankment is currently proposed with a top elevation of 930.1 ft NAVD 88, which equates to a maximum height of 56.1 feet at the Red River Gate, a top width of approximately 15 feet, upstream and downstream sideslopes between 4:1 to 6:1 based on embankment height, and a reservoir capacity of 733,500 acre-feet at the top of the dam of 930.1 ft NAVD 88, of which 431,100 acre-feet will be located in North Dakota.

The elevation of the limited service spillway, and subsequently the final elevation of the top of the Dam, has yet to be finalized. Due to the proposed public-private partnership (P3) agreement and the innovative design tolerances proposed to be given to the Diversion Authority's Diversion Channel contractor, certain design changes with the Diversion Channel could require a lesser top

elevation. As currently proposed, it is anticipated that the P3 contractor will be selected in late 2017. It is expected that future work packages will incorporate any design changes adopted by the selected P3 contractor.

All dams in North Dakota are assigned a hazard classification, either low, medium, or high. The assigned hazard classification, coupled with the dam's height, then dictates which design criteria a dam must meet. A high hazard dam is defined in North Dakota Administrative Code (N.D.A.C.) § 89-08-01-01(9) as follows:

> *A dam located upstream of developed or urban areas where failure may cause serious damage to homes, industrial and commercial buildings, and major public utilities. There is a potential for the loss of more than a few lives if the dam fails.*

According to the ND Dam Safety Engineer, Karen Goff, P.E., due to the proximity of the Dam to the City, a high hazard classification is appropriate. A high hazard dam must meet stringent design criteria in order to provide the greatest practicable level of safety for the integrity of the dam.

The ND Dam Design Handbook states that a high hazard dam that is over 55 feet in height falls within the Class V category. The requirements for a Class V dam include the passage of the 100-year (1-percent AEP) event through the principal spillway without the use of a non-structural emergency spillway, the passage of the 0.4 Probable Maximum Precipitation (PMP) event through a vegetated emergency spillway within acceptable velocity limits, and the passage of the PMP event without overtopping the dam. For the purpose of the Dam, the Inlet is considered the structural emergency spillway.

The first requirement pertains to the passage of the 1-percent AEP event through the principal spillway without utilizing a non-structural emergency spillway. The Gates on the Wild Rice and Red Rivers constitute the principal spillway for the Dam. The 1-percent AEP was determined to be 34,700 cfs (Design Documentation Report Appendix C: Hydrology and Hydraulics), resulting in a stage elevation of 922.5 ft NAVD 88. As designed, the 1-percent AEP flow would be routed through the principal spillway and structural emergency spillway. The combined maximum capacity of the principal spillway and structural emergency spillway is listed to be at least the probable maximum flood (PMF) peak discharge of 204,000 cfs. Therefore, the principal spillway is able to pass the 1-percent AEP without the use of a non-structural emergency spillway, satisfying the first dam safety requirement.

The second requirement mandates the passage of the 0.4 PMP event through a vegetated emergency spillway at or below a permissible velocity. The Inlet, functioning as the structural emergency spillway, will not be vegetated at the flow line, thus the velocity requirements are not applicable.

The third requirement involves the passage of the PMP event without overtopping the dam. The Dam was designed to pass the Inflow Design Flood (IDF) without overtopping. The IDF was determined to be the PMF. The development of the PMF included the PMP event coupled with a snowmelt condition. The PMF was determined to be 204,000 cfs, which equates to a proposed peak reservoir elevation of 925 ft NAVD 88. With the proposed top of the dam at 930.1 ft

NAVD 88, the Dam as proposed satisfies both of the applicable OSE dam safety design requirements for a Class V – High Hazard dam.

One additional requirement, which the Applicant states is currently in development and will be a condition on the approved permit, is the creation of an emergency action plan in accordance with N.D.C.C. § 61-03-25. N.D.C.C. § 61-03-25 states that owners of medium and high-hazard dams must prepare, test, and update an emergency action plan to be utilized in the event of an emergency at the dam. The emergency action plan and any updates must be submitted to the State Engineer for review and approval.

**Recommendation**

Given the complex nature and scope of the Dam, I recommend the State Engineer adopt a phased approach to the permitting of the Dam, beginning with the Inlet as described in this memo. I also recommend the State Engineer require the Applicant to submit updated permit applications with plans, specifications, and land rights for each phase as they are available. Due to the expected time the Dam will take to be constructed, I recommend the State Engineer remove the requirement that the structure must be completed two years from the date of final approval.

