Preliminary Draft

WATERSHED PLAN AND ENVIRONMENTAL IMPACT STATEMENT
for
Upper Maple River Watershed Site 2A

Cass County Joint Water Resource District
Barnes, Cass, Steele, and Griggs Counties, North Dakota

Prepared by:
U.S. Department of Agriculture
Natural Resources Conservation Service

In Cooperation with:
Cass County Joint Water Resource District,
U.S. Army Corps of Engineers

MARCH 2025

Abstract (Fly Sheet)

Preliminary Draft
Watershed Plan and Environmental Assessment
for
Upper Maple Site 2A in the
Upper Maple River Watershed
Barnes, Cass, Steele, and Griggs Counties, North Dakota

Prepared by:
U.S. Department of Agriculture, Natural Resources Conservation Service
In Cooperation with:
Cass County Joint Water Resource District,
U.S. Army Corps of Engineers

AUTHORITY

The watershed plan was prepared under the authority of the Watershed Protection and Flood Prevention Act of 1954 (Public Law 83-566) and the Regional Conservation Partnership Program (RCPP; 16 U.S.C Chapter 58, Subchapter VIII).

ABSTRACT

Flooding within the Upper Maple watershed results in regular, significant damages to agricultural fields, transportation infrastructure, and generates significant nutrient runoff due to long duration cropland inundation. The watershed discharges to the Red River of the North, which is an international water that flows into Lake Winnipeg. Under the terms of Article IV of the Boundary Waters Treaty of 1909 with Canada, the United States government agreed to phosphorus and nitrogen concentration objectives at the international border crossing of the Red River through the International Joint Commission, which will require significant reductions. The Maple River watershed is a significant contributor of nutrient runoff to the Red River. The Red River Basin is one of the largest artificially drained landscapes in the world and lies within the Prairie Pothole Region of the northern Great Plains, where restoration of wetland habitat is a critical need for wildlife.

The Preferred Alternative consists of a dry dam located on a tributary of the Upper Maple River that will provide short-term floodwater retention and has a drainage area of 59.7 square miles, embankment length of 2.3 miles, maximum height of 31 feet, average height of 11 feet, a 48-inch principal spillway conduit, and a structural concrete auxiliary spillway to create 2,863 acre-feet of flood storage to the auxiliary spillway crest. The dam will reduce nutrient transport and flood damages on 2,474 acres of downstream cropland during the 100-year flood. Within the interior of the dry dam, the project will develop 264.3 acres of constructed wetlands managed with biomass harvest to optimize dissolved phosphorus removal. The project will result in a net increase of 245 acres of wetlands. The 1,209.8-acre complex of 724.1 acres of grasslands interspersed with 485.7 acres of wetlands in the dry dam flood pool will provide high quality wildlife habitat. A roadway grade raise on 21st Street SE would be completed and two low farmstead levees constructed in association with the project. The total cost to install the Preferred Alternative is $14,810,000, of which $8,348,686 would be provided through federal funds and $6,461,315 would be from state, county, and local funds.

COMMENTS AND INQUIRIES

Comments and inquiries must be received by XXXXX, 2025. Submit comments and inquiries to: Christi Fisher, ND NRCS State Conservation Engineer, USDA-NRCS (christi.fisher@usda.gov; 701-530-2091).

In accordance with Federal civil rights law and U.S. Department of Agriculture (USDA) civil rights regulations and policies, the USDA, its Agencies, offices, and employees, and institutions participating in or administering USDA programs are prohibited from discriminating based on race, color, national origin, religion, sex, gender identity (including gender expression), sexual orientation, disability, age, marital status, family/parental status, income derived from a public assistance program, political beliefs, or reprisal or retaliation for prior civil rights activity, in any program or activity conducted or funded by USDA (not all bases apply to all programs). Remedies and complaint filing deadlines vary by program or incident.

Persons with disabilities who require alternative means of communication for program information (e.g., Braille, large print, audiotape, American Sign Language, etc.) should contact the responsible Agency or USDA's TARGET Center at (202) 720-2600 (voice and TTY) or contact USDA through the Federal Relay Service at (800) 877-8339. Additionally, program information may be made available in languages other than English.

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Upper Maple River Watershed
Watershed Plan Agreement

between the
Cass County Joint Water Resource District
(Referred to herein as Sponsor)

and the

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
(Referred to herein as NRCS)

Whereas, application has heretofore been made to the Secretary of Agriculture by the Sponsors for assistance in preparing a plan for works of improvement for the Upper Maple River Watershed, State of North Dakota, under the authority of the Watershed Protection and Flood Prevention Act, as amended (16 U.S.C. Sections 1001 to 1008, 1010, and 1012); and

Whereas, the responsibility for administration of the Watershed Protection and Flood Prevention Act, has been assigned by the Secretary of Agriculture to NRCS; and

Whereas, there has been developed through the cooperative efforts of the Sponsor and NRCS a watershed project plan and environmental assessment for works of improvement for the Upper Maple River Watershed, State of North Dakota, hereinafter referred to as the watershed project plan or plan, which plan is annexed to and made a part of this agreement;

Now, therefore, in view of the foregoing considerations, the Secretary of Agriculture, through NRCS, and the Sponsor hereby agree on this watershed project plan and that the works of improvement for this project will be installed, operated, and maintained in accordance with the terms, conditions, and stipulations provided for in this plan and including the following:

1. **Term.** The term of this agreement is for the installation period and evaluated life of the project (50 years) and does not commit NRCS to assistance of any kind beyond the end of the evaluated life.

2. **Costs.** The costs shown in this plan are preliminary estimates. Final costs to be borne by the parties hereto will be the actual costs incurred in the installation of works of improvement.

3. **Real property.** The sponsor will acquire such real property as will be needed in connection with the works of improvement. The amounts and percentages of the real property acquisition costs to be borne by the Sponsor and NRCS are as shown in the Cost-share table in item 5 hereof.

   The sponsor agrees that all land acquired for measures, other than land treatment practices, with financial or credit assistance under this agreement will not be sold or otherwise disposed of for the evaluated life of the project except to a public agency which will continue to maintain and operate the development in accordance with the Operation and Maintenance Agreement

4. **Uniform Relocation Assistance and Real Property Acquisition Policies Act.** The sponsor hereby agrees to comply with all of the policies and procedures of the Uniform Relocation Assistance and Real Property Acquisition Policies Act (42 U.S.C. Section 4601 et seq. as further implemented through regulations in 49 CFR Part 24 and 7 CFR Part 21) when acquiring real property interests for this federally assisted project. If the sponsor is legally unable to comply with the real property acquisition requirements, it agrees that, before any Federal financial assistance is furnished, it will provide a statement to that effect, supported by an opinion of the chief legal officer of the state

containing a full discussion of the facts and law involved. This statement may be accepted as constituting compliance.

5. **Cost-share for Watershed Work Plan.** The following table shows cost-share percentages and amounts for Watershed Work Plan implementation.

Cost-share Table for Watershed Operation or Rehabilitation Projects					
Works of Improvement Cost-Shareable Items	**NRCS**		**Sponsor**		**Total**
	Percent	Cost	Percent	Cost	Cost
List measures by purpose and rate of assistance [1/]					
Project Construction (Watershed Protection)	75%	$ 7,201,754	25%	$ 2,400,585	$ 9,602,338
Wetland Mitigation Real Property Rights (Watershed Protection)	50%	$ 50,000	50%	$ 50,000	$ 100,000
Wetland Mitigation survey, design/construction engineering appraisal fees, legal fees	50%	$ 35,000	50%	$ 35,000	$ 70,000
Subtotal: Cost-Sharable Costs		$ 7,286,754		$ 2,485,585	$ 9,772,338
Non-Cost-Sharable Items [3/]					
Project survey, design and construction engineering (non-mitigation)	100%	$ 1,061,932	0%	$0	$1,061,932
Administration, legal, appraisal, financing, permits [4/]	0%	$ 0	100%	$105,000	$105,000
Real Property Rights (non-wetlands) acquisition [5/]	0%	$ 0	100%	$3,755,730	$3,755,730
Utility Relocation, including coordination	0%	$ 0	100%	$115,000	$115,000
Subtotal: Non-Cost-Share Costs	0%	$ 1,061,932	100%	$ 3,975,730	$ 5,037,662
Total:		$8,348,686		$6,461,315	$14,810,000

1/ Installation costs explanatory notes:
(a) List each multiple-purpose measure separately. Specific cost items and joint costs of multiple-purpose measures will be shown as separate line-item entries. Single-purpose measures may be grouped by kind if the rate of assistance is the same for each measure or group.
(b) For watershed protection enduring measures, the following footnote should be included: 1/ The cost-share rate is the percentage of the average cost of installing the practice in the selected plan for the evaluation unit. During project implementation, the actual cost-share rate must not exceed the rate of assistance for similar practices and measures under existing national programs.

2/ Relocation payments and assurances explanatory notes:
(a) The planned project measures will not cause the displacement of any person, business, or farm operation under present conditions

3/ If actual non-cost-sharable item expenditures vary from these figures, the responsible party will bear the change.
4/ The sponsor and NRCS will each bear the costs of project administration that each incurs.
5/ The sponsor will acquire with other than Watershed Protection and Flood Prevention Act funds, such real property as will be needed in connection with the works of improvement. The value of real property is eligible as in-kind contributions toward the sponsors' share of the works of improvement costs. In no case will the amount of an in-kind contribution exceed the sponsors' share of the cost for the works of improvement. The maximum cost eligible for in-kind credit is the same as that for cost sharing.

6. **Land treatment agreements.** The sponsor will obtain agreements from owners of not less than 50 percent of the land above each multiple-purpose and floodwater-retarding structure. These agreements must provide that the owners will carry out farm or ranch conservation plans on their land. The sponsor will ensure that 50 percent of the land upstream of any retention reservoir site is adequately protected before construction of the dam. The sponsor will provide assistance to landowners and operators to ensure the installation of the land treatment measures shown in the watershed project plan. The sponsor will encourage landowners and operators to continue to operate and maintain the land treatment measures after the long term contracts expire, for the protection and improvement of the watershed.

7. **Floodplain Management.** Before construction of any project for flood prevention, the sponsor must agree to participate in and comply with applicable Federal floodplain management and flood insurance programs. The sponsor is required to have development controls in place below low and significant hazard dams prior to NRCS or the sponsor entering into a construction contract.

8. **Water and mineral rights.** The sponsor will acquire or provide assurance that landowners or resource users have acquired such water, mineral, or other natural resources rights pursuant to State law as may be needed in the installation and operation of the works of improvement.

9. **Permits.** The sponsor will obtain and bear the cost for all necessary Federal, State, and local permits required by law, ordinance, or regulation for installation of the works of improvement.

10. **NRCS assistance.** This agreement is not a fund-obligating document. Financial and other assistance to be furnished by NRCS in carrying out the plan is contingent upon the fulfillment of applicable laws and regulations and the availability of appropriations for this purpose.

11. **Additional agreements**. A separate agreement will be entered into between NRCS and the sponsor before either party initiates work involving funds of the other party. Such agreements will set forth in detail the financial and working arrangements and other conditions that are applicable to the specific works of improvement.

12. **Amendments.** This plan may be amended or revised only by mutual agreement of the parties hereto, except that NRCS may deauthorize or terminate funding at any time it determines that the sponsor have failed to comply with the conditions of this agreement or when the program funding or authority expires. In this case, NRCS must promptly notify the sponsor in writing of the determination and the reasons for the deauthorization of project funding, together with the effective date. Payments made to the sponsor or recoveries by NRCS must be in accordance with the legal rights and liabilities of the parties when project funding has been deauthorized. An amendment to incorporate changes affecting a specific measure may be made by mutual agreement between NRCS and the sponsor having specific responsibilities for the measure involved.

13. **Prohibitions.** No member of or delegate to Congress, or resident commissioner, may be admitted to any share or part of this plan, or to any benefit that may arise therefrom; but this provision may not be construed to extend to this agreement if made with a corporation for its general benefit.

14. **Operation and Maintenance (O&M).** The sponsor will be responsible for the operation, maintenance, and any needed replacement of the works of improvement by actually performing the work or arranging for such work, in accordance with an O&M Agreement. An O&M agreement will be entered into before Federal funds are obligated and will continue for the project life (50 years). Although the sponsors' responsibility to the Federal Government for O&M ends when the O&M agreement expires upon completion of the evaluated life of measures covered by the agreement, the sponsor acknowledges that continued liabilities and responsibilities associated with works of improvement may exist beyond the evaluated life.

15. **Emergency Action Plan.** Prior to construction, the sponsor must prepare an Emergency Action Plan (EAP) for each dam or similar structure where failure may cause loss of life or as required by state and local regulations. The EAP must meet the minimum content specified in the NRCS Title 180, National Operation and Maintenance Manual (NOMM), Part 500, Subpart F, Section 500.52, and meet applicable State agency dam safety requirements. The NRCS will determine that an EAP is prepared prior to the execution of fund obligating documents for construction of the structure. EAPs must be reviewed and updated by the sponsor annually.

16. **Nondiscrimination Provisions.** In accordance with Federal civil rights law and U.S. Department of Agriculture (USDA) civil rights regulations and policies, the USDA, its Agencies, offices, and employees, and institutions participating in or administering USDA programs are prohibited from discriminating based on race, color, national origin, religion, sex, gender identity (including gender expression), sexual orientation, disability, age, marital status, family/parental status, income derived from a public assistance program, political beliefs, or reprisal or retaliation for prior civil rights activity, in any program or activity conducted or funded by USDA (not all bases apply to all programs). Remedies and complaint filing deadlines vary by program or incident.

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17. **Certification Regarding Drug-Free Workplace Requirements** (7 CFR Part 3021). By signing this Watershed Agreement, the sponsor is providing the certification set out below. If it is later determined that the sponsor knowingly rendered a false certification, or otherwise violated the requirements of the Drug-Free Workplace Act, the NRCS, in addition to any other remedies available to the Federal Government, may take action authorized under the Drug-Free Workplace Act.

    Controlled substance means a controlled substance in Schedules I through V of the Controlled Substances Act (21 U.S.C. Section 812) and as further defined by regulation (21 CFR Sections 1308.11 through 1308.15);

    Conviction means a finding of guilt (including a plea of *nolo contendere*) or imposition of sentence, or both, by any judicial body charged with the responsibility to determine violations of the Federal or State criminal drug statutes;

    Criminal drug statute means a Federal or non-Federal criminal statute involving the manufacturing, distribution, dispensing, use, or possession of any controlled substance;
    Employee means the employee of a grantee directly engaged in the performance of work under a grant, including: (i) all direct charge employees; (ii) all indirect charge employees unless their impact or involvement is insignificant to the performance of the grant; and, (iii) temporary personnel and consultants who are directly engaged in the performance of work under the grant and who are on the grantee's payroll. This definition does not include workers not on the payroll of the grantee (e.g.,

volunteers, even if used to meet a matching requirement; consultants or independent contractors not on the grantees' payroll; or employees of subrecipients or subcontractors in covered workplaces).

Certification:

A. The sponsor certifies that they will or will continue to provide a drug-free workplace by—

(1) Publishing a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the grantee's workplace and specifying the actions that will be taken against employees for violation of such prohibition.

(2) Establishing an ongoing drug-free awareness program to inform employees about—
(a) The danger of drug abuse in the workplace;
(b) The grantee's policy of maintaining a drug-free workplace;
(c) Any available drug counseling, rehabilitation, and employee assistance programs; and
(d) The penalties that may be imposed upon employees for drug abuse violations occurring in the workplace

(3) Making it a requirement that each employee to be engaged in the performance of the grant be given a copy of the statement required by paragraph (1).

(4) Notifying the employee in the statement required by paragraph (1) that, as a condition of employment under the grant, the employee must—
(a) Abide by the terms of the statement; and
(b) Notify the employer in writing of his or her conviction for a violation of a criminal drug statute occurring in the workplace no later than five calendar days after such conviction.

(5) Notifying the NRCS in writing, within 10 calendar days after receiving notice under paragraph (4)(b) from an employee or otherwise receiving actual notice of such conviction. Employers of convicted employees must provide notice, including position title, to every grant officer or other designee on whose grant activity the convicted employee was working, unless the Federal agency has designated a central point for the receipt of such notices. Notice must include the identification numbers of each affected grant.

(6) Taking one of the following actions, within 30 calendar days of receiving notice under paragraph (4) (b), with respect to any employee who is so convicted—
(a) Taking appropriate personnel action against such an employee, up to and including termination, consistent with the requirements of the Rehabilitation Act of 1973, as amended; or
(b) Requiring such employee to participate satisfactorily in a drug abuse assistance or rehabilitation program approved for such purposes by a Federal, State, or local health, law enforcement, or other appropriate agency.

(7) Making a good faith effort to continue to maintain a drug-free workplace through implementation of paragraphs (1), (2), (3), (4), (5), and (6).

B. The sponsor may provide a list of the sites for the performance of work done in connection with a specific project or other agreement.

C. Agencies will keep the original of all disclosure reports in the official files of the agency.

18. **Certification Regarding Lobbying** (7 CFR Part 3018) (for projects > $100,000)

A. The sponsor certifies to the best of their knowledge and belief, that:
（1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the sponsor, to any person for influencing or attempting to influence an officer or employee of an agency, Member of Congress, an officer or employee of Congress, or an employee of a Member of

Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned must complete and submit Standard Form LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(3) The sponsor must require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients must certify and disclose accordingly.

B. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by U.S. Code, Title 31, Section 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

19. **Certification Regarding Debarment, Suspension, and Other Responsibility Matters—Primary Covered Transactions (7 CFR Part 3017).**

A. The sponsor certifies to the best of their knowledge and belief, that they and their principals:

(1) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;

(2) Have not within a 3-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(3) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State, or local) with commission of any of the offenses enumerated in paragraph A(2) of this certification; and

(4) (4) Have not within a 3-year period preceding this application/proposal had one or more public transactions (Federal, State, or local) terminated for cause or default.

B. Where the primary sponsor is unable to certify to any of the statements in this certification, such prospective participant must attach an explanation to this agreement.

20. **Clean Air and Water Certification.**

A. The project sponsoring organizations signatory to this agreement certify as follows:

(1) Any facility to be utilized in the performance of this proposed agreement is (____), is not (X) listed on the Environmental Protection Agency List of Violating Facilities.

(2) To promptly notify the NRCS-State administrative officer prior to the signing of this agreement by NRCS, of the receipt of any communication from the Director, Office of Federal Activities,

U.S. Environmental Protection Agency, indicating that any facility which is proposed for use under this agreement is under consideration to be listed on the Environmental Protection Agency List of Violating Facilities.

(3) To include substantially this certification, including this subparagraph, in every nonexempt sub-agreement.

B. The project sponsoring organizations signatory to this agreement agrees as follows:

(1) To comply with all the requirements of section 114 of the Clean Air Act as amended (42 U.S.C. Section 7414) and section 308 of the Federal Water Pollution Control Act (33 U.S.C. Section 1318), respectively, relating to inspection, monitoring, entry, reports, and information, as well as other requirements specified in section 114 and section 308 of the Air Act and the Water Act, issued there under before the signing of this agreement by NRCS.

(2) That no portion of the work required by this agreement will be performed in facilities listed on the EPA List of Violating Facilities on the date when this agreement was signed by NRCS unless and until the EPA eliminates the name of such facility or facilities from such listing.

(3) To use their best efforts to comply with clean air standards and clean water standards at the facilities in which the agreement is being performed.

(4) To insert the substance of the provisions of this clause in any nonexempt subagreement.

C. The terms used in this clause have the following meanings:

(1) The term “Air Act” means the Clean Air Act, as amended (42 U.S.C. Section 7401 et seq.).

(2) The term “Water Act” means Federal Water Pollution Control Act, as amended (33 U.S.C. Section 1251 et seq.).

(3) The term “clean air standards” means any enforceable rules, regulations, guidelines, standards, limitations, orders, controls, prohibitions, or other requirements which are contained in, issued under, or otherwise adopted pursuant to the Air Act or Executive Order 11738, an applicable implementation plan as described in section 110 of the Air Act (42 U.S.C. Section 7414) or an approved implementation procedure under section 112 of the Air Act (42 U.S.C. Section 7412).

(4) The term “clean water standards” means any enforceable limitation, control, condition, prohibition, standards, or other requirement which is promulgated pursuant to the Water Act or contained in a permit issued to a discharger by the Environmental Protection Agency or by a State under an approved program, as authorized by section 402 of the Water Act (33 U.S.C. Section 1342), or by a local government to assure compliance with pretreatment regulations as required by section 307 of the Water Act (33 U.S.C. Section 1317).

(5) The term “facility” means any building, plant, installation, structure, mine, vessel, or other floating craft, location or site of operations, owned, leased, or supervised by a sponsor, to be utilized in the performance of an agreement or subagreement. Where a location or site of operations contains or includes more than one building, plant, installation, or structure, the entire location will be deemed to be a facility except where the Director, Office of Federal Activities, Environmental Protection Agency, determines that independent facilities are collocated in one geographical area.

21. Assurances and Compliance. As a condition of the grant or cooperative agreement, the sponsors assure and certifies that it is in compliance with and will comply in the course of the agreement with all applicable laws, regulations, Executive orders and other generally applicable requirements,

including those set out below which are hereby incorporated in this agreement by reference, and such other statutory provisions as a specifically set forth herein.

State, Local, and Indian Tribal Governments: OMB Circular Nos. A-87, A-102, A-129, and A-133; and 7 CFR Parts 3015, 3016, 3017, 3018, 3021, and 3052.

Nonprofit Organizations, Hospitals, Institutions of Higher Learning: OMB Circular Nos. A-110, A-122, A-129, and A-133; and 7 CFR Parts 3015, 3017, 3018, 3019, 3021 and 3052.

22. **Examination of Records.** The sponsors must give the NRCS or the Comptroller General, through any authorized representative, access to and the right to examine all records, books, papers, or documents related to this agreement, and retain all records related to this agreement for a period of three years after completion of the terms of this agreement in accordance with the applicable OMB Circular.

23. Signatures.

CASS COUNTY JOINT WATER RESOURCE DISTRICT

The signing of this plan was authorized by a resolution by the Cass County Joint Water Resource District governing body and adopted at an official meeting held on

_____, 2025 at West Fargo, North Dakota.

By:

_____ Date: _____

Rodger Olson, Chairman
Cass County Joint Water Resource District
1201 W Main Ave
West Fargo, ND 58078

USDA-NATURAL RESOURCES CONSERVATION SERVICE

By:

_____ Date: _____

Dan Hovland, State Conservationist
USDA Natural Resources Conservation Service
220 East Rosser Ave
Bismarck, ND 58502-1458

Summary (OMB Fact Sheet)

Watershed Plan and Environmental Impact Statement
for
Upper Maple River Watershed, Retention Site #2A
Barnes, Cass, Steele, and Griggs Counties, North Dakota
North Dakota At-Large Congressional District – Julie Fedorchak

Authorization

- The watershed plan was prepared under the authority of the Watershed Protection and Flood Prevention Act of 1954 (Public Law 83-566) as amended and the Regional Conservation Partnership Program (RCPP; 16 U.S.C Chapter 58, Subchapter VIII).

Sponsor:

- Cass County Joint Water Resource District

Proposed Action:

- The proposed action includes construction of a dry dam located on a tributary of the Upper Maple River that will provide short-term floodwater retention and has a drainage area of 59.7 square miles, embankment length of 2.3 miles, maximum height of 31 feet, average height of 11 feet, a 48-inch principal spillway conduit, and a structural concrete auxiliary spillway to create 2,863 acre-feet of flood storage to the auxiliary spillway crest. The dam will reduce flood damages on 2,474 acres of downstream cropland during the 100-year flood. Within the interior of the dry dam, the project will develop 3 constructed wetlands (biomass harvest areas) managed to optimize nutrient removal, to be supplied via a pump and pipelines. A roadway grade raise on 21st Street SE would be completed and two low farmstead levees constructed in association with the project. The project will result in a net increase of 245 acres of wetlands. A conservation easement for a period of 50 years will be placed on 1,209.8 acres upstream of the dam consisting of 221.4 acres of wetlands managed solely for wildlife habitat, 264.3 acres of wetlands managed primarily for nutrient reduction (but which do provide wildlife habitat as well), and 724.1 acres of uplands managed for wildlife habitat.

Purpose and Need for Action:

- The purpose of the proposed action is watershed protection.

- The need for the proposed action is that average annual flooding in the Upper Maple River inundates 12,600 acres, which results in high transport of nutrients downstream, as well as losses to agricultural production and damages to transportation infrastructure. Under the terms of Article IV of the Boundary Water Treaty with Canada, the United States government agreed to phosphorus and nitrogen objectives at the international border crossing of the Red River in 2022. At the international border crossing, the annual flow-averaged concentration of phosphorus in 2017-2021 exceeded the standard by 300-400%. The average nutrient load for phosphorus in 2017-2021was 170% of the standard and for nitrogen was 125%. The Upper Maple watershed is within the top 20% of Red River Basin sub-watersheds for phosphorus contribution and the top 40% for nitrogen. The Red

River Basin is one of the largest artificially drained landscapes in the world and lies within the Prairie Pothole Region of the northern Great Plains, where restoration of wetlands and grasslands is a critical need for wildlife.

Description of the Preferred Alternative:

- The Preferred Alternative entails construction of a dry dam located on a tributary of the Upper Maple River with interior features managed for nutrient reduction and wildlife habitat. The dam will provide temporary floodwater retention (5 days at the 2-year flood, 11 days at the 100-year) during peak flow events and has a drainage area of 59.7 square miles, embankment length of 2.3 miles, maximum height of 31 feet, average height of 11 feet, a 48-inch reinforced concrete pipe principal spillway conduit with a 2-way covered riser, and a straight drop concrete auxiliary spillway to create 2,863 acre-feet of temporary flood storage to the auxiliary spillway crest. The riser will be designed to ensure ~150 cfs continues unrestricted down the river channel, to avoid detrimental impacts to aquatic species. Two farmstead levees will be constructed, one with a length of 1,500 feet, average height 1.4 feet, and maximum height of 3.0 feet and one with a length of 2,900 feet, average height of 2.7 feet, and maximum height of 8.0 feet. A roadway grade raise would take place at the intersection of 21st Street SE and 129th Ave SE.

- Creation of the 3 interior biomass harvest cells, covering a total of 264.3 acres, will entail construction of 22,680 feet of 3-foot-high embankments. The interior of each cell will be graded towards a water control structure with a remote-controlled gate, to allow release of water prior to fall harvest operations. Biomass harvest cells will be underlain with pattern tile, 4-inch corrugated polyethylene at a 60-foot spacing (180,400-feet of tile and mains to be installed), tied into the same remote-controlled gate for gravity release to dry the ground out for harvest in early fall. A float-controlled turbine pump will be installed within the principal spillway, which will route floodwater to the biomass harvest cells via 5,800 feet of 24" PVC pipeline during high flow events. Check valves and pressure sensors will ensure pumping ceases after cells are at maximum capacity and that ~150 cfs continues unrestricted down the river.

- Management for dissolved phosphorus reduction within the 264.3 acres of biomass harvest cells will entail keeping the water control structures and tile drains closed except for a short time period in early fall, when the sites will need to be drained to allow harvest operations with conventional haying and baling equipment. During the growing season, vegetation in the cells will uptake dissolved phosphorus within the overlying water. Prior to first frost, when that phosphorus would typically move back into the soil/dead matter on the floodplain available for dissolution into spring floodwaters, vegetation would be cut, baled, and removed from the floodplain (likely delivered to a confined animal feeding operation for bedding). Additional reduction to dissolved phosphorus loads will result from the reduction in cropland flooding extents and frequency downstream of the dam. Denitrification processes within both natural and constructed wetlands site will reduce downstream nitrogen loads.

- Wetlands on cropland have been drained over time with ditches, to facilitate crop production. The project will install 11 individual wetland plugs, with a total of 4,480 cubic yards of embankment material from grading work onsite, to restore natural hydrology to upslope wetlands. A net increase of 245 acres of wetlands will result from the project. A total of 490 acres of existing cropland will be planted to native wetland and upland species within the conservation easement in the temporary flood pool of the dry dam. The project will result in wildlife habitat complex of 724.1 acres of grasslands interspersed with 485.7 acres of wetlands. To maintain optimal wildlife habitat, occasional grazing operations will take place; therefore 60,000 feet of exterior barb wire fencing will be installed, a well will be drilled, and 1-1/2" buried pipeline and 4 stock tanks installed to support flash grazing for vegetation management.

Lat/Long:	47.106982°N/-97.778151°W.
Hydrologic unit number:	0902020501
Climate:	Humid continental climate with long, exceedingly cold winters and warm-to-hot humid summers. Since the mid-1990s, the Red River Valley has been in a wetter hydrologic cycle than previous decades .
Topography:	The Red River Valley was once the bed of glacial Lake Agassiz, and the resulting terrain is extremely flat and prone to flooding.
Watershed area:	186,440 acres
Land uses:	164,067 acres cultivated cropland/hay/pastureland, 7,457 acres developed; the remaining 14,916 acres consists of herbaceous barren land, forested land, open water, and wetlands
Land ownership:	100% Private
Population:	The U.S. Census Bureau 2017 estimate for the watershed is 4,014
Demographics:	2017 census estimate: 99% White and 1% Hispanic
Per capita income:	2017 census estimate: $34,535
Poverty level:	2017 census estimate: 11% below poverty level
Median home value:	$135,200 in Barnes County, $227,900 in Cass County, $82,620 in Steele County, and $96,316 in Griggs County
Resource concerns:	o Fish and Wildlife o Invasive Species o Migratory Birds, Bald and Golden Eagles o Threatened and Endangered Species o Natural Areas o Air Quality o Soil Resources o Prime and Unique Farmland o Riparian Areas o Floodplain Management o Water Resources o Wetlands o Waters of the United States o Water Quality o Regional and International Water Resource Plans o Social Issues o Land Use o Cultural Resources o Public Health and Safety o Scenic Beauty o Parkland o Noise

Alternative Plans Considered

Two alternatives were formulated and considered within this Watershed Plan-EIS; the No-Action Alternative and Site 2A. During the preliminary planning stages of the project an extensive suite of structural and non-structural strategies were evaluated by the project team. Following selection of feasible strategies, thirty-eight individual proposed project sites were evaluated based on their ability to meet the purpose and need for the project. Two projects, Site 2A and Site 5, were selected for additional analysis, however Site 5 was ultimately eliminated due to high construction costs. Site 2A therefore moved on to detailed consideration within the EIS given the extensive watershed protection benefits and strong local support for flood damage reduction benefits. The No-Action Alternative would involve no federal funding to reduce excess nutrient loads delivered to rivers, increase the quality and quantity of wetlands and wildlife habitat, or reduce flood damages.

Project Costs

Item	PL-83-566 Funds	Other Funds	Total
Project Construction	$ 7,201,754	$ 2,400,585	$ 9,602,338
Project Engineering	$ 1,061,932	$ 0	$ 1,061,932
Project Land Rights	$ 0	$ 3,755,730	$ 3,755,730
Wetland Mitigation Engineering	$ 35,000	$ 35,000	$ 70,000
Wetland Mitigation Land Rights	$ 50,000	$ 50,000	$ 100,000
Utility Relocation, Coordination	$ 0	$ 115,000	$ 115,000
Project Administration, Legal Fees, Financing	$ 0	$ 105,000	$ 105,000
Total Implementation Costs	$ 8,348,686	$ 3,975,730	$ 14,810,000
Annual Operation & Maintenance	$ 0	$ 45,717/yr	$ 45,717/yr

Implementation Funding Schedule

It is anticipated that final engineering design, permitting, and land rights acquisition would require 2 years. Construction would be completed over two construction seasons (typically July to November).

- Federal funds (budget year): $705,765 (2026-2027)
- Federal funds (year after budget year): $7,642,721 (2028-2029)
- Non-federal funds (budget year): $3,8933,230 (2026-2027)
- Non-federal funds (year after budget year): $6,461,315 (2028-2029)

Project Life

- Project life is 50 years

Project Benefits

- Watershed protection benefits of the Preferred Alternative include reduced nutrient loading within the Upper Maple River, most critically reduction of dissolved phosphorus for which conservation practices available through other NRCS Farm Bill Programs have not been effective. To date the only proven strategy for reduction of dissolved phosphorus in the Red River Basin has been through the approach incorporated into the proposed project. Flood flows will be routed to shallow retention basins constructed within the interior to the dry dam during peak flow events, which will be managed through water control and biomass harvesting to remove an average of 11,828 pounds of phosphorus and 37,693 pounds of nitrogen annually from the upstream drainage area. Additionally, nutrient delivery from downstream crop fields will be reduced due to the decreased extents and frequency of inundation during runoff events. During the 1% probability (100-year) flood event, for example, 658 acres of cropland are eliminated from flood inundation due to the project and during the 4% (25-year) event 387 acres of cropland would be eliminated. As a result, average annual phosphorus delivery downstream of the structure will be reduced by an estimated 734 pounds and nitrogen delivery will drop an estimated 1,859 pounds annually. An ancillary benefit is an average annual sediment load reduction of 661 tons per year due to deposition behind the dam and reduced cropland and riverbank erosion downstream.
- Federal investment in nutrient reduction, within a tributary of the Red River Basin (RRB), is an important contribution to the Boundary Waters Treaty obligation of the United States. With concurrence from the U.S. government, the International Joint Commission formally adopted concentration and total load objectives for phosphorus and nitrogen at the international border crossing in 2022, at a level that will require extraordinary investment and innovation in reducing agricultural non-point source pollution within the U.S. portions of the RRB. Even when removing the effects of flow, phosphorus concentrations have steadily risen since the early 1980s, exceeding the agreed to 0.15 mg/L objective nearly continuously. The average phosphorus load in 2017-2021 was 170% of the standard and for nitrogen was 125% of the standard. The annual flow-averaged concentration of phosphorus exceeds the standard by 300-400%. Nutrient transport seasonality and form in the Red River Basin is unique and creates a scientific problem that typical on-farm voluntary conservation practices cannot effectively address.
- The proposed project will restore, enhance, or create a net 485.7 acres of pothole and riparian wetlands. Scoring of wetland function improvements, through the use of Hydrogeomorphic Models, result in Functional Capacity Unit (FCU) increases due to restoration of hydrology to prior converted wetlands, conversion of existing cropland to perennial vegetation within wetlands, and creation of wetlands through excavation for the project. FCU's represent the wetland area multiplied by the Functional Capacity Index (FCI). The FCI ranges from 0 – 1, with 0 representing a very poorly functioning wetland and 1.0 a pristine wetland with native prairie watershed, wetland soils, and vegetation. Therefore, a FCU of 1.0 represents 1 acre of an optimally functioning wetland of a particular classification. All wetland acreage lost as the result of the project and each associated function were mitigated for and then the additional wetland restoration and creation accounted for gained improvements. The minimum riverine FCU gain is 4.53 FCUs for the Storage & Release Subsurface Water function, while the maximum FCU gain is 8.75 FCUs for the Organic carbon export function. The minimum pothole FCU gain is score of 54.814 (habitat), the maximum FCU gain is 213.02 (Retention), and all other scores range from 135 - 190.
- The project will improve wildlife habitat through restoration of previously drained wetlands, creation of wetlands, conversion of cropland to perennial vegetation, and long term management to optimize wildlife habitat on all but the planned retention basins to be managed with biomass harvest for dissolved phosphorus removal. The project results in a 1,209.8-acre complex of wetlands and uplands that would be managed for wildlife over a minimum of 50 years.

- The project will reduce sedimentation due to road washouts during floods at 173 locations during the 1% chance event (100-year), 113 locations during the 4 % event (25-year), and 28 locations during the 50% event (2-year).

