ENVIRONMENTAL ASSESSMENT WORKSHEET

This Environmental Assessment Worksheet (EAW) form and EAW Guidelines are available at the Environmental Quality Board's website at: http://www.eqb.state.mn.us/EnvRevGuidanceDocuments.htm.
The EAW form provides information about a project that may have the potential for significant environmental effects. The EAW Guidelines provide additional detail and resources for completing the EAW form.
Cumulative potential effects can either be addressed under each applicable EAW Item, or can be addresses collectively under EAW Item 19.
Note to reviewers: Comments must be submitted to the RGU during the 30-day comment period following notice of the EAW in the *EQB Monitor*. Comments should address the accuracy and completeness of information, potential impacts that warrant further investigation and the need for an EIS.

1. **Project title: Klondike Clean Water Retention Project #11**

2. **Proposer:**
Contact person: Dan Money
Title: District Administrator
Address: 410 S 5th St
City, State, ZIP: Hallock, MN 56728
Phone: 218-843-3333
Fax:
Email: dan.money@tworiverswd.com

3. **RGU**
Contact person: Dan Money
Title: District Administrator
Address: 410 South 5th Street
City, State, ZIP: Hallock, MN 56728
Phone: 218-843-3333
Fax:
Email: dan.money@tworiverswd.com

4. **Reason for EAW Preparation:** (check one)

Required:	Discretionary:
☐ EIS Scoping	☐ Citizen petition
✓Mandatory EAW	☐ RGU discretion
	☐ Proposer initiated

If EAW or EIS is mandatory give EQB rule category subpart number(s) and name(s):
4410.4300 Subp. 27.B. Public Waters, public waters & wetlands, and wetlands.

5. **Project Location:**
County: Kittson & Roseau

City/Township: Klondike Township (T161N, R45W), Kittson County & Juneberry (T162N, R44W), Polonia (T161N, R44W), Soler (T162N, R43W) & Barto (T161N, R43W) Townships, Roseau County

PLS Location (¼, ¼, Section, Township, Range): All of Sections 1, 2, 10, 11, 12, 13, 14, 15, 22, 23, 24 T161N R45W; All of section 31 and the S ½, S ½ of sections 32, 33, 34, 35, 36 T162N, R44W; The N ½, N ½ of Sections 1, 2, 3, 4, 5, 6 T161N, R44W; The W ½, W ½ of sections 4 & 9, the N ½ N ½ and the E ½ E ½ of section 5, the N ½ N ½ of section 6, and the E ½ E ½ of section 8, T161N, R43W; The S ½, S ½, Sections 31, 32, T162N, R43W.

Watershed (81 major watershed scale): Two Rivers (HUC 8 - 0920312)

Tax Parcel Numbers: 41.0022000; 41.0022100; R13.0352520; R13.0271700; R13.0271680; R13.0271660; R13.0271640; R13.0241520; R13.0231460; R13.0221340; R13.0221320; R13.0211160;

R13.0160840; R13.0150760; R13.0150740; R13.0140720; R13.0130700; R13.0120650; R13.0110610; R13.0100480; R13.0020080; R13.0020060; R13.0020040; R13.0010020

Figures / Maps / Appendices:

- Figure 1. Location Map
- Figure 2. Site Plan & U.S. Geological Survey 7.5 minute map
- Figure 3. USDA Soils Map
- Figure 4. MCBS Biodiversity Map
- Figure 5.
- Figure 6.
- Figure 7.
- Figure 8.
- Appendix A. Project Component Descriptions & Typical Drawings
- Appendix B. Klondike Clean Water Retention Project – NRE Objectives
- Appendix C. SHPO / NRCS Preliminary Cultural Resources Review
- Appendix D. HDR Memo – Design Alternatives Considered

6. Project Description:

a. Provide the brief project summary to be published in the EQB Monitor, (approximately 50 words).

The Klondike Clean Water Retention Project (KCWRP) is a multi-purpose public project providing both flood damage reduction and natural resources enhancement components. Located in Roseau and Kittson Counties and within the Two Rivers and Red River watersheds, the project will reduce flooding, improve water quality, improve aquatic habitat, protect and enhance a prairie rich fen, and provide an adequate drainage outlet primarily for lateral 1 of State Ditch 95 and secondarily for State Ditch 72.

b. Give a complete description of the proposed project and related new construction, including infrastructure needs. If the project is an expansion include a description of the existing facility. Emphasize: 1) construction, operation methods and features that will cause physical manipulation of the environment or will produce wastes, 2) modifications to existing equipment or industrial processes, 3) significant demolition, removal or remodeling of existing structures, and 4) timing and duration of construction activities.

Background/History: In the mid 1940's Lateral 1 of State Ditch 95 was constructed to divert Badger Creek from its original northerly outlet in the Roseau River to a westerly outlet in the Two Rivers watershed. The new ditch was not constructed with proper capacity and this combined with the slope of the land and rather large upstream drainage area causes frequent breakouts from the ditch leading to large scale overland flooding. Typical damages that occur both in spring and summer floods are road washouts, culvert and bridge damages, sloughing along side slopes, overland flooding resulting in erosion, sedimentation, and crop damage. Existing ditches and a general project layout are included in figures 1 through 3 on pages 36 - 39.

Beginning 2009 the Two Rivers Watershed District convened a "Project Work Team" to assess the situation, look at alternatives to solve the problem, and recommend a preferred alternative. This team consisted of local, state, and federal agencies, landowners, and non- government natural resources agencies and followed the process of the Red River Flood Damage Reduction Work Group. Monthly meetings were held over a 3 year period to determine priorities for both flood damage reduction and for natural resources enhancement. A variety of alternatives were considered, including new ditches, upstream impoundments, diversions and other common structural and non structural solutions. The Project Work Team eventually recommended an impoundment project to the Two Rivers Watershed District. The TRWD initiated the project under MN Statute §103D. The purpose of the project is to reduce flooding along the State Ditch 72 and the State Ditch 95 systems, and also to contribute to the regional goal of 20% flood flow reduction on

the Red River of the North, which will address the severe and repeated damage that currently occurs to public infrastructure, private property, and agricultural lands.

In order to accomplish the flood damage reduction and natural resource enhancement components of the project, a seven mile long inlet ditch will be constructed to divert runoff and overland flooding from an upstream drainage area of approximately 181 square miles into a diked impoundment. Eight miles of new dike will be constructed and eight miles of an existing dike will be improved to divert and contain runoff in an impoundment 10 square miles in size. Water will be held at an average depth of five feet up to a surface water elevation of 1017 feet mean sea level, resulting in the storage of up to 35,250 acre feet of water. Water storage will typically occur during spring snowmelt runoff and large summer rainfall events. Duration of storage will be variable and drawdown of the impoundment's primary pool will be timed to occur as soon after a flood event when downstream watercourses are able to accept water. A low flow pool is planned to allow for summer releases to augment flows on the Two Rivers. The impoundment will typically be drained dry according to a detailed operating plan. Specific construction components are described below.

Several township roads and one county road are proposed to be altered either by widening, raising, or abandonment. Petitions to the appropriate road authorities have been submitted. Similarly, alterations to State Ditch 50, State Ditch 72, and State Ditch 95 are proposed. Petitions have been submitted to the appropriate ditch authorities and hearings are pending.

Construction

Project components will consist of construction of 7 miles of inlet ditches, 2 miles of diversion ditch, 3 inlet control structures, a 16 mile long impoundment dike, 2 outlet structures, 2 emergency spillways, and interior pilot channels for water conveyance. These components are included in Appendix A and are discussed in more detail below. Detailed construction plans and specifications have not been developed but the concepts and typical drawings have been included in the appendix.

The impoundment dike will be constructed up to elevation 1019.5 (NAVD 88) primarily using backhoes, scrapers, and bulldozers. Off road trucks and compaction equipment may also be used on site during construction. Interior borrow pits adjacent to the dike will be dug to provide earthen materials for construction. Dike construction will generally include ground preparation by stripping topsoil, backfilling with clay, compaction of the dike, topdressing with topsoil, and seeding with appropriate vegetation. Dikes will typically have a 12 foot top width and a minimum 4:1 side slope. In areas where the dike will double as a road, the top width will be 20'.

An exterior ditch will be constructed around the outside of the impoundment. This ditch will be 3' deep, have an 8' wide bottom width with 4:1 side slopes and varying depth (See Figure 4). It will have a minimal slope and will drain to either State Ditch 50 or Lateral 1 State Ditch 95. All dike and ditch construction will be set back 50 feet from property lines to avoid impacts to adjacent property.

Depending upon funding, the project may be constructed in 3 phases (See Figure 2). Phase 1 will stor up to 16,500 acre feet of water, phase 2 up to 27,500, and phase 3 up to 35,250 acre feet.

<u>Diversion County Road 103 (See Appendix A):</u>

A new channel that will divert flows out of SD 95 Lat 1 Br 3 to the north and into the Diked Inlet will be constructed along the east side of County Road 103 (CR 103). The existing ditch is only about 2 feet below natural ground along CR 103, and less than 5 feet below the edge of the road. The bottom width is 3 to 8 feet. There is a berm on the field side of the ditch when it gets near SD 95 Lat 1. Otherwise the land to the east is unprotected from breakout flows from the ditch.

This diversion is planned for Phase 1 and designed for a 50-year capacity. The drainage area for Br 3 Lat 1 SD 95 at this diversion is 14.7 square miles. An additional 2.75 square miles of drainage area that normally reaches SD 95 Lat 1 by going under CR 103 and across private lands before reaching SD 95 Lat 1 will be cut off by this diversion.

The diversion inlet culverts are proposed to be higher than the existing ditch. Therefore, a 2-year, 24-hour runoff event will bypass this diversion through the existing culvert in Br 3 Lat 1 SD 95. Flap gates on the north end (diversion outlet) will prevent flows from leaving SD 95 Lat 1 and also keep flows from entering the Diked Inlet when water levels reach elevations higher than the CR 103 Diversion. This design will keep post-project flooding conditions the same or better than the existing condition.

Lateral 1 SD 95 Upstream Improvements (See Appendix A):

The Diked Inlet as an extension of the Retention Area extends only as far as 160th Ave (six miles east of the Roseau Kittson county line). From 160th Ave to CR 103 the existing SD 95 Lat 1 has inconsistent bottom widths and grades. This two-mile section of Lat 1 SD 95 will be improved in Phase 1.

In Phase 1, with a consistent 20' bottom width, 4:1 side slope (field side), and greater than .03% grade, the channel will convey the 50-year, 24-hour event from both upstream drainage areas (Lateral 1 and CR 103 diversion). The existing road side slope is 2.5:1 which appears unstable, due to the slope failures observed during survey. Phase 3 would further expand this channel to a 35' bottom width, which would have capacity to carry the 100-year, 10-day event from SD 95 Lat 1 (1,400 cfs).

Diked Inlet (on State Ditch 95 Lateral 1) (See Appendix A):

The Diked Inlet is an extension of the Retention Area. It has a two-stage channel design that utilizes the existing SD 95 Lat 1 for low flows.

The SD 95 Lat 1 in Roseau County has a drainage area that extends east to the former Badger Creek. TRWD owns and operates the Ross # 7 project, which controls a little over 18 square miles of the upstream portion of the drainage area. The existing SD 95 Lat 1 has a positive grade going east to west of approximately 1 foot per mile (0.02%). It also passes through a higher ridge in the vicinity of 120th Ave. The natural ground has even less elevation change from east to west. West of 120th Ave, the topography falls and remains very flat between 1011 and 1012 feet.

The topography in the Project area has only 1 foot of elevation difference per mile. Hydraulically, in order for the Diked Inlet to convey flows from upstream during a flood event, the water surface elevation has to rise on the upstream end of the channel and create a positive energy grade going east to west. When this happens naturally with the existing ditch system in place, the water surface rises until it is no longer contained within the banks of SD 95 Lat 1 and it inundates the surrounding lands. By constructing an embankment along the south side of SD 95 Lat 1 with continuous protection from the upstream end of the Project all the way to the retention area, the Diked Inlet can convey these flood events without water breaking out and inundating the lands adjacent to the Project.

The current legal ditch has capacity for less than a 10-year rainfall. The landowners along SD 95 Lat 1 petitioned for improvement of the ditch up to a 10-year capacity, but the petition was denied due to an inadequate outlet. The existing SD 95 Lat 1 can convey flows below natural ground up to a 2-year, 24-hour event as the low flow portion of the Diked Inlet. Events greater than a 2-year, 24-hour will be conveyed above ground in the high flow channel created by 280th St and the Diked Inlet embankment.

280th Street Road Raise & Exterior Drainage (See Appendix A):

The existing 280th St is located on the north side of Lat 1 SD 95 and on the boundary lines between Soler/Barto and June Berry/Polonia Townships. Phase 2 of the project includes altering the existing road to create the northern boundary of the Diked Inlet.

280th St is a gravel road from 120th Ave to the east, and a minimum maintenance road from 120th Ave to the west. The road currently acts as a dam during flood events.

Existing pipes through 280th St will be removed and replaced with new culverts, and flap gates (traps) will be installed on the south (outlet) end of each culvert. An exterior drainage ditch will provide local drainage along all privately-owned lands and will outlet into Lat 11 or 12 of SD 72.

State Ditch 72, Lateral 6 Structure (See Appendix A):

The existing 48" pipe at this location was installed in 2011 to allow local drainage from the east and water that overflows from Roseau River another outlet to drain floodwaters from SD 72 to SD 95. This will be improved to consists of two gated 48" culverts. The normal position will be one gate fully open and one

gate closed, but will be operated during floods for both to be open to allow 10,000 acre feet of floodwater to flow from north to south into the project via the diked inlet channel during the later part of the flood event, typically when overflow flooding from Roseau River is occurring. A reinforced spillway at 1021.15' will allow additional flood water to flow over 280th St (road grade along Lat 1 SD 95) into the project.

State Ditch 72, Lateral 8 Structure (See Appendix A):

The existing 30" pipe at this location was installed in 2007 to allow water that overflows from Roseau River another outlet to drain floodwaters from SD 72 to SD 95. This will be a gated culvert. Normally the gate will be closed and opened only during floods to allow approximately 1,200 acre feet of floodwater to flow from north to south into the project via the diked inlet channel during the later part of the flood event, typically when overflow flooding from Roseau River is occurring.

Retention Area (Impoundment) (See Appendix A):

The Retention area is the 10.3 square miles of land owned by the Two Rivers Watershed District and proposed to be used to store flood waters. The north and west sides of the retention area is mainly very flat terrain, with up to 4 feet of peat soils on top of lean clay. The south and east sides of the retention area are bordered by a minimum maintenance road. The road consists of compacted spoil from the adjacent SD 95 Lat 1. This spoil road will be built up to form the south and east sides of the retention area and new embankment will be built on top of the existing peat (without stripping the peat) to form the north and west sides.

The existing area has a history of flooding, but only at depths less than 1 foot. The proposed Project will provide gated storage up to 6 feet deep (Phase 3). More detailed information can be found in the Operating Plan, which is currently in draft form and on file with the TRWD.

Interior Pilot Channel (See Appendix A):

To operate the Project, including filling and drawdown, a pilot channel is required that connects the two outlet structures with the retention areas and the Diked Inlet. Much of the retention area was previously farmed and has drainage to either SD 50 or SD 95 Lat 1. The new pilot channel will utilize portions of these existing ditches. A newly excavated channel will connect with the existing SD 95 Lat 1 and convey inflows to the retention area to the north of 280th St at one mile east of the Roseau-Kittson County line (Section 31, June Berry Township). This new channel will cross over the county line on the interior of the retention site and continue to the southwest towards SD 50.

Outlets (See Appendix A):

Two outlet structures will be constructed to allow outflows from the impoundment. A south outlet will discharge to Lateral 1 SD 95 (South Branch Two Rivers) and will consist of a 6'x6' concrete box and a 12' x 28' concrete drop inlet. A west outlet will discharge to State Ditch 50 (Middle Branch Two Rivers) and will consist of a 4' reinforced concrete pipe with an 8' x 13.5' concrete drop inlet. An earthen emergency spillway will also be constructed for each outlet structure.

Design of the impoundment outlets references commonly used hydraulic and hydrologic models. The TR-60 model was used for sizing the gates, conduits, drop inlets, and emergency spillways. The HEC-HMS and EPA-SWMM models were primarily used to complete these calculations and test the sensitivity of each component. Additional detail on the outlet structure is included in the Operating Plan.

Timing & Duration of Construction:

Construction activity for each phase is expected to occur over a 2 year period. Additional construction seasons may be necessary depending on weather conditions and other factors. The project can be constructed in 1, 2, or 3 phases, each phase building upon the prior phase. Exact timing will depend on the permit review and approval process and also on the procurement of funding. The following timeline is anticipated.

Phase 1: Construct inlet, inlet gates, and dikes to elevation 1016.5 to store 16,500 acre feet; provide aquatic habitat, fen protection and improve water quality.
Timing - 2023 to 2025

Phase 2: Raise dikes to elevation 1018 to store 26,759 acre feet; provide additional fen protection and water quality benefits.
Timing - 2026-2027 or earlier if funded

Phase 3: Raise dikes to elevation 1019.5 to store 37,250 acre feet; provide additional fen protection and water quality benefits.
Timing - 2028-2029 or earlier if funded

SEE APPENDIX A for typical drawings of each of the above components.

Operation:

A draft operating plan has been prepared by the TRWD with substantial input from the MN Department of Natural Resources and the MN Pollution Control Agency. The following information is taken from the current draft (#3) of the operating plan. It is anticipated that this draft #3 will be further discussed and altered before a final draft is approved by the TRWD Board of Managers.

The goal of the operating plan is to manage the KCWRP to reduce local and regional flood damages, improve water quality, and enhance wildlife habitat. This will result in lower peak flows and shorter durations of uncontrolled flooding on the surrounding lands and downstream of the Project, promote sedimentation upstream and reduce erosion downstream, and mimic a more natural flow regime by extending flows over a longer period of time. The operating plan provides a general description of how to maximize flood control, improve habitat, and provide water quality benefits and identifies trigger points at which to operate the control gates to allow flows into and out of the Project.

The Project will generally be a dry impoundment, with the outlet gates set in an open position. During flood events the Project will collect and store runoff and provide gated flood control that can be released from the impoundment through outlets to either the Middle Branch or the South Branch of the Two Rivers. Operation of the Project will vary depending on the estimated size of the upcoming storm event. For smaller events (2- to 10-year floods), where the local agricultural drainage is functioning and downstream flood damage reduction (FDR) triggers are not predicted, the operation of the project will be subject to seasonal natural resource enhancement (NRE) operating goals. The purpose of operation during smaller events is intended to keep local agriculture drainage functioning. During larger events, (i.e., greater than a 10-year flood) by managing outflow from the impoundment, the frequency and severity of downstream flooding will be reduced.

With all control gates closed, all upstream inflows will be stored by the Project until the pool elevation reaches automatic outflow elevations. The first automatic outflows will occur at the top of concrete drop inlets, and finally if inflows continue, they will automatically access the emergency spillways. The design goal is to provide principal outlet (gated) control for the 50-year, 24-hour rainfall event, to pass the 100-year, 10-day rainfall event without overtopping the emergency spillways, and to provide emergency spillway capacity for inflows in accordance with dam safety requirements and the probable maximum precipitation.

The Project will store up to 35,250 acre-feet of flood water (see table 1). By following this operating plan, the gated storage will reduce the amount and duration of flooding on the SD 50, 72, and 95 systems and reduce the peak flows and volumes in State Ditch 95 Lateral 1, the Middle Branch and the South Branch of Two Rivers, and the Red River of the North. It is estimated that the Project will result in a peak flow reduction of 10% and a volume reduction of 15% in South Branch of Two Rivers above the Red River during a 100-year flood event.