Based upon the application materials submitted to the OSE, the catastrophic impacts riverine flooding has caused in the City of Fargo, and the persistent efforts of the FM Diversion Project design team to coordinate and inform OSE Staff, **I recommend the State Engineer approve construction permit application number 2489 subject to the conditions stated in the permit.**

AJC:pdh/1928

**Bibliography**

Schwert, D. P. (2009). What Makes the Red River of the North So Vulnerable to Flooding? Retrieved June 21, 2016, from https://www.ndsu.edu/fargo_geology/whyflood.htm

Economic Profile - Greater Fargo/Moorhead Economic Development Corporation. (2016, May). Retrieved June 21, 2016, from http://gfmedc.com/business/community-profile/economic-profile/

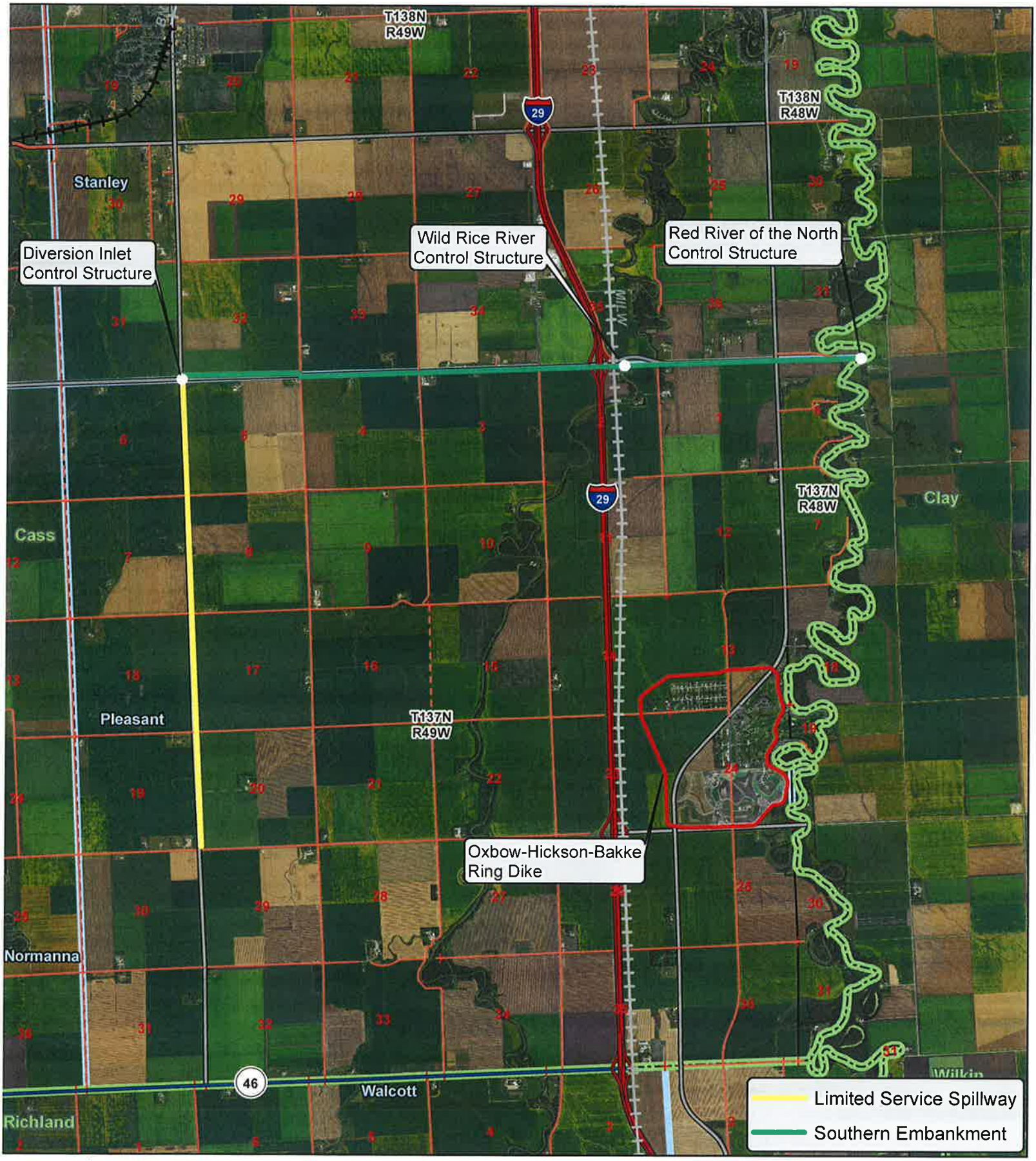


**Figure 1: Fargo-Moorhead Flood Risk Management Project Dam**
Construction Permit Application No. 2489
Stanley and Pleasant Townships, Cass County
2015 NAIP Aerial Photography

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Prepared By: AJC
Date: 6/23/2016

**State of North Dakota**
**Permit to Construct or Modify**

Permit No. **2489**

This permit authorizes the permittee to construct or modify a portion of the FM Diversion Project Dam (***Diversion Inlet Structure***), pursuant to North Dakota Century Code § 61-16.1-38.

Name of Permittee: **Flood Diversion Board of Authority**
**211 9th Street South**
**Fargo, ND 58103**

Structure Type: **Dam**

Purpose: **Flood Control**

Location and Waterway on which Project will be constructed:

Location: **Sections 31 and 32, Township 138 North, Range 49 West;**
**Sections 1-6, 8, 17, and 20, Township 137 North, Range 49 West;**
**Section 6, Township 137 North, Range 48 West, Cass County**

Stream: **Wild Rice & Red Rivers**

Basin: **Red River of the North**

Maximum Height: **56.1 feet** Top Width: **15 feet** Sideslopes: **4:1 to 6:1** Upstream
**4:1 to 6:1** Downstream

Dam Design Classification: **Class 5 – High Hazard**

| | Spillway Type | Elevation (NAVD 88) | Reservoir Surface Area (acres) | Reservoir Capacity (acre-feet) |
|---|---|---|---|---|
| Top of Southern Embankment: | -- | **TBD** | **TBD** | **TBD** |