Environmental Effects

- Construction and operation of the project results in negative impacts to 31.7 acres of wetlands, 27.7 acres of pothole wetlands and 4 acres of riparian wetlands. These are offset by a gain of 282.6 acres of pothole wetlands and 7.9 acres of riparian wetlands.
- Operation of the project results in an average annual reduction of 12,562 pounds of phosphorus, 39,552 pounds of nitrogen, and 661 tons of sediment delivered to the Maple River and downstream Red River.
- The project will result in a net increase of 258.8 acres of wetlands. In total, a management area of 724.1 acres of grasslands interspersed with 485.7 acres of wetlands will provide wildlife habitat along the Maple River for a period of at least 50-years.
- Potential for temporary detrimental impacts during construction include turbidity, reduced air quality, noise, spread of invasive species, and disturbance to fish, wildlife, and migratory birds.

Major Conclusions / Rationale for Alternative Selection

- The proposed alternative to reduce dissolved phosphorus transport, which combines retention cells managed with biomass harvest with downstream reductions in cropland flooding, is the least cost alternative to address this significant resource problem in this watershed.
- Nutrient reduction benefits from the project are unique, with the dissolved phosphorus reduction specifically an outcome that cannot be replaced through the typical conservation practices installed through other USDA Farm Bill Programs in this region. Construction and long term operation of a $14.8 M project is well outside the scope of NRCS Farm Bill Programs.
- Federal investment in nutrient reduction demonstrates commitment of the United States to the Boundary Waters Treaty and agreed to objectives through the International Joint Commission regarding nutrient reduction in the Red River at the international border crossing.
- Wetland and upland habitat restoration, enhancement, and creation will improve wildlife habitat for insects, large and small mammals, waterfowl, nesting birds, reptiles, and amphibians.
- Strong local support for the flood prevention benefits to cropland and roads downstream of the project has resulted in willingness of the local Sponsor to operate the project for watershed protection benefits. Regional cooperation through the Red River Retention Authority on monitoring, research, and adaptive management of this and similar retention projects is planned.

Areas of Controversy

- There are no known areas of controversy.

Issues to be Resolved

- There are no remaining issues to be resolved.

Evidence of Unusual Congressional or Local Interest

- None.

Is this report in compliance with executive orders, public laws, and other statutes governing the formulation of water resource projects? Yes ___X____ No_____

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Tables

Appendices

1 Background

The Cass County Joint Water Resource District (CCJWRD) is the sponsoring local organization for this watershed plan, the development of which was partially funded under a portion of a $12 million 2015 NRCS Regional Conservation Partnership Program (RCPP) award secured by the Red River Retention Authority (RRRA) to plan and design distributed retention projects in the Basin. The remainder of planning funding came from the North Dakota Department of Water Resources, the Red River Joint Watershed Board, and CCJWRD. The objective of the Red River Basin RCPP project was to generate retention projects in the Red River Basin for the purpose of rural flood damage reduction, water quality, and wildlife habitat.

2 Purpose and Need for Action

The purpose of the proposed action is watershed protection.

The need for the proposed action is that average annual flooding in the Upper Maple River inundates 12,600 acres, which results in high transport of nutrients downstream, as well as losses to agricultural production and damages to transportation infrastructure. Under the terms of Article IV of the Boundary Water Treaty with Canada, the United States government agreed to phosphorus and nitrogen objectives at the international border crossing of the Red River in 2022. At the international border crossing, the annual flow-averaged concentration of phosphorus in 2017-2021 exceeded the standard by 300-400%. The average nutrient load for phosphorus in 2017-2021was 170% of the standard and for nitrogen was 125%. The Upper Maple watershed is within the top 20% of Red River Basin sub-watersheds for phosphorus contribution and the top 40% for nitrogen. The Red River Basin is one of the largest artificially drained landscapes in the world and lies within the Prairie Pothole Region of the northern Great Plains, where restoration of wetlands and grasslands is a critical need for wildlife.

The need for action is supported by the following facts:

- The Upper Maple River Watershed, with a drainage area of 186,400 acres, annually contributes an estimated 30,200 pounds of phosphorus and 331,600 pounds of nitrogen to the Red River downstream (Appendix D-5). Approximately 88 percent of the watershed is farmed for row crops consisting predominantly of soybeans, corn, spring wheat, dry beans, and sunflowers.

- The average slope of the Upper Maple River is 4 foot of drop per mile and the downstream Red River averages 1 foot of drop per mile. The low topographic relief landscape results in floods over wide swaths of cropland for long durations, allowing for phosphorus dissolution from soils and vegetation into the overlying stagnant floodwaters. Within the Upper Maple Watershed, 17,684 acres of cropland are inundated by the 2-year recurrence interval (RI) flood event, 29,418 acres at the 10-year RI flood, and 37,246 acres are inundated by a 100-year RI flood.

- Agricultural non-point source pollution from the U.S. portion of the Red River Basin is a major contributor to the ongoing eutrophication of Lake Winnipeg which is degrading a $102 million a year recreational fishing industry, $25 million a year commercial fishing

industry, and subsistence fishing by 14 First Nation communities along the lakeshore (Armstrong and McCullough 2011). Between 1994 and 2007, annual phosphorus loads to Lake Winnipeg increased 71% and nitrogen loads increased 18% (Schindler 2012). While the Red River contributes only 15 to 20 percent of overall annual runoff to the lake by volume, within the 1994-2007 time period it contributed 70% of the total phosphorus load, largely in the form of inorganic dissolved phosphorus, and 78% of the annual total nitrogen load (Armstrong and McCullough 2011). Modeling indicates that the Upper Maple River Watershed is within the top 20% of Red River Basin sub-watersheds for phosphorus and the top 40% for nitrogen delivery and that 65% of total nitrogen and 75% of total phosphorus originates from cropland within the North Dakota portion of the Basin (Benoy, et al. 2016). Increased runoff volume, land in row crop production, use of synthetic fertilizer, and conversion to conservation tillage over the last 3 decades have contributed to high dissolved phosphorus loads; primarily transported in spring floods (Armstrong and McCullough 2011) (Benoy, et al. 2016) (Ryberg 2017).

- Federal investment in nutrient reduction within the Red River Basin is an important contribution to the Boundary Waters Treaty (BWT) obligation of the United States. Article IV of the BWT states that "boundary waters or waters flowing across the boundary shall not be polluted to the injury of health and property to the other." The International Joint Commission (IJC) acts as the arbitral body for the BWT, with International Red River Board (IRRB) established as the IJC sub entity for the Red River Basin. In 2019, the IRRB recommended nutrient concentration and load target objectives for the international border crossing of the Red River to the IJC, which were formally adopted in 2022 with the concurrence from the U.S. State Department and Global Affairs Canada. The average nutrient load for phosphorus in 2017-2021 was 170% of the standard and for nitrogen was 125% (IRRB 2023). The annual flow-averaged concentration of phosphorus exceeds the standard by 300-400% (Nustad and Vecchia 2020) (IRRB 2023).

- The Prairie Pothole Region (PPR) in the northcentral Great Plains is one of the most threatened waterfowl habitats in the United States. The Red River Valley is one of the largest artificially drained landscapes in the world, with hundreds of miles of publicly owned drainage ditches, privately owned lateral ditches, and thousands of acres of surface tile drains (Carlyle 1984). The remaining wetlands and grasslands of the PPR are one of the most productive areas in the world for breeding waterfowl and are important habitat for migratory grassland and shore birds as well. It is estimated that only 3% of tallgrass prairie in the Red River Basin remains unplowed (NDGFD 2015) and that 85% of wetlands were drained as of 1980 (Carlyle 1984). Drainage of remaining wetlands continues at a high rate as precipitation has continued to increase, from 1997 to 2009 more than 50,000 individual wetlands were lost within North Dakota alone, a -3.3 percent overall change (NDGFD 2015).

- The Maple River is designated as a habitat focus area by the ND Game and Fish Department. River floodplains and the associated riparian habitat represent narrow corridors of unique habitat in the state. NDG&F has identified 23 Key Species of Conservation Priority in the greater Sheyenne River watershed including birds, mammals, mussels and 9 species of fish.

- In addition to generating nutrient transport from cropland to the Maple River, the average annual flood inundation of 12,600 acres of cropland generates approximately $2.1 million in annual economic damages to agricultural producers in the watershed (Rooney 2020). Total economic losses due to flooding, considering damage to cropland, structures, roads, drain ditches, structures, and vehicles in the watershed are estimated at approximately $3.8 million a year (Rooney 2020).

- Since 1953 there have been 56 Presidential Disaster Declarations (Federal Emergency Management Agency [FEMA] disasters) for Cass County; in 38 of those declarations, flooding has been identified as a major component. FEMA damages to township roads within the Upper Maple River watershed amounted to about $2,630,431 for the years 2009, 2010, and 2011. Other years have also had significant damage.

- Emergency services have been disrupted numerous times, notably during 2009, 2010, and 2011 with many road washouts and/or closures. Emergency services took alternate routes that added to their response times. In 2009, 2010, and 2011 the North Dakota National Guard was called into Cass County for many aspects of flood operations such as dike construction, traffic-control points, quick-reaction teams, sandbagging, rescue operations, and aerial 1-ton sandbag placement.

3 Scope of the Environmental Impact Statement

A scoping process was used to determine the issues significant in defining the problems and formulating and evaluating alternatives. Scoping included an initial public scoping meeting on Jan 6, 2016, advertised in the Cass County Recorder, and a written request for input from federal, state, local agencies, and tribes. A steering committee of Sponsor board members and local citizens was also formed to solicit input, as was a group of interdisciplinary agency experts to review the alternatives being evaluated. Comments received are recorded in Appendix A and discussed in Section 7.

In 2023, it was determined that the plan would need to be upgraded from an Environmental Assessment to an Environmental Impact Statement, based on the planned storage volume of the alternative identified for detailed analysis and impacts to international waters. Therefore, an additional public scoping meeting was held on May 30, 2023 with related notices in the Federal Register and the Cass County Recorder. Potentially impacted landowners were engaged at a follow up onsite meeting on August 2, 2023. Comments from the scoping meeting are included in Appendix A, however many of the comments related directly to Alternative 2A selected for detailed analysis in the Plan-EIS given that 7 years of planning had already been completed. The comments on the alternative are addressed in Sections 5 and 7. Table 3-1 presents a summary of the identified National Environmental Policy Act (NEPA) scoping concerns determined to be appropriate for assessment within the EIS.

Table 3-1 Summary of NEPA Scoping Concerns

Item/Concern	Relevant to the Proposed Action?		Rationale
	Yes	No	
Human Concerns			
Social Issues	X		Disruption of community cohesion occurs during floods. Concerns regarding potential local tax assessments.
Land Use	X		Nutrient transport, wildlife habitat, and flooding is impacted by land use in the watershed.
Cultural Resources	X		Cultural resources are present in the watershed. Federal projects must comply with Section 106 of the National Historic Preservation Act.
Public Health and Safety	X		Standing water over roads and road washouts cause a risk to public safety during floods.
Scenic Beauty	X		No designated scenic sites, however visual impacts from alternatives may be present.
Parklands	X		Parklands are present in the watershed.
Noise	X		Potential temporary noise impacts due to construction.
Significant Scientific Resources		X	No scientific resources present in the watershed.
Environmental Concerns			
Fish and Wildlife	X		Fish and wildlife present, however habitat has been impacted due to loss of native prairie and wetlands.
Essential Fish Habitat		X	There is no designated essential fish habitat in the watershed.
Invasive Species	X		Both terrestrial and aquatic invasive species are present in the watershed and could be spread by construction.
Migratory Birds, Bald and Golden Eagles	X		Migratory birds utilize the watershed. There is potential for Bald and Golden Eagle presence.
Threatened and Endangered Species	X		Potential presence of threatened and endangered species in the watershed. Federal projects must comply with Section 7 of the Endangered Species Act.
Ecologically Critical Areas		X	There are no designated ecologically critical areas in the watershed.
Coastal Management Zones, Coral Reefs		X	None are present in the watershed.
Natural Areas	X		Natural areas are present in the watershed.
Air Quality	X		Potential for temporary dust emissions during construction; impacts to carbon emissions.
Soil Resources	X		Wind erosion and salinity is a concern with soils in the watershed.
Prime and Unique Farmland	X		Prime farmland is present in the watershed and regulated under the Farmland Protection Policy Act.
Riparian Areas	X		Riparian areas are present in the watershed.
Forest Resources	X		Very small areas of forest resources are present in the watershed.

Item/Concern	Relevant to the Proposed Action?		Rationale
	Yes	No	
Floodplain Management	X		Designated floodplains exist throughout the watershed. Federal projects must comply with E.O. 11988.
Water Resources	X		Surface and groundwater resources are present in the watershed. Flood damages to cropland, roads, basements, and water quality is a concern.
Sole Source Aquifers		X	There are no EPA designated sole source aquifers in the watershed.
Wild and Scenic Rivers		X	There are no wild and scenic river designations within the watershed.
Wetlands	X		Wetlands are present in the watershed and wetland loss within the region is an identified concern. Federal projects must comply with E.O. 11990.
Waters of the United States	X		Waters of the United States are present in the watershed and impacts must be permitted by the USACE.
Water Quality	X		Water quality concerns exist within the watershed. Concerns with flooding impacts on private drinking water wells.
Regional and International Water Resource Plans	X		International and regional water resource plans have identified the watershed as a priority for nutrient reduction and construction of flood retention projects.

4 Affected Environment

The Upper Maple River Watershed, as shown in Appendix C, Figure C-1 represents the area assessed for the affected environment. The watershed comprises a total of 186,440 acres, the majority of which is in Barnes County (83,605 acres), North Dakota. The watershed also extends into Steele County (65,565 acres), Cass County (36,923 acres), and Griggs County (347 acres). Sections below describe current conditions within the watershed.

4.1 Human Concerns

4.1.1 Social Issues

Community cohesion is based on characteristics that keep members of a group together to establish meaningful interactions, common institutions, and agreed upon ways of behavior. These characteristics may include race, education, ethnicity, religion, language, and mutual economic and social benefits. The watershed is predominantly rural with a focus on agriculture. Flood damages have impacted communities by disrupting agricultural practices and transportation systems within the watershed.

4.1.2 Land Use

Land use in the watershed was assessed by reviewing local zoning ordinances and relevant comprehensive land-use plans, aerial photography, the U.S. Department of Agriculture's (USDA) National Agricultural Statistics Service CropScape program, and the United States Geological

Survey's (USGS) Multi-Resolution Land Characteristics Consortium 2019 National Land Cover Database (USGS 2019). Appendix C, Figure C-2 provides an overview of land use and infrastructure in the watershed.

According to the U.S. Department of Agriculture's (USDA) National Agricultural Statistics Service CropScape program, in 2023 the majority of the watershed (83 percent) consisted of cropland (USDA NASS 2023). Soybean and corn row crops are the majority crops, with smaller acreages of small grains, dry edible beans and sunflowers. Grassland suitable for grazing and haying comprised 7.4 % of the watershed. Other cover types included wetlands (3.51%), tree/forest (0.66%), open water (0.91%), open space (2.47%).

The major roads in the watershed include North Dakota Highway 32, as well as several county highways and local paved and unpaved roads (Appendix C, Figures C-2 and C-7). Railroads present in the watershed include the Burlington Northern Santa Fe Railway, which primarily travels east/west through the watershed. One private airport is present in the watershed, the Johnson Private Airstrip, located approximately 5 miles north of Luverne (Appendix C, Figure C-2). Numerous bridges are present throughout the watershed over the Maple River and its tributaries (Appendix C, Figure C-2). Bridges and roads have become compromised during periods of flooding, making them unusable and resulting in detours and the need for extensive infrastructure repairs. Between 1989 and 1998, damages to transportation infrastructure due to flooding have been up to $763,187 annually (Rooney 2020).

Cass County has developed a Comprehensive Plan, which provides an overview of the existing and planned future land use within Cass County and cities and townships within the county (Cass County, North Dakota 2005). Cass County has also prepared a Draft Model Zoning Ordinance for Townships (Cass County, North Dakota 2014). None of the townships in the Cass County watershed have developed their own township-level zoning ordinances and/or comprehensive plans. Barnes County has a county Development Code, which was developed in 2016 (Barnes County 2016), along with a Comprehensive Plan, which was developed in 2001 (Barnes County, North Dakota 2001). No comprehensive plans or zoning ordinances have been identified at the county level for Griggs County or Steele County. There may be township-level ordinances in Barnes, Griggs, and Steele counties; townships in these counties where alternatives are located should be contacted to determine if any zoning ordinances or comprehensive plans exist. Alternatives developed for the proposed project should ensure compatibility with comprehensive plans, development codes, and zoning ordinances.

4.1.3 Cultural Resources

Section 106 of the National Historic Preservation Act of 1966, (54 U.S.C. 306108) as amended, states that projects requiring federal approval must be evaluated for their potential effects on historic and archaeological resources included or eligible for listing on the National Register of Historic Places (NRHP). In February of 2016, SWCA Environmental Consultants (SWCA) completed a Class I cultural resource inventory of the Upper Maple River watershed to identify all known archaeological sites and historic structures that could potentially be affected by the project (SWCA Environmental Consultants 2016). The file review showed that 21 previous cultural resource inventories were conducted within the watershed between 1980 and 2015 in support of oil and gas

development, wind energy projects, and bridge and road development and maintenance. Forty-three cultural resources were recorded in the report. Twenty-five of these cultural resource sites are unevaluated regarding their eligibility for listing in the NRHP, while the remaining 18 have been recommended not eligible for listing in the NRHP. The 25 unevaluated sites include two cairns, two churches, Burlington Northern Railroad Earthworks, and 20 site leads (SWCA Environmental Consultants 2016).

The U.S. portion of the Red River Basin is a major contributor to the ongoing eutrophication of Lake Winnipeg. According to the State of Lake Winnipeg 2020 Report, "for the Indigenous nations residing near the shores of Lake Winnipeg, the water provides for many spiritual, cultural, recreational and economic needs. It supports the commercial and subsistence fishery, as well as medicines, plants, and berries. It provides for the animals needed for hunting and trapping, while also providing recreational and cultural opportunities such as angling, boating, paddling, and swimming" (ECCC Manitoba 2020). Lake Winnipeg provides subsistence fishing by 14 First Nation communities along the lakeshore (Armstrong and McCullough 2011).

4.1.4 Public Health and Safety

According to the North Dakota Department of Environmental Quality (NDDEQ), there are no municipal solid waste facilities or special waste landfills in the watershed. The NDDEQ database indicates that four inactive underground storage tanks (UST) are present within the watershed, as identified on (Appendix C, Figure C-2).

The watershed is served by the Steele, Cass, Barnes, and Griggs County Sheriff Departments. The Hope, Page, and Valley City Fire Protection Districts cover the majority of the watershed, with the Finley and Tower City Fire Protection Districts covering the northern and southern edges, respectively. The Hope, Page, and Barnes County Ambulance Services cover the majority of the watershed, with Finley Ambulance Service covering the northern edge. The nearest hospital is in Valley City, North Dakota, approximately 8.5 miles southwest of the watershed. During flood events, road washouts and detours in the watershed increase emergency response times due to required detours; residents indicate that during some flood events they have been unable to leave their homes for several days.

There are no source-water wellhead protection areas within the watershed. There are 3 production wells in the city of Luverne and 7 private drinking wells within the watershed (ND DWR 2025).

4.1.5 Scenic Beauty

The visual quality of an area may be affected by the introduction of new buildings or structures. These effects may be significant to visually sensitive areas such as:

- Historic properties.
- Cultural resources, traditional cultural places, and cultural landscapes.
- Areas of scenic beauty, scenic overlooks, and highways.

- Wilderness areas, parks, and national forests.
- Wild and scenic rivers, recreational, or nationwide inventory rivers.
- Areas adjacent to rural residences.

The watershed is located in rural portions of Barnes, Cass, Griggs, and Steele Counties. The towns of Luverne and Pillsbury are located within the watershed; however, the viewshed for the majority of the watershed is rural-agricultural, including fields, and rural residences. The presence of flooding and associated debris is currently visible across the watershed during intense rain events. There are no designated scenic byways, scenic waterways, or other visually sensitive areas within the watershed.

4.1.6 Parklands

Small local parks and playgrounds are present in the watershed. According to the North Dakota Parks and Recreation website, there are no other county, state, or federal recreation areas—such as parks, preserves, or scenic byways—in the watershed. General outdoor recreational opportunities in the watershed include hunting, fishing, boating, snowmobiling, and golfing. In addition, there is a snowmobile Recreation Trails Project (RTP) in the center of the watershed (Appendix C, Figure C-3).

As mentioned in Section 4.2.1, there are three Waterfowl Production Areas (WPAs) present in the watershed (Appendix C, Figure C-3). In accordance with state laws, WPAs are open to hunting, fishing, and trapping. According to North Dakota Game and Fish Department (NDGFD), several Private Lands Open to Sportsmen (PLOTS) are scattered throughout the watershed (NDGFD 2023).

The North Dakota Department of Parks and Recreation manages several Land and Water Conservation Fund (LWCF) project sites throughout the state. These sites are under protection of Section 6(f) of the LWCF Act. According to the North Dakota Parks and Recreation Department, no LWCF project sites are present in the watershed.

4.1.7 Noise

The watershed predominantly consists of rural areas that are exposed to local traffic and agriculture-related noise such as machinery, small aircraft, or other farm-related noise sources. Several highways and county roads traverse the watershed, providing a source of traffic-related noise. A review of local ordinances was performed for Barnes, Cass, Griggs, and Steele Counties; only Barnes County was found to have a local noise ordinance. Sensitive noise receptors in the watershed consist primarily of residences and farms.

4.2 Environmental Concerns

4.2.1 Fish and Wildlife

Fish and wildlife habitat in the watershed is closely associated with land use and presence of wetlands. As discussed in section 4.1.2, the majority of native tall grass prairie habitat in the watershed (83 percent) has been converted to cropland (USDA NASS 2023) starting in the late 1800s. Cropland has some food value, but little shelter value for wildlife. Grassland suitable for

wildlife, grazing and haying comprised 7.4 % of the watershed. Other cover types included wetlands (3.51%), tree/forest (0.66%), open water (0.91%), open space (2.47%). Many shallow wetlands have been drained and watercourses altered or straightened. Most grassland has been impacted by prior cropping, grazing and haying with little native cover still present. Some of the grassed cover is enrolled in the USDA's Conservation Reserve Program (CRP).

The watershed lies within the Prairie Pothole Region (PPR) in the northcentral Great Plains. The Red River Basin is not a valley formed by erosive forces, rather it is part of an area once occupied by glacial Lake Agassiz through which the Red River now flows. Soils in the old lake bed consist of very fine silts and lacustrine clay to depths as much as 150 feet with numerous depressions caused by accumulations of glacial drift and moraines (Bluemle 2016). Surface water collects and is held in these low permeability soils within innumerable kettles, potholes, and sloughs until it evaporates away. To allow crop production in these highly fertile soils, extensive surface drainage systems were installed in the early 20th century. As both precipitation and crop values have increased over the last several decades, extensive subsurface tile drainage systems have been installed to drain remaining wetlands throughout the watershed. The PPR is one of the most threatened waterfowl habitats in the U.S.; the Red River Valley is one of the largest artificially drained landscapes in the world (Bluemle 2016). Between 50% and 80% of North American ducks breed in the PPR, and waterfowl production is closely associated with the number and quality of wetlands and surrounding grasslands. In addition to adequate nesting and cover habitat, invertebrate production as a food source for broods is critical to their success. Preservation of remaining wetlands and wetland restoration is critical to ensuring habitat is available to the continent's waterfowl populations. Wetlands and surrounding grasslands also provide critical habitat for many other game and non-game species in the region. The availability of large contiguous blocks of prairie habitat is limited within the planning area. High crop production potential, and the resulting comparatively high land values to other areas within the Red River Basin, are financially prohibitive when attempting to enhance and create wildlife habitat in the planning area. In general, prairie habitats are generally limited to smaller fragmented blocks of habitat, typically in areas where crop production is difficult.

The U.S. EPA Level IV Ecoregions Map indicates that the watershed is within two Level IV regions, including the End Moraine Complex and the Drift Plains, both within the Northern Glaciated Plains Level III Ecoregion. The Drift Plains ecoregion dominates the Watershed and is described as subtly undulating, with historic high concentrations of temporary and seasonal wetlands. This area has largely been converted to cropland, but cropped pothole wetlands still serve as waterfowl habitat where present. Historically, grassland on the Drift Plains has been a transitional mix of tallgrass and shortgrass prairie. According to the North Dakota Game and Fish Department (NDGFD) 2015 State Wildlife Action Plan (SWAP), the watershed is located in the Eastern Mixed-Grass Prairie (Drift Prairie) region of North Dakota, along the border of the Red River Valley (NDGFD 2015). The Upper Maple River is on the eastern edge of this ecosystem. The predominant soils historically supported more tall grass species as noted in USDA NRCS Ecological Site Descriptions (USDA NRCS 2025). Prior to settlement, the predominant upland grass species included western wheatgrass (*Pascopyrum smithii*), green needlegrass (Nassella viridula), big bluestem (Andropogon gerardii), and sideoats grama (Bouteloua Curtipendula) along with a variety of forbs such as tall blazing star

(Liatris aspera) and Prairie coneflower (Ratibida columnifera). Examples of vegetation on wetter sites such as riparian areas included prairie cordgrass (Spartina pectinata) and wooly sedge (Carex pelita). Cropping and domestic livestock production has resulted in the transition to more invasive cool season species such as Kentucky bluegrass (Poa pratensis) and smooth bromegrass (Bromus inermis) in the upland areas and reed canary grass (Phalaris arundinacea) and broadleaf cattails (Typha latifolia) in wetter areas.

The 2015 ND SWAP identifies several species of conservation priority in the Drift Prairie region. Species conservation priority levels are defined as follows:

Level I — These are species which are in decline and receive little or no monetary support or conservation efforts. NDGFD has a clear obligation to use SWG funding to implement conservation actions that directly benefit these species.
Level I species are those having a:
• high level of conservation priority because of declining status either here or across their range; - or -
• high rate of occurrence in North Dakota constituting the core of the species breeding range (i.e. "responsibility" species) but are at-risk range wide

Level II — NDGFD will use SWG funding to implement conservation actions to benefit these species if SWG funding for Level I species is sufficient, or conservation needs have been met.
Level II species are those having a:
• moderate level of conservation priority
- or -
• high level of conservation priority but a substantial level of non-SWG funding is available to them

Level III — These are North Dakota's species having a moderate level of conservation priority but are believed to be peripheral or non-breeding in North Dakota

A list of species of conservation priority of the eastern mixed-grass prairie (drift prairie) and their respective rankings is provided below.

Level I — American Bittern (*Botaurus lentiginosus*), Baird's Sparrow (*Ammodramus bairdii*), Black Tern (*Chlidonias niger surinamensis*), Canadian Toad (*Anaxyrus hemiophrys*), Chestnut-collared Longspur (*Calcarius ornatus*), Ferruginous Hawk (*Buteo regalis*), Franklin's Gull (*Leucophaeus pipixcan*), Grasshopper Sparrow (*Ammodramus savannarum*), Horned Grebe (*Podiceps auritus*), Lark Bunting (*Calamospiza melanocorys*), Marbled Godwit (*Limosa fedoa*), Monarch Butterfly (*Danaus plexippus*), Nelson's Sparrow (*Ammodramus nelsoni*), Plains Hog-nosed Snake (*Heterodon nasicus*), Plains Spadefoot (*Spea bombifrons*), Regal Fritillary (*Speyeria idalia*), Smooth Green Snake (*Opheodrys vernalis*), Sprague's Pipit (*Anthus spragueii*), Swainson's Hawk (*Buteo swainsoni*), Wilson's Phalarope (*Phalaropus tricolor*), Yellow Rail (*Coturnicops noveboracensis*)

Level II — American Kestrel (*Falco sparverius*), Bobolink (*Dolichonyx oryzivorus*), Dakota

	Skipper (*Hesperia dacotae*), Dickcissel (*Spiza americana*), Le Conte's Sparrow (*Ammodramus leconteii*), Lesser Scaup (*Aythya affinis*), Loggerhead Shrike (*Lanius ludovicianus*), Northern Harrier (*Circus hudsonius*), Northern Pintail (*Anas acuta*), Pygmy Shrew (*Sorex hoyi*), Richardson's Ground Squirrel (*Urocitellus richardsonii*), Sharp-tailed Grouse (*Tympanuchus phasianellus*), Short-eared Owl (*Asio flammeus flammeus*), Upland Sandpiper (*Bartramia longicauda*), Western Meadowlark (*Sturnella neglecta*), Willet (*Tringa semipalmata*)
Level III	Arctic Shrew (*Sorex arcticus*), Gray Fox (*Urocyon cinereoargenteus*), Plains Pocket Mouse (*Perognathus flavescens*)
Unranked	Sedge Wren (*Cistothorus platensis*)

Fish species found in the Maple River watershed include typical communities of warm water streams and those species found in the connected waters of the Red River of the North drainage area. A list of fish species compiled from a variety of sources by the U.S. Geological Survey (USGS) (Goldstein 1995) includes a total of 75 different species in the Red River drainage area; 51 of those species were found in the North Dakota tributaries of the Red River. Notably, only three of the 75 species were found in all tributaries: white sucker (*Catostomus commersoni*), fathead minnow (*Pimephales promelas*), and northern pike (*Esox lucius*). Another nine species were documented in 80 percent of the major tributaries, including the Maple River: carp (*Cyprinus carpio*), creek chub (*Semotilus atomaculatus*), blacknose dace (*Rhinichthys atratulus*), common shiner (*Luxilus cornutus*), black bullhead (*Ameiurus melas*), brook stickleback (*Culaea inconstans*), walleye (*Zander vitreous*), blackside darter (*Percina maculata*), and johnny darter (*Ethostoma nigrum*). No designated essential fish habitat is present within the watershed.

Sources compiled by the USGS (Goldstein 1995) for the Red River drainage and tributaries list 12 mollusk species of pelecypod mussels and eight species of spaeriid clams. The most prevalent mussels were giant floater (*Anodonta grandis*), white heelsplitter (*Lasmigona complanata*), and eastern lampmussel (*Lampsilis radiata*). The most abundant species were eastern lampmussel and giant floater.

The Sheyenne River is identified as a Focus Area by NDGF, the Maple River is considered a secondary focus area as it is a tributary to the Sheyenne. Key Species of Conservation Priority are listed below.

Level I	Black-billed Cuckoo (*Coccyzus erythropthalmus*), Red-headed Woodpecker (*Melanerpes erythrocephalus*), Big Brown Bat (Eptesicus fuscus), Little Brown Bat (*Myotis lucifugus*), Northern Long-eare Bat (Myotis septentrionalis), Northern Pearl Dace (*Margariscus nachtriebi*), Creek Heelsplitter (*Lasmigona compressa*)
Level II	River Otter (*Lontra canadensis*), Northern Redbelly Dace (*Chrosomus eos*), Silver Chub (*Marcrhybopis storeriana*), Trout-perch (*Percopsis omiscomaycus*), Threeridge (*Amblema plicata*), Wabash Pigtoe (*Fusconaia flava*), Black Sandshell (*Ligumia recta*), Pink Heelsplitter (*Potamilus alatus*)
Level III	Gray Fox (*Urocyon cinereoargenteus*), Pugnose Shiner (*Notropis anogenus*), Blacknose Shiner (*Notropis heterolepis*), Carmine Shiner (*Notropis percobromis*), Yellow Bullhead (*Ameiurus natalis*), River Darter (*Percina shumardi*), Mapleleaf (*Quadrula*

quadrula), Creeper (*Strophitus undulatus*)

The watershed contains suitable habitat for a variety of wildlife, such as whitetail deer (*Odocoileus virginianus*), wild turkey (*Meleagris gallopavo*), coyote (*Canis latrans*), red fox (*Vulpes vulpes*), and rodents such as squirrels (*Sciurus* sp.), rabbits (*Oryctolagus cuniculus*), and raccoons (*Procyon lotor*). There are three USFWS Waterfowl Production Areas (WPAs) present in the watershed, including the Fugelstad WPA in Steele County, the Goose Lake and Burdick WPA's in Barnes County (Appendix C, Figure C-3). These WPAs are public lands and are meant to preserve wetlands and grasslands critical to waterfowl and other wildlife.

There are four USDA NRCS Wetland Reserve Program (WRP) conservation easements located in the watershed, as identified on Figure C-3 (Appendix C, Figure C-3). These WRP easements were established to support long term conservation and wildlife protection. All easements were for 30-years from the dates of original establishment. Easement vegetation is combination of native and introduced grasses, forbs and small shrubs. Wetlands within the Prairie Pothole Region serve as important habitat to more than 50% of North American migratory waterfowl (USEPA 2012). Species of the waterfowl typically occupying pothole wetlands include terns and gulls, rails, bitterns, pelicans, geese, and ducks (PPJV 2021).

4.2.2 Invasive Species

An "invasive species" is defined as a species that is not native to the ecosystem under consideration and whose introduction causes or is likely to cause harm to the economy, environment, or human health. This includes plant and animal species along with other organisms such as microbes.

North Dakota law (NDCC § 4.1-47-02) includes provisions to control the spread of noxious weeds. The North Dakota Department of Agriculture (NDDA) coordinates the efforts of county and city weed boards and state and federal land managers to implement integrated weed-management programs. All work undertaken and performed under PL83-566 is to be in compliance with applicable federal, state, and local laws, orders, and policy.

According to the NDDA's Weed Mapper (NDDA 2015), the 2015 weed survey identified the following noxious weed species within the watershed: Canada thistle (*Cirsium arvense*) and leafy spurge (*Euphorbia esula*). The majority of documented locations were found in road and railroad rights-of-way. The state has recently adopted a plan to identify Palmer Amaranth as a significant threat to production agriculture. Palmer Amaranth has been found in Barnes and Cass counties and is under management. The NDGFD (NDGFD 2024) and ND NRCS (USDA NRCS ND 2006) have also documented their concerns regarding the presence of the non-native/invasive Russian Olive (Elaeagnus angustifolia) – a small tree/shrub species that disrupts prairie ecosystems in wetlands, grasslands and riparian areas.

According to the North Dakota Game and Fish Department's January 2023 Aquatic Nuisance Species Infestation Map (NDGFD 2023), no zebra mussel infestations are known in the Upper Maple River Watershed. Zebra mussels, Curly leaf pondweed and Eurasian watermilfoil have all been identified in the Sheyenne River downstream and are expected to continue moving up the watershed.

Herbaceous cover in the watershed, including cover in the CRP program and other grazed and hayed acres in the watershed are commonly invaded with non-native cool season grasses such as Kentucky bluegrass (Poa pratensis) and smooth bromegrass. These species are invasives to tallgrass and mixed grass prairies. These grasses out-complete native species and reduce biodiversity (NDGFD 2024).

4.2.3 Migratory Birds and Bald and Golden Eagles

The U.S. Department of Interior, U.S. Fish and Wildlife - USFWS oversees compliance with the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act. Executive Order 13186 directs executive departments and agencies to take certain actions to further implement the Migratory Bird Treaty Act. The EO requires that each Federal agency taking actions that have, or are likely to have, a measurable negative effect on migratory bird populations is directed to develop and implement, within 2yr, a Memorandum of Understanding (MOU) with the Fish and Wildlife Service (Service) that shall promote the conservation of migratory bird populations. Bird species not listed under the Endangered Species Act (ESA) may still be protected under the Migratory Bird Treaty Act (MBTA) of 1918. A bird species is considered migratory if "(1) It occurs in the United States or U.S. territories as the result of natural biological or ecological processes and is currently, or was previously listed as, a species or part of a family protected by one of the four international treaties or their amendments; (2) revised taxonomy results in it being newly split from a species that was previously on the list, and the new species occurs in the United States or U.S. territories as the result of natural biological or ecological processes; or (3) new evidence exists for its natural occurrence in the United States or U.S. territories resulting from natural distributional changes and the species occurs in a protected family (USFWS 1918).