Table 1. KCWRP #11 Stage-Storage

Elevation (feet NAVD88)	Volume (acre-feet)
1,009.0	32
1,009.5	56
1,010.0	111

	1,010.5	313
Natural Ground	**1,011.0**	**700**
	1,011.5	1,800
	1,012.0	3,750
	1,012.5	6,500
	1,013.0	9,700
	1,013.5	13,000
Phase 1 Full Pool	**1,014.0**	**16,500**
	1,014.5	20,000
	1,015.0	23,400
Phase 2 Full Pool	**1,015.5**	**26,750**
	1,016.0	30,250
	1,016.5	33,700
	1,017.0	35,250

Spring Goals

During spring spawning season until the spawn is over, water levels at or above bankfull are very beneficial. Fish will spawn in backwater areas if water levels are high enough. Then, when the young fish have reached life stages where they should migrate to the main channel, the water levels play a critical role. If flows recede significantly during spawning or immediately post-spawn, the backwater areas become disconnected and can strand fish. Ideally, the water levels would stay at or above bankfull until all the fish have reached the main channel.

The spring snowmelt can be estimated from snowpack conditions before spring. If a below-average runoff is expected based on snow-water content measurements, then NRE operations will be considered by the TRWD. If average or above-average runoff is expected, the TRWD will monitor gages and predicted crests in order to choose the best time to **close** the outlet gates and reduce downstream peak flows. Normal gate position will be **open** in spring. The spring goals and NRE targets are very similar to the non-growing and growing season FDR goals. When flows are low in the downstream channels, then gates should be left **open** to allow flow through the Project. The MN DNR gage at Hallock is bankfull at 802.0 feet (assumed Minnesota DNR zero datum Subtract 0.152 ft to get NGVD29 or add 0.864 ft to get NAVD88). This is the same as the Flood Warning Stage for Minor flooding. The NRE trigger for spring spawning will consider this as the target for bankfull flows. The NRE operation should consider augmenting the flows when the Hallock gage is predicted to fall below 802.0. When flows reach 802 at Hallock, the gates should be **closed** until the levels are stable and then **opened** as the levels start to drop. In other words, the spring NRE goals can be met through normal FDR operations, which will reduce peak flows downstream and release impounded water as soon as possible to prepare for follow on events.

Summer Goals

In summer, the NRE goals of the Project will be to add flow to the South and Middle Branches of Two Rivers. The Project will retain up to 10% of full capacity in summer, so that additional flow can be released at critical times. In general, fish are able to pass freely through the systems as long as flows do not drop into the lowest flow regimes (Table 2). The summer goal for South Branch is to maintain flows at or above 20 cubic feet per second (cfs), setting the SW Outlet gate in an **open** position when flows and precipitation typically drop in summer. The summer goal for the Middle Branch is to maintain flows at or above 10 cfs, setting the W Outlet gate in an open position when flows and precipitation become low. These augmented flows will continue as long as possible, and TRWD can transition to winter FDR operations (complete drawdown) when the summer season is over. A USGS gage in Lake Bronson provides discharges for South Branch Two Rivers and USGS rating curves will be used to determine gate openings and discharges. The Middle Branch does not have any online gage information, so the TRWD will measure flows at their staff gage Thompson 4.

Table 2. April 1 through October 31 Flow regimes based on the HSPF model using data from 1996-2009.

Flow Regime	South Branch Median Flow (cfs) [a]	Middle Branch Median Flow (cfs) [b]
0%-10% (very high)	1490.7	153.8
10%-40% (high)	324.4	29.5
40%-60% (mid)	98.5	8.7
60%-90% (low)	32.2	2.4
90%-100% (very low)	6.40	0.29

Fall & Winter Goals

Fish movement during the fall and winter months is less than the other seasons. Therefore, a flow that is close to baseflow conditions would provide the most beneficial flow regime. If any drawdowns are occurring in fall or winter, this baseflow will be met or exceeded in South Branch. This also aligns well with FDR operations. Once a drawdown is completed, the impoundment outlet gates will be left in an **open** position and flows will pass freely through. The minimum flow regime in South Branch of 6 cfs will be a target point to release flows from the impoundment or leave gates open for flow-through to occur. The Middle Branch has a lowest flow of less than 1cfs and will be a trigger to release flow through the West Outlet. Table 3 summarizes target flows for the South and Middle Branches Two Rivers for various seasons.

Table 3. NRE Operation Targets

Season	Stream	Gage Location	Target
Spring (spawning)	South & Middle Branch Two Rivers (Confluence)	Two Rivers @ Hallock	802 ft (Bankfull Stage & Minor Flooding)
Summer	South Branch Two Rivers	Two Rivers @ Lake Bronson	20 cfs
	Middle Branch Two Rivers	Thompson 4	10 cfs
Fall/Winter	South Branch Two Rivers	Two Rivers @ Lake Bronson	6 cfs
	Middle Branch Two Rivers	Thompson 4	1 cfs

a. *Project magnitude*:

Table 4 summarizes acres in the project area and length of dikes and ditches that will be constructed.

Table 4. Project Data

Total Project Acreage	7,843 acres (12.25 square miles)
Linear project length (including inlet channels and impoundment area)	25 miles
Number and type of residential units	N/A
Commercial building area (in square feet)	N/A
Industrial building area (in square feet)	N/A
Institutional building area (in square feet)	N/A
Other uses – specify (in square feet)	N/A
Structure height(s)	N/A

d. *Explain the project purpose; if the project will be carried out by a governmental unit, explain the need for the project and identify its beneficiaries*.

Purpose:
The purpose of the project is to reduce flooding along the State Ditch 72 and the State Ditch 95 systems, and also to contribute to the regional goal of 20% flood flow reduction on the Red River of the North, which will address the severe and repeated damage that currently occurs to public infrastructure, private property, and agricultural lands.

The project will store up to 35,250 acre feet of floodwater. This will achieve the flow reduction goals for the Two Rivers contribution to the Red River as identified by the regional 20% flow reduction strategy in the Red River Basin Commission's "Long Term Flood Solutions" 2011 report to the MN Legislature. The flood pool will be released over time according to a detailed operating plan to provide flow augmentation to benefit fish and macroinvertebrates on the Middle and South Branches of the Two Rivers. The project will also protect and enhance a naturally occurring prairie rich fen. Finally, according to modelling done by the MN Pollution Control Agency, the project will provide significant water quality benefits to Lake Bronson, the Middle Branch Two Rivers, and the South Branch Two Rivers.

The project will 1) reduce flooding from a 181 square mile upstream drainage area and provide an adequate outlet for the State Ditch #95 system, 2) accept and store a portion of overflow flooding arising from the Roseau River and the State Ditch #72 system, 3) reduce extreme high flows on the Two Rivers and increase low flows to provide better fish/macroinvertebrate habitat, 4) protect and enhance portions of the Beaches Lake Area prairie rich fen, 5) provide water quality benefits by reducing in stream erosion and nutrient loading and increasing dissolved oxygen levels in the Two Rivers, 6) reduce duration and frequency of algal blooms at Lake Bronson by providing low flow augmentation.

Figure 5 depicts results of computer modelling to determine pre and post project flooded areas for a 5 year, 10 year, 25 year and 50 year runoff events. Tables are included listing the flooded acres and the anticipated changes that will occur as a result of the impoundment operation during runoff events. Six areas of interest are shown and the results for each. For areas of intact high quality fen, the results show that 508 less acres will be flooded for a 5 year event, 531 acres for a 10 year event, 969 acres for a 25 year event, and 1,278 acres for a 50 year event.

Need: The need for the project is significant in that these damages are occurring on a frequent basis. The original Lateral 1 State Ditch 95 channel was constructed in the mid 1940's and diverted both Badger and Skunk Creek away from the Roseau River and into the Two Rivers. The drainage area is disproportionate to the channel size and the ditch capacity, therefore water breaks out of the ditch channel, causing frequent large scale overland flooding in the local area. An estimated 25,617 acres of cropland in the project area experience flooding during runoff events smaller than a 10-year event. Maintenance costs for stream bank and adjacent public infrastructure repair and removing deposited sediment are becoming excessive.

From 1993 to 2022, fourteen Federal and/or State Disaster declarations have been made in Kittson County. Therefore, a large flood has occurred in 48% of the years in that time period. Smaller floods of lesser magnitude have occurred in other years which would have triggered operation of the impoundment. When operation is triggered flooding typically lasts for a period of 3 to 4 weeks and drawdown of the impoundment would typically take another 3 to 4 weeks after flooding has subsided, barring any follow on rain or runoff events. Although the impoundment will not be needed in every year, and thus the flood control benefits of operation will not occur every year, there generally will be benefits achieved in the majority of years. These runoff events have caused extreme and repetitive damage to roads, bridges, ditches and other public infrastructure, farmsteads, and agricultural lands, resulting in millions of dollars of public money expended on repairs and crop damages. Numerous plans have been written with action items to address flooding, including the *Overall Plan of the Two Rivers Watershed District* and the Red River Basin Commission's *Long Term Flood Solutions* report to the MN and ND Legislatures in 2011.

There is also a need to reduce transport of suspended sediments and nutrients to help alleviate downstream water quality issues that have been documented by the MN Pollution Control Agency's *Watershed Restoration and Protection Strategy* for the Two Rivers. The storage features of this project will address this need. Within and downstream of the Big Swamp area located in the vicinity of the Kittson and Roseau county line, there are turbidity, biota, and dissolved oxygen water quality impairments listed by the MN Pollution Control Agency (See Appendix B). Some sections of the Two Rivers system have low fish IBI scores, indicating that the river is not fully supporting to aquatic life due to various factors (i.e. excessive suspended sediments & nutrients, insufficient habitat, low dissolved oxygen, etc.). At Lake Bronson known problems include annual significant algae blooms from excess nutrients entering the lake, large amounts of sediment depositing where the mouth of Two Rivers enters the lake, and extreme low flows during the summer months.

Improvement of potential habitat downstream and adjacent to lateral 1 of State Ditch 95 is also needed. Very high peak flows from spring snowmelt and summer rainfall events coupled with extended periods of low flow during late summer and early fall contribute to accelerated bank and channel erosion, turbidity and impacts to aquatic communities. This proposed project will allow for management of flow conditions that will benefit downstream habitat by providing flow at critical times of the year.

A prairie rich fen is located on lands adjacent to the impoundment. Over the course of a year, the DNR and the TRWD met and jointly wrote the "*Beaches Lake Area Fen Management Plan*". Extensive pre project groundwater and surface water monitoring, vegetation monitoring, and flow monitoring have been done. The plan identifies strategies to protect, enhance, restore, and otherwise perform activities that will benefit fen habitat within and nearby the project footprint. As the project proceeds, certain items from the fen plan will be incorporated into the project as jointly identified by the DNR and TRWD (Appendix B).

e. *Are future stages of this development including development on any other property planned or likely to happen?* **No**
If yes, briefly describe future stages, relationship to present project, timeline and plans for environmental review.

f. *Is this project a subsequent stage of an earlier project*? **No**
If yes, briefly describe the past development, timeline and any past environmental review.

7. Cover types: *Estimate the acreage of the site with each of the following cover types before and after development:*

Table 5 below indicates the areas (in acres) that will be disturbed by construction of the project, including the location of inlets, outlets, dikes, and structures.

Cover Type	Before	After
Wetlands	6770.97	6612.5
Deep Water/Streams	0	0
Wooded Forest	0.67	0
Brush/Grassland	12.2	166.67
Cropland	121.18	66.43
Lawn/Landscaping	0	0
Impervious Surface	0	0
Stormwater Pond	0	0
Ditch	0	59.42
Totals	6905.02	6905.02

8. Permits and approvals required: *List all known local, state and federal permits, approvals, certifications and financial assistance for the project. Include modifications of any existing permits, governmental review of plans and all direct and indirect forms of public financial assistance including bond guarantees, Tax Increment Financing and infrastructure. All of these final decisions are prohibited until all appropriate environmental review has been completed. See Minnesota Rules, Chapter 4410.3100.*

Funding

Unit of government	Type of application	Status
Two Rivers Watershed District	103D, 103E	approved
Red River Watershed Management Board	Implementation Funding	approved
Flood Damage Reduction Work Group	Project Development Funding	approved
Lessard Sams Outdoor Heritage Council	Implementation Funding	Pending
MN DNR Flood Hazard Mitigation Grant Program	Implementation Funding	Pending
MN DNR	Land Exchange	Pending
Natural Resources Conservation Service	Planning Assistance	Completed

Table 6 Permits and Status

Two Rivers Watershed District
Klondike Clean Water Retention Project #11

Permits Required

Required Permit	Jurisdiction	Governing Agency	Requirements	Location	Status	Est. Completion
Environmental Assessment Worksheet (EAW)	State of MN	Environmental Quality Board RGU – Two Rivers WD	Prepare & Submit worksheet	Project Footprint & Affected Surrounding Area	Submittal Pending	2023
National Environmental Protection Act (NEPA) (If Necessary)	Federal	USCOE;	Assess Environmental Impacts on a Federal Level	Project Footprint & Affected Surrounding Area	Preliminary info prepared RCPP - EA	N/A
Federal 404 Wetland 401 Water Quality Cert.	Federal State	USACE MPCA	No Net Loss of Wetlands	See Wetland Delineation Report	Application Submitted Concurrence Pt #2 approved	2023
Wetland Conservation Act (WCA)	State of MN	BWSR - SWCD	No Net Loss of Wetlands	See Wetland Delineation Report	Application Submitted	2023
State Historic Preservation Office [See Appendix C]	State of MN	SHPO	Review cultural resources	Project Footprint & Affected Surrounding Area	Review Completed – Letter Received	2022
Public Waters - Protected Waters	State of MN	DNR	No Net Loss of Wetlands	See Wetland Delineation Report	Application Pending On Hold until EAW completed	2023
103E - Drainage Law - Permission reroute / impound	Ditch Authority	Kittson & Roseau Counties	Submit plans to 103E drainage authority	SD 50; SD 72; SD 95	Applications Submitted	2023
Permit to alter existing roads	Road Authority	Kittson & Roseau Counties Several Townships	Submit plans to road authority	Klondike Twp, Juneberrry Twp Polonia Twp, Barto	Barto, Polonia & Klondike - Approved Juneberry - Pending	2023

				Twp, Soler		
Dam Safety Permit	State of MN	DNR	Address loss of life and property	outlet structures	Not Applied Yet	2023
Nat. Pollutant Discharge Elimination System (NPDES)	State of MN	MPCA	Erosion Control Plans during Construction	Project Footprint & Affected Surrounding Area	Not Applied Yet	2023

Cumulative potential effects may be considered and addressed in response to individual EAW Item Nos. 9-18, or the RGU can address all cumulative potential effects in response to EAW Item No. 19. If addressing cumulative effect under individual items, make sure to include information requested in EAW Item No. 19

9. Land use:

a. *Describe*:

i. Existing land use of the site as well as areas adjacent to and near the site, including parks, trails, prime or unique farmlands.

Tables 7 & 8 describe the current land use within the KCWRP area is primarily agricultural and recreational. Most of the land within the proposed impoundment is or was enrolled in the Conservation Reserve Program. Land that makes up the proposed diked inlet is currently agricultural land farmed mostly for small grains, beans, sunflowers and corn. The adjacent State Wildlife Management Area is used for public recreation. TRWD land is also open for public recreation and utilizes the same rules as WMA's.

Category	Acreage	Percentage
Corn	10.7	0.1419%
Soybeans	159.5	2.1147%
Sunflowers	0.2	0.0027%
Barley	0.4	0.0053%
Spring Wheat	66.5	0.8817%
Oats	0.2	0.0027%
Canola	1.6	0.0212%
Alfalfa	3.6	0.0477%
Other Hay/Non Alfalfa	9.3	0.1233%
Sod/Grass Seed	2.9	0.0384%
Open Water	12	0.1591%
Developed/Open Space	210.6	2.7922%
Developed/Low Intensity	50.3	0.6669%
Developed/Medium Intensity	15.1	0.2002%
Developed/High Intensity	7.8	0.1034%
Deciduous Forest	95	1.2595%
Grass/Pasture	318.2	4.2188%
Woody Wetlands	99.9	1.3245%
Herbaceous Wetlands	6478.6	85.8957%

Table 7: United States Department of Agriculture (2019) National Agricultural Statistics Service – Cropscape, Cropland Data Layer. https://nassgeodata.gmu.edu/CropScape/

Table 8 prime farmland

Classification	Acres	Percentage of Acres
All areas are prime farmland	0	0%
Farmland of statewide importance	58.7	0.8%
Not prime farmland	7,331.9	97%
Prime farmland if drained	142.9	2%

ii. *Plans. Describe planned land use as identified in comprehensive plan (if available) and any other applicable plan for land use, water, or resources management by a local, regional, state, or federal agency.*

Klondike Clean Water Retention Project – NRE Objectives (2020) - Big Swamp Project Work Team – NRE Subcommittee - See Appendix B
This project team was comprised of staff consisting of 4-5 DNR (wildlife, fisheries, ecological & water resources), 1 MPCA, 1 USACE, 1 The Nature Conservancy, 2 BWSR, and 3 Two Rivers Watershed District. The document followed the Red River Basin Flood Damage Reduction Work Group's Technical Paper #14 (https://mfiles.wildricewatershed.org/mfiles_rrwmb/#CC774983-AC09-4666-81D9-8B8AAA310342/views/V102/L29) to look at specific improvements that implementation of the project could make to natural resources. These objectives focused in on 1) habitat improvement for fish and aquatic organisms, 2) water quality, and 3) protection, enhancement, and restoration of a prairie rich fen.

Overall Plan of the Two Rivers Watershed District (2004) – Two Rivers Watershed District
http://www.tworiverswd.com/overall_plan.html
This plan, required under MN Statute 103D, pertains to water management initiatives within the watershed district. The plan focuses on several sub-watersheds within the District and goals and objectives are listed for the State Ditch 95, Middle Branch, and South Branch sub-watersheds. These include:

1. Flood Damage Reduction Alternatives – these include flood water detention, flood water retention, ring dikes, culvert sizing, watershed treatment, wetland restoration, floodways, and floodplain management.
2. Natural Resources Enhancement Alternatives – these include buffer strips, best management practices, wetland restoration, preservation of remnant natural areas, stream restoration, improvement of water quality and aquatic habitat, and advocate stable wildlife populations.

Two Rivers Plus Comprehensive Management Plan (2021) – Kittson & Roseau SWCD's & Kittson & Roseau Counties https://www.tworiversplus1w1p.org/_files/ugd/bb5956_9f076675d16e41a196994c4c76463ad4.pdf
The plan was written relative to Minnesota's 'one watershed one plan' initiative. It looks at water quality enhancements, projects, and management opportunities to improve water quantity and quality. The plan names the Klondike Clean Water Retention Project as a preferred capital improvement project.

Long Term Flood Solutions (2011) – Red River Basin Commission report to MN & ND Legislatures
https://drive.google.com/drive/folders/0B776EVHLD2yGaFdPZkxBQVFQRTg?resourcekey=0-GgFPWywQS8RT37yU6F32jA
Over a 2 year period the RRBC convened a working group to look at flooding and flood solutions within the Red River valley. It discusses the history of flooding, summarizes costs of flooding in rural and urban areas, presents basin wide flood solutions, provides technical analysis of hydraulic and hydrologic conditions, and lists strategies to reduce flooding.

Two Rivers Watershed Restoration and Protection Strategies (WRAPS) (2019) – MN Pollution Control Agency
https://www.pca.state.mn.us/sites/default/files/wq-ws4-57a.pdf

MPCA performed intense monitoring of water quality, fish and macroinvertebrates over a 2 year period. They looked a prior data as well, held several meetings, identified stressors that negatively affect the watershed, and provided several suggestions for strategies to protect-improve-enhance aquatic ecosystems.