| *Emergency Spillway:* | ***Tainter Gate*** | ***899.7*** | ***1,029*** | ***8,100*** |
| Auxiliary Emergency Spillway: | **Uncontrolled** | **TBD** | **TBD** | **TBD** |
| Principal Spillway: | **Tainter Gate** | **TBD** | **TBD** | **TBD** |
| Auxiliary Principal Spillway: | **Tainter Gate** | **TBD** | **TBD** | **TBD** |
| Streambed at Dam (Red River): | -- | **874.0** | **0** | **0** |
| Streambed at Dam (Wild Rice): | -- | **TBD** | **TBD** | **TBD** |

Location Map: **See Attached Map**

***Diversion Inlet Control Structure (Emergency Spillway):***

*Location:* ***Sections 5 and 6, Township 137 North, Range 49 West; Sections 31 and 32, Township 138 North, Range 49 West, Cass County***

*Type:* ***3x50-foot wide Tainter Gates*** *Length:* ***255 feet*** *Width:* ***180 feet***

*Invert Elevation (NAVD 88):* ***899.7 feet*** *Top Elevation (NAVD 88):* ***925.7 feet***

**Wild Rice River Control Structure (Auxiliary Principal Spillway):**

Location: **TBD**

Type: **TBD** Length: **TBD** Width: **TBD**

Invert Elevation (NAVD 88): **TBD** Top Elevation (NAVD 88): **TBD**

**Red River Control Structure (Principal Spillway):**

Location: **TBD**

Type: **TBD** Length: **TBD** Width: **TBD**

Invert Elevation (NAVD 88): **TBD** Top Elevation (NAVD 88): **TBD**

**Southern Embankment:**

Location: **TBD**

Type: **TBD** Length: **TBD** Width: **TBD**

Invert Elevation (NAVD 88): **TBD** Top Elevation (NAVD 88): **TBD**

**Limited Service Spillway (Auxiliary Emergency Spillway):**

Location: **TBD**

Type: **TBD** Length: **TBD** Width: **TBD**

Invert Elevation (NAVD 88): **TBD** Top Elevation (NAVD 88): **TBD**

## Conditions

1. Evidence of a property right for lands required for the inlet control structure has been established. Additional construction permit applications for subsequent phases, land acquisition schedule, parcel map, evidence establishing a property right for the footprint of the specific construction phase, and signed design plans and specifications must be submitted to and approved by the State Engineer before the Dam project phases consisting of the Southern Embankment, Wild Rice Control Structure, Limited Service Spillway, and Red River Control Structure construction phases will be permitted for construction.