The MBTA prohibits take of protected migratory bird species without prior authorization by the USFWS, which may include actions which "take, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any migratory bird, or the parts", nests, or eggs of such a bird except under the terms of a valid federal permit" (50 CFR § 21.11). Bald and golden eagles are additionally protected under the Bald and Golden Eagle Protection Act of 1940 (BGEPA), which similarly prohibits the take of bald or golden eagles, their parts, nests, or eggs or disturbance of birds and provides criminal penalties for such acts (USFWS 1940).

The watershed is located in the Central Flyway of North America, a bird migration route that generally follows the Great Plains through Montana, Wyoming, Colorado, New Mexico, Texas, Oklahoma, Kansas, Nebraska, South Dakota, and North Dakota into Canada. Migratory birds use portions of the watershed as resting grounds during spring and fall migration, as well as breeding and nesting grounds throughout the summer. Specifically, the watershed is located in the Prairie Potholes Bird Conservation Region, which is particularly important for migratory waterfowl due to the abundance of wetlands and native grasslands, even with a long history of agriculture and drainage (NABCI 2021). A list of migratory birds with potential to occur within the watershed was obtained using the U.S. Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) program in January 2025. The IPaC returned a list of 20 birds of conservation concern, which are provided in the table below.

Table 4-1 Migratory Birds with Potential Presence in the Watershed (USFWS IPaC)

Scientific Name	Common Name	Breeding Season
Pluvialis dominica	American Golden-plover	Breeds elsewhere
Haliaeetus leucocephalus	Bald eagle	December through August
Chlidonias niger	Black Tern	Early May to late August
Coccyzus erythropthalmus	Black-billed Cuckoo	Mid-May to Mid-October
Dolichonyx oryzivorus	Bobolink	Mid-May to late July
Calcarius ornatus	Chestnut-collared Longspur	Early May to Mid-August
Chaetura pelagica	Chimney swift	Mid-March to Late August
Leucophaeus pipixcan	Franklin's Gull	May through July
Vermivora chrysoptera	Golden-winged Warbler	Early May to Late July
Ammodramus savannarum perpalidas	Grasshopper Sparrow	June to late August
Limosa haemastica	Hudsonian Godwit	Breeds elsewhere
Tringa flavipes	Lesser Yellowlegs	Breeds elsewhere
Asio otus	Long-eared Owl	Early May to Mid-July
Limosa fedoa	Marbled Godwit	Early May to Late July
Circus hudsonius	Northern Harrier	April to mid-September
Calidris melanotos	Pectoral Sandpiper	Breeds elsewhere
Melanerpes erythrocephalus	Red-headed Woodpecker	Early May to mid-September
Limnodromus griseus	Short-billed Dowitcher	Breeds elsewhere
Aechmophorus occidentalis	Western Grebe	Early June to Late August
Tringa semipalmata	Willet	Mid-April to early August

Review of the North American Breeding Bird Survey dataset, the watershed is adjacent to the Cooperstown (64009) breeding bird survey route. Survey data indicate a total of 143 species have been detected on this route, including the following species listed above: bald eagle, black tern, black-billed cuckoo, bobolink, chestnut-collared longspur, Franklin's gull, marbled godwit, redheaded woodpecker, western grebe, and willet (USGS 2023).

4.2.4 Threatened and Endangered Species

The Endangered Species Act (ESA) of 1973 was implemented to protect and aid in the recovery of imperiled species and their ecosystems. It is administered at the federal level by the U.S. Fish and Wildlife Service (USFWS) and the Commerce Department's National Marine Fisheries Service (NMFS). Under the ESA, species are listed as either threatened or endangered. According to the USFWS, ""Endangered" means a species is in danger of extinction throughout all or a significant portion of its range. "Threatened" means a species is likely to become endangered within the foreseeable future". The state of North Dakota does not maintain an individual threatened and endangered species list beyond the USFWS federal list. In accordance with Section 7 of the

Endangered Species Act (ESA) of 1973, as amended, federal agencies are required to ensure the following two criteria:

1. Any action funded or carried out by such agency must not be likely to jeopardize the continued existence of any federally listed endangered or threatened species or species proposed to be listed.

2. No such action can result in the destruction or adverse modification of habitat of such species that is determined to be critical by the Secretary.

In accordance with Section 7, the watershed was evaluated to determine the potential presence of federally listed species. An official list of federally listed species in the watershed was requested through the USFWS online Information, Planning, and Conservation System (IPaC) program in 2022 and updated in January of 2025. According to the IPaC results, there is no designated critical habitat (habitat considered essential for the conservation of a threatened or endangered species) in the watershed, but the following federally listed species may occur within the vicinity of the watershed: the Dakota skipper (*Hesperia dacotae* – threatened) and northern long-eared bat (*Myotis septentrionalis* – endangered). Other species in the watershed that are candidates for listing as threatened or endangered but not currently protected by the ESA include: the monarch butterfly (*Danaus plexippus*; a federal candidate species), Western Regal Fritillary (*Argynnis idalia occidentalis* – a federal candidate species*)*, and Suckley's Cuckoo Bumble Bee (*Bombus suckle* – a proposed candidate species).

The Dakota skipper is found in native prairie habitat containing a high diversity of wildflowers and grasses. The species is rare, though it has been documented in several counties in North Dakota in scattered, mostly isolated sites. The principal threat to Dakota skipper is habitat loss due to conversion to other land uses, in particular agriculture, as the species prefers unbroken grasslands with low levels of periodic disturbance such as light grazing. Two primary habitat types are known for this species: (a) low, wet prairie dominated by bluestem, wood lily, harebell, and smooth camas and (b) upland dry prairie ridges and hillsides dominated by bluestem grasses, needlegrass, pale purple coneflower and upright coneflowers, and blanketflower. These habitats are limited in the watershed; the nearest designated critical habitat for Dakota skipper is located approximately 56 miles southeast of the watershed.

In North Dakota, the Northern Long-eared Bat (NLEB) has only been identified in a few locations, including the forested habitat of the Turtle Mountains, Little Missouri and Missouri Rivers (NDGFD 2023). The NLEB roosts in living and dead trees greater than 3 inches in diameter that have loose or peeling bark, cavities, or crevices. During winter, the Northern long-eared bat hibernates in caves and mines. According to USFWS and North Dakota Natural Heritage Data, there are no known occupied roost trees or hibernacula in North Dakota; however, the entire state of North Dakota is within the white-nose syndrome zone.

In December 2020, the USFWS assigned the monarch butterfly a candidate for listing under the Endangered Species Act (ESA) due to its decline from habitat loss and fragmentation; however, candidate species are not protected under the ESA. The monarch butterfly inhabits fields and parks

where native flowering plants, including milkweed (*Asclepias* spp.), which is required for breeding, are common. These habitats are limited in the watershed.

The North Dakota Parks and Recreation Department maintains the North Dakota Natural Heritage biological conservation database, which provides information on rare species or communities across the state. According to the database, no rare species are present in the watershed. One significant ecological community, Northern Tallgrass Prairie/Wet-Mesic Tallgrass Prairie, is located in the south-central portion of the watershed, adjacent to County Road 32. North Dakota does not have a state-level threatened and endangered species program.

4.2.5 Natural Areas

The watershed is primarily agricultural; however, several streams, wetlands, and small lakes are also present. The watershed is located in the Valley City Wetland Management District, which has over 89,000 acres of land in conservation for the benefit of migratory birds, wildlife, and recreation opportunities (USFWS 2025). Specifically, the Valley City Wetland Management District includes over 51,000 acres of wetland and grassland easements on private land. There are 70 Fish and Wildlife Service Realty Tracts within or adjacent to the watershed, which include three Waterfowl Production Areas (WPAs) and four WRP conservation easements. With the exception of the WPAs and the WRPs noted previously, no county, state, or federal preserves or designated natural areas are present in the watershed.

4.2.6 Air Quality

The Clean Air Act (CAA) of 1970, as amended in 1977 and 1990, is the primary federal statute governing ambient air pollution. The CAA designates standards for the following criteria pollutants that have been determined to affect human health and the environment: particulate matter (PM10 and PM2.5), carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), lead (Pb), and ozone (O_3). Volatile organic compounds (VOC) and NO_2 are precursors to O_3, which is not an emitted source but is formed by these pollutants in the atmosphere (40 CFR Part 50).

The EPA recommends establishing the existing environment for air quality and Air Quality Related Values (AQRV's) to obtain a baseline from which alternatives can be judged. An AQRV is a resource identified by the Federal Land Manager (FLM) for one or more federal areas that may be adversely affected by a change in air quality. The resource may include a specific scenic, physical, biological, ecological or recreational resource identified by the FLM. The existing environment includes not only the values for the 6 criteria pollutants, but also visibility and resources sensitive to deposition (wet deposition for nitrogen and sulfur). Several federal agencies conduct air quality monitoring as well as the ND Department of Environmental Quality (NDDEQ).

The USEPA has developed National Ambient Air Quality Standards (NAAQS) for these criteria pollutants to protect public health and welfare. When a designated air quality area or "airshed" exceeds NAAQS, that area may be designated as a "nonattainment" area. Areas with levels of pollutants below the health-based standard are designated as "attainment" areas. NDDEQ operates and maintains a network of ambient air quality monitoring sites throughout the state; the nearest air quality monitoring station is in Fargo, North Dakota; however this station does not record all parameters. Data from other state and federal monitoring sites was utilized to obtain a complete

baseline for existing air quality. These other sites included Bismarck, ND; Hiddenwood National Wildlife Refuge near Ryder ND; Hannover, ND, Beulah (North), ND; Red Lake Nation, MN; and Becker Co. MN. Design Values for the six criteria pollutants are summarized in Table 4-2. A design value is a mathematically determined pollutant concentration at a particular site that must be reduced or maintained at or below the NAAQS to assume attainment. There were no monitoring sites where the Design Value exceeded the NAAQS standard. No non-attainment areas were documented (EPA 2022 Design Value Interactive Map epa.gov).

Table 4-2 EPA Design Values for Air Quality Pollutants

Criteria Pollutants	NAAQS THRESHOLD	Fargo, ND	Hiddenwood NWR (Ryder) ND	Bismarck, ND	Red Lake Nation MN	Hannover (Oliver Co)	Beulah N. (Mercer Co)	FWS (Becker Co MN)
Ozone (8-Hour) ppm	0.07	0.058	0.053	no data	no data	0.058	0.057	no data
Particulate Matter 2.5 mm (Annual) µg/m³	12	8.3	6.3	7.7	6.2	7.2	6	7.2
Particulate Matter 2.5 mm 24 Hour µg/m³	35	32	24	28	24	26	21	24
Particulate Matter 10 mm µg/m³	150	no data	no data	0	no data	no data	no data	no data
Sulfur Dioxide ppb (1 hour)	75	3	8	10	no data	11	26	no data
Lead NAAQS µg/m³	0.15	no data	no data	no data	no data	no data	no data	no data
Nitrogen Dioxide (1 hour) ppb	100	32	13	30	no data	11	no data	no data
Nitrogen Dioxide (Annual) ppb	53	4	2	4	no data	2	3	no data
Carbon Monoxide (8 hour) ppm	9	no data	no data	0.8	no data	no data	no data	no data

The NDDH Air Quality Division regulates air quality throughout the state, with the exception of Indian reservations. North Dakota has promulgated ambient air quality standards (NDAAQS) in addition to the NAAQS. These standards include hydrogen sulfide and SO_2; for all other pollutants,

the NAAQS are equivalent or more stringent than the NDAAQS. Both the NAAQS and NDAAQS apply to the proposed project.

Interagency monitoring programs evaluate air quality conditions and trends for particulate matter (2.5mm), ozone, visibility, nitrogen deposition and sulfur deposition in Class 1 areas which include national parks. The closest national parks are Theodore Roosevelt National Park in ND and Voyagers NP in Minnesota. In both parks, for 10-year average data from 2012 – 2021, the condition for all of the parameters was "fair", with the exception of Mercury which was "poor" at Voyagers and "good" at TRNP. At TRNP, sulfur deposition was rated "good". Trends for all of the parameters in both parks was considered Relatively Unchanged for all parameters (USDI NPS 2023).

The *2020 North Dakota Ambient Air Quality Monitoring Program Network Plan with Data Summary* indicates that no sulfur dioxide, nitrogen dioxide, ozone, or particulate matter exceeds either the state or federal ambient air quality standards measured at any state-operated ambient air monitoring sites (NDDH 2020). Because of North Dakota's attainment status and because primary emissions associated with the project would not be from major sources, it is not anticipated that any air-quality permits or authorizations would be required from the NDDEQ Air Quality Division.

Existing deposition was characterized by utilizing the National Atmospheric Deposition Program's National Trends Network (NADP NTN 2023). Deposition data is available from precipitation data collected from 1984- 2023 at USGS Woodworth site in Stutsman County ND. The NTN Wet Deposition Summary for the park indicates an upward trend in Nitrate, Ammonium and Total Nitrogen. The Sulfate deposition is on a downward trend. Potential sources of ammonium include livestock manure, synthetic fertilizer and automobile exhaust.

Uptake of atmospheric carbon has been observed to be substantially greater in perennial crops compared to annual crops. Growing season net ecosystem CO_2 exchange has been observed to be 556 g C m^{-2} yr^{-1} in perennial crops compared to 89 g C m^{-2} yr^{-1} in annual crops (Kim 2022). The USDA COMET-Planner calculates the minimum difference in emission reductions between non-irrigated cropland and unfertilized grass/legume cover for Barnes county is 0.69 tons CO_2 $acre^{-1}$ yr^{-1}. Total greenhouse gas reduction is calculated at 0.91 tonnes/$acre^{-1}$ yr^{-1} , the major component being stored soil carbon (0.75 tonnes/$acre^{-1}$ yr^{-1}) with N_2O being a minor component (0.16 tonnes/$acre^{-1}$ yr^{-1}) (USDA and CSU 2025).

4.2.7 Soil Resources

The Red River Valley is not a typical river valley formed by erosive forces, but rather an area formed by glacial Lake Agassiz. Lake Agassiz formed when the late Wisconsinan ice sheet blocked northward flowing rivers, in existence from nearly 12,000 years ago to almost 7,500 years ago (Bluemle 2016). Much of the ancient lake bed is covered with deposits of very fine silts and lacustrine clay to depths of as much as 150 feet.

According to the USDA NRCS Web Soil Survey (WSS) there are 91 soil map units found within the Upper Maple watershed (USDA, NRCS 2023). The most predominant are Barnes-Svea loams, 3 to 6 percent slopes (19 percent of the watershed), Hamerly-Tonka complex, 0 to 3 percent slopes (17.4

%), and Barnes-Buse loams, 3 to 6 percent slopes (17.2 %). Topography in the watershed is generally flat, with areas of moderate slopes up to 25 percent. The majority of the soils have some limitations for growing field crops. Common limitations, according to the NRCS Land Capability Class and Subclass reports, include moderate limitations due to erosion and severe limitations due to wetness such as Hamerly-Tonka complex. The wetter soils found in depressions and along riparian areas are better suited to pasture, range or wildlife land uses. The majority of soils within the watershed have a Kf[1] factor less than 0.37, resulting in low susceptibility to sheet and rill erosion by water. The majority of the soils are moderately susceptible to wind erosion with Wind Erodibility Group average value of 4L, which is in the middle of the 1-8 range. The "L" indicates high calcium carbonate which further buffers wind erosion. The hydric status of soils within the watershed varies, with approximately 66 percent of the watershed mapped as predominantly non-hydric, 18 percent mapped as partially hydric; 12 percent mapped as predominantly hydric, 4 percent mapped as not hydric, and less than 1 percent mapped as all hydric. Cropping systems in the planning area use traditional tillage methods such as disking, chisel plowing and cultivation. These systems have reduced soil organic matter over time. Increased soil salinity has occurred in the region over time as water tables have risen and brought salts to the surface.

4.2.8 Prime and Unique Farmland

The Farmland Protection Policy Act (FPPA), USDA regulations implementing the FPPA (7 CFR Part 658), and USDA Departmental Regulation (DR) No. 9500-3 Land Use Policy, provide protection for prime and important farmland and prime rangeland and forestland. Section 658.5 of the FPPA provides criteria for federal agencies to consider when identifying the potential adverse effects of federal programs on farmland. As appropriate, federal agencies are to consider actions that could lessen adverse effects on farmland. They should also assure that federal programs, to the extent practicable, are compatible with state, local government unit, and private programs and policies that protect farmland.

The watershed is predominantly classified as prime farmland (55 percent of the watershed) and prime farmland if drained or not prime farmland (each 21 percent of the watershed); approximately 4 percent of the watershed is classified as farmland of statewide importance (Appendix C, Figure C-5).

4.2.9 Riparian Areas

Riparian areas occur at the interface between land and a watercourse (river, stream, tributary), such as a streambank or floodplain. These areas have different characteristics from adjacent upland communities, containing vegetation and soil adapted to the presence of water. Riparian areas occur adjacent to the watercourses throughout the watershed, including portions of the Maple River. The North Dakota Forest Service (NDFS) Identified riparian forests across North Dakota in North Dakota's Statewide Assessment of Forest Resources and Forest Resource Strategy (NDSU - NDFS 2010), including areas adjacent to the Maple River.

[1] The Kf erosion factor indicates the erodibility of materials less than 2 millimeters in size. Values of K range from 0.02 to 0.69, with higher values indicating greater susceptibility.

The size and complexity of riparian areas in the watershed varies significantly based on stream dimensions and contributing watershed size, topography, and anthropogenic features. Generally, larger streams with larger watersheds have more defined channel features, including streambanks and wider floodplains than smaller streams with smaller catchments. However, topography provides variability, which can include limited riparian areas where slopes are steep or extensive when low lying flats or very low slopes extend from the watercourse. Common anthropogenic features and practices that effect riparian areas include ditches, roads, levees, agronomic and grazing practices. Ditches have a strong influence on riparian quantity and quality as constructed widened and deepened stream channels limit flood flows from accessing the floodplain. The most prevalent ditch efforts include extensive straightening of the Maple River main stem in Cass County townships Rochester, Lake, and Cornell where the soil parent material developed in the flatter topography of the glacial lake plain. Little to no native riparian vegetation is present in these areas. Many smaller tributaries flow east and northeast through glacial till where significant widths of herbaceous riparian cover provide buffering to the streams from cropland. Roads are widespread and align with most section lines within the watershed; they dissect habitats in riparian areas and concentrate flood flows to culverts or bridges. Levees in the watershed are not extensive, but do include a few farmstead ring levees and push-up berms along streams. Agronomic practices include replacing perennial vegetation with annual row crops, tillage, and installing drain tile; these practices limit riparian area diversity, degrade soil structure, lower water tables, increase runoff, and incite wind and water-based erosion. Grazing practices can include cattle in the stream and dugout ponds for watering; each have water quality implications. In summary, watershed riparian areas vary in size and functions throughout the watershed, but anthropogenic changes have had a significant impact leaving less than pristine riparian areas.

Seasonal flow duration drives habitat for fish and wildlife; streams with larger contributing watershed size are often perennial, while smaller catchments produce ephemeral streams. Low-flow duration statistics can be used to determine percentage of time in days a stream is at or above a certain flow rate. Regression equations were developed to make these calculations for ungauged streams in North Dakota, which is outlined in USGS Scientific Investigations report 201-5184 (USGS, Williams-Sether, Tara, and Gross, T.A. 2016). Duration flow rates at Site 2A for existing conditions were estimated using the equations for the appropriate zone (C) and are summarized in Table 4-3.

Table 4-3 Flow Duration, Upper Maple River @ Site 2A (Existing Conditions)

Duration		Flow
(% time)	(days)	(cfs)
90	189	0.01
75	157.5	0.03
50	105	0.30
25	52.5	6.72
10	21	32.34

4.2.10 Forest Resources

Forest resources are a minor component of the watershed. According to the U.S. Department of Agriculture's (USDA) National Agricultural Statistics Service CropScape program, in 2023 tree/forest cover comprised only 0.66% of the watershed. The majority of the tree cover consists of planted field and farmstead windbreaks. Some of the riparian areas have sufficient hydrology to support tree and shrub vegetation such as willows and cottonwood, however the intermittent flows and seasonally flooded areas typically do not support riparian forest cover. Invasive non-native Russian olive trees dot riparian areas that are not managed. Windbreaks are commonly planted to mix of native and non-native species such as green ash, blue spruce and shrubs such as common lilac and redosior dogwood.

4.2.11 Floodplain Management

Floodplains constitute lands situated along rivers and their tributaries that are subject to periodic flooding. A 100-year floodplain represents a 1 percent chance of being flooded in any given year, on the average interval of 100 years or less.

Continued encroachment on floodplains decreases the natural flood control capacity of these lands, creates the need for disaster relief activities, and endangers both lives and property. In compliance with Executive Order (EO) 11988, Floodplain Management, and the USDA DR No. 9500-3, it is the USDA's policy to avoid to the extent possible:

- Long- and short-term adverse impacts associated with the occupancy and modification of floodplains.
- Direct or indirect support of floodplain development where there is a practicable alternative.

EO 11988 requires that to the extent practicable, federal agencies avoid actions which would result in the locations of facilities in floodplains and/or affect floodplain values. Facilities located in floodplains may be damaged or destroyed by a flood or may change the flood-handling capability of the floodplain.

Review of the FEMA Map Service Center (MSC) indicates that National Flood Hazard Layer (NFHL) data are not available for approximately two-thirds of the watershed. Preliminary maps indicate that the majority of map panels within the watershed are unprinted as well, due to no special flood hazard areas present within the panel area. Exceptions to this are two preliminary map panels (38091C0300A and 38091C409A) printed for the northernmost portion of the watershed in Steele County, showing preliminary flood hazard areas. The remaining panels in the watershed are unprinted or contain no flood hazard areas. There are no FEMA-designated floodplains in the watershed.

The broad, flat, floodplain of the Upper Maple River is predominantly made up of cropland farmed for row crops, with some occasionally interspersed hayfields, wetlands, sloughs, and natural lands which provide environmental benefits.

4.2.12 Water Resources

Water resources in the watershed are shown on Appendix C, Figure C-4. The main watercourse in

the watershed is the Maple River, which runs along the eastern portion of the watershed (Appendix C, Figure C-4). The Maple River discharges to the Sheyenne River, which then discharges to the Red River. As shown on Figure C-4, Appendix C, there are also several tributaries associated with the Maple River. Several small lakes are present in the watershed, including Stony Lake, Willow Lake, Goose Lake, and Minnie Lake (Appendix C, Figure C-4). Four dams are located in the watershed: the Hope Dam, Sussex Dam (breached), Upper Maple River Dam, and an unnamed dam (Appendix C, Figure C-4).

There are no USEPA-designated sole-source aquifers in the watershed. The far east side of the watershed is underlain by the Page Aquifer, however shallow wells (less than 50 feet on average) are scattered throughout the watershed. There are no municipal wells in the watershed, however there are 23 private drinking water wells, 2 stockwater wells, and 2 irrigation wells (both within the Page Aquifer).

At present, excess runoff and intense rain events cause frequent overland and overbank flooding within the watershed. These flooding events create significant impacts to agriculture, residences, transportation systems, and infrastructure, as well as create conditions with the potential to increase erosion and subsequent sediment delivery to downstream receiving waters. Existing conditions were modeled and referenced in Appendix D-1 and are shown in Appendix C, Figure C-7. During the 100-year event, approximately 20% of the drainage area is inundated under existing conditions or approximately 37,246 acres. Of those acres, approximately 81% are crop or hay/pasture areas, 3% are developed and 16% are wetlands, open water or forest. Estimated annual crop damage for existing conditions is approximately $2,128,000 (Rooney 2020). In addition to agricultural damage, impacts to roadways are also significant. Over 190 roadways within the watershed are inundated during a 100-year event. In addition to these modeled events, historical damages have also been documented in this area. FEMA disasters in 2009, 2010 & 2011 amounted to over $2,600,000 dollars in damages to roadways. Overland flooding within the watershed has posed difficult farming conditions, including delayed planting, lower land values, and loss of agriculturally generated income. Historically, between 1989 and 1998, flooding has resulted in annual agricultural damages ranging from $27,142 to over $1.3 million (Rooney 2020).

All-season peak flow recurrence was compared to the resultant peak flows from rainfall recurrences to determine applicability of the analyzed synthetic rainfall events for structural (non-cropland) impacts. All-seasons peak flow rates for the Upper Maple River, at Site 2A, were estimated using Regional Regression Equations defined in the USGS Scientific Investigations report 2015-5096 (USGS, Willams-Sether, Tara 2015). Peak flow rates generated from USGS Regional Regression Equations account for flow throughout the entire year, including spring runoff. Rainfall peak flow rates are developed from calibrated models described in Appendix D-1. This comparison indicates that peak flow rates that are result of synthetic rainfall are greater than peak flow rates from regional regression equations representing all season events. This would indicate the Upper Maple River Watershed is more at risk from floods during widespread severe rainfall events compared to spring runoff. Table 4-4 summarizes the peak flow rates from all-season regional regression equations and synthetic rainfall events.

Table 4-4 Seasonality Flow Comparison, Upper Maple River @ Site 2A (Existing Conditions)

Recurrence	Flow Rates (cfs)	
	All-Seasons (USGS Regional Regression Equations)	Rainfall (24-hour Atlas 14 Precipitation)
2-year	141	572
5-year	426	1,014
10-year	711	1,487
25-year	1,160	2,301
50-year	1,560	3,076
100-year	1,990	3,937

4.2.13 Wetlands

Wetlands are defined in 1977 Executive Order 11990, Protection of Wetlands, and in Section 404 of the CWA as those areas that are inundated by surface or ground water frequently enough to support, under normal circumstances, a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Three parameters that define a wetland, as outlined in the *1987 U.S. Army Corps of Engineers Wetlands Delineation Manual* (USACE 1987) and the *2010 Great Plains Regional Supplement* (USACE 2010), are hydric soils, hydrophytic vegetation, and hydrology.

The watershed is located in an area known as the Prairie Pothole Region. As glaciers from the last ice age began to recede, millions of small depressional wetlands, known as potholes, were created. As humans settled and developed the area, it is estimated that more than half of the wetlands within the Prairie Pothole Region were drained to accommodate agricultural practices (USEPA 2012). Beyond wetland acreages lost, remaining wetlands have reduced functions due to the same anthropogenic changes described in 4.2.9, i.e. ditches, roads, levees, agricultural practices, and ranching practices. Wetland functions are described in Appendix D-4, Section 3.3.

Wetlands in riparian areas resulting only from streamflow, and not other sources like groundwater or surface water retained in depressional potholes, are not expected due to typically short flood hydrograph (less than two days), and time to develop hydric soil indicators (greater than 14 days).

The U.S. Fish and Wildlife Service (USFWS) maintains and continually updates the National Wetlands Inventory (NWI) (USFWS NWI 2023), which provides the public with information on the extent and status of the nation's wetlands and deepwater habitats. The NWI was developed by the USFWS in the late 1970s, based primarily on interpretation of aerial photographs. The NWI classifies wetlands into different types, using the USFWS Cowardin Classification System (Cowardin, et al. 1979). The NWI maps identify approximately 11,281 acres of wetlands within the watershed, with approximately 88 percent (9,891 acres) mapped as palustrine freshwater emergent wetlands (Appendix C, Figure C-4). Additional wetland types mapped include freshwater pond, which includes Minnie Lake in the southern part of the watershed (979 acres, 9 percent of the

wetland area); lakes, including Stony Lake, Willow Lake, and Goose Lake (261 acres; 2 percent of the wetland area); palustrine freshwater forested/shrub wetlands (149 acres, 1 percent of the wetland area); and other (1 acre, less than 0.1 percent of the wetland area). The NWI maps tend to underestimate the presence of wetlands on the landscape, particularly in farmed and forested areas. As such, additional wetlands could be present in the watershed.

The wetland compliance provisions of the Farm Bill restrict participation in USDA programs for producers who convert wetlands in a manner that would make production of agricultural commodities possible.

4.2.14 Waters of the United States

Water resources are protected to varying degrees under the Clean Water Act and other legislation. When federal funding is used for construction and improvement projects, Executive Order 11990 requires federal agencies to preserve, enhance, or minimize degradation and losses to wetlands in that priority order, regardless of Clean Water Act status. NRCS policy for implementing the executive order can be found at 190-GM, Part 410, Subpart B, Section 410.26. Section 404 of the Clean Water Act Section requires permitting from the US Army Corps of Engineers (USACE) for activities that impact Waters of the US. NRCS floodplain management policy reviews activities in wetlands that occur within the 50-year floodplain (190-GM Section 510.25). The Red River of the North is a navigable river; therefore, by definition, the Maple River and tributaries would be considered Waters of the US and under the jurisdiction of USACE.

As mentioned in Section 4.2.13, under the authority of Section 404 of the CWA, the USACE regulates the placement of dredged or fill material into waters of the United States, including wetlands adjacent or hydraulically connected to interstate or navigable waters. The Maple River, Sheyenne River, and Red River are all considered Waters of the United States. Some of the individual wetlands identified in Appendix D-4 may be considered jurisdictional, however this determination has not been completed by USACE. USACE is a cooperating agency on this EIS however the agency has limited resources and prefers to make final jurisdictional determinations after final design is complete and a 404-permit application submitted immediately prior to construction. Jurisdictional determinations would only be completed on identified wetlands that would be impacted by proposed alternative. Given Executive Order 11990, NRCS would address all wetland impacts through mitigation identically, regardless of jurisdictional status, therefore the determination would have no impact on project design or implementation costs.

4.2.15 Water Quality

Groundwater Quality

The ND Department of Water Resources (NDDWR) and ND Department of Environmental Quality (NDDEQ) have identified and assessed unconfined surficial aquifers in the region consisting of sands and gravels. A small portion of the Page Aquifer underlies the far east side of the watershed, however shallow wells (less than 50 feet on average) are scattered throughout the watershed. There are no municipal wells in the watershed, however there are 23 private drinking water wells, 2 stockwater wells, and 2 irrigation wells (both within the Page Aquifer). NDDEQ does not release groundwater quality data from private wells. Outside of the watershed, there are public wells for

the Cass and Trail Rural Water Districts that draw from the Page Aquifer and that test data is available. The Page Aquifer is included in an NDDEQ Agricultural Groundwater Monitoring Program. High levels of arsenic, iron and manganese were detected in the 2017 water chemistry testing. Nitrate levels exceeding the maximum contaminant level are uncommon but have occurred in 3-12% of the wells in 1994, 1999, 2009, and 2014. Pesticide detections are also uncommon, however 10 of the 94 wells tested have had pesticide detections since 1994. Bentazon, Carbaryl and Dicamba were detected in one well in 2017. ND DEQ has ranked the Page Aquifer as Moderately Susceptible to contamination.

Surface Water Quality

Under Section 303(d) of the Clean Water Act of 1986 (CWA), states are required to monitor and assess their waters to determine if they meet water quality standards, supporting the beneficial uses they are intended to provide (33 U.S.C. 1313(d)). Waters that do not meet their designated uses due to water quality standard violations are listed as impaired. States are required to develop a list of impaired waters that require total maximum daily load (TMDL) studies and to submit an updated list of impaired waters to the EPA every 2 years.

The North Dakota 2020-2022 Integrated Section 305(b) Water Quality Assessment Report and Section 303(d) List of Waters Needing Total Maximum Daily Loads (NDDEQ 2023), lists the Maple River (ND-09020205-024-S_00), which ultimately flows into the Red River of the North, as impaired downstream to its confluence with a tributary near the Steele, Cass, and Barnes County line. The designated use is fish and other aquatic biota; listed impairments include dissolved oxygen and fishes bioassessments. TMDLs have not been prepared for the impairments. There are no impaired lakes or ponds within the watershed.

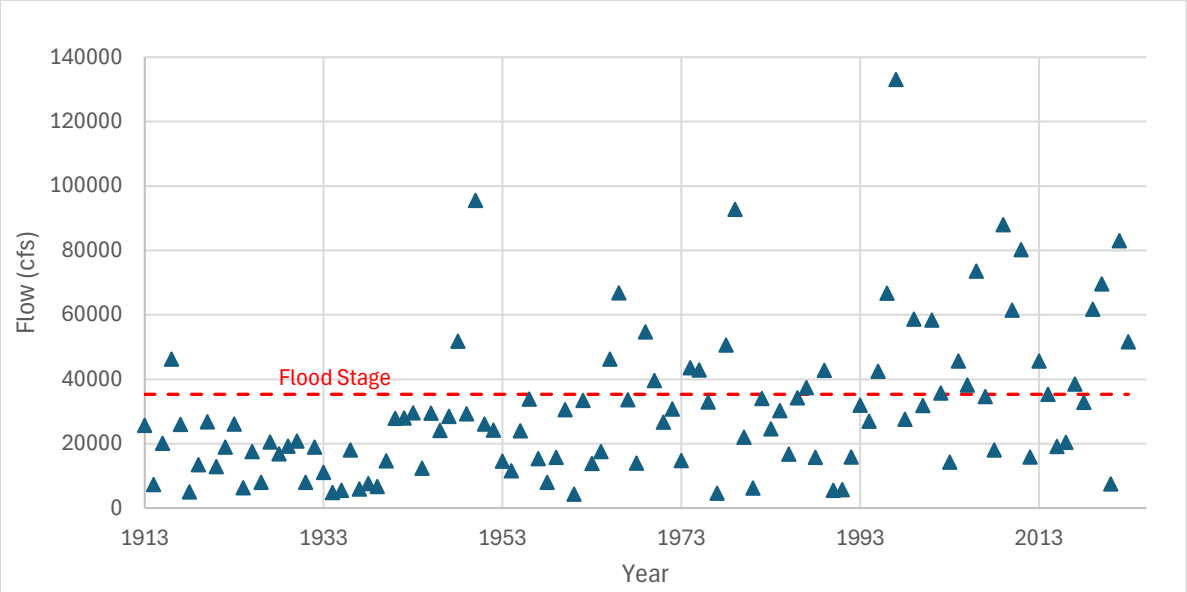
The North Dakota Administrative Code (NDAC) 33-16-02.1-09 designates the Maple River as a Class II stream, which is defined as "the quality of class I streams, except that additional treatment may be required to meet the drinking water requirements of the department. Streams in this classification may be intermittent in nature which would make these waters of limited value for beneficial uses such as municipal water, fish life, irrigation, bathing, or swimming". Class I stream quality is defined as "suitable for the propagation or protection, or both, of resident fish species and other aquatic biota and for swimming, boating, and other water recreation. The quality of the waters shall be suitable for irrigation, stock watering, and wildlife without injurious effect".

Agricultural non-point source pollution from the U.S. portion of the Red River Basin is a major contributor to the ongoing eutrophication of Lake Winnipeg which is degrading a $102 million per year recreational fishing industry, $25 million per year commercial fishing industry, and subsistence fishing by 14 First Nation communities along the lakeshore (Armstrong and McCullough 2011). Between 1994 and 2007, annual phosphorus loads to Lake Winnipeg increased 71% and nitrogen loads increased 18% (Schindler 2012). While the Red River contributes only 15 to 20 percent of overall annual runoff to the lake by volume, within 1994-2007 it contributed 70% of the total phosphorus load, largely in the form of inorganic dissolved phosphorus originating from synthetic fertilizers, and 78% of the annual total nitrogen load (Armstrong and McCullough 2011). Modeling indicates that the Upper Maple River Watershed is within the top 20% of Red River Basin

sub-watersheds for phosphorus and the top 40% for nitrogen delivery. Within the North Dakota portion of the Red River Basin, 65% of total nitrogen and 75% of total phosphorus originates from cropland (Benoy, et al. 2016). Over the last two decades, a longer and warmer growing season has allowed replacement of small grain to corn/soybean crop rotations, which have higher fertilizer requirements.