Beaches Lake Area Fen Management Plan (2017) – MN DNR & Two Rivers Watershed District
Available upon request -
This plan was written jointly by the MN DNR and the Two Rivers Watershed District to identify ways to restore, protect, and enhance the large naturally occurring prairie rich fen located adjacent to the project area. It identifies specific opportunities for this project and projects of other agencies and organizations to improve conditions within the fen.

Minnesota Prairie Conservation Plan (2018) – MN DNR et. al.
https://www.dnr.state.mn.us/prairieplan/index.html
The *Prairie Conservation Plan* was developed as a 25-year plan to conserve, enhance and restore the Prairie Region of Minnesota. The Prairie Region is primarily the west and southwest portions of Minnesota and is broken up into the "Prairie" zone and the "Forest/Prairie Transition" zone. The *Prairie Conservation Plan* describes four approaches to prairie conservation including 1) protection, 2) enhancement, 3) connection of habitat corridors, and 4) maintain grassland/wetland

iii. *Zoning, including special districts or overlays such as shoreland, floodplain, wild and scenic rivers, critical area, agricultural preserves, etc*.

The land within the project is classified as rural agricultural non-homestead land. There are no known wild and scenic rivers, critical areas, agricultural preserves, special districts, or other ordinances.

Roseau County administers a floodplain ordinance and a shoreland ordinance.
The impoundment proposal would be classified as a conditional use within a floodway district.

Kittson County administers a zoning ordinance and a floodplain ordinance.
The impoundment proposal within Kittson County does not lie within a designated floodplain.

b. *Discuss the project's compatibility with nearby land uses, zoning, and plans listed in Item 9a above, concentrating on implications for environmental effects*.

The proposed project is compatible with land uses, zoning, and other plans relevant to this area and listed in question 9a. This project has been designed to help relieve upstream and downstream flooding of the landscape, including private and public land, agricultural lands, residences, and public infrastructure. Another aspect of the project is to provide an adequate outlet to store excessive flows on State Ditches 72 and 95. Along with flood reduction the KCWRP has also been designed to help enhance and maintain the environment around it with initiatives to improve, protect, and enhance water quality, fish habitat, and the prairie rich fen.

The project will be compatible with agricultural land uses by reducing flooding and improving drainage capabilities. It will be compatible with wildlife management areas by reducing flooding, enhancing habitat, and improving water quality. It is anticipated that the project features will accomplish a net environmental benefit.

c. *Identify measures incorporated into the proposed project to mitigate any potential incompatibility as discussed in Item 9b above*.

The KCWRP team has met with all affected parties. A "Project Team" was convened and consisted of area farmers/landowners, local officials, state and federal government agencies and non government organizations. Input gathered was used to design the most balanced solution that helps mitigate the flooding problem while also providing net natural resources benefits.

Appendix D describes design options that were considered at one time during the planning process however were dismissed. These options were abandoned for other preferred alternatives that were deemed to avoid, minimize or otherwise reduce potential negative impacts. In short, plans for six

miles of diversion channel were abandoned to avoid wetland and habitat impacts, dike location and footprints were altered to avoid wetland impacts, and one gated outlet structure was abandoned to avoid habitat and wetland impacts.

Required mitigation is necessary to replace wetland impacted by construction of the embankment and associated project components. The proposed mitigation site is to restore over 400 acres of drained prairie rich fen from its previous prior converted farmland status.

Appendix B describes natural resources enhancements that are planned to improve existing conditions regarding water quality and habitat. Currently over 65 miles of river channel on the South Branch Two Rivers and Middle Branch Two Rivers will dry up during a normal to dry summer. Long periods of no flow or interstitial flow can occur which puts stress on aquatic fish and macroinvertebrates. Downstream reaches of the Two Rivers are currently impaired for biota. This project is planned to store water from spring runoff, hold it until dry conditions arise, and release it to alleviate stress on aquatic life.

A large wetland complex consisting of 1,500 acres has been restored to wetland status from prior converted farmland status. This site is adjacent to and east of the proposed impoundment. In addition, the proposed project is designed to reduce flooding. This pertains to flood water that currently inundates a naturally occurring prairie rich fen. The project will eliminate flooding on over 1000 acres of high quality fen and reduce flooding on several hundred more acres of fen.

Water quality benefits are also anticipated. The MN Pollution Control Agency has performed intensive monitoring and written a 'Watershed Restoration and Protection Plan' for the Two Rivers. This plan identifies impairments and stressors that contribute to the impairments. Strategies to improve water quality include utilizing impoundments to store water to reduce sediment, nitrogen, and phosphorous loading. A total of 111 river miles will potentially benefit from improved water quality.

10. Geology, soils and topography/land forms:

a. <u>Geology</u> - *Describe the geology underlying the project area and identify and map any susceptible geologic features such as sinkholes, shallow limestone formations, unconfined/shallow aquifers, or karst conditions. Discuss any limitations of these features for the project and any effects the project could have on these features. Identify any project designs or mitigation measures to address effects to geologic features*.

The area is generally classified as till, which is a heterogeneous mixture of ice deposited clay, silt, sand, and gravel. It is largely calcareous sandy clay containing scattered pebbles and cobbles. The upper 5 to 15 feet of till is commonly oxidized to a buff-tan color and is more permeable than the underlying unweathered gray till. Lenses of sand occur throughout the till. Thin, discontinuous deposits of clay, silt, sand, and peat overlie the till at numerous localities. The till section of the ground water reservoir is essentially saturated; however, locally dry zones can be found below the water table in areas of unusually well compacted till. Till aquifers are confined except for the shallow, permeable, oxidized zone.

b. <u>Soils and topography</u> - *Describe the soils on the site, giving NRCS (SCS) classifications and descriptions, including limitations of soils. Describe topography, any special site conditions relating to erosion potential, soil stability or other soils limitations, such as steep slopes, highly permeable soils. Provide estimated volume and acreage of soil excavation and/or grading. Discuss impacts from project activities (distinguish between construction and operational activities) related to soils and topography. Identify measures during and after project construction to address soil limitations including stabilization, soil corrections or other measures. Erosion/sedimentation control related to stormwater runoff should be addressed in response to Item 11.b.ii*.

Soil types in the area are peat, which is generally less than 5 feet thick, underlain by clayey till. The peat is poorly drained and the water table is at or near the surface. This is consistent with the area known as Northern Minnesota Wetlands. A soils map is provided in figure 6 of this document.

Table 9 - Soil Textures.

Texture	Acres
Clay	12.7
Clay Loam	41.8
Fine Sandy Loam	158.7
Loam	200.7
Loamy Fine Sand	187.4
Muck	6,888.3
Mucky Loam	40.8
Water	3.1

NOTE: For silica sand projects, the EAW must include a hydrogeologic investigation assessing the potential groundwater and surface water effects and geologic conditions that could create an increased risk of potentially significant effects on groundwater and surface water. Descriptions of water resources and potential effects from the project in EAW Item 11 must be consistent with the geology, soils and topography/land forms and potential effects described in EAW Item 10.

11. Water Resources

a. Describe surface water and groundwater features on or near the site in a.i. and a.ii. below.

i. *Surface water - lakes, streams, wetlands, intermittent channels, and county/judicial ditches. Include any special designations such as public waters, trout stream/lake, wildlife lakes, migratory waterfowl feeding/resting lake, and outstanding resource value water. Include water quality impairments or special designations listed on the current MPCA 303d Impaired Waters List that are within 1 mile of the project. Include DNR Public Inventory number(s), if any.*

Ditches - In the proposed project area, there are three legal ditch systems and several wetlands. The three legal ditch systems are State Ditch 50, State Ditch 72, and State Ditch 95. See Figure 3.

State Ditch 50: This ditch begins on the Kittson – Roseau County boundary and travels westerly approximately 4.5 miles, ending in in the Middle Branch Two Rivers. It has a variable grade between .02% and .05%. A water control structure is located at the west end of this ditch which is operated by the MN DNR and created a pool known as Beaches lake. State Ditch #50 is under the jurisdiction of the Two Rivers Watershed District. The first 3 miles of the ditch will be within the proposed impoundment. A gated outlets structure will be constructed to impound water on the upper 3 miles of this ditch. The alterations to the ditch resulting from the impoundment construction will follow procedures required by MN Statute 103E.

State Ditch 72: The main ditch of State Ditch #72 is located 3 miles north of the project. It is approximately 15 miles long and outlets into State Ditch 85, which in turn outlets into the North Branch Two Rivers. There are 14 laterals of SD 72, located both south and north of the main ditch. Currently during large floods, overflows from the Roseau River enter state ditch 72 and it becomes inundated. During large flood events, water currently overflows to the south from state ditch #72 via laterals #6 and #8 of State Ditch 72. Some of this water enters the State Ditch #95 system through these laterals, but most flows in a westerly direction overland and into Kittson County. As a part of the proposed impoundment, structures will be constructed to allow overflow water to more efficiently flow into the impoundment. The alterations to the ditches resulting from the impoundment construction will follow procedures required by MN Statute 103E.

State Ditch 95: SD 95 consists of a main ditch and numerous laterals and branches. Lateral 1 of State Ditch 95 was constructed in the mid 1940's and diverted Badger Creek from its original outlet to the Roseau River and into the Two Rivers system. The ditch has limited capacity and frequently water breaks out of the ditch and flows

overland, inundating ag land, overtopping public roads, and causing severe erosion and sedimentation. 15 miles of Lateral 1 of State Ditch 95 will be affected by the project. Water from this lateral will be diverted into a diked impoundment to reduce the severity and duration of flooding. The alterations to the ditch resulting from the impoundment construction will follow procedures required by MN Statute 103E.

Wetlands – A large wetland complex known as the "Beaches Lake Area Prairie Rich Fen" is located on 18,000 acres adjacent to the project location. This prairie rich fen is one of the largest intact of its kind and has rare and unique features (See question 13 below for more detailed information regarding this fen). The MN DNR and the Two Rivers Watershed District jointly wrote a fen management plan with input from the MN Pollution Control Agency, Board of Water & Soil Resources, The Nature Conservancy, and the US Army Corps of Engineers. Appendix B discusses several objectives from the Fen Plan that can be implemented to protect, improve and enhance the fen.

DNR Public Waters Inventory – There are no DNR public waters within the proposed project corridor. There is one DNR public wetland (126W) lying adjacent to the diked inlet and two DNR public water basins (21P; 37P) lying within one mile of the project.

MPCA 303d Impaired Waters – There are two water quality impairments identified along, adjacent to, or within one mile of the project area. AUID 09020312-539 is along a 12 mile segment of Lateral 1, State Ditch #95. AUID 09020312-521 is a one mile segment of Lateral 1, State Ditch #95. Details of these impairments are listed below. Several impairments exist downstream from the project on the North, Middle and South Branches of the Two Rivers, however they are more than one mile away. The project is anticipated to have positive effects on these watercourses.

Impaired stream: Lateral Ditch 1 of State Ditch 95
AUID: 09020312-539
Reach description: Unnamed ditch to State Ditch 50
Use class: 2Bm
Impaired use: AQL
New impairments: None
TMDL approved for: None
TMDL not required for: None
Additional impairments: FishesBio; InvertBio

Impaired stream: Lateral Ditch 1 of State Ditch 95
AUID: 09020312-521
Reach description: Unnamed ditch to State Ditch 95
Use class: 2Bg
Impaired use: AQL
New impairments: None
TMDL approved for: None
TMDL not required for: None
Additional impairments: FishesBio; InvertBio

ii. *Groundwater – aquifers, springs, seeps. Include: 1) depth to groundwater; 2) if project is within a MDH wellhead protection area; 3) identification of any onsite and/or nearby wells, including unique numbers and well logs if available. If there are no wells known on site or nearby, explain the methodology used to determine this.*

The depth of groundwater at the proposed project site is at or near the surface most years due to the peat substrate. The proposed project is not within a MDH wellhead protection area. According to the MDH well index in or within one mile of the proposed project there are three domestic wells (well IDs 220277, 147731, and 215164), two sealed

wells (IDs 20459 and 20464), nine monitor wells (IDs 278160, 278159, 278161, 278157, 278155, 278153, 278154, 278156, and 278163), and one other well (ID 278158).

Unique Well ID	Depth (ft)
220277	145
147731	95
215164	123
20459	596
20464	544
278160	3.43
278159	2.78
278161	5.8
278157	5.51
278155	4.79
278153	2.62
278154	2.9
278156	3.23
278163	3.31
278158	5.72

Table 10 : Wells adjacent to or within the Project Corridor. All well logs are available through the Minnesota Well Index.

b. Describe effects from project activities on water resources and measures to minimize or mitigate the effects in Item b.i. through Item b.iv. below.

i. Wastewater - For each of the following, describe the sources, quantities and composition of all sanitary, municipal/domestic and industrial wastewater produced or treated at the site.

Construction related to the project will not produce or treat any sanitary, municipal/domestic, or industrial wastewater.

1) If the wastewater discharge is to a publicly owned treatment facility, identify any pretreatment measures and the ability of the facility to handle the added water and waste loadings, including any effects on, or required expansion of, municipal wastewater infrastructure.

Not applicable.

2) If the wastewater discharge is to a subsurface sewage treatment systems (SSTS), describe the system used, the design flow, and suitability of site conditions for such a system.

Not applicable.

3) If the wastewater discharge is to surface water, identify the wastewater treatment methods and identify discharge points and proposed effluent limitations to mitigate impacts. Discuss any effects to surface or groundwater from wastewater discharges.

Not applicable.

ii. *Stormwater - Describe the quantity and quality of stormwater runoff at the site prior to and post construction. Include the routes and receiving water bodies for runoff from the site (major downstream water bodies as well as the immediate receiving waters). Discuss any environmental effects from stormwater discharges. Describe stormwater pollution prevention plans including temporary and permanent runoff controls and potential BMP site locations to manage or treat stormwater runoff. Identify specific erosion*

control, sedimentation control or stabilization measures to address soil limitations during and after project construction.

The project construction site is located immediately adjacent to Lateral 1 of State Ditch #95. Water from the site can outlet either to 1) Lateral 1 State Ditch #95, then to the South Branch Two Rivers, or to 2) State Ditch #50, then to the Middle Branch Two Rivers. Both of these routes are eventually tributary to the Red River of the North. Runoff enters these ditches from the adjacent landscape via private ditches, open cuts and side water culvert inlets or via overland flow. Water quality data show varying amounts of sediment and turbidity depending on the time of year and the amount of vegetation present on the adjacent landscape. Runoff from grasslands and wetlands generally holds little to no sediment.

Stormwater from upstream areas currently can enter the site mainly during times when there is large overland flooding events. Stormwater from upstream areas during times when there is no overland flooding occurring generally does not enter the site and is carried within Lateral 1 SD #95. After the project is completed, stormwater from upstream areas will be diverted into the impoundment and held there. This will allow sediment carried with the floodwater to drop out and be stored on site. The impoundment is expected to reduce downstream loading of sediment, nitrogen, and phosphorous. The fate of these nutrients in the short term will be that they will be captured on site. The long term fate of these nutrients is unknown, and will depend upon numerous variables.

During construction, contractors will implement a stormwater pollution prevention plan as mandated by MN law. This will be developed through the MPCA permitting process. Best management practices and structural measures will be implemented, including, but not limited to, silt fences, bail checks, sediment basins, erosion control blankets, silt curtains, rock check dams, and straw sediment control logs. Once construction is completed, disturbed areas will be restored using techniques such as grading to final contours, seeding, and mulching.

iii. *Water appropriation - Describe if the project proposes to appropriate surface or groundwater (including dewatering). Describe the source, quantity, duration, use and purpose of the water use and if a DNR water appropriation permit is required. Describe any well abandonment. If connecting to an existing municipal water supply, identify the wells to be used as a water source and any effects on, or required expansion of, municipal water infrastructure. Discuss environmental effects from water appropriation, including an assessment of the water resources available for appropriation. Identify any measures to avoid, minimize, or mitigate environmental effects from the water appropriation*.

The project does not involve any appropriation of surface or groundwater. It is not anticipated that any dewatering will be necessary. Although water appropriation is not anticipated, the project will comply with all water appropriation requirements during construction. Dewatering would comply with the MPCA NPDES Construction Stormwater Permit and would be discharged in a manner that does not create nuisance conditions or adversely affect the receiving water or downstream properties.

iv. Surface Waters

a) Wetlands - Describe any anticipated physical effects or alterations to wetland features such as draining, filling, permanent inundation, dredging and vegetative removal. Discuss direct and indirect environmental effects from physical modification of wetlands, including the anticipated effects that any proposed wetland alterations may have to the host watershed. Identify measures to avoid (e.g., available alternatives that were considered), minimize, or mitigate environmental effects to wetlands. Discuss whether any

required compensatory wetland mitigation for unavoidable wetland impacts will occur in the same minor or major watershed and identify *those probable locations*.

Impacts to wetlands will occur as a part of the project and wetland permits are required by the US Army Corps of Engineers under section 404 of the Clean Water Act and the MN Board of Water & Soil Resources with regard to the Wetland Conservation Act. Preliminary desk top analysis as well as field work has been done. The U.S. Army Corps of Engineers has completed a jurisdictional determination and a local technical evaluation panel has been working to address impacts. A large area of degraded fen/wetland over 400 acres in size has been targeted for restoration to achieve mitigation requirements of the state and federal laws. Additional areas have been identified through the fen management plan to be considered for wetland improvements. While areas of wetland will be filled and impacted, it is noted that an overall gain in wetland area and quality will occur because of the project.

Wetland Impacts within the flood pool

The wetland complex within the impoundment area covers more than 6,700 acres. Current land cover consists mainly of grasslands and emergent wetlands. Land use within the impoundment area consists formerly farmed areas now in the Conservation Reserve Program or otherwise set aside. During flood events, this expansive wetland area is inundated and holds shallow surface water for long durations. The proposed project will increase the depth and duration of water within the impoundment area.

Surface water depths will be the deepest in the southwest portion of the impoundment, gradually decreasing in depth moving toward the northeast portion of the impoundment. The most frequently observed species within the impoundment area include *Phalaris arundinacea* (reed canary grass), *Typha X glauca* (hybrid cattail, *Salix petiolaris* (meadow willow), and *Salix Discolor* (pussy willow). After project construction, these species are anticipated to shift throughout the impoundment area due to changes in hydrology (increasing surface water depth and duration). The composition of most vegetation communities within the impoundment are not anticipated to change. However, there is approximately 210 acres of high-quality Prairie Rich Fen wetland in the south half of Section 12, Township 161N, Range 45W, along the east boundary of the impoundment area.

It is anticipated that there will be an increase in plant species which are more tolerant of the altered hydrology within the impoundment. Specifically, this will likely result in increased prevalence of P. arundinacea (reed canary grass) and T. X glauca (hybrid cattail) within the fen plant communities. Additionally, there will be a decrease in prevalence of sensitive native plant species typically found in fen wetland community within the impoundment area. Although the proposed project will increase water levels and flood duration within the impoundment area, it will also decrease the depth and duration of flooding of the rich fen complex outside of the impoundment area. Reduced overland flooding will stabilize hydrologic conditions within the surrounding fens. This would provide greater benefits to the overall rich fen complex which covers a vast area outside of the impoundment area.

Figure 5 shows modelling results for impacted areas from flooding both with and without the project for the 5 year, 10 year, 25 year and 50 year runoff events. The tables that are included show the difference in acres for each of six areas of interest. The model shows that significant changes in flooding can occur from the project. In general, it is anticipated that existing high quality fen can be protected and enhanced by reducing the amount of flooding on these fen areas and also thereby reducing the potential for invasive species to enter these high quality fen areas.

Impacts to wetland from the lateral effects of new ditches

The current landscape in and adjacent to the project area includes extensive and established drainage networks. State Ditches #50, #72, and #95 are located directly adjacent to the impoundment area and the pilot channel. There are also several laterals running perpendicular in and near the project area. The average depth is over 6 feet for the State Ditches their laterals. The new ditches associated with the proposed project are

between 3 and 6 feet deep on average. Figure 3 depicts the existing network of ditches that are present in the project area, along with their depths. Figure 4 depicts the proposed new ditches and their depths resulting from the construction of the project.

