



Infiltration Analysis and Plan

Enbridge Energy, Limited Partnership • Line 3 Replacement Project

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ACRONYMS AND ABBREVIATIONS

Application	an application to the Minnesota Pollution Control Agency for a National Pollutant Discharge Elimination System/State Disposal System Individual Permit
BMPs	best management practices
EI	environmental inspector
Enbridge	Enbridge Energy, Limited Partnership
FdL Reservation	Fond du Lac Band of Lake Superior Chippewa Reservation
gpm	gallons per minute
HDD	horizontal directional drill
Individual NPDES/SDS Permit	National Pollutant Discharge Elimination System/State Disposal System Individual Permit
L3R	Line 3 Replacement Project
MDNR	Minnesota Department of Natural Resources
MPCA	Minnesota Pollution Control Agency
NPDES	National Pollutant Discharge Elimination System
Project	Line 3 Replacement Project
ROW	right-of-way
SDS	State Disposal System
SSURGO	Soil Survey Geographic Database

1.0 INTRODUCTION

Enbridge Energy, Limited Partnership (“Enbridge”) has submitted an application (“Application”) to the Minnesota Pollution Control Agency (“MPCA”) for a National Pollutant Discharge Elimination System (“NPDES”)/State Disposal System (“SDS”) Individual Permit (“Individual NPDES/SDS Permit”) to discharge process wastewater generated during construction of the Line 3 Replacement Project (“L3R” or “Project”). Enbridge is requesting authorization to discharge process wastewater generated by the Project associated with the following construction activities:

- Buoyancy water introduced during the horizontal direction drill (“HDD”) and push-pull installation processes
- Hydrostatic Testing
 - HDD (“pre-test”) segments
 - Mainline spread segments

L3R consists of approximately 355 miles of new 36-inch-diameter pipeline traversing the states of North Dakota, Minnesota, and Wisconsin, and terminating at the existing Enbridge Superior terminal facility near Superior, Wisconsin. The section of L3R that is the subject of this Application includes the replacement of approximately 282 miles of the existing 34-inch-diameter Line 3 pipeline with 330 miles of 36-inch-diameter pipeline and associated facilities from the North Dakota/Minnesota border to the Minnesota/Wisconsin border (see Figure 1.0-1). Enbridge’s Designated Route generally follows the existing Line 3 pipeline along the Enbridge Mainline System right-of-way (“ROW”) from the North Dakota/Minnesota border in Kittson County to the Clearbrook Terminal in Clearwater County. Next, L3R turns south from Clearbrook to generally follow an existing third-party crude oil pipeline ROW to Hubbard County. The route then turns east to generally follow other existing electric transmission lines until it rejoins with the Enbridge Mainline System ROW in St. Louis County through the Fond du Lac Band of Lake Superior Chippewa Reservation (“FdL Reservation”) to the Minnesota/Wisconsin border in Carlton County.

This Application applies to Project-related process wastewater discharges within the State of Minnesota and outside of the external boundaries of the FdL Reservation.

Authorization of this Individual NPDES/SDS Permit requires an NPDES/SDS antidegradation assessment under Minnesota Rules parts 7050.0250 through 7050.0335. As part of its antidegradation assessment, Enbridge assessed the alternative of infiltrating process wastewater at upland locations to avoid net increases in loading and other causes of degradation. Enbridge assessed infiltration of all potential process wastewater discharges, including moderate volume discharges, such as those associated with HDD pre-tests or buoyancy water, and high volume discharges associated with mainline spread hydrostatic tests. This infiltration analysis is presented in Section 2.0.

Based on the results of the infiltration analysis, Enbridge identified locations where infiltration is a prudent and feasible alternative to avoid degradation of surface water. For these selected locations, Enbridge developed an Infiltration Plan that describes Enbridge’s proposal to manage process wastewater discharge via infiltration at upland locations. The Infiltration Plan is presented in Section 3.0.



2.0 INFILTRATION ANALYSIS

Enbridge analyzed potential upland discharge locations in the vicinity of Project construction activities that will generate process wastewater to assess their suitability for infiltration and to estimate the discharge rate and the size of the area over which water would spread (the anticipated infiltration area). Section 2.1 describes the infiltration analysis method. Section 2.2 presents the infiltration analysis results and identifies which upland discharge locations were selected for inclusion in the Infiltration Plan (Section 3.0).

2.1 INFILTRATION ANALYSIS METHOD

The purpose of the infiltration analysis was to identify a potential upland discharge study area in the vicinity of each potential process wastewater discharge, and to estimate: 1) the discharge rate; 2) the size of the area over which water would spread before infiltrating (the anticipated infiltration area); and 3) the time that would be needed to infiltrate the discharge water (the infiltration duration). The infiltration analysis was a desktop assessment which used publicly available soils and topography data, as described below.

2.1.1 Identify Potential Upland Discharge Study Areas

For each discharge, Enbridge first identified a potential upland discharge study area. The objective was to identify an area adjacent to the ROW where HDD or mainline spread hydrostatic test activities will occur that has the topography and soils that allow for infiltration of the volume of water to be discharged. Sites also need to be located a sufficient distance from surface waters and existing infrastructure. For some discharge locations, no area with favorable characteristics for infiltration is present adjacent to the ROW. In these cases, the nearest area with favorable characteristics was identified.

The potential upland discharge study area (shown as blue outlined areas in the attached figures) does not represent the area over which water would spread during infiltration. Rather, it is a study area over which site-specific information was evaluated. For each potential upland discharge study area selected for the Infiltration Plan, Enbridge conducted additional assessment, as described in the subsequent subsections.

The acreages of the potential upland discharge study areas are listed in Table 2.2-1, and their locations are documented in the Large Figures in Appendix A for those that have been incorporated into the Infiltration Plan, and the Large Figures in Appendix B for those determined to not be feasible as discussed in Table 2.2-1.

2.1.2 Gather Information About Potential Upland Discharge Study Areas

Enbridge gathered site-specific soils information for each potential upland discharge study area. Soils data obtained from the Soil Survey Geographic Database (“SSURGO”) (Soil Survey Staff, 2018) were used to check various properties related to soil infiltration ability. Data taken from SSURGO included the following:

- Hydrologic Soil Group – The hydrologic soil group designations are based on estimates of runoff potential. Soils are assigned to one of four groups according to the estimated rate of water infiltration. Group A soils have a high infiltration rate, group B soils have a moderate infiltration rate, group C soils have a slow infiltration rate, and group D soils have

a very slow infiltration rate (Soil Survey Staff, 2018). Soil hydrologic group infiltration was used for qualitative screening.

- Saturated Hydraulic Conductivity – Saturated hydraulic conductivity refers to the ease with which pores in saturated soil can transmit water. This estimate is based on soil characteristics observed in the field, particularly structure, porosity, and texture (Soil Survey Staff, 2018). Saturated hydraulic conductivity values were used for the quantitative analyses.

2.1.3 Obtain Potential Discharge Volumes

Enbridge estimated discharge volumes associated with construction activities adjacent to each potential upland discharge study area, as shown in Table 2.2-1. Some potential upland discharge study areas are associated with more than one discharge, for example at locations adjacent to both an HDD crossing, push-pull installation, and/or the end of a mainline spread.

2.1.4 Estimate Discharge Rate, Infiltration Area, and Infiltration Duration

Estimates of the discharge rate, potential infiltration area, and infiltration duration were calculated (or assumed) based on the following:

- Discharge/infiltration water volumes were calculated by Enbridge's engineering staff.
- The saturated hydraulic conductivity reported in SSURGO (Soil Survey Staff, 2018) was assumed to be representative of the soil infiltration properties in the potential upland discharge study area.
- The discharge rate was set to be 660 gallons per minute ("gpm"), which is the rate listed for a 30-foot by 30-foot dewatering structure in Best Management Practice ("BMP") Typical Figure 44 (see Appendix C).
- The infiltration area was estimated by dividing the discharge rate (660 gpm) by the saturated hydraulic conductivity of the soils at the site.
- The estimated infiltration area was compared to the assumed maximum infiltration area of 0.5 acre.
 - If the calculated infiltration area was greater than 0.5 acre, then the infiltration area was set at 0.5 acre and the discharge rate was estimated by multiplying the saturated hydraulic conductivity of the soils at the site by the infiltration area (0.5 acre). This additional calculation provided an estimate of the maximum discharge rate (< 660 gpm) for locations with relatively low saturated hydraulic conductivity soils, while maintaining the 0.5-acre infiltration area.
- The discharge volume calculated by Enbridge's engineering staff was assumed to be the maximum infiltration volume for the associated test (HDD, mainline spread, or buoyancy water).
- The infiltration duration was estimated by dividing the discharge/infiltration volume by the selected discharge rate (660 gpm or < 660 gpm).

2.2 INFILTRATION ANALYSIS RESULTS

Results of the infiltration analysis are presented in Table 2.2-1. Enbridge evaluated the estimated infiltration durations and other factors (e.g., accessibility, required workspace) to identify locations where infiltration is a technically feasible. These locations were carried forward into the Infiltration Plan (Section 3.0), as noted on Table 2.2-1. All moderate volume discharges are included in the Infiltration Plan. Several high volume discharges are also included, including discharges for which the source water would be groundwater because the Minnesota Department of Natural Resources (“MDNR”), has indicated that it will condition the water appropriation permit to prohibit discharge of groundwater to surface water due to differences in water chemistry and potential impacts to aquatic organisms. Large Figures for locations in the Infiltration Plan are presented in Appendix A. Large Figures for locations not carried forward into the Infiltration Plan are presented in Appendix B.

3.0 INFILTRATION PLAN

The Infiltration Plan addresses locations where infiltration of process wastewater is a prudent and feasible alternative to avoid degradation of surface water based on the infiltration analysis described in Section 2.0. These locations are listed on Table 3.0-1.

This plan describes source waters, anticipated infiltration areas, and infiltration procedures, including treatment methods prior to discharge. It also presents the infiltration monitoring plan and a contingency action plan. Finally, it assesses potential impacts on groundwater.

3.1 SOURCE WATERS

The source waters to be used for construction activities are listed in Table 3.0-1. The source waters will be surface waters or groundwater; no municipal water sources are planned. Withdrawal of source water will be permitted under a water appropriation permit from the MDNR.

3.2 ANTICIPATED INFILTRATION AREAS

For the Infiltration Plan, Enbridge started with the potential upland discharge study areas identified in the infiltration analysis (Section 2.0), then gathered additional site specific information in order to identify one or more potential discharge location(s) within each potential upland discharge study area where the dewatering structures will be placed. Information assessed included the following:

- The statewide topographic dataset (U.S. Geological Survey, 2016), was used to estimate the average slope over the potential upland discharge study area.
- Topographic slope data (2-foot Light Detection and Ranging data) was used to identify potential flow paths from the infiltration analysis area to the nearest surface water.
- Access constraints identified by Enbridge; the potential infiltration area must be accessible from the construction workspace and located such that infiltration activities would not impact public infrastructure or surface water.

Table 2.2-1 Infiltration Analysis Results									
Approximate (Milepost)	Assessed Discharge Volume (gallons)	Associated Project feature(s)	Saturated Hydraulic Conductivity ^a (ft/d)	Discharge Rate ^b (gpm)	Estimated Infiltration Area ^c (acres)	Estimated Infiltration Duration ^d	Screening Assessment	MPCA ID	Large Figure
802.1	114,000	Red River HDD and Push-Pull Buoyancy Control	1.4	150 - 160	0.50	11.9 - 12.7 hrs	Suitable potential infiltration area for moderate volume discharge(s).	LA001	Large Figure A1
	7,300,000	Mainline Spread 1A				31.7 – 33.8 days	Due to infiltration duration and additional workspace requirements, not selected for infiltration of large volume discharges. This test is located adjacent to existing Enbridge pipelines. Additional workspace would be required on top of the existing lines for water storage.	N/A	
814.5	7,300,000	Mainline Spread 1A	0.02	2.2	0.50	2,304 days	Due to infiltration duration and additional workspace requirements, not selected for infiltration of large volume discharges.	N/A	Large Figure B1
	10,200,000	Mainline Spread 1B				3,220 days			
828.7	81,000	Tamarac River HDD and Push-Pull Buoyancy Control	9.2	660	0.32	2.0 hrs	Suitable potential infiltration area.	LA002	Large Figure A2
836.2	94,000	Middle River HDD and Push-Pull Buoyancy Control	9.8 - 11	660	0.27 - 0.30	2.4 hrs	Suitable potential infiltration area.	LA003	Large Figure A3
843.3	85,000	Snake River HDD and Push-Pull Buoyancy Control	23 - 32	660	0.09 - 0.13	2.1 hrs	Suitable potential infiltration area.	LA004	Large Figure A4
848.2	10,200,000	Mainline Spread 1B	11.5	660	0.25	10.7 days	Suitable potential infiltration area.	LA024	Large Figure A5
	7,900,000	Mainline Spread 1C				8.3 days			
864.8	170,000	Red Lake River HDD and Push-Pull Buoyancy Control	1.7 - 12	190 - 660	0.24 - 0.50	4.3 – 14.9 hrs	Suitable potential infiltration area for moderate volume discharge(s).	LA005	Large Figure A6
875.3	7,900,000	Mainline Spread 1C	10	660	0.29	8.3 days	Suitable potential infiltration area.	LA026	Large Figure A7
	6,200,000	Mainline Spread 1D				6.5 days			
875.9	150,000	Clearwater River HDD and Push-Pull Buoyancy Control	3.3	380	0.50	6.6 hrs	Suitable potential infiltration area for moderate volume discharge(s).	LA006	Large Figure A8
896.1	6,200,000	Mainline Spread 1D	26	660	0.11	6.5 days	The potential upland discharge location is located NW of the existing CP Rail Systems railroad tracks. The piping/hoses need to transport water from the test header within the construction workspace to the infiltration area would have to be placed over the tracks. Therefore, this was not selected for infiltration of mainline discharges.	N/A	Large Figure B2
	3,800,000	Mainline Spread 2A				4.0 days			
909.1	3,800,000	Mainline Spread 2A	4.3	490	0.50	5.4 days	Due to additional workspace requirements, not selected for infiltration of large volume discharges. In addition, the potential upland discharge area is located approximately 1,490 ft. from the end of the spreads, and piping/hoses would cross a highway. Workspace needed for water storage is not available due to the proximity of the test and the Clearbrook terminal and existing Enbridge lines.	N/A	Large Figure B3
	10,100,000	Mainline Spread 2B				14.3 days			
922.1	151,000	Clearwater River HDD and Push-Pull Buoyancy Control	39 - 42	660	0.07	3.8 hrs	Suitable potential infiltration area.	LA007	Large Figure A9
941.2	119,000	Mississippi River HDD and Push-Pull Buoyancy Control	1.8 - 26	200 - 660	0.11 - 0.50	3.0 – 9.9 hrs	Suitable potential infiltration area for moderate volume discharge(s).	LA008	Large Figure A10
944.1	10,100,000	Mainline Spread 2B	12.4	660	0.23	10.6 days	Enbridge unable to negotiate an agreement with landowner to conduct infiltration on their property.	N/A	Large Figure B4
	2,400,000	Mainline Spread 2C				2.5 days			
952.5	3,800,000	Mainline Spread 2A	17 - 20	660	0.15 - 0.17	4.0 days	Suitable potential infiltration area. In addition, source water for these mainline hydrostatic tests is groundwater. As a condition of the water appropriation permit, the MDNR is requiring that these discharges be infiltrated rather than discharged to surface water.	LA009	Large Figure A11
	10,100,000	Mainline Spread 2B				10.7 days			
	2,400,000	Mainline Spread 2C				2.6 days			
	3,900,000	Mainline Spread 2D				4.2 days			
	2,800,000	Mainline Spread 2E				3.0 days			
964.4	150,000	Hay Creek HDD and Push-Pull Buoyancy Control	25	660	0.12	3.8 hrs	Suitable potential infiltration area.	LA010	Large Figure A12
966.1	3,900,000	Mainline Spread 2D	2.6	290	0.50	9.3 days	Due to additional workspace requirements, not selected for infiltration of large volume discharges.	N/A	Large Figure B5
	2,800,000	Mainline Spread 2E				6.7 days			
973.9	192,000	Straight River HDD and Push-Pull Buoyancy Control	23	660	0.13	4.8 hrs	Suitable potential infiltration area.	LA011	Large Figure A13
975.6	2,800,000	Mainline Spread 2E	3.0	340	0.50	5.7 days	Due to additional workspace requirements, not selected for infiltration of large volume discharges.	N/A	Large Figure B6
	2,900,000	Mainline Spread 3A				5.9 days			
983.5	124,000	Shell River HDD and Push-Pull Buoyancy Control	25	660	0.12	3.1 hrs	Suitable potential infiltration area.	LA013	Large Figure A14

Table 2.2-1 Infiltration Analysis Results									
Approximate (Milepost)	Assessed Discharge Volume (gallons)	Associated Project feature(s)	Saturated Hydraulic Conductivity ^a (ft/d)	Discharge Rate ^b (gpm)	Estimated Infiltration Area ^c (acres)	Estimated Infiltration Duration ^d	Screening Assessment	MPCA ID	Large Figure
985.8	237,000	Shell River HDD and Push-Pull Buoyancy Control	25	660	0.12	6.0 hrs	Suitable potential infiltration area for moderate volume discharge(s).	LA014	Large Figure A15
	2,900,000	Mainline Spread 3A				3.1 days	The topography and property boundaries of this site limit the location and size of the infiltration area such that for large volume discharges there would not be adequate available space to effectively infiltrate. In addition, the adjacent landowners have not granted permission for infiltration to occur on their property.		
	9,100,000	Mainline Spread 3B				9.6 days			
991.0	86,000	Shell River HDD and Push-Pull Buoyancy Control	21 - 26	660	0.11 - 0.14	2.2 hrs	Suitable potential infiltration area.	LA015	Large Figure A16
993.1	88,000	Crow Wing River HDD	26	660	0.11	2.2 hrs	Suitable potential infiltration area.	LA016	Large Figure A17
1017.1	77,000	Pine River HDD and Push-Pull Buoyancy Control	26	660	0.11	1.9 hrs	Suitable potential infiltration area.	LA020	Large Figure A18
1017.3	2,900,000	Mainline Spread 3A	26	660	0.11	3.1 days	Suitable potential infiltration area.	LA025	Large Figure A19
	9,100,000	Mainline Spread 3B				9.6 days			
	6,900,000	Mainline Spread 3C				7.3 days			
1037.1	121,000	Daggett Brook HDD and Push-Pull Buoyancy Control	26	660	0.11	3.1 hrs	Suitable potential infiltration area.	LA021	Large Figure A20
1041.1	111,000	Spring Brook HDD	26.1	660	0.11	2.8 hrs	Suitable potential infiltration area for moderate volume discharge(s).	LA022	Large Figure A21
	6,900,000	Mainline Spread 3C				7.3 days	This site is located on top of a hill near Spring Brook (designated trout stream). Due to topography, there is potential for discharge water to leave the site and enter a culvert near State Highway MN-6 and into Spring Brook. Therefore, this site is not a suitable infiltration location for large volume discharges.		
	8,300,000	Mainline Spread 4A				8.7 days			
1066.6	241,000	Willow River HDD and Push-Pull Buoyancy Control	0.79	90	0.50	1.9 days	Suitable potential infiltration area for moderate volume discharge(s).	LA018	Large Figure A22
1069.4	241,000	Mississippi River HDD and Push-Pull Buoyancy Control	0.79 - 1.7	90 - 190	0.50	21.1 hrs - 1.8 days	Suitable potential infiltration area for moderate volume discharge(s). Due to additional workspace requirements, not selected for infiltration of large volume discharges. Any additional workspace would cause more temporary wetland impacts	LA017	Large Figure A23
1069.8	8,300,000	Mainline Spread 4A	26	660	0.11	8.7 days	Suitable potential infiltration area.	LA027	Large Figure A24
	4,600,000	Mainline Spread 4B				4.8 days			
1085.7	78,000	East Savanna River HDD and Push-Pull Buoyancy Control	2.4 - 6.2	270 - 660	0.47 - 0.50	2.0 - 4.8 hrs	Suitable potential infiltration area for moderate volume discharge(s).	LA019	Large Figure A25
	4,600,000	Mainline Spread 4B				4.8 – 11.8 days	The potential upland discharge location is located approximately 2,050 ft. from the spread ends. Due to additional workspace requirements, not selected for infiltration of large volume discharges.	N/A	
	10,000,000	Mainline Spread 5A				10.5 – 25.7 days			
1094.6	162,000	Push-Pull Buoyancy Control	0.81 – 1.0	90 – 110	0.50	24.5 – 30.0 hrs	Suitable potential infiltration area for moderate volume discharge(s).	LA023	Large Figure A26
1120.3	10,000,000	Mainline Spread 5A	31	660	0.09	10.5 days	The potential upland discharge location is located approximately 3,720 ft. from the spread ends, and piping would have to cross at least two roads, and the infiltration area is located in Chub Lake Park Not suitable for an infiltration location for mainline spread discharges.	N/A	Large Figure B7
	2,600,000	Mainline Spread 5B				2.7 days			
1129.4	2,600,000	Mainline Spread 5B	Due to topography, low soil saturated conductivity, and nearby surface waters, no potential infiltration area was identified					N/A	N/A
^a	From SSURGO (Soil Survey Staff, 2018). Saturated hydraulic conductivity values are converted from cm/s to ft/d.								
^b	The analysis assumed that where feasible, Enbridge would discharge at a rate of 660 gpm, which is the rate associated with a 30-foot by 30-foot dewatering structure in BMP Typical Figure 44 (Appendix C). For locations where discharge at 660 gpm resulted in an estimated infiltration area larger than 0.5 acre, the analysis scaled back the discharge rate to determine the maximum discharge rate for which infiltration can be accomplished within 0.5 acre. Enbridge may utilize multiple dewatering structures where space and site-specific conditions allow to reduce infiltration time.								
^c	The accuracy of the infiltration area estimate is a function of the SSURGO saturated hydraulic conductivity data, and may also be affected by vegetation, precipitation, and other physical factors. In practice, a larger infiltration area could be used if suitable space is available, with BMPs and monitoring as described in Section 3.4 to prevent flow from reaching surface water.								
^d	The infiltration duration estimate is based on the listed discharge rate and estimated infiltration area and assumes that the SSURGO saturated hydraulic conductivity represents the entire unsaturated zone and that it would be constant during the entire discharge period. The saturated hydraulic conductivity of the soil in the unsaturated zone may decrease during the discharge, depending on the depth to the water table and the transmissivity of the water table aquifer. If the saturated hydraulic conductivity decreases during the discharge, the discharge rate might need to be reduced and the infiltration duration would be longer. Alternately, infiltration duration could be shorter if a larger infiltration area is available, and/or a higher discharge rate can safely be used, with BMPs and monitoring as described in Section 3.4 to prevent flow from reaching surface water.								

Table 3.0-1 Infiltration Plan Summary											
Primary Source Water	Infiltration Location				Associated Project Feature(s)	Discharge Rate ^a (gpm)	Maximum Discharge Volume		Upland Discharge Area		Large Figure
	MPCA ID	Approximate Milepost	County	Township, Range, Section			gallons	acre-feet	Average slope ^b	Downslope distance to nearest surface water ^c	
Red River	LA001	802.1	Kittson County	T160N, R50W, S9	Red River HDD and Push-Pull Buoyancy Control	150 - 160	114,000	0.35	1.15	57	Large Figure A1
Tamarac River	LA002	828.7	Marshall County	T157N, R47W, S16	Tamarac River HDD and Push-Pull Buoyancy Control	660	81,000	0.25	1.06	228	Large Figure A2
Middle River	LA003	836.2	Marshall County	T156N, R46W, S18	Middle River HDD and Push-Pull Buoyancy Control	660	94,000	0.29	1.11	460	Large Figure A3
Snake River	LA004	843.3	Marshall County	T155N, R46W, S12	Snake River HDD and Push-Pull Buoyancy Control	660	85,000	0.26	1.10	145	Large Figure A4
Tamarac River	LA024	848.2	Marshall County	T155N, R45W, S33	Mainline Spread 1B	660	10,200,000	31.3	1.42	5,605	Large Figure A5
Red Lake River			Marshall County	T155N, R45W, S33	Mainline Spread 1C	660	7,900,000	24.24	1.42	5,605	
Red Lake River	LA005	864.8	Pennington County	T153N, R43W, S32	Red Lake River HDD and Push-Pull Buoyancy Control	190 - 660	170,000	0.52	2.61	0	Large Figure A6
Red Lake River	LA026	875.3	Red Lake County	T151N, R42W, S4 &S9	Mainline Spread 1C	660	7,900,000	24.24	2.14	590	Large Figure A7
Clearwater River			Red Lake County	T151N, R42W, S4 &S9	Mainline Spread 1D	660	6,200,000	19.03	2.14	590	
Clearwater River	LA006	875.9	Red Lake County	T151N, R42W, S9	Clearwater River HDD and Push-Pull Buoyancy Control	380	150,000	0.46	1.70	0	Large Figure A8
Clearwater River	LA007	922.1	Clearwater County	T147N, R37W, S21	Clearwater River HDD and Push-Pull Buoyancy Control	660	151,000	0.46	1.28	29	Large Figure A9
Mississippi River	LA008	941.2	Clearwater County	T145N, R36W, S35	Mississippi River HDD and Push-Pull Buoyancy Control	200 - 660	119,000	0.37	2.47	0	Large Figure A10
Clearwater River	LA009	952.5	Hubbard County	T143N, R35W, S20	Mainline - Spread 2A/2B	660	10,100,000	31.3	6.37	1,108	Large Figure A11
Well #718159			Hubbard County	T143N, R35W, S20	Mainline - Spread 2C/2D	660	3,900,000	12.02	6.37	1,108	
Well #763975			Hubbard County	T143N, R35W, S20	Mainline - Spread 2E	660	2,800,000	8.59	6.37	1,108	
Well #763975	LA010	964.4	Hubbard County	T141N, R35W, S20	Hay Creek HDD and Push-Pull Buoyancy Control	660	150,000	0.46	3.13	68	Large Figure A12
Well #232423	LA011	973.9	Hubbard County	T140N, R35W, S32	Straight River HDD and Push-Pull Buoyancy Control	660	192,000	0.59	1.37	601	Large Figure A13
Shell River	LA013	983.5	Hubbard County	T139N, R35W, S35	Shell River HDD and Push-Pull Buoyancy Control	660	124,000	0.38	2.41	864	Large Figure A14
Shell River	LA014	985.8	Hubbard County	T139N, R34W, S32	Shell River HDD and Push-Pull Buoyancy Control	660	237,000	0.73	2.86	197	Large Figure A15
Well # 465115	LA015	991.0	Wadena County	T138N, R34W, S1	Shell River HDD and Push-Pull Buoyancy Control	660	86,000	0.26	3.02	364	Large Figure A16
Well # 797182	LA016	993.1	Wadena County	T138N, R33W, S5	Crow Wing River HDD and Push-Pull Buoyancy Control	660	88,000	0.27	2.30	386	Large Figure A17
Pine River	LA020	1017.1	Cass County	T138N, R29W, S8	Pine River HDD and Push-Pull Buoyancy Control	660	77,000	0.24	5.62	604	Large Figure A18
Pine River	LA025	1017.3	Cass County	T138N, R29W, S8	Mainline Spread 3A	660	2,900,000	8.9	6.64	197	Large Figure A19
					Mainline Spread 3B/3C	660	9,100,000	27.93	6.64	197	
Daggett Brook	LA021	1037.1	Cass County	T139N, R26W, S19	Daggett Brook HDD and Push-Pull Buoyancy Control	660	121,000	0.37	4.74	139	Large Figure A20
Daggett Brook	LA022	1041.1	Cass County	T139N, R26W, S15	Spring Brook HDD	660	111,000	0.34	3.40	514	Large Figure A21

Table 3.0-1 Infiltration Plan Summary											
Primary Source Water	Infiltration Location				Associated Project Feature(s)	Discharge Rate ^a (gpm)	Maximum Discharge Volume		Upland Discharge Area		Large Figure
	MPCA ID	Approximate Milepost	County	Township, Range, Section			gallons	acre-feet	Average slope ^b	Downslope distance to nearest surface water ^c	
Willow River	LA018	1066.6	Aitkin County	T51N, R24W, S31	Willow River HDD and Push-Pull Buoyancy Control	90	241,000	0.23	1.02	2	Large Figure A22
Mississippi River	LA017	1069.4	Aitkin County	T51N, R24W, S27	Mississippi River HDD and Push-Pull Buoyancy Control	90 - 190	241,000	0.38	2.24	15	Large Figure A23
Mississippi River	LA027	1069.8	Aitkin County	T51N, R24W, S27	Mainline Spread 4A/4B	660	8,300,000	25.47	4.89	100	Large Figure A24
East Savanna River	LA019	1085.7	St. Louis County	T51N, R21W, S20	East Savanna River HDD and Push-Pull Buoyancy Control	270 - 660	78,000	0.24	1.48	0	Large Figure A25
Trench Water	LA023	1094.6	St. Louis County	T151N, R20W, S27	Push-Pull Buoyancy Control	90 – 110	162,000	0.78	6.96	228	Large Figure A26
^a The analysis assumed that where feasible, Enbridge would discharge at a rate of 660 gpm, which is the rate associated with a 30-foot by 30-foot dewatering structure in BMP Typical Figure 44 (Appendix C). For locations where discharge at 660 gpm resulted in an estimated infiltration area larger than 0.5 acre, the analysis scaled back the discharge rate to determine the maximum discharge rate for which infiltration can be accomplished within 0.5 acre. Enbridge may utilize multiple dewatering structures where space and site-specific conditions allow to reduce infiltration time.											
^b From statewide topographic dataset (U.S. Geological Survey, 2016).											
^c The distance from the downslope edge of the potential upland discharge area to the nearest surface water body or delineated wetland.											

The potential discharge locations are shown in the Large Figures in Appendix A; however, the final location(s) within each upland discharge study area will be selected in the field by Enbridge's environmental inspector ("EI"). Prior to final selection of each discharge location and before the discharge event, the Field Conditions Inspection Sheet (see Appendix D) will be completed by an Environmental Engineer, soils scientist, or a Professional Geologist who has reviewed the site-specific conditions present at the time of construction. The EI will consider procedures in Section 5.0, BMP Typical Figure 44 (see Appendix C), the information provided in the Field Conditions Inspection Sheet (see Appendix D), and the applicable figures in Appendix A when selecting the final discharge location(s).

For each potential discharge location, an "anticipated infiltration area" was mapped (see Large Figures in Appendix A) using topography and the infiltration area calculations provided in Table 2.2-1; however, the actual infiltration area may change pending field conditions at the time of the discharge (e.g., higher soil saturation at time of discharge may expand the infiltration area). The size of the anticipated infiltration area will be equal to the area of the dewatering structure plus the additional area that water flows beyond the dewatering structure before infiltrating. The infiltration procedures described in Section 3.3 will be used to prevent discharge from flowing beyond property where access has been obtained, into areas with sensitive resources, or to surface water.

3.3 INFILTRATION PROCEDURES

This section describes the infiltration procedures that would be used at all infiltration locations, as well as the BMPs that will be implemented at each infiltration site.