Over the course of the 20th century, an increase of 20% in precipitation produced 300% higher annual discharge in the Red River (Ehsanzadeh, Kamp and Spence 2011). A significant positive trend is also present in peak discharges over the last century, as illustrated by the frequency of peak flows at the long term gauge at the international border crossing of the Red River shown in Figure 1. A similar long term gauge is not available in the Maple River watershed, however trends throughout other tributaries in the Red River Basin are similar. The magnitude and frequency of spring floods is directly tied to water quality; 62% of annual total phosphorus was found to be transported during the 12-18 day snowmelt period (Rattan 2019) and concentration in spring floods is nearly double that of summer high flow events (McCullough, et al. 2011). Modeling of a variety of drivers thought to influence phosphorus loads in the Red River (seasonal precipitation, wastewater treatment plant discharges, urban stormwater discharges, percent of the basin in row crops, percentage of small grain versus corn/soybean crops, synthetic versus manure based fertilizer applications, fertilizer timing) indicated that 40% of the variation in total phosphorus can be explained by November to June precipitation and 20% can be explained by agricultural practices (Ryberg 2017).

Figure 1- Annual Peak Flow, Red River @ Emerson 1913-2023

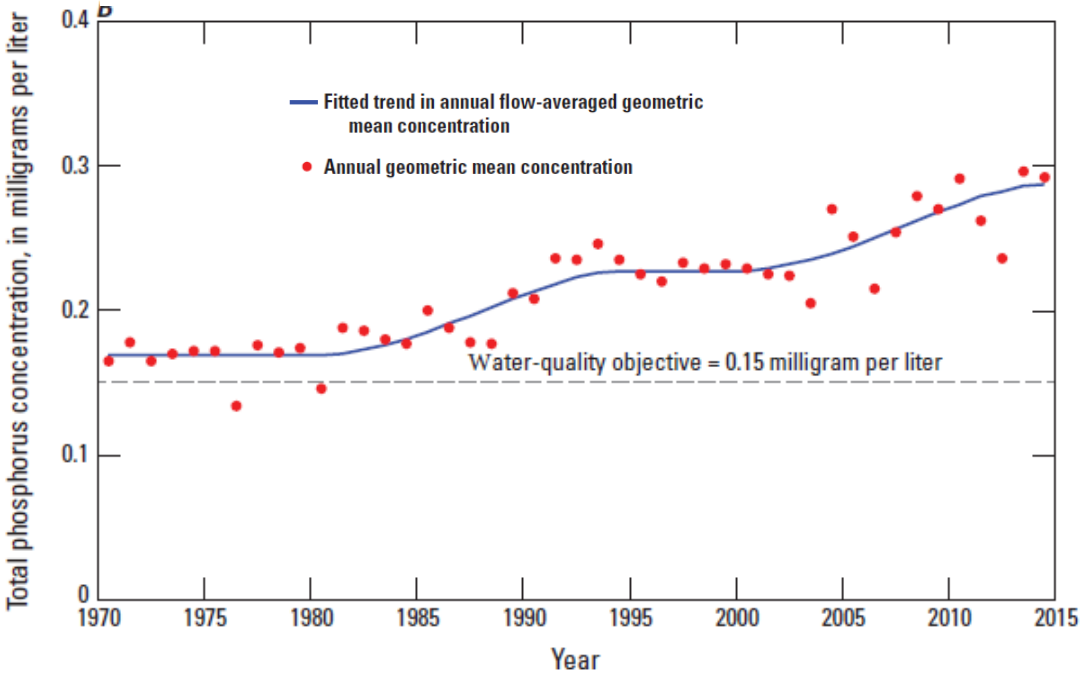


Elevated phosphorus concentrations associated with floods are in part due to leaching of soluble phosphorus from inundated soils, whether by overland flooding by direct runoff or by floodwaters inundating extensive areas outside of the low flow channel. When certain weather conditions prevail, major flooding can be spread over 1,000 to 2,000 square miles and may last for 4 to 6 weeks (Carlyle 1984). Mobilization of phosphorus is more strongly correlated to peak flow events

than to mean discharge. Several studies have shown that the highest phosphorus concentrations are recorded on the falling limb of the hydrograph, which indicates that initial surface runoff and channel erosion are not the main transport mechanisms (McCullough, et al. 2011). Both crops and perennial vegetation actively incorporate dissolved inorganic phosphorus into above and below ground plant tissue via uptake of dissolved phosphorus from the soil pore water during the growing season. Prior to winter die off, a substantial percentage is translocated to below-ground plant tissue, but the residual above-ground biomass is deposited on the soil surface. In addition, during leaf senescence, phosphorus solubilizing exudates can be responsible for generation of soluble phosphorus as well as the freezing process itself causing intracellular phosphorus release from biomass within shoots. During the long duration flood inundations typical in this watershed, labile phosphorus from dead vegetation is converted to dissolved phosphorus in the overlying waters.

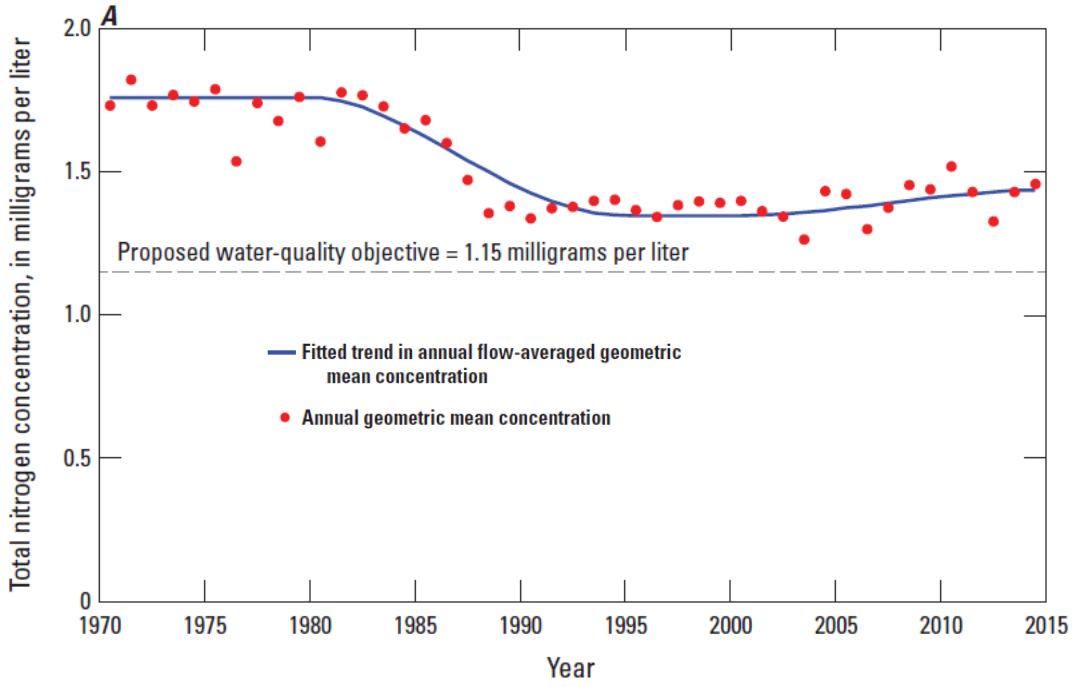
While the floods of the 1990s did increase runoff volume from the Red River Basin, even when removing those effects via flow averaging, the statistical analysis presented in Figure 2 for 1970-2017 indicates an increasing trend at the international border crossing of the Red River (Nustad and Vecchia 2020).

Figure 2- Flow Averaged Mean Concentrations of Phosphorus 1970-2017, Red River @ Emerson



Over that same time period, nitrogen trended lower as shown in Figure 3 (Nustad and Vecchia 2020), potentially as the result of millions of dollars invested in conservation efforts over the last four decades targeting conservation tillage, improved nutrient management, riparian buffers, wetland restoration, and soil health efforts throughout the U.S. portions of the Red River Basin.

Figure 3- Flow Averaged Mean Concentrations of Nitrogen 1970-2017, Red River @ Emerson



4.3 Regional and International Water Resource Plans

The United States and Canada share a 5,000-mile border with 150 rivers and lakes shared between the countries. The Boundary Waters Treaty (BWT) was signed in 1909 to adjudicate conflicting interests on rivers and lakes along the international border between the U.S. and Canada. Article IV of the BWT states that "boundary waters or waters flowing across the boundary shall not be polluted to the injury of health and property to the other." The International Joint Commission (IJC) acts as the arbitral body for the BWT, with International Red River Board (IRRB) established as the IJC sub entity for the Red River Basin. After decades of research and negotiation, in 2019 the IRRB recommended nutrient concentration and load target objectives for the international border crossing of the Red River at Emerson to the IJC; the objectives were formally adopted in 2022 with concurrence from the U.S. State Department and Global Affairs Canada. The average nutrient load for phosphorus in 2017-2021 was 170% of the standard and for nitrogen was 125% (IRRB 2023). The average nutrient load for phosphorus in 2017-2021 was 170% of the standard and for nitrogen was 125% (IRRB 2023). The Upper Maple watershed is within the top 20% of Red River Basin sub-watersheds for phosphorus contribution to the Red River and among the top 40% for nitrogen (Benoy, et al. 2016) . Figures 4 and 5 provide non-flow averaged nutrient concentrations, as compared to the IJC agreed to concentration objectives at the international border crossing of the Red River (IRRB 2023).

Figure 4- Total Phosphorus, Red River @ Emerson 2017-2022

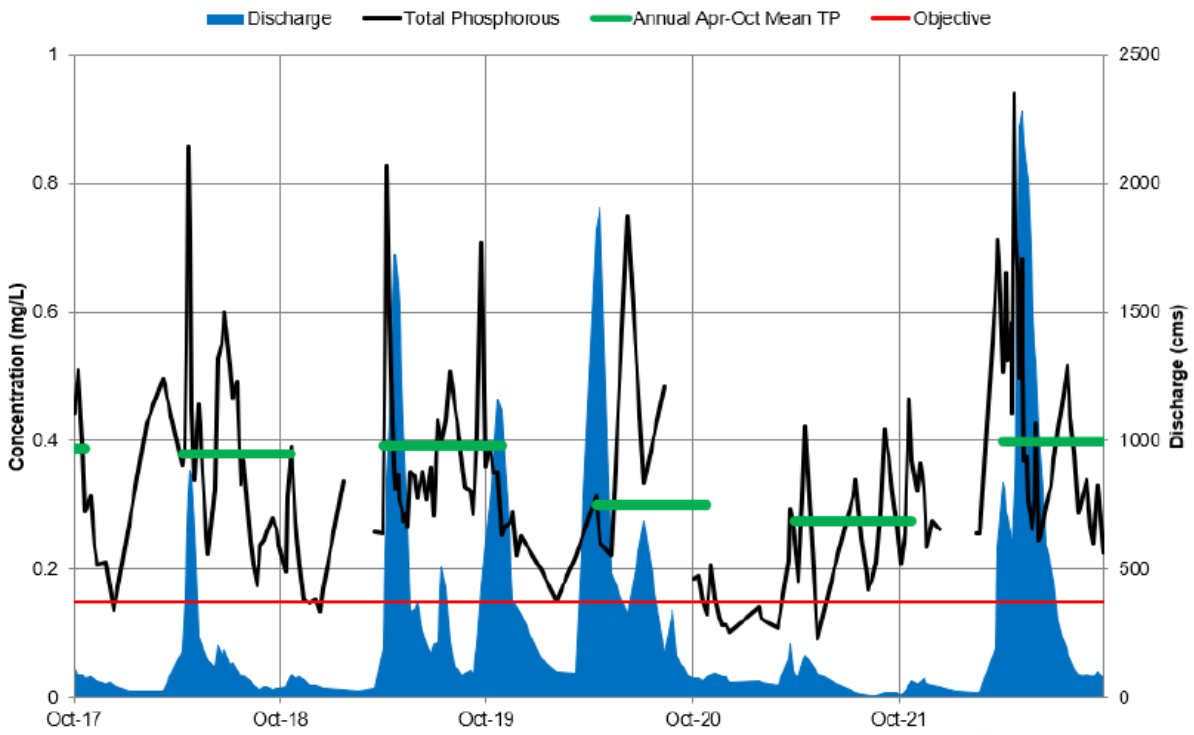
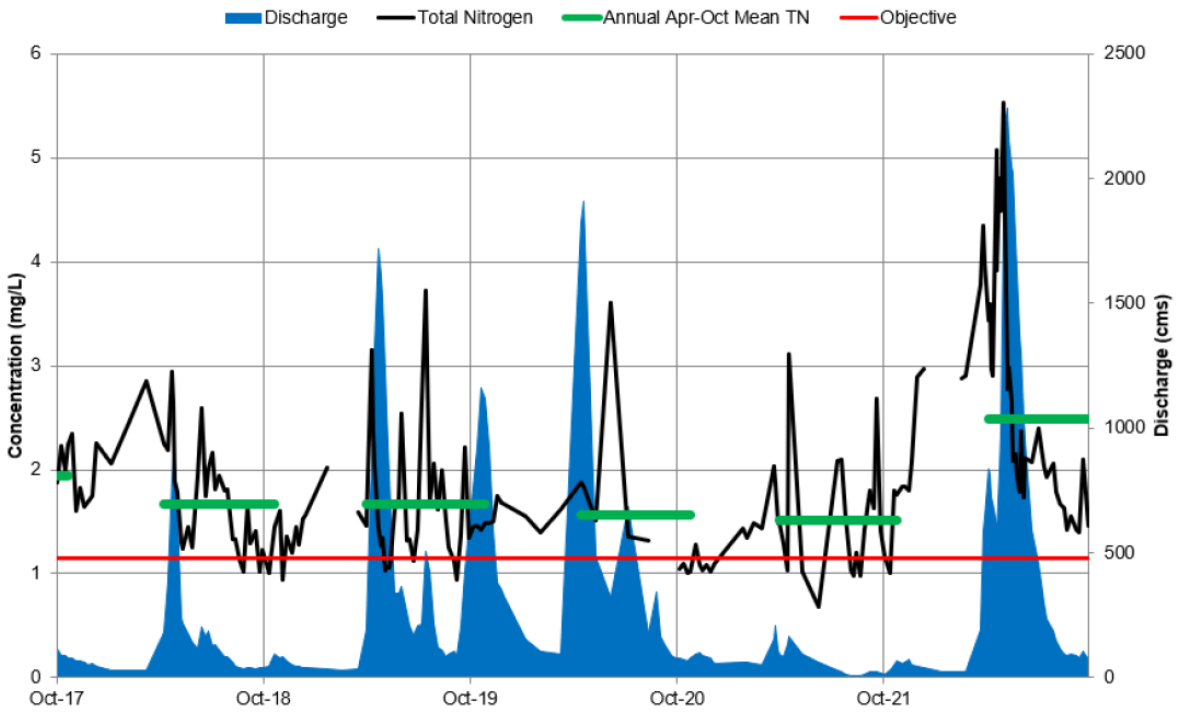


Figure 5- Total Nitrogen, Red River @ Emerson 2017-2022



Flooding in the Red River Basin has also long been an international priority. The Red River Basin Commission (RRBC) is a non-profit entity governed by representatives from Manitoba, North

Dakota, and Minnesota; these entities have worked together for over 40 years to address flooding and natural resource issues. Major projects to protect the cities of Winnipeg and Grand Forks from flood damage were completed and one currently is underway for the Fargo/Moorehead area. Levees have been constructed to protect many of the smaller cities in the Basin, with more projects underway. Many individual farmsteads in rural areas have been protected with ring dikes. Flood damages to the highly productive cropland and roads throughout the rural areas of the Basin, however, have been much more challenging to address. The RRBC launched a planning effort which concluded with the Long Term Flood Solutions Report (LTFS) adopted in 2011, which identified distributed retention projects within rural areas as a priority. It was recognized that individually these smaller retention projects would benefit flood reduction in their local sub watersheds but that collectively they would have a benefit to the Red River mainstem as well. The LTFS adopted goal of 1.5 million acre-feet of distributed retention was projected to generate a 20% flow reduction to peak flows on the mainstem (RRBC 2011).

The Red River Retention Authority (RRRA) was established as a sub-entity of the RRBC with a mandate to coordinate and advocate for implementation of the 1.5 million acre-feet of distributed rural retention projects. When the RRRA secured a national USDA-NRCS RCPP project in 2015 to support PL-566 Small Watershed Planning in the Basin, they recognized that a similar strategy could be applied to the challenges of nutrient reduction and wildlife habitat. While an individual retention project with those features incorporated may not individually generate a significant magnitude, the aggregate of many projects would address some of these daunting natural resource challenges.

The 2021 North Dakota State Water Commission State Water Management Plan (NDDWR 2021) has identified the following potential projects on the Maple River and/or within the Upper Maple River watershed: Enderlin Park Board – Maple River Bank Stabilization, Maple River WRD – Davenport Flood Risk Reduction, Maple River WRD – T-180 Dam Repair, Sheyenne-Maple Flood Control Improvements, District No. 2 (MR-2) Channel Improvement – Phase II, Tower Township Improvement District No. 77, 79, and 80, Buffalo-Lynchburg Channel Improvement-Phase III, Cass County Drain No. 46 Channel Improvement, and Upper Maple River Watershed Detention – Site #1 and #2. Any proposed project that promotes rural flood control within the watershed would be consistent with the general water management priorities of the *2021 North Dakota State Water Management Plan* (NDDWR 2021).

5 Alternatives

5.1 Formulation Process

Alternatives were formulated and evaluated based on their ability to meet the watershed protection goals of the plan: reduced nutrient export out of the watershed, improved wildlife habitat, and reduced flood damages. NRCS National Watershed Program Manual, the NRCS conservation planning process, and the Principles and Guidelines for Federal Water Resource Projects were used in the alternative formulation process. Additionally, alternatives were formulated with consideration to the Clean Water Act goals of avoiding and minimizing impacts to Waters of the United States and included alternatives that avoided and minimized impacts to

aquatic resources, as well as alternatives that specifically benefited aquatic resources. Planning followed procedures outlined in the USDA-NRCS National Environmental Compliance Handbook (USDA, NRCS 2011). Alternatives were rejected if other practicable alternatives were available which met the purpose and need, without significant adverse environmental consequences.

5.1.1 Initial List of Considered Strategies

Given the inter-relationship between flooding and nutrient transport in the Red River Basin, the initial set of strategies to achieve the identified watershed protection goals was derived from the Red River Basin Flood Damage Reduction Work Group Technical and Scientific Advisory Committee's Technical Paper (TP) 11 (Anderson and Kean 2004). Although not an exhaustive list, TP 11 provides a variety of FDR strategies that have proven track records of success within the Red River Valley. These strategies are divided into four distinct categories, representing four unique methodologies to alleviate flooding. The full list of strategies by category is presented below.

Category 1 – Increase temporary or permanent flood storage
- 1A – Dams and impoundments
- 1B – Create or restore wetlands with controls plus added storage
- 1C – Alter groundwater through drainage or drainage water management
- 1D – Culvert sizing to meter runoff
- 1E – Overtopping levees

Category 2 – Increase conveyance capacity
- 2A – Channelization of existing natural water ways and flowages (floodway) and surface drainage
- 2B – Diversions
- 2C – Set back levees (move existing)
- 2D – Increase road crossing capacity

Category 3 – Reduce flood volume
- 3A – Create or restore wetlands (natural function)
- 3B – Cropland Best Management Practices (BMPs)
- 3C – Cropland conversion (back to grass or forest)
- 3D – Other beneficial uses—irrigation, municipal/industrial–flow augmentation

Category 4 – Protection/avoidance
- 4A – Urban levees
- 4B – Farmstead levees
- 4C – Agricultural levees
- 4D – Evacuation of the floodplain
- 4E – Flood proofing
- 4F – Flood warning system

Along with the initial strategies identified in TP 11, two additional strategies, river restoration to reconnect floodplains with a natural channel and aquifer recharge were identified by the project team for consideration.

5.1.2 Strategy Evaluation

Each of the FDR categories listed underwent several general evaluations on the basis of:

1. Whether or not the strategy would effectively address the watershed protection goals of the project: reduction of nutrient runoff, improvement of wildlife habitat, and reduction of flood damages.

2. Whether the alternative would cause a significant negative impact on NEPA concerns.

3. Whether the strategy is practical for the local Sponsor to implement through a PL-566 watershed project.

The following seven strategies were eliminated without detailed analysis, based on the rationale described below.

- Measure 1D – Culvert sizing to meter runoff. The concept of utilizing the 1-mile by 1-mile grid of roads in the basin combined with gated culverts, to create distributed retention throughout the basin, was termed the "Waffle concept" and studied in detail (EERC 2007). While potentially effective for downstream flood reduction, the strategy relies on intentionally flooding cropland for downstream benefits. This strategy was eliminated given it would result in increased dissolved phosphorus loads transported downstream and flood damage to cropland.

- Measure 2B – Diversions. Diversions are practical means of flood prevention measures for urban areas, however without associated retention features they increase peak flows downstream. Construction of channels in the Red River Basin can rarely be done without impacts to wetlands either directly or through the lateral effect of lowered groundwater tables for hundreds of feet to either side of the excavated channel. This strategy was eliminated because it would not provide wildlife habitat benefits nor would it likely provide net benefits to flood damages and nutrient reduction.

- Measure 2D – Increasing road crossing capacity. As with diversions, this strategy can provide flood damage reduction for a specific location upstream of a road crossing, but typically at the expense of increased flooding downstream. It was eliminated because of it would be unlikely to meet any of the watershed protection goals.

- Measure 4A – Urban levees. This strategy was eliminated because there are no communities in the watershed.

- Measure 4D – Evacuation of the floodplain. This strategy was eliminated because it is impractical since most of the floodplain is high value cropland that cannot be relocated.

- Measure 4E – Floodproofing. This strategy is geared to structures and would be unlikely to meet any of the watershed protection goals.

- Measure 4F – Flood Warning System. This strategy is focused on public safety and would be unlikely to meet any of the watershed protection goals. Although water overtopping roads and road washouts are a public safety concern, construction of a flood warning system over a vast rural area is not practical.

5.1.3 Preliminary Alternative Identification

The planning team then met and identified project alternatives where the remaining strategies could be implemented to address at least one watershed protection goal. In total, 38 alternatives were identified as listed below and shown in Figure C-6, Appendix C. There were 18

impoundment/dry alternatives, 3 wetland creation/restoration (impoundment) alternatives, 3 wetland creation/restoration alternatives (natural function) alternatives, 1 overtopping levee alternative, 5 channelization alternatives, 1 setback levee alternative, 1 agricultural/farmstead levee, 1 channel restoration alternative, 1 aquifer storage alternative, 1 cropland BMP alternative, 1 cropland converted to grass or forest alternative, 1 alter ground water – tile management alternative, and 1 other beneficial uses (irrigation, industrial, municipal) alternative.

The project team reviewed the remaining project alternatives to determine if additional technical analysis would be necessary. As outlined Appendix D-1, a HEC-HMS hydrology model and HEC-RAS hydraulic model were developed for the planning effort and utilized to screen effectiveness of alternatives. The project team also considered potential for wildlife habitat development, nutrient reduction features, environmental concerns, financial considerations or barriers, public and agency comments, comments from the project team, any known permitting obstacles, cultural resource concerns, agricultural improvements, and potential impacts to threatened or endangered species to evaluate these alternatives.

Table 5-1 Preliminary Alternatives

Alternative No.	Location (Township-Section)	Type/Strategy
1	Melrose 33	Impoundment/Dry
2	Carpenter 29	Impoundment/Dry
3	Ellsbury 11	Impoundment/Dry
4	Ellsbury 24	Impoundment/Dry
5	Ellsbury 25	Impoundment/Dry
6	Ellsbury 36	Impoundment/Dry
7	Ellsbury 32	Impoundment/Dry
8	Grand Prairie 1	Impoundment/Dry
9	Grand Prairie 24	Impoundment/Dry
10	Minnie Lake 18	Impoundment/Dry
11	Minnie Lake 16	Impoundment/Dry
12	Minnie Lake 15	Impoundment/Dry
13	Lake 7	Impoundment/Dry
14	Grand Prairie 36	Impoundment/Dry
15	Minnie Lake 33	Impoundment/Dry
16	Minnie Lake 35	Impoundment/Dry
17	Lake 29	Impoundment/Dry
18	Welmer 11	Impoundment/Dry
19	Willow Lake 15	Wetland Created/Restored (impoundment)
20	Minnie Lake 17	Wetland Created/Restored (impoundment)
21	Rochester 8	Wetland Created/Restored (impoundment)
22	Various Locations	Overtopping Levees

Alternative No.	Location (Township-Section)	Type/Strategy
23	Rochester	Channelization
24	Lake	Channelization
25	Lake	Channelization
26	Lake	Channelization
27	Cornell	Channelization
28	Various Locations	Setback Levee
29	Willow Lake 15	Wetland Created/Restored (natural function)
30	Minnie Lake 17	Wetland Created/Restored (natural function)
31	Rochester 8	Wetland Created/Restored (natural function)
32	Cornell 4	Agricultural/Farmstead Levee
33	Watershed	Maple River Channel Restoration
34	Watershed	Aquifer Storage
35	Watershed	Cropland BMPs
36	Watershed	Cropland converted to Grass or Forest
37	Watershed	Alter Ground Water – Tile Management
38	Watershed	Other Beneficial Uses (Irrigation, Industrial, Municipal)

5.2 Preliminary Alternatives Eliminated from Detailed Study

The project team met on numerous occasions, as described in Section 7, and chose to eliminate the alternatives below based on the rationale listed.

Alternative #1: Impoundment – Located in Steele County, Melrose Twp – Sec 33 area.

Preliminary hydraulic analysis showed that the project showed little benefits for nutrient/flood reduction. The impoundment showed a minor peak flow reduction which ranged from 0% to 2.59% at Location 1 noted on Appendix C – Figure C-6. This peak flow reduction is significantly less than other alternatives. These peak flow reductions are less due to the Upper Maple River Dam which is downstream of this alternative. There would be a minor opportunity for wetland restoration in the temporary pool of the dry dam through ditch plugs in constructed drainage channels, however most wetlands are undrained. Wetlands are cropped in most years, so planting to native grass would be an available enhancement. Alternative eliminated from further review due to limited ability to generate watershed protection benefits.

Alternative #2: Impoundment – Located in Steele County, Carpenter Twp – Sec 29 area.

Preliminary hydraulic modeling results indicate that this alternative only provides nutrient/flood reduction benefits to a small area and improvement dissipates quickly through the watershed. Additionally, this alternative increases peak discharges downstream by approximately 13.9% causing negative impacts during certain events. The negative impacts are likely due to the timing of

the runoff through the watershed. The impoundment is likely slowing down water that would normally pass prior to the peak downstream. Alternative eliminated from further review due to limited ability to generate watershed protection benefits.

Alternative #3: Impoundment – Located in Barnes County – Ellsbury Twp – Sec 11 area.

Preliminary hydraulic analysis showed that the project showed little benefits for nutrient/flood reduction. The impoundment showed a minor peak flow reduction which ranged from 0.0% to 0.01% at Outlet Location noted on Appendix C – Figure C-6. It provides benefits to land that already receives flood reduction benefits provided by the Upper Maple River Dam. Landowners in the benefitted area are also currently paying tax assessments for the construction of the Upper Maple River Dam, so another assessment for these benefitting landowners is not feasible nor acceptable at this time. Although this alternative was not chosen for any further review or study, the project team noted this alternative could be considered in combination with other remaining alternatives.

Alternative #4: Impoundment – Located in Barnes County – Ellsbury Twp – 24 Sec area.

Preliminary hydraulic analysis showed that the project showed little benefits for flood/nutrient reduction. The impoundment showed a minor peak flow reduction which ranged from 1.74% to 7.6% at Location 2 noted on Appendix C – Figure C-6. This peak flow reduction is significantly less than other alternatives. There would be an opportunity for wetland restoration in the temporary pool of the dry dam through ditch plugs in constructed drainage channels, however most wetlands are undrained. Wetlands are cropped in most years, so planting to native grass would be an available enhancement. Alternative eliminated from further review due to limited ability to generate watershed protection benefits.

Alternative #5: Impoundment – Located in Barnes County – Ellsbury Twp – 25 Sec area.

This impoundment location was initially carried forward for detailed analysis due to the fact it would provide strong watershed protection benefits. The dry dam had a drainage area of 38.5 square miles and 3,658 ac-ft to the auxiliary spillway. Hydraulic analysis indicated that peak flows of 100-year, 24-hour rainfall event were reduced by over 26% downstream of the impoundment and provided benefits to priority problem areas identified by the project team. Preliminary designs for interior environmental features were completed, including 6,000 feet of channel restoration (re-meandering a straightened, channelized reach), 130 acres of constructed wetlands to be managed with biomass removal for dissolved phosphorus treatment, and development of a wildlife habitat area with 274.1 acres of pothole and riverine wetlands interspersed with 895.9 acres of uplands. The biomass harvest area was projected to have the ability to remove 6,250 lbs/year of incoming phosphorus, 27,907 lbs/year of incoming nitrogen, and 459 tons/year of incoming suspended solids. Although 21.8 acres of pothole wetlands would have been negatively impacted by the project due to fill or disturbed hydrology, the project would have resulted in a net increase of 206.6 acres of pothole wetlands. Substantial functional improvements would have been made to 67.5 acres of existing wetlands. The 775 acres of existing cropland would have been planted to native perennial upland and wetland vegetation.

Preliminary engineering design, including geologic investigation and geotechnical analysis was

completed at the site. The total implementation cost estimate for this alternative was determined to be $26.1 million, which was high due to the embankment length (3.4 miles), two necessary auxiliary concrete drop structures, and a 0.5-mile-long farm levee . An economic benefits analysis was completed based on flood damage reduction benefits alone (Rooney 2020), which indicated a benefit/cost ratio of 0.05 for Site 5. In March 2022 the Sponsor requested an NED exception to ND NRCS on the basis of nutrient reduction and wetland/wildlife habitat benefits of the project. The Red River Retention Authority, as the overall RCPP project lead provided a letter of support as well. The ND NRCS State Conservationist made a subsequent request to NRCS National Headquarters, which was denied in July 2022 due to the high cost of the project. Lacking the opportunity for federal funding, the Sponsor chose to remove the alternative from the Plan-EIS as it would be infeasible for them to pursue financially.

Alternative #6: Impoundment – Located in Barnes County – Ellsbury Twp – 36 Sec area.

Preliminary hydraulic analysis showed that the project showed little benefits for flood/nutrient reduction. This alternative showed a minor peak flow reduction which ranged from 0.04% to 0.11% at Location 2 noted on Appendix C – Figure C-6. This peak flow reduction is significantly less than other alternatives because the contributing drainage area upstream is relatively small. There would be an opportunity for wetland restoration in the temporary pool of the dry dam through ditch plugs in constructed drainage channels. Wetlands are cropped in most years, so planting to native grass would be an available wildlife habitat enhancement. Alternative eliminated from further review due to limited ability to generate watershed protection benefits.

Alternative #7: Impoundment – Located in Barnes County – Ellsbury Twp – 32 Sec area.

Preliminary hydraulic analysis showed that the project showed little benefits for flood/nutrient reduction. The impoundment showed a minor peak flow reduction which ranged from 9.17% to 13.21% at Location 3 noted on Appendix C – Figure C-6. This peak flow reduction is significantly less than other alternatives. While this alternative does have a significant amount of storage when considering runoff volume from the contributing area, the modeled hydrographs indicate that this alternative is controlling only a small amount of water contributing to the peak discharges in the watershed. A large part of the area that would be within the temporary inundation area behind the dry dam is already in perennial vegetation/conservation easements, therefore the potential to improve wildlife habitat would be limited. Alternative eliminated from further review due to limited ability to generate watershed protection benefits.

Alternative #8: Impoundment – Located in Barnes County – Grand Prairie Twp – Sec 1 area.

Preliminary hydraulic analysis showed minimal flood/nutrient reduction benefits. Hydraulic modeling indicated minor peak flow reduction which ranged from 3.71% to 12.21% at Location 3 noted on Appendix C – Figure C-6. While this alternative does provide some reduction in peak discharges, the larger peak discharge reductions are for the smaller events. Additionally, this alternative provides little benefit to problem areas because the drainage area upstream is relatively small compared to other alternatives. Drained wetlands within cropland are present in the temporary flood pool, presenting potential for wetland restoration/wildlife habitat improvements.

Also present, however, are mature tree rows which would need to be disturbed for the project and could impact threatened and endangered species. Alternative eliminated from further review due to limited ability to generate watershed protection benefits.

Alternative #9: Impoundment – Located in Barnes County – Grand Prairie Twp – Sec 24 area.

Preliminary hydraulic analysis showed minimal flood/nutrient reduction benefits. Hydraulic modeling indicated minor peak flow reduction which ranged from 20.3% to 21.39% at Location 3 noted on Appendix C – Figure C-6. This alternative provides some benefit to problem areas; however, other alternatives provide larger benefits to similar areas. There are few drained wetlands in the temporary flood pool, however there is overall limited potential for wetland restoration/wildlife habitat improvements at the site. Mature tree rows would need to be disturbed for the project and could impact threatened and endangered species. Alternative eliminated from further review due to limited ability to generate watershed protection benefits.

Alternative #10: Impoundment – Located in Barnes County – Minnie Lake Twp – Sec 18 area.

Preliminary hydraulic analysis showed minimal flood/nutrient reduction benefits. Hydraulic modeling indicated minor peak flow reduction which ranged from 22.34% to 26.14% at Location 3 noted on Appendix C – Figure C-6. This alternative provides some benefit to problem areas, however other alternatives provide larger benefits to similar areas. There are few drained wetlands in the temporary flood pool which could be restored and extensive pothole wetlands within cropland which could be enhanced through planting of perennial vegetation for improved wildlife habitat. Alternative eliminated from further review due to limited ability to generate watershed protection benefits.

Alternative #13: Impoundment – Located in Cass County – Lake Twp – Sec 7 area.

Preliminary hydraulic analysis showed minimal flood/nutrient reduction benefits. Hydraulic modeling indicated minor peak flow reduction which ranged from 0.0% to 0.02% at Outlet Location noted on Appendix C – Figure C-6. There are extensive drained wetlands that could be restored in the temporary flood pool, all located within cropland, so good potential for improved wildlife habitat improvement exists. Alternative eliminated from further review due to limited ability to generate watershed protection benefits.

Alternative #14: Impoundment Located in Barnes County – Grand Prairie Twp – Sec 36 area.

Preliminary hydraulic analysis showed minimal flood/nutrient reduction benefits. Hydraulic modeling indicated minor peak flow reductions which ranged from 6.19% to 6.41% at Outlet Location noted on Appendix C – Figure C-6. This alternative provides little benefit to problem areas because the upstream drainage area and the amount of available storage is relatively small compared to other alternatives. Some drained wetlands exist in the temporary flood pool, as well as straightened/channelized stream reaches that could be restored to improve wildlife habitat. Alternative eliminated from further review due to limited ability to generate watershed protection benefits.

Alternative #15: Impoundment Located in Barnes County – Minnie Lake Twp – Sec 33 area.

Preliminary hydraulic analysis showed minimal flood/nutrient reduction benefits. Hydraulic modeling indicated minor peak flow reductions which ranged from 1.19% to 5.08% at Outlet Location noted on Appendix C – Figure C-6. Some drained wetlands exist within the temporary flood pool, most located within cropland, so potential for wildlife habitat improvement exists. Alternative eliminated from further review due to limited ability to generate watershed protection benefits.

Alternative #16: Impoundment Located in Barnes County – Minnie Lake Twp – Sec 36 area.

Project team had concerns regarding very high implementation costs due to the requirement to purchase a large amount of prime farmland. Additionally, this impoundment only provides benefit to one area of concern as it is downstream of the State Highway 32 corridor identified as another significant problem area. Significant impacts to Waters of the U.S. would also result from construction. Some drained wetlands exist within the temporary flood pool, most located within cropland, so potential for wildlife habitat improvement was present. Alternative eliminated from further review due to limited ability to generate watershed protection benefits.