When considering the existing condition of the proposed project area, cumulative impacts from the proposed ditches will be minimal. Changes in vegetation or hydrology that could be attributed to the lateral effect of existing ditches were not observed during field analysis. This is likely due to the general size and nature of the wetland complex. The project is within a large wetland complex over 30,000 acres in size. Most of this area is organic (peat) soils. In addition, due to the relatively flat topography, during wet periods many of the ditches contain several feet of surface water hindering any lateral movement of water toward the ditch channels.

For regulatory purposes, impacts to wetlands from the proposed project can be categorized as either 1) new fill, 2) fill over existing fill, 3) borrow, 4) excavation of new ditches, or 5) excavation of existing ditches. These activities are regulated federally by the Clean Water Act through the US Army Corps of Engineers or by the state Wetland Conservation Act and/or Public Waters law through the MN Board of Water & Soil Resources and the MN Department of Natural Resources, respectively. Table 11 below summarizes the expected wetland impacts. Several studies and field work have been completed that will inform the various permit application processes. These include vegetation analysis of the prairie rich fen, a floristic quality assessment, an aquatic resources delineation report, and an offsite wetland delineation report, along with a jurisdictional determination from the US Army Corps of Engineers. The project sponsor has been meeting regularly with a Technical Evaluation Panel consisting of all permitting agencies and wetland permit applications are forthcoming.

Table 11 - Summary of project activities within wetlands determined to be jurisdictional under USACE and/or WCA

Activity Type	USACE & WCA Jurisdictional (acres)	WCA ONLY* Jurisdictional (acres)	Total Activity Area within Aquatic Resources (acres)
Borrow	48.78	54.50	103.28
New Fill	70.60	33.47	104.07
Fill over Existing Fill	57.61	4.72	62.33
Excavation - New Ditches	53.17	20.51	73.68
Excavation - Existing Ditches	45.41	2.00	47.41

***The areas shown in this column are the project activities occurring in wetlands that were determined to be non-jurisdictional by USACE but remain jurisdictional under the Wetland Conservation Act.**

A wetland mitigation site has been selected that is immediately adjacent to the project, and therefore is within the same watershed as the impacts. Wetlands previously on this site have been drained by ditching and degraded from conversion to cropland production. Restoration activities will include filling the ditches and re-establishing wetland hydrology and vegetation on the site. This mitigation plan is currently under development and will be finalized and submitted with the State and Federal wetland permit applications. As a part of the process, sequencing was done to avoid, minimize and mitigate wetland impacts. Appendix D discusses this process that was undertaken.

A goal of the project beyond flood control and beyond regulatory permitting is to provide habitat which includes protecting and enhancing the large prairie rich fen, as well as providing flow enhancement for fish and improving water quality. The fen management plan was written to help guide activities that could protect, restore, and improve wetlands in and around the project. Appendix B discusses these natural resource enhancement proposals in detail.

The project will be constructed entirely on areas of previously degraded wetland and also in upland areas. Although prime wetland fen areas exist adjacent to the property, construction of dikes, ditches, structures and other project components will be set back from property lines a distance significant enough that it will not impact wetlands on adjacent properties from drainage, soil compaction, or other hydrological and vegetative parameters.

Unique well numbers 278153, 278154, 278156, 278157, 278159, 278160, 278161, and 278163, listed in table 10, were established jointly by the MN DNR and the TRWD to monitor groundwater levels in the existing areas of prime quality fen. A Fen Management Planning team, a subcommittee of the Project Work Team described in question #6, was established to review the Beaches Lake Area Fen and write a fen management plan. Groundwater monitoring, surface water monitoring, and vegetation monitoring was completed.

The inter-agency Fen Management Planning team's evaluation and observation of groundwater levels and movements in and near the fen and proposed impoundment area were inconclusive. No directionality or movement of groundwater was measured. However, due to the extremely flat terrain, groundwater movement is presumed to be in a northwesterly direction within the peat subsurface soils. Early embankment designs included intentional sub-surface permeable foundations, to presumably maintain groundwater movement in any direction. However, these designs were tabled for more traditional earth filled embankment as there is no clay cutoff walls as part of the proposed dikes, and the design essentially still allows subsurface movement of groundwater. The Fen Management Plan participants concluded that the benefits of the Project with respect to reduced depth and duration of surface water flooding of the fen was a larger benefit to the fen than the potential for alteration of groundwater movement.

As mentioned prior, several fen protection and restoration strategies will be implemented. Groundwater, surface water, flow, and vegetation are being monitored which will provide a benchmark in the future to determine the effects on the fen.

- Currently over 1,200 acres of high quality fen is inundated with floodwaters. This is not desirable because of the potential introduction of invasive species and the alteration of fen hydrology. DNR long term studies of the fen indicate that areas of the fen are being negatively impacted by floodwaters and changes in vegetation. The proposed project is planned to prevent flooding on these acres and achieve several goals as outlined in appendix B.
- A land exchange between the Two Rivers Watershed District and MN DNR has been initiated to permanently protect over 800 acres of high and medium quality areas of the fen.

- In the planning process, a proposed section of the impoundment dike located in section 2, Klondike Township, Kittson County, was moved to avoid 160 of potential impact to existing intact fen.

By implementing the activities outlined in appendix B that are deemed practical and feasible, it is intended that the project will have a significant net natural resources gain. Direct wetland impacts have been calculated to be 391 acres. It is anticipated that compensatory mitigation will restore over 450 acres of high quality prairie rich fen. The project will additionally protect and enhance over 1,200 additional acres of existing prairie rich fen from degradation due to excessive floodwater and invasive species. By augmenting downstream flows on over 60 miles of river, aquatic habitat will be improved. Finally, computer modelling done by the MPCA estimates the project will potentially decrease sediment by 62%, phosphorous by 77%, and nitrogen by 81% at the impoundment outlet. As indicated on pages 23 and 24 in Appendix B, the MPCA expects phosphorous and nitrogen levels within and downstream of the impoundment to be improved to conditions better than existing conditions.

b) *Other surface waters- Describe any anticipated physical effects or alterations to surface water features (lakes, streams, ponds, intermittent channels, county/judicial ditches) such as draining, filling, permanent inundation, dredging, diking, stream diversion, impoundment, aquatic plant removal and riparian alteration.*

Discuss direct and indirect environmental effects from physical modification of water features. Identify measures to avoid, minimize, or mitigate environmental effects to surface water features, including in-water Best Management Practices that are proposed to avoid or minimize turbidity/sedimentation while physically altering the water features. Discuss how the project will change the number or type of watercraft on any water body, including current and projected watercraft usage.

Typical drawings of structural works are shown in Appendix A. Natural resources objectives of the project are listed in detail in Appendix B. The project will physically alter Lateral 1 State Ditch 95 for 8 miles. Dikes will be constructed on either side of the existing ditch and it will become the inlet channel for the impoundment. A new channel for Lateral 1 State Ditch 95 will be constructed on the outside of the south dike and will provide for the local drainage of agricultural land.

Except for a low flow pool that will be held until mid-summer and released to provide fish habitat, water that is diverted into the impoundment during spring runoff and severe summer rains will be held there until floodwaters have receded, and the impoundment will be drained proportionately into either Lateral 1 State Ditch 95 or into State Ditch 50. It is expected that the impoundment will be dry by late summer to early fall under normal circumstances. This operation will decrease the peak and duration of flooding and will extend in channel flows for a longer period of time. In the past 125 years, the construction of drainage ditches and roads and also land use changes have altered how flows drain from the landscape and enter streams and rivers. Environmental benefits will be achieved by establishing a more natural flow regime, addressing water quality impairments on fish and macroinvertebrates, protecting and improving an existing high quality rich fen/wetland complex, and improving upon current levels of suspended solids, dissolved oxygen, phosphorous, and nitrogen in downstream areas.

Short term impacts during construction may include an increase in erosion and sedimentation due to bare soil areas from construction activities. As mentioned earlier, storm water pollution prevention plans will be developed and implemented, and all local, state, and federal laws will be followed. This will include implementation of best management practices and construction practices that will limit sediment and total suspended solids from moving off of the construction site and into downstream areas. This project will have no effect on watercraft usage.

12. Contamination/Hazardous Materials/Wastes:

a. *Pre-project site conditions - Describe existing contamination or potential environmental hazards on or in close proximity to the project site such as soil or ground water contamination, abandoned dumps, closed landfills, existing or abandoned storage tanks, and hazardous liquid or gas pipelines. Discuss any potential environmental effects from pre-project site conditions that would be caused or exacerbated by project construction and operation. Identify measures to avoid, minimize or mitigate adverse effects from existing contamination or potential environmental hazards. Include development of a Contingency Plan or Response Action Plan.*

There are no known existing contamination or potential environmental hazards on or in close proximity to the project site.

b. *Project related generation/storage of solid wastes - Describe solid wastes generated/stored during construction and/or operation of the project. Indicate method of disposal. Discuss potential environmental effects from solid waste handling, storage and disposal. Identify measures to avoid, minimize or mitigate adverse effects from the generation/storage of solid waste including source reduction and recycling.*

Potential waste material from construction activity may include metal or concrete from culverts, gasoline, motor oil, plastic materials, trees, stumps, rocks, gravel and soil materials. All solid wastes generated from construction will be disposed of at a licensed solid waste storage facility or an approved and regulated facility. All materials and debris produced from the proposed project will be disposed of in accordance with MPCA specifications. No construction materials will be placed in wetlands, floodplains, or any sensitive resource areas. Contamination of soils during construction of the proposed project will be handled in accordance with MPCA requirements.

c. *Project related use/storage of hazardous materials - Describe chemicals/hazardous materials used/stored during construction and/or operation of the project including method of storage. Indicate the number, location and size of any above or below ground tanks to store petroleum or other materials. Discuss potential environmental effects from accidental spill or release of hazardous materials. Identify measures to avoid, minimize or mitigate adverse effects from the use/storage of chemicals/hazardous materials including source reduction and recycling. Include development of a spill prevention plan.*

Chemicals and hazardous materials that could be used by the contractor during construction will not be determined until the contract is bid and a contractor is selected. Generally these materials will amount to fuel and lubricants needed to operate heavy equipment. Practices will be required to minimize spills of these materials into the environment. This will include such things as a designated refueling areas and temporary storage of materials on site in areas away from known sensitive areas.

Spill prevention plans and what to do if a spill should occur will be developed. These will include emergency contacts and who to notify of a spill. All local, state, and federal laws and regulations will be followed.

d. *Project related generation/storage of hazardous wastes - Describe hazardous wastes generated/stored during construction and/or operation of the project. Indicate method of disposal. Discuss potential environmental effects from hazardous waste handling, storage, and disposal. Identify measures to avoid, minimize or mitigate adverse effects from the generation/storage of hazardous waste including source reduction and recycling.*

No hazardous wastes are expected to be generated as a result of this project. There will be no permanent storage facilities of any hazardous substances as a result of the project. During construction it is likely that temporary fuel tanks will be present on site. As noted above spill prevention plans and emergency spill plans will be developed.

13. Fish, wildlife, plant communities, and sensitive ecological resources (rare features):

Describe fish and wildlife resources as well as habitats and vegetation on or in near the site.

The proposed Klondike Clean Water Retention Project is located in an 'open rich peatland' in the Lake Agassiz ecological section of the Tallgrass Aspen Parklands province, a landscape that is predominantly peatland dominated by fine leaved sedges and grasses, with little forest wetland and wet shrubland. The Proposed Klondike Clean Water Retention Project is an area approximately 12 square miles in size. The location of the KCWRP is mostly degraded wetland, formerly prairie rich fen, that were previously tilled and broken up in the 1980's for agriculture. SEE Figure 8 Beaches Fen.

The climate of this province is generally dry and cold with precipitation rates estimated between 20 and 22 inches per year. Generally, evapotranspiration rates exceed precipitation rates in any given year resulting in an annual deficit two to six inches of water . The majority of water on the landscape in this region comes from snowmelt and runoff from nearby agricultural fields. The water table in this open rich peatland is at the surface much of the year, but shallow flooding usually occurs after snowmelt and spring heavy rains. Typically the water table is lowered to several inches below the surface in the late summer and fall.

This area is nearly level with a few old agricultural ditches running through it. There is a slight drainage gradient to the northwest, and water is also able to flow through the peat laterally. Soils consist mostly of muck (SEE Figure 6 – soils). Spring snow melt and early rains can result in large scale flooding events within the region causing loss of agriculture and damage to infrastructure such as roads and farmsteads. Flooding events typically last 1 – 2 months during the spring and 1 – 3 weeks during the growing season but can be extended when overflow flooding comes from the Roseau River to the north. Water is efficiently removed from the landscape via a network of streams, rivers, drainage ditches and other watercourses. The goal for this impoundment project is to reduce these flooding events while also providing natural resource enhancements.

There is a prairie rich fen adjacent to the proposed project on MN DNR wildlife management land (Figure 8). The KCWRP Team has written a fen plan for the project to help maintain, protect, and enhance this rare native plant community. Where practical and feasible, this plan will be used as primary guidance to implement fen protection and enhancement. Action items are discussed in appendix B. It is anticipated that the KCWRP will reduce flooding on the fen, reduce invasive species carried by floodwater, reduce sediment and nutrients entering the fen, and protect/enhance medium and high quality fen by trading land with the DNR. The KCWRP Team has also been working with DNR Fisheries and MPCA to help provide fish habitat and enhance fish production in the downstream Two Rivers and Lake Bronson, and to provide water quality enhancements for both downstream water bodies.

a. *Describe rare features such as state-listed (endangered, threatened, or special concern) species, native plant communities, Minnesota County Biological Survey Sites of Biodiversity Significance, and other sensitive ecological resources on or within close proximity to the site. Provide the license agreement number and/or correspondence number from which the data were obtained and attach the Natural Heritage letter from the DNR. Indicate if any additional habitat or species survey work has been conducted within the site and describe the results.*

State & Federal Species of Concern

There are 35 state listed species between Kittson and Roseau Counties. State listed species within the two counties include 14 endangered species and 21 threatened species. Of these 35 state listed species the Poweshiek skipperling is listed as Federally endangered, and the Western Prairie Fringed Orchid and Dakota Skipper are listed as Federally threatened. The United States Fish & Wildlife Service's (USFWS) Information for Planning & Consulting (IPaC) website identified the Canadian Lynx (Threatened), Northern Long-eared Bat (Threatened), and the Monarch Butterfly (Candidate) as three more species of concern that may possibly be found within the project.

The USFW IPaC also identified eight migratory birds of conservation concern that may be found within the project. These birds include Black Tern, Black-billed Cuckoo, Bobolink, Golden-winged Warbler, Le Conte's Sparrow, Marbled Godwit, Olive-sided Flycatcher, and Yellow Rail.

Minnesota Biological Survey (MBS)

The Minnesota Biological Survey (MBS) identifies and describes sites of biodiversity significance and areas of native plant communities. Sites of biological significance are ranked based on landscape context and ecological function, native plant community quality and rarity, and species quality and rarity. The ranks include below, moderate, high, and outstanding, in which a "below" rank lacks rare species/native plant community occurrence or does not meet MBS standards and an "outstanding" rank has the best quality of rare species/native plant communities. This data has ranked the surrounding DNR land as outstanding, and the area of DNR land within the project as moderate (SEE Figure 7). The majority of the land within the project area was once agriculture land which is most likely a major contributing factor to the lower biodiversity within the project boundaries.

Additional Surveys - Between 2015 and 2021 the MN DNR re-visited the site of the prairie rich fen to survey vegetation and make comparisons from site visits back to 1990. Key findings that were made in their report (available upon request) were 1) there was an increase of invasive and hybrid cattail, 2) there was an increase in generalist native species that do well in deeper and continuous water, 3) a decline in native species that are more sensitive to deeper water or longer periods of inundation, and 4) a decline of species dependent on mineral salts in the rooting zone (known as calciphiles), and 5) fen quality tended to be better the farther distance away from existing drainage ditches.

Rare Features

The DNR Natural Heritage Information System (NHIS) (LA-619) was consulted to identify the presence of rare features in or within one mile of the project corridor. A review of the NHIS data identified nine rare features within the project corridor. The rare features found within one mile of the project include:

- Sandhill Crane (*Grus canadensis*)- Federal: Not Listed; Minnesota: Protected (legal to hunt in northwest during season)- Observed on 1979-06-08.
    - Sandhill Cranes breed and forage in open prairies, grasslands, and wetlands. Outside of the breeding season, they often roost in deeper water of ponds or lakes, where they are safe from predators.
- Yellow Rail *(Coturnicops noveboracensis)*- Federal: Not Listed; Minnesota: Special Concern- Observed on 1991-07-10.
    - Yellow Rails nest in shallow freshwater sedge marshes; winters in wet meadows and marshes with cordgrass, saltgrass, sedges, and other low vegetation. They are not found in deeper areas with tall vegetation, such as cattail marshes. Yellow Rails are extremely vulnerable to changes in hydrology; even a slight change of one inch in water depth can cause yellow rails to abandon the area.
- American Bittern (*Botaurus lentiginosus*)- Federal: Not Listed; Minnesota: Species of Greatest Conservation Need- Observed on 1991-06-11.
    - American Bitterns habitat is shallow freshwater marshes, typically toward the margins and among reeds and other vegetation; they are rarely out in the open. As the wetlands on which the bird relies are drained, filled, and converted to agriculture, the species, like many wetlands' inhabitants, declines. Although the bittern remains widely distributed, populations are declining across its range.

- Twig-Rush (*Cladium mariscoides*)- Federal: Not Listed; Minnesota: Special Concern- Observed on 1992-08-14 and also in 2021.
    - Occurs mostly in fens, particularly the types of fens that ecologists call prairie rich fens, northern rich fens, and calcareous fens. These are sunny, wet, sedge-dominated habitats with a substrate of saturated, sedge-derived peat. Habitat that Twig-Rush grows in has declined as a result of

groundwater appropriations, agricultural expansion, surface water diversion, gravel quarrying, and other consumptive uses of natural resources.

- Few Flowered Spiked Rush (*Eleocharis quinqueflora*)- Federal: Not Listed; Minnesota: Special Concern- Observed on 1992-06-29.
    - Few Flowered Spike Rush occurs primarily in sparsely vegetated wet habitats found in graminoid fens, shorelines of ponds and small lakes, and occasionally in wet prairie openings.
- Nelson's Sparrow (*Ammodramus nelson*)- Federal: Not Listed; Minnesota: Special Concern- Observed on 1991-06-11.
    - The Nelson's sparrow is primarily a bird of sedge wetlands, and it is often found in the same areas and habitat as the yellow rail (*Coturnicops noveboracensis*), another Minnesota special concern species. However, Nelson's sparrows may be slightly more tolerant of a wider range of water levels, and perhaps slightly coarser vegetation than yellow rails.
- McCalla's Willow (*Salix maccalliana*)- Federal: Not Listed; Minnesota: Special Concern- Observed on 1990-09-02.
    - *Salix maccalliana* is apparently restricted to shallow wetlands in the northwestern counties, particularly shrub swamps, shrubby fens, and sedge meadows. The habitats are usually calcareous to circumneutral, sedge-derived peat or sometimes wet loam or wet clayey-loam. It seems that the strongly acidic and nutrient-poor conditions found in bogs are beyond the tolerance of this species.
- Wilson's Phalarope (*Phalaropus tricolor*)- Federal: Not Listed; Minnesota: Threatened- Observed on 1991-06-11.
    - Wilson's phalaropes are most frequently found in wet prairie, rich fen, and other grass- or sedge-dominated wetlands. The presence of short vegetation in or adjacent to shallow pools of open water is an important microhabitat feature. Human-altered habitats, particularly flooded pastures and municipal wastewater stabilization ponds may also provide suitable habitat.
- Prairie Rich Fen (OPp91)- Rare plant community in Minnesota- State Rank "2" - Observed on 1990-08-16.
    - Occurs in nearly level expanses of glaciolacustrine deposits and in broad glacial drainageways. Vegetation is made up of graminoids, forbs, shrubs, and some moss. Substrates vary from mineral and muck to sapric or hemic peat derived from sedges and grasses. Peat depth is variable, usually 12-36". Peat is shallower than peat bogs to the east mostly due to drier climate, more severe drought, and the more often occurrence of fire.

