**FLOOD SALES TAX COMMITTEE**

**AGENDA FOR NOVEMBER 4, 2019**

Cass County Commission

Conference Room

1:00 PM

1. Call to Order

2. Approve minutes from previous meeting

3. Flood sales tax fund update

4. Status of previously approved projects

5. Consider additional project requests for 2019
   a. Dan and Kathy Auka request for ring levee
   b. Maple River Dam site safety improvements

6. Additional costs for previously approved projects
   a. Western Cass FIS map appeal
   b. Lake Bertha Flood Control Project No. 75

7. Discussion on flood buyout requests

8. Other business

9. Adjournment

cc: Local Media

# FLOOD SALES TAX COMMITTEE
# MAY 6, 2019—12:00 PM

## 1. MEETING TO ORDER

Commissioner Mary Scherling called a meeting of the Flood Sales Tax Committee to order on Monday, May 6, 2019, at 12:00 PM in the Commission Conference Room, Cass County Courthouse, with the following present: County Finance Director Michael Montplaisir; Joint Water Resource District Representative Rodger Olson via telephone; County Commissioner Mary Scherling; County Commissioner Rick Steen; and County Administrator Robert Wilson. County Engineer Jason Benson was absent.

Also present were Red River Basin Commission Executive Director Ted Preister; Harwood City Councilman Dick Sundberg; and Engineers Mike Opat and Andrew Aakre, Moore Engineering.

## 2. MINUTES APPROVED

***MOTION, passed***

**Mr. Steen moved and Mr. Montplaisir seconded to approve the meeting minutes from February 4, 2019, as presented. Motion carried.**

## 3. FLOOD SALES TAX FUND UPDATE

Mr. Montplaisir reviewed the Flood Sales Tax Fund, which has a current balance of $7.7 million, of which over $800,000 is designated for the Diversion project. Encumbrances for approved projects total $1.1 million, which leaves $5.8 million available for county projects.

Mr. Montplaisir said an approved funding request in the amount of $1.4 million to build an earthen ring levee around Davenport is not included on the approved projects list. The request is contingent on State Water Commission approval and funding participation, which has not yet been secured.

Mr. Montplaisir said the allocation of funds going towards the Diversion project has increased. Taking into account potential project requests and assuming no sales tax growth, the fund balance should be approximately $5 million by 2030.

Mr. Montplaisir said after several years of negative growth, sales tax proceeds are beginning to increase.

## 4. STATUS OF PREVIOUSLY APPROVED PROJECTS

Mr. Montplaisir said there are $1,083,979.27 in encumbrances yet to be requested for reimbursement for previously approved projects.

Engineer Mike Opat of Moore Engineering said the previously mentioned Davenport project will be on the agenda for the first State Water Commission meeting in August and approval looks promising.

Mr. Opat gave brief updates on the status of several open projects of which he is involved.

Red River Basin Commission Executive Director Ted Preister said over $90,000 has been raised from Minnesota to assist in funding the Long Term Flood Solutions study update. The project commenced with USACE at the end of last year and the first invoices are beginning to come in.

Mr. Preister said there is still about $60,000 needed to fund the project but there are several pending grant requests and Mr. Preister believes funding will be secured.

Engineer Andrew Aakre of Moore Engineering said of the $102,000 unencumbered funding approved for the 2015 Harwood Levee Improvements project, only a few thousand dollars are left to be requested to close out the project. However, there is an additional project request for Harwood in which the unencumbered balance could be used.

**5. REVIEW AND SELECTION OF PROJECTS TO BE FUNDED IN 2019**

Harwood Riverbank Rehabilitation Project

Mr. Aakre said a portion of the east riverbank of the Sheyenne River in Harwood has become steep due to sliding and past flood efforts when material was taken from the riverbank by the Corps. As a result, a nearby storm water control structure has been experiencing seepage over the past few years and the city would like to rehabilitate the riverbank to flatten out and restore the slope. The project cost is estimated to be $74,000 and a 50% cost share of $37,000 is being requested from this committee.

Mr. Aakre said as previously highlighted, a 2015 project request for levee improvements in Harwood has an unencumbered balance that would cover the cost of this project.

Mr. Steen asked if the Flood Sales Tax policy allows a 75% match for projects of this type. Mrs. Scherling said she is not sure.

***MOTION, passed***

**Mr. Steen moved and Mr. Montplaisir seconded to approve the Harwood Riverbank Rehabilitation Project up to 75% if allowed by policy, or up to 50% if the policy does not allow for a greater match. Discussion: Mr. Montplaisir asked if the intent is to leave the remainder of the unencumbered project balance for the Harwood levee project. Mr. Steen said yes, until the final reimbursement has been requested. Motion carried.**

Upper Maple River Dam Outlet Channel Improvements Project

Mr. Opat said this committee has funded the Upper Maple River Dam Project from the study phase to construction, which was funded at 75% of the local share. Due to recent flow conditions, the dam experienced significant erosion in the outlet channel downstream of the dam. The new project request is to reconstruct the failed side slopes, remove unsuitable materials, and line the channel with riprap. The original request was for 75% of the local share, in the amount of $21,233.13; however, the State Water Commission is able to provide more funding than previously anticipated so the request from this committee will be reduced.

Mrs. Scherling asked if there is any sort of project warranty as the dam was constructed somewhat recently. Mr. Opat said something of that nature would depend on the cause of the issue and when it occurred. Too much time has passed in this case, and the original project design implemented vegetation for erosion prevention. Unfortunately, the ground was too saturated to allow for grass to grow.

***MOTION, passed***

**Mr. Steen moved and Mr. Montplaisir seconded to approve the Upper Maple River Dam Outlet Channel Improvements Project up to 75% of the local share, up to $21,233.13. Discussion: Mr. Montplaisir asked if remaining funds for the Maple River Dam study and construction projects can be utilized for this project. Mr. Opat said he will find out if those projects can be closed out and the funds re-appropriated. Motion carried.**

## 6. OTHER BUSINESS

Red River Basin Commission Long Term Flood Solutions plan update

Mrs. Scherling asked what the timeline of the Long Term Flood Solutions study is. Mr. Preister said they are roughly anticipating completion by August of 2020.

Mrs. Scherling asked how continued mitigation efforts will be taken into account for the study. Mr. Preister said the plan is to only model complete or ongoing construction projects.

2019 flood impacts

Mrs. Scherling said she is aware of a ring levee request that may come to this committee from an individual homeowner north of Harwood.

Mrs. Scherling said she is unsure if the policy addresses the ability of a single homeowner to apply for project funds, but the larger concern is that the home in question was recently built. As townships have zoning authority, it is not immediately apparent who is responsible for ensuring that new construction takes potential flooding impacts into account, but it appears that due diligence was not performed in this case. Mrs. Scherling would be more inclined to approve funds for a ring levee for a group of older homes.

Mr. Montplaisir said another matter that came up after spring flooding is a group of homes north of Fargo that have requested to be bought out if a FEMA declaration is made and funds become available.

## 7. ADJOURNMENT

***MOTION, passed***

**On motion by Mr. Montplaisir, seconded by Mr. Steen and all in favor, the meeting was adjourned at 12:32 PM.**

Minutes prepared by Brielle Edwards, HR Assistant

| Cass County Sales Tax Activity (420)<br>Cash Basis - 2019<br>10/21/2019 | | | |
|---|---|---|---|
| Date | Description | Amount | Balance |
| | Balance Forward | | 7,767,487.65 |
| 2019 | Sales Tax | 13,391,153.47 | 21,158,641.12 |
| 2019 | Interest | 144,529.72 | 21,303,170.84 |
| 1/8/2019 | Diversion Board of Authority | (1,222,453.21) | 20,080,717.63 |
| 2/12/2019 | County Projects | (58,278.44) | 20,022,439.19 |
| 2/5/2019 | Diversion Board of Authority | (1,211,242.41) | 18,811,196.78 |
| 2/28/2019 | Diversion Board of Authority | (1,458,126.93) | 17,353,069.85 |
| 4/2/2019 | Diversion Board of Authority | (975,911.25) | 16,377,158.60 |
| 5/6/2019 | County Projects | (100.05) | 16,377,058.55 |
| 5/7/2019 | County Projects | (5,595.64) | 16,371,462.91 |
| 5/9/2019 | Diversion Board of Authority | (734,151.22) | 15,637,311.69 |
| 6/4/2019 | Diversion Board of Authority | (1,480,511.04) | 14,156,800.65 |
| 6/24/2019 | County Projects | (2,705.75) | 14,154,094.90 |
| 7/10/2019 | Diversion Board of Authority | (1,133,953.73) | 13,020,141.17 |
| 8/13/2019 | County Projects | (128,644.67) | 12,891,496.50 |
| 8/13/2019 | County Projects | (32,555.35) | 12,858,941.15 |
| 8/7/2019 | Diversion Board of Authority | (940,223.72) | 11,918,717.43 |
| 9/5/2019 | County Projects | (1,756.84) | 11,916,960.59 |
| 9/6/2019 | Diversion Board of Authority | (1,892,209.32) | 10,024,751.27 |
| | | | 10,024,751.27 |
| | | | 10,024,751.27 |

| | | |
|---|---|---|
| Reserved for County Projects - Cash | 7,187,038.20 | |
| Reserved for Diversion Project | 2,837,713.07 | 10,024,751.27 |

**Summary**

| | |
|---|---|
| 2019 Receipts | |
| Transfer | - |
| Sales Tax Revenue | 13,391,153.47 |
| Interest Revenue | 144,529.72 |
| Total Receipts | 13,535,683.19 |
| | |
| 2019 Expenditures | |
| Diversion Board of Authority | (11,048,782.83) |
| City of Fargo - Cash Flow Other Sources | - |
| County Projects | (229,636.74) |
| Land Purchase | - |
| Total Expenditures | (11,278,419.57) |
| | |
| Receipts over Expenditures | 2,257,263.62 |
| | |
| Balance from 2018 | 7,767,487.65 |
| | |
| Balance Current 2019 | 10,024,751.27 |

**Reserve for County Projects 2019 Activity**

| | | |
|---|---|---|
| Balance of Cash Carried forward from 2018 | 6,483,856.11 | |
| 2019 Reserves (9% Jan-Mar 6% Apr-Dec) | 932,818.84 | |
| Total | 7,416,674.94 | |
| | | |
| County Projects - Expenses Paid in 2018 | | |
| 2013 City of Casselton - Levee Repairs | - | |
| 2013 Maple-Steele - Dam Project | - | |
| 2015 Normanna Township Slide Repair and Road Move | - | |
| 2015 Upper Maple River Detention Study Phase II | - | |
| 2015 Rush River Detention Study Phase II | - | |
| 2015 Swan Creek Detention Study Phase II | - | |
| 2015 Harwood Levee Improvements | - | |
| 2015 Casselton Industrial Park Improvements | - | |
| 2016 City of Mapleton Levee Raise | - | |
| 2017 Sheldon Addition Ring Levee Project | - | |
| 2018 City of Arthur Storm Sewer | 195,224.50 | |
| 2018 City of Hunter Dam Projects | 1,856.89 | |
| 2018 Red River Basin Commission | 32,555.35 | |
| 2018 Mapleton Levy Recertification | - | |
| 2019 Harwood Riverbank Rehabilitation Project | - | |
| 2019 Upper Maple River Dam Improvements | - | |
| Total County Project Expenditures | 229,636.74 | - |
| | | |
| Cash Balance Reserve for County Projects | 7,187,038.20 | |
| | | |
| Encumbrances: | | |
| 2013 City of Casselton - Levee Repairs | (5,039.05) | 138474 |
| 2013 Maple-Steele - Dam Project | (15,706.30) | 138476 |
| 2015 Upper Maple River Detention Study Phase II | (45,500.00) | 138490 |
| 2015 Rush River Detention Study Phase II | (45,500.00) | 138490 |
| 2015 Swan Creek Detention Study Phase II | (34,509.41) | 138490 |
| 2015 Harwood Levee Improvements | (102,149.53) | 138475 |
| 2015 Casselton Industrial Park Improvements | (1,999.33) | 138491 |
| 2016 City of Mapleton Levee Raise | (11,754.88) | 138477 |
| 2017 Sheldon Addition Ring Levee Project | (462,750.00) | 138472 |
| 2018 City of Arthur Storm Sewer | (51,032.96) | 138473 |
| 2018 City of Hunter Dam Projects | (13,911.86) | 138476 |
| 2018 Red River Basin Commission | (92,444.65) | 138492 |
| 2018 Mapleton Levy Recertification | (30,323.00) | 138478 |
| 2019 Harwood Riverbank Rehabilitation Project | (55,500.00) | 139613 |
| 2019 Upper Maple River Dam Improvements | (21,233.13) | 139614 |
| Total Encumbrances | (989,354.10) | - |
| | | |
| Available Balance for County Projects | 6,197,684.10 | - |
| | 1,425,000.00 | |

| Current County Projects | | | |
|---|---|---|---|
| 10/21/2019 | | | |
| Project | Total Approved | Paid | Left to Pay |
| Round Hill Project | $ 350,696.00 | $ 350,696.00 | $ - |
| City of Oxbow Diking | $ 105,284.29 | $ 105,284.29 | $ - |
| 2012 City of Argusville Diking | $ 168,925.00 | $ 168,925.00 | $ - |
| 2012 Maple-Steele WRD Study | $ 20,562.00 | $ 20,562.00 | $ - |
| 2012 City of Mapleton - Lift Station | $ 52,500.00 | $ 52,500.00 | $ - |
| 2013 Pontiac Township - Project No 73 | $ 448,000.00 | $ 448,000.00 | $ - |
| 2013 City of Argusville - Levee improvement | $ 23,874.73 | $ 23,874.73 | $ - |
| 2013 City of Casselton - Levee Repairs | $ 23,750.00 | $ 18,710.95 | $ 5,039.05 |
| 2013 Maple-Steele - Dam Project | $ 17,500.00 | $ 1,793.70 | $ 15,706.30 |
| 2014 City of Mapleton Levee Recertification 2012-1 | $ 543,324.58 | $ 543,324.58 | $ - |
| 2014 Pontiac township Project no 73 additional | $ 52,000.00 | $ 52,000.00 | $ - |
| 2014 Upper Maple River Dam | $ 706,000.00 | $ 706,000.00 | $ - |
| 2014 Lake Bertha Flood Water Detention (reduced from 242500) | $ 66,215.45 | $ 66,215.45 | $ - |
| 2014 Detention project Development | $ - | $ - | $ - |
| 2015 Normanna Township Slide Repair and Road Move | $ 40,500.00 | $ 40,500.00 | $ - |
| 2015 Upper Maple River Detention Study Phase II | $ 45,500.00 | $ - | $ 45,500.00 |
| 2015 Rush River Detention Study Phase II | $ 45,500.00 | $ - | $ 45,500.00 |
| 2015 Swan Creek Detention Study Phase II | $ 45,500.00 | $ 10,990.59 | $ 34,509.41 |
| 2015 Harwood Levee Improvements | $ 556,935.00 | $ 454,785.47 | $ 102,149.53 |
| 2015 Casselton Industrial Park Improvements | $ 255,000.00 | $ 253,000.67 | $ 1,999.33 |
| 2015 Reed Township Road Raise | $ 60,308.18 | $ 60,308.18 | $ - |
| 2016 City of Mapleton Levee Raise | $ 99,812.68 | $ 88,057.80 | $ 11,754.88 |
| 2016 City of Mapleton Levee Recert change order | $ 14,867.00 | $ 14,867.00 | $ - |
| 2016 Erie Dam Repairs (25,000 removed) | $ - | $ - | $ - |
| 2016 Absaraka Dam Repairs | $ 11,183.50 | $ 11,183.50 | $ - |
| 2016 Garsteig Dam Repairs | $ 12,202.64 | $ 12,202.64 | $ - |
| 2016 Embden Dam Repairs | $ 10,263.87 | $ 10,263.87 | $ - |
| 2016 Drain 77 Study Maple River Water Resource | $ 20,000.00 | $ 20,000.00 | $ - |
| 2017 Upper Maple River Dam Project | $ 361,500.00 | $ 361,500.00 | $ - |
| 2017 Erie Dam Project (10,000 removed) | $ - | $ - | $ - |
| 2017 Casselton Map Revision Project | $ 12,472.45 | $ 12,472.45 | $ - |
| 2017 Davenport Flood Risk Reduction Project | $ 32,500.00 | $ 32,500.00 | $ - |
| 2017 Sheldon Addition Ring Levee Project | $ 462,750.00 | $ - | $ 462,750.00 |
| 2017 Casselton Storm Water Improvments Projects | $ 128,762.04 | $ 128,762.04 | $ - |
| 2018 City of Arthur Storm Sewer | $ 266,250.00 | $ 215,217.04 | $ 51,032.96 |
| 2018 City of Hunter Dam Projects | $ 23,645.25 | $ 9,733.39 | $ 13,911.86 |
| 2018 Red River Basin Commission | $ 125,000.00 | $ 32,555.35 | $ 92,444.65 |
| 2018 Mapleton Levy Recertification | $ 30,323.00 | $ - | $ 30,323.00 |
| 2019 Harwood Riverbank Rehabilitation Project | $ 55,500.00 | $ - | $ 55,500.00 |
| 2019 Upper Maple River Dam Improvements | $ 21,233.13 | $ - | $ 21,233.13 |
| | | | |
| Total | $ 5,316,140.79 | $ 4,326,786.69 | $ 989,354.10 |

**Reserve for County Projects 2018 Activity**

| | |
|---|---|
| Balance of Cash Carried forward from 2018 | $ 6,483,856.11 |
| 2018 Reserves (9%) | 932,818.84 |
| Total | 7,416,674.94 |
| Paid in 2019 | 229,636.74 |
| Encumbrances | 989,354.10 |
| Un-encumbered Balance | $ 6,197,684.10 |

Growth Factor 100.00%

**Assuming 0.00% growth in Sales Tax and the County Keeping 6%**

Retainage beyond 2018 6%

| Year | Amount Received | 9% Reserve | Poject Name | Amount Encumbered | Balance | |
|---|---|---|---|---|---|---|
| 2011 | $ 7,619,287 | $ 685,736 | | $ 455,980 | $ 229,755 | |
| 2012 | $ 14,530,075 | $ 1,307,707 | Note that the amount encumbered is the | $ 241,987 | $ 1,295,475 | |
| 2013 | $ 15,012,832 | $ 1,351,155 | project requests, the balance is the | $ 513,125 | $ 2,133,505 | |
| 2014 | $ 16,015,790 | $ 1,441,421 | unencumbered balance. | $ 1,367,540 | $ 2,207,387 | |
| 2015 | $ 16,981,159 | $ 1,528,304 | | $ 1,049,243 | $ 2,686,448 | |
| 2016 | $ 16,239,726 | $ 1,461,575 | | $ 168,330 | $ 3,979,693 | |
| 2017 | $ 15,546,903 | $ 1,399,221 | | $ 997,984 | $ 4,380,930 | |
| 2018 | $ 15,620,962 | $ 1,405,887 | | $ 445,218 | $ 5,341,598 | |
| 2019 | $ 13,535,683 | $ 932,819 | | $ 76,733 | $ 6,197,684 | Partial Year |
| | | | | | $ 6,197,684 | |
| | | | | | $ 6,197,684 | |
| | | | Davenport project (year remains uncertain) | $ 1,425,000 | $ 4,772,684 | |
| 2019 3 months est | $ 3,600,000 | $ 216,000 | Amenia Levee | $ 900,000 | $ 4,088,684 | |
| 2019 | | | MRWRD Upper Maple River Dam Imp | $ 26,250 | $ 4,062,434 | |
| 2020 | $ 15,620,962 | $ 937,258 | Argusville Leonard's Way Flood Protection | $ 300,000 | $ 4,699,692 | |
| 2020 | | | CCJWRD Upper Maple Impoundment #1 | $ 1,680,000 | $ 3,019,692 | |
| 2020 | | | MRWRD Tower Twp Project #77 | $ 825,000 | $ 2,194,692 | |
| 2021 | $ 15,620,962 | $ 937,258 | Harwood Flood Control Improvements | $ 75,000 | $ 3,056,950 | |
| 2021 | | | Harwood Levee Improvements | $ 375,000 | $ 2,681,950 | |
| 2021 | | | Mapleton Levee Development Park | $ 150,000 | $ 2,531,950 | |
| 2021 | | | CCJWRD Upper Maple Impoundment #1 | $ 987,000 | $ 1,544,950 | |
| 2022 | $ 15,620,962 | $ 937,258 | Casselton East View Floow Protection | $ 150,000 | $ 2,332,207 | |
| 2023 | $ 15,620,962 | $ 937,258 | Kindred Internal Retention Original Townsite | $ 1,125,000 | $ 2,144,465 | |
| 2023 | | | Casselton Original Townsite Retention | $ 1,125,000 | $ 1,019,465 | |
| 2024 | $ 15,620,962 | $ 937,258 | Casselton Industrial Park Retention | $ 1,125,000 | $ 831,723 | |
| 2025 | $ 15,620,962 | $ 937,258 | Gardner Flood Control | $ 750,000 | $ 1,018,981 | |
| 2026 | $ 15,620,962 | $ 937,258 | | | $ 1,956,238 | |
| 2027 | $ 15,620,962 | $ 937,258 | | | $ 2,893,496 | |
| 2028 | $ 15,620,962 | $ 937,258 | | | $ 3,830,754 | |
| 2029 | $ 15,620,962 | $ 937,258 | | | $ 4,768,012 | |
| 2030 | $ 15,620,962 | $ 937,258 | Tower City Drainage Improvements | $ 187,500 | $ 5,517,769 | |
| 2030 | | | Hunter Dam Reconstruction | $ 157,500 | $ 5,360,269 | |

Approved contigent upon state water commission funding

| | |
|---|---|
| Total Project cost | $ 3,850,000.00 |
| Est SWC | $ (1,950,000.00) |
| Balance | $ 1,900,000.00 |
| Sales Tax 75% | $ 1,425,000.00 |
| Remaining Local Share | $ 475,000.00 |

| | | |
|---|---|---|
| | Total | $ 11,363,250 |
| City Projects | $ 3,518,250 | Snagging (Annual) $ 75,000 |
| WRD Projects | $ 7,845,000 | Snagging (Annual) $ 300,000 |
| | $ 11,363,250 | Dam Repairs (Annual) $ 3,750 |
| | | EPA Updates (Annual) $ 3,750 |
| | | Total Annual Expenses asked for $ 382,500 |

We have funds in the Emergency/Flood Mitigation Fund

| | |
|---|---|
| Floodway Buyouts | $ 900,000 |
| FEMA Mapping/Flood Plain Management | $ 48,750 |
| Flood Mitigation / General Funds | $ 948,750 |
| Total on Draft List for 2019-2030 ** | $ 12,694,500 |

** includes the Davenport Project

This is a spreadsheet I put together in looking at keeping 9% or 6% of the flood sales tax for local projects. In the commission discussion this week you mentioned the Davenport project so I added the summary of the dollars needed (yellow) for the entire Davenport project.