Alternative #17: Impoundment – Located in Cass County – Lake Twp – Sec 29 area.

Preliminary hydraulic analysis showed minimal flood/nutrient reduction benefits. Hydraulic modeling indicated minor peak flow reduction which ranged from 3.6% to 7.04% at Outlet Location noted on Appendix C – Figure C-6. In addition, construction of the alternative would have an unacceptably high impact on wetlands (and potentially Waters of the U.S.). Some drained wetlands exist within the temporary flood pool, most located within cropland, so potential for wildlife habitat improvement exists. Alternative eliminated from further review due to limited ability to generate watershed protection benefits.

Alternative #18: Impoundment – Located in Barnes County – Weimer Twp – Sec 11 area.

Preliminary hydraulic analysis showed that the project showed minimal flood/nutrient reduction. Hydraulic modeling indicated minor peak flow reduction which ranged from 0.7% to 1.83% at Outlet Location noted on Appendix C – Figure C-6. This peak flow reduction is significantly less than other alternatives. Some drained wetlands exist within the temporary flood pool, most located within cropland, so potential for wildlife habitat improvement exists. Alternative eliminated from further review due to limited ability to generate watershed protection benefits.

Alternative #19: Created/Restored Wetlands – with added storage and controls – Steele County – Willow Lake Twp – Section 15 area.

It was noted that there are a significant number of hydric soils within the watershed per NRCS Web Soil Survey and a significant number of drained or ditched wetlands per the National Wetland Inventory (NWI). The Section 15 area, in particular, was noted as a potential site for wetland restoration. Rather than attempting to complete an analysis of each potential wetland restoration site, such as this Section 15 area, a hydrologic analysis was completed for the full watershed. Three

methods were considered to identify existing wetlands in the watershed. National Wetland Inventory (NWI) areas are ~7% of the watershed, whereas Soil Map Units (SMU) with >90% hydric components are ~8% of the watershed, and SMU with >50% hydric components are ~11% of the watershed. Since these percentages are similar, an estimate of 10% is adopted for natural wetland to watershed areas. The amount of NWI areas considered "Drained or Partially Drained" is ~20%. Therefore, existing wetlands comprise ~8% of watershed, and the quantity of restorable wetlands in the basin is ~2% of watershed area (3,729 acres). Based on adjustment factors for ponding and swampy areas documented in North Dakota Hydrology Manual (USDA 2023), restoring all drained wetlands in the watershed would result in a ~4% flow reduction for all storm frequencies. Within Section 15, there would be potential to restore ~200 acres of wetlands to at the most, therefore flow reduction would be on the order of 0.002% if wetlands were restored to their natural depth. This estimate is in line with an evaluation completed for the concept of utilizing wetland restoration to reduce flooding in the Maple River Watershed in 2003, which determined a benefit-cost ratio range of 0.08 to 0.13 for this approach (Shultz 2003). From a watershed protection standpoint, restoration of natural wetlands would provide strong benefits for wildlife and nitrogen reduction. Unfortunately, research within the Red River Basin and other cold climate, flat landscapes, with high clay content soils and prone to long spring flood inundations, indicate that restored wetlands with natural vegetation can become contributors of dissolved phosphorus loads in the watershed, particularly as they age (Baulch 2019) (Currie 2017) (Haque 2018).

The concept of augmenting flood storage on natural wetlands is problematic, due to the negative impacts deeper, longer duration, water storage can have on wetland vegetation and biotic processes. Evaluations by biologists for dry dam projects, with wetlands in temporary pool area, have indicated minimal negative impacts so long as excess water is removed within 2 weeks of a 100-year recurrence interval flood. While achievable on a large impoundment area, such as the preferred alternative identified in this Plan-EIS, the orifice size on a small prairie pothole (0.1 to 1.0 acre) wetland to retain water and let it naturally recede would be so small that cattails, beavers, and/or silt would quickly plug it. The practical approach for a small impoundment would likely be a manually operated gate structure, however accessing and opening gates on several hundred scattered structures across the watershed within 2 weeks of a 100-year flood is not realistic. Loss of wetland function and acreage would require expensive wetland mitigation to be developed elsewhere (credits through mitigation banks are limited and average $20,000/acre). Moreover, use of the NRCS PL-566 Watershed Program would require the Cass County JWRD to obtain land rights and then manage hundreds of scattered small impoundments, which the team agreed is not feasible. Other USDA Programs, such as the Environmental Quality Incentives Program, Wetland Reserve Easement Program, and Conservation Security Program provide technical and financial assistance to private landowners for voluntary wetland restoration and small pond projects. These programs have been available in the Upper Maple River Watershed for decades and are anticipated to continue and are a more practical alternative for development of small, scattered wetland restoration or pond projects.

Small embankment dams are rare in the watershed and region for multitude of reasons: expensive to build and operate, high rate of washout/failure, low grazing numbers, and issues with adjacent property owners. The topography is flat, which results in even low head dams backwatering on

adjacent landowners' property. Water on or near adjacent landowners' property can cause issues with ponding or saturation damages, sediment deposition, and salinity emerging. In terms of reducing peak flows damaging agricultural fields, a similar storage volume would be necessary to other impoundment alternatives, i.e. ~3,000 acre-ft below auxiliary spillway or ~9,000 acre-ft at top of embankment. To obtain this volume of storage with interspersed wetland restoration, i.e. ditch plugs, which typically have <3 acre-ft of storage would require over 1,000 locations. To obtain this volume of storage with interspersed small embankments, i.e. stock ponds, which typically have <30 acre-ft of storage would require over 100 locations.

Alternative eliminated from further review due to impracticality of implementing through PL-566 and inability to generate significant watershed protection benefits beyond wildlife habitat and nitrogen reduction . While this alternative was not chosen for any further review or study as a part of the PL-566 project, the project team did want it noted as a watershed goal, to be implemented through other programs, for wetlands to be created or restored whether they functioned naturally or with some measure of control features for added storage capability.

Alternative #20: Created/Restored Wetlands – with added storage and controls – Barnes County – Grand Prairie Twp – Section 17 area.

As detailed under Alternative #19, this alternative was eliminated from further review due to impracticality of implementing through PL-566 and inability to generate significant watershed protection benefits beyond wildlife habitat and nitrogen reduction . While this alternative was not chosen for any further review or study as a part of the PL-566 project, the project team did want it noted as a watershed goal, to be implemented through other programs, for wetlands to be created or restored whether they functioned naturally or with some measure of control features for added storage capability.

Alternative #21: Created/Restored Wetlands – with added storage and controls – Cass County – Rochester Twp – Section 8 area.

As detailed under Alternative #19, this alternative was eliminated from further review due to impracticality of implementing through PL-566 and inability to generate significant watershed protection benefits beyond wildlife habitat and nitrogen reduction. While this alternative was not chosen for any further review or study as a part of the PL-566 project, the project team did want it noted as a watershed goal, to be implemented through other programs, for wetlands to be created or restored whether they functioned naturally or with some measure of control features for added storage capability.

Alternative #22 & #32: Levees – Various types and locations– Cass County.

Numerous levee options were explored including farmstead or ring levees and larger flood control levees. Given that the primary goal of the project was to reduce cropland flooding and associated nutrient transport, levees were not a practical approach to achieve that. Levees typically concentrate flows and increase peak flow downstream without additional mitigation. In addition, they would be likely to negatively impact aquatic resources and wildlife habitat. Alternative eliminated from further review due to limited ability to generate watershed protection benefits.

Alternative #23: Channelization – Cass County – Rochester Twp – Section 7 area.

Channelization of existing natural waterways and flowages by widening and straightening of natural channels. This would decrease the Mannings n coefficient from approximately 0.045-0.06 depending on the portions of the channel to approximately 0.035. This reduction in Mannings and the increase in channel capacity would increase flow and thus provide local benefits to reduced cropland flooding and associated dissolved phosphorus transport. However, this alternative was deemed not acceptable because it would increase downstream flooding and related nutrient transport, as well as negatively impacting aquatic resources and WOTUS; the alternative was not consistent with the CWA 404(b)(1), 40 CFR 230.10(b) and preamble to Guidelines at 45 Reg 85336.

Alternative #24: Channelization – Cass County – Lake Twp – Sections 7, 8, 17, & 16 area.

Channelization of existing natural waterways and flowages by widening and straightening of natural channels. This would decrease the Mannings n coefficient from approximately 0.045-0.06 depending on the portions of the channel to approximately 0.035. This reduction in Mannings and the increase in channel capacity would increase flow and thus provide local benefits to reduced cropland flooding and associated dissolved phosphorus transport. However, this alternative was deemed not acceptable because it would increase downstream flooding and related nutrient transport, as well as negatively impacting aquatic resources and WOTUS; the alternative was not consistent with the CWA 404(b)(1), 40 CFR 230.10(b) and preamble to Guidelines at 45 Reg 85336.

Alternative #25: Channelization – Cass County – Lake Twp – Sections 20 & 21 area.

Channelization of existing natural waterways and flowages by widening and straightening of natural channels. This would decrease the Mannings n coefficient from approximately 0.045-0.06 depending on the portions of the channel to approximately 0.035. This reduction in Mannings and the increase in channel capacity would increase flow and thus provide local benefits to reduced cropland flooding and associated dissolved phosphorus transport. However, this alternative was deemed not acceptable because it would increase downstream flooding and related nutrient transport as well as negatively impacting aquatic resources and WOTUS; the alternative was not consistent with the CWA 404(b)(1), 40 CFR 230.10(b) and preamble to Guidelines at 45 Reg 85336.

Alternative #26: Channelization – Cass County – Lake Twp – Sections 39, 31, 32, & 33 area.

Channelization of existing natural waterways and flowages by widening and straightening of natural channels. This would decrease the Mannings n coefficient from approximately 0.045-0.06 depending on the portions of the channel to approximately 0.035. This reduction in Mannings and the increase in channel capacity would increase flow and thus provide local benefits to reduced cropland flooding and associated dissolved phosphorus transport. However, this alternative was deemed not acceptable because it would increase downstream flooding and related nutrient transport, as well as negatively impacting aquatic resources and WOTUS; the alternative was not consistent with the CWA 404(b)(1), 40 CFR 230.10(b) and preamble to Guidelines at 45 Reg 85336.

Alternative #27: Channelization – Cass County – Cornell Twp – Sections 8, 9, & 4 area.

Channelization of existing natural waterways and flowages by widening and straightening of natural channels. This would decrease the Mannings n coefficient from approximately 0.045-0.06 depending on the portions of the channel to approximately 0.035. This reduction in Mannings and the increase in channel capacity would increase flow and thus provide local benefits to reduced cropland flooding and associated dissolved phosphorus transport. However, this alternative was deemed not acceptable because it would increase downstream flooding and related nutrient transport, as well as negatively impacting aquatic resources and WOTUS; the alternative was not consistent with the CWA 404(b)(1), 40 CFR 230.10(b) and preamble to Guidelines at 45 Reg 85336.

Alternative #28: Setback Levee – Cass County, various locations.

This alternative would create a levee (or relocate an existing levee) that is set back from an existing channel to provide some flood protection. An area that could benefit from this type of solution would be Legal Assessment Drain No 46, which is the upper portion of the Maple River. In this upper portion of the watershed the channel is unable to handle volume of water which frequently breaks out causing damages. Setback levees could be installed on either side of the drain at a specified distance. This alternative would provide some isolated benefits to specific landowners or areas; however, flooding in this location is along the entire drain which is approximately 9 miles in length. Building these levees would require tying back into high ground which is difficult as this portion of the watershed is very flat with a floodplain approximately 3 miles wide and with a number of tributaries entering at various points along Drain 46. In consideration of these factors, levee lengths in excess of 18 miles would be required. Additionally, the levees would cut off some local drainage which would require the installation of pumps to address local rainfalls during high flow events. Without some form of mitigation, adding levees to contain the flows would likely provide a negative impact on water surface elevations along the existing channels which would exacerbate damages to roadways and other infrastructure. Lastly, this alternative would only apply to one of the problem flooding areas and would contribute no additional cropland flood reduction benefits to the major problem area along the State Highway 32 corridor. Levees are not as applicable in the Highway 32 corridor as the stream is far more channelized and the floodplain is not as wide. Any type of extensive levee construction in this region is also likely to have wetland impacts and require expensive mitigation, as well. Due to limited ability to provide watershed protection benefits, this alternative was not chosen for further review or study.

Alternative #29: Restored/Created Wetlands – natural function – Steele County – Willow Lake Twp – Section 15 area.

As detailed under Alternative #19, this alternative was eliminated from further review due to impracticality of implementing through PL-566 and inability to generate significant watershed protection benefits beyond wildlife habitat and nitrogen reduction. While this alternative was not chosen for any further review or study as a part of the PL-566 project, the project team did want it noted as a watershed goal, to be implemented through other programs, for wetlands to be created or restored whether they functioned naturally or with some measure of control features for added

storage capability.

Alternative #30: Restored/Created Wetland – natural function – Barnes County – Grand Prairie Twp – Section 17 area.

As detailed under Alternative #19, this alternative was eliminated from further review due to impracticality of implementing through PL-566 and inability to generate significant watershed protection benefits beyond wildlife habitat and nitrogen reduction. While this alternative was not chosen for any further review or study as a part of the PL-566 project, the project team did want it noted as a watershed goal, to be implemented through other programs, for wetlands to be created or restored whether they functioned naturally or with some measure of control features for added storage capability.

Alternative #31: Restored/Created Wetland – natural function – Cass County – Rochester Twp – Section 8 area.

As detailed under Alternative #19, this alternative was eliminated from further review due to impracticality of implementing through PL-566 and inability to generate significant watershed protection benefits beyond wildlife habitat and nitrogen reduction. While this alternative was not chosen for any further review or study as a part of the PL-566 project, the project team did want it noted as a watershed goal, to be implemented through other programs, for wetlands to be created or restored whether they functioned naturally or with some measure of control features for added storage capability.

Alternative #33: Maple River Restoration.

About 13 miles of the Maple River in Rochester, Lake and Cornell townships in Cass County was straightened and channelized with a legal drain project. Legal drains are generally created to help move water at a lower water surface elevation or more efficiently in areas where there are current issues with drainage. Additionally, legal drains are typically designed to contain a 10-year event and are not designed as flood control projects. There would likely be some wildlife habitat and nitrogen reduction benefits to restoring the channel back to its natural pattern and profile, with natural riparian wetlands. However, this would not provide any significant reduction in cropland inundation and long term dissolved phosphorus reduction. Due to limited ability to provide watershed protection benefits, this alternative was not chosen for further review or study.

Alternative #34: Managed Aquifer Recharge.

Managed aquifer recharge (MAR) involves capturing a portion of excess surface water flows and storing that volume of water in an underground aquifer for later use. MAR, with the use of infiltration basins, has been permitted by the State of North Dakota in 4 locations, all through the use of constructed infiltration basins. The North Dakota Department of Water Resources completed an assessment of aquifers in the state based on unmet needs (pending, unapproved groundwater permits), water quality, source water suitability, and hydrogeologic conditions. The Page Aquifer, which underlies the far western side of the planning area, was rated as having “good” potential (3 out of 5) for MAR projects. From a water quality perspective, this aquifer and overlying surface

waters fell into the "least risk" category out of five.

Potential storage capacity of an MAR project is obviously one of the critical factors in evaluating its potential to serve as a dual flood damage reduction project. To be a viable storage alternative, the aquifer must have a continuous sandy layer for a significant area. For sandy soil, average specific yield (Sy) varies from 21% to 27% from fine sand to coarse sand (Johnson, 1967). Specific yield is a percentage of the volume of the rock that can store water. Storage capacity of aquifer can be calculated as

$$Vw=VT* Sy$$

Where VT is the total volume of an aquifer, Vw is the volume of water that the aquifer can store. Using groundwater observations wells and data logs available from the North Dakota State Water Commission, two possible aquifer storage areas can be identified. An area of approximately 8 square miles exists to the west side of the watershed, with a fairly consistent storage layer varying in depth from 10 to 30 feet thick. Using an average thickness of 18 feet and a specific yield of 0.25, the potential storage for this area is approximately 23,000 Ac-ft. This aquifer lays approximately 120 ft below the ground. An area of approximately 11 square miles exists to the east side of the watershed, with a fairly consistent storage layer varying in depth from 10 to 80 feet thick. Using an average thickness of 32 feet and a specific yield of 0.25, the potential storage for this area is approximately 56,300 acre-feet. This aquifer lies approximately 70 feet below the ground.

Construction of MAR facilities is essentially identical to construction of a dry dam impoundment but with the very expensive addition of a graded filter material below the basin to allow for managed infiltration into the aquifer. Operation and maintenance costs for these facilities, based on the 4 projects in ND, is substantially higher than that of a natural dry dam; fine silts must be removed from the top of the filter material regularly to avoid it sealing up. Due to placement of permeable material on the bottom of the MAR basin, it is not possible to avoid negative impacts to wetland habitat. This option was eliminated from further consideration because, as opposed to a dry dam, an MAR project has more limited abilities to provide watershed protection benefits while also having higher construction and operation/maintenance costs.

Alternative #35: Cropland Beneficial Management Practices (BMPs).

Cropland BMPs include conservation practices such as nutrient management, conservation crop rotation, conservation tillage systems (no-till, mulch-till, reduced-till), cover crops, filter strips, and drainage water management. Modeling indicates that within the ND portion of the Red River Basin, 65% of total nitrogen and 75% of total phosphorus originates from cropland (Benoy, et al. 2016). Phosphorus in the Basin is transported primarily in spring floods, due to leaching of soluble phosphorus from inundated soils as well as crop residue and natural vegetation broken down through freeze-thaw cycles; soluble forms make up ~85% of the total phosphorus load transported on road ditches, drains, and tributaries and ~81% of the total in the Red River (McCullough, et al. 2011). Phosphorus concentrations peak on the receding limb of the flood hydrograph, when water is flowing back to channels after having sat for long periods of time in flood fields, often dammed by the roads built on a 1-mile by 1-mile grid. Unfortunately, therefore, BMPs which leave additional

dead plant material on the ground surface in spring, such as conservation tillage systems, cover crops, and filter strips, have been shown to often increase dissolved phosphorus runoff (Baulch 2019) (Kieta 2017). During summer storms soil health practices can increase soil infiltration, thereby reducing runoff, however both major floods and phosphorus transport occur predominantly in spring, over frozen or semi-frozen ground conditions. Given that much of the basin has subsurface tile, leaching of nitrate into tile lines and into the drainage network from summer floods is an issue as well; drainage water management is an effective tool for nitrogen reduction. Likewise, practices such as riparian buffers and filter strips have mixed impacts for nutrient management - intercepting sediment bound phosphorus but also increasing dissolved phosphorus in this watershed. Improved soil health, including organic matter, increases denitrification and infiltration.

Based a 2001-2002 analysis of Red River Basin sub-watersheds, the Maple River watershed contains hot spots for N and P loading derived from fertilizer, but no hot spots from manure (Mulla 2020). The yield and quality of corn, small grains, canola, and sugar beets depend on having sufficient nitrogen and phosphorus from synthetic fertilizer. Analysis of agronomy lab records in the 2014 to 2018 time period in the Red River Basin indicated that overfertilization, based on residual nitrogen levels, is rare on small grains and sugar beets but does occur on corn following soybeans in some cases (Mulla 2020); no similar analysis is available for phosphorus. NRCS staff are in agreement that over-fertilization is not a widespread problem. According to workshop proceedings of regional experts, discouraging fall or spring pre-plant fertilization, to the extent possible, would be a significant step to reducing losses to surface waters (and, in the case of nitrogen, leaching into tile drains). In addition, on certain crops application of nitrogen with inhibitors, sub-surface banded, or drilled with seed can provide benefits. Likewise, phosphorus application as banded, injected, or broadcast and incorporated (in that order) are preferred over broadcast applications. Unfortunately, phosphorus is typically broadcast and not incorporated in the fall because of the limited timing window in the spring, which can be too wet to apply, thereby risking crop production (Mulla 2020).

Technical and financial assistance from USDA Farm Bill Programs have been made available to agricultural producers for decades in the Red River Basin for cropland BMPs. As an example, over the 2014-2017 time period alone, $3.3 million in Farm Bill funding was provided to agricultural producers in the ND portion of the Basin to implement 56,203 acres of nutrient management, 34,776 acres of cover crops, 32,276 acres of conservation crop rotations, and 96,906 acres of conservation tillage practices. Based on the monitoring data presented in Section 4.2.15, it appears these investments have reduced nitrogen export, but not phosphorus to date.

While this alternative could be effective for nutrient reduction, it would not reduce flood damage nor would it promote wildlife habitat and is not practical or feasible to be completed by the Cass County JWRD on a watershed wide scale. Given the crop production risks involved, the decision on whether to accept government incentives to implement BMPs has to be voluntarily made by the landowners. The USDA Environmental Quality Incentive Program and Conservation Stewardship Program are in place and readily available to agricultural producers in the Basin willing to adopt these practices. Ultimately, the PL-566 Watershed Program is not well suited to cropland BMPs.

While this alternative was not chosen for any further review or study as a part of the PL-566 project, the project team did want it noted as a watershed goal.

Alternative #36: Conversion of Cropland back to Grassland or Forest.

The project team determined this alternative was not socially acceptable or economically feasible, since farming and ranching is the economic backbone of the local economy and agricultural activities make up more the 95% of the land use in the watershed. That said, modeling was completed in HEC-HMS to determine peak flow reduction if all cropland in the watershed was converted to grassland. Runoff curve numbers were adjusted from calculated values to a generalized number of 64 to represent a grass condition. As this analysis was cursory, it did not take into account the condition or specific soil types. Results of this analysis indicate that conversion to grassland reduced peak flows at the outlet of the watershed from 3% to 62%, depending on the event. While this alternative does show benefits to the watershed, it is not practical or feasible to be completed on a watershed wide scale. Therefore, this alternative was not being carried forward for further analysis or review. As with Alternative #35, however, there are multiple USDA programs such as the Conservation Reserve Program, Environmental Quality Incentive Program, and Conservation Stewardship Program which can be utilized voluntarily by landowners to convert cropland to grassland. The project team wants the utilization of grassland/CRP to be a watershed goal, however, where appropriate.

Alternative #37: Tile water management.

No watershed-wide studies have been completed to show the results of large-scale tile systems and the impacts to flooding on a specific watershed. Studies are being proposed in parts of the Red River to gather information. While studies have not yet been completed, the results could be similar to the cropland BMPS or cropland conversion to grassland. With a tile system in place, the tile would lower groundwater and allow for increased infiltration at the beginning of a storm event. In essence this could convert the antecedent runoff condition (ARC) from ARC II (average conditions) to an ARC I which is typically for a dry condition. Per Chapter 10 of the National Engineering Handbook this could potentially drop curve numbers from 80 down to 63. This is similar to how cropland BMPs were modeled. However, the tile alternative would likely increase base flows with the tile systems operating fairly consistently and the benefits noted from increased infiltration could be offset by the additional base flow in the tributaries and rivers which could inundate low lying areas. Subsurface tile systems provide a transport mechanism for nitrogen within the soil profile to surface waters, particularly if systems are not operated in conjunction with drainage water management and bioreactors or saturated buffers. The USDA NRCS Environmental Quality Incentive Program provides technical and financial assistance for retrofit of tile systems for drainage water management, with bioreactors and saturated buffers. The project team would like to see tile water management encouraged and believe it can be better addressed by the local Water Resource District with permits. As with several others, obtaining land rights by the Sponsor for implementation and operation of a PL-566 project across a vast acreage of private lands is not practical. This alternative is not being carried forward for further analysis or review.

Alternative #38: Other beneficial uses of water – irrigation, industrial or municipal.

No interest was expressed by project team, agencies, or members of the public in storing surface water for beneficial use. Storing surface waters for an extended time would have a negative impact on underlying wetlands and wildlife habitat, therefore would be counterproductive to the wildlife habitat improvement goals of this plan. This alternative was not selected to be carried forward for further analysis or review.

5.3 Alternatives Description

The combination of Alternatives 11 & 12 (Alternative 2A) was selected to be carried forward for analysis in the Environmental Impact Statement based on the watershed protection benefits it would generate for flood damage reduction, nutrient reduction, and wildlife habitat. In accordance with NEPA, a No-Action Alternative was also analyzed as a baseline for comparing the impacts.

5.3.1 No Action Alternative

The No-Action Alternative would involve no federal funding to address watershed protection needs in the Upper Maple River watershed. High levels of nutrient transport during floods would continue, resulting in no progress towards meeting international treaty obligations of the United States for nutrient concentrations at the international border crossing of the Red River, as outlined in Section 4.3. Fields will continue to see damage due to erosion, crop loss and delayed planting which reduces yields and degrades water quality with increased sediment and nutrient loading. There will be no gains in wetland, riparian and upland wildlife habitat in the project area which is within the Prairie Pothole Region and NDGF Maple/Sheyenne River area of habitat concern. Damages to roads would continue to be a regular occurrence in the form of overtopping, washouts, and detours; for example, road damages in 2009, 2010, and 2011 resulted in over $2.6 million in FEMA compensation in the watershed.

5.3.2 Upper Maple Site 2A

The project team agreed that Alternative 11 & 12 combined into Site 2A, in Sections 9, 15,16,17, 21 and 22 of Minnie Lake Township (T142-R56) in Barnes County, provided strong watershed protection and flood damage reduction benefits. The primary reason for combing and relocating the alternatives was to build one site instead of two separate sites while controlling very similar drainage areas as to the separate alternatives. There were no apparent concerns with environmental impacts, cultural resources, or social issues at the site. The proposed dry dam would provide benefits to the priority problem flooding area identified by the project team by generating flood retention for a 59.7 square mile drainage area. The dam would have an earthen embankment 2.3 miles long, maximum height of 31 feet, average height of 11 feet, a base that varies between 20 and 185 feet wide, an 8-foot-wide top, 3:1 side slopes, a 48-inch principal spillway conduit, and a structural concrete auxiliary spillway to create 2,863 acre-feet of flood storage to the auxiliary spillway crest. An auxiliary spillway would be constructed at an elevation of 1243.0 feet MSL, approximately 8.3 feet lower than the height of the embankment. The auxiliary spillway would consist of a series of two concrete spillway drop structures. The first auxiliary spillway structure would consist of an 80-foot-wide weir placed at elevation 1243. It would convey water down-gradient to the second auxiliary spillway drop structure, which would consist of an 80-foot-wide weir placed at elevation 1225.9. The second auxiliary spillway would outlet into an 80-foot-wide open channel, which would convey flow down-gradient to the unnamed tributary of the Maple

River. The low-level inlet to the principal spillway will be designed to ensure ~150 cfs continues unrestricted downstream even during drought conditions, to avoid detrimental impacts to aquatic species.

Site 2A has been designed such that it would not exacerbate downstream flooding impacts while providing nutrient transport and flood damage reduction to agricultural lands and public infrastructure. Under the 2-year, 24-hour event, this impoundment would occupy approximately 140 acres and provide 546.8 acre-feet of flood storage. Under the 10-year, 24-hour event, this impoundment would occupy approximately 400 acres and provide 2,300.4 acre-feet of flood storage. Alternative 2A would be a dry impoundment, meaning that it would only hold water during times of flooding. As flood levels recede, the impounded water would leave through the primary spillway, leaving the impoundment area dry during normal conditions. Construction of Alternative 2A would reduce peak flows of a 100-year, 24-hour rain event by approximately 30% at Location 3 noted on Appendix C – Figure C-6. downstream of the impoundment. The dam will remove 2,474 acres of cropland from the downstream inundation zone in a 100-year flood and reduce peak flows from a 100–year, 24-hour rainfall event by over 30%. This structure is classified as a significant hazard dam. Preliminary design drawings and further details of the dam design, including hazard classification, are provided in Appendix D-1.

Within the interior of the dry dam, three biomass harvest areas (constructed wetlands) will be developed by excavating material in non-hydric soils. The areas will be graded to balance cut and fill, with the bottoms sloped at 0.05% to drain towards a water control structure with a remote-controlled gate, to allow release of water prior to harvest operations. Biomass harvest cells will be underlain with pattern tile, 4-inch corrugated polyethylene at a 60-foot spacing (180,400 feet of tile and mains to be installed), tied into the same remote-controlled gate for gravity release to dry the ground out for harvest. A float-controlled turbine pump will be installed within the principal spillway, which will route floodwater to the biomass harvest cells via 5,800 feet of 24" PVC pipeline during high-flow events. Check valves and pressure sensors will ensure pumping ceases after cells are at maximum capacity and that ~150 cfs continues unrestricted down the river through the low-level inlet. There will be an approximately 3-foot-tall outside berm along all areas, and two divider berms in biomass harvest area 3. Water will be drained from the biomass harvest areas in late summer through operation of the control structures, which will release both surface and subsurface water back to the river. Wetland vegetation is expected to naturally dominate in the bottoms of the three shallow retention cells, given the 1-2 feet of water that will remain present in them from runoff pumped to the cells from the principal spillway. The shallow retention cells total 264.3 acres. The retention cell annual volume capacity is ~624 acre-feet based on voids in soil (0.9 feet), inundation depth (1 foot), evaporation (1.1 feet) minus precipitation (0.6 feet), and seepage (0.2 feet). The soil void depth is based on three feet between ground surface and tile invert; void ratio of 30% based on difference between saturation and optimum moisture content of loam soil. Average monthly evaporation and precipitation are assumed for May and June when ground is completely thawed. Seepage is expected to be minimal with clay content of site loam soils, therefore 0.2 feet assumed. A preliminary annual pumping plan would require pump capacity of 10 cfs with typical pumping operations of 10 cfs for 21 days ($Q_{10\%}$) and 3.3 cfs for 31.5 days ($Q_{25\%}$).

The Operation and Maintenance Plan would require control structures on the cells be closed through the growing season, to allow vegetation in the cells to uptake dissolved phosphorus from the overlying water. Vegetation to be harvested prior to the first hard freeze to prevent dissolved phosphorus from migrating out of the plant biomass and back into the soil. Harvest must also take place prior to seed dispersal generated by wind due to machinery air intake limitations and adjacent landowners' concerns caused by harvest operations. Therefore, biomass harvest operations should take place in the last two weeks of August, or month of September. Harvested vegetation (biomass) would be baled and transported to an offsite non-contributing area of the watershed; likely to a confined animal feeding operation for bedding. Drought years will likely be non-harvest years due to the lack of water in the impoundment. The Sponsor may attempt trials with alternative vegetation or crops, rather than naturally establishing wetland vegetation (cattails) that will dominate the basins. Ongoing water quality monitoring will be required to evaluate the necessary frequency of harvesting operations, however at this point based on research elsewhere in the Red River Basin, it is anticipated that harvest in 2 out of every 3 years would avoid oversaturation of soils with phosphorus. Denitrification process in the bottom of the wetlands would occur naturally.

The project will restore formerly drained wetlands within the temporary flood pool of the dry dam via construction of 11 individual ditch plugs, with a total of 4,480 cubic yards of embankment. A net increase of 258.8 acres of wetlands will result from the project. A total of 627.7 acres of existing cropland will be planted to native wetland and upland species within the conservation easement in the temporary flood pool of the dry dam. The project will result in wildlife habitat complex of 724.1 acres of grasslands interspersed with 485.7 acres of wetlands. To maintain optimal wildlife habitat, the Operation and Maintenance Plan will specify occasional grazing operations, the need for which will be determined by NRCS and the Sponsor during annual inspections. Therefore 60,000 feet of exterior barbed wire fencing will be installed, a well will be drilled, and 1-1/2" buried pipeline and 4 stock tanks installed. Interior temporary electric fence would be used to further manage grazing intensity for habitat improvements. Restoration of natural wetlands will improve wildlife habitat for insects, large and small mammals, waterfowl, grassland nesting birds, reptiles, and amphibians.

Alternative 2A would include several other elements including farm levees and two roadway grade raises to maintain traffic flows over the proposed embankment. The primary road raise will start approximately 30' west of the existing bridge crossing through 21st St. SE and will continue approximately 1,480 feet east up and over the proposed embankment. In addition to maintaining access, a smaller section of 21st St. SE will be raised to maintain a passable roadway during a 2-year event while the dam is in operation. This portion of the road raise will start approximately 800 feet west of the existing bridge crossing and will continue west for approximately 500 feet. The total length of roadway to be raised is 1,980 feet with an average height of approximately 10 feet and a maximum height 18 feet. A majority of the road raise will maintain flat gradient, while the portion up and over the embankment will have a final gradient between 2-3%. There are impacts to wetlands from the planned road raise which are included in the required mitigation acres. A 530-foot-long farm levee would be constructed to protect a farm immediately 0.25 miles north of the impoundment from flood flows associated with an unnamed tributary to the Maple River. A 2,600-foot-long farm levee would be constructed to protect a farm 1.25 miles northwest of the

impoundment from flood flows associated with another unnamed tributary to the Maple River. Interior drainage within farm levee will need further consideration during final design, which will need gated structure(s) to alleviate rainfall within the ~23-acre leveed area and Hwy 32 road ditch.

Approximately 251,000 cubic yards of material would be needed to construct the embankment. All of this material would be derived onsite through excavation for the auxiliary spillway, channel, and biomass harvest cells. Slope stability and drainage conditions were evaluated and summarized in Appendix D-2, Section 4 (Geotechnical Analysis); rapid-draw-down analysis was conducted with SEEP/W and slope stability analysis conducted with SLOPE/W computer programs. The summary states "The results of the seepage and slope stability modeling indicate that the assumed embankment for this report (clay embankment with …) is generally suitable for the placement of the proposed embankment". As a part of the final design process, additional borings and/or test pits, laboratory testing, and geotechnical design would be performed.

All areas disturbed for construction as well as existing cropland in the flood pool will be seeded to a mixed upland/wetland native perennial vegetation mix. The short duration of inundation resulting from this project will not detrimentally impact the perennial vegetation in wetlands or uplands. During a 2-year event, approximately 95% of the inundation in the backwater pool occurs for less than 5 days. During a 10-year event 82% of the area is inundated for less than 5 days, and for a 100-year event 60% of the inundation occurs for less than 5 days.

5.4 Summary and Comparison of Alternatives

A summary of the two alternatives selected to be analyzed in detail within this Plan-EIS is provided in Table 5-2.