Other Rare Features

Nine other rare features were identified within the project or within one mile of the project by the Beaches Lake Area Fen Management Plan written by the Fen Management Plan Technical Team. The technical team was put together to provide management, protection, and enhancement guidance to the Department of Natural Resources, the Two Rivers Watershed District, and the Klondike Project planning team. These rare features include:

- Upland Sandpiper (*Bartramia longicauda*)- Federal: Not Listed; Minnesota: Watchlist
    - A shorebird that nests in native prairie, cropland, pastureland, mountain meadows, dry tundra, and similar grassland environments.
- Gray Wolf (*Canis Lupus*)- Federal: Threatened; Minnesota: Delisted
    - Delisted in 2013 and population has been stable for the last ten years. Habitat can range from hardwood forests to rich peatland in Minnesota.
- Marbled Godwit (*Limosa fedoa*)- Federal: Not Listed; Minnesota: Special Concern
    - Marbled godwits prefer native grasslands with sparse to moderate cover, adjacent to a complex of wetlands. Nesting occurs in short upland grasslands or in cropland stubble that is within or close to large expanses of grassland.
- Elk (*Cervus canadensis*)- Federal: Not Listed; Minnesota: Special Concern

    - Ideal elk habitat in the current Minnesota Elk range is comprised of a mixture of brushland (savanna or wet meadow/carr) and grassland (upland prairie or lowland prairie) with islands of forest (principally fire-dependent forest and mesic hardwood forest) within the Tallgrass Aspen Parklands biome.
- Moose (*Alces alces*)- Federal: Not Listed; Minnesota: Special Concern
    - The best moose habitat occurs in young forests created by logging, forest fires and windstorms in northeastern Minnesota. They also live in a mixture of woodlots and farm fields in northwestern Minnesota.
- Garber's Sedge (*Carex garberi*)- Federal: Not Listed; Minnesota: Threatened
    - Because of the very few records of *C. garberi* in Minnesota, it is not entirely clear which habitats are preferred. The Kittson County wetland site is an extensive rich fen (peatland) complex in an area dominated by *C. lasiocarpa* ssp. americana (fen wiregrass sedge) and *C. buxbaumii* (Buxbaum's sedge). Associated plants included Calamagrostis spp. (reedgrass species) and *Cladium mariscoides* (twig rush) on a peat mat about 0.5 m (20 in.) thick. Within this rich fen complex, *C. garberi* was localized in patches of sparser vegetation, where the surface was encrusted with whitish deposits of calcium carbonate.
- Dry-Sand Gravel Prairie (UPn12b)- Unique plant community in Minnesota – State Rank "2".
    - Graminoid-dominated, forb rich herbaceous communities on coarse-textured, usually gravelly soils on gentle slopes on wave-reworked Glacial Lake Agassiz shoreline deposits and rarely on moderate slopes on outwash and ice-contact deposits.
- Wet Brush Prairie (WPn53b)- Unique plant community in Minnesota.
    - Ranges in character from graminoid-dominated communities with a strong shrub component to shrub-dominated communities with a strong graminoid component. Shrub cover is commonly 25-50% and often greater, up to 75%.
- Mesic Brush Prairie (UPn23a)- Unique plant community in Minnesota.
    - Mixed herb-shrub communities on medium-textured loamy soils. Soils have well-developed mollic epipedons. Occurs on nearly level to gently sloping sites. Shrub cover is commonly 25-50% and sometimes as great as 75%.

b. *Discuss how the identified fish, wildlife, plant communities, rare features and ecosystems may be affected by the project. Include a discussion on introduction and spread of invasive species from the project construction and operation. Separately discuss effects to known threatened and endangered species.*

The project affects several sensitive habitats including native wetland plant communities and possibly some wetland bird nesting habitat. The main impoundment dike has the potential to cause habitat loss, habitat fragmentation, the loss of biodiversity, and the introduction of invasive species. The project will have an impact on adjacent wetland water levels. Within the impoundment there is potential for wetland type and vegetation to change from the changed water levels due to the operation of the impoundment. There is also a higher likelihood of invasive species establishing inside of the impoundment due to flood waters carrying in invasive seeds. This may be mitigated by establishing an operations and maintenance plan that address noxious weeds and invasive species by inspecting, mowing, burning, spraying or other means.

Figures 5 and 6 depict the effect of the project inside and outside the diked impoundment relative to flood reduction. Computer modelling of the 5 year, 10 year, 25 year and the 50 year runoff events were done relative to six areas identified as 0) SD 72 & 50, 1) State Ditch 95, 2) KCWRP, 3) Intact rich fen, 4) KCWRP rich fen, and 5) Mitigation Section. Tables are included showing pre project and post project flooded areas. It is anticipated that areas inside the impoundment will likely be taken over by species more adapted to changing water levels due to operation of the impoundment. Rich fen outside the project will likely benefit operation of the impoundment by keeping large

amounts of flood water off the fen. This will confine invasive species, sediment and nutrients to the impoundment instead of spreading across the fen and adjacent landscape by being carried with flood water.

State-listed Species

Of the threatened/endangered state-listed species known in Kittson and Roseau Counties, and species known to be found in the rich peatland habitat, Garber's sedge (Carex garberii) was found within one mile the project. If any of the threatened or endangered species are present on the site some threats due to the project could be loss of habitat, change of habitat, fragmentation of habitat, change in hydrology, or introduction of invasive species.

Federal-listed Species

Federally listed species that could be present in this area include the Canadian Lynx and Northern Long-eared Bat. There is a small possibility the Canadian Lynx could be found on the neighboring Wildlife Management Areas, but it is unlikely to be found in the open marshlands of the project. The Northern Long-eared Bat is unlikely to be found in the project due to the lack of roosting sites.

Invasive Species

The DNR identifies 47 terrestrial invasive species that occur in Minnesota and have the potential to occur within the project corridor. These species are divided into four classifications, including prohibited-eradicate, prohibited-control, restricted noxious weeds, and specially regulated. Of the identified terrestrial invasive species approximately 15 species are listed under prohibited-eradicate, 11 species are listed under prohibited-control, 16 species are listed under restricted noxious weeds, and five species with specially regulated status. There are 38 aquatic invasive species identified in Minnesota including 18 animal species, 10 plant species, and 10 identified pathogens. The project will comply with the Minnesota DNR Operational Order 113 to "prevent the introduction, establishment, or spread of invasive species by implementing site-level management."

Terrestrial Invasives

Of the plant species listed by the DNR as invasive, nine species have been reported in Kittson and Roseau Counties and have the potential to be present within the project corridor. These include Canada Thistle (*Cirsium arvense*), Poison hemlock (*Conium maculatum L.),* Common Tansy (*Tanacetum vulgare L.*), Leafy spurge (*Euphorbia esula L.*), Purple loosestrife (*Lythrum salicaria L.*), Wild parsnip (*Pastinaca sativa L.*), Dalmatian toadflax (*Linaria dalmatica (L.) Mill.*), Common Buckthorn (*Rhamnus cathartica*), and Western Poison Ivy (*Toxicodendron rydbergii*). Three species of local concern to the project include Hybrid cattail (*Typha x glauca*), Reed canary grass (*Phalaris arundinacea*), and non-native Phragmites. These species although not listed officially are problematic and of concern of local land managers. All construction equipment will be thoroughly checked and cleaned as necessary for seeds, soil, and vegetation pre-construction and will be thoroughly cleaned post-construction to prevent the spread of any invasive species at the site. A thorough cleaning will be done to remove all seeds and debris from construction equipment.

Aquatic Invasives

Zebra Mussels are present in the Red River which runs along the western edge of Kittson County. Curly Leaf Pondweed has been found in Roseau County. The spread of invasive species is managed through state aquatic invasive species laws including the "clean, drain, and dispose." All construction equipment will be thoroughly cleaned pre- and post-construction to prevent the spread of any invasive species.

Infested Waters

The DNR identifies no waterbodies within or adjacent to the project corridor. The Red River of the North is infested with Zebra Mussels (*Dreissena polymorpha*) and is the only infested waterbody within Kittson County, Minnesota.

c. *Identify measures that will be taken to avoid, minimize, or mitigate adverse effects to fish, wildlife, plant communities, and sensitive ecological resources.*

It is anticipated that this project will have a net environmental benefit. Although construction activities will have a negative impact to wetlands, the project goals along with required wetland mitigation will provide benefits that far outweigh the impacts. Several measures have been taken in the planning phase to minimize and/or eliminate impacts. Appendix D describes design options originally planned but dismissed, altered or changed in order to avoid, minimize and mitigate adverse environmental effects. Significant decisions were made in the planning process are listed below.

- Two north diversion ditches were planned but were removed from consideration to protect an intact fen.
- Tie back dikes at the north end of the two diversion ditches were also removed.
- The main impoundment dike has been moved from its original planned location to one quarter section east in section 11 to avoid building through the prime prairie rich fen.
- The main impoundment dike will be built on what is now degraded (plowed and converted) fen containing less biodiversity. The dike may take up a portion of nesting habitat for wetland birds but having the impoundment will reduce the fluctuation of flood water in the fen that could drown nests.
- Many wetland birds such as yellow rails are also very sensitive to water level changes. The project will keep the prairie rich fen at a more stable water level. A more stable water level will provide better habitat for many wetland bird species. A more stable water level is also very beneficial for the fen itself.
- Reducing flood water entering the fen keeps the fen from being inundated in water for too long, keeps the current native plant community more stable, and gives less potential for invasive species to enter the fen.
- A land exchange of around 800 acres is proposed between the DNR and the TRWD. This will ensure that parcels with prime fen will be managed by the DNR and will allow the TRWD to manage for flood damage reduction in areas of no fen or degraded fen.
- Pre project surface and ground water quality and quantity monitoring have been done by the TRWD, DNR, and Flood Damage Reduction Work Group both upstream, within, and downstream of the project area to collect data to help understand how the impoundment can help protect and enhance both water quality and habitat, and understand how to minimize the impacts of the impoundment.

The operation of the impoundment will provide many beneficial impacts. The draft operating plan was written with help from the MPCA and DNR to help achieve goals and objectives for both flood damage reduction and for natural resources enhancement. The plan is not final and is currently in it's 3rd revision. This plan will be further refined with input from the Project Team. The impoundment's current draft operating plan as noted on pages 6-8, generally calls for gate closure when flooding is occurring. As floodwater subsides, the gates will be incrementally opened. Stored floodwaters will eventually be drained down to a dry impoundment, but they will be utilized to augment typical low flow periods on the Middle and South Branch Two Rivers, resulting in net environmental benefits for water quality, fish and macroinvertebrates. Gate operation will tend to reduce transport of suspended solids, resulting in improved levels of sediment, phosphorous and nitrogen in downstream watercourses.

The TRWD is restoring wetlands to mitigate for wetlands that will be impacted by the dikes. These wetland mitigations will comply with WCA and the Army Corps of Engineers requirements for restoring wetlands. Information on wetland mitigation has been covered previously in question #10.

Several documents were utilized in the planning stages of the project. Many of these were multi agency and/or interdisciplinary collaborations. Among these documents were the "Beaches Area Fen Management Plan", "Floristic Quality Assessment" of the fen, a report of "Potential Impacts from Overland Flow and Ditches – Prairie Rich Fen Vegetation 1990-2021", "Two Rivers Watershed Restoration and Protection Strategy", "Two Rivers Watershed HSPF Model Calibration and Impoundment Scenario", "TRWD Overall Plan", "Two Rivers Plus Watershed Management Plan", and many other documents. Agencies involved with the collection, interpretation and sharing of this data and information included the US Army Corps of Engineers, NRCS, MN DNR, MPCA, BWSR, The Nature Conservancy, International Water Institute, FDRWG, HDR Engineering, and TRWD.

14. Historic properties:

Describe any historic structures, archeological sites, and/or traditional cultural properties on or in close proximity to the site. Include: 1) historic designations, 2) known artifact areas, and 3) architectural features. Attach letter received from the State Historic Preservation Office (SHPO). Discuss any anticipated effects to historic properties during project construction and operation. Identify measures that will be taken to avoid, minimize, or mitigate adverse effects to historic properties.

During project development, the Natural Resources Conservation Service provided planning assistance through its "RCPP" program. An NRCS Cultural Resources Specialist/Archaeologist was consulted as well as a MN DNR Forestry / Fish & Wildlife Archaeologist.

The MN State Historic Preservation Office was contacted and provided their opinion that there is a low likelihood for intact archaeological resources being present in the project area. Further review will take place in the process of obtaining a federal wetland permit from the US Army Corps of Engineers.

See Appendix C – SHPO Letter and email from NRCS

15. Visual:

Describe any scenic views or vistas on or near the project site. Describe any project related visual effects such as vapor plumes or glare from intense lights. Discuss the potential visual effects from the project. Identify any measures to avoid, minimize, or mitigate visual effects.

There are no known scenic views or vistas on this site. The topography on the site is very flat, with less than two feet of fall per mile. The landscape is dominated by wetland, farmland, and interspersed with both legal and private drainage ditch systems.

16. Air:

a. *Stationary source emissions - Describe the type, sources, quantities and compositions of any emissions from stationary sources such as boilers or exhaust stacks. Include any hazardous air pollutants, criteria pollutants, and any greenhouse gases. Discuss effects to air quality including any sensitive receptors, human health or applicable regulatory criteria. Include a discussion of any methods used assess the project's effect on air quality and the results of that assessment. Identify pollution control equipment and other measures that will be taken to avoid, minimize, or mitigate adverse effects from stationary source emissions*.

There will be no stationary source emissions.

b. *Vehicle emissions - Describe the effect of the project's traffic generation on air emissions. Discuss the project's vehicle-related emissions effect on air quality. Identify measures (e.g. traffic operational improvements, diesel idling minimization plan) that will be taken to minimize or mitigate vehicle-related emissions*.

During construction heavy earth moving machinery will be used. It is not anticipated that there will be significant adverse impacts due to vehicle emissions. Operation of equipment is considered to be temporary only during construction. There are no identified measures to be taken to minimize vehicle emissions. The area is remote and only accessible via minimum maintenance township roads, therefore vehicle traffic is not expected to increase.

c. <u>Dust and odors</u> - *Describe sources, characteristics, duration, quantities, and intensity of dust and odors generated during project construction and operation. (Fugitive dust may be discussed under item 16a). Discuss the effect of dust and odors in the vicinity of the project including nearby sensitive receptors and quality of life. Identify measures that will be taken to minimize or mitigate the effects of dust and odors*.

Heavy equipment will be used to move large quantities of earthen material in construction of dikes, ditches, and water control structures. Dust associated with this activity will occur, however it will be somewhat dependent on moisture conditions preceding and during construction. It is anticipated dust and odors will be minimal and will be localized to the construction site. No elevated dust or odors are anticipated prior to or after construction. There are no identified measures to be taken to minimize dust and odors.

17. Noise

Describe sources, characteristics, duration, quantities, and intensity of noise generated during project construction and operation. Discuss the effect of noise in the vicinity of the project including 1) existing noise levels/sources in the area, 2) nearby sensitive receptors, 3) conformance to state noise standards, and 4) quality of life. Identify measures that will be taken to minimize or mitigate the effects of noise.

The construction activities are likely to produce noise due the use of heavy earth moving equipment such as backhoes, loaders, off road dump trucks, scrapers and dozers. The construction crew will be required to follow local noise ordinances and restrictions. Noise impacts from construction activities will be temporary and restricted to the construction period. There are no anticipated permanent noise pollution as a result of the project.

Existing noise within the project corridor and nearby areas are directly associated with agricultural operations and minimal traffic. Residents and visitors located near or adjacent to the construction zone will be temporarily impacted from increased noise resulting in some adverse effects to quality of life. These adverse effects to quality of life include annoyances during everyday activities especially outdoor activities. All residents will be notified about the timing and duration of construction prior to the beginning of construction. Noise pollution will be minimized through restricting the use of heavy machinery to normal working hours.

18. Transportation

a. *Describe traffic-related aspects of project construction and operation. Include: 1) existing and proposed additional parking spaces, 2) estimated total average daily traffic generated, 3) estimated maximum peak hour traffic generated and time of occurrence, 4) indicate source of trip generation rates used in the estimates, and 5) availability of transit and/or other alternative transportation modes*.

All public roadways within the project area are classified as minimum maintenance roads. Of the 24 miles of roadway, 8 miles are gravel and 16 miles are dirt. None are paved. The construction will not cause any adverse impacts to the adjacent roadways. Traffic will be impeded during construction but since these are minimum maintenance roads with extremely low traffic counts and not accessible during winter months this is not considered to be a problem because alternate routes will be available. Access to the impoundment, levees, and access road to the water control structure will be restricted during construction periods. Once operational, the project will provide improvements to roadways because of reduced interruption of transportation access to roads and highways during large floods.

b. *Discuss the effect on traffic congestion on affected roads and describe any traffic improvements necessary. The analysis must discuss the project's impact on the regional transportation system. If the peak hour traffic generated exceeds 250 vehicles or the total daily trips exceeds 2,500, a traffic impact study must be prepared as part of the EAW. Use the format and procedures described in the Minnesota Department of Transportation's Access Management Manual, Chapter 5 (available at: http://www.dot.state.mn.us/accessmanagement/resources.html) or a similar local guidance*,

Peak hour traffic generated will not exceed 250 vehicles nor will total daily trips exceed 2,500 as a result of the project. All roads are currently minimum maintenance with extremely low traffic counts. Traffic may be reduced to one lane at times during construction. There are no traffic improvements necessary to accommodate the temporary construction or operations and maintenance activities associated with the project.

c. *Identify measures that will be taken to minimize or mitigate project related transportation effects*.

The public will be notified when construction commences. No detours are anticipated

19. Cumulative potential effects: (Preparers can leave this item blank if cumulative potential effects are addressed under the applicable EAW Items)

a. *Describe the geographic scales and timeframes of the project related environmental effects that could combine with other environmental effects resulting in cumulative potential effects*.

Recent and upcoming projects in the vicinity of the Klondike Clean Water Retention Project were taken into consideration, both upstream and downstream of the project. Within the upstream watershed, which is the State Ditch #95 and has hydrologic unit code number 0902031202, there are no other known projects completed within the past 5 years or proposed in the next 10 years. Within one downstream watershed, the Two Rivers hydrologic unit code 0902031207, two projects involving existing dams on the Two Rivers were identified as described in (b) below. Within the other downstream watershed, the Middle Branch Two Rivers hydrologic unit code number 0902031203, there are no known projects.

Environmental factors within these three watersheds that could be directly affected by projects recently constructed or being contemplated were considered. These factors mainly include flow regime of the river, aquatic habitat, and water quality. Short term effects can be categorized as construction related and include temporary items such as erosion, stormwater management, dust, and noise. Long term effects can include losses or gains in aces of habitat, changes in various water quality parameters like suspended solids-nitrogen-dissolved oxygen-phosphorous, increase or decrease in velocities of in channel flow, and changes in runoff and resulting effects of overland flooding.

b. *Describe any reasonably foreseeable future projects (for which a basis of expectation has been laid) that may interact with environmental effects of the proposed project within the geographic scales and timeframes identified above*.