**Cass County Commissioners**
**Cass County**
**PO Box 2806**
**Fargo, ND. 58108**

**August 21, 2019**

**RE: Flood Control Sales Tax Committee.**

**Cass County Commissioners,**

**As a recommendation from the Rush River Water Resource District on June 18, 2019 that we, Dan and Kathy Auka request of the Flood Control Sales Tax Committee in partnering with the Auka's to provide relief from future flooding with construction of a Ring Levy.**

**This would not only protect the home but a business as well, which would have a domino effect on several families as well as Fargo, Moorhead and West Fargo business by not being built for these families would not have Child Care.**

**The Ring Levy would be constructed within the guidelines set by a qualified engineer, at this time we have been in contact with Moore Engineering, and we have included with this letter a Preliminary Opinion of Probable Cost from them.**

**Also enclosed is the letter from the Rush River Water Resource District to the North Dakota State Water Commission for cost – share assistance.**

**We request to be on the upcoming Agendas for the Cass County Commissioners and Flood Control Sales Tax Committee to answer any questions.**

**Thank you,**
Dan Auka Kathy Auka
**Dan and Kathy Auka**

CASS COUNTY GOVERNMENT

August 21, 2019

Rush River
Water Resource
District

William A. Hejl
Manager
Amenia, North Dakota

Dick Sundberg
Manager
Harwood, North Dakota

Jacob Gust
Manager
Fargo, North Dakota

Garland Erbele
State Engineer
North Dakota State Water Commission
900 East Boulevard Avenue, Dept. 770
Bismarck, ND 58505-0850

Dear Garland:

RE: Daniel and Kathleen Auka
Individual Rural and Farmstead Ring Dike Program
Section 35 of Berlin Township

The Rush River Water Resource District respectfully requests cost-share assistance from the North Dakota State Water Commission through the *Individual Rural and Farmstead Ring Dike Program* for construction of a ring dike on property owned by Daniel and Kathleen Auka.

Enclosed please find a location map for the proposed ring dike, which notes the protected area volume is 12.5 acre-feet, and the *Engineer's Preliminary Opinion of Probable Cost*. Also enclosed is a copy of the *Ring Dike Cooperation Agreement* between the property owners and the Water Resource District.

If you have any questions or need additional information, please feel free to contact us. Thank you.

Sincerely,

RUSH RIVER WATER RESOURCE DISTRICT

Carol Harbeke Lewis
Secretary-Treasurer

Carol Harbeke Lewis
Secretary-Treasurer

1201 Main Avenue West
West Fargo, ND 58078-1301

701-298-2381
FAX 701-298-2397
wrd@casscountynd.gov
www.casscountynd.gov

Enclosures
cc: Daniel and Kathleen Auka


**2017 LiDAR Contours**
**16651 30th St. SE PIN:27-0000-01645-000**
**Cass County, North Dakota**

Created By: BPK Date Created: 05/30/19 Date Saved: 08/20/19 Date Plotted: 04/12/17 Date Exported: 08/20/19
Plotted By: benjamin.kugler Parcel Date: 05/07/19 Aerial Image: 2017 County NAIP SIDS Elevation Data: Lidar
Horizontal Datum: NAD 1983 StatePlane North Dakota South FIPS 3302 Feet Vertical Datum: NAVD1988
T:\Projects\20000\20012\601_AukaRing\20012-601_Lidar.mxd

N W E S

0 50 100 200 Feet

1 in = 100 feet

moore engineering, inc.

Project #: 20012-601
Date Created: 08/12/2019

***Auka Ring Dike Road Tie In***
***Rush River Water Resource District***
***Cass County, North Dakota***

*Engineer's Preliminary Opinion of Probable Cost*

| | | | | | | FUNDING SOURCES | |
|---|---|---|---|---|---|---|---|
| *BID ITEM NO.* | *& DESCRIPTION* | *UNIT* | *QUANTITY* | *UNIT PRICE* | *TOTAL* | *NDSWC (60%)* | *LOCAL* |
| 1. | Embankment | CY | 2,225 | $12.00 | $26,700.00 | $16,020.00 | $10,680.00 |
| 2. | CSP - 18" | LF | 30 | $36.00 | $1,080.00 | $648.00 | $432.00 |
| 3. | Adjustable Flap Gate - 18" | EA | 1 | $400.00 | $400.00 | $240.00 | $160.00 |
| 4. | Road Raise | LS | 1 | $8,000.00 | $8,000.00 | $4,800.00 | $3,200.00 |
| 5. | Seeding - Type III | LS | 1 | $750.00 | $750.00 | $450.00 | $300.00 |
| | | | | Construction Subtotal | $36,930.00 | $22,158.00 | $14,772.00 |
| | | | | Engineering - Preliminary | $0.00 | $0.00 | $0.00 |
| | | | | Engineering - Design | $0.00 | $0.00 | $0.00 |
| | | | | Engineering - Construction | $0.00 | $0.00 | $0.00 |
| | | | | Permitting | $0.00 | $0.00 | $0.00 |
| | | | | Legal | $0.00 | $0.00 | $0.00 |
| | | | | Bond Issuance / Financing | $0.00 | $0.00 | $0.00 |
| | | | | Owner Administration Expenses | $0.00 | $0.00 | $0.00 |
| | | | | Advertising & Publishing | $0.00 | $0.00 | $0.00 |
| | | | | Right-of-Way Acquisition | $0.00 | $0.00 | $0.00 |
| | | | | Right-of-Way Negotiations | $0.00 | $0.00 | $0.00 |
| | | | | Land Surveying | $0.00 | $0.00 | $0.00 |
| | | | | Utility Relocations | $0.00 | $0.00 | $0.00 |
| | | | | Utility Relocation Coordination | $0.00 | $0.00 | $0.00 |
| | | | | Soil Borings & Geotechnical Report | $0.00 | $0.00 | $0.00 |
| | | | | Project Contingencies | $8,070.00 | $2,215.80 | $5,854.20 |
| | | | | ***TOTAL PROJECT COST*** | $45,000.00 | $24,373.80 | $20,626.20 |



moore engineering, inc.

# RING DIKE COOPERATION AGREEMENT

THIS AGREEMENT is by the Rush River Water Resource District, a North Dakota political subdivision (the "District"); and Daniel and Kathleen Auka, whose post office address is 16651 - 30th Street SE, Harwood, ND 58042-9718 ("Owner").

## RECITALS

A. Owner owns certain real property in Section 35 of Berlin Township, Cass County, North Dakota, Cass County Parcel No. 27-0000-01645-000, legally described as follows:

See attached **Exhibit A**.

The property described above is the "Property."

B. The North Dakota State Water Commission (the "SWC") provides cost-share for certain eligible items to landowners who wish to construct ring dikes to provide flood protection for their properties under the SWC's INDIVIDUAL RURAL AND FARMSTEAD RING DIKE PROGRAM (the "SWC Program"); to participate in the SWC Program, landowners and their proposed dike must meet certain SWC criteria and must comply with the SWC Program requirements and obligations.

C. Under the SWC Program, the SWC will not enter into cost-share agreements with landowners directly; rather, water resource districts must act as local sponsors and facilitators between the SWC and local landowners who wish to participate in the SWC Program.

D. Owner wishes to participate in the SWC Program to construct a ring dike on the Property (the "Project"), and the District has agreed to act as local sponsor, subject to the terms and conditions contained in this Agreement.

In consideration of the mutual covenants contained in this Agreement, and other good and valuable consideration, the receipt and sufficiency of which the parties acknowledge, the parties agree as follows:

## AGREEMENT

1. **The Project.** Owner plans to construct the Project on the Property. The parties will perform their respective obligations related to the Project as provided in this Agreement.

2. **The SWC Program.** This Agreement incorporates the terms of the SWC Program criteria; a copy of the SWC Program criteria, entitled "INDIVIDUAL RURAL AND FARMSTEAD RING DIKE CRITERIA," is attached as **Exhibit B**.

3. **Owner's Responsibilities.** Owner will perform the following regarding the Project:

a) provide all requisite information to the District regarding the Property and the Project, and otherwise cooperate with the District, as necessary, for purposes of preparing and submitting Owner's application for participation in the SWC Program;
b) comply with the terms and conditions of the SWC Program;
c) comply with all applicable laws and obtain all requisite permits and approvals regarding the Project;
d) provide the requisite engineering for purposes of the Project under the SWC Program;
e) timely construct the Project in accordance with the terms of the SWC Program; and
f) monitor, operate, and maintain the Project following its construction.

4. **The District's Responsibilities.** The District will perform the following regarding the Project:

a) serve as local sponsor of the Project solely for purposes of the SWC Program;
b) in the District's discretion, inspect the Property for purposes of preparing Owner's request for participation in the SWC Program;
c) in cooperation with Owner, prepare and submit Owner's request for participation in the SWC Program;
d) facilitate communication between Owner and the SWC regarding the Project for purposes of the SWC Program;
e) if the District deems an inspection necessary, inspect the Property for purposes of preparing Owner's request for participation in the SWC Program; and
f) administer any cost-share provided by the SWC for the Project.

5. **Contractors.** Owner is solely responsible for constructing and completing the Project in accordance with the SWC Program. However, to the extent Owner wishes to retain any contractors to construct and complete any portion of the Project, Owner is solely responsible for any contractor's work, including compliance with the SWC Program, and including all acts and omissions of any contractor. Owner is solely responsible for ensuring any and all contractors retained by Owner are properly licensed, insured, and bonded in accordance with North Dakota law.

6. **Deposit.** In conjunction with Owner's execution of this Agreement, Owner will deposit $1,000 with the District (the "Deposit"). Upon completion of the Project, and upon disbursement of cost-share to the District from the SWC under the SWC Program, the District will return the Deposit to Owner, less costs incurred by the District regarding preparation of this Agreement or otherwise regarding the Project.

7. **Costs and Cost-Share.** If the SWC approves Owner's application for participation in the SWC Program, the SWC Program cost-share criteria and the following terms will apply regarding cost-share. If Owner retains a contractor to construct the Project, the bid amount will determine the amount of costs eligible for cost-share by the SWC. If Owner constructs the Project, the amount of costs eligible for cost-share by the SWC will be in accordance with the SWC Program criteria described in the attached **Exhibit B**. At the conclusion of Owner's construction of the Project, Owner will submit a detailed description of Owner's costs and invoices associated with the Project to the District. After reviewing Owner's cost and invoice submissions to ensure compliance with this Agreement, the District will submit a written application to the SWC for eligible cost-share on behalf of Owner. Under the SWC Program, the SWC may reimburse the District 55% of the eligible costs actually incurred by Owner regarding the Project, not to exceed $55,000.00. However, the SWC has sole discretion in determining what costs are eligible costs for purposes of reimbursement under this Agreement and under the SWC Program; the District does not make any warranties or representations regarding the SWC's decisions regarding eligible costs, or regarding availability of funds, and Owner understands and agrees the SWC may or may not provide funding regarding the Project. If the SWC disburses eligible cost-share to the District, the District will retain its actual costs incurred regarding the Project, and the District will then disburse the remainder to Owner, along with the remainder of the Deposit, in accordance with Section 6 of this Agreement. The cost-share under this Agreement and under the SWC Program does not include any cost-share for maintenance or any other future costs regarding the Project; Owner is solely responsible for all maintenance costs and any other future costs regarding the Project. In addition, Owner is solely responsible for any Project costs that are not eligible items under the SWC Program, or for which the SWC does not ultimately provide cost-share.

8. **Completion of the Project.** Owner must complete the Project within two years of the SWC's approval of the Project application for participation in the SWC Program, including all construction and submission of costs to the District; Owner must also ensure completion of construction and cost submissions in a timely manner to permit all requisite inspections and requests for eligible cost-share to the SWC within two years. Owner recognizes and agrees that if Owner fails to complete construction of the Project or fails to submit Owner's costs to the District in a timely manner to permit the requisite inspections and requests for eligible cost-share to the SWC, Owner will forfeit all rights to any payments or remaining payments from the District or the SWC.

**9. No Warranties.** The District and its officers, agents, representatives, employees, consultants, and contractors disclaim any warranties, express or implied, regarding the Project. The parties specifically agree neither the District nor any of its officers, agents, representatives, employees, consultants, or contractors have made any representations or warranties in any way regarding the Project; the potential success of the Project; the SWC's possible approval or denial

of the Project or of Owner's application for participation in the SWC Program; or the SWC's ability to provide reimbursement to Owner under the SWC Program. No inspections conducted by the District will create or impose any obligations, representations, or warranties on behalf of the District, and this Agreement does not create or impose any obligations, representations, or warranties on behalf of the District beyond those specifically identified in this Agreement.

**10. Title to the Property.** Owner warrants Owner is the fee simple owner of the Property; that Owner has the right to construct the Project on the Property; that Owner has the right to enter into this Agreement and to make the promises, covenants, and representations contained in this Agreement; that Owner has the right to grant the District and the SWC access to the Property for the purposes described in this Agreement; and that this Agreement does not violate any mortgage or other interest held by any third party regarding the Property, or any portion of the Property.

**11. Access.** Owner grants to the District and to the SWC, as well as to the District's and the SWC's officers, agents, representatives, employees, consultants, and contractors, reasonable rights of ingress and egress and right-of-way in, on, over, under, and across the Property for purposes of inspection of the Property and of the Project as necessary for purposes of the SWC Program, without the necessity for any separate easement or access document. Owner will not disturb or in any manner interfere with the District's or the SWC's access to the Property for purposes of inspecting the Property or the Project.

**12. Compliance with Laws.** Owner, at Owner's sole expense, is solely responsible for promptly complying with all present and future laws, ordinances, rules, and regulations, and obtaining all necessary licenses, permits, registrations, or approvals, from all applicable federal, state, county, and municipal governments, and any other applicable governmental entities or political subdivisions, and their appropriate departments, commissions, boards, and officers, regarding the Project or the Property.

**13. Default.** Violation of any provision of this Agreement or of the Owner's obligations under the SWC Program by Owner, or any of Owner's agents, representatives, or contractors, constitutes a breach of this Agreement. At the discretion of the SWC, upon a breach of this Agreement or the terms of the SWC Program, Owner will reimburse the District for all funds paid to Owner for the Project. A breach, however, will not remove or release Owner's obligations to release, defend, indemnify, protect, and hold harmless the District as described in this Agreement. Breach of this Agreement will also relieve the District of all obligations under this Agreement.

**14. Termination.** The following terms apply regarding termination of this Agreement:

a) The parties may mutually agree to terminate this Agreement;
b) The District may terminate this Agreement at any time if the SWC terminates the SWC Program;
c) The District may terminate this Agreement if Owner, or any of Owner's agents, representatives, consultants, or contractors, fails to perform Owner's obligations under this Agreement; and
d) Upon any termination by the District, the District may retain the Deposit as reimbursement for costs incurred and as reimbursement for the District's staff time and other resources.

15. **Indemnity.** Owner will release, defend, indemnify, protect, and hold harmless the District and the District's officers, agents, representatives, employees, consultants, and contractors from and against any and all claims, actions, administrative proceedings, judgments, damages, penalties, fines, costs, liabilities, interests, or losses, including costs, expenses, and attorneys' fees, arising out of or as a result of the Project, the District's obligations under this Agreement, or any injury, death, or property loss or damage on the Property. Owner's obligations to release, defend, indemnify, protect, and hold harmless the District under this Agreement include any costs, expenses, and attorneys' fees incurred in establishing the indemnification provided in this Agreement.

16. **Remedies.** If Owner fails to perform any of Owner's obligations under this Agreement within a reasonable time following request or demand from the District, the District may perform Owner's obligations and may recover its costs incurred by assessing the costs against any property owned by Owner in Cass County, North Dakota, including any attorneys' fees incurred in attempting to collect the amounts due, or by other legal means of collection. The District's remedies provided in this Agreement are cumulative and not exclusive, and are in addition to any and all other remedies available to the District under North Dakota law. Owner will reimburse the District for all of the District's costs and expenses, including reasonable attorneys' fees, incurred in enforcing, collecting, or attempting to collect under this Agreement, or incurred in litigating the terms or validity of this Agreement.

17. **Forbearance.** The failure or delay of the District to insist on the timely performance of any of the terms of this Agreement, or the waiver of any particular breach of any of the terms of this Agreement, at any time, will not be construed as a continuing waiver of those terms or any subsequent breach, and all terms will continue and remain in full force and effect as if no forbearance or waiver had occurred.

18. **Governing Law.** This Agreement will be construed and enforced in accordance with North Dakota law. The parties agree any litigation arising out of this Agreement will be venued in State District Court in Cass County, North Dakota, and the parties waive any objection to venue or personal jurisdiction.

19. **Severability.** If any court of competent jurisdiction finds any provision or part of this Agreement is invalid, illegal, or unenforceable, that portion will be deemed severed from this Agreement, and all remaining terms and provisions of this Agreement will remain binding and enforceable; the parties will reconvene negotiations to arrive, in good faith, at an agreement as to matters remaining undetermined as a result of any finding by a court of competent jurisdiction that any provision or part of this Agreement is invalid, illegal, or unenforceable.

20. **Entire Agreement.** This Agreement, together with any amendments, constitutes the entire agreement between the parties regarding the matters described in this Agreement, and this Agreement supersedes all other previous oral or written agreements between the parties.

21. **Assignment.** Neither party may transfer or assign this Agreement, or any rights or obligations under this Agreement, without the express written consent of the other party; conveyance of ownership of the Property to a third party will not relieve Owner from Owner's obligations under this Agreement.

22. **Binding Effect.** The obligations, covenants, terms, conditions, provisions, and undertakings in this Agreement, or in any amendment, will be binding upon the parties' heirs, successors, and assigns.

23. **Modifications.** Any modifications or amendments of this Agreement must be in writing and signed by both parties.

24. **Headings.** Headings in this Agreement are for convenience only and will not be used to interpret or construe its provisions.

25. **Effective Date.** This Agreement will become effective when executed by the last party to sign.

(Signatures appear on the following pages.)

RUSH RIVER WATER
RESOURCE DISTRICT

By: _____
William Hejl, Chair

ATTEST:

_____
Carol Harbeke Lewis
Secretary-Treasurer

Date: June 21, 2019

OWNER

Daniel Auka

Kathleen Auka

Date: 6-19, 2019

# EXHIBIT A

## Legal Description of the Property

TITLE CO

1298891
Page: 1 of 2
7/1/2010 9:14 AM
WD $13.00

**WARRANTY DEED** 122539

**THIS INDENTURE,** Made this 29 day of June, 2010, between Michael L. Kalebaugh and Zita K. Kalebaugh, husband and wife, Grantors, and Daniel Auka and Kathleen Auka, Grantees, whose post office address is 16651 30th St. SE, Harwood, North Dakota.