3.3.1 Procedures For All Infiltration Locations

Some infiltration procedures would be common to all proposed infiltration locations. Water will be pumped from the pipeline to a dewatering structure located at an upland discharge location as shown in this Infiltration Plan, or as modified in the field by Enbridge's EI, as described in Section 3.2. The dewatering structure will include a straw bale structure that will be lined with geotextile fabric and/or filter bag (refer to Typical Figure 44 in Appendix C) for additional details regarding the dewatering structure. The dewatering structure will be sized appropriately for the rate of discharge. Enbridge may utilize multiple dewatering structures where space and site-specific conditions allow to reduce infiltration time. Water would flow out from the dewatering structure(s) and spread across the infiltration area before infiltrating.

Enbridge will use BMPs to manage the infiltration such that no flow reaches surface waters, and such that channelized flow and erosion do not occur. Potential locations of BMPs are shown on the Infiltration Plan Large Figures in Appendix A. Based on conditions in the field, Enbridge's EI will adjust these locations as necessary. Enbridge will monitor the discharge as described in Section 3.4, and if excessive ponding or unanticipated flow is observed will reduce the discharge rate to prevent water from causing erosion or transporting sediment-laden water to a surface water feature. Section 3.5 provides additional details regarding the procedures Enbridge would use to prevent discharge from reaching surface waters.

3.3.2 Procedures for Infiltration of Process Wastewater Associated with Push-Pull Construction

The push-pull buoyancy control water will be first directed to a frac tank where the solids will be allowed to settle, and the water will be visually inspected and/or tested for parameters of concern per permit requirements. Enbridge will then process the water through a filtration system designed to treat the water to meet permit conditions prior to infiltration. The filtration system consists of a sand filter (could be filled with greensand media) and 0.5-micron bag filter with optional oxidation, dechlorination, and carbon treatments sized for the corresponding discharge volume.

Once the water is treated to meet permit limits, Enbridge will direct the water to an upland discharge area for infiltration using the procedures described in Section 3.3.1.

3.3.3 Procedures for Infiltration of Process Wastewater Associated with HDD Construction

The HDD pre-test and/or buoyancy control water will be directed to an upland infiltration area using the procedures described in Section 3.3.1. For those infiltration areas where a discharge rate below 500 gpm¹ is warranted due to soil conditions as described in Table 2.2-1, Enbridge may either reduce the rate of discharge from the pipe or discharge water first to frac tank(s) to further reduce the discharge rate for the dewatering structure sized appropriately for the site.

Alternatively, Enbridge may temporarily store the pre-test water in frac tanks for reuse as buoyancy control water that is introduced into the pipe during the pullback process. Following the installation of the HDD pipe segment, the buoyancy water will be discharged to a straw bale structure lined with geotextile fabric and/or filter bag in the upland infiltration area (Section 3.3.1).

3.3.4 Procedures for Infiltration of Process Wastewater Associated with Mainline Spread Construction

Mainline hydrostatic test water will first be directed to frac tanks. Frac tanks are needed so that if unanticipated pressure issues occur as the water is draining from the pipe, it does not adversely affect the filtration system. The hydrostatic test water will then be routed through the filtration system that consists of a sand filter and 0.5-micron bag filter with optional carbon pods sized for the corresponding discharge volume. After the filtration system, the discharge will be directed to a straw bale structure lined with geotextile fabric and/or filter bag in the upland infiltration area as described in Section 3.3.1.

3.4 INFILTRATION MONITORING PLAN

This section describes the actions that Enbridge will take to monitor infiltration of discharges associated with this Plan.

Discharge monitoring will occur in accordance with “Infiltration BMP Decision Tree” provided in Appendix C.

¹ Enbridge prefers to maintain the discharge rate from the pipe above 500 gpm to avoid potential issues with the dewatering process; however, for the relatively shorter HDD segments, Enbridge may be able to further reduce the rate during the dewatering process.

Enbridge will monitor the water level within the dewatering structure to avoid overfilling. Enbridge will also monitor the discharge from the dewatering structure and associated infiltration area for excessive ponding, erosion, channelized flow, and potential for off-site discharge of sediment. Enbridge would install temporary erosion and sediment control BMPs as necessary and adjust discharge rates to avoid off-site discharge of sediment or channelization of flow. BMPs may include perimeter controls such as silt fence, straw bales or filter socks (see Figures 6, 8, and 9 of Appendix C) or temporary slope breakers (see Figure 11 of Appendix C). Potential BMP locations are shown on the Large Figures in Appendix A; however, the exact BMP locations and types will be selected in the field based on conditions at the time of discharge.

3.5 CONTINGENCY ACTION PLAN

This section outlines the procedures and contingency action plan for to prevent and respond to discharges of untreated water that occur outside of dewatering structures and not in accordance with this Infiltration Plan.

Prior to discharging, the discharge equipment (i.e., water pipes, hoses, storage tanks, filtration system, dewatering structures) will be inspected to ensure that equipment is in good working order. Inspections will be documented on the Field Conditions Inspection Sheet (Appendix D), and equipment that is not found to be in good working order will be repaired or replaced. Enbridge will continue to monitor equipment throughout the discharge event, and repair or replace equipment as needed.

Enbridge will maintain recovery kits containing materials to adequately contain and recover foreseeable untreated discharges. These kits may include, but are not limited to, straw bales, containment barriers, skimmer pumps, and holding tanks. This equipment will be located near fuel storage areas, near each waterbody crossing, and at other locations as necessary and be readily available.

3.5.1 Untreated Discharge Response

- If an untreated discharge should occur during dewatering operations, STOP the operation until the untreated discharge is controlled and the situation corrected.
- The Contractor's Construction Superintendent or representative will notify the Enbridge Representative and the EI immediately, regardless of volume.
- The source of the untreated discharge shall be identified and contained immediately.
- For larger volumes, the material will be contained and recovered (pumped to a holding tank). The recovered process wastewater will be then be treated and discharged in accordance with this Infiltration Plan (Section 3.3).
- Smaller volumes that infiltrate will be documented on the Field Conditions Inspection Sheet.
- To the maximum extent possible, flowing untreated discharges will be contained using best management practices in Appendix C before reaching surface waters or wetlands.

Enbridge has also developed a Contingency Action Plan to describe actions Enbridge would take during dewatering:

- to address excessive ponding or unanticipated overland flow; and

- in frozen or saturated ground conditions.

To address excessive ponding or unanticipated overland flow, Enbridge has developed a two-part contingency plan.

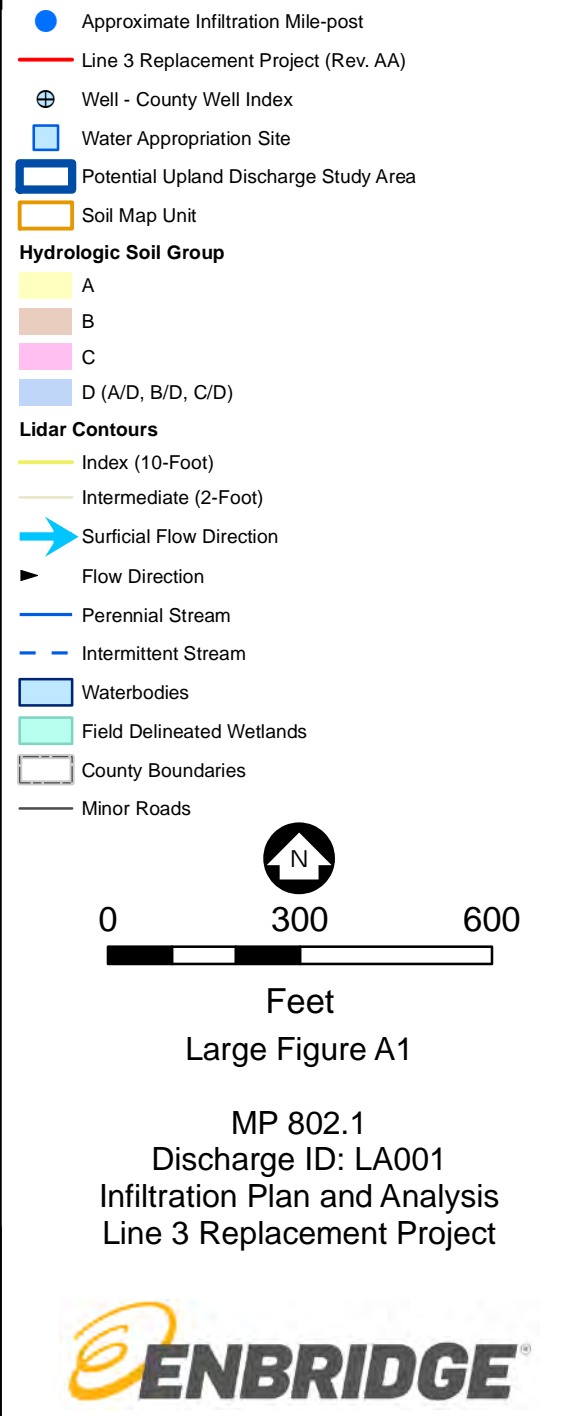
- First, Enbridge will attempt to reduce ponding and/or unanticipated overland flow by decreasing the discharge rate and, if needed, by deploying additional BMPs (see BMP Decision Tree in Appendix C). Enbridge's EI will direct the contractor to decrease the discharge rate if Enbridge's EI observes conditions during construction that limit infiltration as compared to what was estimated by the infiltration analysis. Such conditions could include saturated or frozen conditions, or site-specific variability in soil characteristics. Enbridge's EI will then monitor the infiltration area under the decreased discharge rate to observe ponding and flow patterns, and further decrease the discharge rate if needed.
- If reduction of the discharge rate does not address ponding or flow conditions, Enbridge will stop the discharge until such time soil conditions improve or implement the alternate discharge method described in the NPDES/SDS Application and approved by the MPCA.

In some circumstances Enbridge may choose to stop discharges to the infiltration area and implement the alternate discharge method described in the NPDES/SDS Application and approved by the MPCA without attempting to reduce discharge rates.

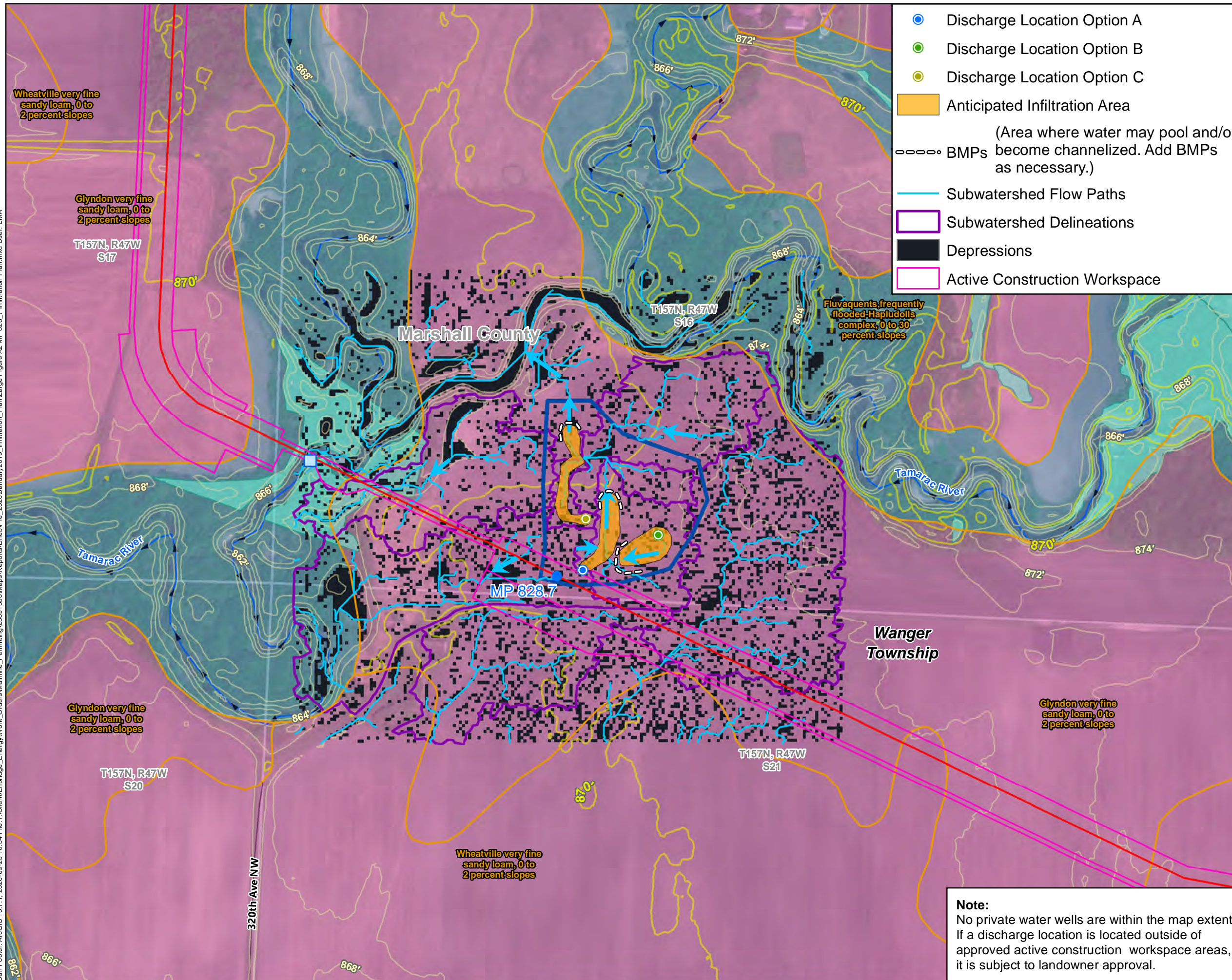
In frozen or saturated ground conditions, where infiltration is not feasible, Enbridge will implement the alternate discharge method described in the NPDES/SDS Application and approved by the MPCA.

Appendix A

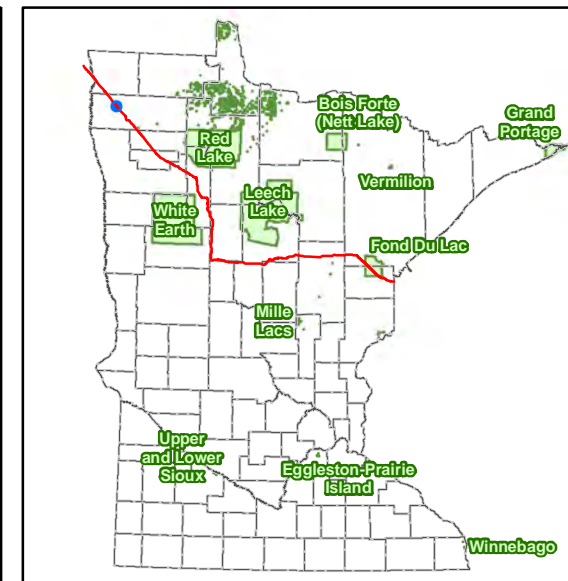
Large Figures for Locations in the Infiltration Plan



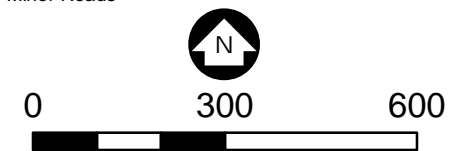
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- Discharge Location Option A
- Discharge Location Option B
- Discharge Location Option C
- Anticipated Infiltration Area
(Area where water may pool and/or BMPs become channelized. Add BMPs as necessary.)
- Subwatershed Flow Paths
- Subwatershed Delineations
- Depressions
- Active Construction Workspace



- Approximate Infiltration Mile-post
- Line 3 Replacement Project (Rev. AA)
- ⊕ Well - County Well Index
- Water Appropriation Site
- Potential Upland Discharge Study Area
- Soil Map Unit
- Hydrologic Soil Group**
 - A
 - B
 - C
 - D (A/D, B/D, C/D)
- Lidar Contours**
 - Index (10-Foot)
 - Intermediate (2-Foot)
 - Surficial Flow Direction
 - Flow Direction
 - Perennial Stream
 - Intermittent Stream
 - Waterbodies
 - Field Delineated Wetlands
 - County Boundaries
 - Minor Roads



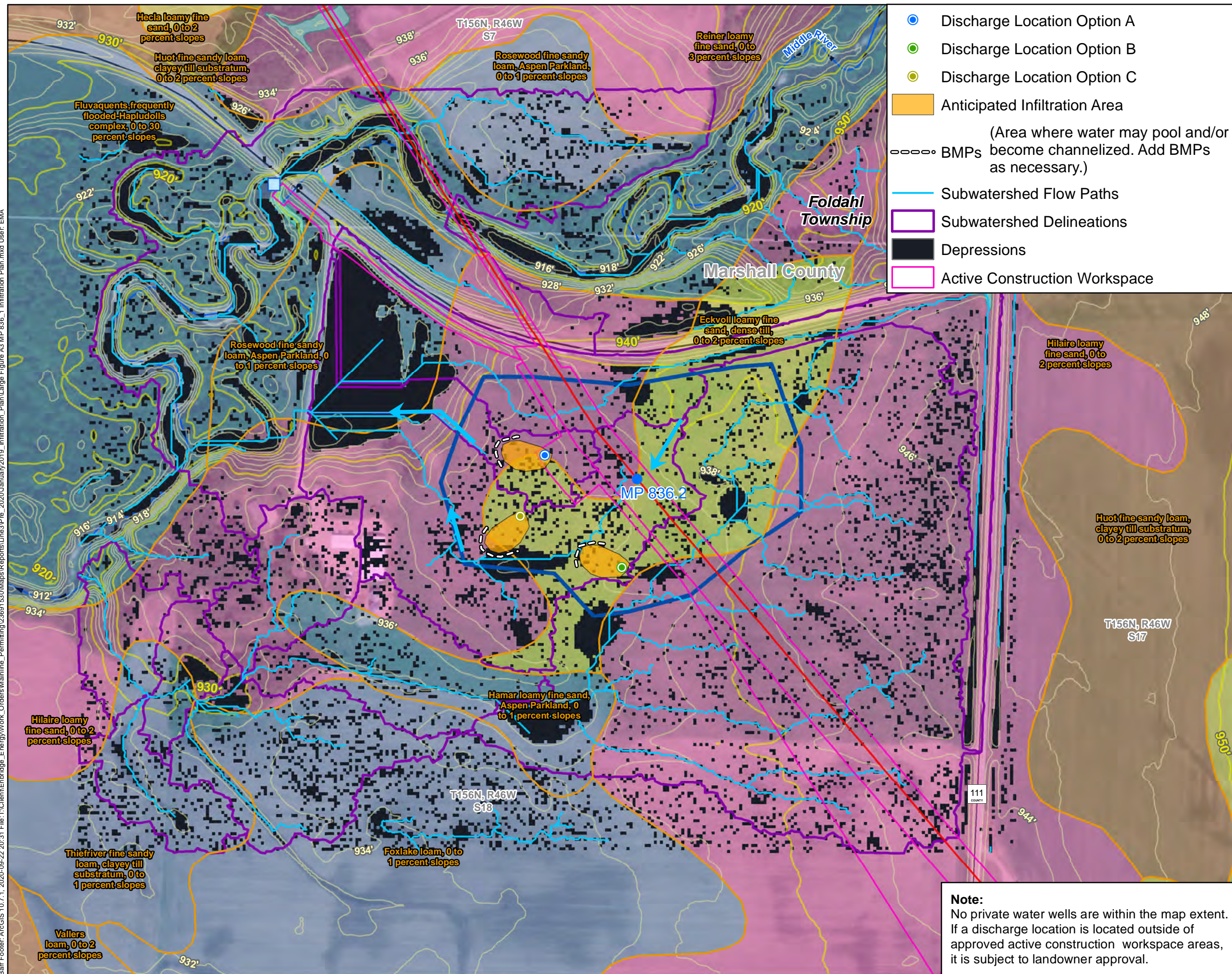
Feet
Large Figure A2

MP 828.7
Discharge ID: LA002
Infiltration Plan and Analysis
Line 3 Replacement Project

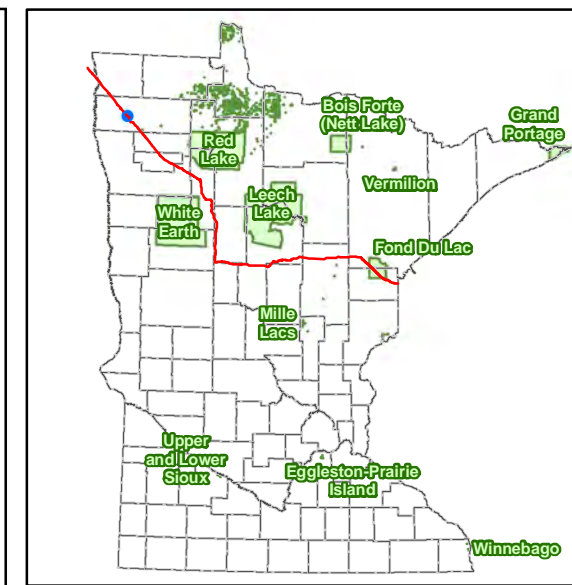
Note:
No private water wells are within the map extent.
If a discharge location is located outside of approved active construction workspace areas, it is subject to landowner approval.



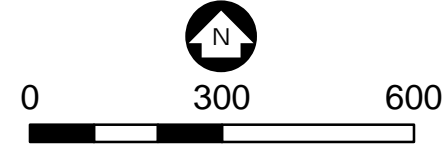
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- Discharge Location Option A
- Discharge Location Option B
- Discharge Location Option C
- Anticipated Infiltration Area
- (Area where water may pool and/or BMPs become channelized. Add BMPs as necessary.)
- Subwatershed Flow Paths
- Subwatershed Delineations
- Depressions
- Active Construction Workspace



- Approximate Infiltration Mile-post
- Line 3 Replacement Project (Rev. AA)
- Well - County Well Index
- Water Appropriation Site
- Potential Upland Discharge Study Area
- Soil Map Unit
- Hydrologic Soil Group**
 - A
 - B
 - C
 - D (A/D, B/D, C/D)
- Lidar Contours**
 - Index (10-Foot)
 - Intermediate (2-Foot)
- Surficial Flow Direction
- Flow Direction
- Perennial Stream
- Intermittent Stream
- Waterbodies
- Field Delineated Wetlands
- County Boundaries
- County State-Aid Highway
- Minor Roads



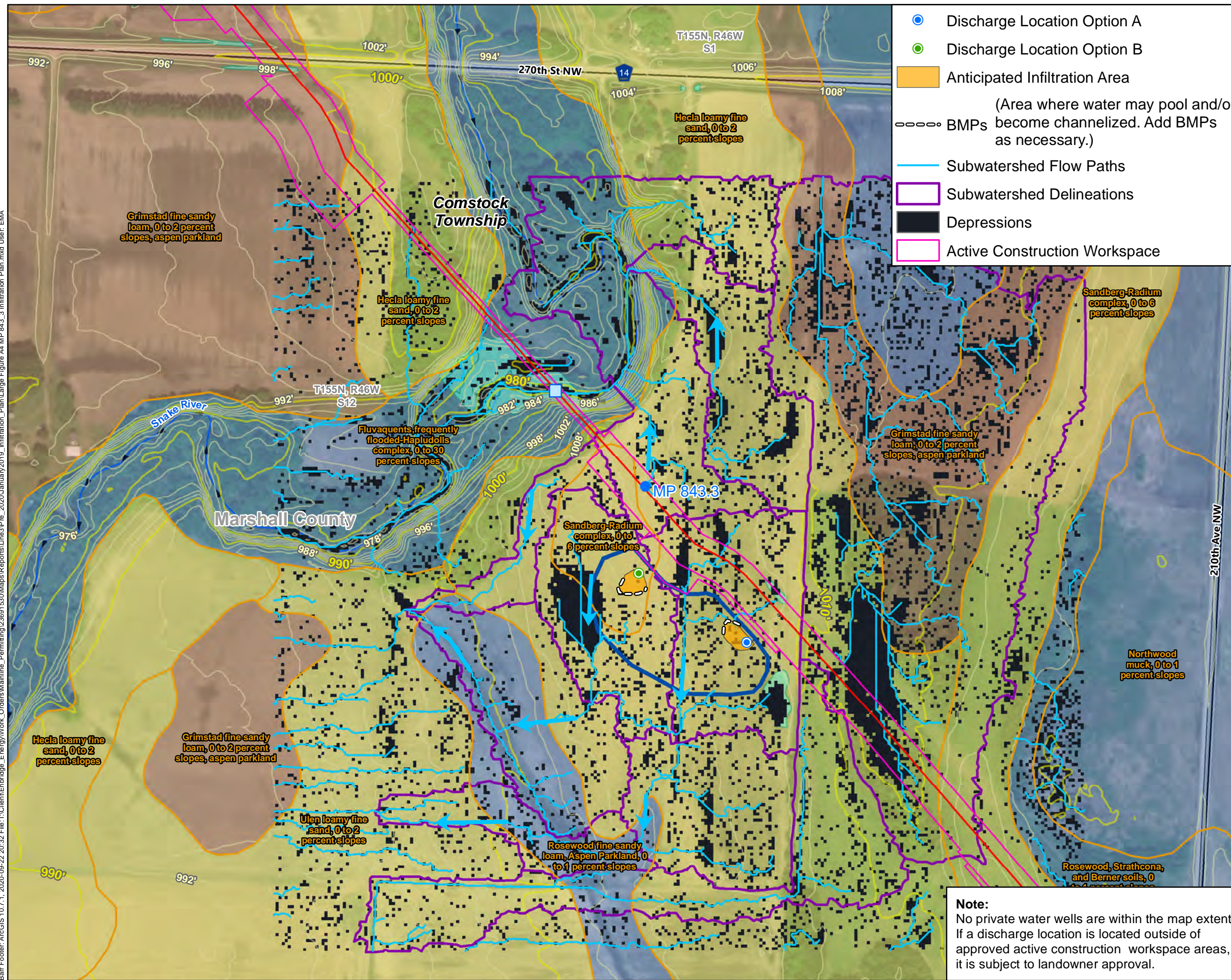
Feet
Large Figure A3

MP 836.2
Discharge ID: LA003
Infiltration Plan and Analysis
Line 3 Replacement Project

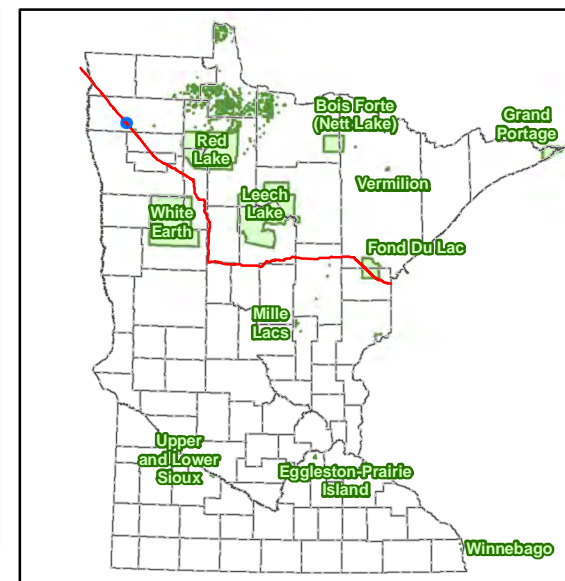
Note:
No private water wells are within the map extent. If a discharge location is located outside of approved active construction workspace areas, it is subject to landowner approval.