Lake Bronson Dam Replacement: The MN DNR plans to replace the dam on the South Branch Two Rivers located at Lake Bronson State Park, approximately 11 miles downstream from the Klondike Clean Water Retention Project. The project has been funded by the State of MN and construction is planned within the next 2-5 years. The current structure was built in 1938, has passed its projected life span, and is in need of replacement as the structural condition has been classified as fair to poor. Engineering plans are currently being prepared by the DNR but have not been made available to the public for review.

Hallock Dam Fish Passage Project: This project, completed in 2021, is located on the South Branch Two Rivers approximately 40 river miles downstream from the southwest outlet of the proposed Klondike Clean Water Retention project. It involved the installation of a series of boulders, toe wood bio protection measures, rock

weirs, and rip rap to create a means for fish to pass over the dam, which has been a barrier since the 1930's. The project allows fish to travel from the Red River of the North upstream to the Lake Bronson dam. During dry periods of the summer and during times of drought, the river has been known to dry up to a point of no flow or interstitial flow. This traps fish in the deep bends of the river resulting in mortality. The KCWRP will provide low flow augmentation, which will extend periods of flow in the river. This is presumed to have a positive effect on the aquatic ecosystem.

c. *Discuss the nature of the cumulative potential effects and summarize any other available information relevant to determining whether there is potential for significant environmental effects due to these cumulative effects.*

The main effect that can be identified as cumulative resulting from the three projects combined is the effect to the quantity, quality, and velocity of water flowing in the South Branch Two Rivers. The KCWRP will divert flows from upstream areas along State Ditch 95, hold them for a period of time, and then release them back into the ditch. SD 95 flows into the South Branch Two Rivers upstream of Lake Bronson, where the Lake Bronson Dam is located. Flows passing through Lake Bronson Dam travel downstream to Hallock where that dam was altered to allow fish passage.

Water Quality: It is concluded that water quality will be improved. The cumulative effect will be a reduction in sediment, nitrogen and phosphorous and an increase in dissolved oxygen.

Flow: The cumulative effect is determined to be a change from a flashy hydrograph of very high but short lived peaks followed by periods of very low or no flow to a new future hydrograph of sustained longer term flow regime with less extreme peaks and troughs.

Habitat: The upstream KCWRP will attenuate flows, improve water quality and provide flood control for downstream reaches of the river. The Lake Bronson dam will sustain the level of Lake Bronson providing lake habitat and recreation, and the Hallock dam project allows for fish passage upstream to the Lake Bronson dam. A positive cumulative effect of these three projects upon the South Branch Two Rivers is expected because of a net gain in quantity and quality of habitat.

20. Other potential environmental effects: *If the project may cause any additional environmental effects not addressed by items 1 to 19, describe the effects here, discuss how the environment will be affected, and identify measures that will be taken to minimize and mitigate these effects*.

There are no other known or anticipated additional environmental effects above and beyond what has already been described in this document.

RGU CERTIFICATION. *(The Environmental Quality Board will only accept **SIGNED** Environmental Assessment Worksheets for public notice in the EQB Monitor.)*

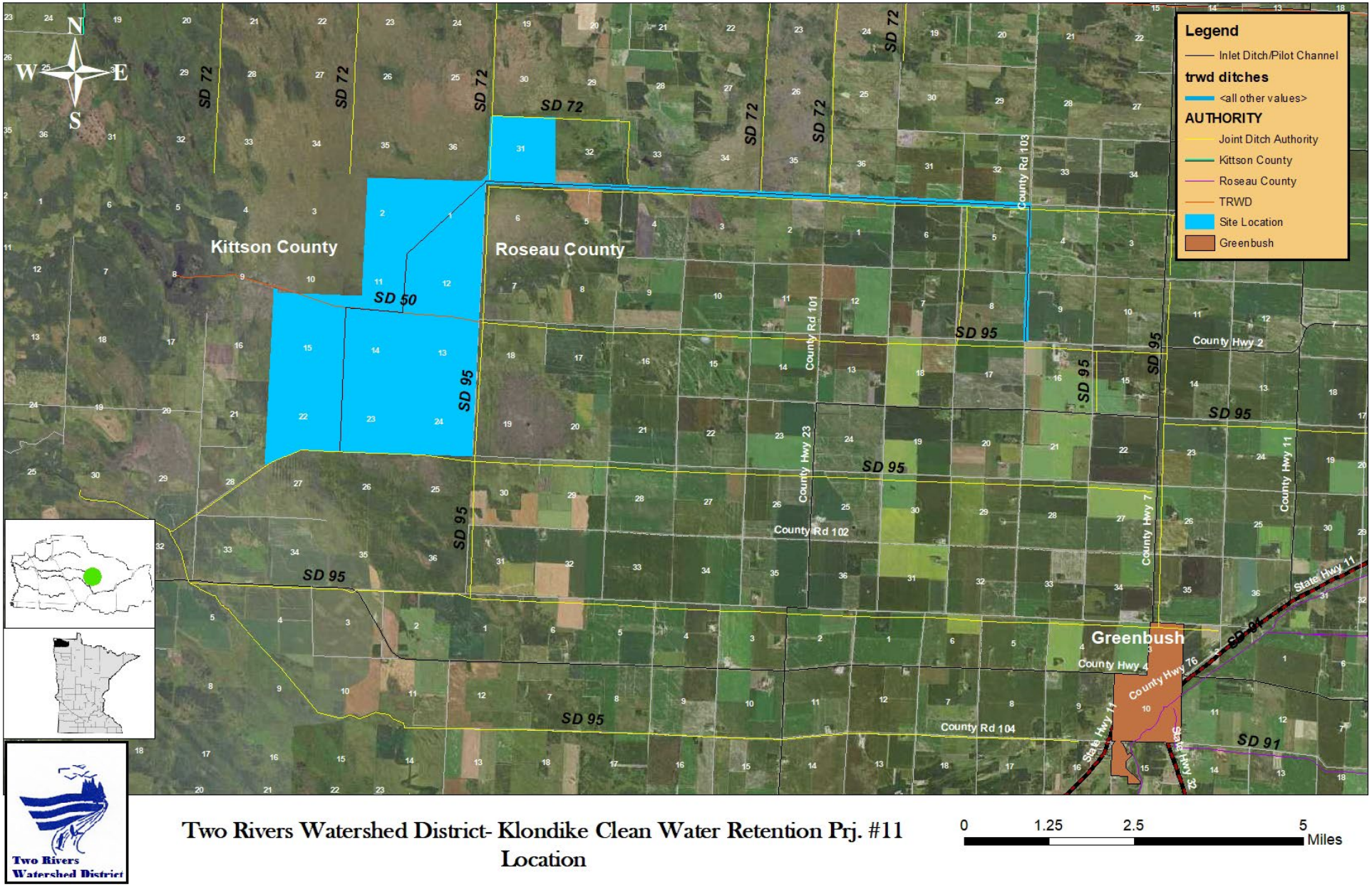
I hereby certify that:

- The information contained in this document is accurate and complete to the best of my knowledge.
- The EAW describes the complete project; there are no other projects, stages or components other than those described in this document, which are related to the project as connected actions or phased actions, as defined at Minnesota Rules, parts 4410.0200, subparts 9c and 60, respectively.
- Copies of this EAW are being sent to the entire EQB distribution list.

Signature  Date 1/17/23

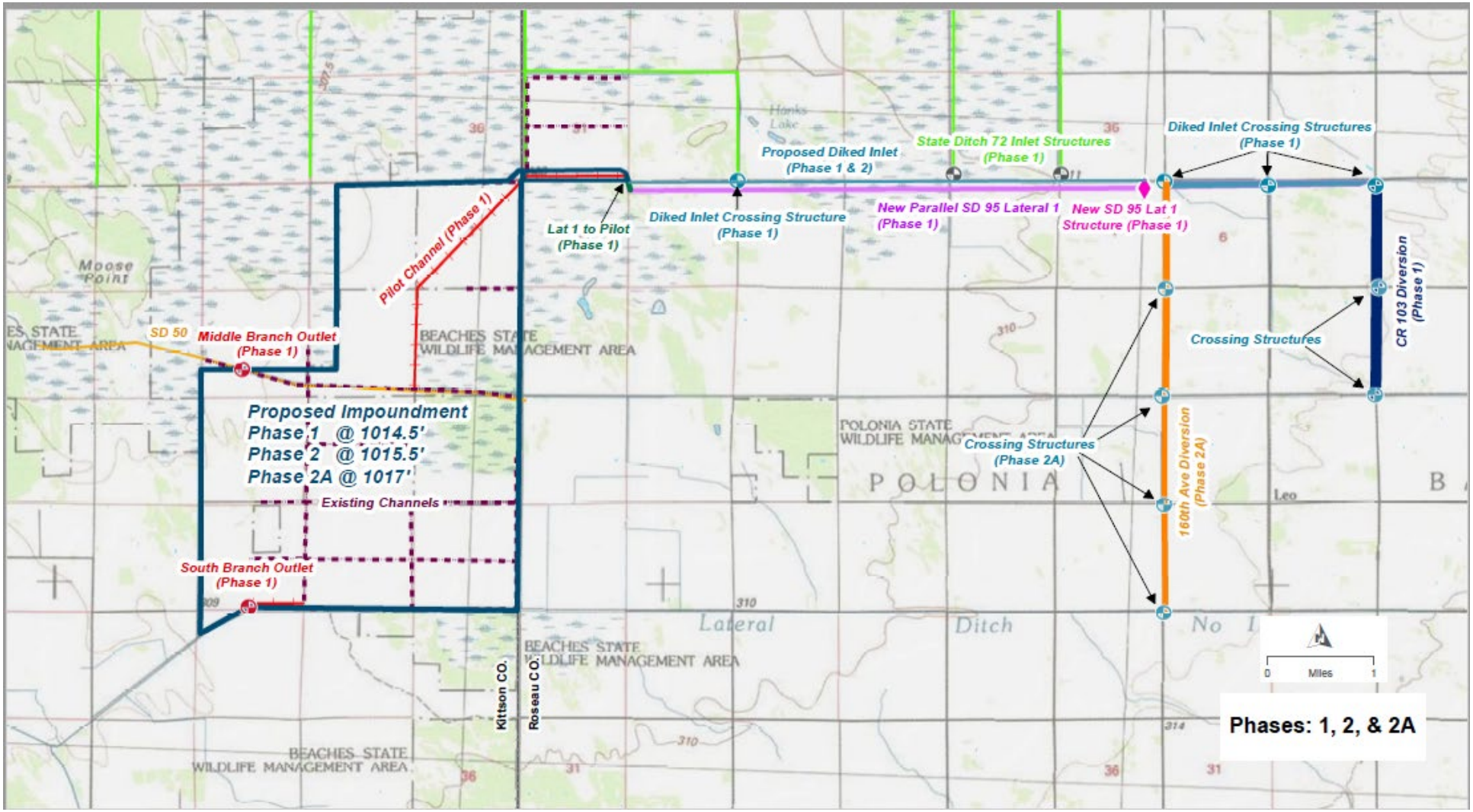
Title District Administrator

FIGURE 1: PROJECT LOCATION



Two Rivers Watershed District- Klondike Clean Water Retention Prj. #11 Location

FIGURE 2: SITE PLAN



Project components and potential construction phasing

FIGURE 3: LOCATION OF EXISTING DITCHES

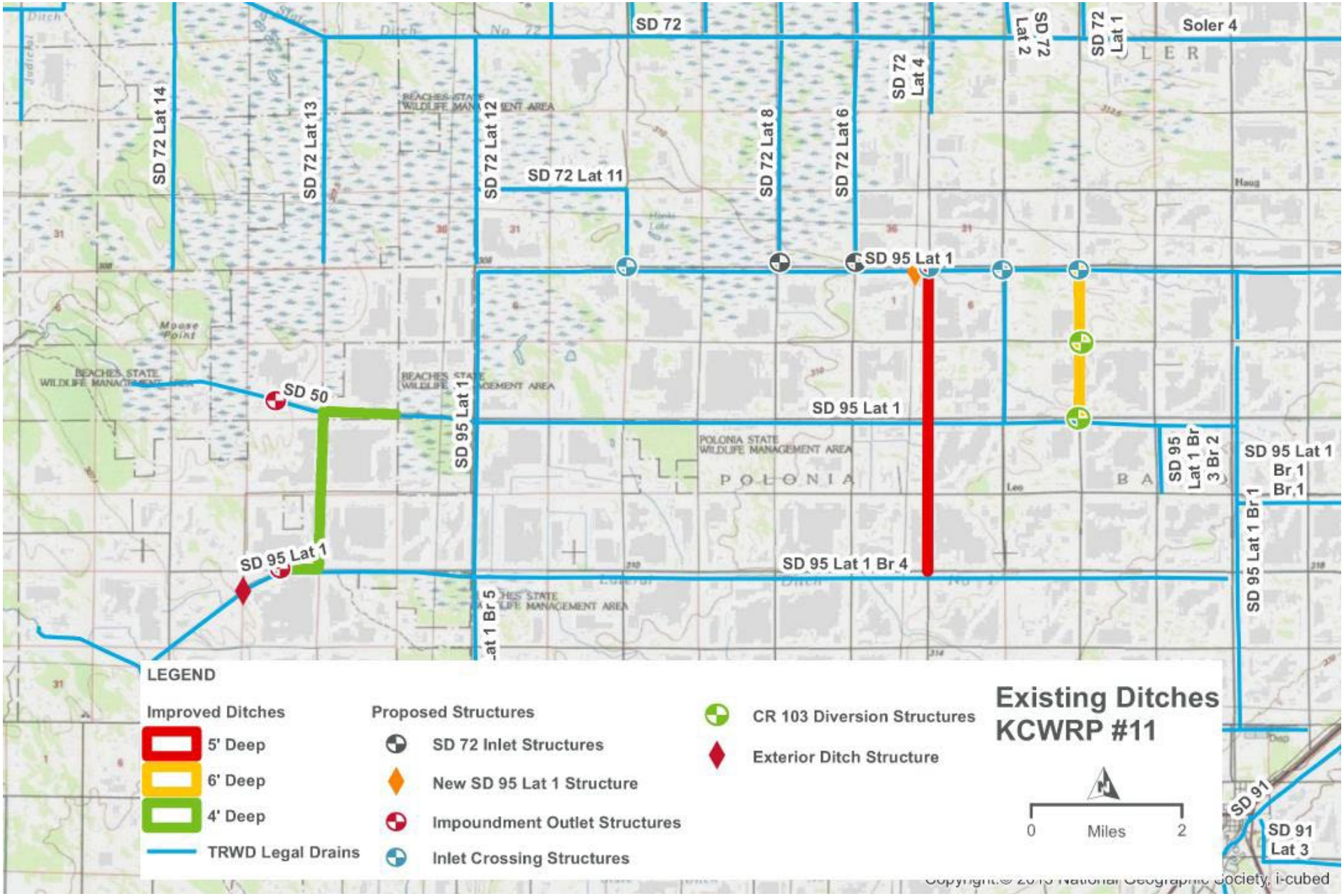
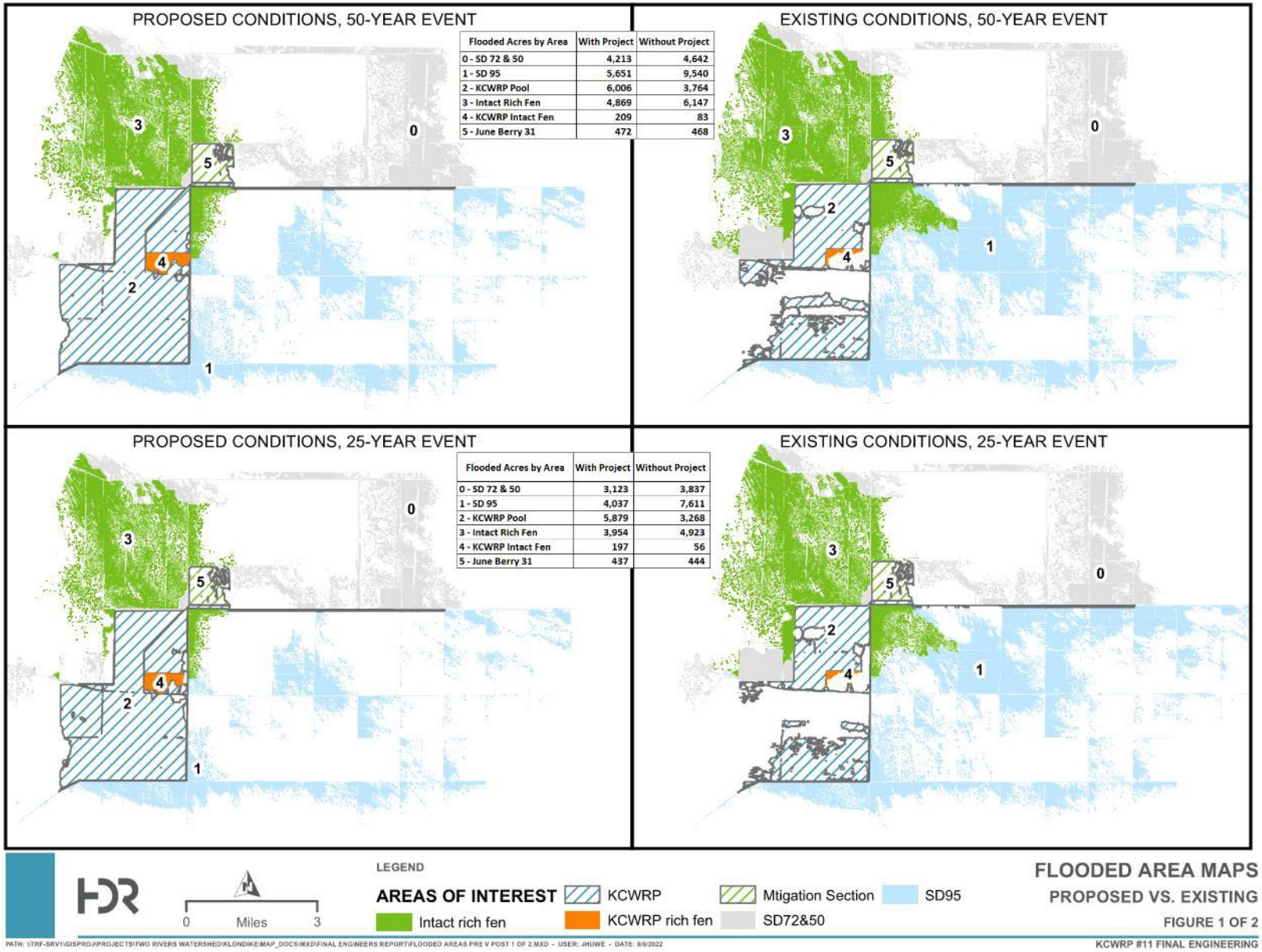
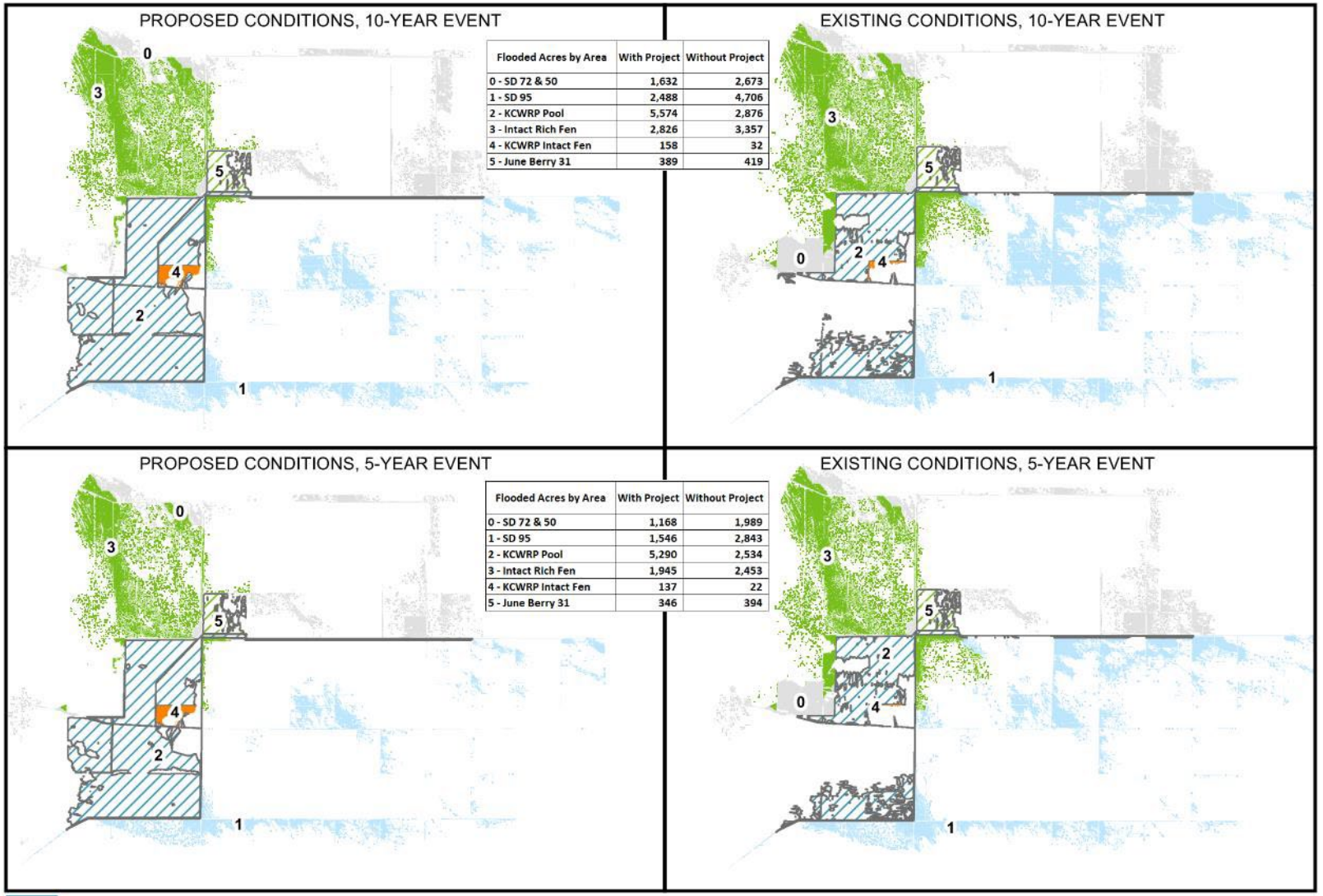