**WITNESSETH,** For and in consideration of the sum of One and no/100 ($1.00) Dollars and other good and valuable consideration Grantors do hereby GRANT to the Grantees, as joint tenants and not as tenants in common, all of the following real property lying and being in the County of Cass and the State of North Dakota:

> A tract of land described as follows: Beginning at the Southeast corner of the West Half of the West Half of the East Half of Section Thirty-five, Township One Hundred Forty-one North of Range Fifty West, thence West 560 feet; thence North 220 feet; thence East 180 feet; thence North 468 feet; thence Southeast to a point on the East line of the West Half of the West Half of the East Half of Section Thirty-five a distance of 530 feet North of the point of beginning; thence South on said East line to the point of beginning a distance of 530 feet, more or less, situate in the County of Cass and the State of North Dakota.

The legal description was obtained from a previously recorded instrument.

And the Grantors for themselves, their heirs, executors and administrators, do covenant with the Grantees that they are well seized in fee of the land and premises aforesaid; that the same are free from all encumbrances, except installments of special assessments and assessments for special improvements which have not been certified to the County Treasurer for collection, easements and restrictions of record; and the above granted land premises in the quiet and peaceable possession of the part thereof, the Grantors will warrant and defend.

27-0000-01645-000

THE SEAL OF CASS COUNTY OFFICIAL SEAL STATE OF NORTH DAKOTA

AUDITOR'S OFFICE
COUNTY OF CASS, NORTH DAKOTA
1 July 2010
Taxes and Special Assessments paid and transfer entered.
Michael W. Montplaisir AUDITOR
DEPUTY

49 Title Co.

TITLE CO

**WITNESS,** the hands of the Grantors:

Michael L. Kalebaugh

Zita K. Kalebaugh

STATE OF NORTH DAKOTA
ss.
COUNTY OF CASS

On this 29 day of June, 2010, before me personally appeared Michael L. Kalebaugh and Zita K. Kalebaugh, husband and wife, known to me to be the persons who are described in, and who executed the within and foregoing instrument, and severally acknowledged that they executed the same.

ANGELA BELCOURT
Notary Public
State of North Dakota
My Commission Expires Oct. 13, 2011

(SEAL)

Notary Public
My Commission Expires:

I certify that the full consideration paid for the property described in this deed was $136,675.00.

Grantee or Agent

This instrument was drafted by:
Lisa J. Wheeler, P.C.
17 South 7th Street
Fargo, ND 58103

RECORDER OF CASS COUNTY
OFFICIAL
SEAL
STATE OF NORTH DAKOTA

RECORDER'S OFFICE, CASS COUNTY, ND 7/1/2010 9:14 AM
I CERTIFY THAT THIS INSTRUMENT WAS FILED FOR RECORD THIS DATE.
JEWEL A. SPIES, COUNTY RECORDER
by Teresa A. Kirby Dep 1298891

# EXHIBIT B

## INDIVIDUAL RURAL AND FARMSTEAD RING DIKE CRITERIA

# ATTACHMENT A
## INDIVIDUAL RURAL AND FARMSTEAD RING DIKE CRITERIA

### MINIMUM DESIGN CRITERIA

- HEIGHT: The dike must be built to an elevation 2 ft above either the 100-year flood or the documented high water mark of a flood event of greater magnitude, whichever is greater.
- TOP WIDTH:
  - If dike height is 5 ft or less: 4 ft top width
  - If dike height is between 5 ft and 14 ft: 6 ft top width
  - If dike height is greater than 14 ft: 8 ft top width
- SIDE SLOPES: 3 horizontal to 1 vertical
- STRIP TOPSOIL AND VEGETATION: 1 ft
- ADEQUATE EMBANKMENT COMPACTION: Fill in 6-8 inch layers, compact with passes of equipment
- SPREAD TOPSOIL AND SEED ON RING DIKE

### LANDOWNER RESPONSIBILITY

Landowners are responsible to address internal drainage on ring dikes. If culverts and flap gates are installed, these costs are eligible for cost-share. The landowner has the option of completing the work or hiring a contractor to complete the work.

**If contractor does the work,** payment is for actual costs with documented receipts.
**If landowner does the work,** payment is based on the following unit prices:

- STRIPPING, SPREADING TOPSOIL, AND EMBANKMENT FILL: Chief Engineer will determine rate schedule based on current local rates
- SEEDING: Cost of seed times 200%
- CULVERTS: Cost of culverts times 150%
- FLAP GATES: Cost of flap gates times 150%

### OTHER FACTS AND CRITERIA

- The topsoil and embankment quantities will be estimated based on dike dimensions. Construction costs in excess of the 3:1 side slope standard will be the responsibility of the landowner. Invoices will be used for the cost of seed, culverts, and flap gates.
- Height can be determined by existing FIRM data or known elevations available at county floodplain management offices. Engineers or surveyors may also assist in establishing height elevations.
- The projects will not require extensive engineering design or extensive cross sections.
- A dike permit is required if the interior volume of the dike consists of 50 acre-feet, or more.

Growth Factor 100.00%

**Assuming 0.00% growth in Sales Tax and the County Keeping 6%**

Retainage beyond 2018 6%

| Year | Amount Received | 9% Reserve | Poject Name | Amount Encumbered | Balance | |
|---|---|---|---|---|---|---|
| 2011 | $ 7,619,287 | $ 685,736 | | $ 455,980 | $ 229,755 | |
| 2012 | $ 14,530,075 | $ 1,307,707 | Note that the amount encumbered is the | $ 241,987 | $ 1,295,475 | |
| 2013 | $ 15,012,832 | $ 1,351,155 | project requests, the balance is the | $ 513,125 | $ 2,133,505 | |
| 2014 | $ 16,015,790 | $ 1,441,421 | unencumbered balance. | $ 1,367,540 | $ 2,207,387 | |
| 2015 | $ 16,981,159 | $ 1,528,304 | | $ 1,049,243 | $ 2,686,448 | |
| 2016 | $ 16,239,726 | $ 1,461,575 | | $ 168,330 | $ 3,979,693 | |
| 2017 | $ 15,546,903 | $ 1,399,221 | | $ 997,984 | $ 4,380,930 | |
| 2018 | $ 15,620,962 | $ 1,405,887 | | $ 445,218 | $ 5,341,598 | |
| 2019 | $ 13,535,683 | $ 932,819 | | $ 76,733 | $ 6,197,684 | Partial Year |
| | | | | | $ 6,197,684 | |
| | | | | | $ 6,197,684 | |
| | | | Davenport project (year remains uncertain) | $ 1,425,000 | $ 4,772,684 | |
| 2019 3 months est | $ 3,600,000 | $ 216,000 | Amenia Levee | $ 900,000 | $ 4,088,684 | |
| 2019 | | | MRWRD Upper Maple River Dam Imp | $ 26,250 | $ 4,062,434 | |
| 2020 | $ 15,620,962 | $ 937,258 | Argusville Leonard's Way Flood Protection | $ 300,000 | $ 4,699,692 | |
| 2020 | | | CCJWRD Upper Maple Impoundment #1 | $ 1,680,000 | $ 3,019,692 | |
| 2020 | | | MRWRD Tower Twp Project #77 | $ 825,000 | $ 2,194,692 | |
| 2021 | $ 15,620,962 | $ 937,258 | Harwood Flood Control Improvements | $ 75,000 | $ 3,056,950 | |
| 2021 | | | Harwood Levee Improvements | $ 375,000 | $ 2,681,950 | |
| 2021 | | | Mapleton Levee Development Park | $ 150,000 | $ 2,531,950 | |
| 2021 | | | CCJWRD Upper Maple Impoundment #1 | $ 987,000 | $ 1,544,950 | |
| 2022 | $ 15,620,962 | $ 937,258 | Casselton East View Floow Protection | $ 150,000 | $ 2,332,207 | |
| 2023 | $ 15,620,962 | $ 937,258 | Kindred Internal Retention Original Townsite | $ 1,125,000 | $ 2,144,465 | |
| 2023 | | | Casselton Original Townsite Retention | $ 1,125,000 | $ 1,019,465 | |
| 2024 | $ 15,620,962 | $ 937,258 | Casselton Industrial Park Retention | $ 1,125,000 | $ 831,723 | |
| 2025 | $ 15,620,962 | $ 937,258 | Gardner Flood Control | $ 750,000 | $ 1,018,981 | |
| 2026 | $ 15,620,962 | $ 937,258 | | | $ 1,956,238 | |
| 2027 | $ 15,620,962 | $ 937,258 | | | $ 2,893,496 | |
| 2028 | $ 15,620,962 | $ 937,258 | | | $ 3,830,754 | |
| 2029 | $ 15,620,962 | $ 937,258 | | | $ 4,768,012 | |
| 2030 | $ 15,620,962 | $ 937,258 | Tower City Drainage Improvements | $ 187,500 | $ 5,517,769 | |
| 2030 | | | Hunter Dam Reconstruction | $ 157,500 | $ 5,360,269 | |

Approved contigent upon state water commission funding

| | |
|---|---|
| Total Project cost | $ 3,850,000.00 |
| Est SWC | $ (1,950,000.00) |
| Balance | $ 1,900,000.00 |
| Sales Tax 75% | $ 1,425,000.00 |
| Remaining Local Share | $ 475,000.00 |

| | | |
|---|---|---|
| | Total | $ 11,363,250 |
| City Projects | $ 3,518,250 | Snagging (Annual) $ 75,000 |
| WRD Projects | $ 7,845,000 | Snagging (Annual) $ 300,000 |
| | $ 11,363,250 | Dam Repairs (Annual) $ 3,750 |
| | | EPA Updates (Annual) $ 3,750 |
| | | Total Annual Expenses asked for $ 382,500 |

We have funds in the Emergency/Flood Mitigation Fund

| | |
|---|---|
| Floodway Buyouts | $ 900,000 |
| FEMA Mapping/Flood Plain Management | $ 48,750 |
| Flood Mitigation / General Funds | $ 948,750 |
| Total on Draft List for 2019-2030 ** | $ 12,694,500 |

** includes the Davenport Project

This is a spreadsheet I put together in looking at keeping 9% or 6% of the flood sales tax for local projects. In the commission discussion this week you mentioned the Davenport project so I added the summary of the dollars needed (yellow) for the entire Davenport project.

CASS COUNTY GOVERNMENT

August 22, 2019

RECEIVED
CASS COUNTY COMMISSION
AUG 26 2019

Maple River Water Resource District

Rodger Olson
Chairman
Leonard, North Dakota

Gerald Melvin
Manager
Buffalo, North Dakota

Chad Miller
Manager
Buffalo, North Dakota

Mary Scherling
Chairwoman
Cass County Commission
P.O. Box 2806
Fargo, ND 58108-2806

Dear Mary:

RE: Maple River Dam Site T-180 Dam Safety Improvements

The T-180 Dam, located on a tributary of the Maple River in Section 24 of Highland Township, Cass County, is a high-hazard dam that is owned and operated by the Maple River Water Resource District (WRD). The dam was originally built as a flood retention project in 1985 and permitted by the North Dakota State Water Commission (SWC) under Dike Permit #80. Since it was constructed, the dam has provided flood damage reduction for properties adjacent to the tributary and Cass County Highway 7.

The purpose of the proposed project is to address safety issues at the dam as identified in the 2018 SWC inspection report. Upgrades to the principal spillway pipe are needed to avoid loss of function and stability of the dam. In order to address this dam safety issue, the WRD proposes to perform the following repairs:

- The principal spillway pipe is showing signs of deterioration which include fine cracking on the top of the pipe and small gaps between sections of pipe. Installation of UV Cured-In-Place pipe (UVCIPP) lining is proposed to rehabilitate the interior of the conduit. This method avoids unnecessary excavation of the principal spillway while effectively upgrading the pipe.
- Rusted and broken items at the spillway inlet structure will be replaced to extend the life of the structure.
- Debris and matted roots will be cleaned out of toe drains to restore functionality to drains and prevent saturation of the embankment.
- Trees, weeds, and woody vegetation observed growing in the embankment and riprap will be removed. The embankment areas will then be reseeded for erosion protection
- Compacted fill will be brought in to repair the cut areas observed on the left bank of the auxiliary spillway.
- Animal control measures will be taken to fill large burrows and mitigate future damage.

Carol Harbeke Lewis
Secretary-Treasurer

1201 Main Avenue West
West Fargo, ND 58078-1301

701-298-2381
FAX 701-298-2397
wrd@casscountynd.gov
www.casscountynd.gov

Preliminary engineering has been completed and the WRD is now pursuing funding options prior to final design, permitting, and construction. There is currently no assessment district established for this project and there is a need for funding to address the deficiencies identified in the 2018 SWC inspection report. If funding is unavailable, the WRD may have to decommission the dam due to lack of maintenance dollars at this time.

The WRD respectfully requests the Cass County Commission approve cost-share assistance in the amount of $25,586.20 (75% of the local share) for the above referenced project so the WRD can proceed with the improvements.

Enclosed is a preliminary cost estimate and a project location map. If you have any questions, please feel free to contact us or the district's engineer, Kurt Lysne, Moore Engineering, Inc., at 701-282-4692.

Sincerely,

MAPLE RIVER WATER RESOURCE DISTRICT

Carol Harbeke Lewis
Secretary–Treasurer

Enclosures

Project #: 20798
Date Created: 08/02/2019

***T-180 Dam Improvements***
***Maple River Water Resource District***
***Cass County, North Dakota***

*Engineer's Preliminary Opinion of Probable Cost*

| | BID ITEM NO. & DESCRIPTION | UNIT | QUANTITY | UNIT PRICE | TOTAL | FUNDING SOURCES | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | NDSWC (75%) | RRJWRD (65%) | CASS COUNTY (75%) | LOCAL |
| 1. | Mobilization | LS | 1 | $10,000.00 | $10,000.00 | $7,500.00 | $1,625.00 | $656.25 | $218.75 |
| 2. | Cured-In-Place Pipe Lining (21" dia.) | LF | 62 | $275.00 | $17,050.00 | $12,787.50 | $2,770.63 | $1,118.91 | $372.97 |
| 3. | Cured-In-Place Pipe Lining (42" dia.) | LF | 312 | $500.00 | $156,000.00 | $117,000.00 | $25,350.00 | $10,237.50 | $3,412.50 |
| 4. | Trash Rack Repair | LS | 1 | $5,000.00 | $5,000.00 | $3,750.00 | $812.50 | $328.13 | $109.38 |
| 5. | Cleanout Toe Drains | LS | 1 | $2,500.00 | $2,500.00 | $1,875.00 | $406.25 | $164.06 | $54.69 |
| 6. | Fill Sinkholes | LS | 1 | $9,000.00 | $9,000.00 | $6,750.00 | $1,462.50 | $590.63 | $196.88 |
| 7. | Repair Animal Burrows | LS | 1 | $5,000.00 | $5,000.00 | $3,750.00 | $812.50 | $328.13 | $109.38 |
| 8. | Clearing and Grubbing | LS | 1 | $5,000.00 | $5,000.00 | $3,750.00 | $812.50 | $328.13 | $109.38 |
| 9. | Dewatering | LS | 1 | $10,000.00 | $10,000.00 | $7,500.00 | $1,625.00 | $656.25 | $218.75 |
| 10. | Stormwater Management | LS | 1 | $3,000.00 | $3,000.00 | $2,250.00 | $487.50 | $196.88 | $65.63 |
| 11. | Seeding - Type III | LS | 1 | $3,000.00 | $3,000.00 | $2,250.00 | $487.50 | $196.88 | $65.63 |
| | | | | Construction Subtotal | $225,550.00 | $169,162.50 | $36,651.88 | $14,801.72 | $4,933.91 |
| | | | | Engineering - Preliminary | $5,000.00 | $3,750.00 | $812.50 | $328.13 | $109.38 |
| | | | | Engineering - Design | $20,300.00 | $15,225.00 | $3,298.75 | $1,332.19 | $444.06 |
| | | | | Engineering - Construction | $20,300.00 | $15,225.00 | $3,298.75 | $1,332.19 | $444.06 |
| | | | | Permitting | $3,000.00 | $2,250.00 | $487.50 | $196.88 | $65.63 |
| | | | | Legal | $500.00 | $0.00 | $325.00 | $131.25 | $43.75 |
| | | | | Owner Administration Expenses | $500.00 | $0.00 | $325.00 | $131.25 | $43.75 |
| | | | | Project Contingencies (20%) | $44,850.00 | $16,916.25 | $18,156.94 | $7,332.61 | $2,444.20 |
| | | | | ***TOTAL PROJECT COST*** | $320,000.00 | $222,528.75 | $63,356.31 | $25,586.20 | $8,528.73 |



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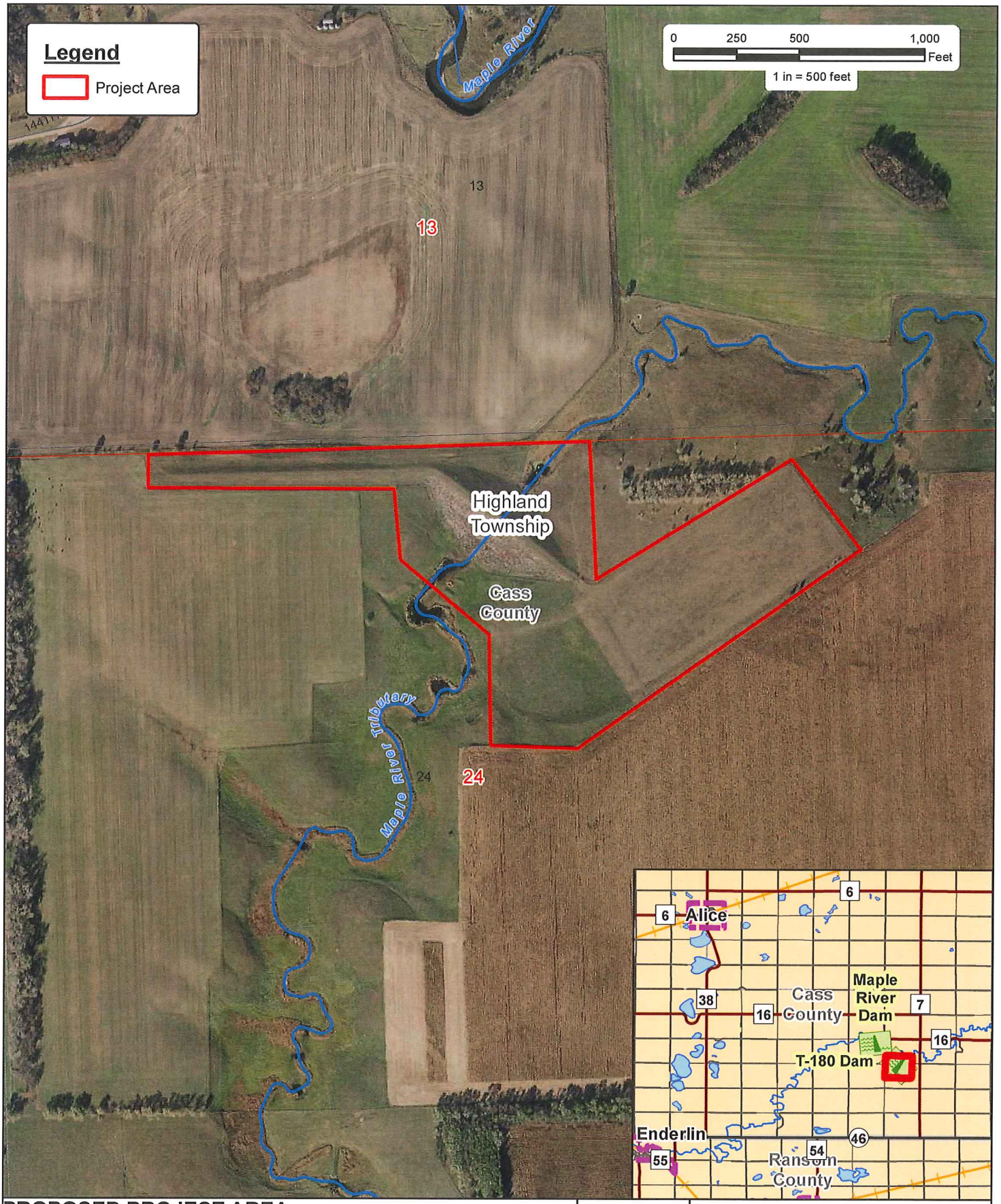


# PROPOSED PROJECT AREA
# T-180 DAM - DAM SAFETY IMPROVEMENTS
# CASS COUNTY, NORTH DAKOTA

Created By: JWP Date Created: 01/28/19 Date Saved: 07/02/19 Date Exported: 07/02/19
Plotted By: jordan.prazak Parcel Date: N/A Aerial Image: 2017 County NAIP SIDS Elevation Data: N/A
Horizontal Datum: NAD 1983 StatePlane North Dakota South FIPS 3302 Feet Vertical Datum: NAVD1988
T:\Projects\20700\20798\20798_NDSWCProjectMap.mxd

N W E S

moore engineering, inc.