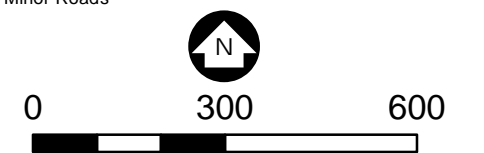
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- Discharge Location Option A
- Discharge Location Option B
- Anticipated Infiltration Area
(Area where water may pool and/or become channelized. Add BMPs as necessary.)
- BMPs
- Subwatershed Flow Paths
- Subwatershed Delineations
- Depressions
- Active Construction Workspace



- Approximate Infiltration Mile-post
- Line 3 Replacement Project (Rev. AA)
- ⊕ Well - County Well Index
- Water Appropriation Site
- Potential Upland Discharge Study Area
- Soil Map Unit
- Hydrologic Soil Group**
 - A
 - B
 - C
 - D (A/D, B/D, C/D)
- Lidar Contours**
 - Index (10-Foot)
 - Intermediate (2-Foot)
 - Surficial Flow Direction
 - Flow Direction
 - Perennial Stream
 - Intermittent Stream
 - Waterbodies
 - Field Delineated Wetlands
 - County Boundaries
 - County State-Aid Highway
 - Minor Roads



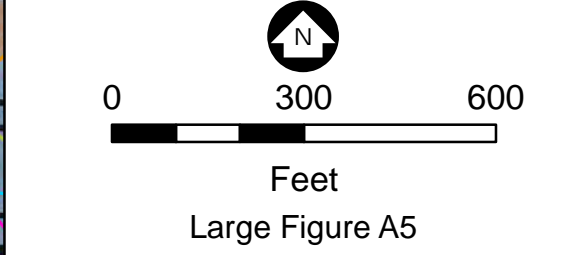
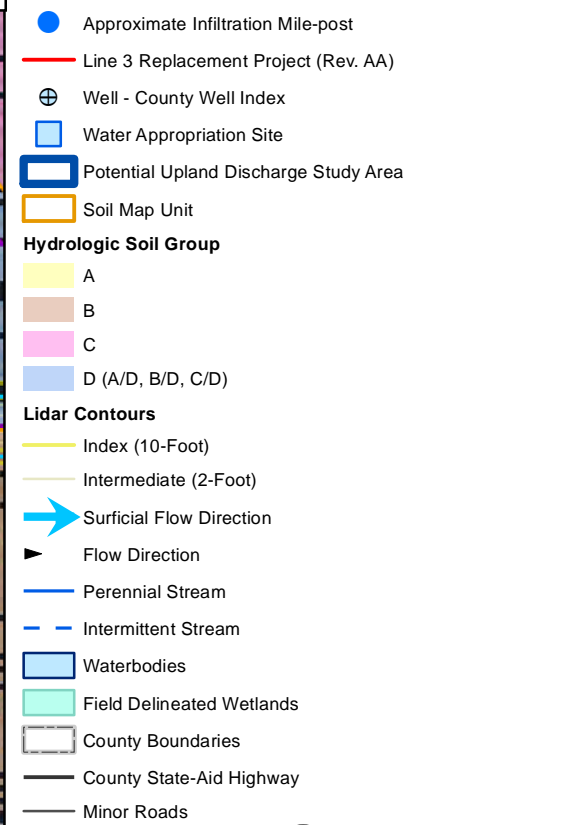
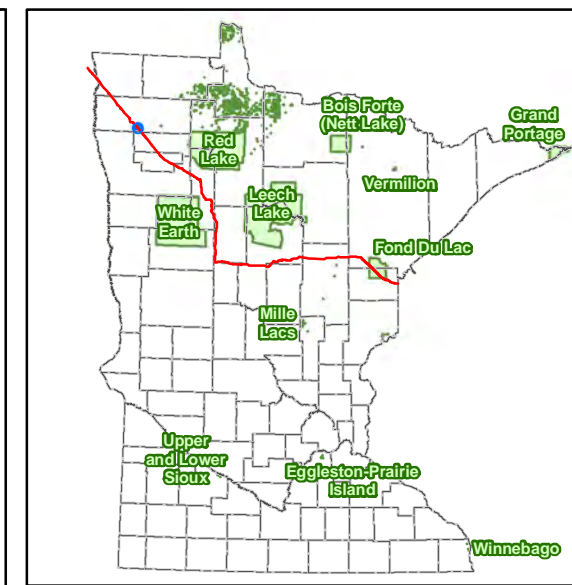
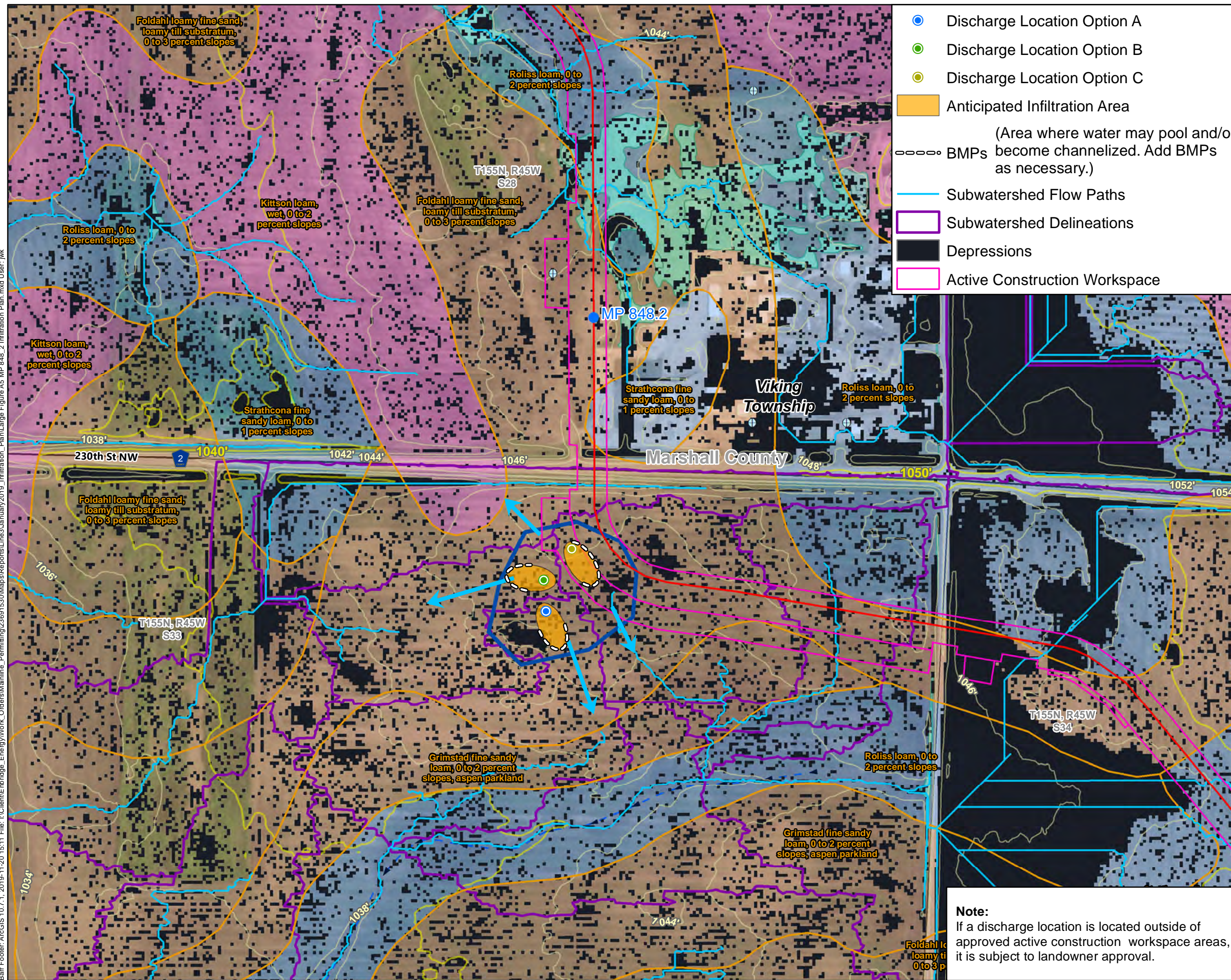
Feet
Large Figure A4

MP 843.3
Discharge ID: LA004
Infiltration Plan and Analysis
Line 3 Replacement Project

Note:
No private water wells are within the map extent. If a discharge location is located outside of approved active construction workspace areas, it is subject to landowner approval.



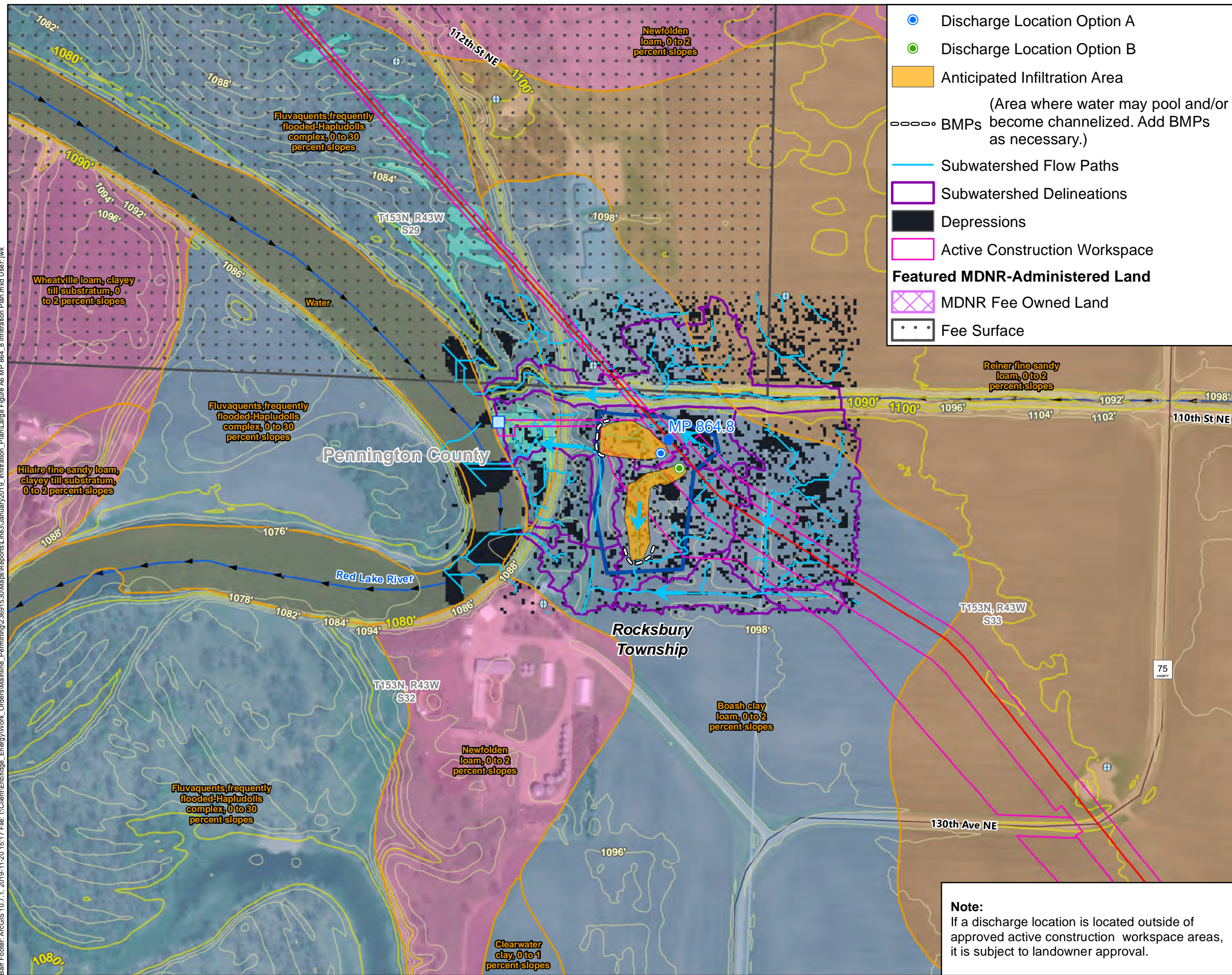
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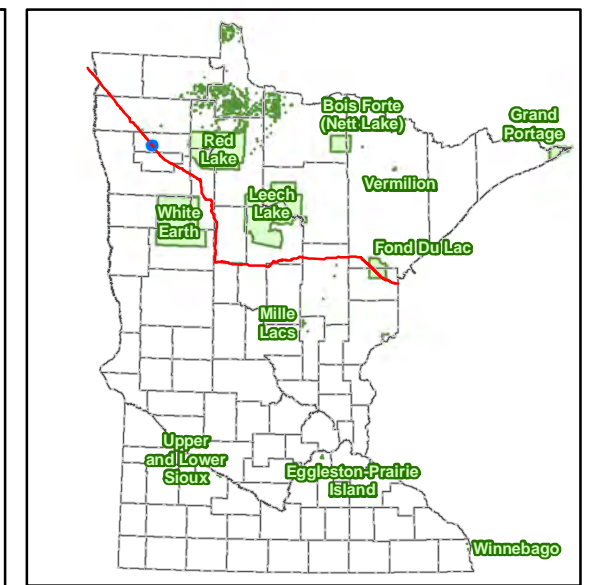
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Discharge ID: LA024
Infiltration Plan and Analysis
Line 3 Replacement Project



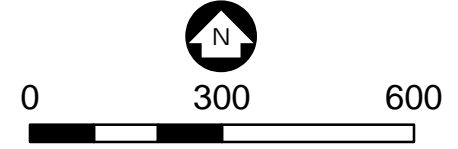
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- Discharge Location Option A
- Discharge Location Option B
- Anticipated Infiltration Area
(Area where water may pool and/or become channelized. Add BMPs as necessary.)
- Subwatershed Flow Paths
- Subwatershed Delineations
- Depressions
- Active Construction Workspace
- Featured MDNR-Administered Land**
- MDNR Fee Owned Land
- Fee Surface



- Approximate Infiltration Mile-post
- Line 3 Replacement Project (Rev. AA)
- Well - County Well Index
- Water Appropriation Site
- Potential Upland Discharge Study Area
- Soil Map Unit
- Hydrologic Soil Group**
- A
- B
- C
- D (A/D, B/D, C/D)
- Lidar Contours**
- Index (10-Foot)
- Intermediate (2-Foot)
- Surficial Flow Direction
- Flow Direction
- Perennial Stream
- Intermittent Stream
- Waterbodies
- Field Delineated Wetlands
- County Boundaries
- Minor Roads

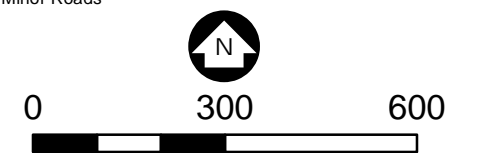
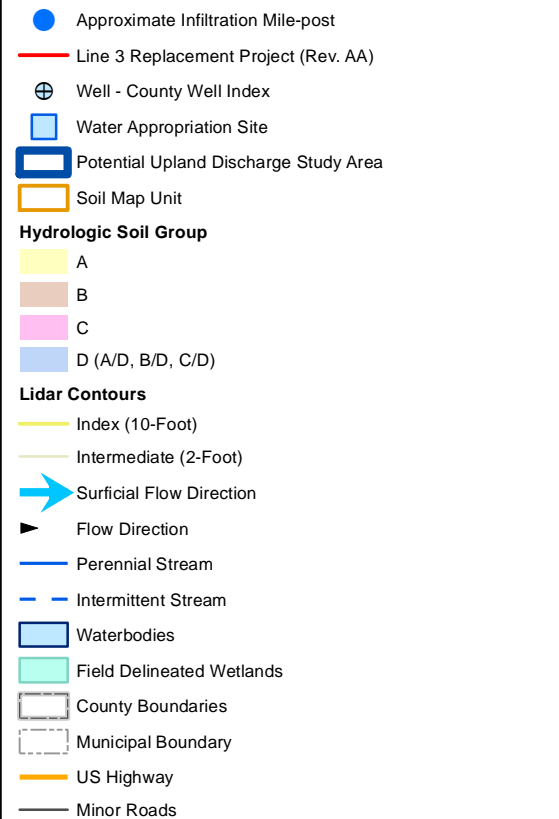
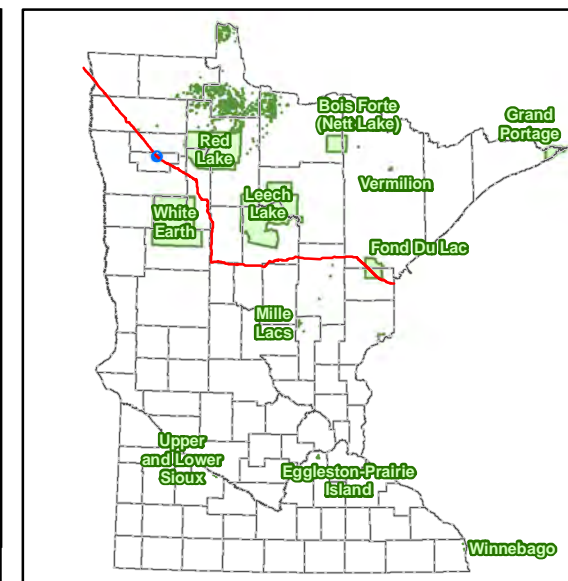
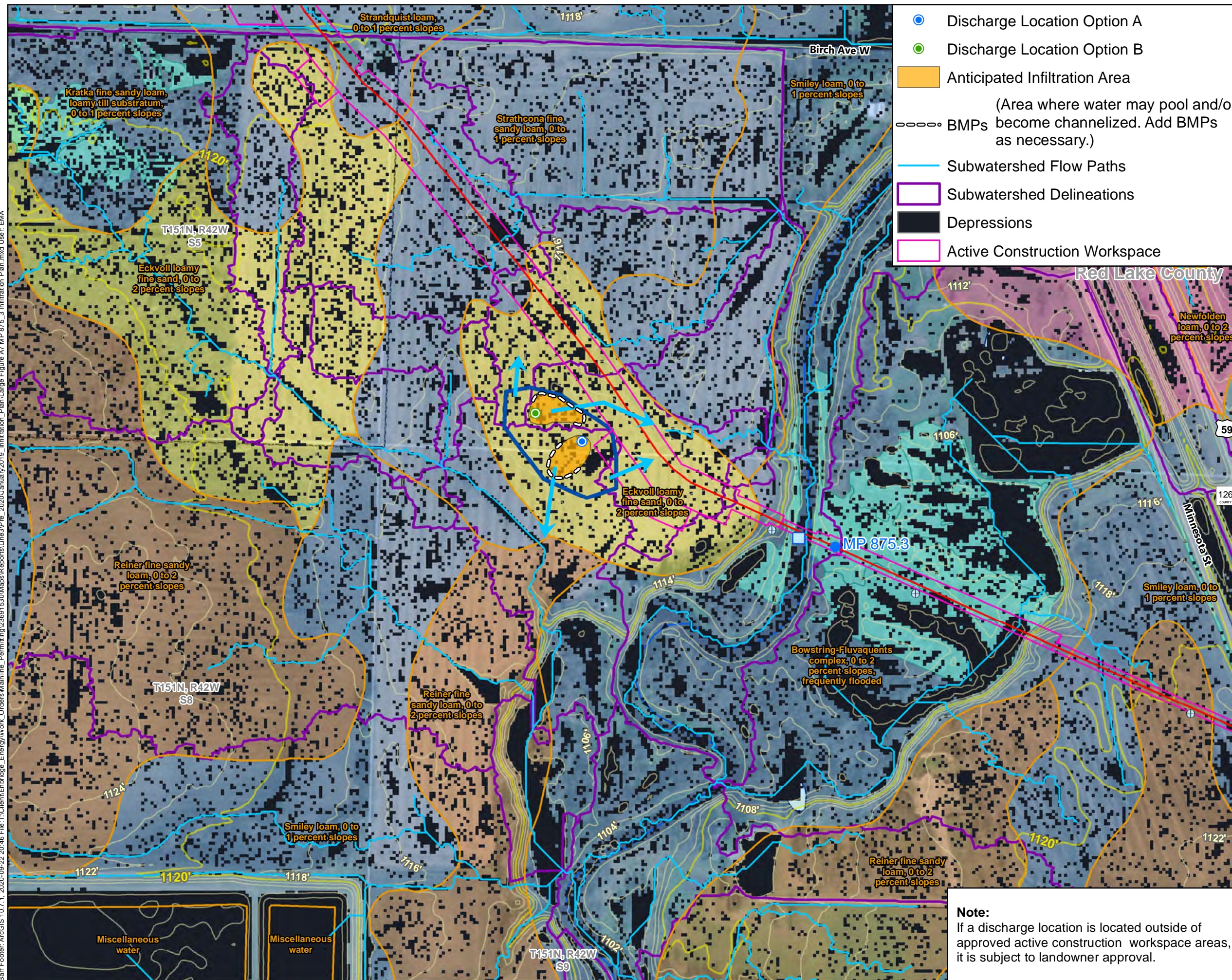


Feet
Large Figure A6

MP 864.8
Discharge ID: LA005
Infiltration Plan and Analysis
Line 3 Replacement Project

Note:
If a discharge location is located outside of approved active construction workspace areas, it is subject to landowner approval.

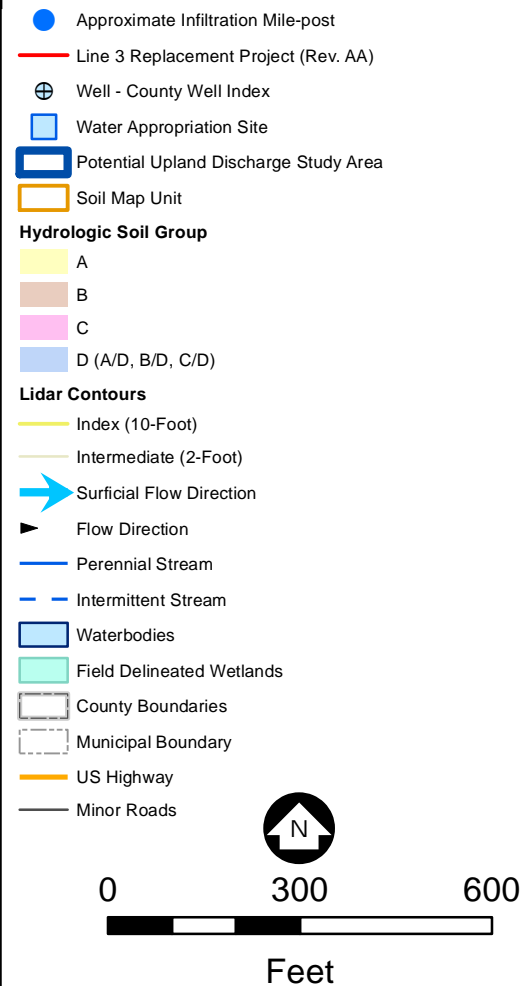
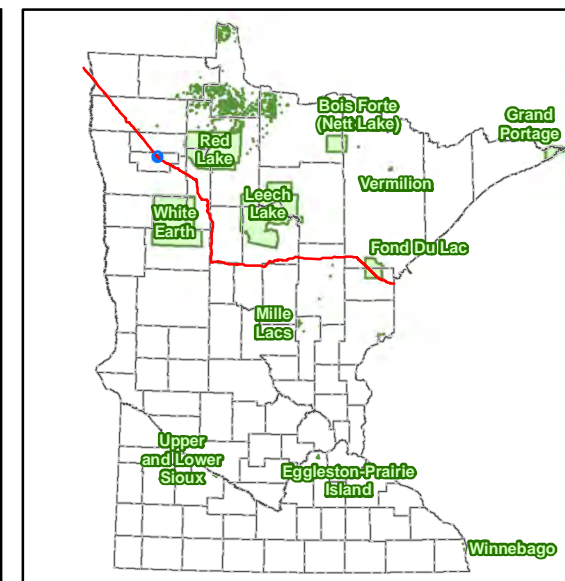
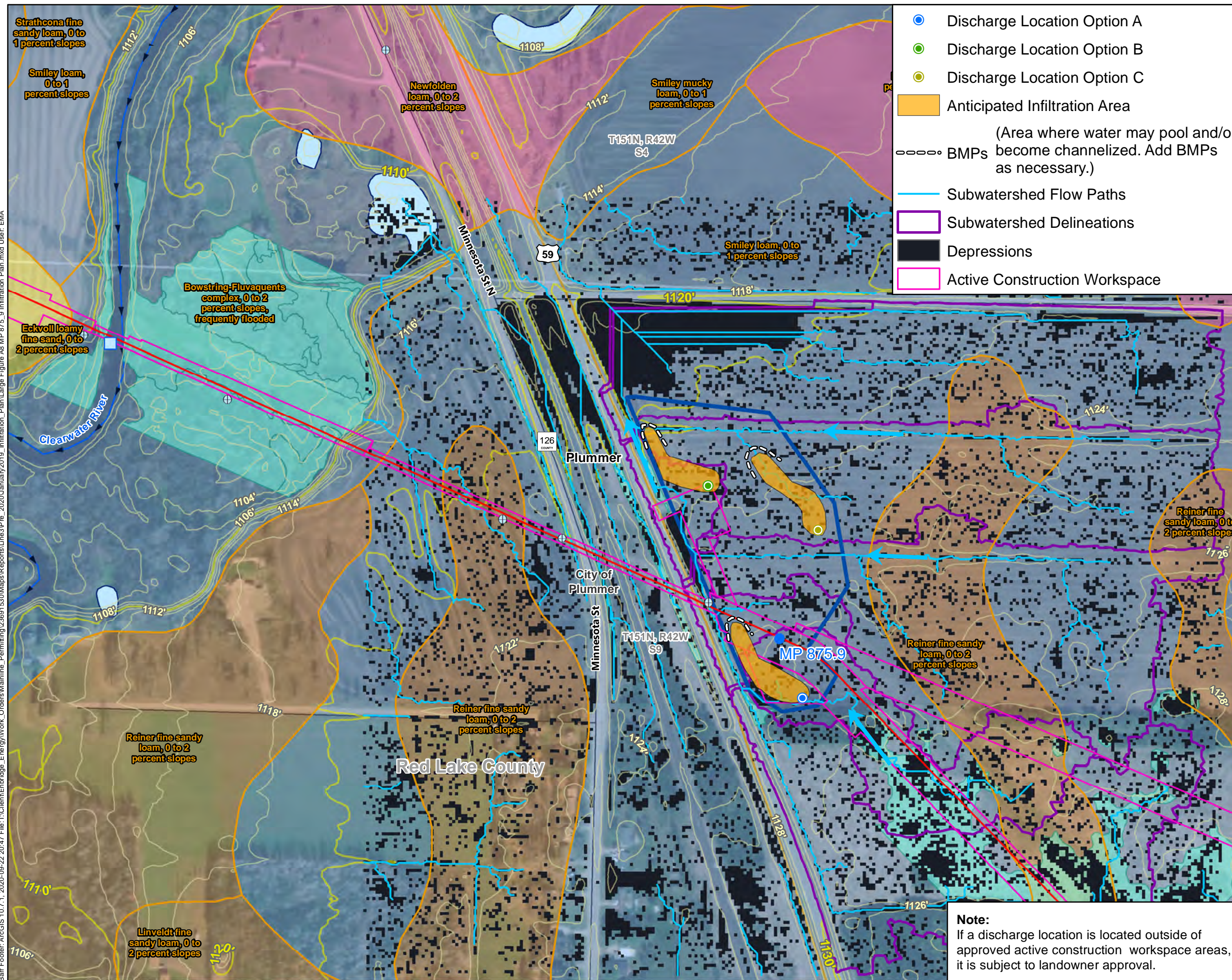




MP 875.3
Discharge ID: LA026
Infiltration Plan and Analysis
Line 3 Replacement Project



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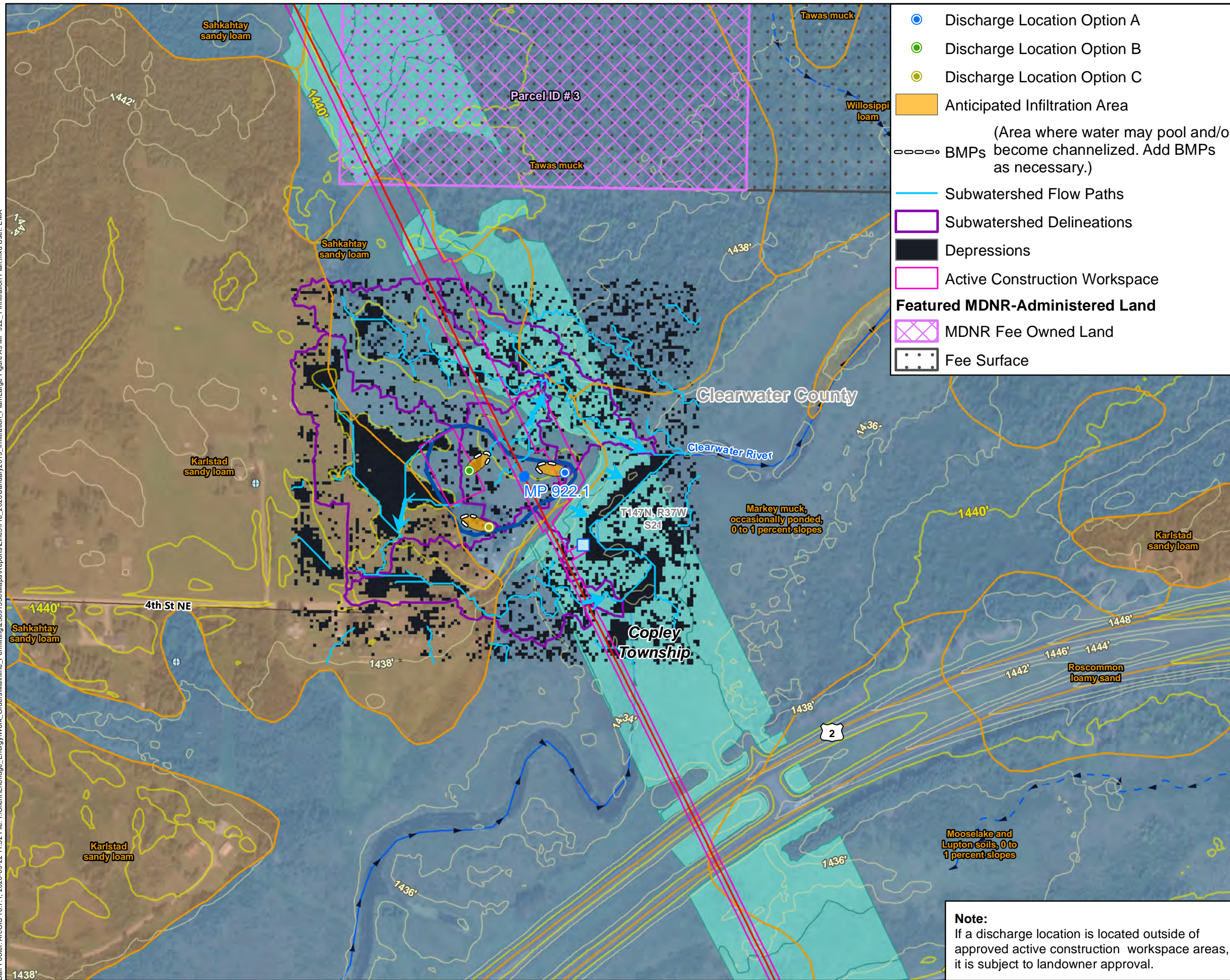
Large Figure A8

MP 875.9
Discharge ID: LA006
Infiltration Plan and Analysis
Line 3 Replacement Project

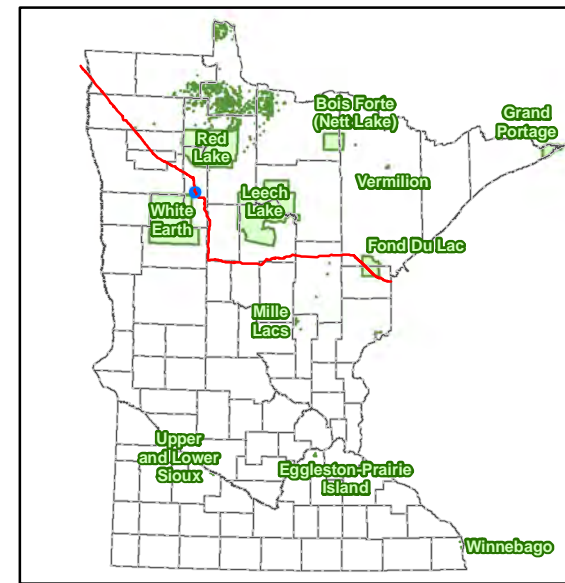
Note:
If a discharge location is located outside of approved active construction workspace areas, it is subject to landowner approval.