Table 5-2 Summary and Comparison of Alternatives

Item or Concern	Alternative 1 - No-Action	Alternative 2 – Upper Maple Site 2A
Watershed Protection Measures to address: -Water Quality -Wildlife Habitat -Flood Damages -International Treaty Obligations -Regional Water Resource Plans	-No change in nutrient transport or flood inundation extents. -No change in wildlife habitat extents or functions (wetlands, riparian areas). -No change in flood damages to cropland and roads. -No contribution to the International Joint Commission Nutrient Concentration Objectives under the Boundary Waters Treaty. -No contribution to Red River Basin Commission Long Term Flood Solutions goal for distributed retention projects.	-Construction of a dry dam with temporary floodwater retention to reduce downstream flood extents, duration, and frequency and resulting nutrient transport and damage to cropland and roads. - Construction and operation of biomass harvest cells to remove incoming nutrient loads. - Wetland restoration, enhancement, and creation to benefit wildlife habitat. - Conversion of cropland to grassland and vegetation management to support wildlife habitat.
Installation Costs (Watershed Protection)		

Item or Concern	Alternative 1 - No-Action	Alternative 2 – Upper Maple Site 2A
NRCS Contribution	$ 0	$ 8,348,685
SLO Contribution	$ 0	$ 6,461,315
Total	$ 0	$ 14,810,000
Average Annual Costs (Watershed Protection)		
Installation	$ 0	$ 561,993
Operation and Maintenance	$ 0	$ 40,624
Total Annual Costs	$ 0	$ 602,617
Environmental Quality Account Benefits (Watershed Protection)		
Water Quality / Flooding	Flooding would continue to occur as it currently does, damaging cropland and transporting high volumes of phosphorus and nitrogen into the river as floodwaters recede, along with sediment and other contaminants. Road failures during floods would continue to regularly deliver sediment and other contaminants.	Installation and operation of the project results in an estimated average annual reduction of 12,562 pounds of phosphorus, 39,552 pounds of nitrogen, and 661 tons of sediment delivered to the Maple River and downstream Red River.
Wetland / Upland Wildlife Habitat	Blocks of high-quality wetland and upland wildlife habitat within the watershed would likely to remain limited, similar to existing conditions.	The project will result in a net increase of 245 acres of wetlands and functional improvements to currently farmed wetlands. Native perennial vegetation would be planted on 490 acres of existing cropland. In total, a large block of wildlife habitat consisting of 724.1 acres of grasslands interspersed with 485.7 acres of wetlands will provide wildlife habitat along the Maple River for a period of at least 50 years and benefit migratory waterfowl, grassland nesting birds, amphibians, deer, beaver, invertebrates, and small mammals including ND SWAP Level 1 species of concern. Long term benefits also include increasing monarch food sources and habitat due to the conversion of 237 acres of cropland converted to native herbaceous cover including forbs suitable for pollinators and monarch butterflies.
Other Social Effects Account Benefits (Watershed Protection)		

Item or Concern	Alternative 1 - No-Action	Alternative 2 – Upper Maple Site 2A
Boundary Waters Treaty Obligations of the U.S. Government	Existing high phosphorus and nitrogen export from the Upper Maple watershed will continue, as outlined in Section 4.3. Red River at the international border crossing likely to continue to exceed concentration and load objectives that the U.S. agreed to under the 2022 International Joint Commission. A major federal project to address nutrient reductions would not be available to demonstrate U.S. commitment to addressing the issue, which could be utilized in negotiations where Canadian cross border exports are causing damage in the U.S., would not be available.	Construction and ongoing management of 264.3 acres of biomass harvest cells in the temporary flood pool of the dam will reduce annual phosphorus loads by an estimated 11,838 lbs and nitrogen by an estimated 37,693 lbs. Reduction in the frequency and extents of downstream cropland flooding (2,474 acre removed at the 100-yr flood) will provide further reduction in nutrient loads. Although this single retention site will not unilaterally address excess nutrients in the Red River it will work in conjunction with similar projects planned in ND and MN to create meaningful reductions at the international border.
Red River Basin Long Term Flood Solutions Plan	No contributions would be made to the RRBC Long Term Flood Solutions goal for 1.5 million acre-feet of distributed retention in the Basin.	The project would contribute 2,863 ac-ft of flood storage to the auxiliary spillway crest elevation (9,235 ac-ft to top of dam) towards the RRBC LTFS goal and be only the 2nd major retention project constructed in the ND portion of the Basin.

A summary of resource concern effects for the two alternatives selected to be analyzed in detail within this Plan-EIS is provided in Table 5-3, for each of the relevant resource concerns determined in Section 3. Detailed information is provided in Section 6, for each resource concern and alternative.

Table 5-3 Comparison of Alternatives – Effects on NEPA Concerns

Item or Concern	Alternative 1 - No-Action	Alternative 2 – Upper Maple Site 2A
Human Concerns		
Social Issues	Flooding impacts on social issues would not change. As is the case currently, some residents will continue to be stranded in their homes for days during flood	Road damages would be reduced downstream of the dam. The project will prevent overtopping and washouts at 173 road crossings at the 100-year flood, 113 crossings at the 25-year, and 28

Item or Concern	Alternative 1 - No-Action	Alternative 2 – Upper Maple Site 2A
	events due to water over roads and/or road washouts.	crossings at the 2-year. Temporary disruption due to road detours required during construction.
Land Use	Periodic flooding conditions would continue to negatively impact cropland productivity and infrastructure in the watershed. The 152-acre WRP easement would expire in 2040 and likely be converted to crop production.	Permanent loss of 41 acres of cultivated cropland, 4 acres of annual hayland, 12 acres of herbaceous wildlife land and 0.19 acres of trees to structural project features. Within the 50-year conservation easement, there would be conversion of 90 acres of cultivated cropland and 104 acres of annual hay production ground to herbaceous cover of which the 240 acres will be managed for wildlife with livestock grazing and 270 ac. managed for wetland habitat/nutrient management are beneficial land uses. Downstream cropland removed from floodplain inundation will benefit. The wetland protections afforded by the current 152-acre WRP easement would be extended to 2080 via the PL-566 conservation easement.
Cultural Resources	Ongoing risk of flooding to cultural resources in Minnie Lake and Ellsbury Townships.	No known cultural resources would be impacted by construction, however cultural resource monitors would have to be onsite during excavation operations due to a historic farmstead. The project would contribute to lowering nutrient loads to address ongoing eutrophication in Lake Winnipeg, subsistence fishing from which is critical for First Nations in Manitoba.
Public Health and Safety	Periodic flooding conditions, including temporary road closures, delays, and detours, would continue to impact public health and safety due to decreased emergency access. Risk of contamination during flooding to 23 private drinking water wells	Reduced frequency and severity of floods would minimize future road closures, delays, and detours downstream of Site 2A. At the 100-year, 24-hour event 20 road crossings would no longer be overtopped and at the 10-year, 24-hour event 9 road crossings would no longer be overtopped. Alternative 2A would also raise the elevation of 21st Street SE to be

Item or Concern	Alternative 1 - No-Action	Alternative 2 – Upper Maple Site 2A
	in the watershed.	open to traffic during flood. Proposed farm levees would protect 2 rural residences that are currently within the floodplain. Reduced risk of contamination of 2 farmstead drinking water wells removed from flood inundation extents.
Scenic Beauty	Scenic integrity of the landscape would not change.	Restoration of natural grasslands and wetlands upstream of the dam would enhance scenic beauty. Concrete features at principal and auxiliary spillway locations will not blend with natural landscape, however grassed slopes of the dam and levees largely will.
Parkland	Availability and quality of parkland and recreational opportunities would not change.	No negative or beneficial impacts to parkland (or recreation in general) are anticipated.
Noise	Noise levels would not change.	Temporary construction-related noise impacts anticipated, maximum of 95 decibels at a distance of 50 feet.
Environmental Concerns		
Fish and Wildlife	Fish and wildlife habitat and populations expected to remain as is, with limited availability of quality habitat due to loss of grasslands and wetlands.	A net gain of 245 acres of wetlands and 241 acres of diverse native upland habitat is expected with the project from the conservation and creation of grassland habitat and improved wetland habitat. Wetland restoration and riparian/upland plantings and management would improve wildlife habitat for insects, large and small mammals, waterfowl, nesting birds, reptiles, amphibians, invertebrates, fish and mussel species including ND Level 1 Species of Concern. Long term benefits also include increasing monarch food sources and habitat due to the conversion of 237 acres of cultivated cropland converted to native herbaceous cover including forbs suitable for pollinators

Item or Concern	Alternative 1 - No-Action	Alternative 2 – Upper Maple Site 2A
		and monarch butterflies. Removal of trees and herbaceous vegetation, increased noise, and human activity during construction could temporarily impact habitat or disrupt some wildlife species.
Invasive Species	Invasive species presence or potential for spread of invasive species would not change.	Potential adverse impacts from soil disturbance and importing soil-carrying weed seeds during construction activities. Beneficial impacts from the removal of Russian Olive shrubs and planting of deep-rooted native species which compete more aggressively with invasive and noxious species. Reduced potential for invasive species spread downstream of the dam during floods.
Migratory Birds and Golden Eagles, Bald Eagles	Presence of habitat and populations of migratory birds utilizing the watershed not expected to change.	Removal of trees and shrubs during construction could alter habitat for some migratory birds. Construction activities have the potential to damage or destroy nests. Increased noise and human activity during construction could disrupt migratory birds. See benefits under Fish and Wildlife Concern.
Threatened and Endangered Species	Endangered or threatened species populations and habitat not expected to change.	Unlikely potential impact to northern long-eared bats as no trees suitable for hibernaculum are present. Temporary impacts from increased noise and human activity during construction could disrupt candidate species monarch butterflies if present within the vicinity. Long term benefits include increasing monarch food sources and habitat due to the conversion of 237 acres of cropland converted to native herbaceous cover including forbs suitable for pollinators and monarch butterflies.
Natural Areas	Natural areas not expected to change until 2040, when WRP	Conversion of cropland and prior converted wetlands to wetland restorations and diverse native cover will

Item or Concern	Alternative 1 - No-Action	Alternative 2 – Upper Maple Site 2A
	easement would expire.	result in gains/enhancement of approximately 65 acres of wetlands and 237 acres of natural cover respectively.
Air Quality	Air quality conditions would not change from current conditions.	Temporary and localized construction-related dust emissions (PM10 particle size) estimated at 9,543 tons. Long term carbon emission reduction, over the 50-year project lifespan, expected to be 73,704 tons.
Soil Resources	Cropland flooding will continue to cause sediment originating from sheet and rill erosion at current rates.	Temporary and permanent impacts from construction activities due to compaction and dust emissions. Alt 2A will reduce soil erosion to nearly zero in the temporary flood pool upstream of the dam over the long term, as the current cropland will be in planted to deep rooted perennial cover which will also increase soil organic levels and infiltration. Eliminating water driven erosion from cropland downstream of the dam, plus sediment retention behind the dam, will reduce sediment delivery to the Maple River by an estimated 661 tons per year.
Prime and Unique Farmland	Periodic flooding conditions would continue to pose difficult farming conditions and would continue to erode and reduce value of prime farmland resources downstream.	Construction/operation impacts at the project site: Removal of approximately 571 acres of cropland for at least the 50-year conservation easement time period, of which 345.2 acres are designated by USDA NRCS as prime farmland, and 37.9 acres of prime farmland if drained. Only 0.1 acres of prime farmland will be irreversibly lost for other ag purposes such as haying and grazing. Downstream impacts: At the 100-year, 24-hour flood there would be an increase of 200 acres of

Item or Concern	Alternative 1 - No-Action	Alternative 2 – Upper Maple Site 2A
		prime farmland and 382 acres of prime farmland if drained protected due to flood reduction provided by Site 2A.
Riparian Areas	Quality and quantity of riparian areas not expected to change in the watershed.	Approximately 233 feet of stream channel and 5.3 acres of riparian area would be directly and permanently impacted by construction of the Alternative 2A primary spillway. Approximately 717 ft stream channel and 26 acres of riparian area would be temporarily impacted during construction. Long term, the riparian areas will benefit from the conversion of approximately 545 acres of cropland to herbaceous cover which will reduce the amount of sediment and nutrients running off into the river.
Floodplain Management	No change to management of floodplain, it would remain predominantly cropland.	Beneficial changes to floodplain management immediately upstream of the dam, due to restoration of wetlands and perennial grass cover. Downstream of the dam no change in management expected.
Water Resources	Water resources would not change from present conditions. Excess runoff and intense rain events would continue to cause frequent overland and overbank flooding and result in damages to rural residences, structures, cropland and infrastructure.	As noted in Appendix D, hydraulic modeling results indicate that construction of Site 2A include significant reduction of peak flows out of the dam. This alternative would result in an overall reduction in the amount of land flooded during 2- and 100-year events by approximately 67 acres and 658 acres, respectively.
Wetlands	No change to quality and quantity of wetlands anticipated, with the exception of the WRP easement expiring in 2040.	Fourteen of the fifty-three wetlands will be affected by the embankment footprints or will have hydrology cutoff by the embankments or auxiliary spillway and completely lost. Eighteen of the fifty-three wetlands will be affected by the biomass harvest features and lose

Item or Concern	Alternative 1 - No-Action	Alternative 2 – Upper Maple Site 2A
		some functions due to modified hydroperiod and management, but retain their wetland designation. Six wetland plugs are accounted for in wetland losses. The wetland area lost sums to 29.27 acres (25.71 acres of Potholes and 3.56 acres of riverine). Alternative 2A would result in positive impacts as a result of creating/restoring wetlands; with a net gain of 245 acres of wetland (243.8 acres of pothole wetland and 1.2 acres of riverine wetland). These wetlands would provide habitat for insects, large and small mammals, waterfowl, grassland nesting birds, reptiles, and amphibians. Wetland protection for the WRP easement would be extended to 2080.
Waters of the U.S.	No change to Waters of the U.S. anticipated.	Approximately 233 feet of channel will be permanently impacted due to fill placement for the principal spillway and dam. Excavation work to tie the spillway into the natural channel to either side will temporarily impact 717 feet of channel. Impacts to 29.27 acres of wetlands will be mitigated with onsite restorations, regardless of final USACE WOTUS jurisdictional determination in the future. Some or all of the net gain of 245 acres of wetlands may also be considered WOTUS.
Water Quality	No change to water quality anticipated.	Direct impacts to acres of wetland and feet of stream as noted above. Potential indirect impacts from construction stormwater via sediment and sediment-related pollutants within or adjacent to the riparian area. Would also provide water quality benefits by reducing sediment loading by approximately 37%, nitrogen loading by approximately 51% and phosphorus loading 27%.
Regional / International Water	The No-Action Alternative is not	The Site 2A Alternative is consistent with

Item or Concern	Alternative 1 - No-Action	Alternative 2 – Upper Maple Site 2A
Resources Plans	consistent with the Boundary Waters Treaty and 2022 International Joint Commission nutrient objectives at the international border crossing of the Red River. It is also not consistent with RRBC Long Term Flood Solutions Report, or the overall goals of the Red River Retention Authority.	the goals of the Boundary Waters Treaty and 2022 International Joint Commission nutrient objectives at the international border crossing of the Red River. It is also consistent with RRBC Long Term Flood Solutions Report, or the overall goals of the Red River Retention Authority.

6 Environmental Consequences

Throughout the sections below, impacts are discussed for each alternative in terms of whether they would be adverse or beneficial in nature; whether they would be permanent or temporary; and whether they would occur during construction or operation of the project.

6.1 Human Factors

6.1.1 Social Issues

Social issues were assessed throughout the watershed, including the Alternative 2A project area and its vicinity. Similar to the watershed, the Alternative 2A project area consists of small towns surrounded by rural areas with a focus on agriculture.

No-Action Alternative—Under the No-Action Alternative, impacts to social issues would not change from present conditions, with flood damages continuing to impact communities by disrupting agricultural practices and transportation systems. As is the case currently, some residents will continue to be stranded in their homes for days during flood events due to water over roads and/or road washouts.

Alternative 2A— Over the long term, road damages and road overtopping disruptions would be reduced in the watershed. The project would prevent overtopping and washouts at 173 road crossings at the 100-year flood, 113 crossings at the 25-year, and 28 crossings at the 2-year. During construction, there would be temporary, localized disruption of transportation systems due to required detours around the project. No negative direct or indirect impacts to social issues would be anticipated once the impoundment is operational.

6.1.2 Land Use

Land use was assessed throughout the watershed, including the Alternative 2A project area and its vicinity; see Section 4.1.2. Similar to the watershed, land use in the Alternative 2A project area primarily consists of cultivated crops, hayland, rural residences/farmsteads, riparian and wetland

habitat (Appendix C – Figure C-9). Infrastructure in the project area includes highways, local paved and unpaved roads, bridges, and a railroad (Appendix D-1). Land cover in the project area consists of approximately 50% cultivated cropland, 9% land hayed annually, 15% riparian/wetland herbaceous cover (including the Upper Maple River), and 26% upland herbaceous cover. Road, tree/forest cover is very minor (<1%). The area includes a 30-year USDA Wetland Reserve Program easement (152.54 acres) set to expire in 2040. Grazing and haying are possible on about half of the acres, however wet conditions and poor connectivity hamper these uses.

No-Action Alternative—Under the No-Action Alternative, impacts to land use would not change from present conditions, as the area has no urgent need for growth or expansion due to no significant change in population. In 2040, the WRP easement will expire and the land would likely returned to cultivated cropland use.

Alternative 2A—Direct impacts to land use would result from the construction of the embankment, primary spillway, auxiliary spillway, inlet channel, farm levees, road raise, biomass areas, and wetland restoration areas (Appendix B). Construction impacts will temporarily remove approximately 1.5 acres of riparian habitat near the principal spillway. Permanent losses include approximately 41 acres of cultivated cropland, 4 acres of hayland, 12 acres of herbaceous wildlife land and .19 acres of trees to the structural project features. Approximately 490 acres of cultivated cropland and 104 acres of annual hay production will be converted to herbaceous cover of which 240 acres will be managed for wildlife habitat with livestock grazing and 270 acres managed for wetland habitat/nutrient removal. Impacts to wetlands are discussed in Section 6.2.13 and 6.2.14. In addition, as outlined in the Environmental Quality Benefits report (Appendix D-5), Alternative 2A would also make changes to land use by creating/restoring wetland and native grassland habitat over the term of the 50-year conservation easement, which would be in place from 2030 through 2080. Under this alternative, the PL-566 conservation easement would be in place on the existing WRP from 2040 to 2080.

6.1.3 Cultural Resources

SWCA Environmental Consultants conducted a Class I study of cultural resources for the entire Upper Maple River Watershed as described in section 4.1.3. Updates to the Class I Literature Search were completed by NRCS in April 2020, March 2023 and July 2024 for the Area of Potential Impact of Alternative 2A (Appendix D-6). Seven archaeological sites are within two miles of the APE. None of the sites were formally listed on the National Register of Historic Places. NRCS completed a Class III Resources Survey on January 19, 2024 and submitted it to 31 tribal governments and ND SHPO. NDSHPO requested revisions to the document and the final version is dated. September 27, 2024. More details regarding tribal consultation are found in Section 7.3.

No-Action Alternative—Under the No-Action Alternative, impacts to cultural resources would not change from present conditions. There are two sites adjacent to or within the floodplain of the unnamed stream associated with Alternative 2A. The first is a 1959 Farmstead in Section 21; only remnants of a destroyed pumphouse remain. This site is just outside the 100-year flood inundation boundary. The second site is Minnie Lake Post Office in Section 22, which based on associated nearby structures, is also outside the 100-year floodplain.

Alternative 2A— Alternative 2A requires construction activities with the potential to directly impact unknown archaeological resources and unevaluated historical resources located within and around the project area. Ground-disturbing activities associated with the proposed project include excavation, grading, and sub-surface disturbance that could damage or destroy surface and subsurface features comprising archaeological resources. Additionally, temporary inundation from flood storage during a 2-year, 24-hour event or a 10-year, 24-hour flood event may contribute to the deposition of unknown archaeological resources.

Some project features including the embankment, pipeline and principal spillway are within or adjacent to the boundary of the 1959 Farmstead. As per recommendations from ND SHPO, additional survey work and a shovel probe was conducted in 2023 by a NRCS Cultural Resources Specialist Janelle Harrison. No artifacts were found. The farmstead is partially within the impoundment and is currently in floodplain, during flood events water will inundate the site to a deeper depth than it is currently inundated, i.e. 10-year depth is ~10 feet. The Minnie Lake Post office site is downstream of the dam; during flood events reduced depth of water is expected in the stream, i.e. 10-year depth is reduced by 3.3 feet.

ND SHPO also requested additional analysis on the impacts of the embankment on 5 farmstead viewsheds adjacent to the project. They also required an uninhabited farmstead in section 22 to be submitted as a site lead. Only minor or slight visual impacts were found for 3 of the 5 farmsteads (Table 10, Appendix D-6).

The Class III Survey was revised to address all of ND SHPO comments. The final NRCS recommendation for Alternative 2A in the Class III Survey (Appendix D-6), was "No Adverse Effect to Historic Properties". The finding is predicated on the presence of Cultural Resource Monitors during excavation operations. ND SHPO concurred with this recommendation on December 10, 2024 (Appendix A). No tribal governments contested the recommendation.

This alternative reduces non-point source pollution from the U.S. portion of the Red River Basin which is a major contributor to the ongoing eutrophication of Lake Winnipeg. Lake Winnipeg is an important cultural resource for 14 First Nation communities in Canada (ECCC Manitoba 2020) (Armstrong and McCullough 2011).

6.1.4 Public Health and Safety

The Alternative 2A project area and its vicinity are served by a number of public services that require access to the transportation system. Overland flooding and road washouts can result in impeded or delayed access to emergency services due to road closures and detours.

No-Action Alternative—Under the No-Action Alternative, current impacts to public health and safety would continue during times of flooding. These impacts include impeded or delayed access to emergency services due to road closures, road washouts, and detours associated with overland flooding. The 100-yr flood inundation extents include 23 private drinking water wells, providing a potential source of groundwater contamination.

Alternative 2A—Construction of Alternative 2A and associated features would reduce peak flows from a 100-year, 24-hour rain event by approximately 56% in areas downstream of the

impoundment and the 10-year, 24-hour event by approximately 81%. This will result in fewer road overtopping locations by floodwaters and road washouts than is currently the case in the Upper Maple Watershed: at the 100-year, 24-hour event 20 road crossings would no longer be overtopped and at the 10-year, 24-hour event 9 road crossings would no longer be overtopped. Alternative 2A would also raise the elevation of 21st Street SE to allow traffic to pass across the flood protection embankment. The roadway grade raise would allow 21st Street SE to be open to traffic during flood events.

In addition, Alternative 2A would provide protection to two rural residences (farms) with levees that would otherwise be at risk during flooding under existing conditions (Appendix B). These two residences are above the top of dam elevation and over 9 feet above 500-year peak reservoir level. Therefore, flooding due to dam impoundment does not decrease existing flood safety levels, nor increase groundwater levels that could affect residence basements. The well in the northern farmstead will be protected from overland flooding by the ring dike. Breach modeling analysis and results are summarized in Appendix D-1 (Hydraulic and Hydrologic Design Report), including overview map and details map for fourteen residential structures with breach inundation in close proximity. Two drinking water wells would be removed from the 100-yr flood inundation area downstream of the dam, reducing risk of groundwater contamination.

6.1.5 Scenic Beauty

Scenic beauty was assessed throughout the watershed, including the Alternative 2A project area and its vicinity; see Section 4.1.5. Similar to the watershed, scenic beauty elements within the vicinity of Alternative 2A consists of rural-agricultural viewsheds, including fields and rural residences. There are no designated scenic byways, scenic waterways, or other visually sensitive areas within the vicinity of the Alternative 2A.

No-Action Alternative—Under the No-Action Alternative, the overall scenic integrity of the landscape will not change from present conditions. The presence of flooding and associated debris will continue to be visible across the area during intense rain events.

Alternative 2A—Scenic beauty elements in the vicinity of Alternative 2A consist of rural-agricultural viewsheds and unnamed tributaries to the Maple River. The farm levees and embankment associated with Alternative 2A could result in minor adverse impacts to the viewsheds of the farmsteads within or nearby the project. While the grass covered dam slopes would blend with the surrounding landscape, the concrete spillway features would not. A viewshed analysis for adjacent properties is in the Cultural Resource Survey - Appendix D-6. Beneficial impacts under Alternative 2A include reducing risk from future flooding events to existing homesteads and agricultural fields and the associated negative visual impacts that go along with these events, such as presence of flood debris.

6.1.6 Parklands

No local, county, state, or federal parks are present in the immediate area of Site 2A however dispersed recreational activities (big game, waterfowl, and upland bird hunting) take place.

No-Action Alternative—Under the No-Action Alternative, no change in recreational opportunities

is anticipated.

Alternative 2A— Under Alternative 2A, no change in recreational opportunities is anticipated. While PLOTS hunting lands are in the vicinity of the Alternative 2A project area, there is no anticipated impact to these lands and the hunting opportunities they provide.

6.1.7 Noise

The watershed, including Ellsbury Township and Minnie Lake Township, predominantly consists of rural agricultural areas that are exposed to local traffic and agriculture-related noise such as machinery, small aircraft, or other farm-related noise sources. Several highways and county roads traverse the area, providing a source of traffic-related noise. There are no known sources of noise that exceed 100 dB within the watershed.

No-Action Alternative—Under the No-Action Alternative, noise would not change from present conditions.

Alternative 2A—Short-term adverse construction-related noise impacts could occur under Alternative 2A. During activities related to the construction of Alternative 2A and associated features, there would be temporary, localized increases in noise from the operation of construction equipment would be expected to be a maximum of 95 dB at a distance of 50 feet. Once construction is complete, noise in the vicinity of Alternative 2A would return to pre-construction conditions.

6.2 Environmental Factors

6.2.1 Fish and Wildlife

The project area contains habitat for a variety of common fish (and other aquatic organisms) and wildlife species. There is one Wetland Reserve Program (WRP) conservation easement located in the watershed, as identified on Figure C-3 (Appendix C). WRP easements are established to support long term (30 year) conservation and wildlife protection. This easement is 152.54 acres in the NW ¼ of Section 16. The contract will expire in 2040. Prior to enrollment in WRP, the land was in CRP for at least 15 years; there were no restoration structures or changes made to the vegetation when rolling from CRP to WRP. Some remnants of the CRP planted vegetation are present, including tall wheatgrass and alfalfa, however the cover has been heavily invaded by Kentucky bluegrass and smooth bromegrass. There are also weeds present, including Canadian thistle and sow thistle. Disturbance in the easement is restricted and contingent on obtaining a Compatible Use Permit for uses such as haying, grazing and wetland enhancement. Disturbance must take place outside of the primary nesting season. There is one USFWS Wetland Easement tract in the project area in the south ½ of section 9 and three easements downstream of the project area.

Existing vegetation was documented in a Wetland Delineation conducted in 2017 (Appendix D-4) at the Site 2A location. Dominant vegetation in the shallow marsh communities consists of narrow leaf cattail (*Typha angustifolia*), broad leaf cattail (*Typha latifolia*), reed canary grass (*Phalaris arudinacea*), smartweed (*Persicaria pensylvanica*), softstem bulrush (*Schoenoplectus tabernaemontani)*, and common reed (*Phragmites australis*). In some wetlands, the shallow marsh community transitions to a fresh (wet) meadow community, which is characterized by a change in vegetation from cattail into wetland grasses. Dominant vegetation in the fresh (wet) meadow

community consists of reed canary grass, common reed, an unidentified grass, smartweed, and prairie cordgrass (*Spartina pectinata*). The transition to upland is characterized by upward sloping topography with an absence of hydrology indicators and a dominance of smooth brome (*Bromus inermis*) and Kentucky bluegrass. Other species present include Canadian thistle, Canadian goldenrod, wild licorice, sweet clover (*Melilotus officianalis*), common milkweed (*Asclepias syracia*), dogbane (*Apocynum sp.*), prairie clover (*Dalea leporina*), Indian grass (*Sorghastrum nutans*), big bluestem (*Andropogon gerardii)*, little bluestem (*Schizachyrium scoparium*), leafy spurge (*Euphorbia esula*), and snowberry (*Symphoricarpos occidentalis*), or the presence of row crops when located in an agricultural field. Dominant vegetation in the shrub-carr community consists of sandbar willow (*Salix interior*) and an unidentified grass.

Upland herbaceous areas are commonly managed for forage with annual haying. Livestock ponds are visible within the Maple River riparian area, but there is no current grazing or other active wildlife management in the riparian areas. There are a few visible drains indicating prior converted wetlands which are currently cropped. Very few larger trees are present in the project area, however there are several areas with small to medium sized Russian olive. Russian olive negatively affect grassland habitat by providing cover for predators of songbirds and small game birds. A large stick nest was observed in a farmstead shelterbelt south of the project area. The project area is potentially a food source for raptors.

In addition, the North Dakota Natural Heritage biological conservation database indicates that while no rare species are present in the project area, one significant ecological community, Northern Tallgrass Prairie/Wet-Mesic Tallgrass Prairie, is located in the south-central portion of the watershed, adjacent to Alternative 2A on the west side of County Road 32.

No-Action Alternative—Under the No-Action Alternative, the quality and quantity of fish and wildlife habitat would not be expected change from present conditions until the WRP easement expired in 2040; at that point the wildlife value of those 152.54 acres would likely be reduced due to their return to cropland either with or without drainage. Existing flooding conditions would continue across the landscape during intense rain events; some species may be temporarily displaced from their habitats during flood events. The project area will continue to have reduced fish and wildlife values due to the cropping of prior converted wetlands, the encroachment of cropping in the riparian areas, and a lack of vegetative management which degrades the food and shelter value of existing herbaceous vegetation for songbirds and small game birds. Prior converted wetlands and poorly managed wetlands will continue to reduce food and habitat stocks for aquatic and semi-aquatic insects and migratory waterfowl in the critically important Prairie Pothole Region (See Appendix D-5 – Environmental Quality Benefits Analysis).

Alternative 2A— Long term, Alternative 2A is anticipated to provide substantial benefits to vegetation communities and wildlife habitat. The conversion of 490 acres of cultivated cropland to grassland/wetlands from the project will increase and enhance wildlife habitat. A net gain of 245 acres of wetlands and 241 acres of diverse native upland habitat is expected with the project (see Appendix D-5). The project will result in a large block of wildlife habitat consisting of 724.1 acres of grasslands interspersed with 485.7 acres of wetlands. Extensive functional capacity improvements would be made to existing degraded wetlands, as discussed in Section 6.2.13. The

project will improve wildlife habitat through the restoration of previously drained wetlands, the conversion of cropland to perennial vegetation, the removal of invasive Russian Olive trees and shrubs, and long term management to optimize wildlife habitat. No negative direct or indirect impacts to fish and wildlife would be anticipated once the impoundment is operational. A reduced risk of flooding downstream in the vicinity of Alternative 2A may benefit terrestrial wildlife residing in that area and restores a more natural, pre-drainage/channelization, hydrograph downstream. The project Operation and Maintenance (O&M) Plan will outline specific goals for vegetative communities. NRCS and the Project Sponsor, through annual O&M inspections, will utilize adaptive management and monitoring to meet those goal over the 50-year conservation easement lifespan. Wetland restoration and riparian/upland plantings will improve wildlife habitat for insects, large and small mammals, waterfowl, nesting birds, reptiles, amphibians, invertebrate, fish and mussel species. Management practices such as managed haying and grazing will also help to promote a healthy upland and wetland plant community needed to enhance fish and wildlife habitat values. Protection for the existing 152.54-acre WRP easement would be extended to 2080 with the project and the wetland will be enhanced with a ditch plug restoration compatible with the easement. This will gradually result in increased wetland habitat. No wetlands protected by the USFWS easement will be directly impacted by Alt 2 construction activities. Design of the low-flow inlet for the principal spillway will ensure that ~150 cfs (the bankfull flow) will pass through the structure, unimpeded, to avoid impacts to downstream aquatic species and wetlands.

Operation of the biomass harvest areas and discontinued cropping will reduce the amount of dissolved phosphorus, nitrogen, and sediment contributions into the Red River Basin which will contribute to improving aquatic habitat in the Upper Maple River, the Red River and Lake Winnipeg. The continued operation of the biomass harvest areas is not expected beyond the required O&M period of the project. In the event the sponsor would discontinue BHA operations, the harvest areas would continue to provide aquatic habitat and reduce nutrient concentrations at a reduced level. Other modifications to the BHAs could be implemented to continue or improve their environmental benefits.

Direct and indirect adverse impacts to fish and wildlife could occur during construction of Alternative 2A. There are very few large trees are in the project area and no trees of sufficient size for Northern Long-Eared Bats or raptor nesting will be removed for the project. Tree removal will be limited to a few smaller trees. The removal of the invasive Russian olive tree will be beneficial for songbirds and small game birds. During construction, temporary indirect impacts to fish and wildlife species could occur from increased noise and human activity, which could disrupt fish and wildlife species, causing them to temporarily abandon habitat. Direct mortality or displacement from construction equipment is possible for small mammals, fish, mussels, amphibians, and reptiles present in the project area. Potential adverse impacts to fish could occur during construction as a result of heavy equipment causing ground disturbance and potentially increasing the chances of soil erosion and sediment delivery to the river or from the potential for fuels and other chemicals being deposited in the river during construction (see Section 6.2.14 for additional information on potential impacts to water quality). Best management practices (BMPs), such as silt fences, would be used during construction and restoration to minimize impacts to water quality and associated fish habitat and aquatic species removal from the impacted channel segments would be conducted

immediately prior to construction.

6.2.2 Invasive Species

Invasive species are those species (plant, animal, aquatic, or other living organisms) that are not native to an ecosystem and whose presence in some way causes harm or disruption to the natural state of flux within that environment, economy, or to human health. Invasive species that have been identified on site, in the location of Alternative 2A include Canada Thistle (*Cirsium arvense*) and leafy spurge (*Euphorbia esula*). These have been documented primarily in road and railroad rights-of-way (NDDA 2015). Both species are North Dakota State-listed noxious weeds. The invasive tree species Russian olive is present in small quantities in the project area. Herbaceous areas in the project area have been invaded by Kentucky bluegrass and smooth bromegrass which out-compete native vegetation which are superior species for wildlife cover.

No-Action Alternative— Under the No-Action Alternative, soil-disturbing activities would be limited to tillage activities on cropland that already take place, thus reducing risk of further spread of noxious weed species from trucks and construction equipment. Continued widespread, frequent, flood events will continue to spread invasive species, many of which establish quickly after disturbances such as flooding. Currently the riparian areas are not actively managed. A lack of management will increase the spread of noxious weeds as well as Russian Olive. A lack of management will also allow for the continued invasion of Kentucky bluegrass and smooth bromegrass. There are no known aquatic nuisance species in the project area.

Alternative 2A—Indirect adverse impacts as a result of implementing Alternative 2A could include the spread of Canada thistle and/or leafy spurge through construction equipment or vehicles. Best management practices, such as cleaning truck tires and construction equipment entering and leaving the site, would be implemented to reduce this risk. Reduced flooding downstream, over the long term, would likely result in fewer disturbances to existing vegetation and reduced spread of invasive species. Direct impacts include the removal of vegetation during construction which could potentially spread invasive herbaceous species. Long term, Alternative 2A is anticipated to reduce the presence of herbaceous invasive species by the conversion of cropland to native perennial vegetation, and long term management to optimize wildlife habitat. The removal and control of the invasive tree species Russian olive as part of the long term management will eliminate this species.

In accordance with North Dakota Century Code 4.1-47-030, it is illegal to willfully transport any material, or equipment in a manner that allows for the dissemination of noxious weeds. Furthermore, materials containing noxious weed seeds or propagating parts may not be disposed of. Neither the North Dakota Department of Agriculture, nor the Barnes County noxious weed board have equipment inspection protocols, however NRCS typically places restrictions in project specifications. To reduce the spread of aquatic nuisance species, North Dakota Administrative Code 30-03-06-01 states that upon entering or leaving any water body, construction equipment must be free of prohibited or regulated aquatic nuisance species, as defined in the state's aquatic nuisance species list. All construction related equipment traveling into the state or for which the vessel's last exit was from a class 1 infested water body must be certified free of aquatic nuisance species by the North Dakota Game & Fish Department before entering into any water of the state. Inspection criteria include but are not limited to: Last known location, and water body equipment was at, the

last known time the equipment was in the water, date of last cleaning, cleaning procedures.

6.2.3 Migratory Birds and Bald and Golden Eagles

The project area is located in the Central Flyway of North America. Migratory birds use portions of the area as resting grounds during spring and fall migration, as well as breeding and nesting grounds throughout the summer. One medium-large stick nest was observed approximately ½ mile south of the project area. No large trees suitable for large raptor nesting are within the project area. However, the area does provide habitat suitable for raptor prey species.

No-Action Alternative—Under the No-Action Alternative, impacts to eagles (bald and golden), migratory birds, such as waterfowl, wading birds, and shorebirds, would not change from present conditions. Existing flooding conditions would continue across the landscape during 100-year flood events, as shown in Appendix C Figure C-7. Some migratory bird species may be temporarily displaced from their habitats during flood events.