## Worden, Heather

**From:** Wilson, Robert
**Sent:** Wednesday, September 11, 2019 5:19 PM
**To:** Worden, Heather
**Subject:** FW: Western Cass FIS Appeal - City of Arthur, FEMA Case No. 10-08-0041S - email 1 of 2

**From:** Lewis, Carol <LewisC@casscountynd.gov>
**Sent:** Wednesday, September 11, 2019 4:42 PM
**To:** {Cass}-Commissioners <Cass-ADM-Com@casscountynd.gov>; Wilson, Robert <WilsonRo@casscountynd.gov>; Benson, Jason <BensonJ@casscountynd.gov>; Voigt, Barrett <VoigtB@casscountynd.gov>
**Cc:** klysne <klysne@mooreengineeringinc.com>
**Subject:** FW: Western Cass FIS Appeal - City of Arthur, FEMA Case No. 10-08-0041S - email 1 of 2

This is the first of two emails with appeals submitted to FEMA regarding the Western Cass Flood Insurance Study.

As you may recall, the Cass County Commission approved at the March 4, 2019, meeting, to reimburse Southeast Cass Water Resource District for 50% of the requested $181,346.08 in costs for the Western Cass Flood Insurance Study. Expenses to-date total $176,039.13. Due to the extensive modeling involved, it is likely costs will exceed the total estimated cost. We will submit a request for 50% of the total cost approved earlier this year when we reach that total. At that time, we can also discuss how any anticipated costs over that amount should be addressed. Please feel free to contact us if you have any questions. Thank you.

Carol

**Carol Harbeke Lewis**
**Secretary-Treasurer**
**Cass County Water Resource Districts**
**1201 Main Avenue West**
**West Fargo, ND 58078-1301**
**Phone: 701-298-2381**
**Fax: 701-298-2397**
**Lewisc@casscountynd.gov**

CASS COUNTY
GOVERNMENT

**From:** Kurt Lysne <kurt.lysne@mooreengineeringinc.com>
**Sent:** Friday, September 6, 2019 2:49 PM
**To:** r8commentsandappeals@fema.dhs.gov; David Sutley <David.Sutley@fema.dhs.gov>
**Cc:** Lewis, Carol <LewisC@casscountynd.gov>; Horner, Laura M. <lmhorner@nd.gov>; McGlone, Matthew L.

**To:** Worden, Heather <WordenH@casscountynd.gov>
**Subject:** FW: Western Cass FIS Appeal - Noble and Wiser Township, FEMA Case No. 10-08-0041S - email 2 of 2

2/2 emails...

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**From:** Lewis, Carol <LewisC@casscountynd.gov>
**Sent:** Wednesday, September 11, 2019 4:44 PM
**To:** {Cass}-Commissioners <Cass-ADM-Com@casscountynd.gov>; Wilson, Robert <WilsonRo@casscountynd.gov>; Benson, Jason <BensonJ@casscountynd.gov>; Voigt, Barrett <VoigtB@casscountynd.gov>
**Cc:** klysne <klysne@mooreengineeringinc.com>
**Subject:** FW: Western Cass FIS Appeal - Noble and Wiser Township, FEMA Case No. 10-08-0041S - email 2 of 2

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**From:** Kurt Lysne <kurt.lysne@mooreengineeringinc.com>
**Sent:** Friday, September 6, 2019 3:02 PM
**To:** r8commentsandappeals@fema.dhs.gov; David Sutley <David.Sutley@fema.dhs.gov>
**Cc:** Lewis, Carol <LewisC@casscountynd.gov>; Horner, Laura M. <lmhorner@nd.gov>; McGlone, Matthew L. <mcgloneml@cdmsmith.com>
**Subject:** Western Cass FIS Appeal - Noble and Wiser Township, FEMA Case No. 10-08-0041S

Hi David,

I am submitting an appeal to the Revised Preliminary FIRM and FIS that was developed for the Red River of the North through Noble and Wiser Townships, Cass County, ND. Moore Engineering, working on behalf of the Cass County Joint Water Resource District, has completed a technical report in support of the appeal. Specifically, this appeal responds to local concerns with the delineation of the base floodplain and regulatory floodway.

This document, as well as other supporting information (letter of community endorsements, hydraulic models, GIS shapefiles, plan drawings, etc.) can be downloaded from the following FTP location:

ftp://ftp.mooreengineeringinc.com
Username: FEMA
Password: P01UcgwPE1qa

Please let me know if you have trouble accessing the files or need additional supporting documentation.

Have a great weekend,
Kurt

**Kurt Lysne, PE*, CFM**
Water Resources Group Leader
**moore engineering, inc.**
*Licensed in ND & MN

Phone 701.282.4692 | Fax 701.282.4530
Direct 701.499.5856 | Cell 218.205.3324
444 Sheyenne Street, Suite 301, West Fargo, ND 58078
kurt.lysne@mooreengineeringinc.com | www.mooreengineeringinc.com

## Worden, Heather

**From:** Benson, Jason
**Sent:** Tuesday, September 17, 2019 5:55 PM
**To:** Wilson, Robert; Worden, Heather
**Subject:** RE: Western Cass FIS Appeal - Noble and Wiser Township, FEMA Case No. 10-08-0041S - email 2 of 2

Robert,

I've review these two documents and they appear to be good in providing critical analysis of these areas and proposing a new map. I think we need to be prepared to discuss these at the next ½ Cent Sales Tax meeting. I also think these reviews ensure the new map doesn't adversely affect property causing the owner to have to purchase flood insurance or to trigger a larger, more costly flood control project.

*Jason Benson, P.E.*
*County Engineer*
*Cass County Highway Department*
*1201 Main Ave West*
*West Fargo, ND 58078*
*701-298-2372*

**From:** Wilson, Robert <WilsonRo@casscountynd.gov>
**Sent:** Thursday, September 12, 2019 8:34 AM
**To:** Worden, Heather <WordenH@casscountynd.gov>
**Cc:** Benson, Jason <BensonJ@casscountynd.gov>
**Subject:** RE: Western Cass FIS Appeal - Noble and Wiser Township, FEMA Case No. 10-08-0041S - email 2 of 2

I need to read it a little closer – and bounce it off Jason. I cruised through these as I was looking at about 60 emails after being in training yesterday.
-Robert

**From:** Worden, Heather <WordenH@casscountynd.gov>
**Sent:** Thursday, September 12, 2019 7:28 AM
**To:** Wilson, Robert <WilsonRo@casscountynd.gov>
**Subject:** RE: Western Cass FIS Appeal - Noble and Wiser Township, FEMA Case No. 10-08-0041S - email 2 of 2

I assume this will need to be discussed at the next Flood Sales Tax Committee meeting.

CASS COUNTY GOVERNMENT

**Heather Worden**
Administrative Assistant
Cass County Commission Office
211 9th Street South
PO Box 2806
Fargo ND 58108-2806
wordenh@casscountynd.gov
D: 701-241-5609

**From:** Wilson, Robert <WilsonRo@casscountynd.gov>
**Sent:** Wednesday, September 11, 2019 5:19 PM

**REGULAR MEETING OF CASS COUNTY BOARD OF COMMISSIONERS**
**MARCH 4, 2019**

**1. MEETING CALLED TO ORDER**

Chairwoman Mary Scherling called the meeting to order at 3:30 PM with all members present as follows: Rick Steen, Vern Bennett, Duane Breitling, and Mary Scherling. Chad Peterson was present via conference call.

**2. PLEDGE OF ALLEGIANCE**

Heather Worden led the Pledge of Allegiance.

**3. MINUTES APPROVED**

***MOTION*, *passed***

**Mr. Steen moved and Mr. Breitling seconded that the minutes of the previous meeting be approved as written. Motion carried.**

**4. AGENDA, Order approved**

***MOTION*, *passed***

**Mr. Steen moved and Mr. Bennett seconded to approve the order of the agenda with the addition of a contract to the consent agenda. Motion carried.**

**5. CONSENT AGENDA APPROVED**

***MOTION*, *passed***

**Mr. Bennett moved and Mr. Steen seconded to approve the consent agenda as follows, including a correction to the amount in the contract with Central Specialties based on an error found by the State's Attorney. On roll call vote, the motion carried unanimously.**

a. Approve a special event permit for Brewtus' Brickhouse to serve alcoholic beverages from 4:00 PM to midnight on March 15, 2019, for a West Fargo Hockey Association benefit to be held at the Hartl Ag Building, Red River Valley Fairgrounds in West Fargo, North Dakota.
b. Approve a fireworks display permit for Starr Fireworks to be held at 9:00 PM on May 4, 2019, at Starr Fireworks, 10908 38th Street South in Horace, North Dakota.
c. Receive and file Indemnity Bond on Lost Instrument for Ashley Kasson Therapy LMFT PLLC; and authorize the county auditor and county treasurer to issue a duplicate check.
d. Authorize the Red River Valley Fair Association to list Cass County as the fiscal agent on a grant application for funding through the Garrison Diversion Conservancy District.
e. Authorize the chair to sign the North Dakota Department of Transportation Local Match Certification for Federal Aid Project BRO-0009(047) to certify the county has paid the local match for this bridge project in Section 3 of Dows Township.
f. Contract approval
   - Central Specialties, Inc.—subgrade repair projects on three county highways.

**6. PUBLIC COMMENT**

Mrs. Scherling asked for public comment and hearing none, moved on to the regular agenda items.

**7. WESTERN CASS FLOOD INSURANCE STUDY, County to reimburse half of study costs**

Robert Wilson, County Administrator, was present for the meeting via conference call. The Commission received a funding request from the Cass County Joint Water Resource District for costs associated with the Western Cass Flood Insurance Study (FIS). This item was tabled at the last meeting so Carol Lewis, Secretary-Treasurer for the Cass County Water Resource Districts, could be present to answer questions.

In 2013 the Cass County Joint Water Resource District (CCJWRD) agreed to serve as the coordinating agency for the Western Cass FIS to update flood insurance rate maps to accurately illustrate flood risks. In 2013 the Cass County Commission authorized a 50% cost share to the CCJWRD not to exceed $40,000 for the study.

Mr. Wilson said Mrs. Lewis provided an account of project-related expenses through March of 2018 which totaled $141,346.08 plus an additional $40,000 to cover remaining costs. The CCJRWD requests the Commission consider reimbursing previously incurred and future costs in the amount of $181,346.08.

There was discussion on the significant increase in the cost over the past six years. County Engineer Jason Benson was present via conference call and said a lot of the changes to the flood insurance rate maps and modeling reviews added to the study costs since 2013.

Mr. Steen said $127,000 was approved for study costs according to minutes from the Cass County Joint Water Resource District and questioned the disparity between this figure and the request of $181,346.08. He also asked why the Commission did not hear about any additional costs since 2013.

Rodger Olson serves on the CCJWRD. He said water board members thought the expenses would be reimbursed through the Flood Sales Tax Committee and wanted to complete the project before expenses were submitted for consideration. This is why the issue was submitted to the Flood Sales Tax Committee last year and not submitted to the Cass County Commission.

Mrs. Lewis reviewed the amounts that were included in the Southeast Cass Water Resource District (WRD) General Fund budgets for the Western Cass FIS. The CCJWRD does not have its own budget, so funds were funneled through the Southeast Cass WRD. She said $25,000 was budgeted in 2013 with $8,550 spent; $100,000 in 2014 with $43,800 spent; $23,675 in 2015 with $50,620 spent; $25,000 in 2016 with $8,370 spent; $25,000 in 2017 with $19,170 spent; $25,000 in 2018 with $37,500 spent; and $20,000 in 2019 with $440 spent to date.

Mr. Steen said funds for the Western Cass FIS were included in the Southeast Cass WRD budgets, so he does not support the county contributing additional funds other than $20,000 approved in 2013 as part of the 50/50 cost share with the CCJWRD.

Mr. Bennett questioned why the flood sales tax cannot be used for the project since it has provided a cost savings to residents who do not have to pay for flood insurance. Mr. Steen said the FIS does not fit the criteria outlined in county policy for projects eligible for sales tax funds. Mr. Steen said the cost should be paid through the General Fund or the Highway Fund.

Mr. Peterson said all the bills have been paid for the study, so to him it is a philosophical question. He has some difficulty in how it was presented and the significant cost increase from the original $40,000 expense, but would not object to reimbursing the CCJWRD for 50% of the total cost. He said there is a broader benefit from the project beyond Southeast Cass WRD. Mr. Benson said the study has benefitted all of the water resource districts as well as rural townships and cities in Cass County.

***MOTION*, *passed***

**Mr. Peterson moved and Mrs. Scherling seconded to reimburse the Southeast Cass Water Resource District for 50% of the requested $181,346.08 in costs for the Western Cass Flood Insurance Study. Discussion: Mr. Wilson said the county share would amount to $90,673.04. Mr. Steen has issues with spending money that was already budgeted and requesting reimbursement from the county six years later. On roll call vote, the motion carried with Mr. Peterson, Mrs. Scherling, Mr. Bennett, and Mr. Breitling voting "Yes"; and Mr. Steen voting "No".**

# Cass County, ND
# Western Cass FIS Noble and Wiser Township
# Floodplain Map Appeal

Prepared for
David Sutley, PE, FEMA Region VIII

September 2019

Prepared by:
Kurt Lysne, PE, CFM
Stu Dobberpuhl, PE (MN)
Alexa Ducioame, PE, CFM

moore engineering, inc.

444 Sheyenne St Ste 301
West Fargo, ND 58078

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

REGISTERED PROFESSIONAL ENGINEER
KURT LYSNE
PE-6871
DATE 9/6/19
NORTH DAKOTA

REGISTERED PROFESSIONAL ENGINEER
ALEXA R
DUCIOAME
PE-10599
DATE 9/6/19
NORTH DAKOTA

Kurt Lysne, PE, CFM
PE-6871
Date: 9/6/19

Alexa Ducioame, PE, CFM
PE-10599
Date: 9/6/19

# Table of Contents



# Figures



# Tables

## 1. Background

Moore Engineering was hired by the Cass County Joint Water Resource District to perform a technical review of the preliminary regulatory floodway as delineated for the Western Cass Flood Insurance Study (FIS) as mapped by AECOM. This memorandum is specific to the steady-state model updates in the northeast part of the county through Noble and Wiser Townships shown in Figure 1 and represents the technical basis for an appeal to the preliminary modeling and mapping efforts.

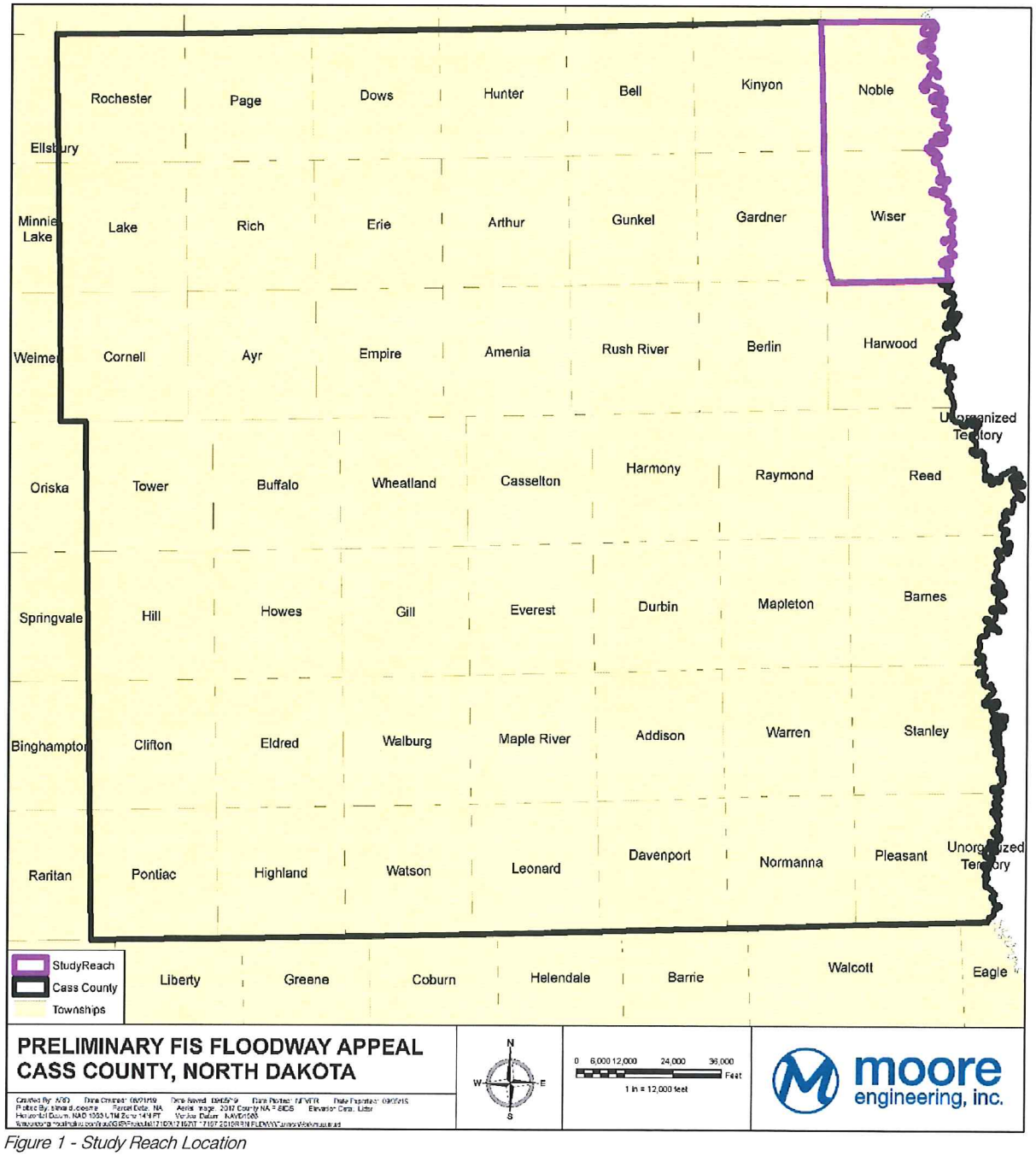


*Figure 1 - Study Reach Location*

## 2. Data Sources

Several different models were available for the area, as shown in Table 1. AECOM modeled the northern 1/3rd of the Red River in Cass County using the Eldred to Perley model, and Michael Baker modeled the southern 2/3rds using the Fargo Oakport model. AECOM leveraged the first three models listed for their study from the U.S. Army Corps of Engineers (USACE) and Houston Engineering. Moore also referenced the last two models for the review. The Norman County FIS was obtained from the Minnesota Department of Natural Resources and the Houston Moore Group is modeling the FM Diversion.The Perley through Fargo model was updated to create the Fargo Oakport model, and the Oakport model was used for the preliminary Western Cass FIS. AECOM reran the Eldred to Perley model in HEC-RAS v4.1 and made several minor changes from the original model.

To put it concisely, the proposed regulatory floodway through Noble and Wiser Townships of Cass County was completed using two separate models – the Eldred to Perley model and the Fargo Oakport model – rather than one continuous model along the Red River of the North.

*Table 1 - Existing HEC-RAS Models*

| Model | Affected ND Counties | Cross Sections[1] | RAS version | Source | Projection | Datum |
|---|---|---|---|---|---|---|
| Eldred to Perley | Cass & Traill | 279-217 | 3.0.1 | 2001 USACE | NAD1983 UTM Zone14N m | NGVD29 |
| Perley through Fargo | Cass | 279-? | 3.0.1 | 2003 USACE | NAD1983 UTM Zone14N m | NGVD29 |
| Fargo Oakport | Cass | 279-415 | 4.1 | 2007 Houston | NAD1983 ND State Plane South feet | NAVD88 |
| Norman County MN FIS | Cass & Traill | 282-237 | 4.1 | 2011 Houston | NAD1983 UTM Zone14N m | NAVD88 |
| FM Diversion Phase 9.1[2] | Cass & Traill | | 5.0.6 | 2019 HMG | NAD1983 UTM Zone14N feet | NAVD88 |

[1]Cross sections listed are not in river miles. The FM Diversion model encompasses the area the other three models cover, but river stationing uses distances in feet.

[2]FM Diversion model is the only unsteady state model with shorter cross sections and storage areas for overland flow

The NGVD29 to NAVD88 datum conversion was checked at several points along the Red River using NOAA's VertCon and averaged to be 1.10 feet.

## 3. Hydraulic Model Revisions

To ensure that Cass County has a usable, continuous model within the extents of the FIS, a portion of the Fargo Oakport model was added to the upstream end of the Eldred to Perley model to create a single model that spanned the study reach of Argusville to the Cass/Traill County line. The model was run in the latest version of HEC-RAS v5.0.7 for use of advanced mapping features. The change from v4.1 to v5.0.7 caused a maximum increase in the water surface elevation of 0.02 feet. These updates to the hydraulic model ensure a simplified model utilizing the latest version of the HEC-RAS software, and are referenced in this memorandum as the "appeal model". This is a major benefit to Cass County and the Townships administering the floodplain, as well as the Office of the State Engineer which has regulatory authority over the floodway.

### 3.1 Coordinate System and Datum

The Preliminary FIS models used a coordinate system in meters, but the cross section station elevation data, reach lengths, etc. were all in feet. This created issues with georeferencing and exporting data from the model for mapping. The appeal model updated the coordinate system from NAD1983 UTM Zone 14N meters to feet. This change makes the model more functional for simple analyses that will be completed for small projects in the coming years.