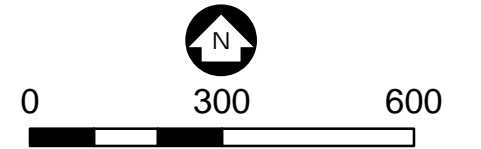
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- Discharge Location Option A
- Discharge Location Option B
- Discharge Location Option C
- Anticipated Infiltration Area
(Area where water may pool and/or become channelized. Add BMPs as necessary.)
- BMPs
- Subwatershed Flow Paths
- Subwatershed Delineations
- Depressions
- Active Construction Workspace
- Featured MDNR-Administered Land**
- MDNR Fee Owned Land
- Fee Surface



- Approximate Infiltration Mile-post
- Line 3 Replacement Project (Rev. AA)
- Well - County Well Index
- Water Appropriation Site
- Potential Upland Discharge Study Area
- Soil Map Unit
- Hydrologic Soil Group**
- A
- B
- C
- D (A/D, B/D, C/D)
- Lidar Contours**
- Index (10-Foot)
- Intermediate (2-Foot)
- Surficial Flow Direction
- Flow Direction
- Perennial Stream
- Intermittent Stream
- Waterbodies
- Field Delineated Wetlands
- County Boundaries
- US Highway
- Minor Roads



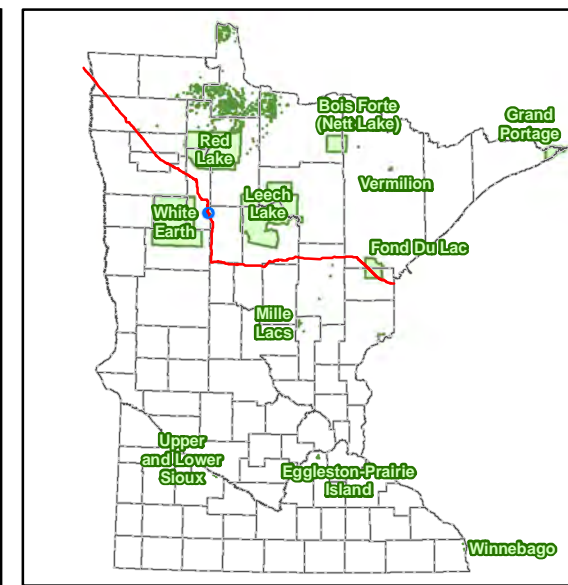
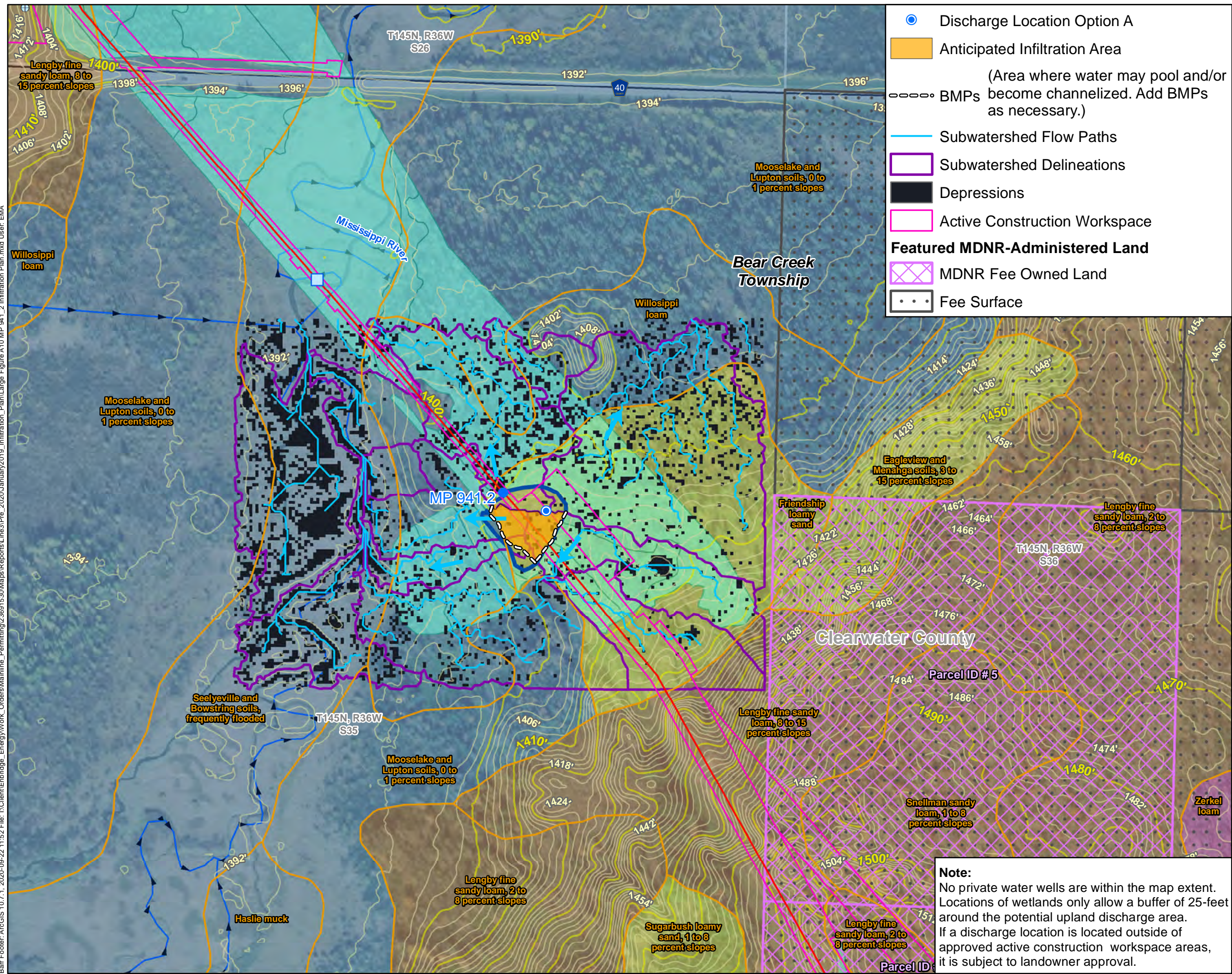
Feet
Large Figure A9

MP 922.1
Discharge ID: LA007
Infiltration Plan and Analysis
Line 3 Replacement Project

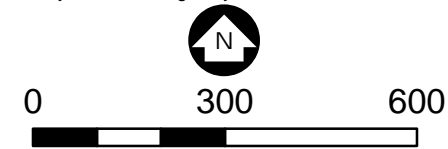
Note:
If a discharge location is located outside of approved active construction workspace areas, it is subject to landowner approval.



Barr Footer: ArcGIS 10.7.1, 2020-09-22 11:52 File: \\Client\\Enbridge_Energy\\Work_Orders\\Mainline_Permitting\\23691530\\Maps\\Reports\\L_in3\\Pre_2020\\January2019_Infiltration_Plan\\Large_Figure A10 MP 941.2 Infiltration Plan.mxd User: ENA



- Approximate Infiltration Mile-post
- Line 3 Replacement Project (Rev. AA)
- Well - County Well Index
- Water Appropriation Site
- Potential Upland Discharge Study Area
- Soil Map Unit
- Hydrologic Soil Group**
- A
- B
- C
- D (A/D, B/D, C/D)
- Lidar Contours**
- Index (10-Foot)
- Intermediate (2-Foot)
- Surficial Flow Direction
- Flow Direction
- Perennial Stream
- Intermittent Stream
- Waterbodies
- Field Delineated Wetlands
- County Boundaries
- County State-Aid Highway

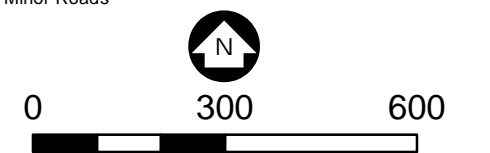
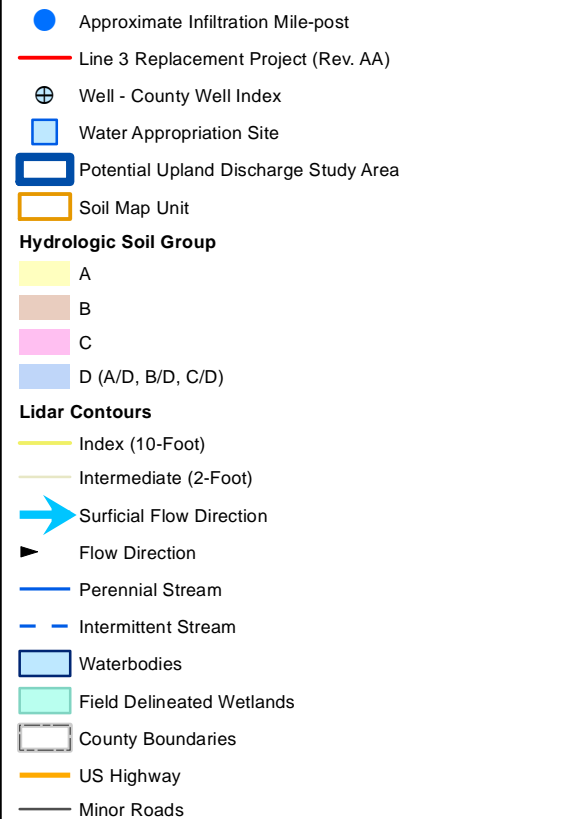
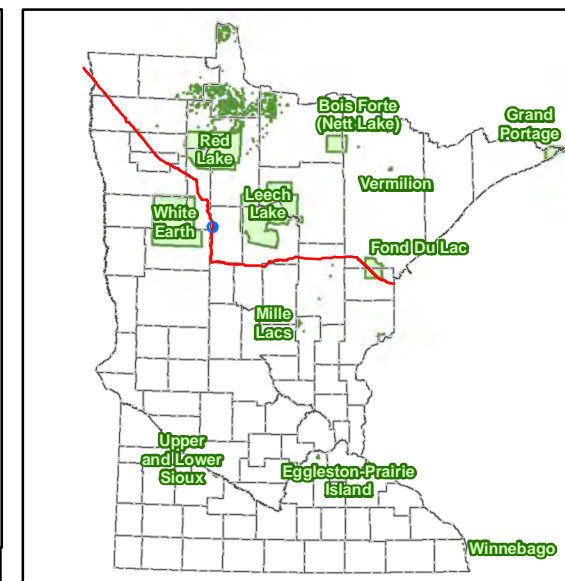
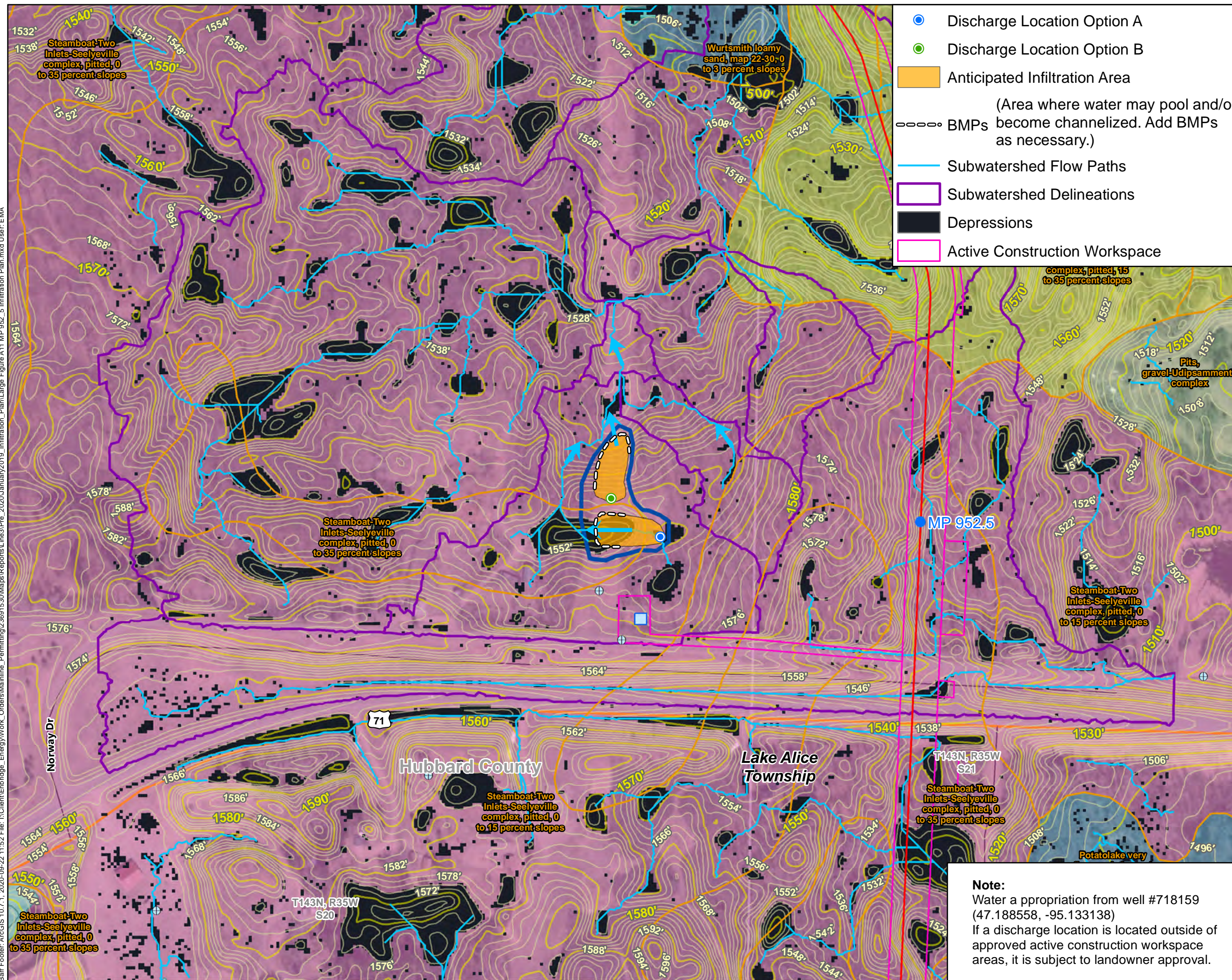


Feet
Large Figure 10

MP 941.2
Discharge ID: LA008
Infiltration Plan and Analysis
Line 3 Replacement Project



Barr Footer: ArcGIS 10.7.1, 2020-09-22 11:52 File: I:\Client\Enbridge_Energy\Work_Orders\Mainline_Permitting\23691530\Maps\Reports\LA009\Pre_2020\Jan\Jan2019_Infiltration_Plan\Large_Figure A11_MP 952.5 Infiltration Plan.mxd User: EMA



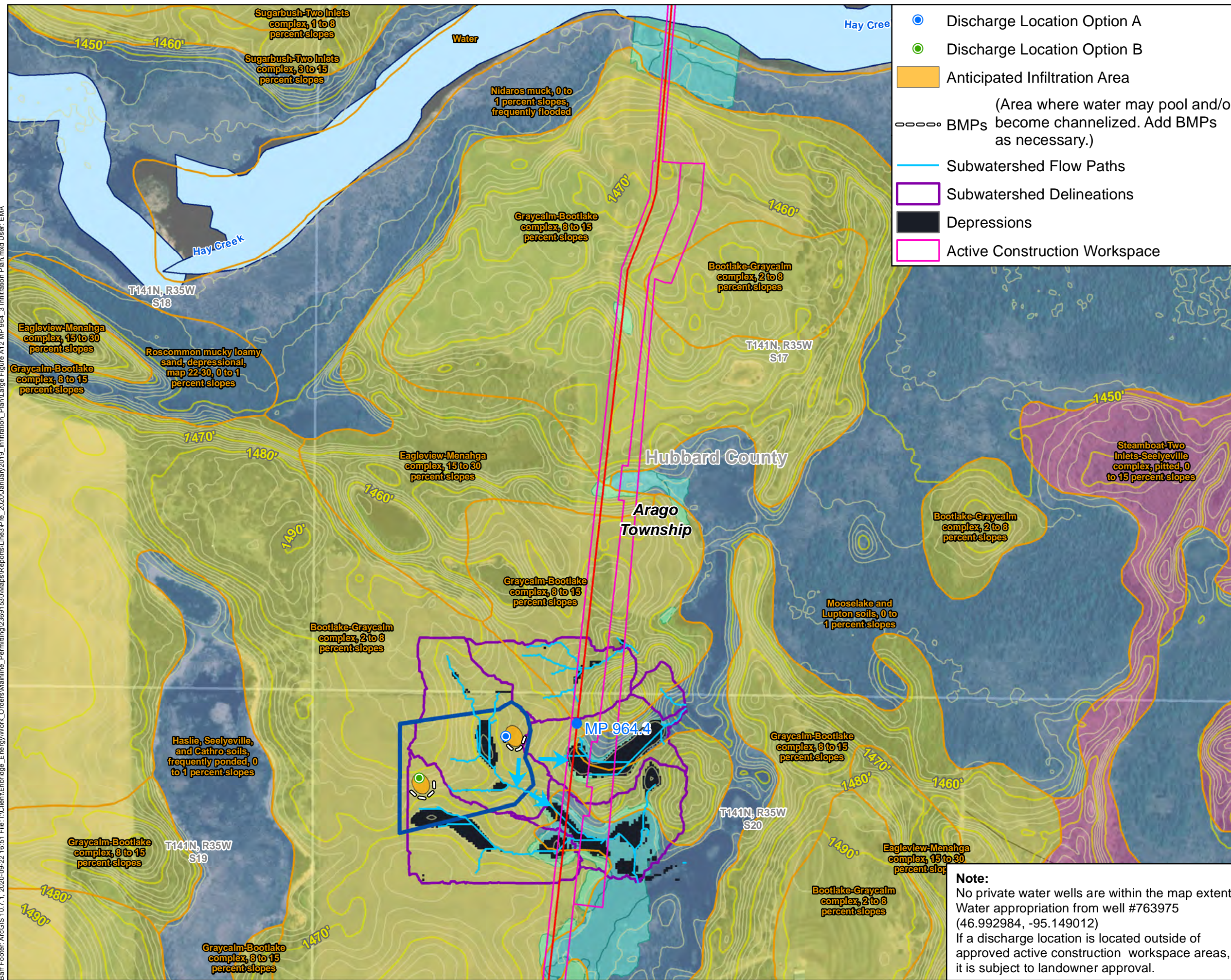
Feet
Large Figure A11

MP 952.5
Discharge ID: LA009
Infiltration Plan and Analysis
Line 3 Replacement Project

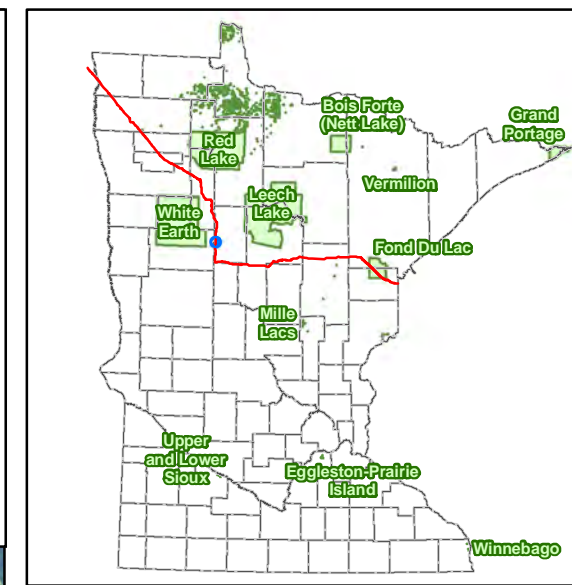
Note:
Water a ppropriation from well #718159 (47.188558, -95.133138)
If a discharge location is located outside of approved active construction workspace areas, it is subject to landowner approval.



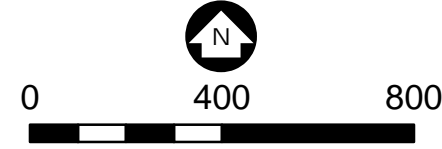
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- Discharge Location Option A
- Discharge Location Option B
- Anticipated Infiltration Area
(Area where water may pool and/or BMPs become channelized. Add BMPs as necessary.)
- Subwatershed Flow Paths
- Subwatershed Delineations
- Depressions
- Active Construction Workspace



- Approximate Infiltration Mile-post
- Line 3 Replacement Project (Rev. AA)
- ⊕ Well - County Well Index
- Water Appropriation Site
- Potential Upland Discharge Study Area
- Soil Map Unit
- Hydrologic Soil Group**
 - A
 - B
 - C
 - D (A/D, B/D, C/D)
- Lidar Contours**
 - Index (10-Foot)
 - Intermediate (2-Foot)
 - Surficial Flow Direction
 - Flow Direction
 - Perennial Stream
 - Intermittent Stream
 - Waterbodies
 - Field Delineated Wetlands
 - County Boundaries
 - Minor Roads



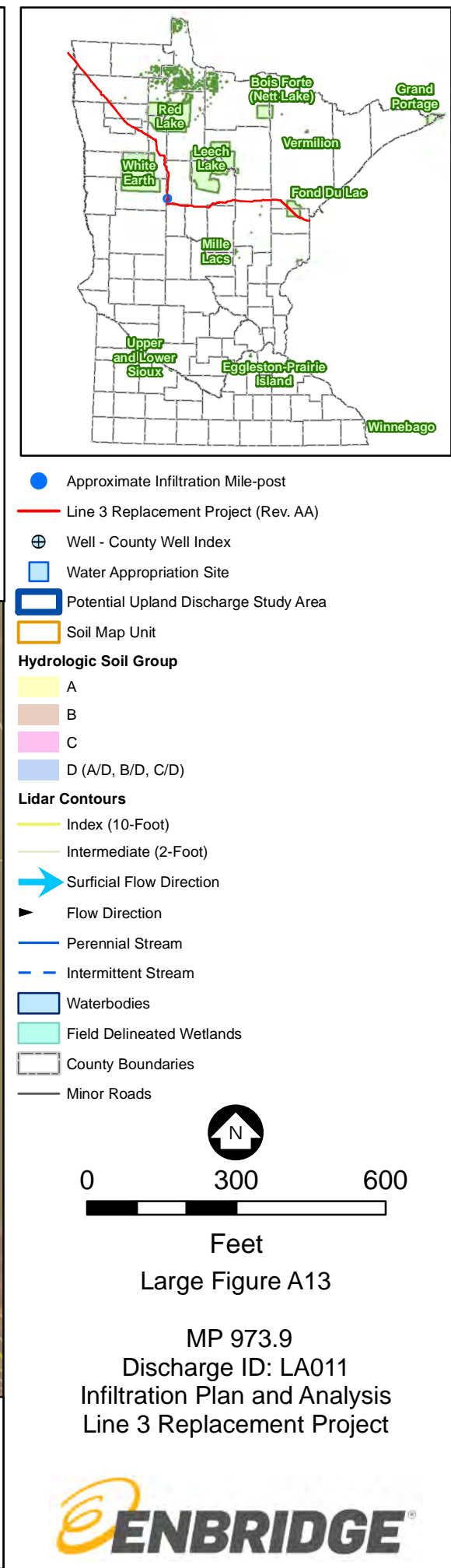
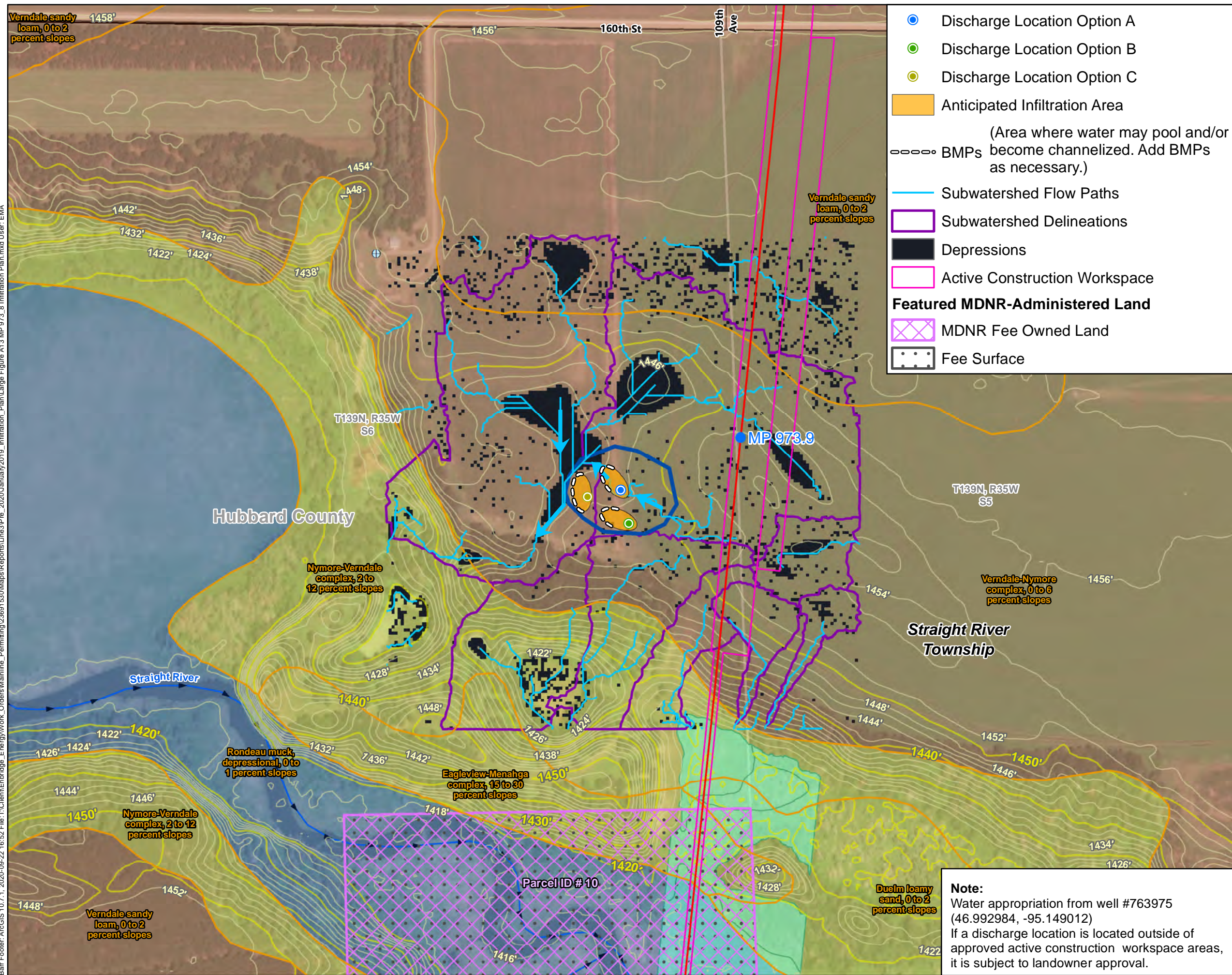
Feet
Large Figure A12

MP 964.4
Discharge ID: LA010
Infiltration Plan and Analysis
Line 3 Replacement Project

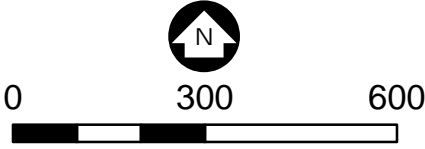
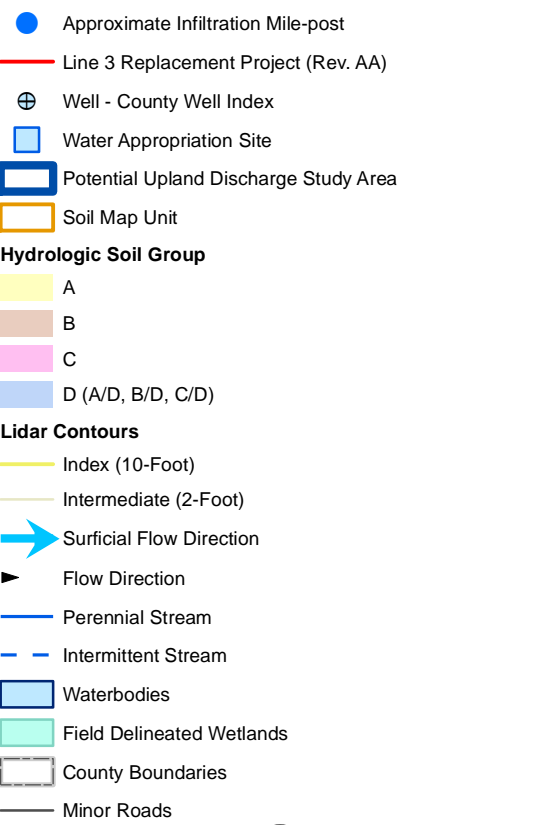
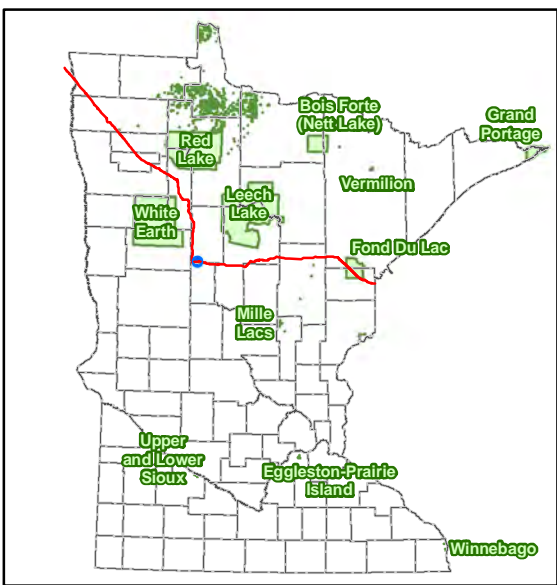
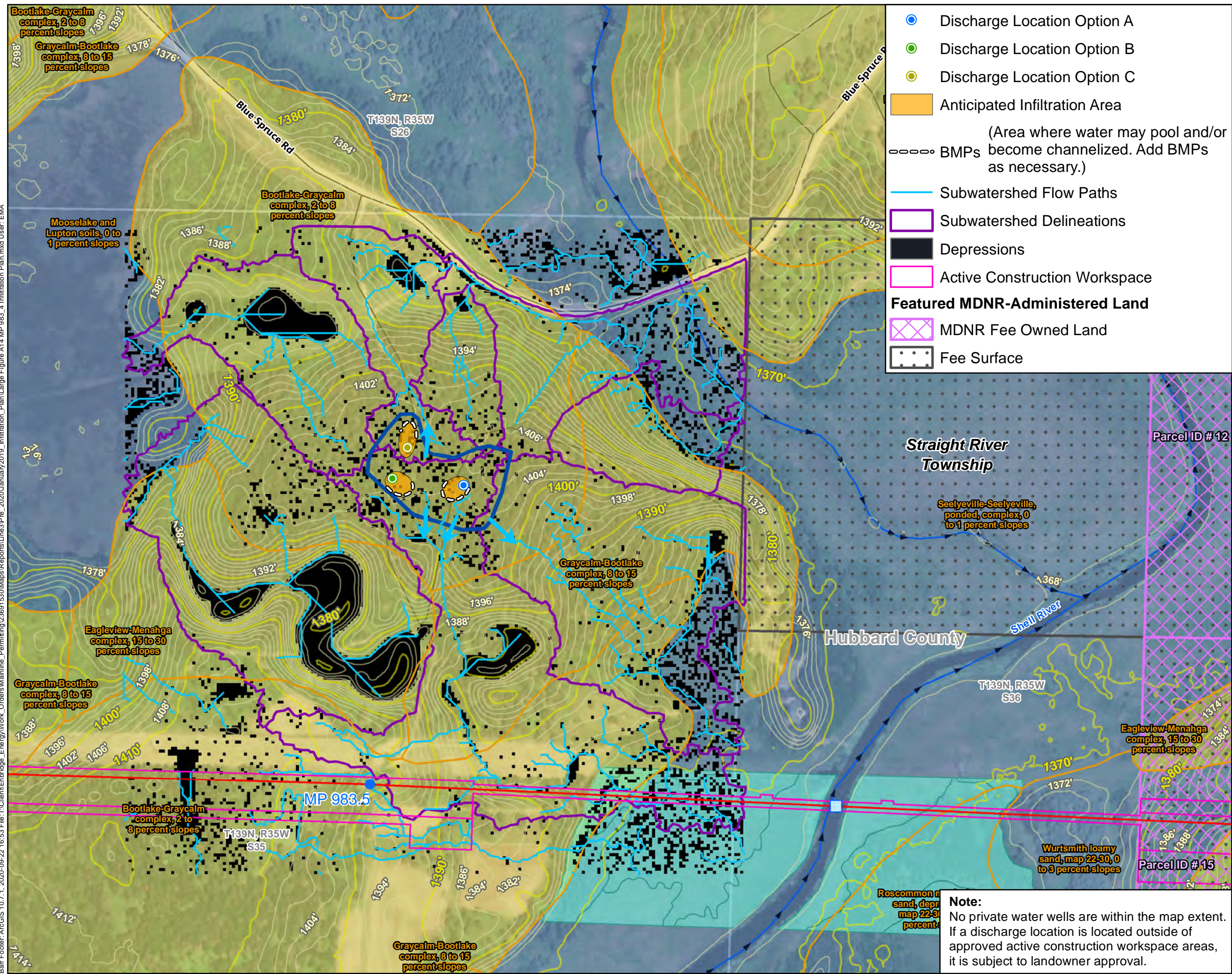
Note:
No private water wells are within the map extent
Water appropriation from well #763975
(46.992984, -95.149012)
If a discharge location is located outside of
approved active construction workspace areas,
it is subject to landowner approval.