FIGURE 4: LOCATION OF NEW PROPOSED DITCHES

FIGURE 5 (1 OF 2): FLOODED AREAS EXISTING VS PROPOSED – 25 AND 50 YEAR EVENTS



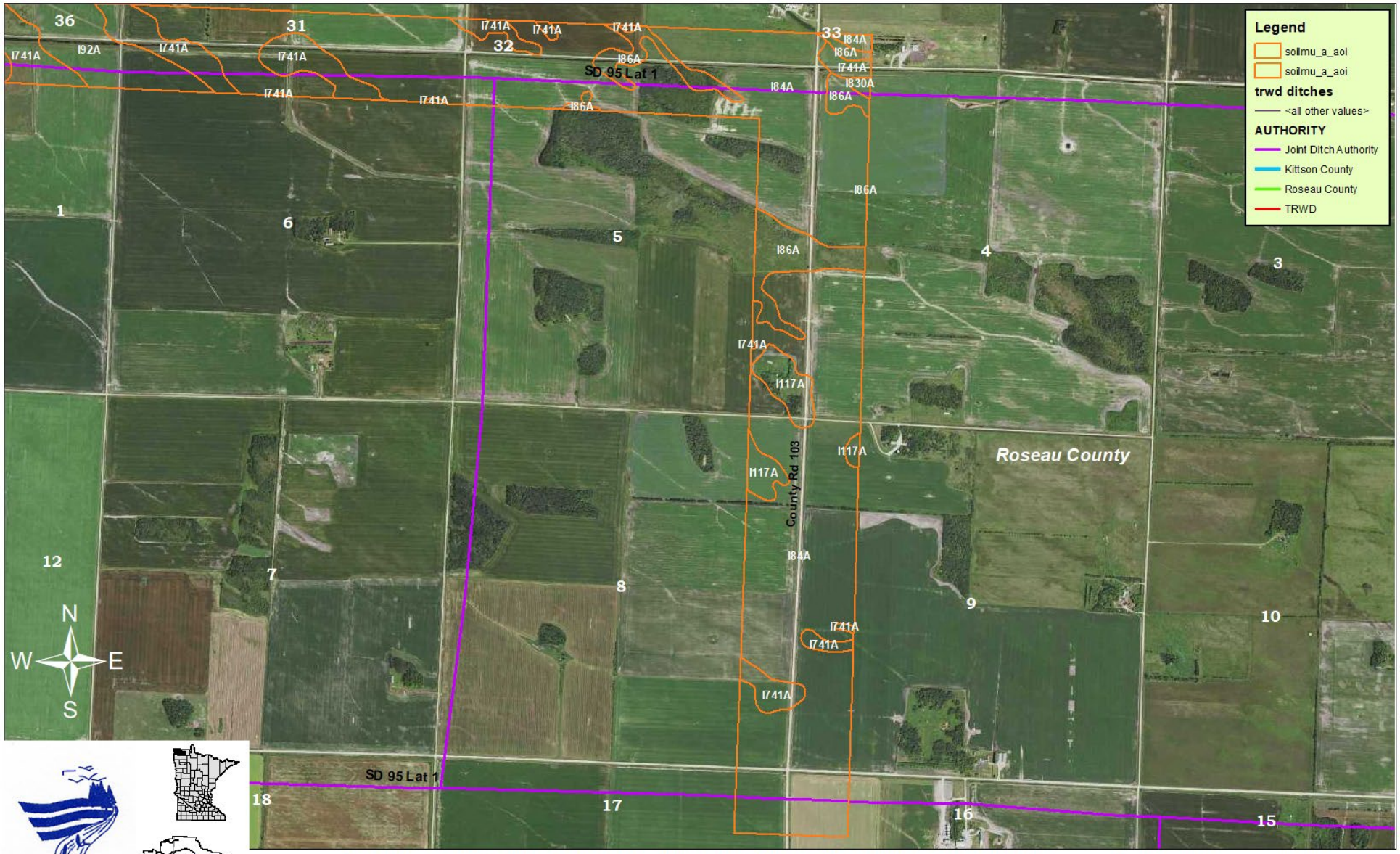
FUGURE 5 (2 OF 2): FLOODED AREAS EXISTING VS PROPOSED – 5 AND 10 YEAR EVENTS

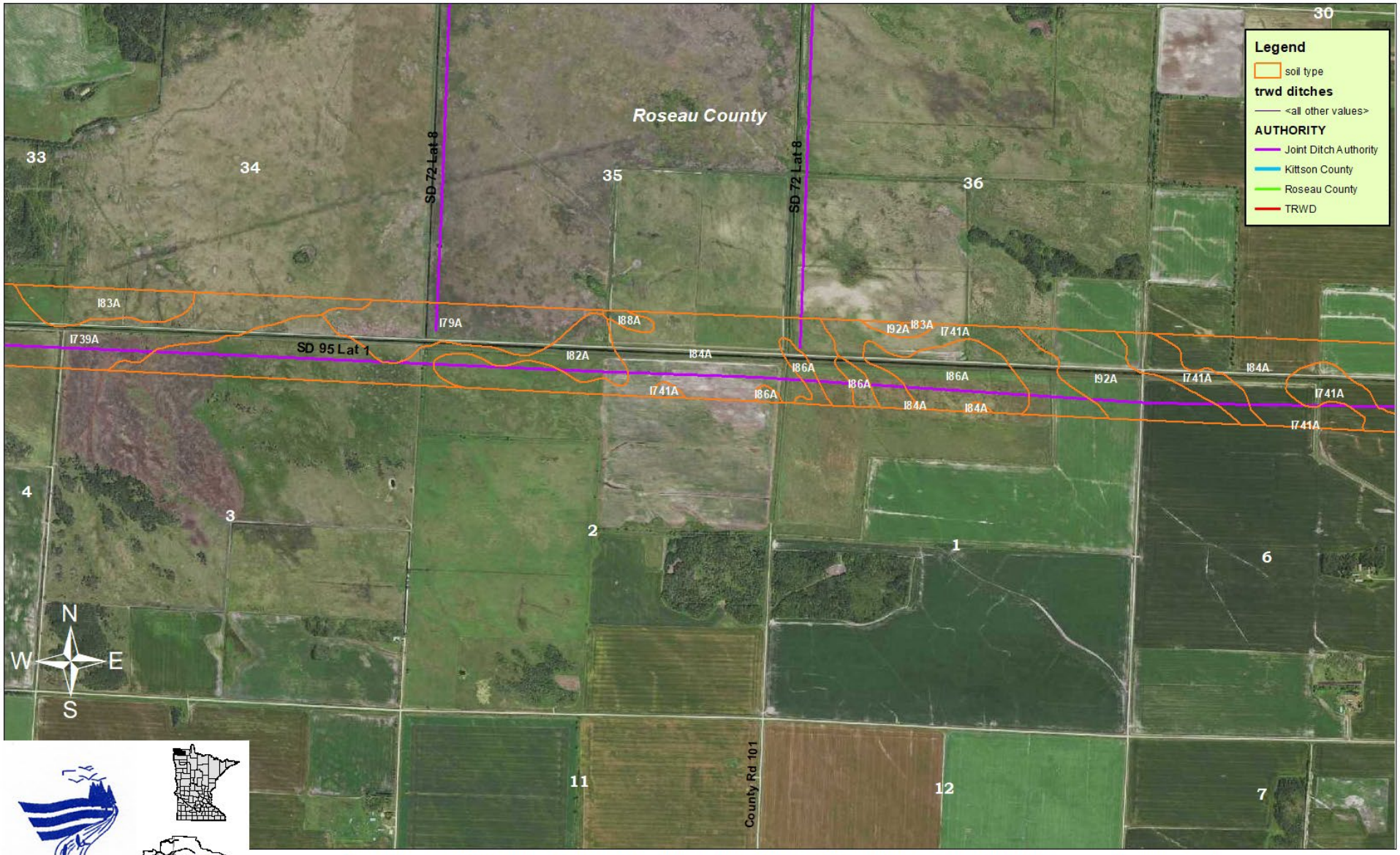


Flooded Acres by Area	With Project	Without Project
0 - SD 72 & 50	1,632	2,673
1 - SD 95	2,488	4,706
2 - KCWRP Pool	5,574	2,876
3 - Intact Rich Fen	2,826	3,357
4 - KCWRP Intact Fen	158	32
5 - June Berry 31	389	419

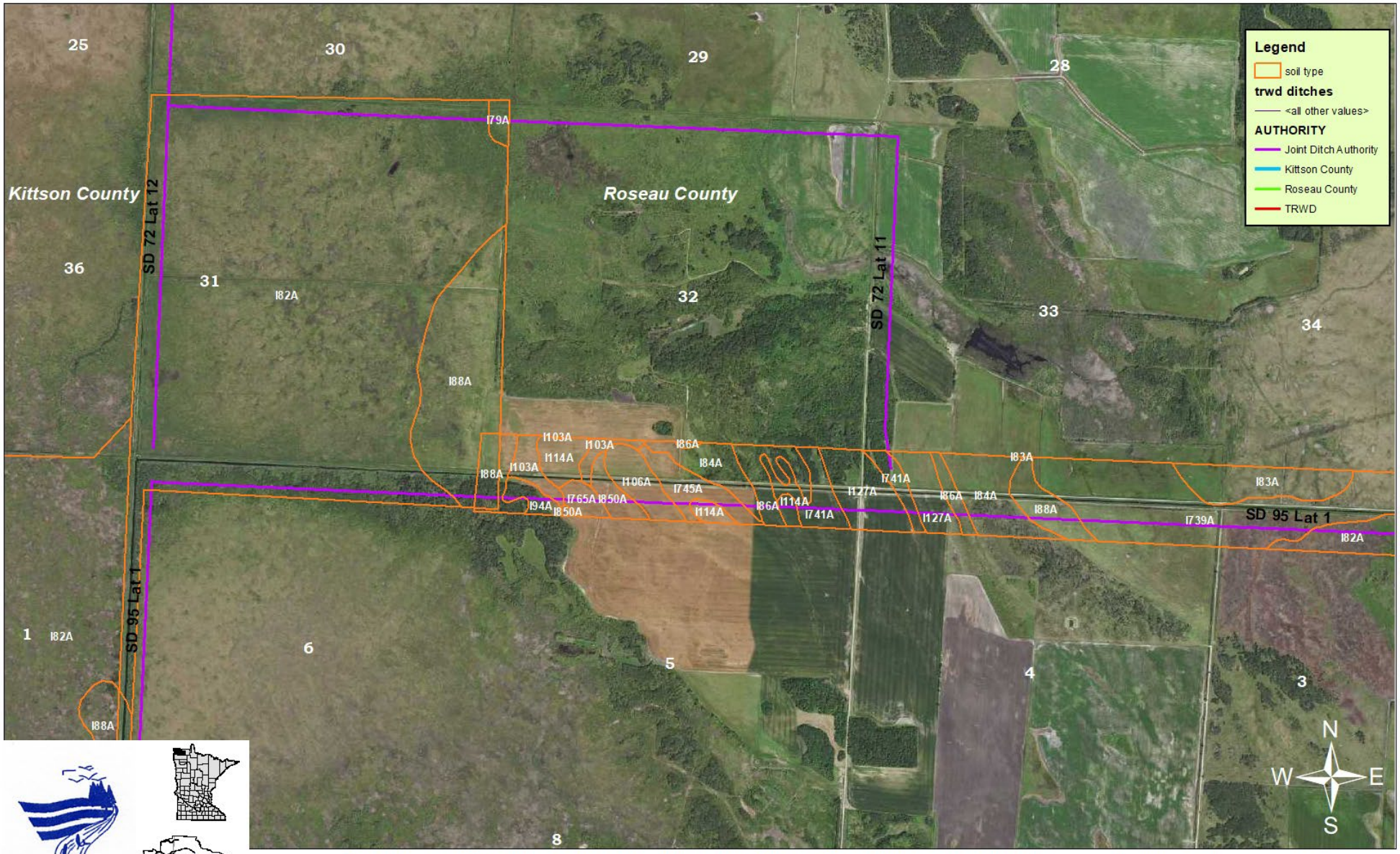
Flooded Acres by Area	With Project	Without Project
0 - SD 72 & 50	1,168	1,989
1 - SD 95	1,546	2,843
2 - KCWRP Pool	5,290	2,534
3 - Intact Rich Fen	1,945	2,453
4 - KCWRP Intact Fen	137	22
5 - June Berry 31	346	394

FIGURE 6: SOILS MAPS





Two Rivers Watershed District - Klondike Clean Water Retention Prj. #11
Soil Map Diked Inlet


Legend
soil type
trwd ditches
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AUTHORITY
Joint Ditch Authority
Kittson County
Roseau County
TRWD
Kittson County
Roseau County
SD 72 Lat 12
SD 72 Lat 11
SD 95 Lat 1
SD 95 Lat 1
25
30
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1
6
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I82A
I88A
I103A
I114A
I86A
I84A
I106A
I745A
I765A
I850A
I94A
I741A
I127A
I739A
I83A
N
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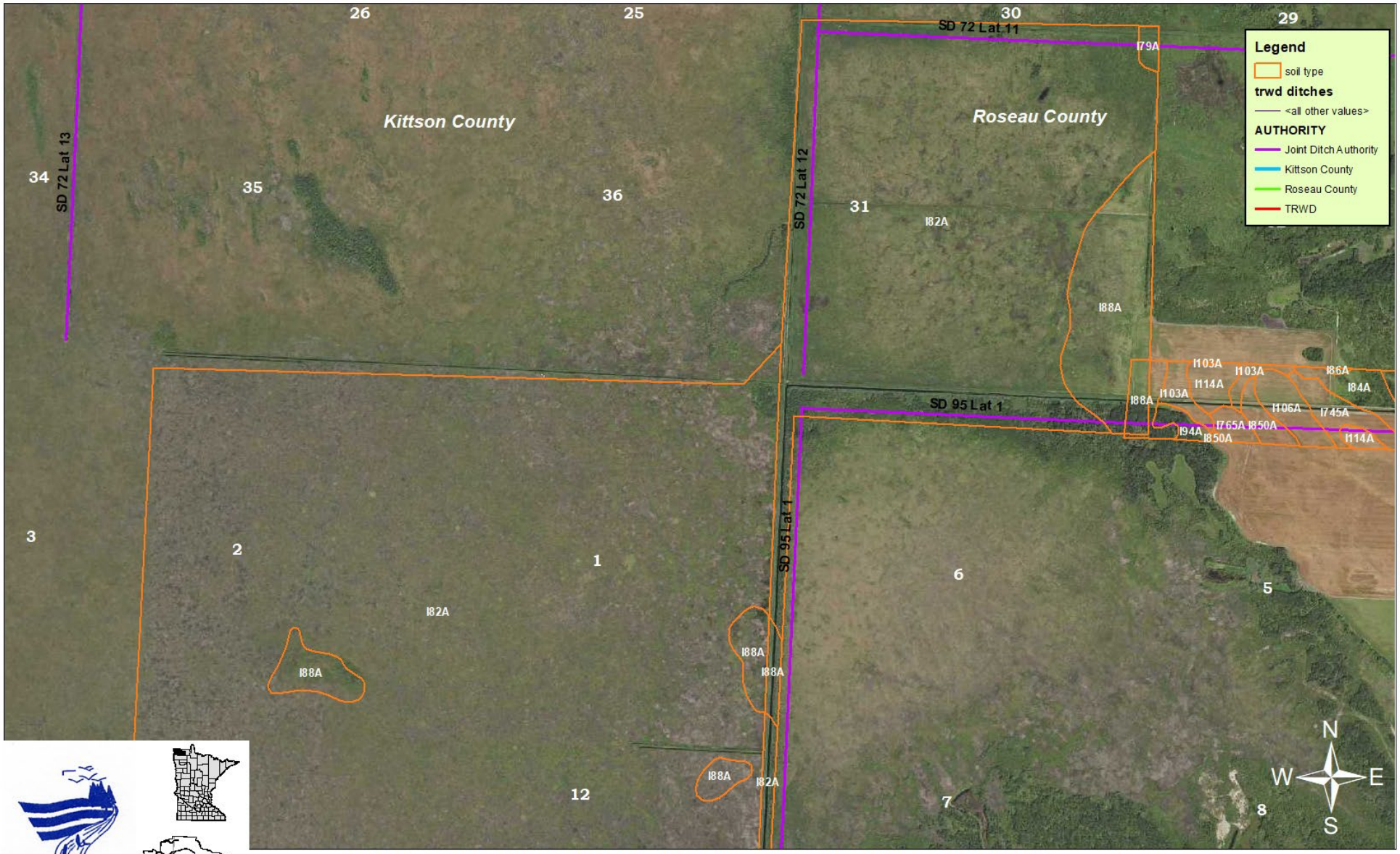
Two Rivers Watershed District
Two Rivers Watershed District - Klondike Clean Water Retention Prj. #11
Soil Map Diked Inlet & Impoundment
0 0.125 0.25 0.5 Miles