The Fargo Oakport, Norman County MN FIS, and FM Diversion models are all in NAVD88, while the Eldred to Perley model being used for the preliminary FIS was still in NGVD29. The Light Detection and Ranging (LiDAR) Digital Elevation Model (DEM) data for the area is all in NAVD88. The appeal model was converted to NAVD88 for simplicity in mapping and comparing model results.

### 3.2 Data Collection

LiDAR from 2008 was available for the entire model area. There was also 2017 LiDAR available for the area south of County Road 26. The 2008 LiDAR was used for results mapping, with the exception of a few road raises and ring levees that appeared in the 2017 LiDAR. This is discussed further in Section 4.1.

The Red River bridge at County Road 26 was redesigned in 2007 and the road was raised. The Eldred to Perley model used for the preliminary FIS did not reflect this change. The design firm, Erickson Engineering, was contacted for plans, which included the bridge as well as the modified channel geometry. Survey was also collected by Moore at the new bridge and along the road centerline for the extent of the cross sections.

### 3.3 Hydrology

The review found that the steady flow models and FIS reports for Norman, Clay, and Cass Counties had consistent hydrology. Moore did not adjust any hydrology from the preliminary FIS for this appeal.

### 3.4 Geometry

#### 3.4.1 Cross Sections

It was immediately noted during Moore's review that cross section 274 was not located properly. Cross sections should be drawn perpendicular to the flow lines. This cross section was removed and 274.3 and 274.6 were added in its place, as shown in Figure 2. Several other cross sections were also added to the model to reduce the downstream reach lengths and more accurately model and map the floodplain.

The cross sections in the Eldred to Perley model all had less than 100 points for cross sections approximately three miles wide. HEC-RAS v5.0.7 allows up to 500 points each. The cross sections were recut using LiDAR and compared to the original Eldred to Perley model, Norman County FIS, and FM Diversion model to combine the best available data. Cross section 273 is shown in Figure 3. The black line is from the Preliminary FIS geometry, and the pink line is the new cross section. It is clear that the lower number of points compromised some of the detail. Figure 4 shows one of the cross sections at the County Road 26 bridge and the new channel geometry.

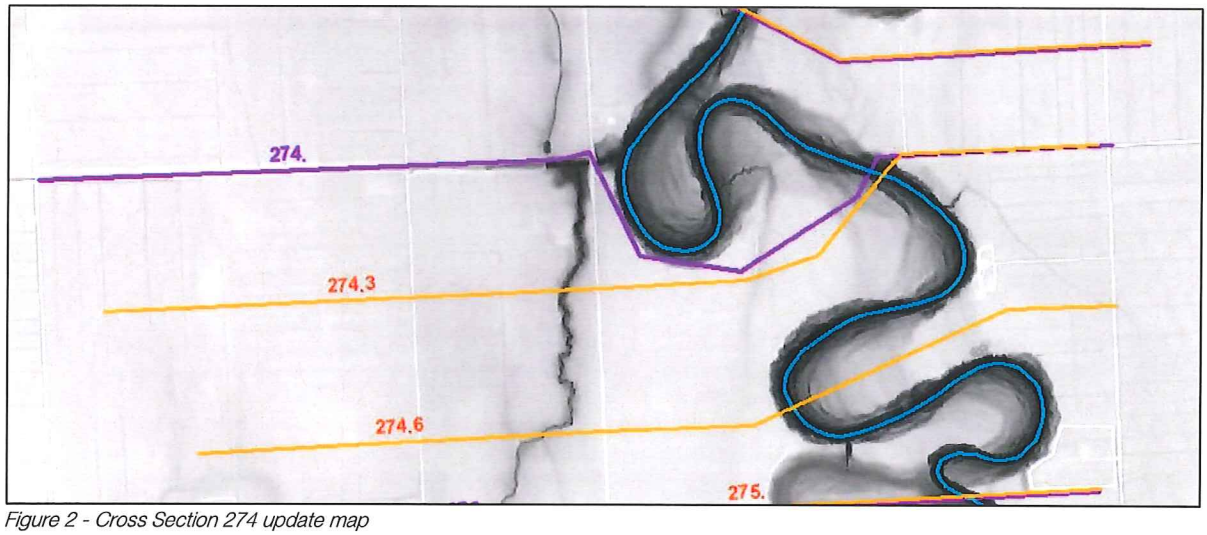


*Figure 2 - Cross Section 274 update map*

The use of a coordinate system in meters, but measurements in feet caused issues as the model was originally developed. Changes previously made to the cross sections were not reflected accurately in the GIS cut lines, resulting in differences with a maximum of 2,151 feet at cross sections 276 and 278. This creates errors when exporting cross sections and inundation areas. When the Eldred to Perley cross sections were recut, the lengths were corrected.

The ineffective flow areas were also updated with the cross sections to better represent high ground limiting effective flow, as well as contraction and expansion of flow at the bridges.

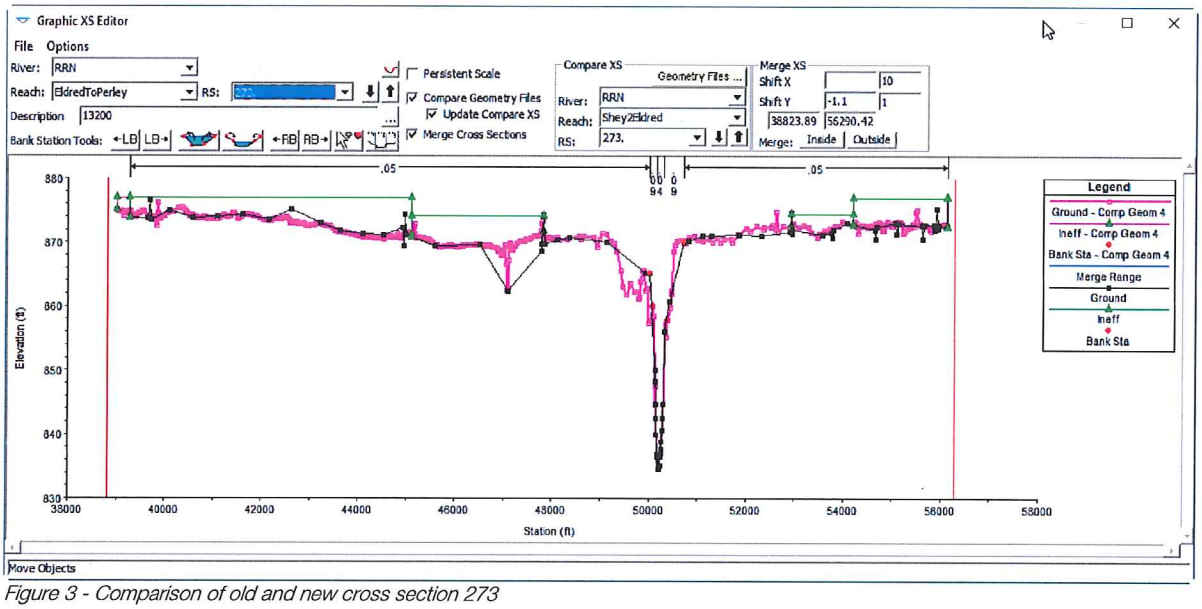


*Figure 3 - Comparison of old and new cross section 273*

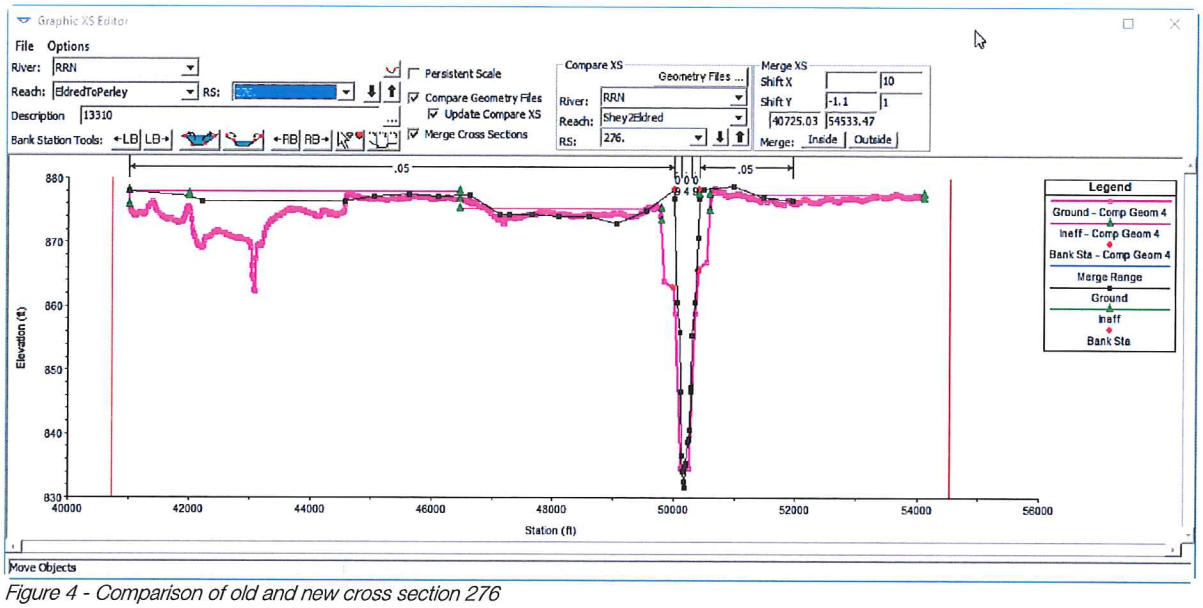


*Figure 4 - Comparison of old and new cross section 276*

## 3.4.2 County Road 26 Bridge

As mentioned in Section 3.2, plans and survey were collected for the County Road 26 road raise, new bridge, and channel modifications. Figure 5 shows the Preliminary FIS bridge, while Figure 6 shows the updated bridge in the appeal model. The channel and bridge shape and pier placement have a dramatic difference. There is also a considerable difference in the road elevations. This is further illustrated in the plot in Figure 7.

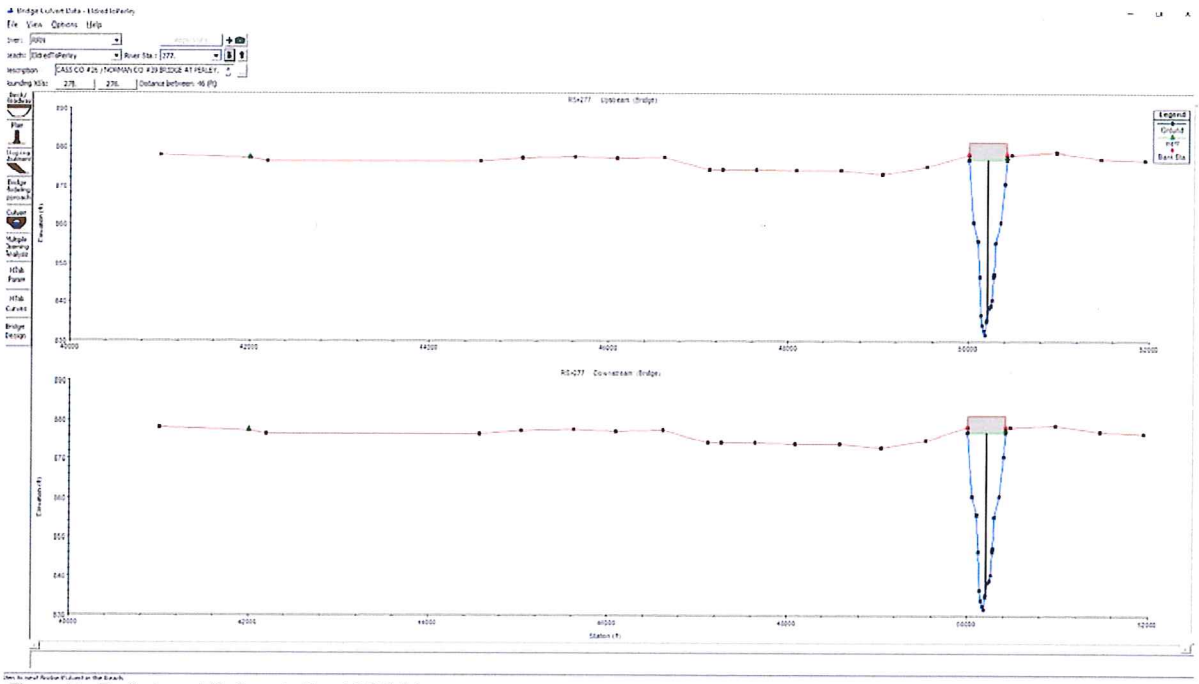

*Figure 5 - Preliminary FIS County Road 26 Bridge*

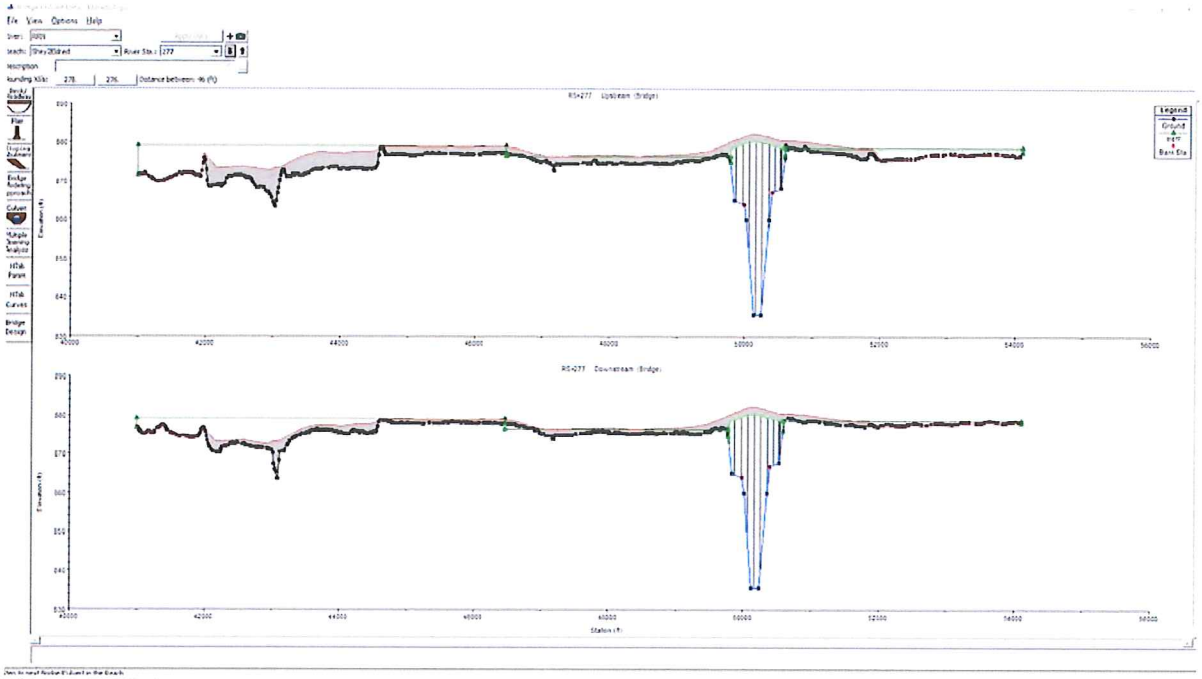

*Figure 6 - Preliminary FIS Appeal County Road 26 Bridge*

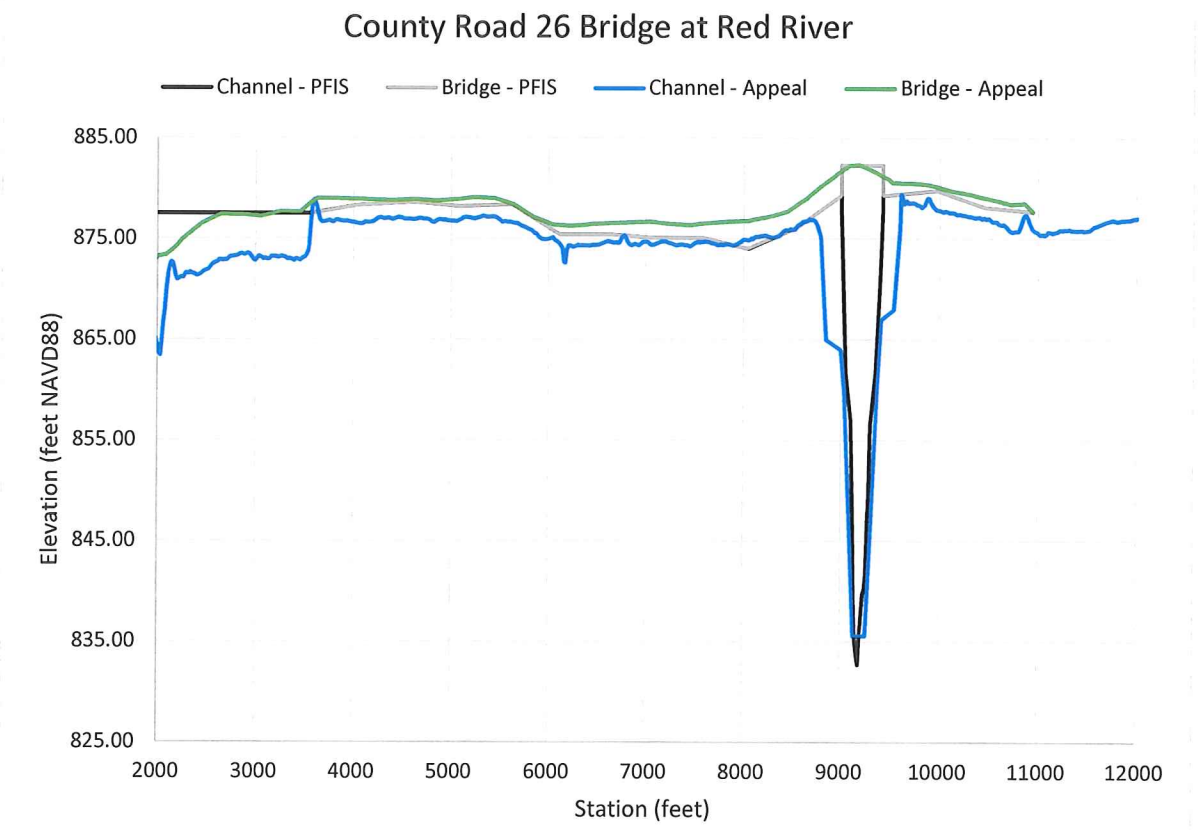


*Figure 7 - Preliminary FIS vs Appeal County Road 26 Bridge*

## 3.5 Floodway

"*Regulatory Floodway* means the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height." (44 CFR 59.1)

The National Flood Insurance Program (NFIP) requires that the designated height be a maximum of one foot. Several states have adopted more stringent standards, such as Minnesota, which limits the allowable surcharge to 0.5 feet. The allowable surcharge in North Dakota is one foot. Through a joint agreement between the states of North Dakota and Minnesota, the allowable surcharge on the Red River of the North is 0.75 feet.

The Preliminary FIS floodway generally followed 172nd Ave SE, except for a mile and a half just north of County Road 26 where it crosses over to the west. The local landowners and township officials noted that this area is not effective flow, so the floodway was looked into in more detail. The Preliminary FIS model surcharge north of the Cass/Traill County Line has a maximum of 1.26 feet, well over the allowable 0.75 feet. This is outside of the project reach, but this constriction was causing the cross sections within the project reach to need a very wide floodway in order to stay below the 0.75 feet surcharge requirement. Essentially, for the preliminary floodway currently proposed as part of the Western Cass FIS, tailwater from Traill County is impacting Cass County in such a way that Cass County would have to mitigate excessive floodway height from downstream reaches and be required to have an unreasonably wide floodway.

Additionally, FEMA's map service center shows no effective floodway for Traill County at the Cass County line, so there are no tie-in requirements to an existing floodway. For the appeal, the floodway model was truncated one cross section downstream of the Cass/Traill County Line, and a downstream boundary condition of a known water surface elevation was set at 0.75 feet above the 1% Annual Chance water surface elevation to allow for a future floodway. This ensures that, for this appeal, Cass County's floodway will account for any future downstream floodway that could become effective in Traill County. The encroachments on the Minnesota side were set to match the effective floodway stations from the effective Norman County and Clay County studies, and the proposed floodway stations on the North Dakota side were adjusted through multiple iterations to get as close to the maximum surcharge as possible.

The Minnesota encroachments are very close to the Red River in several locations, so the North Dakota floodway still needed to be wide. One example of this is near County Road 26, as shown in Figure 8. The elevation at the border of the floodway is around 873-874 feet on both sides of the river. However, the floodplain is very flat, so it is also that elevation a mile to the east. Table 2 shows the lengths and percentage split between the two states. Cross section 279 upstream of County Road 26 has the largest split with 97% in ND and 3% in MN.