Barr Footer: ArcGIS 10.7.1, 2020-09-22 16:52 File: I:\Client\Enbridge_Energy\Work_Orders\Mainline_Permitting\23691530\Maps\Reports\Lines3Pre_2020\January2019_Infiltration_Plan\Large Figure A13 MP 973.9 Infiltration Plan.mxd User: EMA



Barr Footer: ArcGIS 10.7.1, 2020-09-22 16:53 File: I:\Client\Enbridge_Energy\Work_Orders\Mainline_Permitting\23691530\Maps\Reports\Lines3\Pre_2020\January2019_Infiltration_Plan\Large Figure A14 MP 983.5 Infiltration Plan.mxd User: EMA



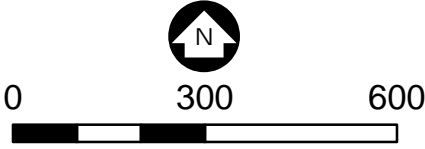
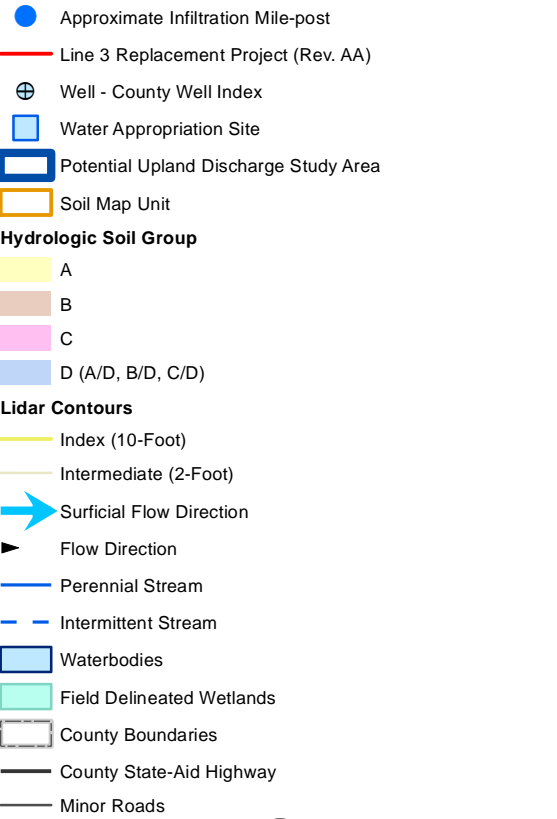
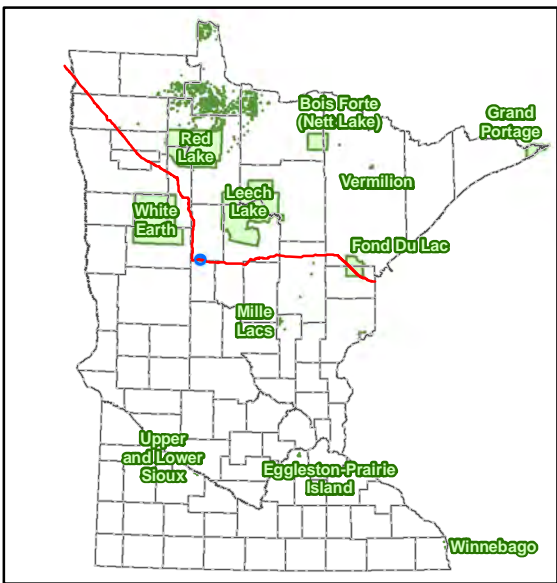
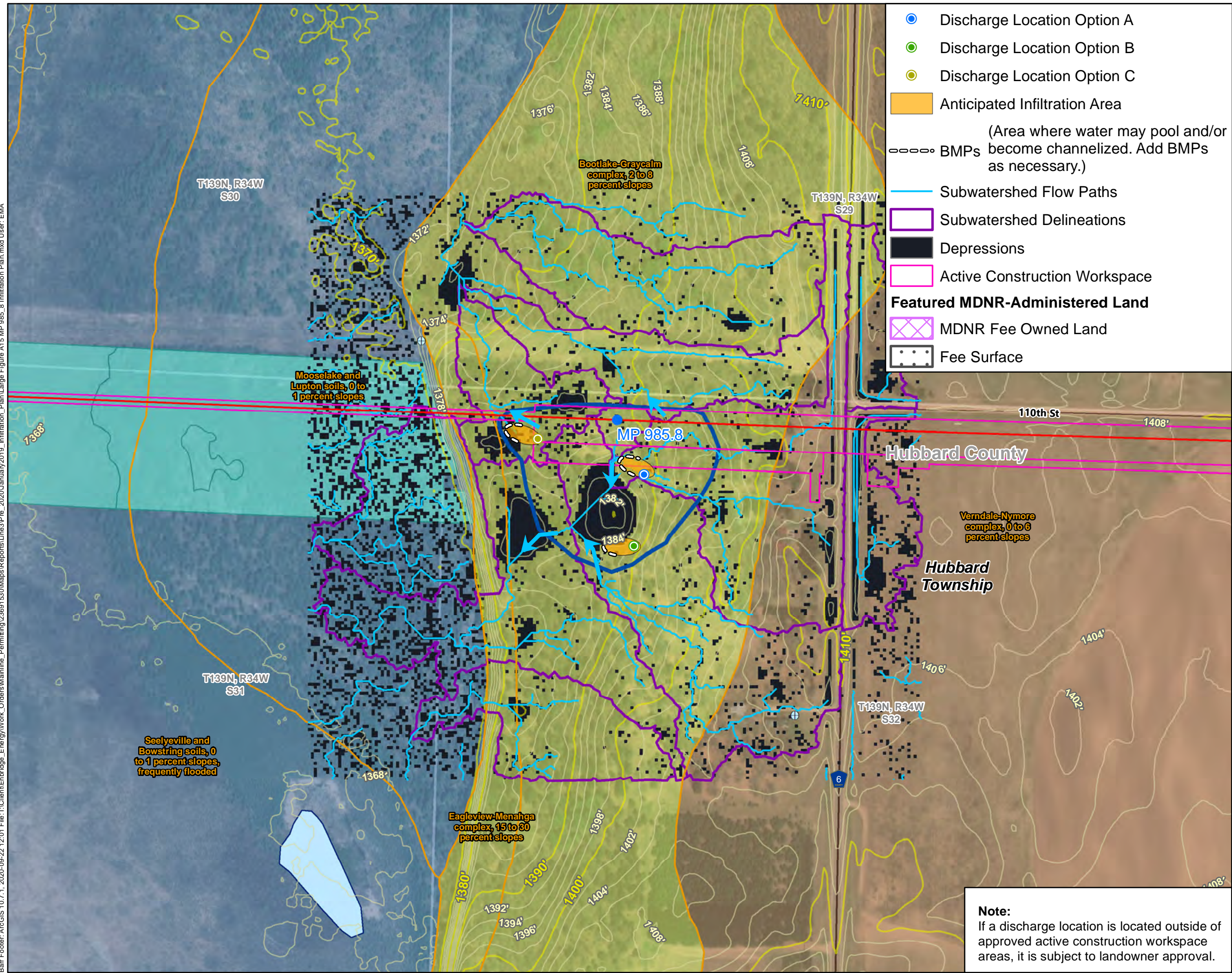
Feet
Large Figure A14

MP 983.5
Discharge ID: LA013
Infiltration Plan and Analysis
Line 3 Replacement Project



Note:
No private water wells are within the map extent. If a discharge location is located outside of approved active construction workspace areas, it is subject to landowner approval.

Barr Footer: ArcGIS 10.7.1, 2020-09-22 12:01 File: I:\Client\Enbridge_EnergyWork_Orders\Mainline_Permitting\23691530\Maps\Reports\Lines3\Pre_2020\January2019_Infiltration_Plan\Large Figure A15 MP 985.8 Infiltration Plan.mxd User: EMA



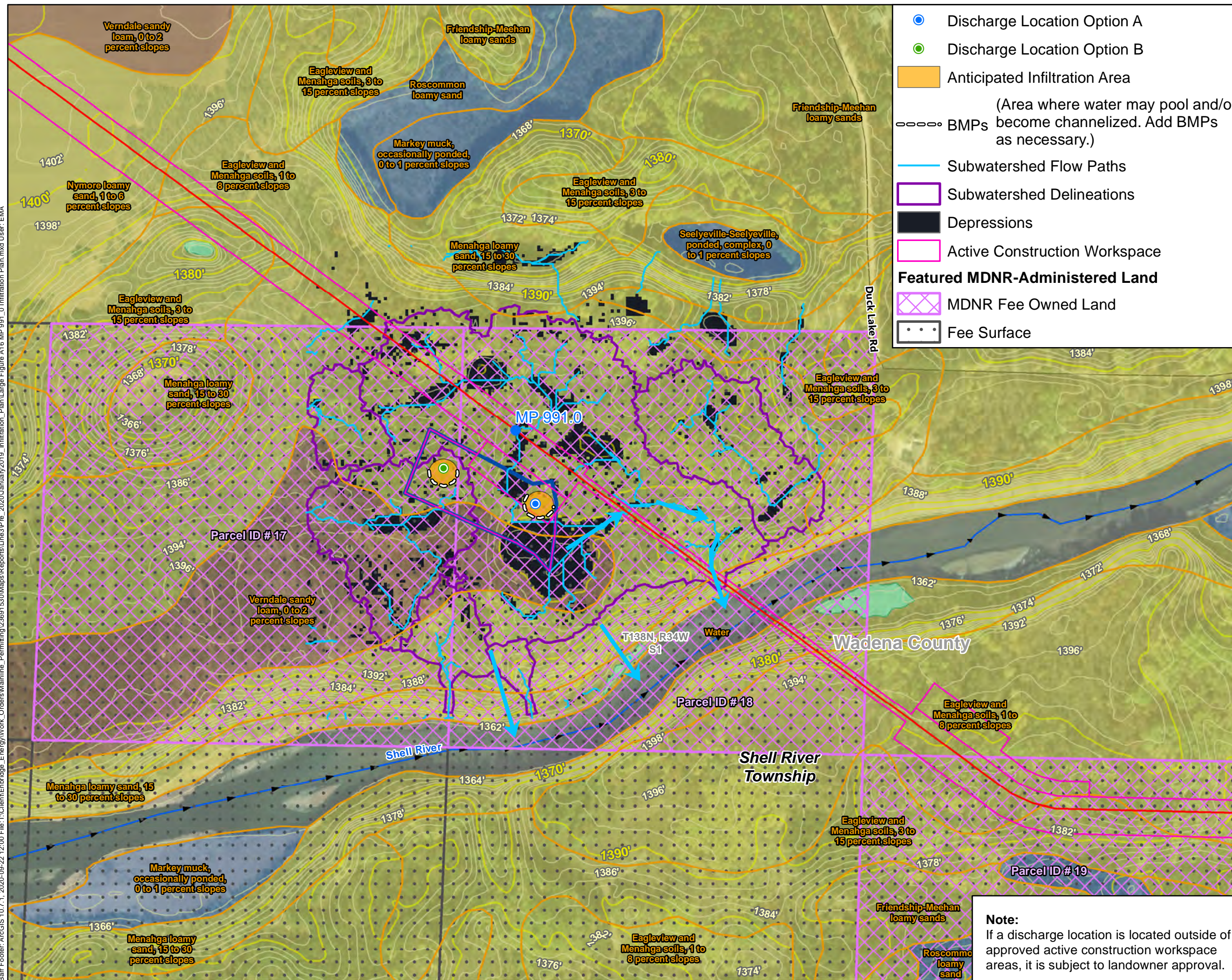
Feet
Large Figure A15

MP 985.8
Discharge ID: LA014
Infiltration Plan and Analysis
Line 3 Replacement Project

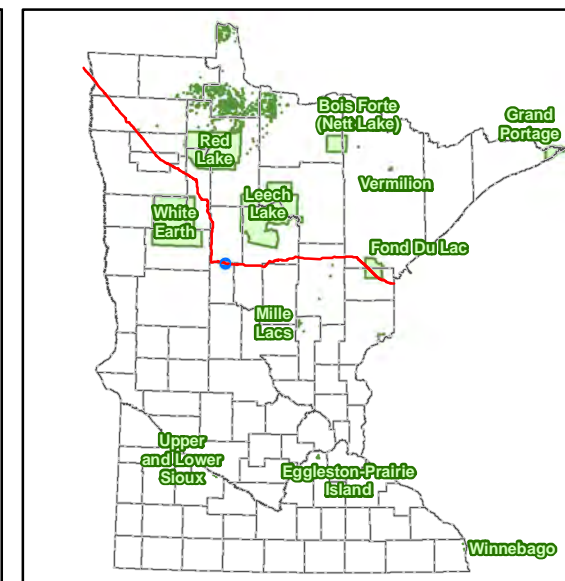
Note:
If a discharge location is located outside of approved active construction workspace areas, it is subject to landowner approval.



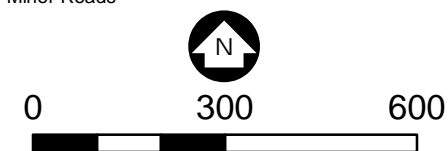
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- Discharge Location Option A
- Discharge Location Option B
- Anticipated Infiltration Area
(Area where water may pool and/or become channelized. Add BMPs as necessary.)
- BMPs
- Subwatershed Flow Paths
- Subwatershed Delineations
- Depressions
- Active Construction Workspace
- Featured MDNR-Administered Land
- MDNR Fee Owned Land
- Fee Surface



- Approximate Infiltration Mile-post
- Line 3 Replacement Project (Rev. AA)
- Well - County Well Index
- Water Appropriation Site
- Potential Upland Discharge Study Area
- Soil Map Unit
- Hydrologic Soil Group
 - A
 - B
 - C
 - D (A/D, B/D, C/D)
- Lidar Contours
 - Index (10-Foot)
 - Intermediate (2-Foot)
- Surficial Flow Direction
- Flow Direction
- Perennial Stream
- Intermittent Stream
- Waterbodies
- Field Delineated Wetlands
- County Boundaries
- Minor Roads

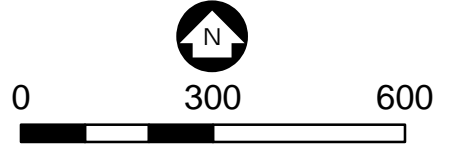
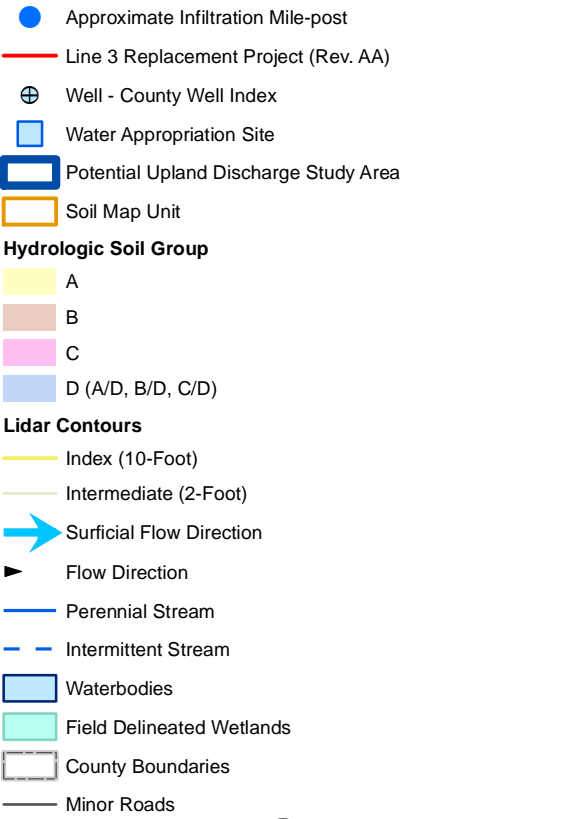
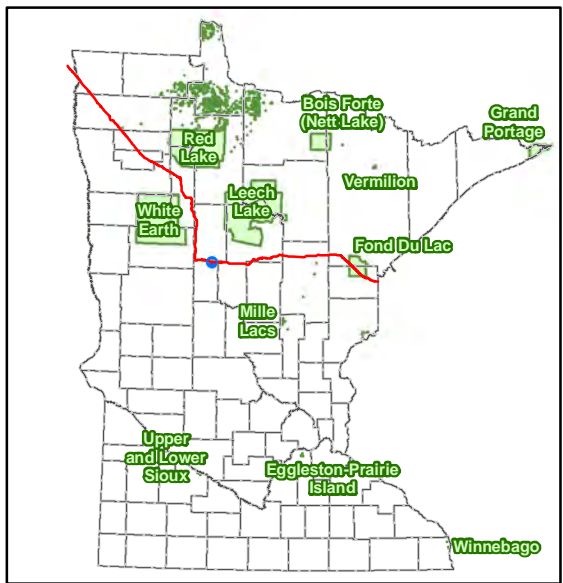
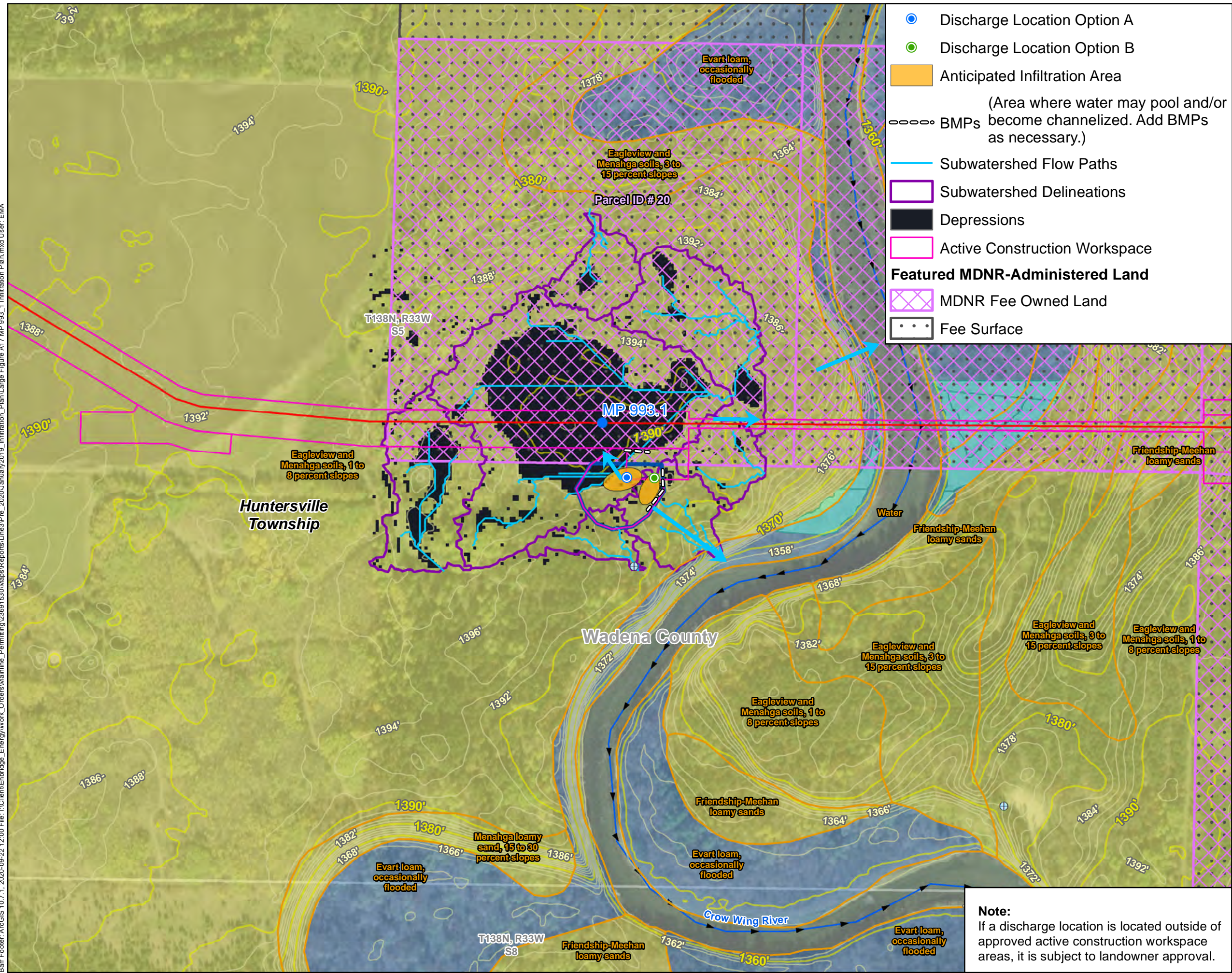


Feet
Large Figure A16

MP 991.0
Discharge ID: LA015
Infiltration Plan and Analysis
Line 3 Replacement Project

Note:
If a discharge location is located outside of approved active construction workspace areas, it is subject to landowner approval.



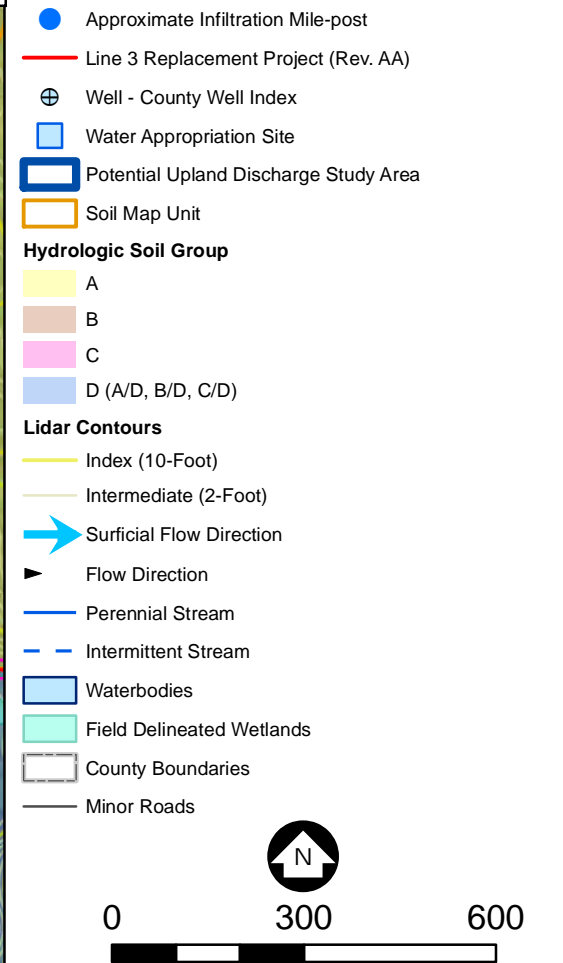
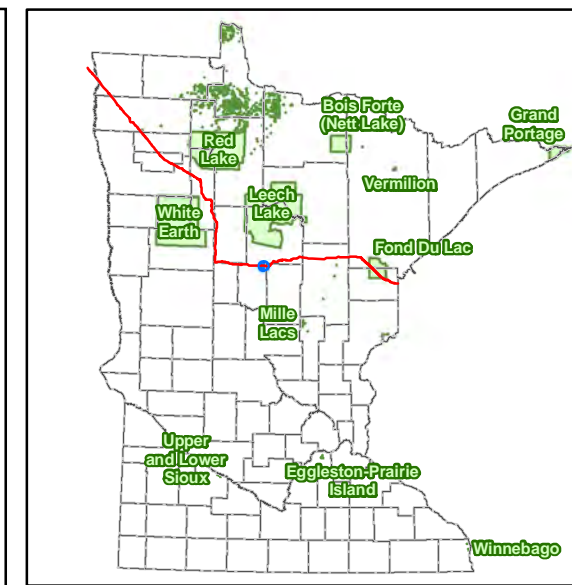
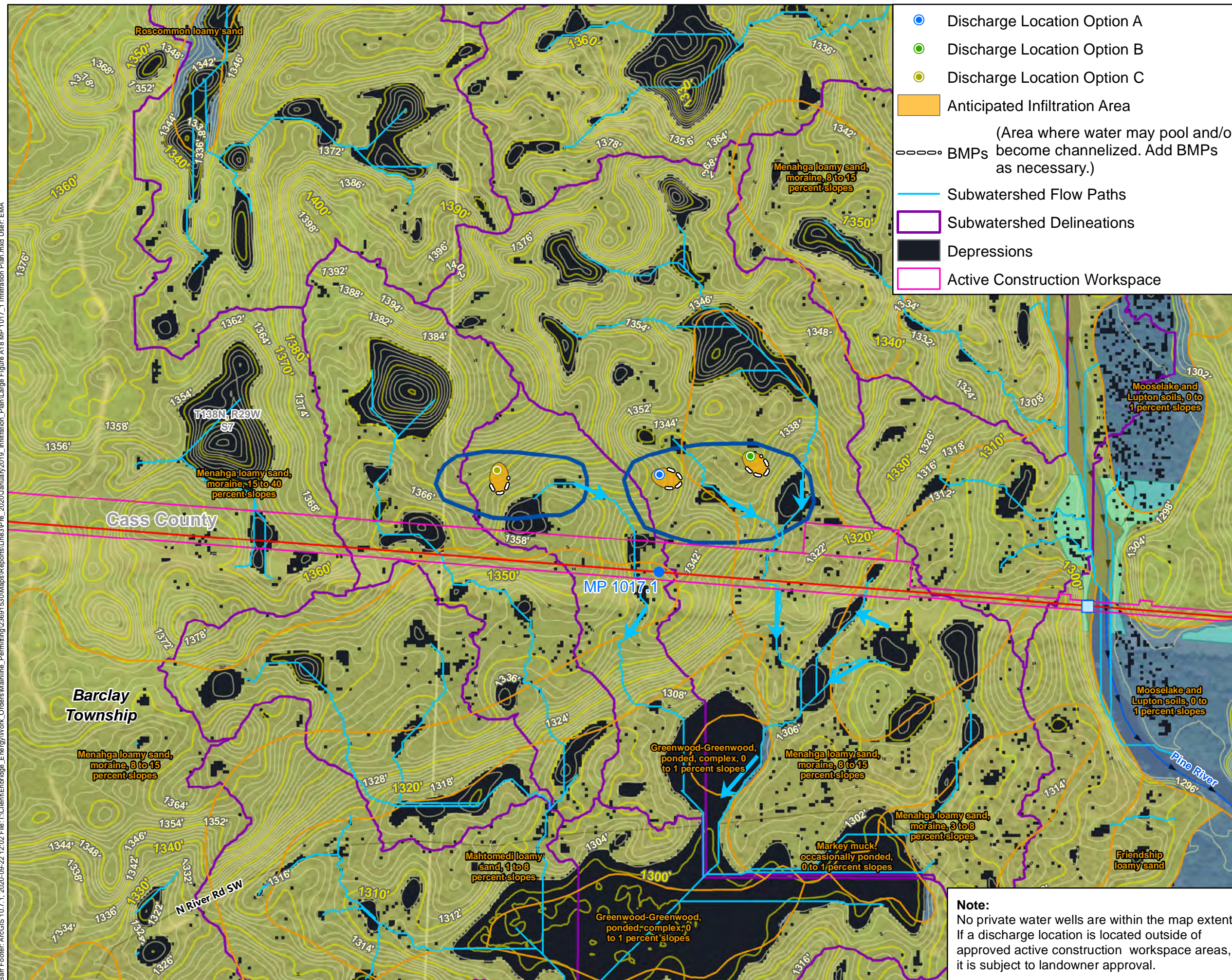


MP 993.1
Discharge ID: LA016
Infiltration Plan and Analysis
Line 3 Replacement Project

Note:
If a discharge location is located outside of approved active construction workspace areas, it is subject to landowner approval.