2. For the final phase of the Dam project, evidence establishing a property right for all lands affected as a result of the final design elevation of the Limited Service Spillway, including the final construction permit application, parcel map, and signed design plans and specifications, must be submitted to and approved by the State Engineer before the last construction phase of the Dam will be permitted for construction.

3. The two-year window to construct a permitted structure, as outlined in N.D.A.C. § 89-08-02-03.1, does not apply to this or any permitted phase of the FM Diversion Project Dam.

4. An Operation and Maintenance Plan must be submitted to and approved by the State Engineer before the last construction phase of the Dam will be permitted for construction.

5. An Emergency Action Plan must be submitted to and approved by the State Engineer before the last construction phase of the Dam will be permitted for construction.

6. With regard to any project component or phase that will impact or require modification of any Southeast Cass County Water Resource District Facility, the USACE must submit all engineering designs and construction plans to the Southeast Cass County Water Resource District.

7. USACE should consult with the Southeast Cass County Water Resource District to ensure acceptable mitigation of impacts to drainage as a result of construction or operation of the Diversion Inlet Structure; the USACE should otherwise ensure the Diversion Inlet Structure does not impede or inhibit drainage.

8. The Permittee must obtain a Construction General Permit from the North Dakota Department of Health.

9. At the discretion of the State Engineer, in accordance with North Dakota Century Code chapter 61-03 and section 61-04-11, the project is subject to modification at the expense of the owner.

10. By granting this permit, no liability for damages caused by improper design, construction, operation, maintenance, failure in materials, or workmanship is assumed by or transferred to the State Engineer, the State Water Commission, the county water resource district, or their respective employees, agents, or assigns.

11. Access to the project for inspection will not be denied to the county water resource district of jurisdiction, State Engineer staff, or State Water Commission staff.

12. Prior to construction, the foundation must be stripped to remove topsoil, all vegetation and other unsuitable materials. This includes the borrow area.

13. Prior to repair, modification, or construction, all topsoil, vegetation, and other unsuitable material, which may include sod, riprap, and loose, soft or spongy soil, must be removed from all areas to be repaired or modified. Repaired or modified areas shall cut back to 3H:1V and steps of 8 to 12 inches in height and 12 inches horizontally shall be cut in the sides to "Key In" the new fill material. Any trees and brush on the existing embankment must be removed.

14. A sustainable vegetative cover must be reestablished as soon as possible upon construction completion. No trees, shrubs, or other woody vegetation will be allowed on the embankment.

15. By constructing this structure, Permittee acknowledges responsibility for its safety and maintenance. This maintenance will include correction of slumping or erosion problems, removal of all woody vegetation, and maintenance of vegetative cover.

16. If prior to or during construction items of substantial archeological value are discovered or a deposit of such items are disturbed, the Permittee shall cease construction activities in the affected area. The State Historical Preservation Office and the State Engineer must be promptly notified of the discovery, and construction will not resume until written permission is granted.

17. The permit applies to the specific site described on the permit application.

18. Permittee is responsible for obtaining any other local, state, or federal permits or approvals that may be necessary prior to construction.

19. In accordance with North Dakota Administrative Code section 89-08-02-07, Permittee must provide the State Engineer with As-Built plans after the dam has been constructed.

20. In accordance with North Dakota Administrative Code chapter 89-08-03, a registered and licensed professional engineer must be in charge of and responsible for inspections during construction.

21. In accordance with North Dakota Administrative Code chapter 89-08-03, inspections during construction must be performed at intervals necessary to ensure conformity with the construction permit as well as the plans and specifications.