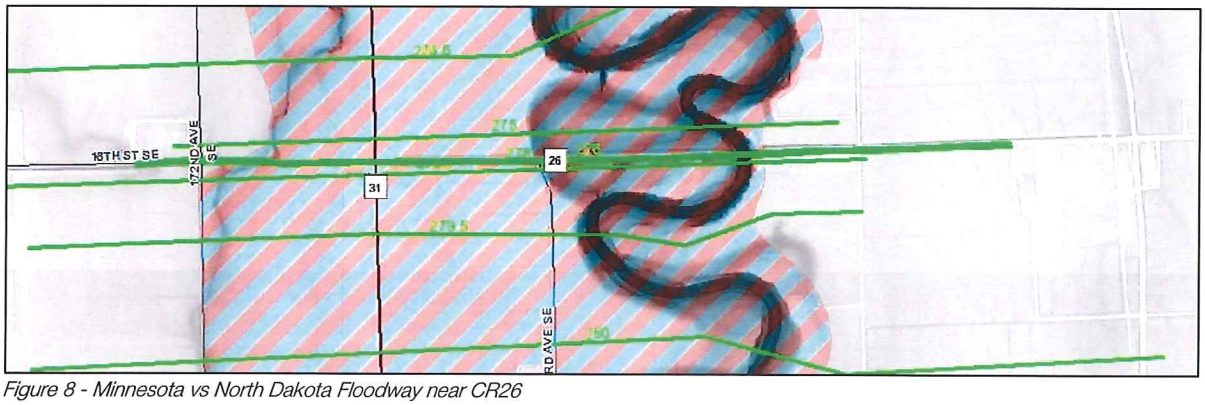


*Figure 8 - Minnesota vs North Dakota Floodway near CR26*

*Table 2 - Floodway Split between North Dakota and Minnesota*

| Cross Section | | FW Width | | | | |
|---|---|---|---|---|---|---|
| Letter | Station | Total | ND | | MN | |
| A | 270 | 7,472 | 4,851 | 65% | 2,621 | 35% |
| B | 271 | 9,522 | 5,645 | 59% | 3,877 | 41% |
| C | 272 | 5,520 | 2,663 | 48% | 2,857 | 52% |
| D | 273 | 5,404 | 2,355 | 44% | 3,049 | 56% |
| E | 274.3 | 7,739 | 7,247 | 94% | 492 | 6% |
| F | 275 | 7,411 | 6,731 | 91% | 680 | 9% |
| G | 279 | 8,413 | 8,198 | 97% | 215 | 3% |
| H | 280 | 9,394 | 8,488 | 90% | 906 | 10% |
| I | 281 | 7,827 | 5,265 | 67% | 2,562 | 33% |
| J | 282 | 5,995 | 3,320 | 55% | 2,675 | 45% |
| K | 283 | 7,788 | 5,764 | 74% | 2,024 | 26% |
| L | 284 | 7,350 | 4,779 | 65% | 2,571 | 35% |
| M | 285 | 5,250 | 2,706 | 52% | 2,544 | 48% |
| N | 286 | 5,588 | 3,777 | 68% | 1,811 | 32% |
| O | 290 | 6,826 | 4,869 | 71% | 1,957 | 29% |
| P | 291 | 5,676 | 5,325 | 94% | 351 | 6% |
| Q | 292 | 7,635 | 4,594 | 60% | 3,041 | 40% |
| R | 293 | 5,743 | 3,355 | 58% | 2,388 | 42% |
| S | 294 | 5,955 | 2,599 | 44% | 3,356 | 56% |
| | | | **MAX:** | 97% | | 56% |
| | | | **MIN:** | 44% | | 3% |
| | | | **Average:** | 69% | | 31% |

## 4. Results

The Floodway Data Table (FWDT) in the Preliminary FIS report was compared to the PFIS model and some differences were found, as shown in Table 4. This table also shows the results from the appeal model and the comparison to the PFIS model for the width, section area, velocity, regulatory water surface elevation, floodway, and surcharge. The elevation differences could be attributed to rounding or a different datum conversion used. The 100-year floodplain increased a maximum of 0.3 ft at cross sections D and E, and decreased a maximum of 0.3 ft at cross section B. The proposed FWDTs with the appeal model results are shown in Table 5 and Table 6 for cross sections A-S.

The Preliminary FIS flood hazard zones are shown in Figure 10, while the appeal model redelineated floodplain and floodway are shown in Figure 11. The floodplain administrators and local landowners had concerns that the Preliminary FIS floodway did not reflect realistic conveyance of the river. The floodway area in the project area was reduced by 1,231 acres from 8,097 to 6,866, but is still a floodway of significant size due to the flat topography of the Red River valley. Figure 12 shows the layers overlaid to compare. The 500-year floodplain didn't change much, but the PFIS 100-year floodplain was held to the section lines, and the appeal model mapping updates the floodplain to extend farther west, which is more consistent with the topography.

### 4.1 Manual Editing

The model cross sections are narrower than the floodplain. In order to map the floodplain, the cross section lines were extended and water surface elevations for each cross section were used to create a surface that was then compared to the LiDAR surface. The outer extents of the cross section overbanks are modeled as ineffective flow areas in the model, so this extension does not need to be modeled. This methodology was also used by AECOM for the Preliminary FIS floodplain delineations.

As mentioned in Section 3.2, the elevations at several locations had changed from the 2008 to 2017 LiDAR. Figure 13 shows these locations, which include newly constructed ring levees and road raises. The high ground was removed from the applicable floodplains, as noted in Figure 13. Ring leveed areas were removed from the floodway because they do not provide conveyance within their footprint during flood event, but they remain in the 1% Annual Chance Floodplain since they are not certified levees.

### 4.2 Tie-ins

FEMA's Contiguous Community Matching Guidance Document 45 states that different hydraulic models can be used for different stream segments, as long as the water surface elevation ties in within 0.5 feet. When backwater computations are used, water surface elevations must tie in exactly. Table 3 shows the tie-ins are less than 0.5 feet for the study reach in Noble and Wiser townships when compared to the effective reaches in Cass and Traill Counties that are outside the extents of the Western Cass FIS.

As mentioned in Section 3.5, there is no effective floodway in Traill County downstream of the study reach. At the upstream end of the study reach, the floodway was delineated to tie into the effective floodway, as shown in Figure 9.

*Table 3 - 100-year Water Surface Elevation Tie-ins*

| | Cross Section | | Effective 100-year | Appeal 100-year | Proposed-Effective | Tie-Ins |
|---|---|---|---|---|---|---|
| Study Reach | X | 269 | 874.37 | 874.36 | -0.01 | --- |
| | A/AM | 270 | 874.87 | 874.78 | -0.09 | 0.41 |
| | S | 294 | --- | 884.31 | --- | -0.39 |
| | T | 295 | 884.70 | 884.87 | 0.17 | --- |

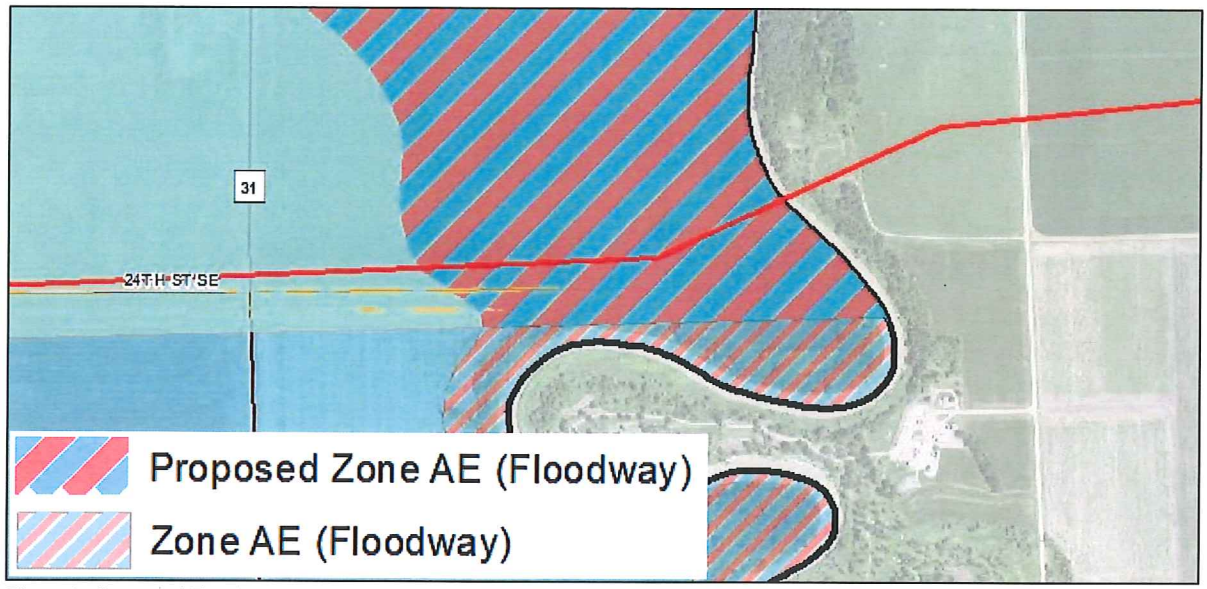


*Figure 9 - Proposed Floodway Tie-in at Wiser/Harwood Township line*

## 5. Conclusion

The models used for the Preliminary FIS in Noble and Wiser townships were combined into one model and the coordinate system and datum were updated to match the FIS report using feet and the NAVD88 datum. The model geometry was updated with new bridge plans, survey, and LiDAR ground elevations and the model was run in the latest version of HEC-RAS 5.0.7. This simplified model is a major benefit to Cass County and the Townships administering the floodplain, as well as the Office of the State Engineer which has regulatory authority over the floodway. The township floodplain administrators support the appeal results as being more accurate.

The following supporting documentation will be included in this appeal submittal:

- Letters from Noble and Wiser Township floodplain administrators
- County Road 26 Bridge plans
- Models
    - 9 plans for comparison
        - Eldred to Perley original: Historic, FIS flows, and Floodway plans (3)
        - Eldred to Perley WCass FIS: FIS flows and Floodway plans (2)
        - Fargo Oakport: FIS flows and Floodway (2)
        - Eldred to Argus Appeal: FIS flows and Floodway (2)
    - 2 plans for future regulatory use
        - Eldred to Argus Appeal: FIS flows and Floodway (2)
    - RASmapper files
- Map Package
    - Survey points
    - LiDAR surface
    - Proposed flood hazard zones, cross sections, and BFE line shapefiles
    - Aerial imagery
    - ND Roads

*Table 4 - Comparison of Preliminary FIS Report, PFIS Model, and Appeal Model Floodway Data Table*

| Cross Section | | | PFIS Floodway Data Table (FWDT) | | | | | | PFIS Model | | | | | | PFIS Model-FWDT Difference | | | | | | Appeal Model | | | | | | Appeal - PFIS Difference | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Letr | PFIS Station | Appeal Station | Width | Section Area | Mean Vel | 100-year | Flood way | Increase | Width | Section Area | Mean Vel | 100-year | Flood way | Increase | Width | Section Area | Mean Vel | 100-year | Flood way | Increase | Width | Section Area | Mean Vel | 100-year | Flood way | Increase | Width | Section Area | Mean Vel | 100-year | Flood way | Increase |
| A | 270 | 270 | 10,050 | 55,417 | 1.0 | 874.8 | 875.6 | 0.8 | 10,050 | 55,368 | 1.01 | 874.9 | 875.6 | 0.73 | 0 | -49 | 0.0 | 0.1 | 0.0 | -0.1 | 7,472 | 47,840 | 1.17 | 874.8 | 875.5 | 0.73 | -2,578 | -7,528 | 0.2 | -0.1 | -0.1 | 0.0 |
| B | 271 | 271 | 8,900 | 52,764 | 1.1 | 875.4 | 876.2 | 0.8 | 8,900 | 52,732 | 1.06 | 875.5 | 876.2 | 0.71 | 0 | -32 | 0.0 | 0.1 | 0.0 | -0.1 | 9,522 | 48,756 | 1.15 | 875.2 | 876 | 0.75 | 622 | -3,976 | 0.1 | -0.3 | -0.2 | 0.0 |
| C | 272 | 272 | 7,700 | 53,053 | 1.1 | 876.1 | 876.8 | 0.7 | 7,693 | 53,032 | 1.06 | 876.1 | 876.9 | 0.74 | -7 | -21 | 0.0 | 0.0 | 0.1 | 0.1 | 5,520 | 38,980 | 1.44 | 876.2 | 876.8 | 0.6 | -2,173 | -14,052 | 0.4 | 0.1 | 0.0 | -0.1 |
| D | 273 | 273 | 7,350 | 61,478 | 0.9 | 876.6 | 877.3 | 0.7 | 7,350 | 61,462 | 0.91 | 876.6 | 877.3 | 0.68 | 0 | -16 | 0.0 | 0.0 | 0.0 | 0.0 | 5,404 | 43,532 | 1.29 | 876.9 | 877.5 | 0.59 | -1,946 | -17,931 | 0.4 | 0.3 | 0.2 | -0.1 |
| E | 274 | 274.3 | 8,300 | 57,001 | 1.0 | 876.9 | 877.6 | 0.7 | 8,300 | 56,986 | 0.98 | 877 | 877.6 | 0.63 | 0 | -15 | 0.0 | 0.1 | 0.0 | -0.1 | 7,739 | 52,962 | 1.06 | 877.3 | 878 | 0.69 | -561 | -4,024 | 0.1 | 0.3 | 0.4 | 0.1 |
| F | 275 | 275 | 8,600 | 71,004 | 0.8 | 877.4 | 878 | 0.6 | 8,589 | 70,758 | 0.79 | 877.5 | 878 | 0.55 | -12 | -246 | 0.0 | 0.1 | 0.0 | -0.1 | 7,411 | 51,248 | 1.09 | 877.7 | 878.4 | 0.72 | -1,178 | -19,510 | 0.3 | 0.2 | 0.4 | 0.2 |
| G | 279 | 279 | 8,650 | 67,896 | 0.8 | 877.8 | 878.5 | 0.7 | 8,647 | 66,029 | 0.85 | 877.8 | 878.4 | 0.54 | -3 | -1,867 | 0.1 | 0.0 | -0.1 | -0.1 | 8,413 | 74,584 | 0.75 | 877.8 | 878.6 | 0.74 | -234 | 8,555 | -0.1 | 0.0 | 0.2 | 0.2 |
| H | 280 | 280 | 9,400 | 58,892 | 1.0 | 878 | 878.7 | 0.7 | 9,392 | 58,892 | 0.95 | 878 | 878.7 | 0.68 | -8 | 0 | 0.0 | 0.0 | 0.0 | 0.0 | 9,394 | 59,805 | 0.94 | 878.1 | 878.8 | 0.72 | 2 | 913 | 0.0 | 0.1 | 0.1 | 0.0 |
| I | 281 | 281 | 7,240 | 52,338 | 1.1 | 878.5 | 879.2 | 0.7 | 7,240 | 52,338 | 1.07 | 878.5 | 879.2 | 0.68 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 | 7,827 | 54,745 | 1.02 | 878.6 | 879.3 | 0.7 | 587 | 2,406 | -0.1 | 0.0 | 0.1 | 0.0 |
| J | 282 | 282 | 7,190 | 59,634 | 0.9 | 879.4 | 880 | 0.6 | 7,190 | 59,974 | 0.94 | 879.4 | 880.1 | 0.64 | 0 | 340 | 0.0 | 0.0 | 0.1 | 0.1 | 5,995 | 54,658 | 1.03 | 879.5 | 880.2 | 0.7 | -1,195 | -5,316 | 0.1 | 0.0 | 0.1 | 0.1 |
| K | 283 | 283 | 7,700 | 42,152 | 1.3 | 880.6 | 881.1 | 0.5 | 7,700 | 42,295 | 1.33 | 880.6 | 881.1 | 0.5 | 0 | 143 | 0.0 | 0.0 | 0.0 | 0.0 | 7,788 | 43,997 | 1.27 | 880.7 | 881.3 | 0.62 | 88 | 1,702 | -0.1 | 0.0 | 0.1 | 0.1 |
| L | 284 | 284 | 7,350 | 43,298 | 1.2 | 881.6 | 882.3 | 0.7 | 7,350 | 43,375 | 1.24 | 881.6 | 882.3 | 0.68 | 0 | 77 | 0.0 | 0.0 | 0.0 | 0.0 | 7,350 | 43,881 | 1.22 | 881.6 | 882.3 | 0.74 | 0 | 506 | 0.0 | 0.0 | 0.1 | 0.1 |
| M | 285 | 285 | 5,250 | 55,001 | 1.0 | 881.7 | 882.4 | 0.7 | 5,250 | 55,053 | 0.98 | 881.7 | 882.4 | 0.7 | 0 | 52 | 0.0 | 0.0 | 0.0 | 0.0 | 5,250 | 55,399 | 0.97 | 881.7 | 882.5 | 0.75 | 0 | 345 | 0.0 | 0.0 | 0.1 | 0.1 |
| N | 286 | 286 | 5,600 | 24,377 | 2.2 | 881.9 | 882.6 | 0.7 | 5,587 | 24,431 | 2.20 | 881.9 | 882.6 | 0.66 | -13 | 54 | 0.0 | 0.0 | 0.0 | 0.0 | 5,588 | 24,789 | 2.17 | 881.9 | 882.6 | 0.71 | 1 | 357 | 0.0 | 0.0 | 0.1 | 0.1 |
| O | 290 | 290 | 6,883 | 30,270 | 1.8 | 882.2 | 882.8 | 0.6 | 6,883 | 30,333 | 1.77 | 882.2 | 882.8 | 0.64 | 0 | 63 | 0.0 | 0.0 | 0.0 | 0.0 | 6,826 | 31,697 | 1.69 | 882.2 | 882.9 | 0.69 | -57 | 1,365 | -0.1 | 0.0 | 0.1 | 0.0 |
| P | 291 | 291 | 5,500 | 37,366 | 1.4 | 883 | 883.6 | 0.6 | 5,489 | 37,401 | 1.44 | 883 | 883.6 | 0.66 | -11 | 35 | 0.0 | 0.0 | 0.0 | 0.0 | 5,676 | 38,029 | 1.41 | 883 | 883.6 | 0.67 | 187 | 629 | 0.0 | 0.0 | 0.0 | 0.0 |
| Q | 292 | 292 | 7,740 | 46,128 | 0.9 | 883.4 | 884.1 | 0.7 | 7,740 | 46,168 | 0.91 | 883.4 | 884.1 | 0.68 | 0 | 40 | 0.0 | 0.0 | 0.0 | 0.0 | 7,635 | 45,736 | 0.91 | 883.4 | 884.1 | 0.7 | -105 | -432 | 0.0 | 0.0 | 0.0 | 0.0 |
| R | 293 | 293 | 6,320 | 31,522 | 1.5 | 884 | 884.7 | 0.7 | 5,741 | 28,857 | 1.45 | 884 | 884.7 | 0.68 | -579 | -2,665 | 0.0 | 0.0 | 0.0 | 0.0 | 5,743 | 28,954 | 1.44 | 884 | 884.7 | 0.71 | 3 | 97 | 0.0 | 0.0 | 0.0 | 0.0 |
| S | 294 | 294 | 7,275 | 36,396 | 1.3 | 884.3 | 885 | 0.7 | 7,275 | 31,460 | 1.33 | 884.3 | 885 | 0.68 | 0 | -4,936 | 0.0 | 0.0 | 0.0 | 0.0 | 5,955 | 26,515 | 1.58 | 884.3 | 885 | 0.72 | -1,320 | -4,945 | 0.3 | 0.0 | 0.0 | 0.0 |

*Table 5 - Appeal Floodway Data Table: Cross Sections A-J*

| LOCATION | | FLOODWAY | | | 1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET)[2] | SECTION AREA (SQ FEET) | MEAN VELOCITY (FEET/ SEC) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| A | 243.17 | 7,472/ 4,851 | 47,840 | 1.2 | 874.8 | 874.8 | 875.5 | 0.7 |
| B | 245.23 | 9,522/ 5,645 | 48,756 | 1.2 | 875.2 | 875.2 | 876.0 | 0.8 |
| C | 247.72 | 5,520/ 2,663 | 38,980 | 1.4 | 876.2 | 876.2 | 876.8 | 0.6 |
| D | 250.16 | 5,404/ 2,355 | 43,532 | 1.3 | 876.9 | 876.9 | 877.5 | 0.6 |
| E | 251.94 | 7,739/ 7,247 | 52,962 | 1.1 | 877.3 | 877.3 | 878.0 | 0.7 |
| F | 254.33 | 7,411/ 6,731 | 51,248 | 1.1 | 877.7 | 877.7 | 878.4 | 0.7 |
| G | 254.47 | 8,413/ 8,198 | 74,584 | 0.8 | 877.8 | 877.8 | 878.6 | 0.7 |
| H | 255.79 | 9,394/ 8,488 | 59,805 | 0.9 | 878.1 | 878.1 | 878.8 | 0.7 |
| I | 257.32 | 7,827/ 5,265 | 54,745 | 1.0 | 878.6 | 878.6 | 879.3 | 0.7 |
| J | 261.02 | 5,995/ 3,320 | 54,658 | 1.0 | 879.5 | 879.5 | 880.2 | 0.7 |