Barr Footer: ArcGIS 10.7.1, 2020-09-22 12:02 File: I:\Client\Enbridge_Energy\Work_Orders\Mainline_Permitting\23691530\Maps\Reports\Line3\Pre_2020\January2019_Infiltration_Plan\Large Figure A13 MP 1017_1 Infiltration Plan.mxd User: EMA



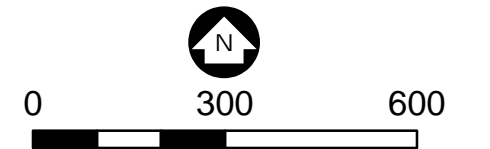
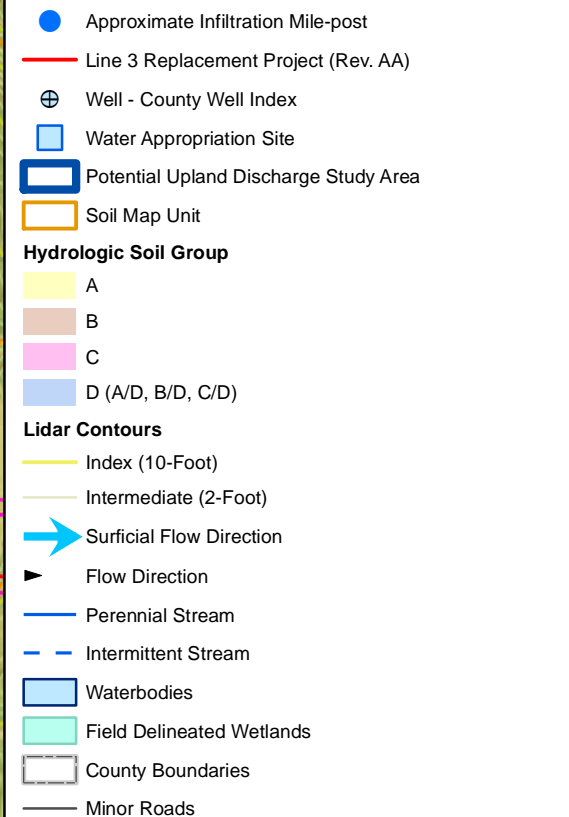
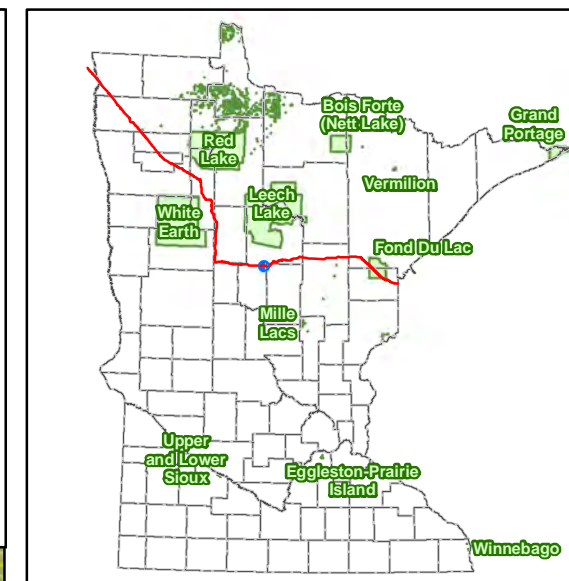
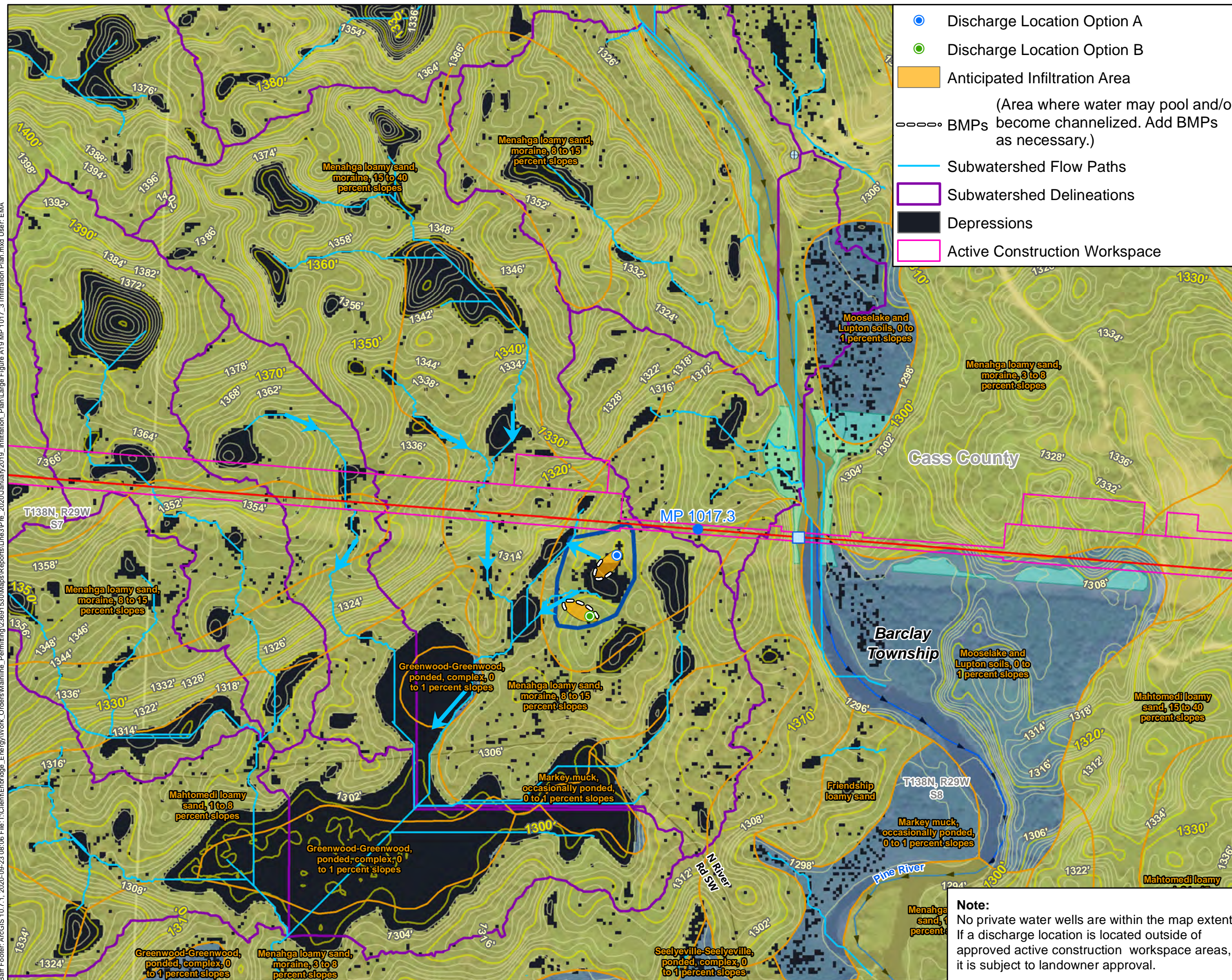
Large Figure A13

MP 1017.1
Discharge ID: LA020
Infiltration Plan and Analysis
Line 3 Replacement Project

Note:
No private water wells are within the map extent.
If a discharge location is located outside of approved active construction workspace areas, it is subject to landowner approval.



Barr Footer: ArcGIS 10.7.1, 2020-09-23 08:06 File: I:\Client\Enbridge_Energy\Work_Orders\Mainline_Permitting\23691530\Map\Reports\Lines3\Pre_2020\January2019_Infiltration_Plan\Large Figure A19 MP 1017.3 Infiltration Plan.mxd User: EMA



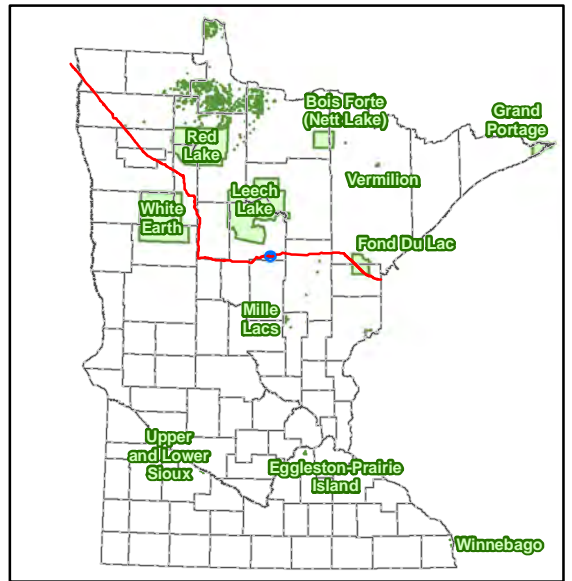
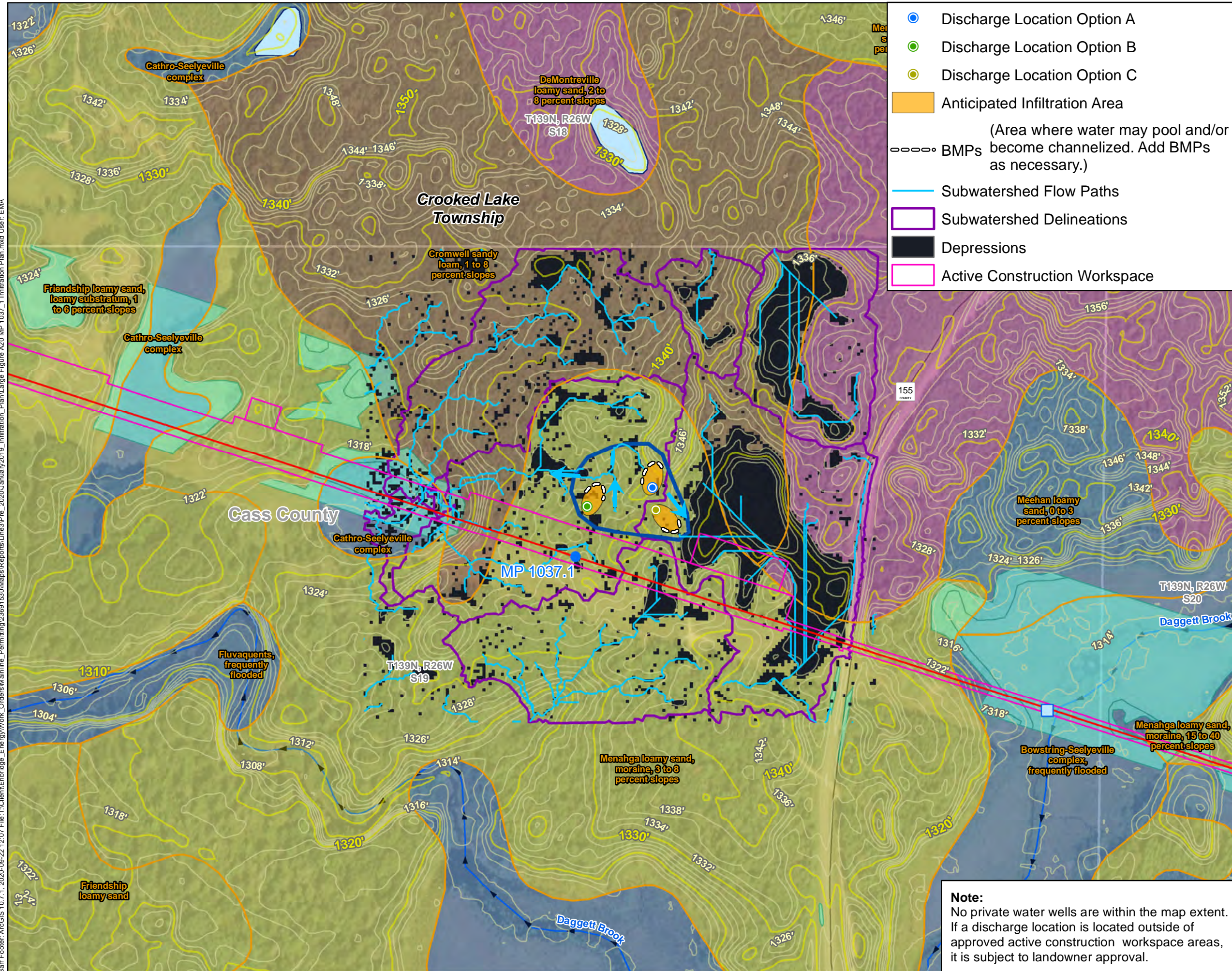
Feet
Large Figure A19

MP 1017.3
Discharge ID: LA025
Infiltration Plan and Analysis
Line 3 Replacement Project

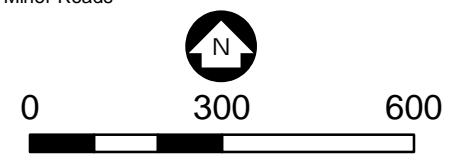
Note:
No private water wells are within the map extent.
If a discharge location is located outside of approved active construction workspace areas, it is subject to landowner approval.



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- Approximate Infiltration Mile-post
- Line 3 Replacement Project (Rev. AA)
- ⊕ Well - County Well Index
- Water Appropriation Site
- Potential Upland Discharge Study Area
- Soil Map Unit
- Hydrologic Soil Group**
 - A
 - B
 - C
 - D (A/D, B/D, C/D)
- Lidar Contours**
 - Index (10-Foot)
 - Intermediate (2-Foot)
 - Surficial Flow Direction
 - ▶ Flow Direction
 - Perennial Stream
 - - Intermittent Stream
 - Waterbodies
 - Field Delineated Wetlands
 - County Boundaries
 - Minor Roads



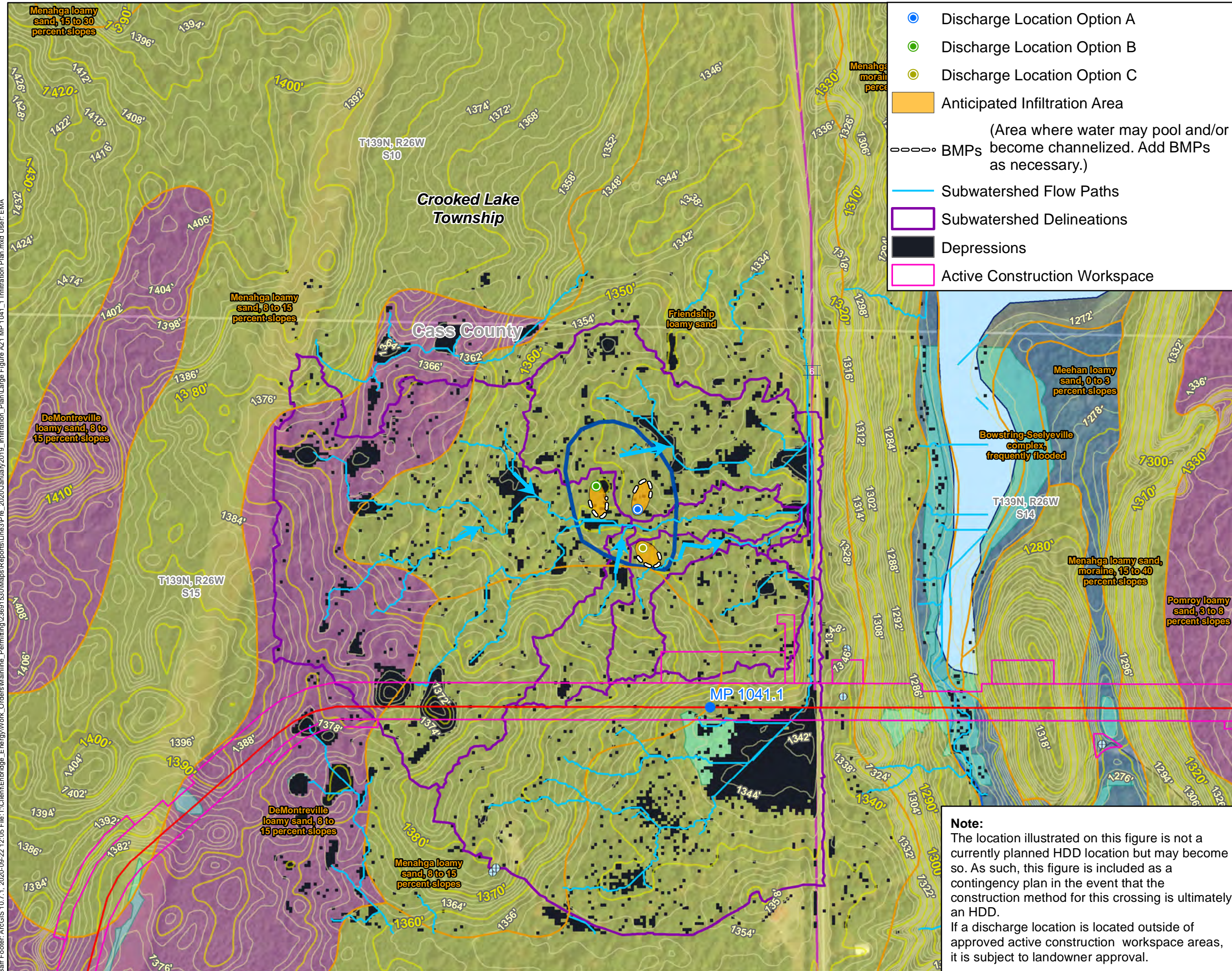
Feet
Large Figure A20

MP 1037.1
Discharge ID: LA021
Infiltration Plan and Analysis
Line 3 Replacement Project

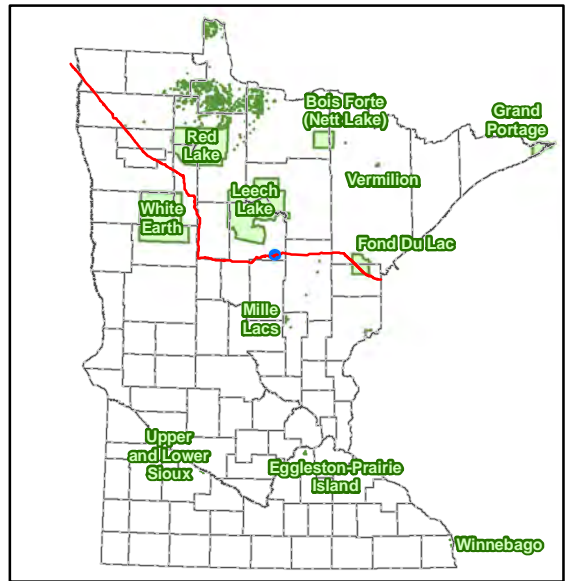
Note:
No private water wells are within the map extent. If a discharge location is located outside of approved active construction workspace areas, it is subject to landowner approval.



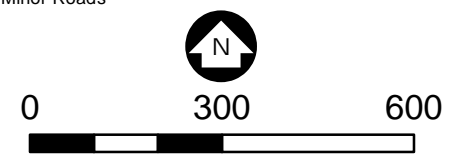
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- Discharge Location Option A
- Discharge Location Option B
- Discharge Location Option C
- Anticipated Infiltration Area
(Area where water may pool and/or become channelized. Add BMPs as necessary.)
- Subwatershed Flow Paths
- Subwatershed Delineations
- Depressions
- Active Construction Workspace



- Approximate Infiltration Mile-post
- Line 3 Replacement Project (Rev. AA)
- ⊕ Well - County Well Index
- Water Appropriation Site
- Potential Upland Discharge Study Area
- Soil Map Unit
- Hydrologic Soil Group**
 - A
 - B
 - C
 - D (A/D, B/D, C/D)
- Lidar Contours**
 - Index (10-Foot)
 - Intermediate (2-Foot)
- Surficial Flow Direction
- Flow Direction
- Perennial Stream
- Intermittent Stream
- Waterbodies
- Field Delineated Wetlands
- County Boundaries
- State Trunk Highway
- Minor Roads

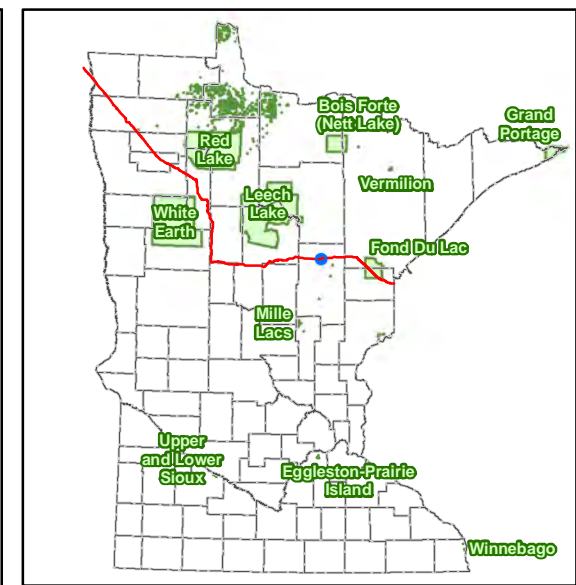
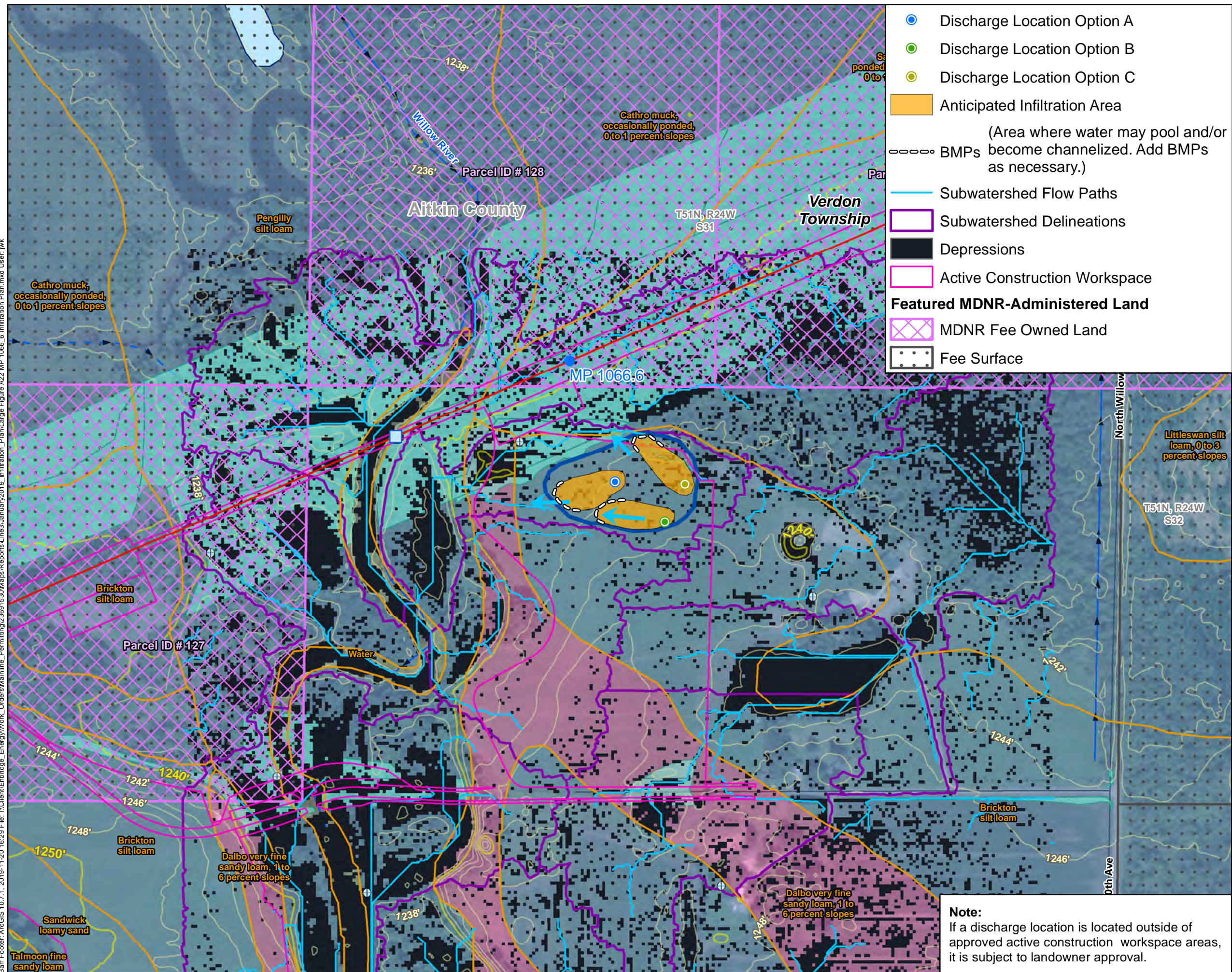


Feet
Large Figure A21

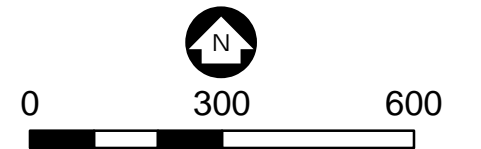
MP 1041.1
Discharge ID: LA022
Infiltration Plan and Analysis
Line 3 Replacement Project



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- Approximate Infiltration Mile-post
- Line 3 Replacement Project (Rev. AA)
- ⊕ Well - County Well Index
- Water Appropriation Site
- Potential Upland Discharge Study Area
- Soil Map Unit
- Hydrologic Soil Group**
 - A
 - B
 - C
 - D (A/D, B/D, C/D)
- Lidar Contours**
 - Index (10-Foot)
 - Intermediate (2-Foot)
 - Surfacial Flow Direction
 - ▶ Flow Direction
 - Perennial Stream
 - - Intermittent Stream
 - Waterbodies
 - Field Delineated Wetlands
 - County Boundaries
 - Minor Roads

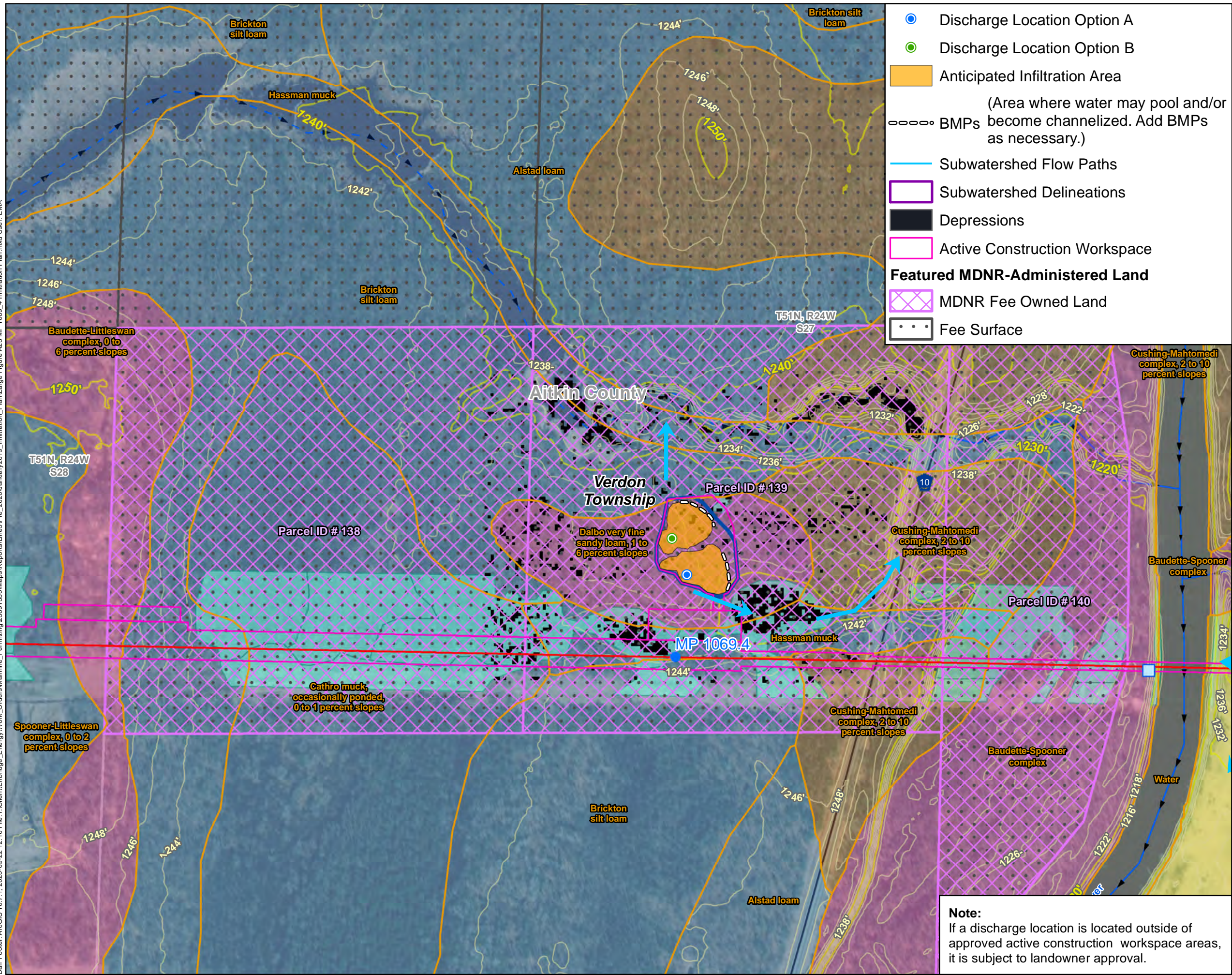


Feet
Large Figure A22

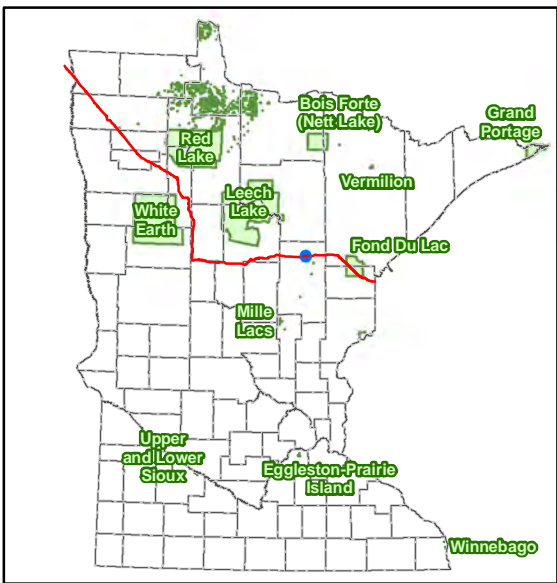
MP 1066.6
Discharge ID: LA018
Infiltration Plan and Analysis
Line 3 Replacement Project



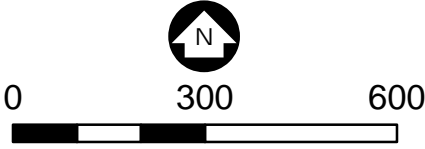
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- Discharge Location Option A
- Discharge Location Option B
- Anticipated Infiltration Area
(Area where water may pool and/or become channelized. Add BMPs as necessary.)
- BMPs
- Subwatershed Flow Paths
- Subwatershed Delineations
- Depressions
- Active Construction Workspace
- Featured MDNR-Administered Land
- MDNR Fee Owned Land
- Fee Surface



- Approximate Infiltration Mile-post
- Line 3 Replacement Project (Rev. AA)
- Well - County Well Index
- Water Appropriation Site
- Potential Upland Discharge Study Area
- Soil Map Unit
- Hydrologic Soil Group
 - A
 - B
 - C
 - D (A/D, B/D, C/D)
- Lidar Contours
 - Index (10-Foot)
 - Intermediate (2-Foot)
- Surficial Flow Direction
- Flow Direction
- Perennial Stream
- Intermittent Stream
- Waterbodies
- Field Delineated Wetlands
- County Boundaries
- County State-Aid Highway



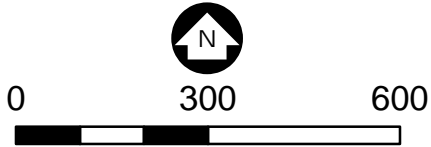
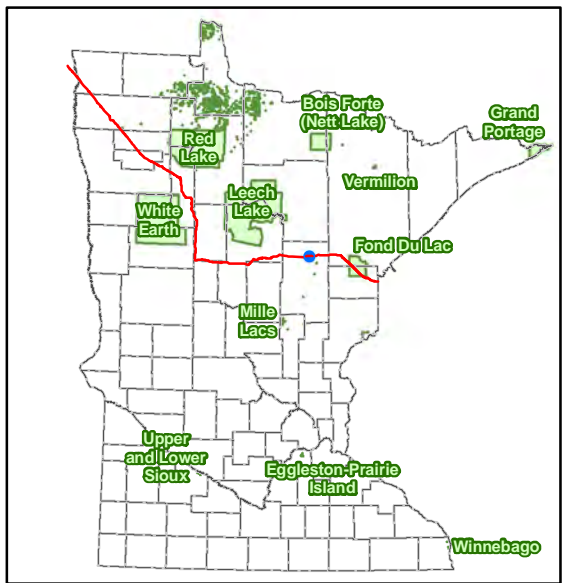
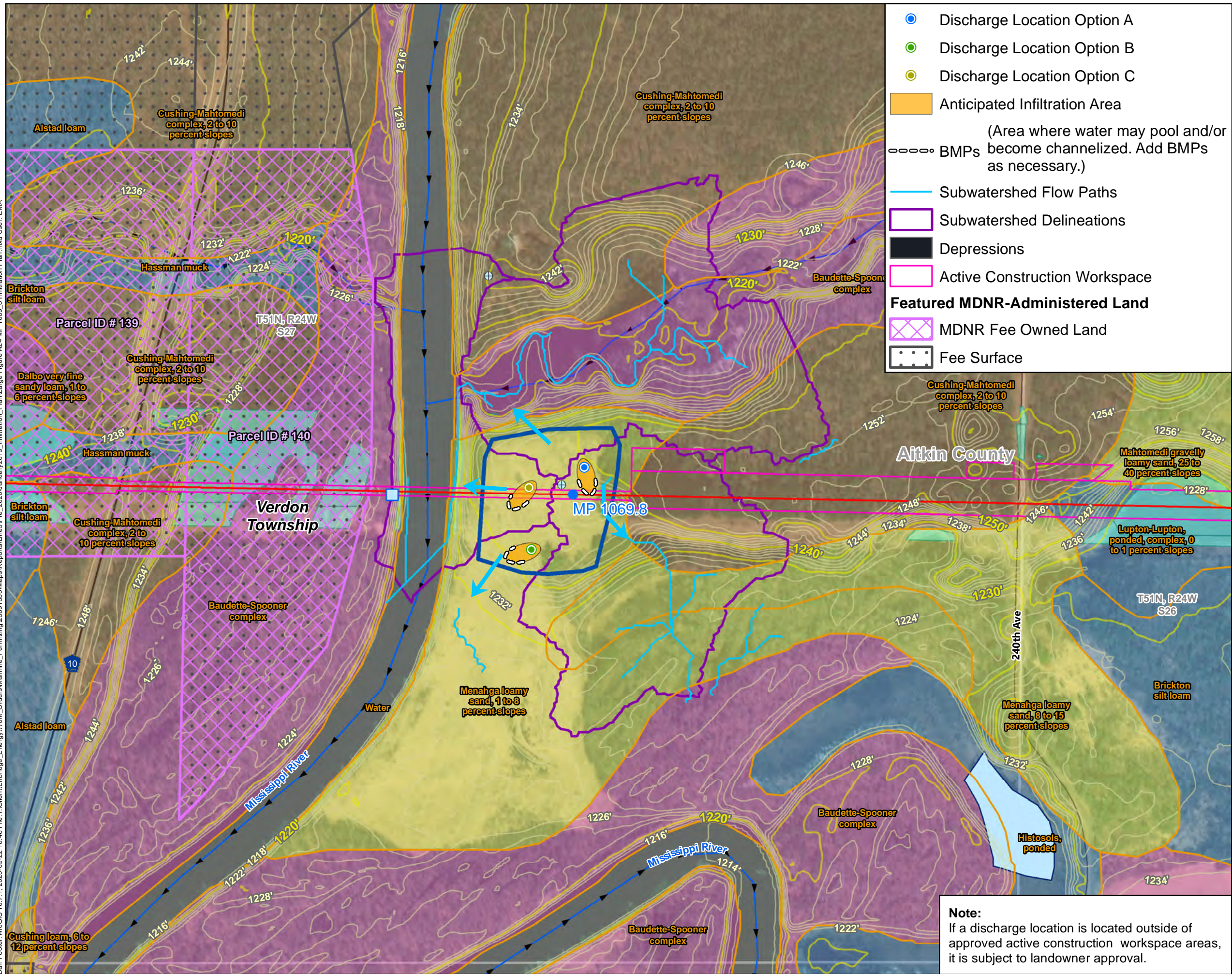
Feet
Large Figure A23

MP 1069.4
Discharge ID: LA017
Infiltration Plan and Analysis
Line 3 Replacement Project

Note:
If a discharge location is located outside of approved active construction workspace areas, it is subject to landowner approval.