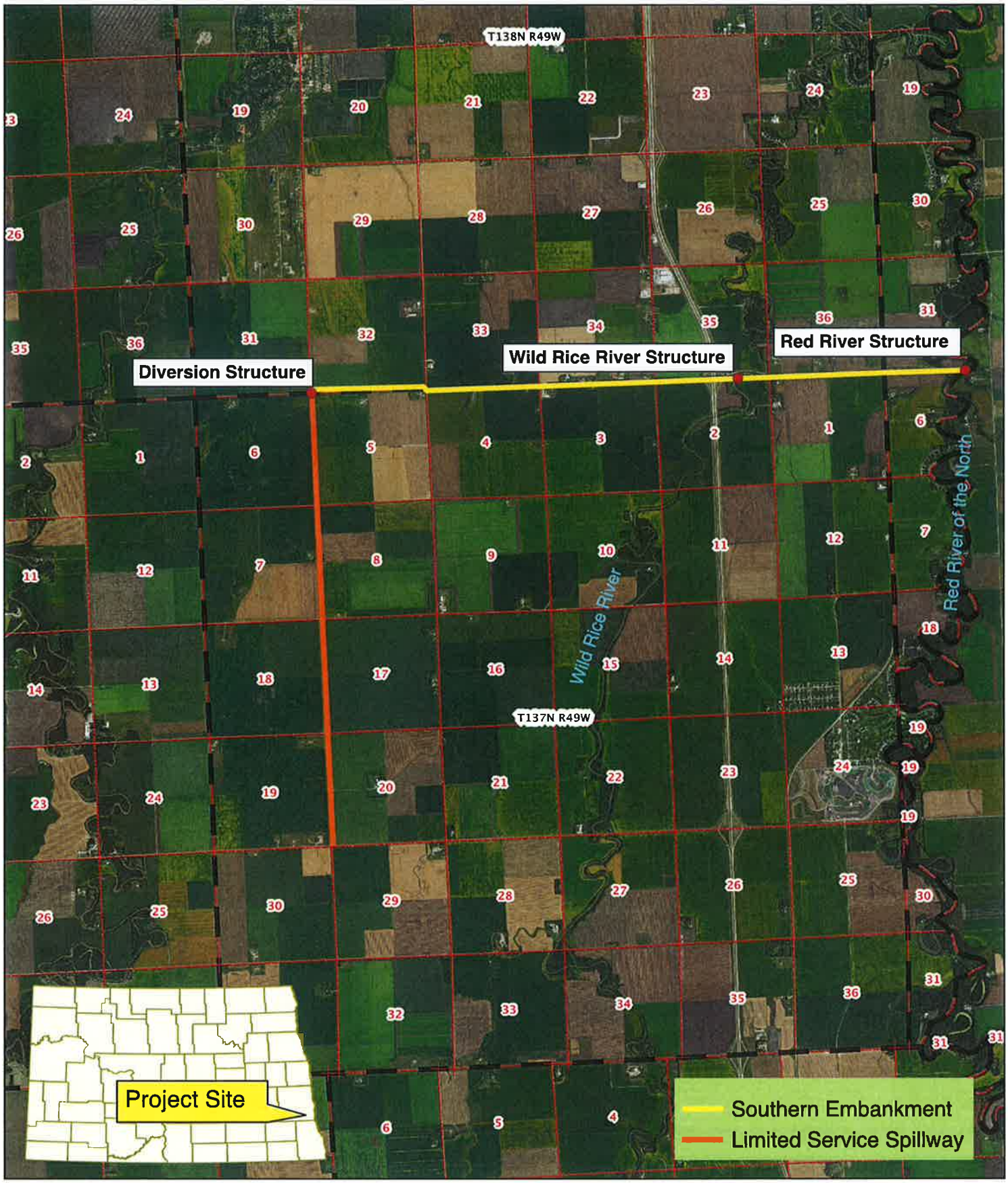
22. In accordance with North Dakota Administrative Code chapter 89-08-03, the information obtained during an inspection must be documented in a written report. The report will specify any changes necessary under section 89-08-03-03. The inspection reports must be provided to the State Engineer upon request.

23. In accordance with North Dakota Administrative Code section 89-08-02-03.1, Permittee must notify the State Engineer of the completion of the dam by returning a completed Construction Completion Notification form.

Garland Erbele

Garland Erbele, P.E.
State Engineer

Date: July 8, 2014




# Permit No. 2489 - Flood Diversion Board of Authority

## Fargo Moorhead Metropolitan Area Flood Risk Management Project Dam

SE 1/4 Section 31, S 1/2 Section 32 T138N, R49W;
W 1/2 Sections 5, 8, 17 & 20, N 1/2 Sections 1, 2, 3, 4, 5, T137N, R49W
N 1/2 Section 6, T137N, R48W, Cass County

6/10/2016
Prepared by: DEC