[1]Stream distance in miles above International Border
[2]Total floodway width/ width within jurisdiction

PROPOSED

| TABLE 1 | FEDERAL EMERGENCY MANAGEMENT AGENCY | FLOODWAY DATA |
|---|---|---|
| | CASS COUNTY, ND ALL JURISDICTIONS | FLOODING SOURCE: RED RIVER OF THE NORTH |

*Table 6 - Appeal Floodway Data Table: Cross Sections K-S*

| LOCATION | | FLOODWAY | | | 1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET)[3] | SECTION AREA (SQ FEET) | MEAN VELOCITY (FEET/ SEC) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| K | 264.04 | 7,788/ 5,764 | 43,997 | 1.3 | 880.7 | 880.7 | 881.3 | 0.6 |
| L | 265.79 | 7,350/ 4,779 | 43,881 | 1.2 | 881.6 | 881.6 | 882.3 | 0.7 |
| M | 266.20 | 5,250/ 2,706 | 55,399 | 1.0 | 881.7 | 881.7 | 882.5 | 0.8 |
| N | 266.66 | 5,588/ 3,777 | 24,789 | 2.2 | 881.9 | 881.9 | 882.6 | 0.7 |
| O | 266.75 | 6,826/ 4,869 | 31,697 | 1.7 | 882.2 | 882.2 | 882.9 | 0.7 |
| P | 267.92 | 5,676/ 5,325 | 38,029 | 1.4 | 883.0 | 883.0 | 883.6 | 0.7 |
| Q | 269.00 | 7,635/ 4,594 | 45,736 | 0.9 | 883.4 | 883.4 | 884.1 | 0.7 |
| R | 270.74 | 5,743/ 3,355 | 28,954 | 1.4 | 884.0 | 884.0 | 884.7 | 0.7 |
| S | 271.14 | 5,955/ 2,599 | 26,515 | 1.6 | 884.3 | 884.3 | 885.0 | 0.7 |
| T | 272.75/ 205.81[2] | 2,370 | 33,720 | 1.6 | 884.7 | 884.7 | 885.5 | 0.8 |

Outside Project Area

[1]Stream distance in miles above International Border

[2]Inaccurate stream distance in miles above International Border

[3]Total floodway width/ width within jurisdiction

PROPOSED

| TABLE 2 | FEDERAL EMERGENCY MANAGEMENT AGENCY | FLOODWAY DATA |
|---|---|---|
| | CASS COUNTY, ND ALL JURISDICTIONS | FLOODING SOURCE: RED RIVER OF THE NORTH |

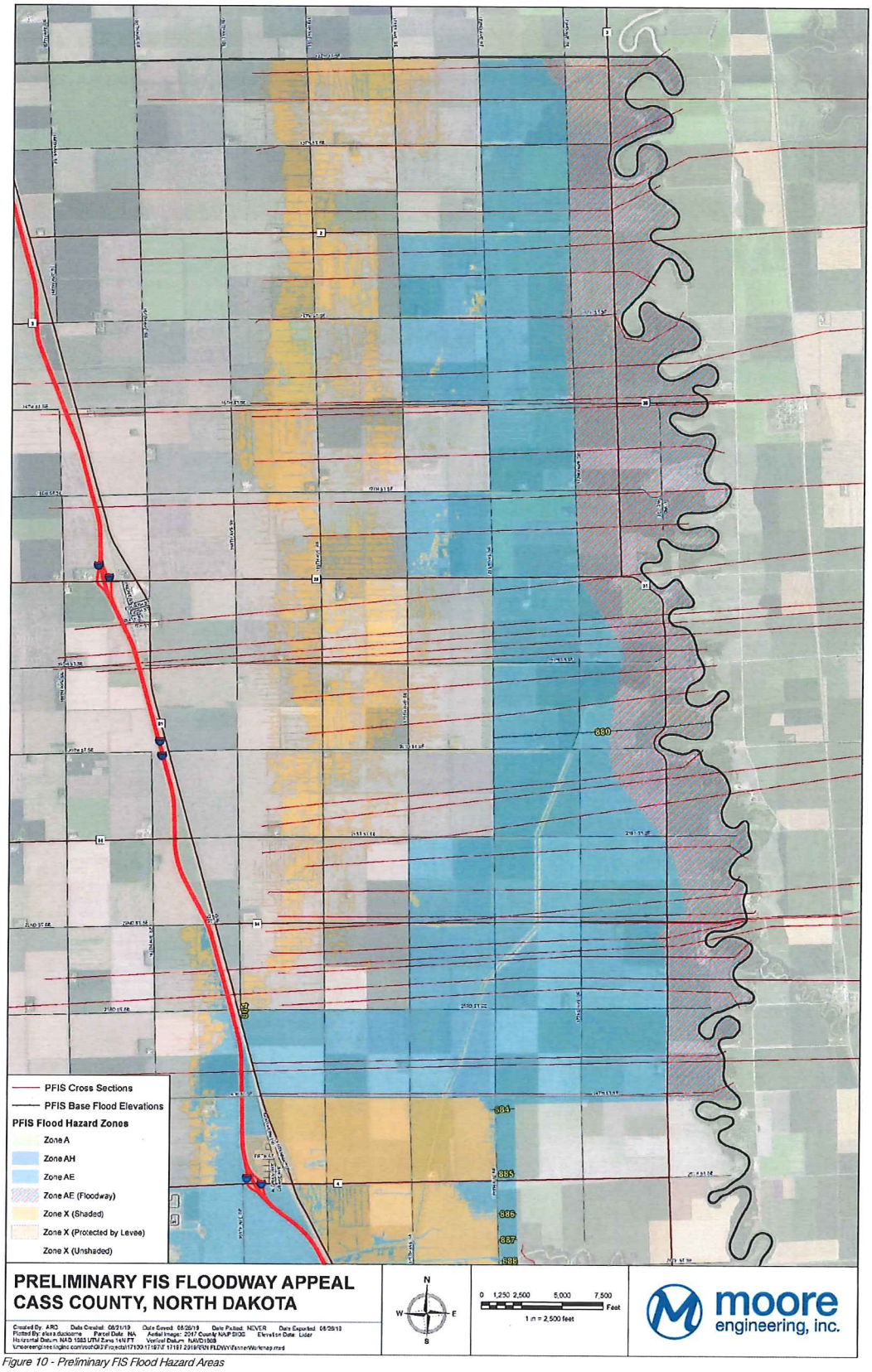


*Figure 10 - Preliminary FIS Flood Hazard Areas*

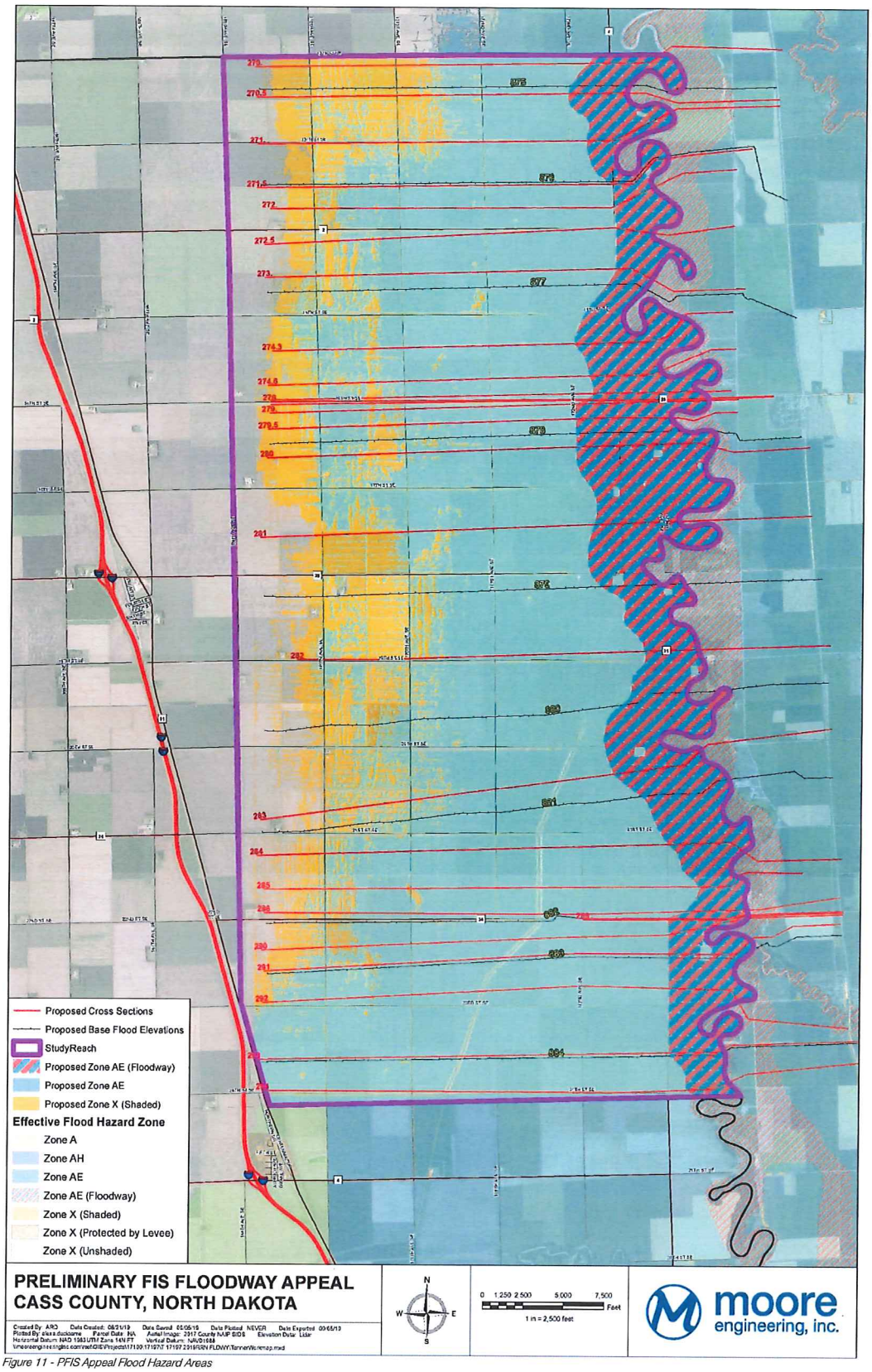


*Figure 11 - PFIS Appeal Flood Hazard Areas*

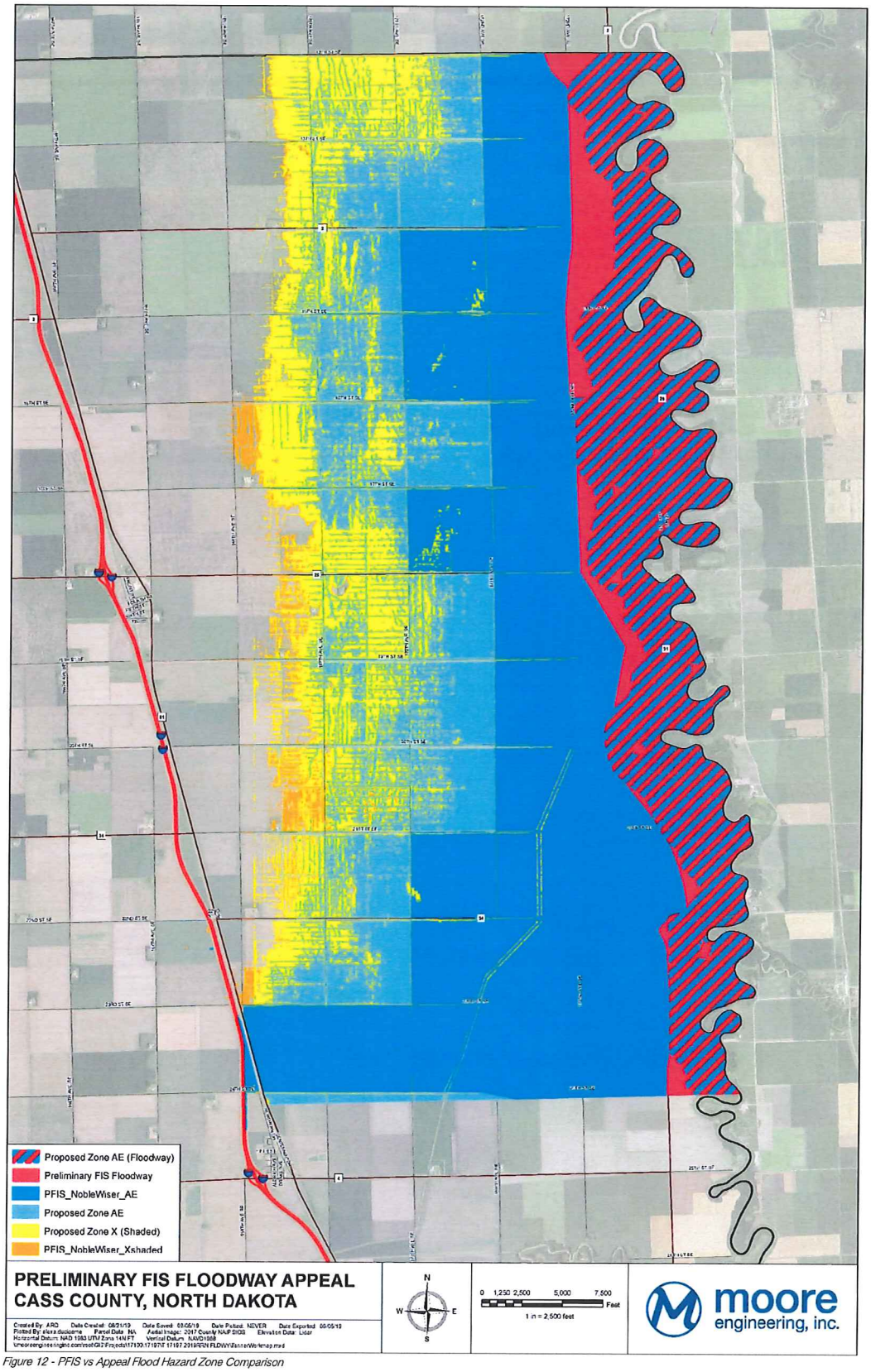


*Figure 12 - PFIS vs Appeal Flood Hazard Zone Comparison*

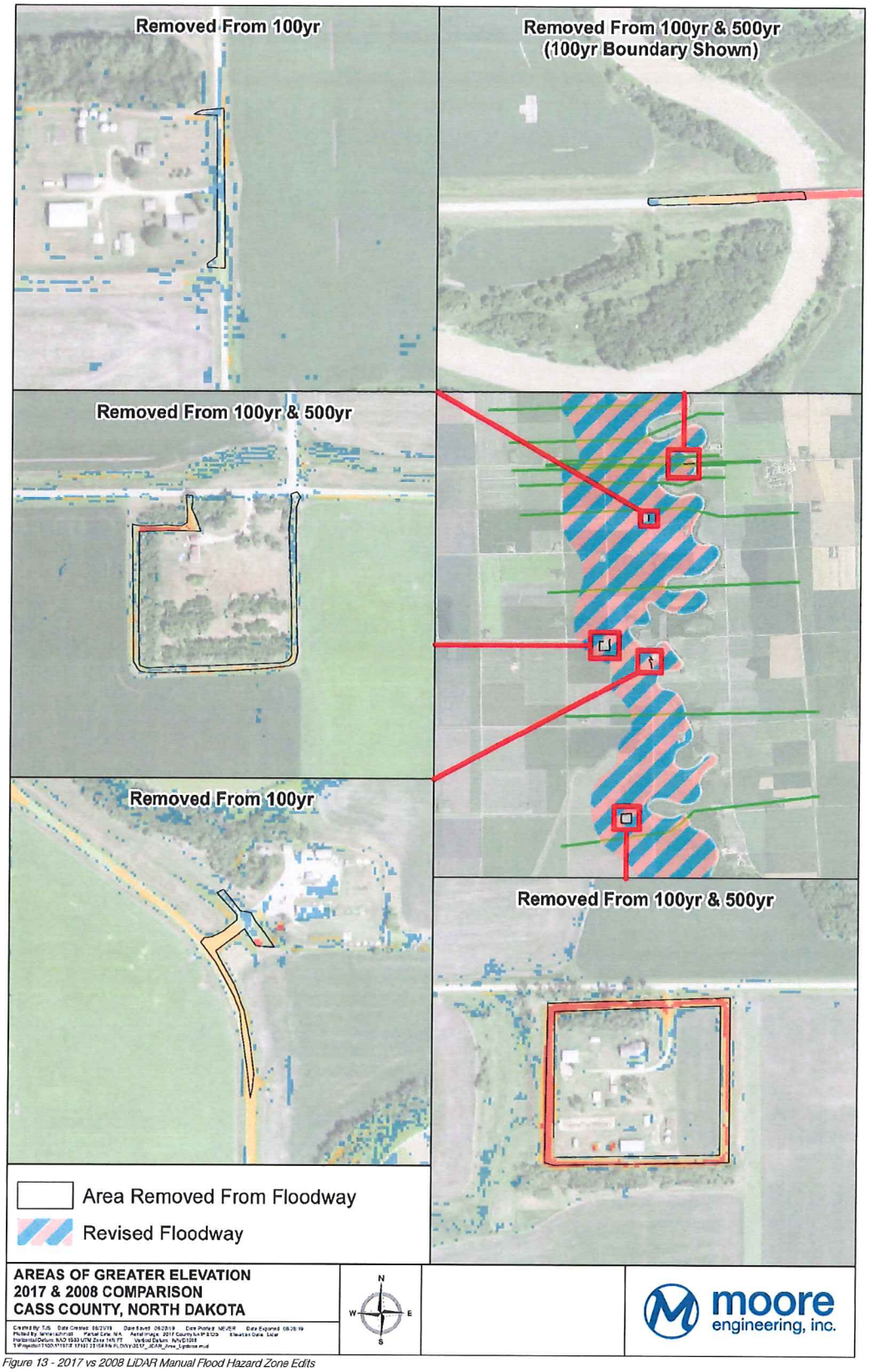


*Figure 13 - 2017 vs 2008 LiDAR Manual Flood Hazard Zone Edits*

# Cass County, ND
# City of Arthur Floodplain Map Appeal

Prepared for
David Sutley, PE, FEMA Region VIII

September 2019

Prepared by:
Kurt Lysne, PE, CFM
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moore engineering, inc.

444 Sheyenne St Ste 301
West Fargo, ND 58078

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

REGISTERED PROFESSIONAL ENGINEER
KURT LYSNE
PE-6871
DATE 9/6/19
NORTH DAKOTA

REGISTERED PROFESSIONAL ENGINEER
ALEXA R DUCIOAME
PE-10599
DATE 9/6/19
NORTH DAKOTA

Kurt Lysne, PE, CFM
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Date: 9/6/19

Alexa Ducioame, PE, CFM
PE-10599
Date: 9/6/19

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# Figures



# Tables

## 1. Background

The north and south branches of an unnamed coulee run through the city of Arthur, then converge and flow east to the Elm River, a tributary of the Red River of the North. A general layout of the coulee and street names is shown in Figure 1.

The Effective Flood Insurance Rate Map for Arthur has mapped area along this coulee as Zone A. Zone A is an area where the 1 – percent annual chance (100-yr) floodplain has been mapped, but the 100-yr Base Flood Elevation (BFE) has not been defined. As part of the Western Cass Flood Insurance Study (FIS), a model was created for an approximate study and a new Zone A flood hazard area was proposed. The Effective and Preliminary FIS floodplains are shown in Figure 2.

Moore Engineering was contracted by the Cass County Joint Water Resource District and the City of Arthur to investigate the mapping updates and create a refined model to more accurately delineate the floodplain.

All elevations are in the NAVD88 vertical datum.

## 2. Hydrology

The Preliminary FIS report stated that U.S. Geological Survey (USGS) *Water-Resources Investigations Report 92-4040* for streams in South Carolina was used for the hydrology for approximate streams [1].

Moore delineated the contributing area and watershed slope based on LiDAR using the HEC-GeoHMS extension within Arc-GIS. The USGS *Scientific Investigations Report 2015-5096* for streams in North Dakota was used to calculate the 1% Annual Chance (100-yr) event discharges for the area with regression equations [2].

This method produced a discharge over 300 cfs at the upstream end of the north branch, however there is a single 36 inch culvert through the abandoned Highway 18 and the same through the new Highway 18. It would not be valid to ignore the attenuating effect of these culverts and road embankments. CulvertMaster ® was used to calculate a maximum discharge that could pass through the culverts assuming the upstream headwater was equal to the top of road elevation for the highway. This is conservative since the highway has never overtopped from large-volume snowmelt events, which have a much higher volume of runoff than summer rainfall events and the culvert discharge is much more dependent on volume than peak discharge. A flow of 65 cfs was determined and used for the upstream limit discharge on the north branch. Additional local drainage comes in downstream of the Highway 18 crossing, so the flow increases to 95 cfs at that location. This is reasonable close to the Preliminary FIS model discharge of 111 cfs.