Alternative 2A—Over the long term, conversion of cultivated cropland to grassland/wetland following construction will enhance migratory bird habitat (see Environmental Quality Benefits report in Appendix D), particularly for migratory waterfowl species which rely on wetlands for habitat (ducks, geese, gulls, and terns) and species reliant on grasslands for breeding or foraging (songbirds). No negative direct or indirect impacts to migratory birds or bald and golden eagles would be anticipated once the impoundment is operational.

Temporary direct and indirect adverse impacts to migratory birds could occur during construction of Alternative 2A. Removal of shrubs during construction could directly alter habitat for some migratory birds. Direct impacts to ground nesting migratory birds could also occur if nests are damaged or destroyed during construction. No large trees suitable for gold or bald eagle nesting are present within the construction zone, therefore a "take" is not possible. Construction will take place outside of the primary nesting season, therefore unintentional takes of nesting birds will be reduced or eliminated.

6.2.4 Threatened and Endangered Species

An official list of federally listed species in the project area was requested through the USFWS online Information, Planning, and Conservation System (IPaC) program in January 2025. According to the IPaC results, there is no designated critical habitat (habitat considered essential for the conservation of a threatened or endangered species) in the project area, however the following federally listed species may occur within the vicinity of the project area: the Northern Long-eared Bat (NLEB) (*Myotis septentrionalis* – endangered) and the monarch butterfly (*Danaus Plexippus*). There are no known occupied roost trees or hibernacula in North Dakota. In addition, NLEB have only been found in a few locations in North Dakota, none of which are within the vicinity of Alternative 2A ((NDGFD 2023). The monarch butterfly is a candidate species for listing as threatened and endangered but not currently protected by the ESA.

No-Action Alternative—Under the No-Action Alternative, impacts to federally endangered and threatened species or state rare communities would not change from present conditions. Existing flooding conditions would continue across the landscape during 100-year flood events, as shown in

Appendix C Figure C-7. Because the likelihood of federally listed species inhabiting the area is so low, this flooding does not represent an adverse impact to these federally listed species. The project area lacks hydrology for the growth of large native trees suitable for NLEBs. The project area has existing herbaceous habitat suitable for monarch butterflies, however the diversity of herbaceous species is lacking and in decline.

Alternative 2A—Although unlikely, direct and indirect adverse impacts to federally endangered and threatened species could occur under Alternative 2A. Once construction is complete and the impoundment is operational, no direct or indirect adverse impacts to federally endangered or threatened species would be anticipated. Reduction of flooding as a result of Alternative 2A is not anticipated to affect these federally listed species.

There are no trees of suitable size for NLEB roosting in the construction footprint of Alternative 2A. As such, direct or indirect impacts to northern long-eared bats from construction of Alternative 2A are unlikely. Alternative 2A is within the white-nose syndrome zone; as such, the 4(d) rule may not allow tree removal between June 1 and July 31 unless a survey shows there are no occupied maternity trees. However, significant tree removal is not anticipated for Alternative 2A. The NRCS will continue to undergo Section 7 consultation with the USFWS regarding the potential impacts to federally listed threatened or endangered species.

Temporary indirect impacts could occur to monarch butterflies, should any individuals be present in the vicinity of Alternative 2A during construction. The Northern Tallgrass Prairie/Wet-Mesic Tallgrass Prairie located adjacent to Alternative 2A could provide suitable habitat for Dakota skipper butterflies. A few common milkweed plants were observed in the WRP easement. Monarch larva require milkweed species as a food source. Monarch butterfly habitat will be directly benefited in the long term with Alternative 2A due to the conversion of approximately 237 acres of cropland to native herbaceous cover including forbs suitable for pollinators and monarch butterflies.

6.2.5 Natural Areas

As discussed above, the landscape across the project area is predominantly agricultural, with natural areas consisting of one USFWS Waterfowl Production Area (WPA), one WRP easement, and the riparian area along the Upper Maple River.

No-Action Alternative—Under the No-Action Alternative, impacts to these natural areas would not change from present conditions. The project area will continue to have reduced natural area values due to the cropping of prior converted wetlands, the encroachment of cropping in the riparian areas, and a lack of vegetative management which degrades the food and shelter value of existing herbaceous vegetation for songbirds and small game birds. The WRP easement will expire in 2040 and is likely to be converted back to cropland.

Alternative 2A— Direct and indirect adverse impacts to fish and wildlife could occur under Alternative 2A. There will be some disturbance and loss of natural riparian area at the principal spillway where the embankment crosses the riparian area. Long term, Alternative 2A is anticipated to enhance the natural areas in the project area due to the conversion of cultivated cropland to

grassland and wetlands. Conversion of cropland and prior converted wetlands to wetland restorations and diverse native cover will result in gains/enhancement of approximately 65 acres of wetlands and 237 acres of natural cover respectively (see Appendix D-5). The project Operation and Maintenance (O&M) Plan will outline specific goals for vegetative communities. Management practices such as managed haying and grazing or possibly prescribed burning will also help to improve natural areas in the project area.

6.2.6 Air Quality

No-Action Alternative— Under Alternative 1 - No-Action, there would be no changes to the quantity of criteria pollutants emitted from existing land use management practices which include typical cropping practices which may emit small quantities of diesel emissions from implements such as tractors and trucks. Small amounts of fugitive dust are common from rural gravel roads and wind erosion during winter and spring months. There would be no effect to visibility and no changes to any emissions that may contribute to deposition such as ammonium ions from fertilizer applications. It is likely that in 2040 the existing WRP land would be returned to crop production which would slightly increase greenhouse gas emissions from the annual turning of the soil. Under the No-Action Alternative, air quality would not change from present conditions.

Site 2A— Long term effects to air will not change significantly under Alternative 2. The most significant air effects under Alternative 2 will occur during construction where temporary increases in tailpipe emissions and fugitive dust are possible. An equipment roster is shown in Table 6-1. Construction specifications will require equipment meet EPA Tier Exhaust Emission Standards. Equipment must be manufactured no earlier than 2014 and within the equipment's Useful Life hours/year, NTE 8,000 hrs/10 years. The criteria pollutants for tailpipe emissions include carbon monoxide, nitrogen oxides and particulate matter. EPA standards are compared with expected construction engine types in Table 6-2.

Table 6-1 Equipment Roster and EPA Tier Rating

Heavy Equipment	Model	Power	EPA Tier Rating
Tracked Hydraulic Excavators	Cat 320	109 kW/146 hp	Tier 4
Tracked Bulldozer	CatD6	97 kW/130 hp	Tier 4
Self-propelled Scrapers	Cat 623L	304 kW/407 hp	Tier 4
Self-propelled Vibratory Pad Food Compactor	Cat 815K	185 kW/248 hp	Tier 4
Off Road Trucks	Cat 770G	360 kW/483 hp	Tier 3

Table 6-2 Equipment Emission Standards

Heavy Equipment	CO (g/kW-hr)	NO(x) (g/kW-hr)	PM (g/kW-hr)
Tracked Hydraulic Excavators	5.0	0.40	0.02
Tracked Bulldozer	5.0	0.40	0.02
Self-propelled Scrapers	3.5	0.40	0.02
Self-propelled Vibratory Pad Food Compactor	3.5	0.40	0.02

Heavy Equipment	CO (g/kW-hr)	NO(x) (g/kW-hr)	PM (g/kW-hr)
Off Road Trucks	3.5	-	0.20

The criteria pollutant of interest associated with fugitive dust is PM10 (USEPA 1995). Dust is generated by the pulverization and abrasion of surface materials by application of mechanical force through implements. Emission factors for fugitive dust emissions were derived from table values in EPA AP-42 Compilation of Air Pollutant and Emission Factors, Vol 1, 5th Edition: Section 11.9, Section 13.2.2, and Section 13.3.3 as shown in **Table 6-3** Estimated Construction PM10 Emissions, Alternative 2. Note that these assume a 50% effective control rate via dust abatement activities such as watering roads and the construction site.

Table 6-3 Estimated Construction PM10 Emissions

Activity	Emission Factor	Amount Traveled or Moved	Estimate Construction PM10 Emissions
Scrapers Excavating	0.06 lb / ton	874 tons	26 tons
Scrapers Traveling	0.60 lb / VMT	18,086 miles	5,426 tons
Scrapers Dumping	0.04 lb / ton	874 tons	17 tons
Excavator- Ditch Exc, Riprap, Misc	2.66 lb / VMT	147 miles	195 tons
Loading Trucks	0.75 lb / ton	81 tons	30 tons
Off Road Trucks Transporting	2.48 lb / VMT	2,568 miles	3,182 tons
Dozer Spreading, Finish Grading	0.75 lb / ton	874 tons	328 tons
Self-propelled Vibratory Compactor	2.99 lb / VMT	164 miles	245 tons
Vehicle Travel, Unpaved Public Roads	0.86 lb / VMT	60 miles	26 tons
Wind Erosion, Exposed Surfaces	0.38 ton / ac	350 acres	67 tons
Total Construction Project Estimate			**9,543 tons**

EPA AP-42 provides a general emission factor for construction sites of 1.2 tons/ac/month for total suspended particles (includes both PM10 and PM2.5 size particles), when measured concentrations are unknown. Based on this factor total emissions would be computed as 1.2 tons/acre/month x 328 acres x 18 months (start of construction to final revegetation) = 7,085 tons.

Fugitive dust emissions and construction equipment exhaust would not exceed NAAQS or NDAAQS criteria and as such, the attainment status of the area would be maintained. Because of North Dakota's attainment status and because primary emissions associated with Alternative 2A would not be from major sources, it is not anticipated that any air quality permits or authorizations would be required from the NDDEQ Air Quality Division. Best management practices, such as wetting dry, exposed soil and planting temporary cover crops on exposed soils, would be implemented during construction to minimize impacts to air quality.

Approximately 571 acres of annually cultivated cropland would be converted to grass vegetation, thus reducing carbon dioxide (CO_2) emissions from annual tillage practices, annual tractor/truck emissions and fertilizer application. The USDA COMET-Planner was utilized to calculate the

estimated emission reductions due to reduced farm equipment usage due to converting non-irrigated cropland to unfertilized grass/legume cover for Barnes County; 0.76 tons CO_2 per acre per year (USDA and CSU 2025). An estimate of 1.9 tons per acre per year CO_2 sequestration due to the change from annual crop to perennial grassland was assumed based on literature reference (Kim 2022). Emissions from construction and operation and maintenance operations for the project were calculated utilizing available EPA emission factors and quantification calculations (USEPA 1995) . The accounting for net carbon emissions reduction from the project is summarized in Table 6-4.

Table 6-4 Net Carbon Emissions

Activity	Carbon Impact	Time Frame	Total
Conversion of 572 acres of non-irrigated cropland to permanent grass – reduced emissions from farming equipment	-434.7 tons/yr	50 years	-21,736 tons
Net sequestration due to conversion of cropland to perennial vegetation	-1,081 tons/yr	50 years	-54,054 tons
Annual Mowing of Embankments	0.8 tons/yr	50 years	41 tons
Construction Operations	1,667 tons	-------	1,667 tons
Biomass Harvest, Trucking	7.6 tons/yr	50 years	378 tons
Net Carbon Emissions			-73,704 tons

6.2.7 Soil Resources

No-Action Alternative—Under the No-Action Alternative, impacts to soil resources would not change from present conditions. Existing flooding conditions would continue across the landscape during flood events, as shown in Appendix C Figure C-7. Flooding would likely make soil conditions unproductive for agricultural practices. Soils in the project area would continue to be tilled conventionally – contributing to soil erosion by wind and water. Soil erosion will continue to contribute sediment and nutrients to the Maple River. In the long term, the WRP easement is likely to be returned to conventional crop production – further increasing runoff and erosion downstream. The herbaceous cover will continue to be unmanaged for nutrient runoff – continuing to contribute dissolved phosphorus during spring runoff over frozen soils. Downstream of the dam, sediment loads delivered to the Maple River due to sheet and rill erosion on cropland and riverbank erosion would be expected to remain similar to existing conditions as described in Appendix D-5, Table 6.

Alternative 2A— Given that the dam reduces flooding on downstream cropland (658 acres removed during the 100-yr flood, 387 acres removed during the 25-yr flood), there will be a corresponding reduction in sheet and rill erosion. The dam restores some of the natural retention in the watershed, lost to drainage, resulting in in peak flow reductions (56% at the 100-yr flood, 69% at the 25-yr flood) which will in turn reduce bank erosion. In total, the average annual sediment delivery reduction to the Maple River from the project is estimated at 661 tons as outlined in Appendix D-5. Approximately one-half of the soils within the temporary flood pool that

would be created by Alt 2A are currently cropped. The cropped soils have moderate levels of productivity, moderate susceptibility to wind and water erosion, and large areas where crop productivity is very limited by wetness. Alt 2A will reduce soil erosion to nearly zero as the current cropland will be in planted to deep rooted perennial cover which will also increase soil organic levels and infiltration.

During activities related to the construction of Alternative 2A, compaction of soil from heavy equipment could occur; this could have adverse effects on soil quality and growing conditions. In addition, areas of exposed soil will occur, resulting in increased wind erosion. As outlined in Section 6.2.6, PM10 dust emissions are estimated to be 9,543 tons during construction. Best management practices, such as utilization of construction mats and wetting dry, exposed soil, would be implemented to minimize impacts. Once the impoundment is operational, no additional adverse impacts to soil resources are anticipated. Beneficial impacts to soil quality, infiltration and biological productivity will occur as a result of converting cropland to permanent vegetative cover. Reduced risk of flooding would allow the soil to be more productive in the downstream area.

Geotechnical design of the proposed earthen embankments was completed as part of the preliminary design work, as summarized in Appendix D-2. The results of the analysis indicate that the borrow material to be obtained from the site meet minimum requirements for both slope stability and seepage for the preliminary cross section of 8 foot crest width with 3H:1V side slopes. Additionally, the report analyzed the estimated settlement for the embankment. The estimated long term settlement at the center of the embankment is 3-4 inches. The dam embankment was raised 4 inches to account for the settlement. Additional borings and geotechnical design work would be conducted as a part of the final engineering design phase for the project.

6.2.8 Prime and Unique Farmland

No-Action Alternative—Under the No-Action Alternative, no impacts to existing prime farmland are anticipated.

Alternative 2A—Direct and indirect impacts to prime farmland could occur under Alternative 2A; both adverse and beneficial impacts would occur. Construction of Alternative 2A and associated features would directly and adversely impact agriculture and prime farmland by removing approximately 571 acres of cultivated cropland, of which 345.3 acres are designated by USDA NRCS as prime farmland, and 21 acres of prime farmland if drained. The majority of the land (68%), however, is designated as not prime farmland due to severe limitations of flooding and high-water table. Therefore, the site is moderately well suited for conversion from cropland to wildlife land.

The USDA NRCS completed a Farmland Conversion Impact Rating using the Land Evaluation System Assessment on January 22, 2024. This evaluation was completed to comply with the Farmland Protection Policy Act which is intended to minimize the impact Federal programs have on the unnecessary and irreversible conversion of farmland to nonagricultural land. Because only 0.1 acres of prime farmland will be no longer be feasible for any agricultural purpose (farmed, hayed or grazed), the project was determined to be of low impact to prime farmland resources.

Upstream of the dam, the project would result in the removal of approximately 571 acres of

cropland for at least the 50-year conservation easement time period, of which 345.2 acres are designated by USDA NRCS as prime farmland, and 37.9 acres of prime farmland if drained. Downstream of the dam, at the 100-year, 24-hour flood there would be an increase of 200 acres of prime farmland and 382 acres of prime farmland if drained protected due to flood reduction provided by Site 2A.

6.2.9 Riparian Areas

No-Action Alternative—Riparian areas within the project area occur along unnamed tributaries to the Maple River (Appendix C-4). Approximately 163 acres of riparian habitat are present in the planning area. Under the No-Action Alternative, impacts to riparian areas would not change from present conditions and existing flooding conditions would continue across the landscape during flood events, as shown in Appendix C Figure C-8. The functional role of riparian areas in flooding events would continue, as described in Section 4.2.9. Vegetation in the riparian areas is typically herbaceous dominated by cattails (*Typha sp*.) and reed canarygrass (*Phalaris arundinacea*). Wetter areas support willow (*Salix sp*.) and redosior dogwood (*Cornus sericea*). Larger woody species such as native cottonwood are less numerous. Invasive non-native Russian olive (*Elaeagnus angustifolia*) are present and somewhat common. While not currently grazed, there are 2 constructed livestock ponds and one non-functioning dam in the riparian area which could be utilized as water sources for grazing in the riparian areas.

Alternative 2A—Direct impacts to riparian areas in the vicinity of Alternative 2A could occur along unnamed tributaries to the Maple River (Appendix B & Appendix C Figure C-10). Approximately 2,295 feet of stream and approximately 8 acres of riparian area would be directly and permanently impacted by construction of the Alternative 2A primary spillway. Approximately 2,686 feet of stream and 26 acres of riparian area would be directly and permanently impacted from wetland restoration activities.

Other direct and indirect impacts to riparian areas include vegetation removal for the construction of Alternative 2A. Very few trees are present in the planning area, therefore loss of shade from mature trees is not a concern. Shrub and herbaceous vegetation removal for the construction of Alternative 2A features could result in permanent negative impacts to riparian areas at the principal spillway and embankment. All reaches of the riparian areas will benefit from the conversion of approximately 545 acres of cropland to herbaceous cover which will expand the riparian habitat and reduce the amount of sediment and nutrients running off into the river.

Riparian areas downstream of the Alternative 2A will experience altered hydrology. Peak flood flow reductions will result in reduced depth and inundation extents in riparian areas, for magnitude see Table 6-5. Since majority of the biomass harvest retention cells will come from pumped stream water, the duration flows will be reduced. The preliminary pumping plan (10 cfs for 21 days and 3.3 cfs for following 31.5 days) would reduce $Q_{10\%}$ by 31% and $Q_{25\%}$ by 49%. Since the watershed hydrology is significantly altered due anthropogenic changes, i.e. ditches, roads, and agricultural practices, downstream hydrology is expected to return to more natural conditions of less flashy and lower peak hydrographs. Water-based erosion is expected to be reduced as reduction in flows result in lower velocities and stream power acting against streambanks, as well as fewer agricultural fields would be inundated. The altered flow regime would maintain high durations, i.e.

50%, 75%, and 90% the same as existing conditions; the $Q_{10\%}$ and $Q_{25\%}$ reductions would still maintain flow over riffle facets and pools with deeper depths.

6.2.10 Forest Resources

Forest resources are a minor component of the watershed. The majority of the tree cover consists of planted field and farmstead windbreaks consisting of both native and non-native species. Small areas of riparian tree and shrubs are sometimes present.

No-Action Alternative- Under the No-Action Alternative, no change is expected in the quantity or quality of forest resources.

Alternative 2A- Forest cover in the project area is limited to very small patches of riparian shrubs and a few trees. A few individual trees may need removal in the area of the principal and auxiliary spillway outlet. The majority of the larger trees are invasive Russian olive trees; the wildlife habitat would benefit from their removal as they provide perching areas for song and game bird predators such as fox and hawks.

6.2.11 Floodplain Management

As outlined in Section 4.2.11, there are no FEMA-designated floodplains in the watershed and the 100-year floodplain is largely made up of cropland with some occasional interspersed wetlands, sloughs, hay land, and natural lands. Extensive surface and subsurface drainage has occurred throughout the watershed. Neither residential nor industrial development have occurred in the floodplain, given the sparsely populated rural nature of the area. Executive Order 11988 directs federal agencies to avoid adverse impacts to the environmental values served by floodplains.

No-Action Alternative— Under the No-Action Alternative, no change to floodplain management is anticipated.

Alternative 2A— Downstream of the dam, reduced frequency and duration of flooding would not be expected to change floodplain management. Most of the floodplain will remain in cropland, as is currently the case. Conversion of perennial vegetation to cropland, given that those areas are limited in scale and typically not farmed for other reasons, would be unlikely to occur. Upstream of the dam, restoration of wetlands and perennial vegetation within the floodplain due to the project will improve natural floodplain functions, which is in line with E.O. 11988.

6.2.12 Water Resources

At present, excess runoff and intense rain events cause frequent overland flooding within the watershed. Flood events generate nutrient and sediment runoff to the Maple River and downstream waterbodies, as well as causing crop losses and damage to agriculture, residences, transportation systems, and infrastructure.

No-Action Alternative—The frequency and severity of flood damages in the watershed would not change from existing conditions. Within the Upper Maple Watershed, 17,684 acres of cropland are inundated by the 2-year recurrence interval (RI) flood event, 29,418 acres at the 10-year RI flood, and 37,246 acres are inundated by a 100-year RI flood. In addition to generating nutrient transport from cropland to the Maple River, the average annual flood inundation of 12,600 acres of cropland

generates approximately $2.1 million in annual economic damages to agricultural producers in the watershed (Rooney 2020). Total economic losses due to flooding, considering damage to cropland, structures, roads, drain ditches, structures, and vehicles in the watershed are estimated at approximately $3.8 million a year (Rooney 2020).

Alternative 2A—As detailed in Appendix D-1, modeling results indicate that significant reduction of peak flows would occur as a result of construction of Site 2A. Table 6-5 shows the peak flow reductions immediately downstream of the dam. Table 6-6 shows the area inundated under existing conditions and with Site 2A constructed.

Table 6-5 Peak Flow Reductions (immediately downstream of the dam)

Frequency (yr)	Pre-Project Peak Flow (CFS)	Post-Project Peak Flow (CFS)	Peak Reduction (%)
2	572.2	226.4	60
5	1013.5	250.9	75
10	1487.2	273.8	81
25	2301.2	724.1	69
50	3076.3	1173.9	62
100	3937.4	1745.9	56

Table 6-6 Inundated Area

Frequency (yr)	Pre-Project Inundation (Acres)	Post-Project Inundation (Acres)	Difference (Acres)
2	17,684	17,616	67
5	26,661	26,494	167
10	29,418	29,140	278
25	31,942	31,555	387
50	34,557	33,973	584
100	37,246	36,588	658

The construction of Site 2A would result in an overall reduction in the amount of land flooded during 2- and 100-year events by approximately 67 acres and 658 acres, respectively, which is mapped in Appendix C, Figure C-8.

Design of the low flow inlet for the principal spillway will ensure that ~150 cfs (the bankfull flow) will pass through the structure, unimpeded, to avoid impacts to downstream aquatic species and wetlands.

The Page Aquifer does not underly the temporary flood pool of Site 2A and no aquifer recharge is anticipated as the result of the project.

6.2.13 Wetlands

No-Action Alternative—Wetlands mapped by the NWI in the watershed are shown on Figure C-4 of Appendix C. Under the No Action Alternative, existing flooding conditions would continue across the landscape during flood events, as shown in Appendix C Figure C-7. The acreage and degraded functions of wetlands on the landscape would not change under the No-Action Alternative

Alternative 2A— Given that wildlife habitat and wetland restoration are purposes for this plan, it would be ideal if all wetland impacts were positive. Executive Order 11990 requires federal agencies to avoid, minimize, and mitigate wetland impacts, in that order of preference. Alternative 2A did not have a high density of existing, high functioning wetlands that would be impacted as compared to other sites. Project features were laid out to minimize detrimental wetland impacts and maximize opportunities for restoring previously drained wetlands. The project will result in a substantial net increase in wetland area and function; however, it will also require mitigation due to unavoidable impacts. Wetland restorations at the site designated for use to meet mitigation requirements would be acquired by the Sponsor and have deed restrictions placed on them prior to project construction.

Wetlands within the vicinity of Alternative 2A were delineated by Barr in September 2017 (see Wetland Delineation Report in Appendix D). Because the Alternative 2A project area changed since the time of the delineation, a combination of delineated wetlands, NRCS-modified wetlands, and NWI wetlands were used in the analysis.

A Hydrogeomorphic model (HGM) assessment was conducted to determine the loss in the functional capacity of the wetlands from the construction of Alternative 2A. Under alternative 2A, wetlands classified as prairie pothole wetlands and riverine wetlands would be impacted.

The prairie pothole HGM assesses evaluates each wetland based on the following functions:

- *Static* – capacity of the wetland to sustain the area's surface and groundwater supply.
- *Dynamic* – capacity to retain runoff, maintain subsurface recharge, and stable vegetation zone above the more consistent saturated regions.
- *Cycling* – short- and long term cycling of elements and compounds on site through the abiotic and biotic processes that convert elements from one form to another.
- *Removal* – capacity to remove nutrients and particulates from downstream water bodies.
- *Retention* – deposition and retention of inorganic and organic particulate (>45 μm) from the water column, primarily through physical processes.
- *Plants* – species composition and physical characteristics of living plant biomass.
- *Structure* – soil structure to store, move, and release water, cycle nutrients and compounds, and support healthy plant communities.

- *Habitat* – myriad of conditions for animals that allows numerous species to coexist in the same area.

The riverine HGM wetland assessment evaluates each wetland based on the following functions:

- *Velocity reduction surface water*—the capacity of the wetland access floodplain during ~1.5-year runoff event, to dissipate larger flows over broader area with higher roughness.
- *Storage and release subsurface water*—the capacity to maintain baseflow.
- *Removal imported elements and compounds*--capacity to remove nutrients and particulates from downstream water bodies.
- *Elemental and nutrient cycling*—short- and long term cycling and removal of elements and compounds on site through the abiotic and biotic processes that convert elements from one form to another.
- *Retention of particulates and organic materials*—deposition and retention of inorganic and organic particulate (>45 μm) from the water column, primarily through physical processes.
- *Organic carbon export*—export of dissolved and particulate organic carbon and detritus from the wetland.
- *Maintenance of habitat structure*—myriad of conditions for animals that allows numerous species to coexist in the same area.
- *Habitat structure and connectivity among wetlands*—the spatial relationship of an individual wetland with respect to adjacent wetlands in the complex.

The pre-project HGM assessment indicates that the current wetlands have a below optimal functional capacity for all of the prairie pothole and riverine wetland functions. This is primarily due to alterations to the wetlands' natural hydrology, intensive cropping of wetlands, and degradation of uplands. The post-project HGM assessment concluded that Alternative 2A would have a net gain in FCU for all assessed functions. Similarly, Alternative 2A would result in FCU increases for the riverine wetlands; this is primarily due to restored hydrology and perennial vegetation. See the Environmental Quality Benefits report in Appendix D5 for additional information.

Table 6-7 Alternative 2A Prairie Pothole HGM Results

Wetland Functions	Pre-Project (FCU)	Post-Project (FCU)	Mitigation Required (FCU)[1]
Static	24.24	210.74	-186.50
Dynamic	5.26	164.85	-159.60
Cycling	25.41	163.19	-137.78
Removal	23.66	175.08	-151.42

Wetland Functions	Pre-Project (FCU)	Post-Project (FCU)	Mitigation Required (FCU)[1]
Retention	25.85	238.87	-213.02
Plants	28.16	188.83	-160.68
Structure	23.83	174.15	-150.32
Habitat	12.70	67.50	-54.81

1: Negative numbers represent gains in terms of wetland functions, i.e., the result of the project is a significant increase in wetland functions in all categories.

Table 6-8 Alternative 2A Riverine HGM Results

Wetland Functions	Pre-Project (FCU)	Post-Project (FCU)	Mitigation Required (FCU)[1]
Velocity Reduction Surface Water	18.22	22.74	-4.51
Storage and Release Subsurface Water	16.18	18.71	-2.54
Removal Imported Elements and Compounds	16.98	22.50	-5.51
Retention of Particulates and Organic Materials	17.96	21.67	-3.71
Organic Carbon Export	19.03	25.04	-6.02
Maintains Plant Community	17.54	21.87	-4.34
Maintains Habitat Structure	18.50	24.13	-5.63
Habitat Structure and Connectivity among Wetlands	17.10	22.21	-5.10

1: Negative numbers represent gains in terms of wetland functions, i.e., the result of the project is a significant increase in wetland functions in all categories.

Wetlands are impacted through placement of fill or excavation occurring within wetland boundaries. The principal spillway is expected to incorporate an on-channel grade culvert to limit affecting wetlands beyond the embankment footprint and principal spillway extents. The principal spillway excavation extends ~1,000 feet, in order to provide straight flowpath through the embankment, and direct exit flows away from 129th Ave SE. Fourteen of the fifty-three wetlands will be affected by the embankment footprint or will have hydrology cutoff by the embankments or auxiliary spillway and completely lost (Appendix D-5, Figure 15). Eighteen of the fifty-three wetlands will be affected by the biomass harvest features and lose some functions due to modified hydroperiod and management but retain their wetland designation. Six wetland plugs within 14D labeled P2-P7 are accounted for in wetland losses as they are in delineated wetland areas. The wetland area lost sums to 29.27 acres (25.71 acres of Potholes and 3.56 acres of riverine) see Tables 7, 8, and 10 in the Environmental Quality Benefits report in Appendix D.

Alternative 2A also includes flash grazing and biomass harvesting in wetlands. The pump sizing details, feeding biomass harvest wetlands, will be completed in final design to consider water

budget for each basin. The embankment and excavation areas would cause negative impacts to existing wetland functions and areas. Individual lost and gained wetland areas and functions are identified in Tables 8 and 9 in the Environmental Quality Benefits report in Appendix D. Wetland 14A, at the primary spillway, includes a 4-acre loss; wetlands immediately upstream and downstream of that area will be avoided as groundwater hydrology remains intact and the primary spillway channel is sized for natural floodplain connectivity.

Additional adverse impacts to wetlands could occur from construction activities through sedimentation/siltation. Best management practices would be used during construction and restoration activities to minimize impacts to wetlands from the proposed construction activities. Silt fence would be installed around all existing wetlands not planned to be disturbed, as well as the entire WRP easement, to ensure no disturbance during construction from vehicle traffic or stockpiling of materials.

Alternative 2A would result in positive impacts as a result of creating and restoring wetlands; with a net gain of 245.39 acres of wetland (243.8 acres of pothole wetland and 1.2 acres of riverine wetland). These wetlands would provide habitat for insects, large and small mammals, waterfowl, grassland nesting birds, reptiles, and amphibians. After construction of the dam, wetlands upstream would be inundated for durations ranging from 4 days at a 2-year, 24-hour flood to 14 days at a 100-year, 10-day flood. Maximum flood elevations would range from 1,238 feet at a 2-year, 24-hour flood to 1,245 feet at a 100-yr, 10-day flood. A full set of hydrographs is provided for a wide range of flood events Appendix D-1. The opinion of ND NRCS biologists and conservationists is that the additional inundation time period and depth would not have a negative impact on existing or proposed wetlands in the temporary flood pool. The altered hydrology due to the dam likely moves the floodplain towards a more natural hydrologic condition, which would have existed at this site prior to channelization and drainage in the watershed. The dense wetland vegetation which would colonize both natural and created wetlands (biomass harvest areas) would not be impacted by either altered hydrology or management of water levels in the biomass harvest areas.

A USDA Wetland Reserve Program (WRP) Easement is present in the NW ¼ Sec 16, T142N, R56W and will receive additional inundation due to the dry dam. ND NRCS Easements, Engineering, and Ecological Sciences staff reviewed the planned depths, duration, and extents of hydrology modifications made by the project and determined they would not have a negative impact on either wetland or upland habitat in the WRP. The easement is 152.5 acres and is scheduled to expire in 2040; with the project the site would be protected via a PL-566 conservation easement until 2080. A wetland plug will be installed on the easement, to restore full hydrology to wetland #14E. No other construction will take place on the easement.

Riparian area wetlands downstream of Alternative 2A are not expected to be affected because the existing flood hydrograph was not long enough to develop hydric soil indicators, and the wetland criteria was met due to other wetland hydrology input, i.e. groundwater or depressional topography. Wetland 67, which was avoided because of culvert through dam embankment and above auxiliary spillway, is described in Appendix D-4 Addendum.

6.2.14 Waters of the United States

Waters of the U.S. (WOTUS) are present at the Alternative 2A Site, in the form of the river channel. Wetlands may or may not be under the jurisdiction of WOTUS.

No-Action Alternative—WOTUS are present within the watershed and include the Maple River and unnamed tributaries to the Maple River. The extent of wetlands that are defined as WOTUS has been in flux for many years due to litigation, however it is possible that some wetlands would also be designated under this category. Under the No-Action Alternative, there would be no change in WOTUS conditions anticipated.

Alternative 2A—Waters of the U.S. (WOTUS) in the vicinity of Site 2A consist of several unnamed tributaries to the Maple River (Appendix C, Figure C-10). Construction of Site 2A would have impacts to WOTUS. Consultation with the USACE is ongoing to ensure the impacts of this alternative are consistent with the CWA 404(b)(1), 40 CFR 230.10(b) and preamble to Guidelines at 45 Reg 85336. Permanent impacts to channels and potential WOTUS wetlands are analyzed in detail within Appendix D-5 and summarized in Section 6.2.14. The placement of fill material in the Maple River would occur at the location of the principal spillway and embankment where it crosses the river and some excavation of channel length to either side is required as well. Approximately 233 feet of channel will be permanently impacted due to the principal spillway and dam, as shown in Figure 16, Appendix D-5. Excavation work to tie the spillway into the natural channel to either side will temporarily impact 717 feet of channel. A Section 404 permit will be required, which would be accompanied by a Section 401 Water Quality Certification from the ND Department of Environmental Quality. USACE is a cooperating agency on this EIS and indicated that they prefer to issue permits after final design and immediately prior to construction. Likewise, USACE did not want to invest time and resources in completing a jurisdictional determination for the wetlands involved until immediately prior to construction, particularly given the frequent changes in that policy.

Ultimately, whether wetlands are considered WOTUS or not is irrelevant in terms of how Site 2A would be designed and what wetland mitigation would be required as a part of the watershed project. Executive Order 11990 requires federal agencies to avoid, minimize, and mitigate impacts to any wetland (in that order of preference). As outlined in Section 6.2.13, the project results in a significant increase in the quantity and quality of wetlands at Site 2A. The construction of the embankment, road raise, and biomass harvest area berms also may result in fill or discharge to wetlands that may be considered WOTUS. Impacts to wetlands and WOTUS were avoided to the extent possible including adjusting the alignment of the farmstead ring dike and backwater connections at the principal spillway location.

6.2.15 Water Quality

The Maple River (reach ND-09020205-024) is listed as impaired (Appendix C, Figure C-4). The designated use is fish and other aquatic biota; listed impairments include dissolved oxygen and fishes bioassessments. Low dissolved oxygen is a result of eutrophication, driven by high phosphorus and nitrogen loads in this watershed. The Page Aquifer has had detections for high levels of arsenic, iron, manganese, nitrate, and pesticides at various points in time and locations.

No-Action Alternative—No change in surface water quality of the Maple River, or nutrient loading transported downstream to the Red River, would be expected. No change to groundwater quality of the Page Aquifer would be expected.

Alternative 2A— Construction and operation of Site 2A would result in long term decreased nutrient and sediment loads in the Upper Maple River. The project will reduce phosphorus, nitrogen, and sediment loads by two primary means: the first involves construction and operation of 3 shallow retention cells, totaling 240 acres, on the interior of the dry dam to which flood water will be routed and held to depths of 2-3 feet. During the growing season wetland vegetation will uptake dissolved phosphorus from the overlying water as it grows. In the early fall any remaining surface water will be drained through the control structures and subsurface drainage tile systems to allow vegetation to be cut, baled, and removed from the floodplain prior to the first frost in 2 out of 3 years. Denitrification will also take place within the biomass harvest cells and the fine suspended sediments will settle out within the cells. As detailed in Appendix D-5, an estimate of the annual removal volume was made based on monitoring conducted at a similar Red River Basin site managed with biomass harvest, combined with regional load curves. Higher spring runoff years will have significantly higher nutrient removal volumes by Site 2A, but on average the biomass harvest cells will remove 11,828 lbs of phosphorus, 37,693 lbs of nitrogen, and 661 tons of sediment a year. The second means of nutrient and sediment reduction relates to the lower frequency and extents of cropland flooding and peak flow rates; as detailed in Appendix D-5, that is roughly estimated to result in an additional average reduction of 734 lbs of phosphorus and 1,859 lbs of nitrogen a year. In total, the project is estimated to remove 12,562 lbs of phosphorus, 39,552 lbs of nitrogen, and 661 tons of sediment a year from transport to the Maple River. Conversion of 490 acres of existing cropland to native perennial vegetation planted on uplands and wetlands will provide additional unquantified water quality benefits through denitrification in wetlands and reduced sheet and rill erosion from cropland.