Barr Footer: ArcGIS 10.7.1, 2020-09-22 16:46 File: I:\Client\Enbridge_Energy\Work_Orders\Mainline_Permitting\23691530\Maps\Reports\Lines3\Pre_2020\January2019_Infiltration_Plan\Large Figure A24 MP 1069.8 Infiltration Plan.mxd User: EMA



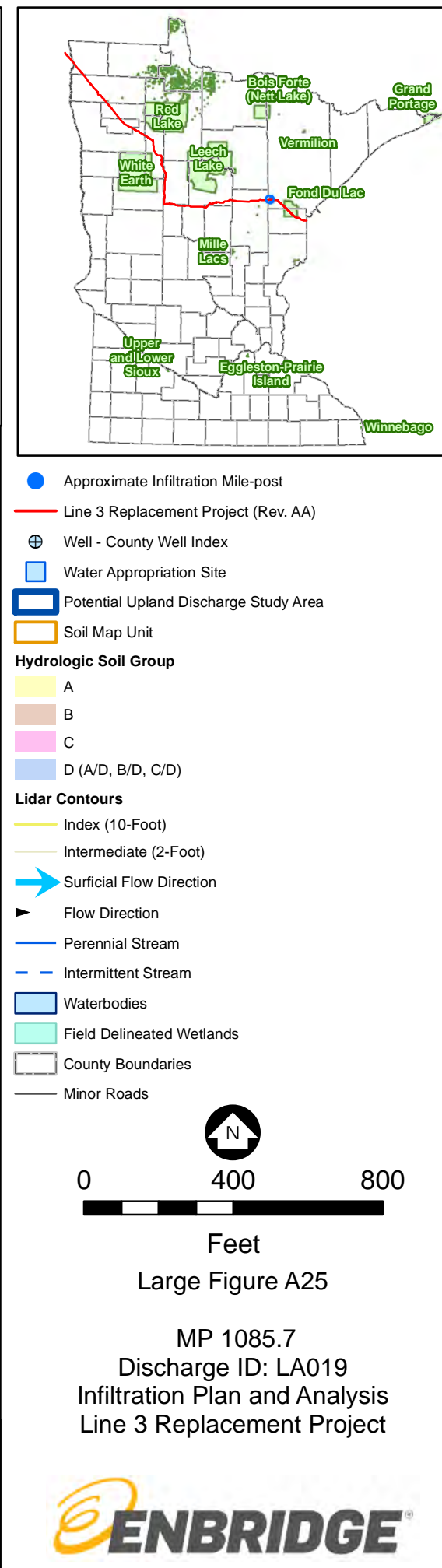
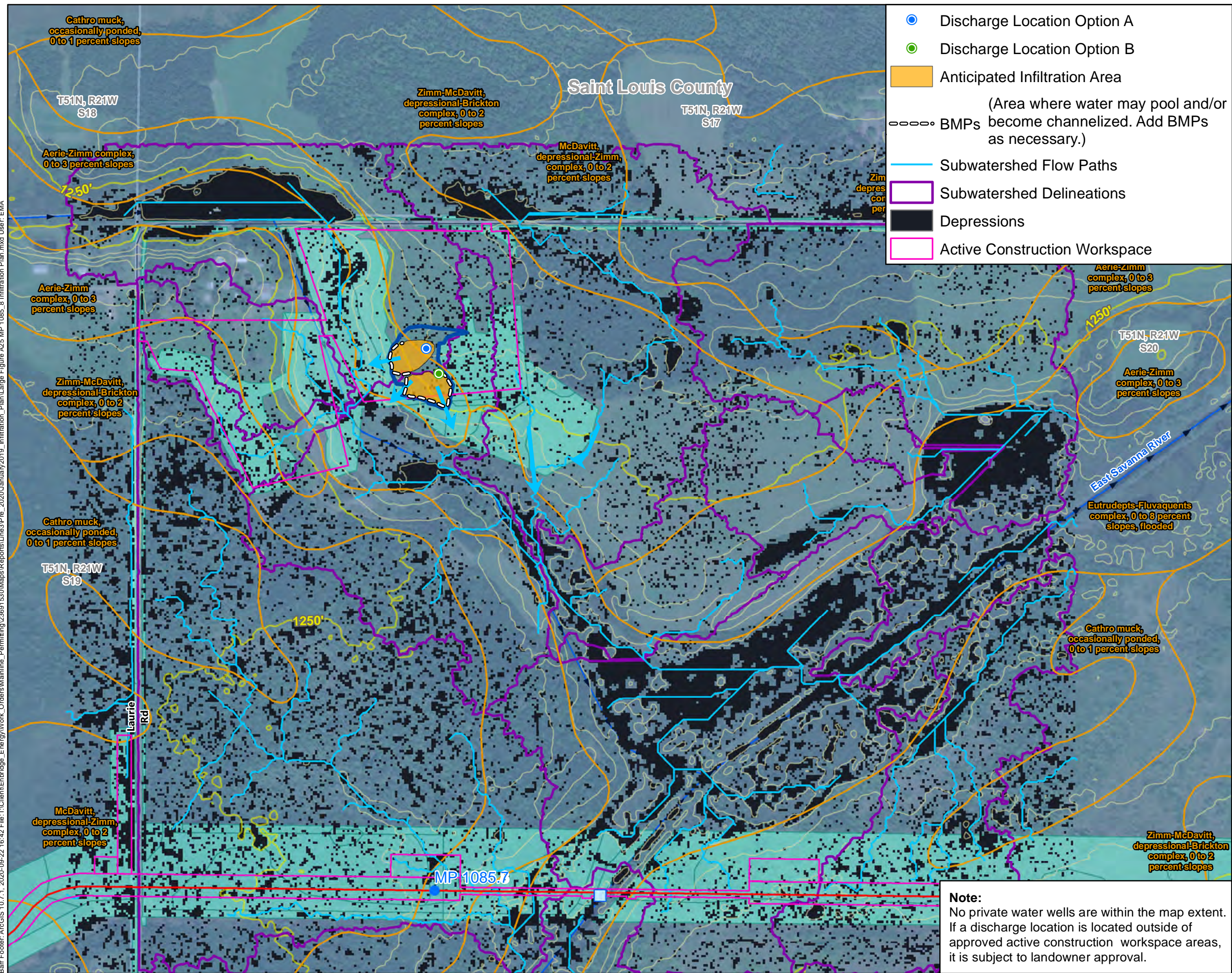
Feet
Large Figure A24

MP 1069.8
Discharge ID: LA027
Infiltration Plan and Analysis
Line 3 Replacement Project

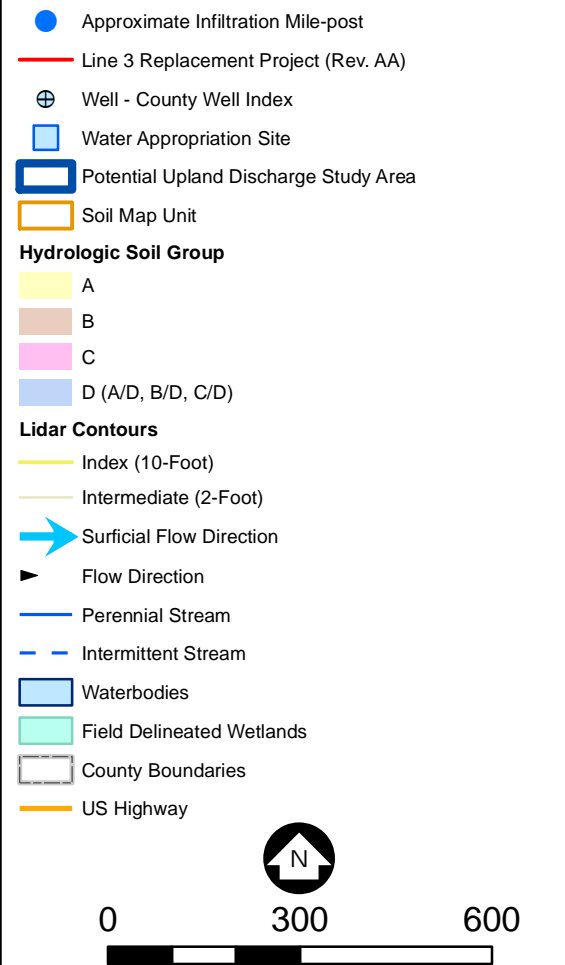
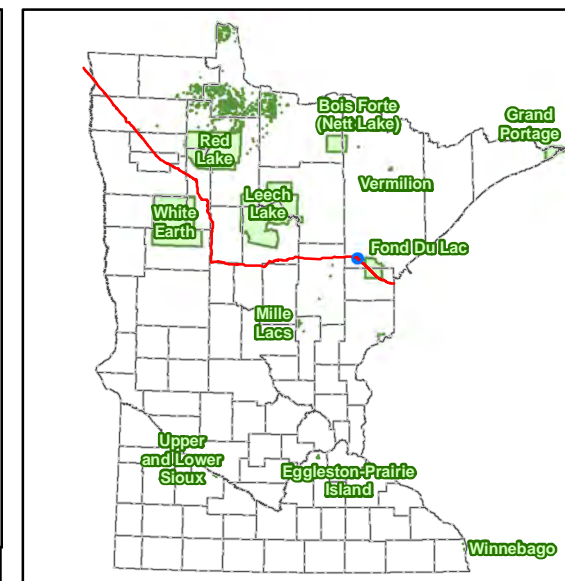
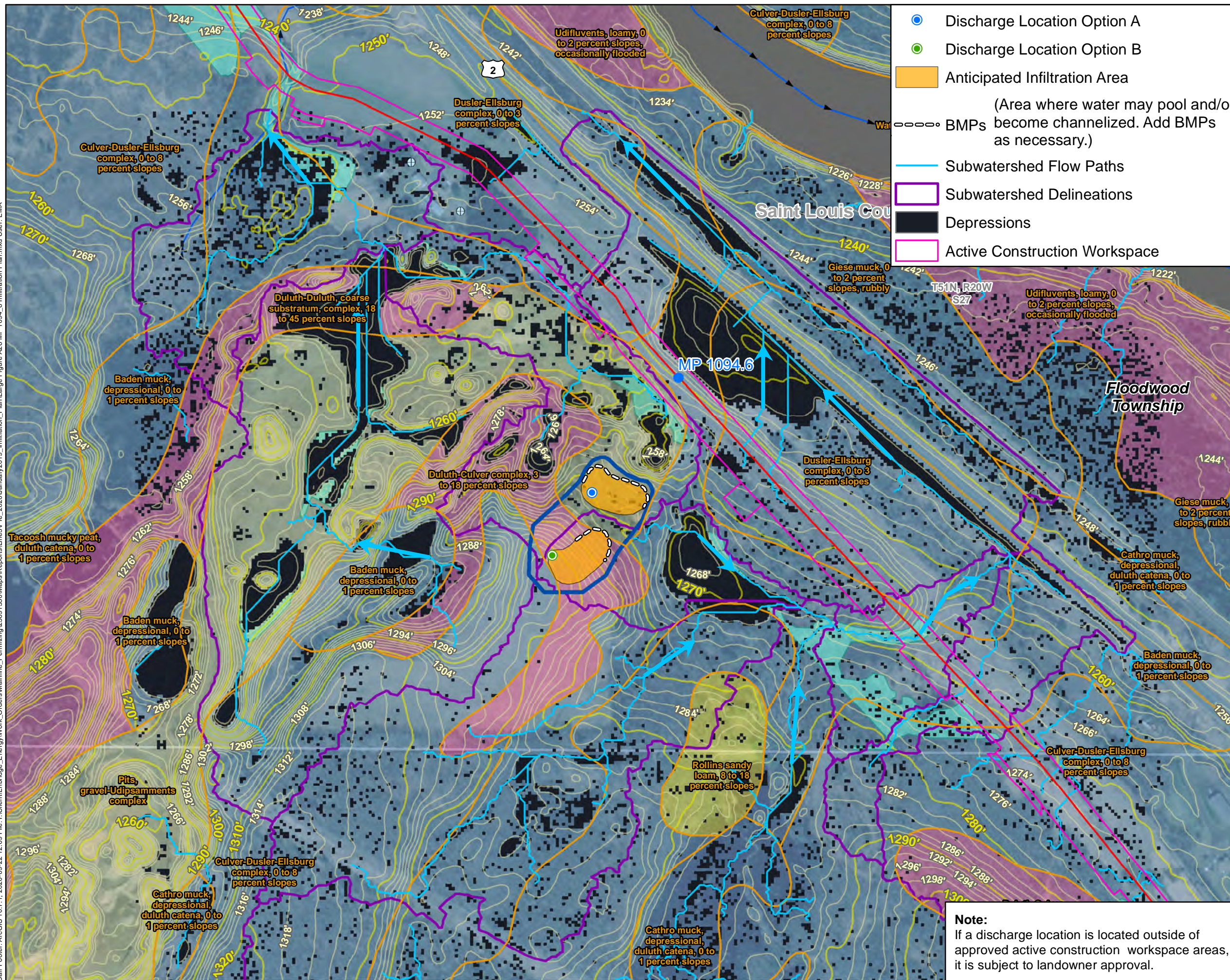
Note:
If a discharge location is located outside of approved active construction workspace areas, it is subject to landowner approval.



Barr Footer: ArcGIS 10.7.1, 2020-09-22 16:42 File: I:\Client\Enbridge_EnergyWork_Orders\Mainline_Permitting\23691530\Maps\Reports\Lines3\re_2020\January2019_Infiltration_Plan\Large Figure A25 MP 1085.7 Infiltration Plan.mxd User: EMA



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0 300 600

Feet

Large Figure A26

MP 1094.6

Discharge ID: LA023

Infiltration Plan and Analysis

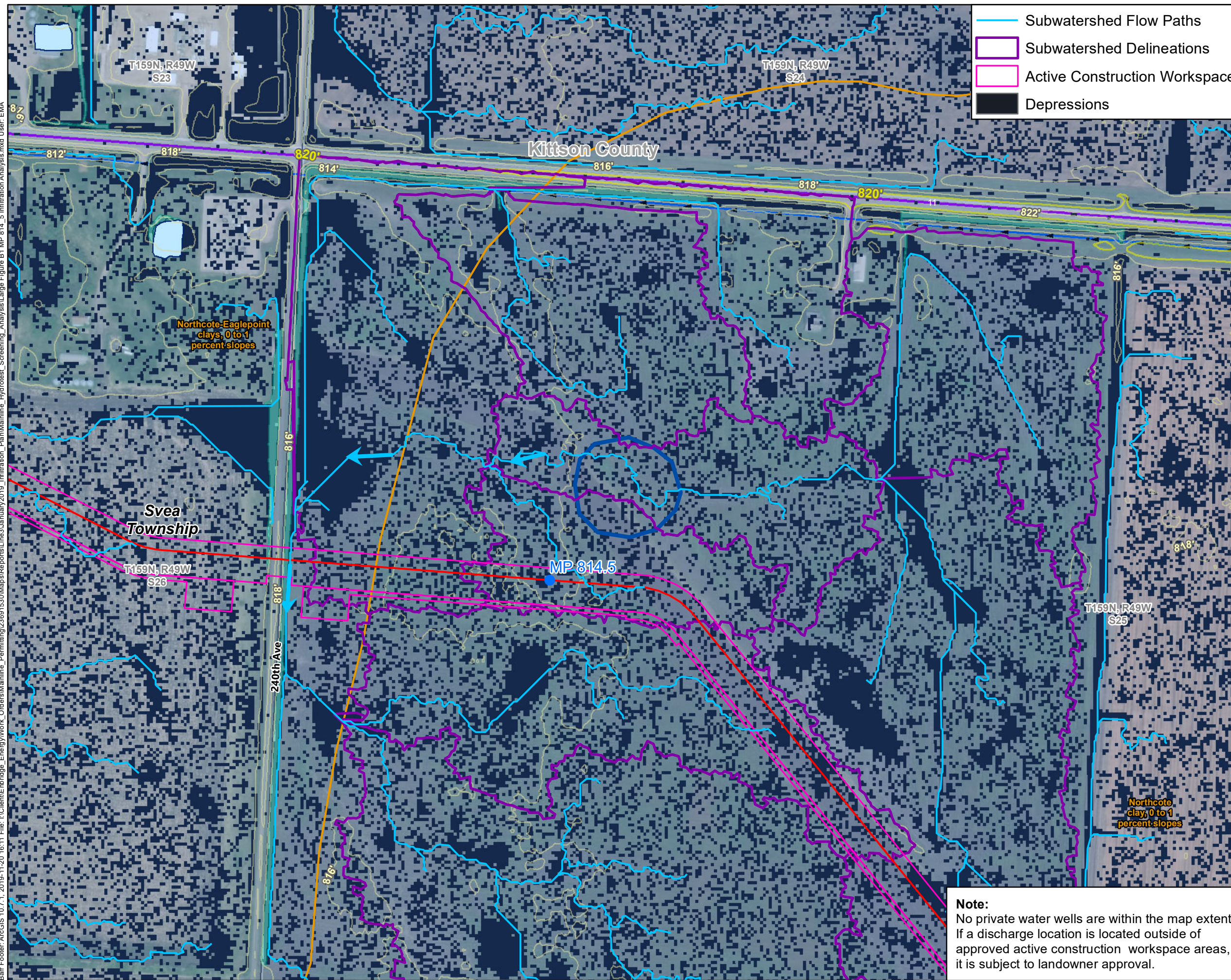
Line 3 Replacement Project



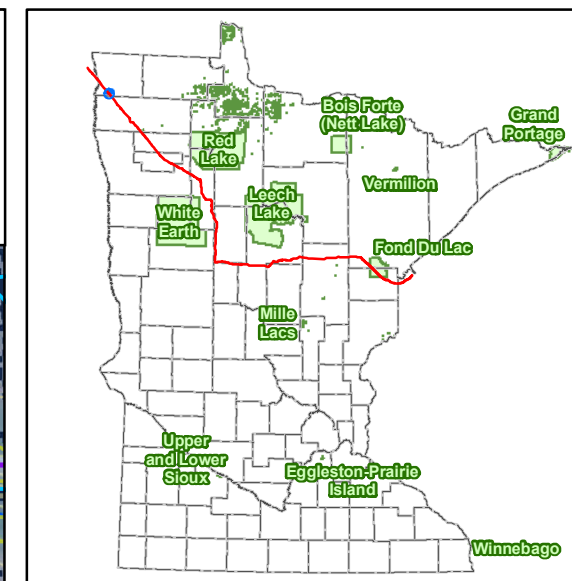
Appendix B

Large Figures for Locations not Carried Forward into the Infiltration Plan

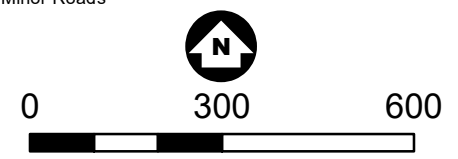
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- Subwatershed Flow Paths
- Subwatershed Delineations
- Active Construction Workspace
- Depressions



- Mainline Spread End Milepost
- Line 3 Replacement Project (Rev. X)
- Well - County Well Index
- Water Appropriation Site
- Potential Upland Discharge Study Area
- Soil Map Unit
- Hydrologic Soil Group**
 - A
 - B
 - C
 - D (A/D, B/D, C/D)
- Lidar Contours**
 - Index (10-Foot)
 - Intermediate (2-Foot)
- Surficial Flow Direction
- Flow Direction
- Perennial Stream
- Intermittent Stream
- Waterbodies
- Field Delineated Wetlands
- County Boundaries
- State Trunk Highway
- Minor Roads



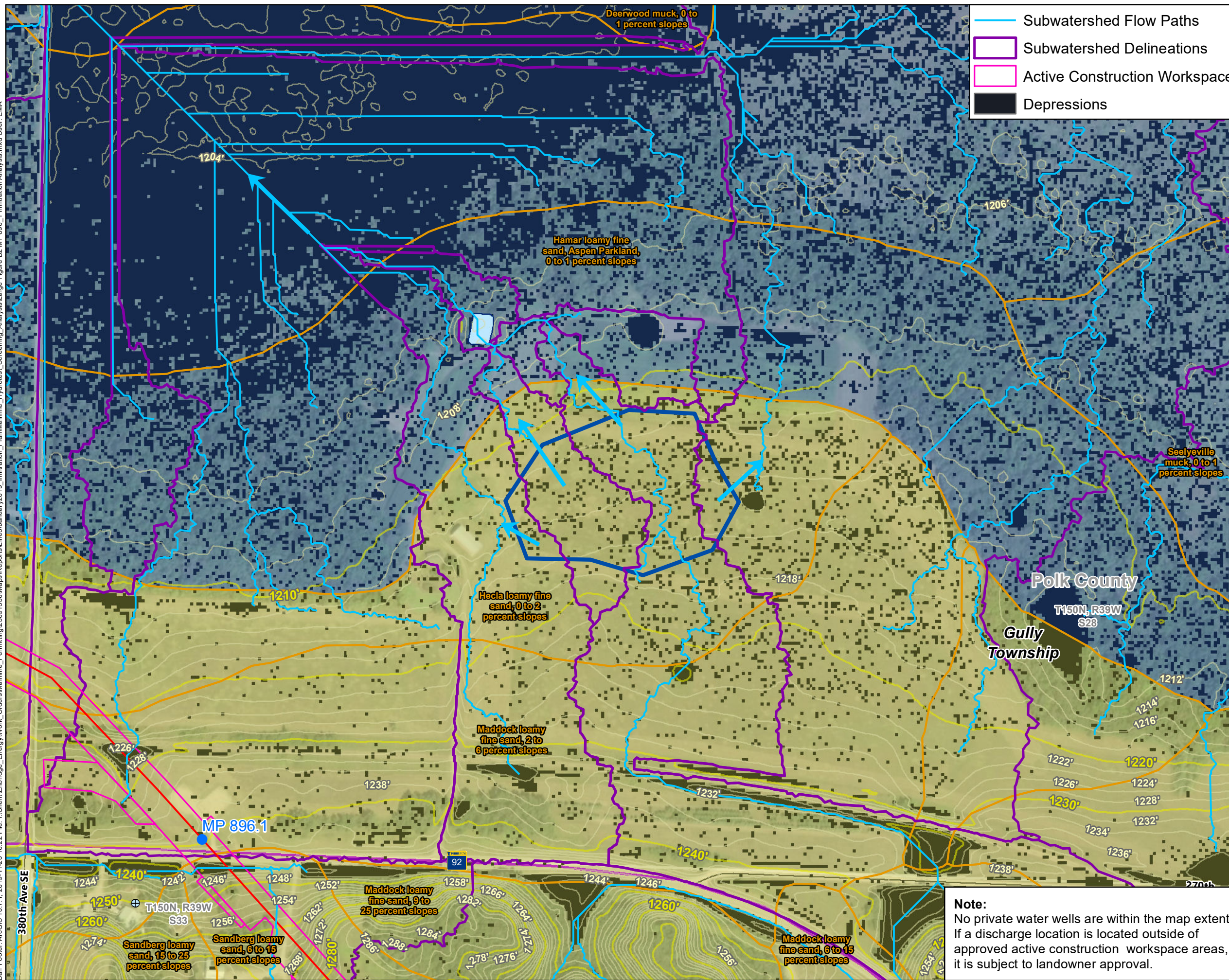
Large Figure B1

MP 814.5
Infiltration Plan and Analysis
Line 3 Replacement Project

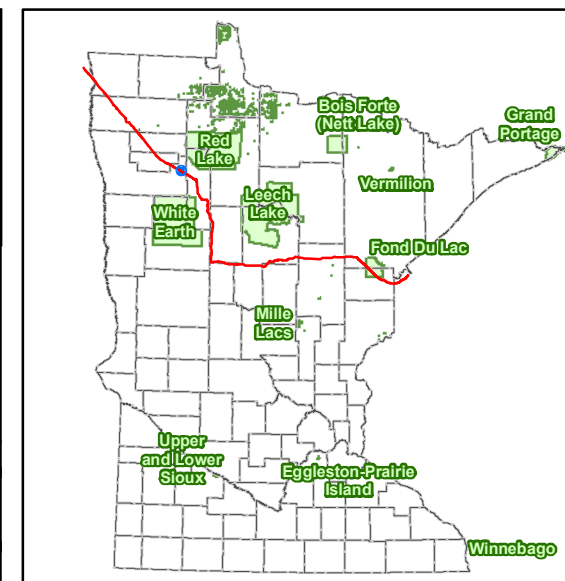
Note:
No private water wells are within the map extent.
If a discharge location is located outside of
approved active construction workspace areas,
it is subject to landowner approval.



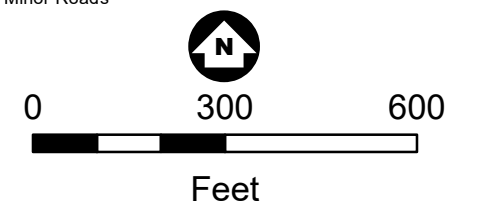
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- Subwatershed Flow Paths
- Subwatershed Delineations
- Active Construction Workspace
- Depressions



- Mainline Spread End Milepost
- Line 3 Replacement Project (Rev. X)
- Well - County Well Index
- Water Appropriation Site
- Potential Upland Discharge Study Area
- Soil Map Unit
- Hydrologic Soil Group
 - A
 - B
 - C
 - D (A/D, B/D, C/D)
- Lidar Contours
 - Index (10-Foot)
 - Intermediate (2-Foot)
- Surficial Flow Direction
- Flow Direction
- Perennial Stream
- Intermittent Stream
- Waterbodies
- Field Delineated Wetlands
- County Boundaries
- State Trunk Highway
- Minor Roads



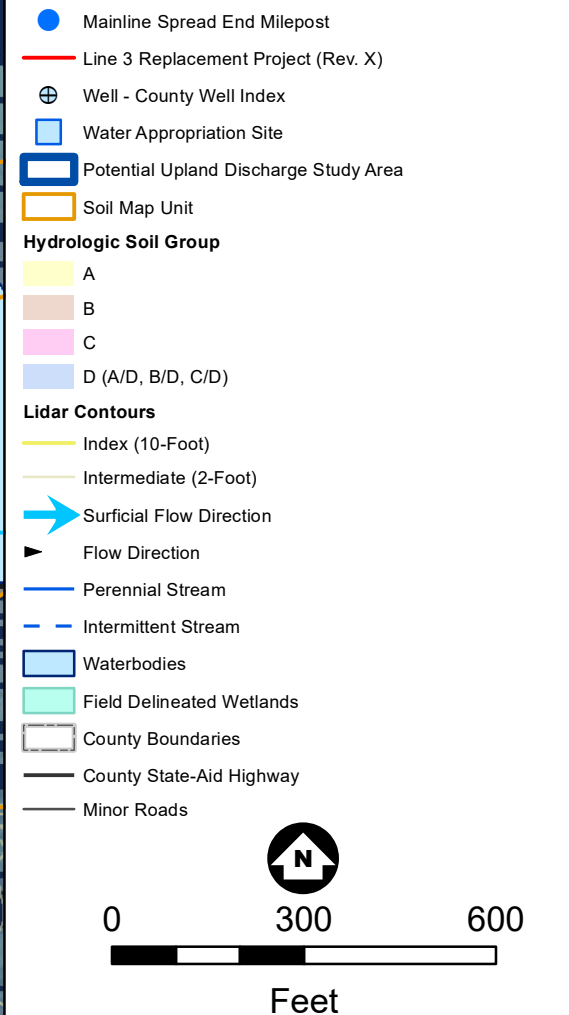
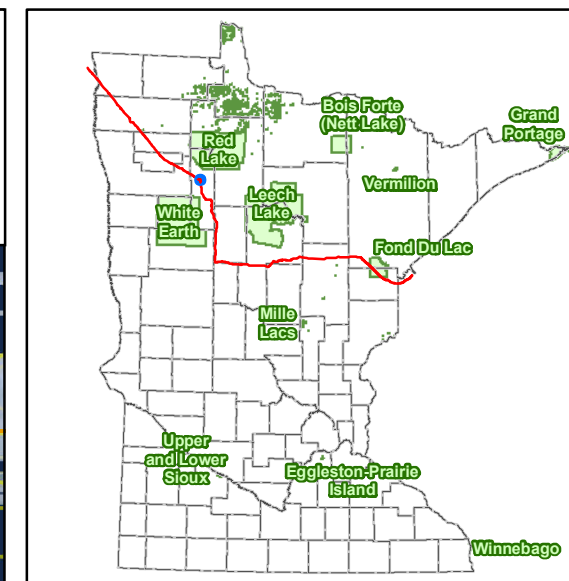
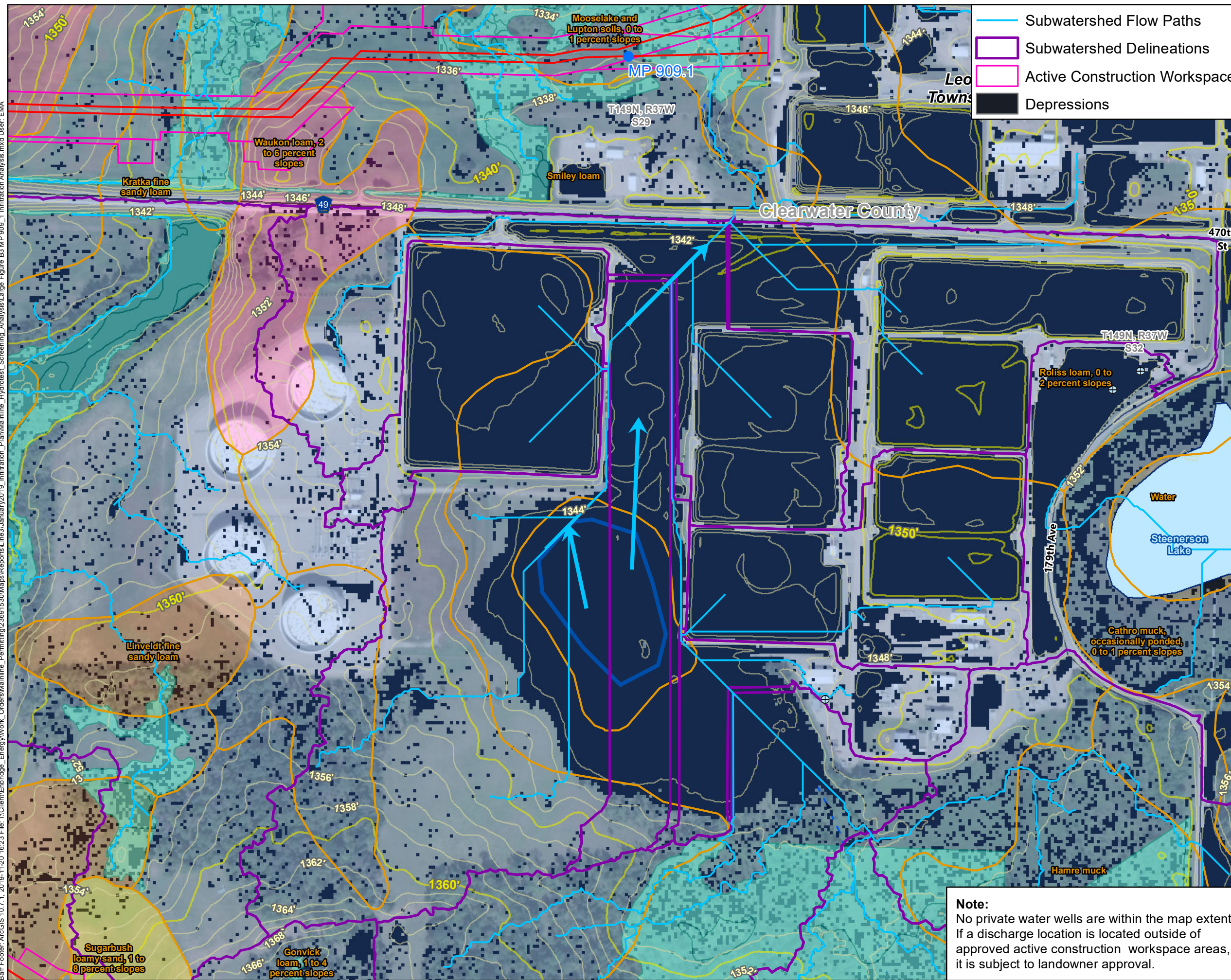
Large Figure B2

MP 896.1
Infiltration Plan and Analysis
Line 3 Replacement Project

Note:
No private water wells are within the map extent.
If a discharge location is located outside of
approved active construction workspace areas,
it is subject to landowner approval.