The USGS equations resulted in a calculated flow of 219 cfs at the upstream end of the south branch, this is considerably higher than the Prelimnary FIS discharge of 137 cfs.. The south branch has larger culverts through the Old and New Highway 18 crossings, so a similar check in CulvertMaster ® found that all of the flow could pass through. The flow for the downstream reach was determined by adding together the north and south branches.

Table 1 shows a comparison of flows calculated from the regression equations chosen for the FIS

and Moore models.

*Table 1 - 1% Annual Chance (100-year) Flow Rates*

| Reach | Location | River Station | Flow (cfs) | |
|---|---|---|---|---|
| | | | FIS | Moore |
| Upstream North | US limit | 4426 | 100 | 334 (65) |
| | DS of Hwy 18 | 1450 | 111 | 95 |
| Upstream South | US limit | 8067 | 137 | 219 |
| | US of 6th Ave | 4211 | 142 | |
| Downstream | US limit | 3138 | 225 | 314 |

US=Upstream DS=Downstream

## 3. Hydraulic Analysis

The Preliminary FIS model used the Hydrologic Engineering Center River Analysis System (HEC-RAS) v4.0. This approximate study used DSS-WISE as a preprocessor to create a HEC-RAS model from the terrain data. An automated routine in WISE was used to place cross sections, but no structures (bridges or culverts) were added to the model. Manning's n channel roughness values were set at 0.04 in the channel and 0.09 in the overbanks. The model was then run to route flood discharges. No historical data was available, so no calibration was performed on the models. However, the results were reviewed for dam effects and compared against the effective floodplain.

Moore used the GeoRAS extension within ArcGIS and GeoHECRAS software to create new channel cross sections and structures to update the HEC-RAS model in v5.0.3. The elevation data came from a combination of Light Detection and Ranging (LiDAR) data from 2008 and survey collected along the south branch in May of 2015 and along the north branch and downstream reach in June of 2017. Bridges and culvert crossings were added into the model using survey data. Manning's n values of 0.032 in the channel and 0.045 in the overbanks were used to represent a clean channel with grass or crop overbanks [3]. Flooding is more likely to occur in the spring with less vegetation, so these values are conservative. Normal depth was used as the downstream boundary condition. A comparison of the FIS and Moore model layouts is shown in Figure 3.

The buried pipe shown as a dashed line in Figure 3 was undersized when the Flood Insurance Study began. Recent flooding events caused components of that current storm sewer system to degrade and fail. The pipe was completely rusted with many holes and portions completely missing. A September 2017 storm washed out part of a street, and the pipe bedding was also being undermined by erosion. The storm sewer system was no longer able to convey drainage as it was originally designed to do. In addition, the area between 2nd and 4th Avenues would have been mapped into the 100-year floodplain because the existing buried pipe did not have the capacity to convey that event. An upgraded system with a single concrete 65x40 inch arch pipe was installed in 2019 to provide an adequate storm sewer and reduce the risk of flooding for homeowners.

## 4. Results

Figure 4 shows a comparison of the Preliminary FIS and Corrected floodplains. The appeal model

floodplain was edited manually upstream of the old County Road 18 on the north branch to reflect the flow restricted by the 36 inch culvert. The floodplain was also edited immediately downstream of Highway 18 and a few other small areas where it was crossing contour lines.

The Preliminary FIS is mapped in red and the Corrected floodplain is in blue. The layers are transparent to show the background imagery. Where the two floodplains are the same it appears as purple. There are a few small blue areas that show an increase in the floodplain. The red areas show a decrease in the floodplain from the Preliminary FIS to the Corrected model. This is due to improved cross sections, the new 65x40 inch arch pipe, and corrected Manning's n values.

The following supporting documentation will be included in this appeal submittal:

- Letter from Mayor of Arthur
- HEC-RAS model
- New 65x40 inch arch pipe record drawing
- Map Package
    - Survey points
    - LiDAR surface
    - Proposed Zone A and cross sections
    - Aerial imagery
    - ND roads

## Bibliography

[1] L. R. Bohman, "Determination of Flood Hydrographs for Streams in South Carolina: Volume 2. Estimation of Peak-Discharge Frequency, Runoff Volumes, and Flood Hydrographs for Urban Watersheds - Water-Resources Investigations Report 92-4040," U.S. Geological Survey, Columbia, South Carolina, 1992.

[2] T. Williams-Sether, "Regional Regression Equations to Estimate Peak-Flow Frequency at Sites in North Dakota Using Data through 2009 - Scientific Investigations Report 2015-5096," U.S. Geological Survey, Reston, Virginia, 2015.

[3] V. T. Chow, Open Channel Hydraulics, New York: McGraw-Hill, 1959.

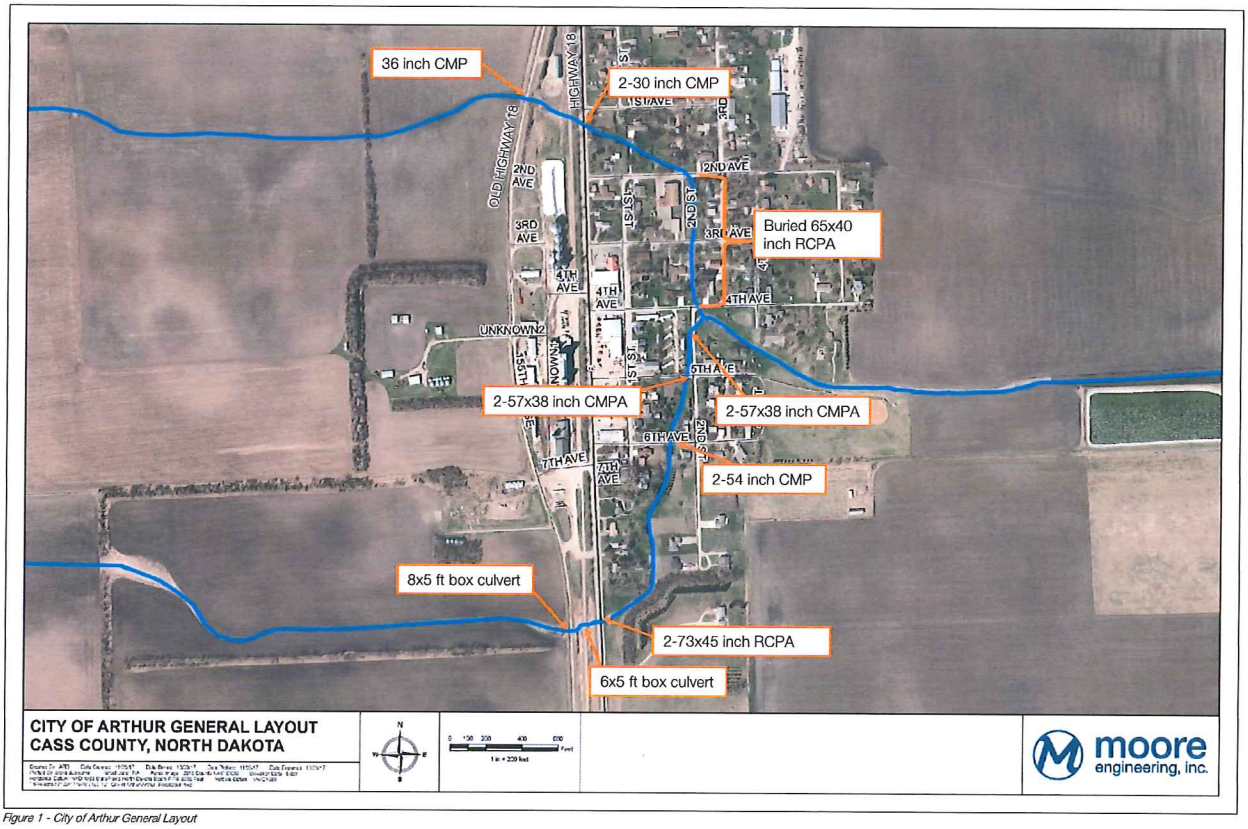


*Figure 1 - City of Arthur General Layout*

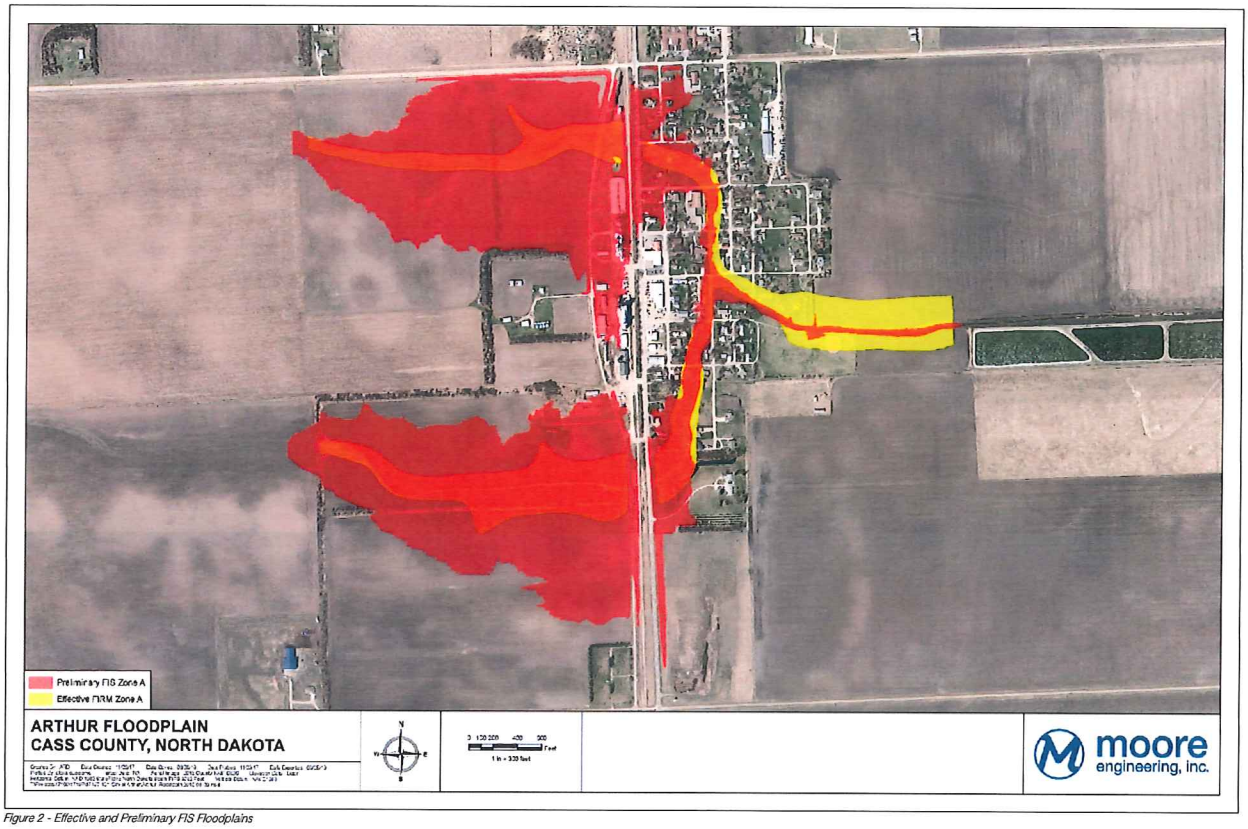


*Figure 2 - Effective and Preliminary FIS Floodplains*

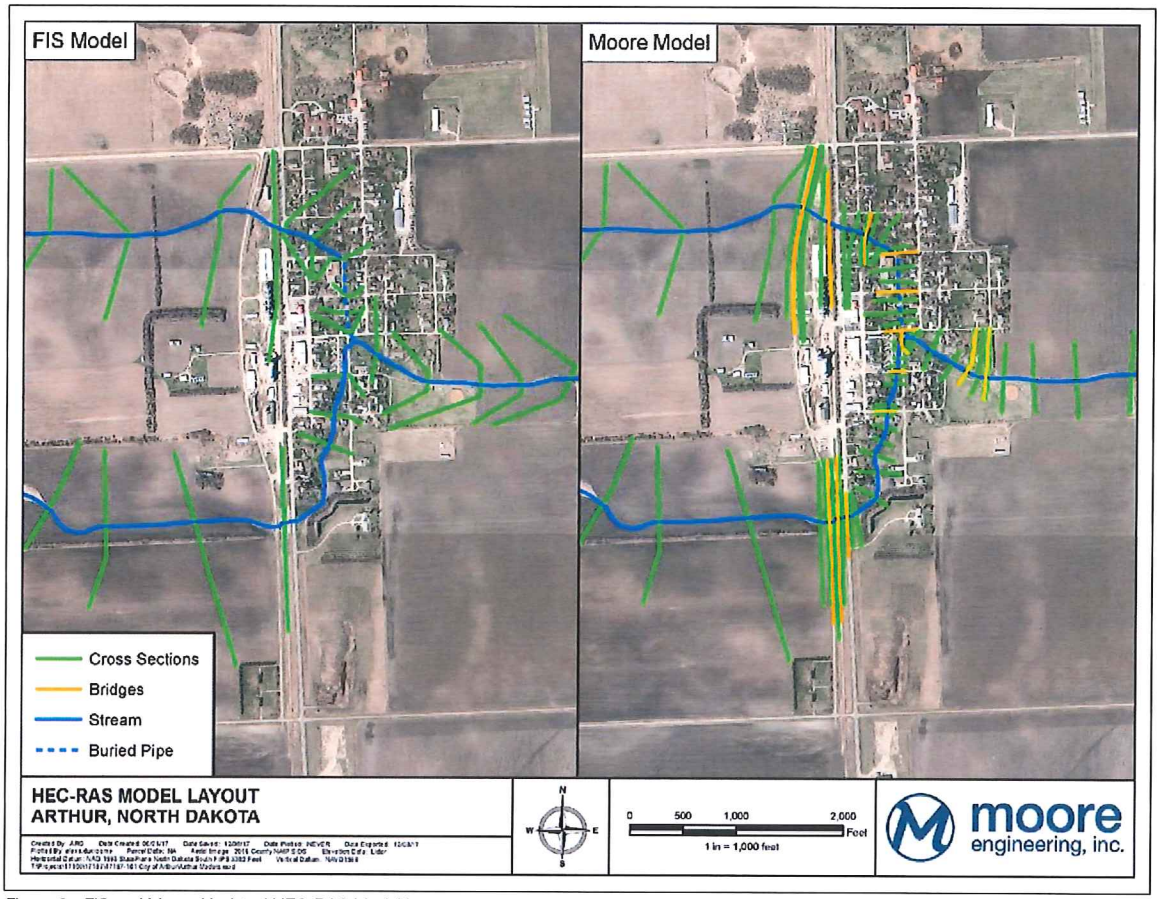


*Figure 3 - FIS and Moore Updated HEC-RAS Model Layouts*

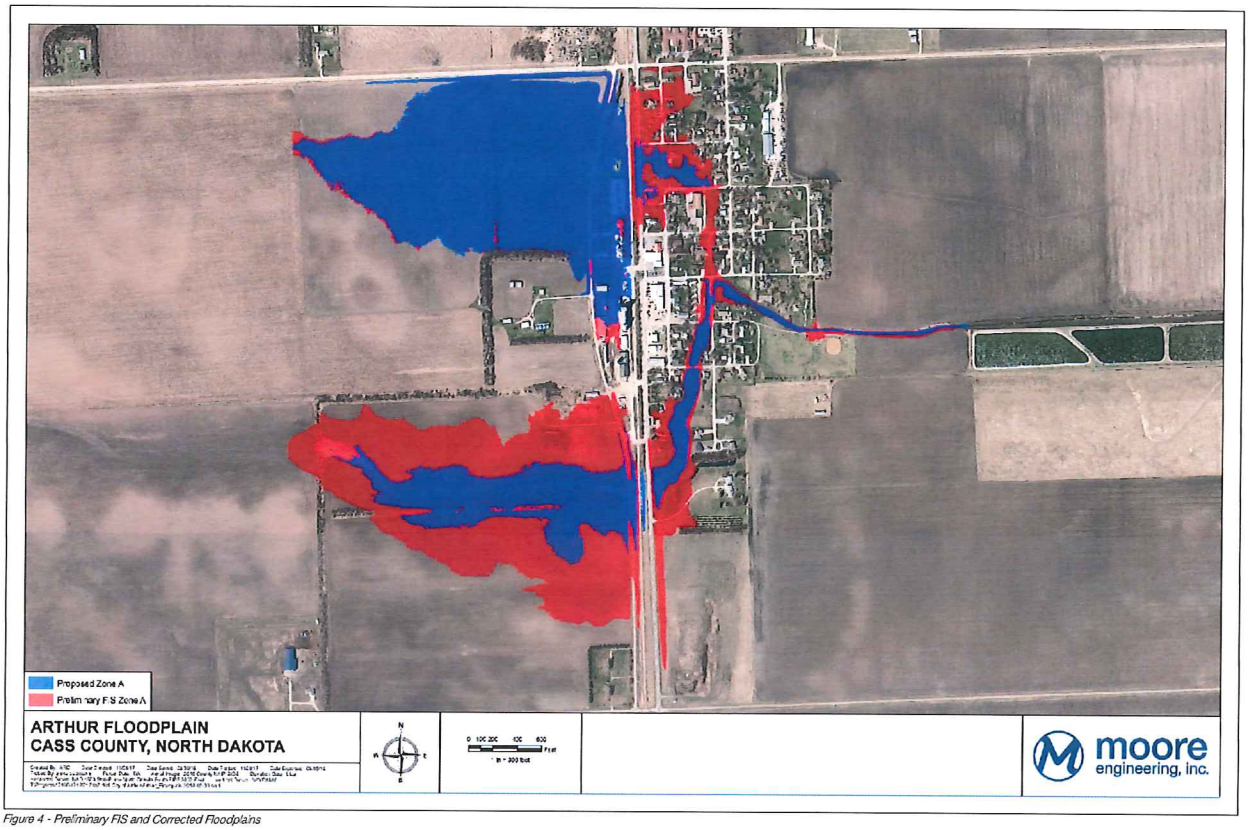


*Figure 4 - Preliminary FIS and Corrected Floodplains*

CASS COUNTY GOVERNMENT

September 20, 2019

RECEIVED
CASS COUNTY COMMISSION
SEP 20 2019

Cass County
Joint Water
Resource
District

Mary Scherling, Chair
Cass County Commission
P.O. Box 2806
Fargo, ND 58108-2806

Dear Chair Scherling:

RE: Lake Bertha Flood Control Project No. 75

Enclosed is a spreadsheet outlining final costs regarding Lake Bertha Flood Control Project No. 75. The cost of this project slightly exceeded the estimate; therefore, we respectfully request your consideration for additional cost-share on the local project cost in the amount of $8,733.97.

The Cass County Flood Sales Tax Committee approved 50% cost-share on the local project cost in the amount of $66,215.45 at its May 2, 2016, meeting. The breakdown of project costs is shown below:

| | |
|---|---|
| Total Cost | $629,632.38 |
| Less SWC cost-share | 201,350.00 |
| Less RRJT cost-share | 278,383.55 |
| Local Cost | 149,898.83 |
| | |
| CCFST (50% of local cost) | 74,949.42 |
| CCFST cost-share approved | 66,215.45 |
| Additional cost-share requested | $ 8,733.97 |

If you have any questions, please feel free to contact us. Thank you.

Sincerely,

CASS COUNTY JOINT WATER RESOURCE DISTRICT

Carol Harbeke Lewis
Secretary–Treasurer

Enclosure



Carol Harbeke Lewis
Secretary-Treasurer

1201 Main Avenue West
West Fargo, ND 58078-1301

701-298-2381
FAX 701-298-2397
wrd@casscountynd.gov
casscountynd.gov

LAKE BERTHA FLOOD CONTROL PROJECT NO 75
SUMMARY

| | |
|---|---|
| LEGAL | $42,041.77 |
| ENGINEERING - ASSESSMENT DISTRICT DEVELOPMENT | 25,650.59 |
| ENGINEERING - PRELIMINARY ENGINEERING-STUDY | 48,973.95 |
| ENGINEERING - PERMITTING | 3,522.50 |
| ENGINEERING - RIGHT OF WAY ADMINISTRATION | 13,160.50 |
| ENGINEERING - LAND SURVEYING | 12,578.40 |
| ENGINEERING - DESIGN SERVICES | 38,500.00 |
| ENGINEERING - UTILITY COORDINATION | 285.00 |
| ENGINEERING - CONSTRUCTION SERVICES | 30,800.00 |
| LEGAL ADVERTISEMENTS | 478.17 |
| UTILITY RELOCATION | 0.00 |
| RIGHT-OF-WAY | 58,996.00 |
| CONSTRUCTION | 353,795.50 |
| MISCELLANEOUS | 850.00 |
| Total Project costs | $629,632.38 |
| Total SWC paid-to-date | -$201,350.00 |
| Total RRJT paid-to-date | -278,383.55 |
| Total Local cost | $149,898.83 |
| | $74,949.42 |
| CC Sales Tax Approved | -66,215.45 |
| | $8,733.97 |