The PL-566 Operation and Maintenance Plan would spell out an adaptive management plan for the biomass harvest cells over the 50-year federal agreement period. Annual monitoring of soils would be completed by NRCS to evaluate actual frequency required to avoid oversaturation of phosphorus in the underlying soils. The Sponsor may wish to experiment with alternative vegetation types within the basins in the future, which NRCS will work with them on to determine effectiveness for nutrient removal.

Short term impacts during construction to water quality could result from stormwater runoff containing sediment or other pollutants within or adjacent to the riparian area. Best management practices, such as silt fences and diversions, would be used during construction and restoration activities to water quality risks from the proposed construction activities. All disturbed areas will be seeded and mulched immediately upon completion. If outside of seeding windows, a temporary cover crop would be seeded on exposed soils. In addition, secondary containment would be used for storage of all construction fuels or chemicals.

The presence of a domestic water well within the northern farmstead was identified during scoping. Alt 2 includes a farm levee which will protect the residence and well from backwater due

to the dam. This would reduce the risk of groundwater contamination posed by the existing well within the 100-year floodplain.

6.3 Regional and International Water Resource Plans

International Joint Commission nutrient concentration and load objectives for the Red River at the international border crossing will require major investments in unique conservation techniques to meet over the coming decades. Implementation of distributed flood retention goals in the Red River Basin Commission Long Term Flood Solutions Report require similarly large investments. To date, no projects targeting dissolved phosphorus reduction and only a single flood retention project have been constructed in the last decade in North Dakota.

No-Action Alternative— Existing high phosphorus and nitrogen export from the Upper Maple watershed will continue, as outlined in Section 4.3. The Red River at the international border crossing would likely to continue to exceed concentration and load objectives that the U.S. agreed to under the 2022 International Joint Commission. A major federal project to address nutrient reductions would not be available to demonstrate U.S. commitment to addressing the issue, which could be utilized in negotiations where Canadian cross border exports are causing damage in the U.S. Likewise, no contributions would be made to the RRBC Long Term Flood Solutions goal for 1.5 million acre-feet of distributed retention in the ND portion of the RRB.

Alternative 2A— Construction and ongoing management of 264.3 acres of biomass harvest cells in the temporary flood pool of the dam will reduce annual phosphorus loads by an estimated 11,838 lbs and nitrogen by an estimated 37,693 lbs. Reduction in the frequency and extents of downstream cropland flooding would provide further reduction in nutrient loads. Although this single retention site will not unilaterally address excess nutrients in the Red River it will work in conjunction with similar projects planned in ND and MN to create meaningful reductions at the international border. Successful implementation of one project in ND is likely to spur additional combined retention and nutrient reduction projects.

6.4 Cumulative Impacts

The assessment of cumulative impacts in National Environmental Policy Act (NEPA) documents is required by the Council of Environmental Quality (CEQ) regulations (1987). This section assesses whether either alternative for the project has the potential to result in cumulative impacts to relevant environmental resources when considered in combination with past, present, and reasonably foreseeable projects or actions in the vicinity of the watershed. Cumulative impacts result when the effects of an action are added to or interact with other effects in a particular place and within a particular time. It is the combination of these effects and any resulting environmental degradation that is the focus of this cumulative impact analysis.

The statewide trends include increases in row crop acreage as well as subsurface drainage, and decreased wetlands. Between 2002 and 2021 the planted acres increased by 14.5% for cultivated crops in North Dakota (NASS 2022). Tile drain systems have increased dramatically since 2001, now accounting for the majority of permits issued by ND DWR. The increase in planted cropland acres reduces natural areas that provide habitat for native perennial vegetation, fish, and all wildlife in uplands, riparian areas, and wetlands. The dramatic increase in subsurface drain tile systems

lowers water tables in uplands and riparian areas that can limit soils from retaining hydric conditions and wetland status. The loss of wetland basins due to drainage is validated with the estimate of 50,000 individual wetlands lost between 1997 and 2009 (NDGFD 2015). The No-Action alternative does nothing to address the cumulative impacts of habitat loss, including wetland losses, due to increases in planted acres and subsurface drainage.

Increasing nutrient loads in sub-watersheds of the Red River, including the Upper Maple River watershed, are similarly a result of cumulative impacts of many factors. Over the course of the 20th century, an increase of 20% in precipitation produced 300% higher annual discharge in the Red River (Ehsanzadeh, Kamp and Spence 2011). Between 1994 and 2007, annual phosphorus loads to Lake Winnipeg increased 71% and nitrogen loads increased 18% (Schindler 2012). Increased runoff volume, land in row crop production, use of synthetic fertilizer, and conversion to conservation tillage over the last 3 decades have contributed to high dissolved phosphorus loads; primarily transported in spring floods (Armstrong and McCullough 2011) (Benoy, et al. 2016) (Ryberg 2017). The No-Action alternative does nothing to address the cumulative impacts of increased flooding related nutrient loads in the Red River.

No past, present, or reasonably foreseeable project within the Upper Maple River watershed that would result in cumulative impacts were identified for this project. there is limited potential for degradation impacts from this project, and none would be classified as cumulative. Within the immediate project area, wetlands and resources lost due to constructed features are mitigated with restored and created wetlands and more natural perennial vegetation will replace annual vegetation. Wetland gains and expanded perennial vegetation are expected to improve all resource functions. There is a net gain of over 230 acres of wetlands; expanded details can be found section 6.2.13 and Appendix D-5. Downstream of the immediate project area the streamflow regime will be altered for flood events. Since the watershed hydrology is significantly altered due anthropogenic changes, i.e. ditches, roads, and agricultural practices, downstream hydrology is expected to return to more natural conditions.

As a result of the scoping process and subsequent meetings throughout the planning process, no past, present, or reasonably foreseeable projects that would result in cumulative impacts were identified (see Appendix A).

7 Consultation, Coordination, and Public Participation

Consultation, coordination, and public participation was conducted throughout the course of project planning (see Appendix A and Appendix D).

7.1 Agency Consultation

The USACE agreed to be Federal Cooperating Agency for the planning process (Appendix A). They have been an active participant with both the project team and interagency team including providing preliminary review of the Watershed Plan/EIS document at various stages. The USFWS was invited to be a Federal Cooperating Agency, however they declined to participate in person. The USFWS online consultation process through their IPaC (Information for Planning and Consultation) tool was utilized for analyzing the environmental consequences of Alterative 2A.

A roster of local, state, and other federal agencies consulted during the planning process is provided in Appendix A. The list of agencies consulted was broad-based and included agencies with experience serving minority populations.

Several agencies submitted comments/questions regarding the project (see Appendix A). Relevant scoping comments received from all agencies were incorporated into the document.

On June 21, 2023 the Notice of Intent to Prepare an EIS was published to the Federal Register. The USEPA provided several scoping comments (see Appendix A) which are addressed in this EIS and appendices.

7.2 Project Team Coordination

The watershed project team held six meetings to discuss the project with regards to goals and objectives, purpose and need, alternatives review, cost-benefit, etc.

- January 12, 2016; Project introduction, history, problem, proposed schedule, and steps; discussed public hearing comments; discussed purpose and need.
- February 24, 2016: Reviewed public comments, discussed strategies for flood damage reduction, adopted draft purpose and need, drafted goals for the project, eliminated categories, and identified categories to remain.
- August 3, 2016: Reviewed inundation mapping, introduced alternatives, reviewed flood damages, and noted priority areas.
- August 18, 2016: Began reviewing developed alternatives, updated draft purpose and need, eliminated alternatives from further review, and defined alternatives to be reviewed further.
- November 17, 2016: Continue to review alternatives for elimination and those to carry forward for further review.
- June 1, 2018: Alternatives were further narrowed and ranked, affected landowners were invited to this meeting. Results are documented in Appendix A.
- March 22, 2019: Reviewed alternatives selected for further review, eliminated alternatives, defined two alternatives to move forward to preliminary design December 1, 2020: Continued work on preliminary design
- Landowner Meetings: 2017: February 8, June 14, August 18; 2018, June 1, 2023 – Reviewed alternatives with impacted landowners. Affected landowners were also engaged at an onsite meeting on August 2, 2023. Several comments and responses were made, considered and included in the Draft Plan EIS. All comments are documented in Appendix A.

7.3 Tribal Consultation

Seventeen tribes and the North Dakota State Historic Preservation Office (SHPO) were initially invited by the sponsor to participate in the planning process on January 15, 2016. No responses

were received by tribes at that time. Thirty tribes were officially consulted in accordance with 36 CFR 800.3(b)(3) Section 106 on November 5, 2018. Two tribal responses were received. Fort Peck gave the concurrence to proceed provided there was consensus with the closest THPO to the project area. The White Earth tribe request to be kept informed with - see Appendix A.

A formal letter of request for continued consultation was sent to the thirty tribes and SHPO on January 19, 2024 which included hard copies of the updated Literature Review and the draft Class III Cultural Resources survey. The results of the survey were that NRCS found "No Effect to Historic Properties". There were nine tribal responses regarding the survey. Six tribes either responded that they concurred with the finding of No Effect to Historic Properties, or had no interest in the project. Two tribes (Spirit Lake Nation and Mille Lacs Band of Chippewa) requested further consultation. NRCS confirmed the receipt of the comments and assured tribes that they would continue to be informed with requests for comment on the Plan/EIS when available. Several tribes recommended following legal procedures and further consultation for unexpected discoveries of historic or cultural properties. The Sisseston-Wahpeton tribe indicated they would follow up with a formal response, but none was received. All tribal correspondence is included in Appendix A.

The ND SHPO requested several additions and corrections to the Class III survey. Specifically they requested a property to be included as a site lead. NRCS revised the Class III survey from "No Effect to Historic Properties" to "No *Adverse* Effect to Historic Properties" in the final version of the Class III Survey on September 27, 2024. SHPO responded on December 10, 2024 and concurred with our findings of No Adverse Effect, see Appendix A.

Thirty Tribes were sent notification and links to the September 27, 2024 revised Class III Cultural Resource Survey on December 19, 2024. Two responses were received, from the Crow Creek Sioux Tribe and the Turtle Mountain Band of Chippewa, both of whom deferred to the local tribes. NRCS planning responsibilities regarding Section 106 were considered completed January 27, 2025. Consultation will resume if there are new discoveries or new information is provided. All 30 Tribes were notified in XX by email, on the availability of the Draft Plan-EIS and opening of the comment period under NEPA.

7.4 Public Involvement

Public participation is documented and is available in Appendix A. An initial public meeting for the project was held in Casselton, North Dakota, on January 6, 2016. Additional public meetings to review project alternatives were held on July 31, 2019 and December 1, 2020. The local landowners and residents were asked to express their concerns with the alternative preference selected by the watershed team.

An additional virtual public scoping meeting was held on May 30, 2023 after it was deemed necessary to upgrade the Environmental Assessment to an Environmental Impact Statement due to the international water quality concerns. The public was notified with the publishing of a legal notice in the Fargo Forum newspaper on May 17th and May 24th. In addition, local landowners, cooperating federal agencies, 30 Tribes, and the planning team were mailed/emailed invitations to the meeting. Meeting notices, invitations and comments received are included in Appendix A.

The Draft Plan – EIS was posted to the NRCS website on XX: https://www.nrcs.usda.gov/conservation-basics/conservation-by-state/north-dakota/upper-maple-river-watershed-plan

Also on XX the Notice of Availability of Draft Plan-EIS was submitted to the EPA (USDI) for publishing in the Federal Register. All stakeholders including tribes, cooperating federal agencies, affected landowners and other local, state and federal agencies were sent a Notice of Availability of the Draft Plan – EIS via mail or email and invited to an in-person Public Meeting on XX in XX, ND. Newspaper advertisements were published 3 times at least 15 days prior to the public meeting. The public comment period began on XX and ends 45 days after EPA publishes the NOA of the Draft Plan EIS.

Substantive comments received and related responses will be addressed in Final Plan/EIS. NRCS will upload Final Plan-EIS and Record of Decision to NRCS website and submit to EPA (USDI) to post to the Federal Register. NRCS will post Notice of Availability of Final Plan-EIS and Record of Decision to the NRCS Website and the Fargo Forum and Valley City Times-Record newspapers and email/mail all stakeholders including tribes, cooperating federal agencies, affected landowners and other local, state and federal agencies.

8 The Preferred Alternative

8.1 Rationale for Plan Preference

According to the Principles and Guidelines (P&G) for federal water resource projects, federal investments in water resources should strive to maximize public benefits, with appropriate consideration of costs (USDA, NRCS 1983). Public benefits encompass environmental, economic, and social goals, include monetary and non-monetary effects, and allow for the consideration of both quantified and unquantified measures. The Preferred Alternative will be the alternative that meets the purpose and need for the project in an environmentally acceptable manner while maximizing net monetized watershed protection benefits unless there are significant other non-monetized benefits to other P&G accounts. For projects primarily providing non-monetary benefits, such as ecosystem restoration, the Preferred Alternative shall be the alternative that achieves the purpose and need at the least cost.

The North Dakota NRCS State Conservationist requested a National Economic Development Account (NED) exception waiver in March of 2022 from the NRCS Chief due to the proposed environmental quality benefits to wetlands, wildlife, and water quality, as well as the social benefits of water quality improvement in waters shared along the international border with Canada. A NED exception was granted for Alternative 2A on October 26th, 2022 and is included in Appendix A. Alternative 2A is the preferred alternative because it results in reduced flooding to downstream cropland thereby reducing nutrient transport, removes incoming nutrient loads from the upstream watershed, provides significant wildlife habitat benefits, and contributes to treaty obligations of the U.S. government and regional/international water resources plans.

8.2 Measures to be Installed

Installation of Site 2A includes installation of a dry dam with interior environmental features, two

low farmstead levees, and a grade raise to an existing road. The site is located in Minnie Lake Township, approximately 6.5 miles south and 1 mile east of Pillsbury, ND in T142N, R56W, Sections 9, 16, 17, and 21.

8.2.1 Dam

An earthen embankment dam would be constructed, approximately 2.3 miles long, with a base that varies between 20 and 185 feet wide, top elevation of 1251.3 feet mean sea level (MSL), an 8-foot-wide top, and 3:1 side slopes. Earthen materials for the dam will come from onsite excavations for the spillways and biomass harvest retention basins. The dam will provide temporary floodwater retention (5 days at the 2-year flood, 11 days at the 100-year) during peak flow events and has a drainage area of 59.7 square miles, embankment length of 2.3 miles, maximum height of 31 feet, average height of 11 feet, and a 48-inch reinforced concrete pipe principal spillway conduit with a 2-way covered riser. The spillway would be constructed at elevation 1217.7 and would be located at the base of the dam structure. The spillway would be designed to accommodate the 10-year, 24-hour event and would allow water to fully drain from the impoundment. No gates or stop logs would be installed to allow water to be held in the dry dam, flow would be entirely controlled by the orifice diameter.

An auxiliary spillway would also be constructed at an elevation of 1243.0 feet MSL, approximately 8.3 feet lower than the height of the embankment. The auxiliary spillway would consist of a series of two concrete spillway drop structures. The first auxiliary spillway structure would consist of an 80-foot-wide weir placed at elevation 1243. It would convey water down-gradient to the second auxiliary spillway structure, which would consist of an 80-foot-wide weir placed at elevation 1225.9. The second auxiliary spillway would outlet into an 80-foot-wide open channel, which would convey flow down-gradient to the Upper Maple River.

Approximately 265,000 cubic yards of material would be needed to construct the embankment, which would come from onsite grading to construct auxiliary spillway and biomass harvest areas. During the preliminary geotechnical investigation, one boring was performed within the second option. As a part of the final design process, additional borings or test pits and laboratory testing will need to be conducted for detailed geotechnical design of the embankment based on available materials onsite.

8.2.2 Biomass Harvest Areas

The total biomass harvest area size is designed based on estimated phosphorus loads incoming to the site and observed content of total phosphorus in biomass, as described in Appendix D-5. There are three biomass harvest areas, one of the east side of the channel and two on the west side of the channel, totaling 264.3 acres. There will be a 22,680-feet of approximately 3-foot-tall outside berms constructed around along all areas, and two divider berms in biomass harvest area 3. Berms will have an 8-foot top width, 3:1 sides slopes, and be seeded to grass. The interior of each cell will be graded towards a water control structure with a remote-controlled gate, to allow release of water prior to fall harvest operations. Biomass harvest cells will be underlain with pattern tile, 4-inch corrugated polyethylene at a 60-foot spacing (180,400-feet of tile and mains to be installed), tied into the same remote-controlled gate for gravity release to dry the ground out for harvest in early

fall. A float-controlled turbine pump will be installed within the principal spillway, which will route floodwater to the biomass harvest cells via 5,800 feet of 24" PVC pipeline during high flow events. Check valves and pressure sensors will ensure pumping ceases after cells are at maximum capacity and that ~150 cfs continues unrestricted down the river.

8.2.3 Wetland Restoration and Enhancement

Wetlands on cropland have been drained over time with ditches to facilitate crop production. The project will install 11 individual wetland plugs, with a total of 4,480 cubic yards of embankment material from grading work onsite, to restore natural hydrology to upslope wetlands. Surface drain blocks, or ditch plugs will fill a minimum length of surface drain based on permeability of exposed soil. Based on Web Soil Survey, the typical length of ditch plugs will be 150 feet. Side slopes will be 3:1 or flatter. Wetlands will be planted to suitable native wetland vegetation, include existing wetlands within crop fields.

8.2.4 Upland Habitat

Uplands (237 acres) currently in annual crop rotations will be planted to perennial native species mixture. Approximately 553 acres of upland including existing grass and newly seeded cover will be actively managed with practices such as flash grazing to assure plant diversity and plant vigor are maintained. Therefore, permanent outside fences are included features of the project. Grazing operations shall use temporary portable electric fences to implement flash grazing rotations. The flash grazing paddocks should range from 30 to 40 acres in size. None are currently planned in the WRP easement, given management restrictions with that program, however after the easement expires it would have vegetation management via grazing to optimize wildlife habitat with the remainder of the area. Typical grazing O&M goals involve 50% removal of seasonal growth at 3 to 5-year intervals applied to all of the area excluding the constructed wetland managed with biomass removal. During annual Operation and Maintenance (O&M) inspections of the project, NRCS staff will evaluate vegetative communities and work with the Sponsor on grazing time periods and stocking needed to meet wildlife habitat goals.

8.2.5 Farmstead Levees

Two farmstead levees will be constructed, one with a length of 1,500 feet, average height 1.4 feet, and maximum height of 3.0 feet and one with a length of 2,900 feet, average height of 2.7 feet, and maximum height of 8.0 feet. Both would have a 10-foot top width and 3:1 side slopes seeded to grass. The levees are designed to protect the farmstead areas from inundation

8.2.6 Roadway Grade Raise

Alternative 2A would include two sections of grade raise on 21st Street SE. A vertical curve meeting ND DOT sight distance and slope requirements for rural roads would be constructed to 21st Street SE to cross over the embankment at the intersection with 29th Avenue SE (maximum elevation 1251.3 feet). A second short section of 21st street to the west of the intersection would be raised, as well.

8.3 Avoidance, Minimization, and Mitigation

As noted in the Environmental Quality Benefits report (Appendix D-5), the project has a very large

and complex wetland area improvement through restoration and construction, which are estimated at 483 acres. Furthermore, variable Functional Capacity Unit (FCU) increases are generated, primarily from biomass harvest constructed wetlands, restored hydrology to prior converted wetlands, and conversion of existing cropland to perennial vegetation. The project is self-mitigating; all wetland acreage lost as the result of the project and each associated function were mitigated for and then the additional wetland restoration and BHA wetland creations accounted for gained improvements. The minimum riverine FCU gain is 2.54 FCUs for the Storage & Release Subsurface Water function, while the maximum FCU gain is 6.02 FCUs for the Organic Carbon Export function. The minimum pothole FCU gain is score of 56.12 (Habitat), the maximum FCU gain is 220.49 (Retention), and all other scores range from 140 - 162. The FCU habitat score is lower than others because the large biomass harvest area constructed wetlands will be harvested, as well as reliance on waterfowl breeding density information by US Fish and Wildlife Service (Thunderstorm Map); this area is comparatively lower than areas with more perennial or semi-permanent wetlands.

The project and nearby area have very limited wetlands remaining due to drainage. Remaining wetlands in the local area have low FCUs due to hydrology changes and intensive cropping of wetlands and buffers. The proposed project has great potential to substantially improve wetland area and functions at these sites, which is intertwined with water quality benefits and overall habitat improvements.

8.4 Permits and Compliance

The Local Sponsor will obtain all necessary permits to construct the project. Permits that are known to date include:

- Dam Construction Permit – North Dakota Department of Water Resources. Required for construction of a significant hazard dam.
- 404 Permit – United States Army Corps of Engineers, with accompanying 401 Water Quality Certification from the ND Department of Environmental Quality. Necessary for the placement of fill in Waters of the United States, which will be required for the project for the principal spillway and potentially for wetland impacts (jurisdictional determination would be completed by USACE immediately prior to construction).
- NPDES Construction Stormwater Permit – North Dakota Department of Environmental Quality. Stormwater Pollution Prevention Plan is required to be submitted in conjunction with this permit.

8.5 Costs and Cost Sharing

Costs include construction, contingencies, project development, engineering (civil, geotechnical, structural, electrical, and construction), land surveying, utility relocations, land rights acquisition and negotiations, wetland mitigation, legal and administrative costs fees, permitting, and fiscal management. The non-federal project costs are anticipated to be shared among the ND Department of Water Resources, Red River Joint Water Resource District, Cass County Joint Water Resource District (Sponsor), and a local assessment.

Table 8-1 Estimated Implementation Cost Share Breakdown

Works of Improvement	Public Law 83-566	ND DWR	RRJWRD	Cass County	Local Assessment
Site 2A	$ 8,348,686	$ 3,554,400	$ 2,073,400	$ 416,757	$ 416,757

Negotiations with private landowners for fee title property acquisition, 50-year easements, and temporary construction easements are solely the responsibility of the Sponsor.

8.6 Installation and Financing

Moving forward, the project will be completed in phases. The next phase would be final engineering design, followed by the construction phase. USDA-NRCS would fully fund the final engineering design phase, subject to available funds in the Watershed Operations Program. After final NRCS approval of the engineering design, the Sponsor would need to secure land rights and permits; at which point application for construction funds from the NRCS Watershed Operations Program could be made. Parallel to those efforts, the Sponsor would secure the additional state and local funding for construction.

Preliminarily, it is assumed that the Local Sponsor will bond for all project costs and seek reimbursement for federal, State Water Commission, and county sales tax shares as the project develops. During development, the Sponsor will develop a local assessment district for the benefiting parcels to pay for the local share of the project. Various options for the bond exist. Typical bonds for these types of projects are 15- or 20-year with a fixed interest rate (to-be-determined).

8.7 Operation, Maintenance, and Replacement

Operation and Maintenance requirements for the Upper Maple Site 2A project will be written into a formal O&M agreement that the Cass County Joint Water Resource District would sign with NRCS prior to construction, as the Sponsoring Local Organization. The O&M Agreement will cover, in detail, the following Sponsor responsibilities over the 50-year lifespan of the project:

- Operation and maintenance of the dam embankment, diversion structure, channels, and spillways. Typically includes items such as regular mowing, trash rack cleaning, repair of concrete cracking, earthwork repairs after major floods, ensuring channels are kept clean and at original grade, replacement/maintenance of gates and valves, and ensuring vigorous vegetation growth where planned and woody vegetation removal where not planned. Salinity in cropland adjacent to new channels will follow criteria and considerations in CPS 610.
- Operation and maintenance of the water control structures and drains in the retention basins to be operated for phosphorus removal; gates for both the gravity surface water release will typically be shut from November through August/early September to collect and hold water in the retention cells from spring snowmelt runoff as well as summer precipitation events, allowing growing vegetation to uptake dissolved phosphorus from both the water column and underlying soils. In September the control structure gates would

be opened to drain standing water and the subsurface drainage system pump turned on to dewater the ground surface. The O&M Plan will require that in mid to late September vegetation in the cells will need to be cut, baled, and hauled off site to a non-contributing area of the watershed. It is anticipated it may be utilized as bedding or feed in a confined animal feeding operation, with permitted stormwater facilities. Harvest is expected to be needed 2 out of every 3 years, but monitoring of phosphorus in soils may determine a lower frequency of harvest during drought periods.

Additional details, including establishment of thresholds for success for water/soil quality and wetlands/wildlife habitat, will be determined during the final design phase of the project and incorporated into in the Operation and Maintenance Plan for Upper Maple Site 2A. It is anticipated that development of the O&M Plan will involve researchers and experts from local, state, and federal agencies working on dissolved phosphorus removal in the Red River Basin. Monitoring and adaptive management would take place, as more is learned about efficient operation and management of constructed biomass harvest cells over time at this site and other similar ones. Prior to receiving federal construction funds, the local Sponsor would concur with the conditions and sign the O&M Agreement.

NRCS and the Local Sponsor will be required to complete annual inspections of the project over the 50-year O&M Agreement time period to assess the status of the dam, retention cells, and wildlife habitat. NRCS is required to issue a letter after each inspection, documenting satisfactory O&M or any outstanding items that must be addressed. If the Sponsor were to be negligent in performing their O&M responsibilities the agreement provides a mechanism where the federal government would require repayment of all federal funds received for the project. The Cass County JWRD has a long history of successfully implementing O&M Agreements for NRCS PL-566 projects.

Table 8-2 Operation, Maintenance, and Replacement Costs

O&M Task	Alt 2A Annual Cost
Mowing Embankments	$ 10,000
Gravel Replacement	$ 1,500
Debris Removal	$ 1,000
Sediment Removal	$ 6,000
Pump Electrical Costs, Maintenance, Replacement	$ 5,000
Mowing-Raking Biomass	$ 3,200
Baling Biomass	$ 1,920
Loading – Moving Bales	$ 5,660
Hauling Bales	$ 10,937
Coordination for grazing operations	$ 500
Total Annual O&M Cost	**$45,717**

1/ Price Base: FY2020

8.8 Economic and Structural Tables

Table 8-3 Economic Table 1 - Estimated Installation Costs

Works of Improvement	Unit	Number	Public Law 83-566	Other Funds	Total
Upper Maple Site 2A (Watershed Protection)	No.	1	$8,348,686	$6,461,315	$14,810,00

1/ Price Base: FY2020

Prepared: August, 2020

Table 8-4 Economic Table 2 - Estimate Cost Distribution

Works of Improvement	Installation Cost - Public Law 83-566								Installation Cost - Other Funds								Total
	Construction	Engineering	Real Property Rights	Wetland Mitigation Property Rights	Utility Relocation	Wetland Mitigation Engineering	Project Admin	Total Public Law 566	Construction	Engineering	Real Property Rights	Wetland Mitigation Property Rights	Utility Relocation	Wetland Mitigation Engineering	Project Admin	Total Other	Installation Costs
Upper Maple Site 2A (Watershed Protection)	$7,201,754	$1,061,932	$ 0	$ 50,000	$ 0	$ 35,000	$ 0	$ 8,348,686	$ 2,400,585	$ 0	$ 3,755,730	$ 35,000	$ 115,000	$ 35,000	$ 105,000	$ 6,461,315	$ 14,810,000

1/ Price Base: FY2020

Prepared: August, 2020

Table 8-5 Structural Table 3 - Structural Data for Alternative 2A

Item	Unit	Alternative 2A
General Statistics		
Type of Structure	--	Dry Dam
Class of Structure	--	Significant
Primary Purpose	--	Flood Protection
Seismic Zone	--	Zone 0
Maximum Height of Dam	Feet	33.5
Fill Volume	Cubic Yards	250,711
Hydrology Data		
Unregulated Drainage Area	Sq. Mi.	59.7
Regulated Drainage Area	Sq. Mi.	0
Total Drainage Area	Sq. Mi.	59.7
Runoff Curve Number (24-Hour, AMC II)	--	73.7
Critical Elevations		
Top of Dam	NAVD 1988	1251
Crest of Auxiliary Spillway	NAVD 1988	1243
High Stage Inlet (Crest of Riser Tower)	NAVD 1988	1219.65
Low Stage Inlet (Pipe Inlet)	NAVD 1988	1217.56
Critical Floodpool Areas		
Top of Dam	Acres	1025.5
Crest of Auxiliary Spillway	Acres	499.5
High Stage Inlet (Crest of Riser Tower)	Acres	213
Low Stage Inlet (Pipe Inlet)	Acres	0
Critical Floodpool Volumes		
Top of Dam	Acre-Feet	9235
Crest of Auxiliary Spillway	Acre-Feet	2863
High Stage Inlet (Crest of Riser Tower)	Acre-Feet	790
Low Stage Inlet (Pipe Inlet)	Acre-Feet	0
Principal Spillway Data		
Rainfall Volume (24-Hour)	Inches	5.08
Rainfall Volume (10-Day)	Inches	7.24
Runoff Volume (10-Day)	Inches	3.89
Low Stage Inlet Type	--	48" RCP
Low Stage Inlet Capacity (Maximum)	CFS	250
High Stage Inlet Type	--	Two Way Riser
High Stage Inlet Frequency of Use	Recurrence	2-Year
Outlet Conduit Type	--	RCP
Outlet Conduit Dimensions	--	48" RCP
Outlet Conduit Capacity (Maximum)	CFS	250
Peak Floodpool Elevation	NAVD 1988	1245.4

Item	Unit	Alternative 2A
Peak Floodpool Surface Area	Acres	697
Peak Floodpool Volume	Acre-Feet	4632.7
Auxiliary Spillway Data		
Type	--	Reinforced Concrete Drop
Bottom Width	Feet	80
Exit Slope	Percent	Straight Drop
Frequency of Use	Recurrence	10-Year
Rainfall Volume	Inches	7.25
Runoff Volume	Inches	4.23
Storm Duration	Hours	33
Velocity of Outflow	FPS	Structural
Peak Floodpool Elevation	NAVD 1988	1247.1
Peak Floodpool Surface Area	Acres	837
Peak Floodpool Volume	Acre-Feet	5608.9
Downstream Channel Bottom Width	Feet	80
Downstream Channel Side Slopes	Horizontal:Vertical	4:1
Downstream Channel Gradient	Foot/Foot	0.0005
Downstream Channel Maximum Depth	Feet	21
Downstream Channel Average Depth	Feet	11.4
Downstream Channel Capacity (Maximum)	CFS	5540
Downstream Channel Capacity (Maximum)	Recurrence	FBH
Downstream Channel Manning's 'n'	--	0.035
Downstream Channel Velocity (Maximum)	FPS	2.9
Downstream Channel Excavation	Cubic Yards	410,242
Freeboard Data		
Rainfall Volume	Inches	12.63
Runoff Volume	Inches	9.17
Storm Duration	Hours	33
Peak Floodpool Elevation	NAVD 1988	1250.9
Peak Floodpool Surface Area	Acres	1022
Peak Floodpool Volume	Acre-Feet	9158

1/ Crest of auxiliary spillway. Prepared: August 2020

Table 8-6 Structural Table 3a - Structural Data for Farm Levees

Dike/Levee	Stationing	Top Width (ft)	Average Side Slope	Average Height of Dike (ft)	100-Year Frequency Velocity (ft/sec)	Dike Protection	Volume of Fill (yd^3)
N Farm Ring Levee (Site 2A)	0+00 to 29+00	10	3:1	1.4	~ 0 ft/sec	Vegetation	5255
S Farm Ring Levee (Site 2A)	0+00 to 15+00	10	3:1	2.7	~ 0 ft/sec	Vegetation	437

Prepared: March 2025

Table 8-7 Economic Table 4 - Estimated Average Annual Costs

Works of Improvement	Project Outlays Amortization of Installation Cost	Project Outlays Operation, Maintenance, and Replacement Cost	Other Direct Costs	Total
Floodwater-Retarding Structure (Alt 2A)	$561,993	$40,624	$0	$602,617

1/ Price Base: FY 2020, amortized over 50 years at a discount rate of 3.0 percent

Prepared: February 2025

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11 Planning Team Members

A planning team was created to identify watershed problems and determine alternatives that could be implemented in the Upper Maple River watershed to alleviate the identified problems. The planning team is composed of members that included local landowners and local, regional, state, and federal agency representatives.

Jurgen Suhr , Jerry Melvin, Rodger Olson – Maple River Water Resource District

Shawn Olausen and Brett Fehr – Barnes County Water Resource District

Josh Ihry – Steele County Water Resource District

Josh Monson: NRCS Cass County District Conservationist

Mike Hargiss: North Dakota Department of Environmental Quality (formerly Dept of Health)

Bruce Kreft: North Dakota Game and Fish

Eric Dahl & Jeff Miller: Cass County Soil Conservation Service

Jason Benson: Cass County Engineer

Randy Gjestvang: North Dakota State Water Commission

Keith Weston: NRCS Red River Basin Coordinator/Red River Retention Authority

Wade Bruns – Local Landowner

Jerry Garrahy – Local Landowner

Steve Baasch – Local Landowner

Patricia McQuery - US Army Corp of Engineers (NEPA cooperating federal agency)

Kevin Shelley - US Fish and Wildlife Service

12 Distribution List

The Draft EIS was distributed to the following federal, state, and local agencies and organizations for comment on XXXX.

Affected Landowners	ND Game and Fish Department
Barnes County Commission	Northern Arapaho Tribe
Barnes County Emergency Services	Governor of North Dakota
Barnes County Hwy Dept	ND Parks and Recreation
Barnes Co SCD	North Dakota Department of Transportation
Barnes Co Water Resource District	Northern Cheyenne Tribe
Blackfeet Indian Reservation of MT	NRCS - Barnes County
Bois Forte Band of the MN Chippewa Tribe	NRCS - Cass County
Cass County Commission	NRCS – Jamestown
Cass County Soil Conservation District	NRCS - Bismarck
Cass County Hwy Dept	Oglala Sioux Tribe
Cass County Emergency Services	Prairie Island Indian Community in MN
Cass County Joint Water Resource District	Red Lake Band of Chippewa Indians
Cheyenne River Sioux Tribe	Red River Retention Authority
Chippewa Cree Tribe of the Rocky Boy's Reservation	Rosebud Sioux Tribe of Indians
City of Cavalier	Shepherd, Ruth
Confederated Salish and Kootenai Tribes	Shoshone Tribe of the Wind River Reservation
Crow Creek Sioux Tribe	Sisseton-Wahpeton Oyate
Federal Emergency Management Agency - Region 8	Spirit Lake Tribe of Fort Totten
Flandreau Santee Sioux Tribe	Standing Rock Sioux Tribe
Fond du Lac Band of MN Chippewa Tribe	State Historical Society of North Dakota
Fort Belknap Indian Community	The Crow Tribe of Montana
Fort Peck Assiniboine and Sioux Tribes	The Three Affiliated Tribes
Grand Portage Band of MN Chippewa Tribe	Turtle Mountain Band of Chippewa
Leech Lake Band of Ojibwe	Upper Sioux Community
Lower Sioux Indian Community	US Army Corp of Engineers
Mille Lacs Band of Ojibwe	US Environmental Protection Agency

ND Department of Emergency Services	US Fish and Wildlife Service
ND Department of Environmental Quality	White Earth Nation of MN Chippewa
ND Department of Water Resources	Yankton Sioux Tribe

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