Kittson County
Roseau County
SD 72 Lat 13
SD 72 Lat 12
SD 72 Lat 11
SD 95 Lat 1
SD 95 Lat 1
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Legend
soil type
trwd ditches
<all other values>
AUTHORITY
Joint Ditch Authority
Kittson County
Roseau County
TRWD
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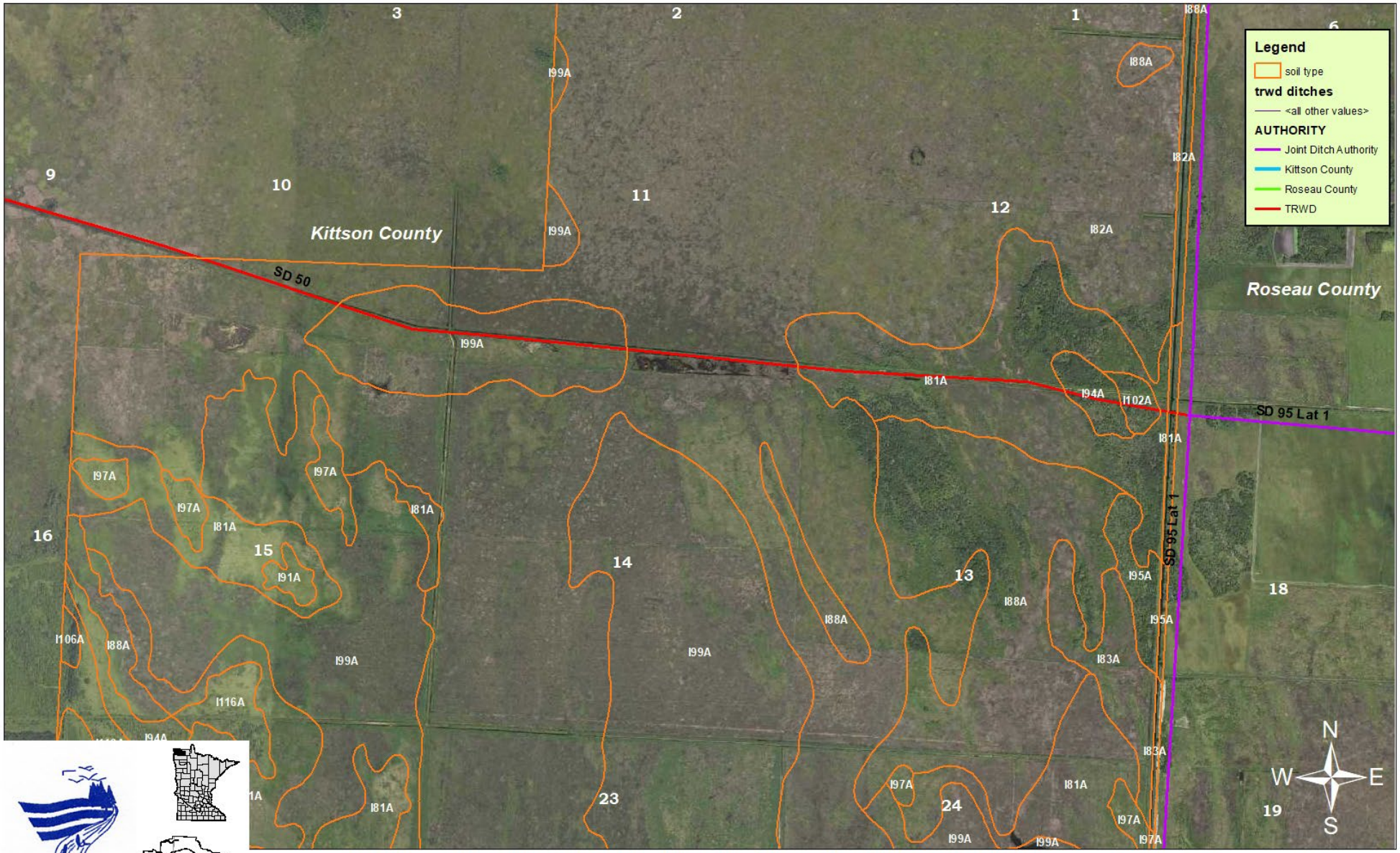
Two Rivers Watershed District
Two Rivers Watershed District - Klondike Clean Water Retention Prj. #11
Soil Map Impoundment
0 0.125 0.25 0.5 Miles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Joint Ditch Authority
Kittson County
Roseau County
TRWD
Kittson County
Roseau County
SD 50
SD 95 Lat 1
SD 95 Lat 1
I99A
I88A
I82A
I81A
I94A
I102A
I97A
I91A
I106A
I116A
I95A
I83A
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12
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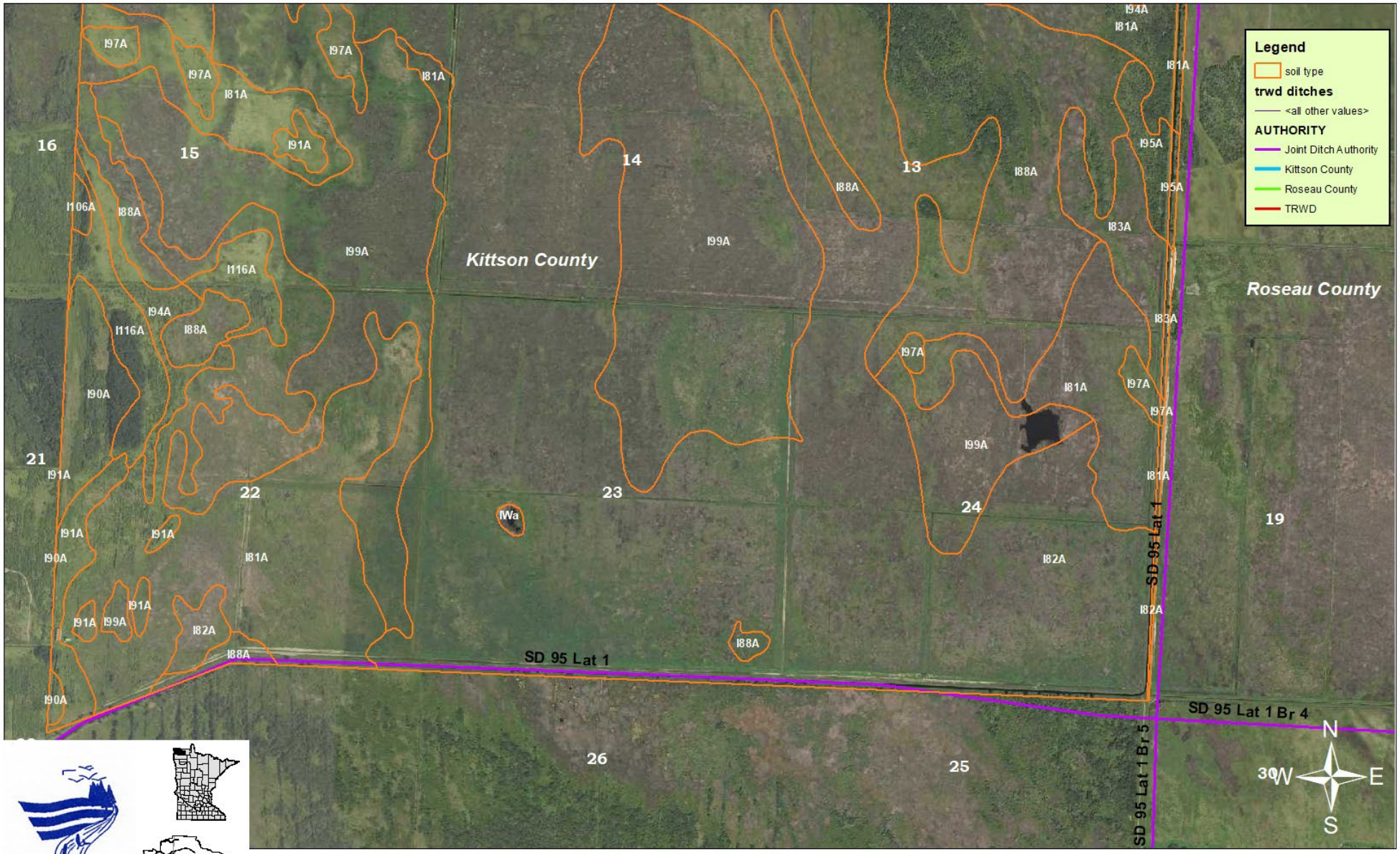
Two Rivers Watershed District - Klondike Clean Water Retention Prj. #11
Soil Map Impoundment
0 0.125 0.25 0.5 Miles
Two Rivers
Watershed District



Two Rivers Watershed District

Two Rivers Watershed District - Klondike Clean Water Retention Prj. #11
Soil Map Impoundment

Soils Legend:

Roseau County, Minnesota (MN135)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
I79A	Berner, Cathro and Haug soils, ponded, 0 to 1 percent slopes	24.8	0.30%
I81A	Northwood muck, dense till, 0 to 1 percent slopes	1.9	0.00%
I82A	Cathro muck, dense till, 0 to 1 percent slopes	591.9	7.90%
I83A	Wildwood muck, dense till, 0 to 1 percent slopes	6.3	0.10%
I84A	Percy loam, 0 to 1 percent slopes, very cobbly	183.2	2.40%
I86A	Percy mucky loam, 0 to 1 percent slopes	40.8	0.50%
I88A	Haug muck, 0 to 1 percent slopes	95.3	1.30%
I92A	Grano clay, 0 to 1 percent slopes	12.7	0.20%
I94A	Strathcona fine sandy loam, dense till, 0 to 1 percent slopes	0.6	0.00%
I95A	Kratka and Strathcona soils, dense till, 0 to 1 percent slopes	0.4	0.00%

I103A	Kratka fine sandy loam, dense till, 0 to 1 percent slopes	5.3	0.10%
I106A	Enstrom loamy fine sand, dense till, 0 to 2 percent slopes	6.2	0.10%
I114A	Foldahl fine sandy loam, dense till, 0 to 2 percent slopes	4.6	0.10%
I117A	Skagen loam, dense till, 0 to 2 percent slopes, very cobbly	4.7	0.10%
I127A	Percy loam, 0 to 1 percent slopes	12.8	0.20%
I739A	Dora muck, 0 to 1 percent slopes	40.9	0.50%
I741A	Boash clay loam, dense till, 0 to 1 percent slopes	41.8	0.60%
I745A	Espelie fine sandy loam, 0 to 2 percent slopes	6.6	0.10%
I765A	Huot fine sandy loam, 0 to 3 percent slopes	0.6	0.00%
I850A	Thiefriver fine sandy loam, 0 to 1 percent slopes	2.4	0.00%
Subtotals for Soil Survey		**1,083.90**	**14.40%**

Kittson County, Minnesota (MN069)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
I81A	Northwood muck, dense till, 0 to 1 percent slopes	768.5	10.20%

I82A	Cathro muck, dense till, 0 to 1 percent slopes	3,856.40	51.20%
I83A	Wildwood muck, dense till, 0 to 1 percent slopes	55.3	0.70%
I88A	Haug muck, 0 to 1 percent slopes	414.6	5.50%
I90A	Redby loamy fine sand, dense till, 0 to 3 percent slopes	58.7	0.80%
I91A	Rosewood fine sandy loam, dense till, 0 to 1 percent slopes	52.1	0.70%
I94A	Strathcona fine sandy loam, dense till, 0 to 1 percent slopes	53.3	0.70%

I95A	Kratka and Strathcona soils, dense till, 0 to 1 percent slopes	23.4	0.30%
I97A	Cormant loamy fine sand, dense till, 0 to 2 percent slopes	45	0.60%
I99A	Berner muck, dense till, 0 to 1 percent slopes	1,032.40	13.70%
I102A	Mavie fine sandy loam, dense till, 0 to 1 percent slopes	9.4	0.10%
I106A	Enstrom loamy fine sand, dense till, 0 to 2 percent slopes	4.6	0.10%
I116A	Grygla loamy fine sand, dense till, 0 to 1 percent slopes	72.9	1.00%
IWa	Water	3.1	0.00%
Subtotals for Soil Survey Area		**6,449.80**	**85.60%**

	Acres in AOI	Percent of AOI
Totals for Area of Interest	**7,538.90**	**100.00%**

FIGURE 7: BIODIVERSITY MAP

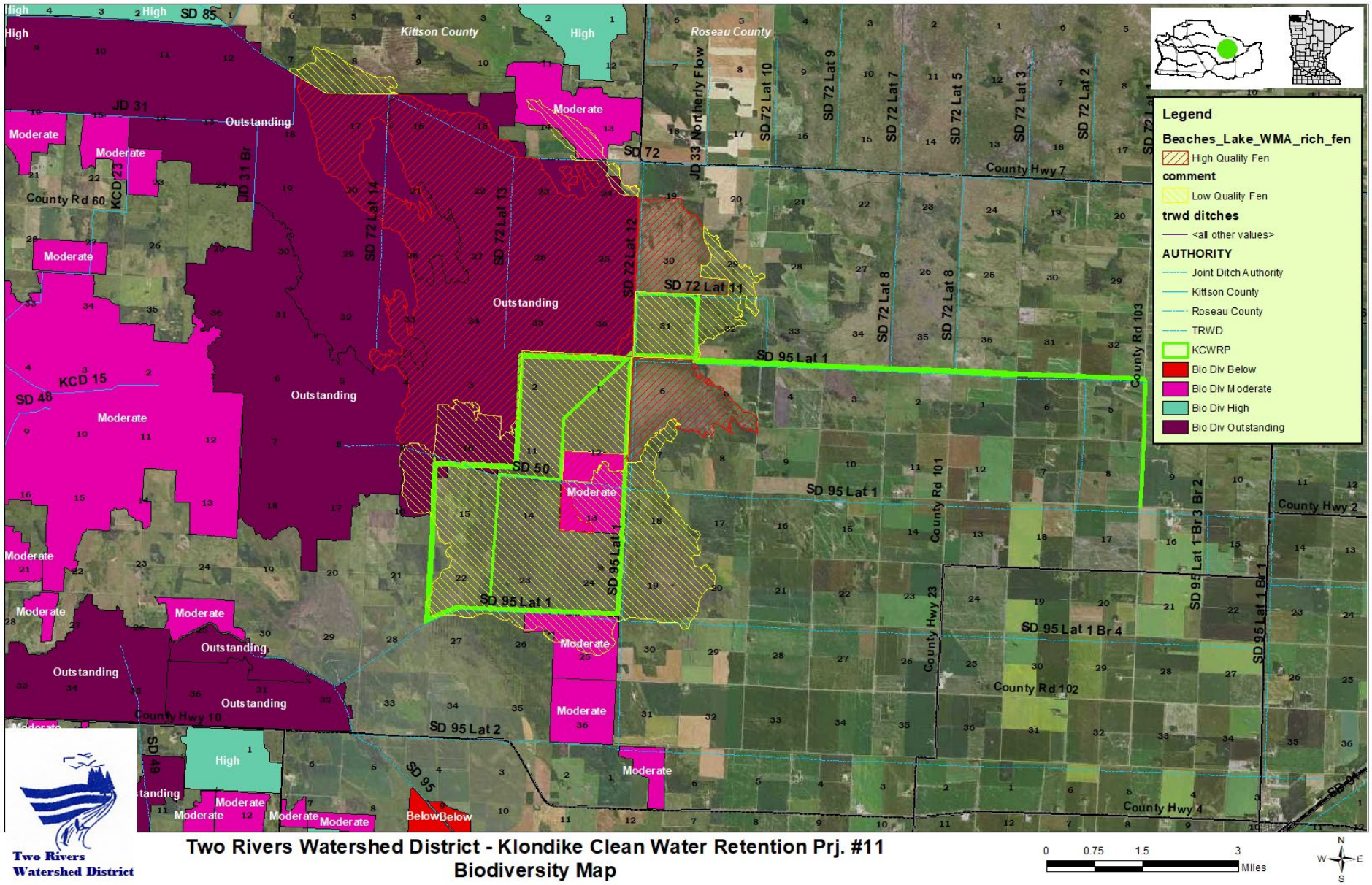
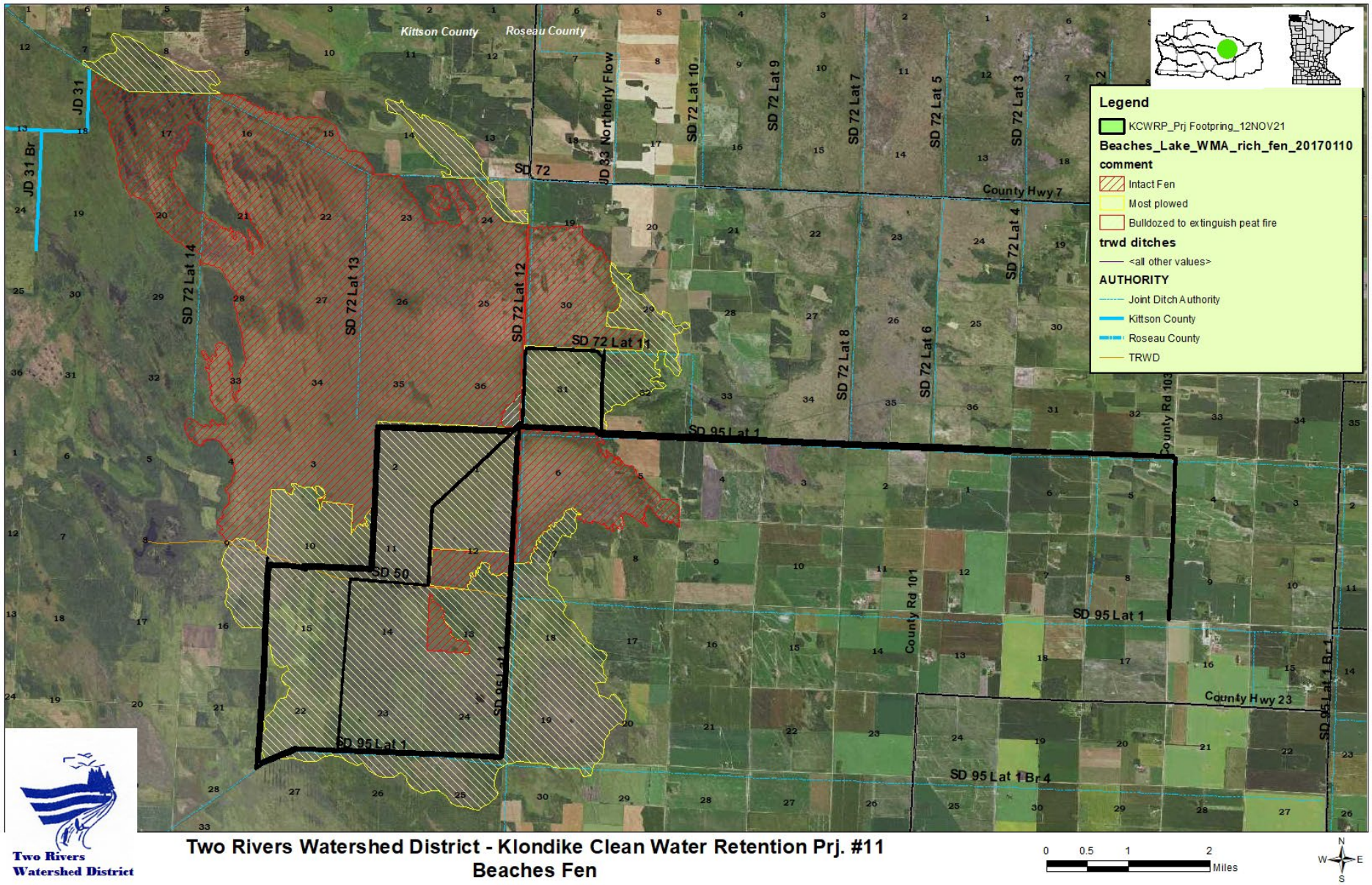


Figure 8. Beaches Fen



APPENDIX A: CONSTRUTION PLANS TYPICAL DRAWINGS AND COMPONENT DESCRIPTIONS

APPENDIX B: NATURAL RESOURCES ENHANCEMENT OBJECTIVES

APPENDIX C: CULTURAL RESOURCES REVIEW

APPENDIX D: ALTERNATIVES CONSIDERED