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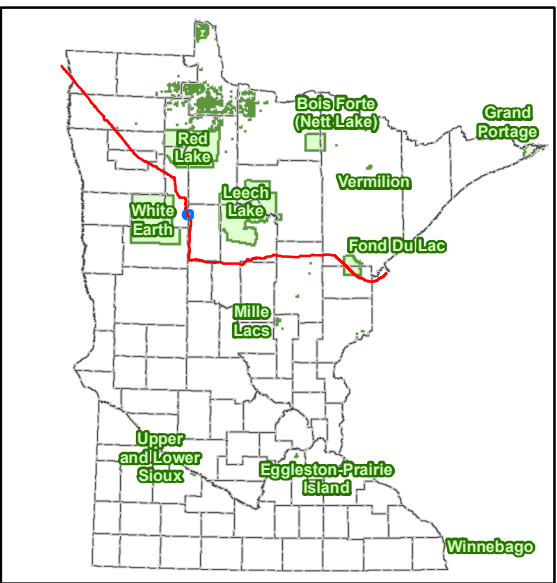
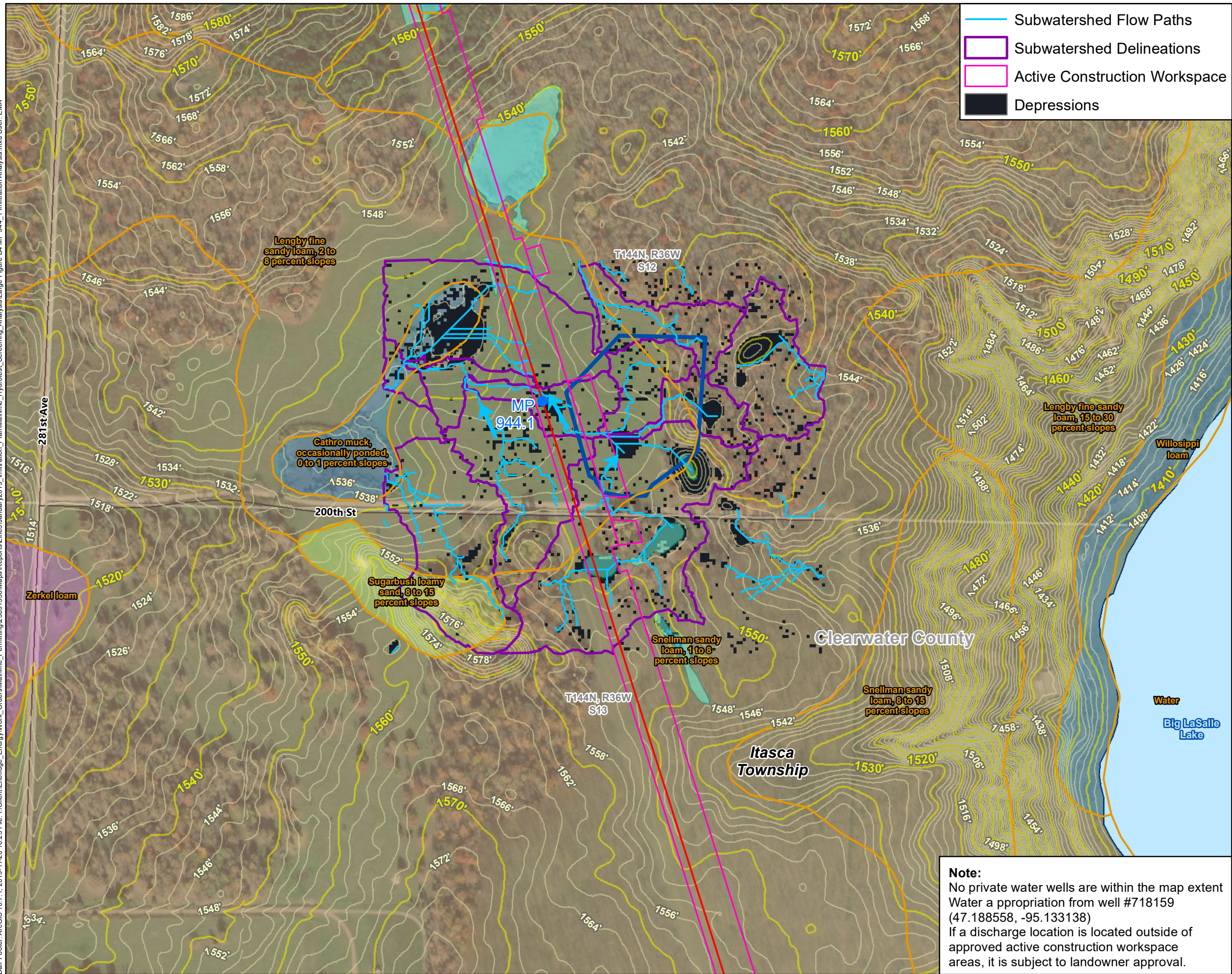


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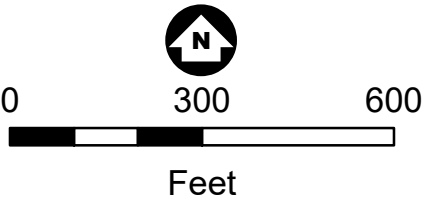
MP 909.1
Infiltration Plan and Analysis
Line 3 Replacement Project



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- Approximate Infiltration Mile-post
- Line 3 Replacement Project (Rev. X)
- ⊕ Well - County Well Index
- ▭ Potential Upland Discharge Study Area
- ▭ Soil Map Unit
- Hydrologic Soil Group**
 - A
 - B
 - C
 - D (A/D, B/D, C/D)
- Lidar Contours**
 - Index (10-Foot)
 - Intermediate (2-Foot)
 - ➡ Surficial Flow Direction
 - ▶ Flow Direction
 - Perennial Stream
 - - Intermittent Stream
 - ▭ Waterbodies
 - ▭ Field Delineated Wetlands
 - ▭ County Boundaries
 - Minor Roads

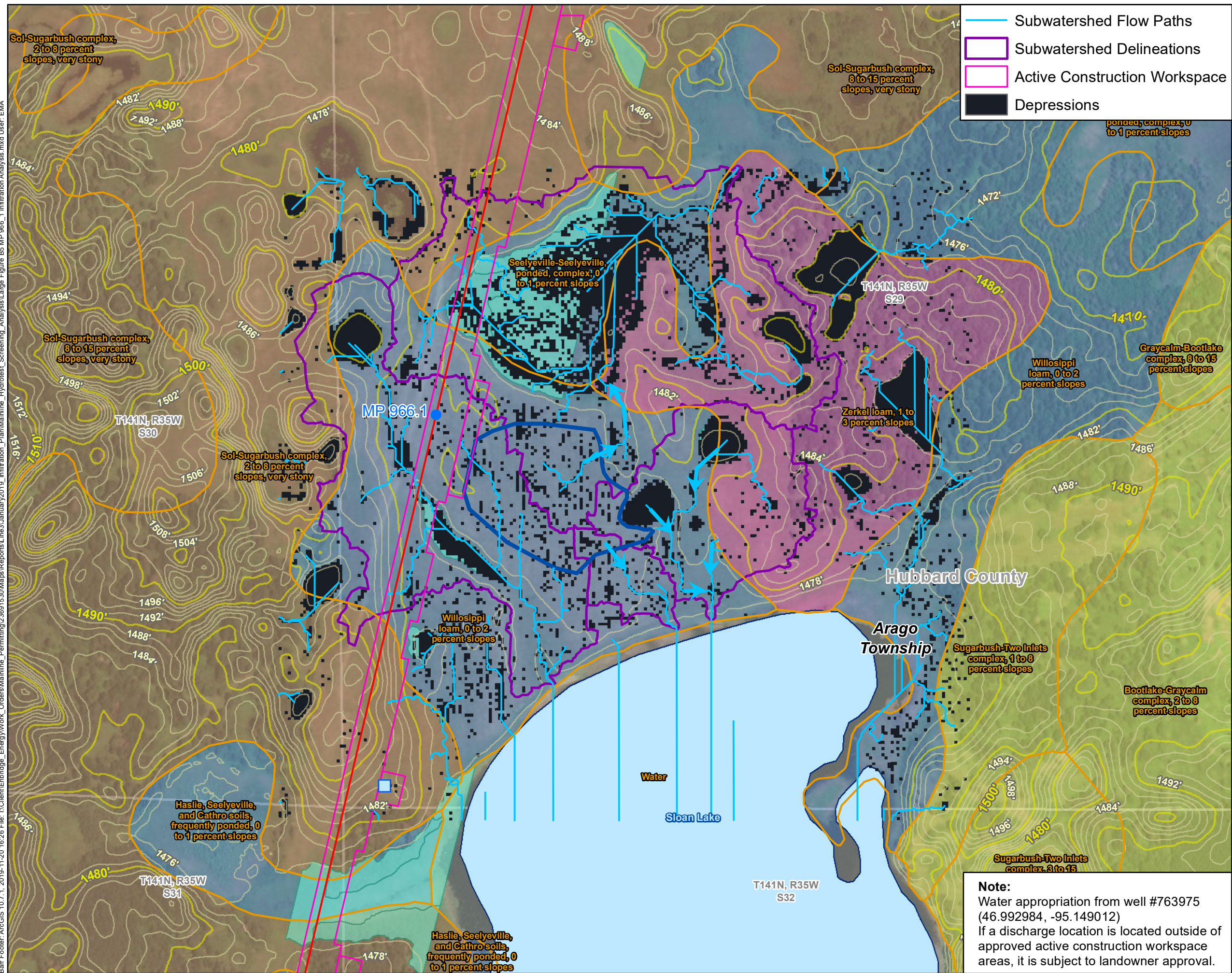


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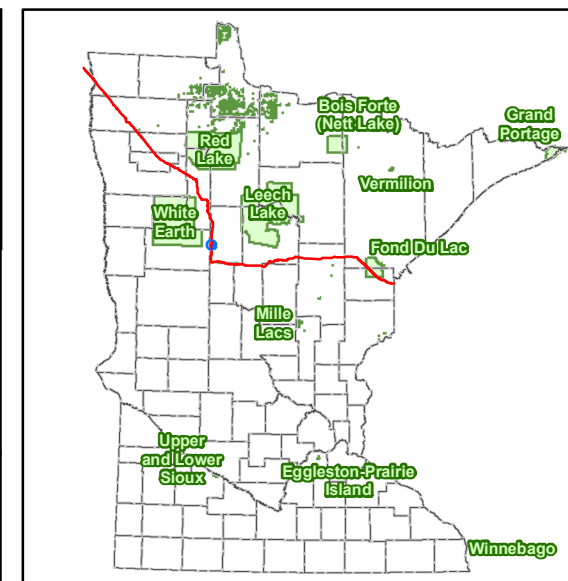
MP 944.1
Infiltration Plan and Analysis
Line 3 Replacement Project



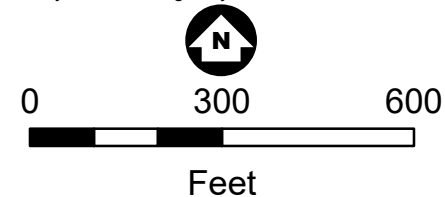
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- Subwatershed Flow Paths
- Subwatershed Delineations
- Active Construction Workspace
- Depressions



- Approximate Infiltration Mile-post
- Line 3 Replacement Project (Rev. X)
- Well - County Well Index
- Water Appropriation Site
- Potential Upland Discharge Study Area
- Soil Map Unit
- Hydrologic Soil Group
 - A
 - B
 - C
 - D (A/D, B/D, C/D)
- Lidar Contours
 - Index (10-Foot)
 - Intermediate (2-Foot)
- Surficial Flow Direction
- Flow Direction
- Perennial Stream
- Intermittent Stream
- Waterbodies
- Field Delineated Wetlands
- County Boundaries
- County State-Aid Highway

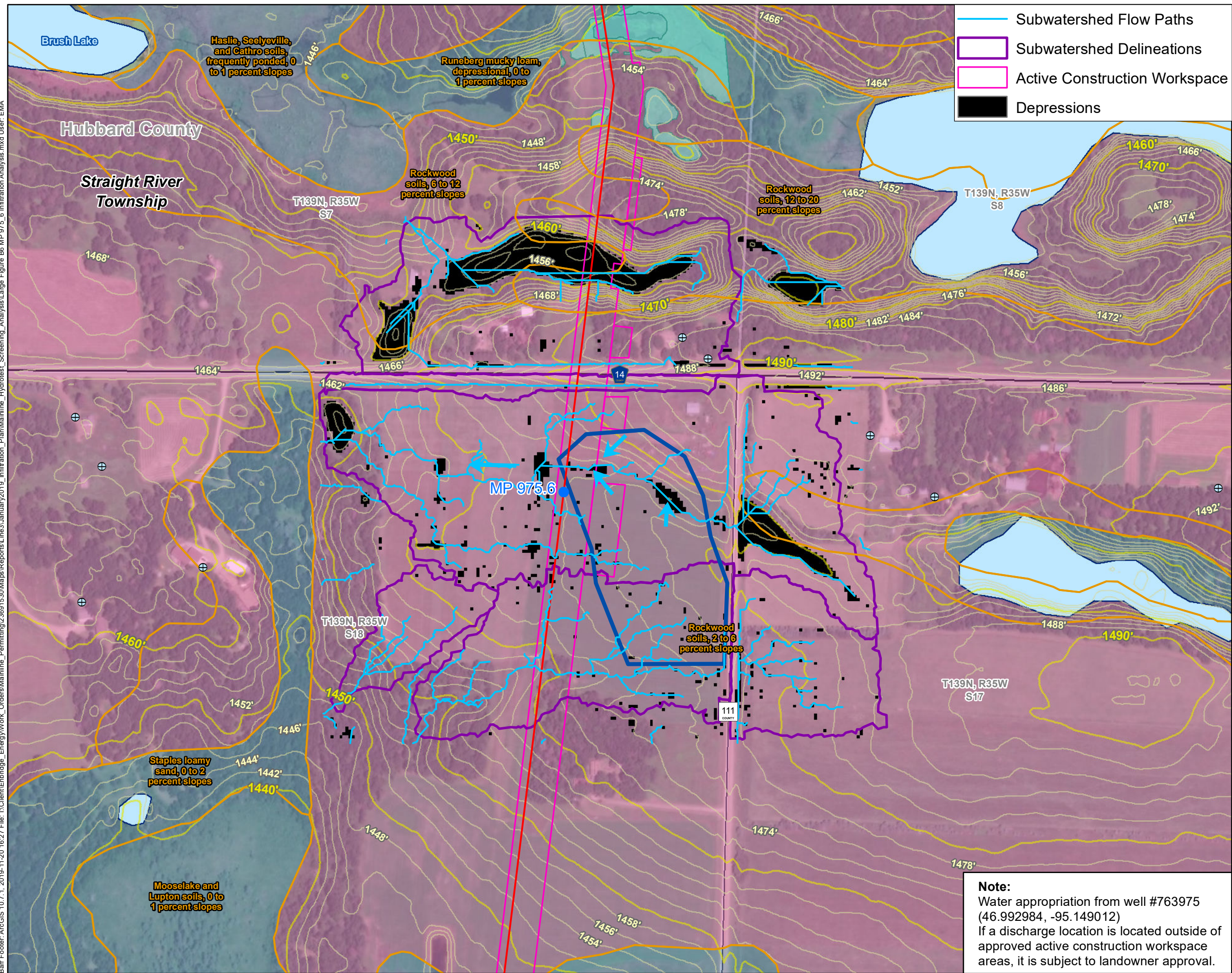


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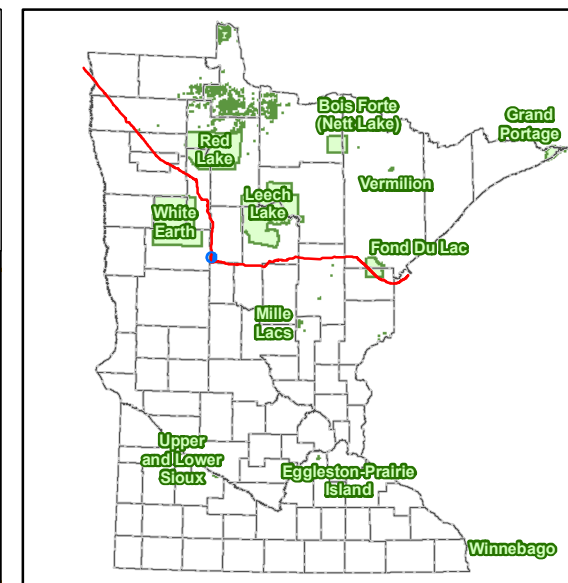
MP 966.1
Infiltration Plan and Analysis
Line 3 Replacement Project

Note:
Water appropriation from well #763975 (46.992984, -95.149012)
If a discharge location is located outside of approved active construction workspace areas, it is subject to landowner approval.

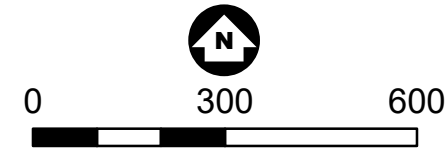




- Subwatershed Flow Paths
- Subwatershed Delineations
- Active Construction Workspace
- Depressions



- Approximate Infiltration Mile-post
- Line 3 Replacement Project (Rev. X)
- Well - County Well Index
- Potential Upland Discharge Study Area
- Soil Map Unit
- Hydrologic Soil Group
 - A
 - B
 - C
 - D (A/D, B/D, C/D)
- Lidar Contours
 - Index (10-Foot)
 - Intermediate (2-Foot)
- Surficial Flow Direction
- Flow Direction
- Perennial Stream
- Intermittent Stream
- Waterbodies
- Field Delineated Wetlands
- County Boundaries
- County State-Aid Highway
- Minor Roads



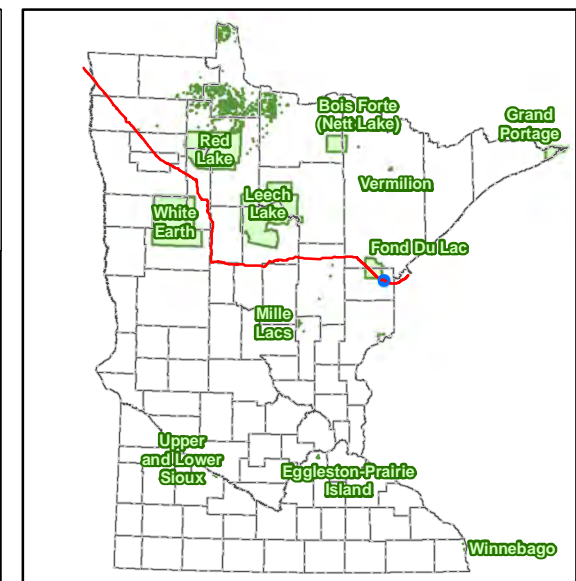
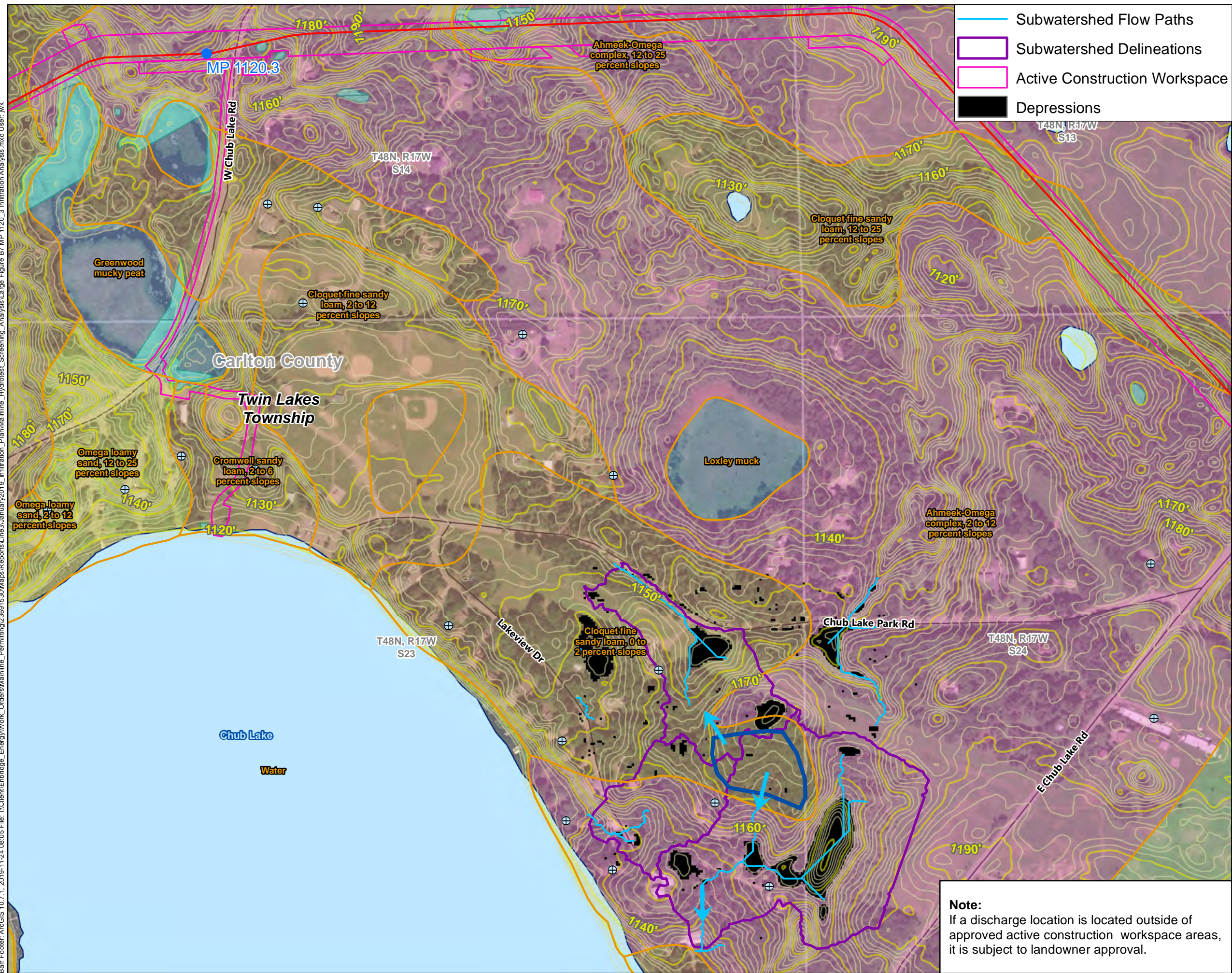
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MP 975.6
Infiltration Plan and Analysis
Line 3 Replacement Project

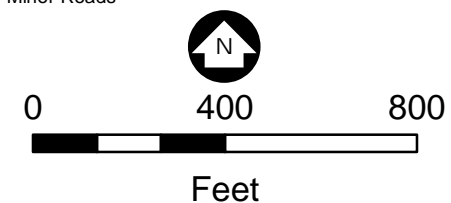
Note:
Water appropriation from well #763975 (46.992984, -95.149012)
If a discharge location is located outside of approved active construction workspace areas, it is subject to landowner approval.



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- Mainline Spread End Milepost
- Line 3 Replacement Project (Rev. X)
- ⊕ Well - County Well Index
- Water Appropriation Site
- Potential Upland Discharge Study Area
- Soil Map Unit
- Hydrologic Soil Group**
 - A
 - B
 - C
 - D (A/D, B/D, C/D)
- Lidar Contours**
 - Index (10-Foot)
 - Intermediate (2-Foot)
 - Surficial Flow Direction
 - ▶ Flow Direction
 - Perennial Stream
 - - Intermittent Stream
 - Waterbodies
 - Field Delineated Wetlands
 - County Boundaries
 - Minor Roads



Large Figure B7

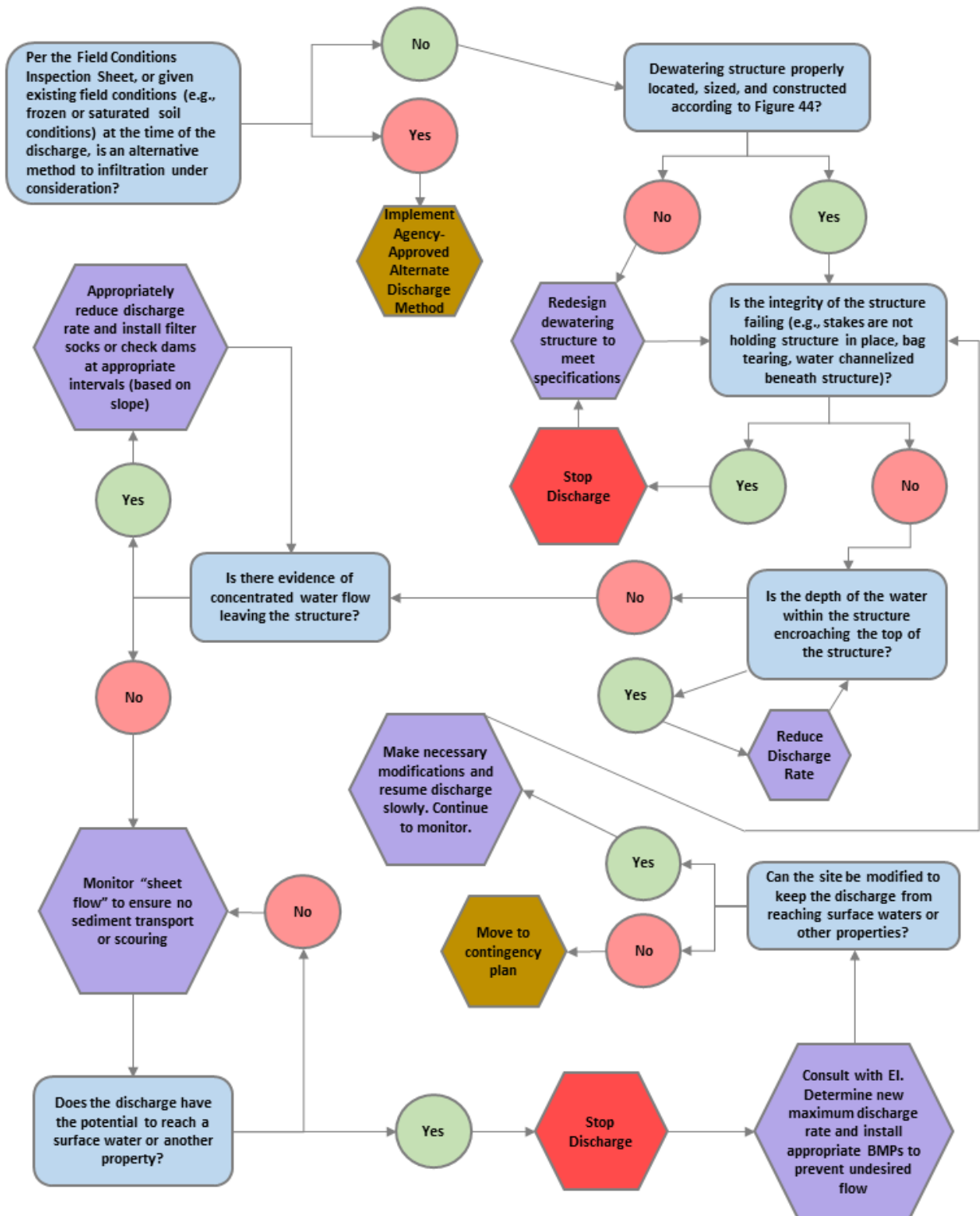
MP 1120.3
Infiltration Plan and Analysis
Line 3 Replacement Project

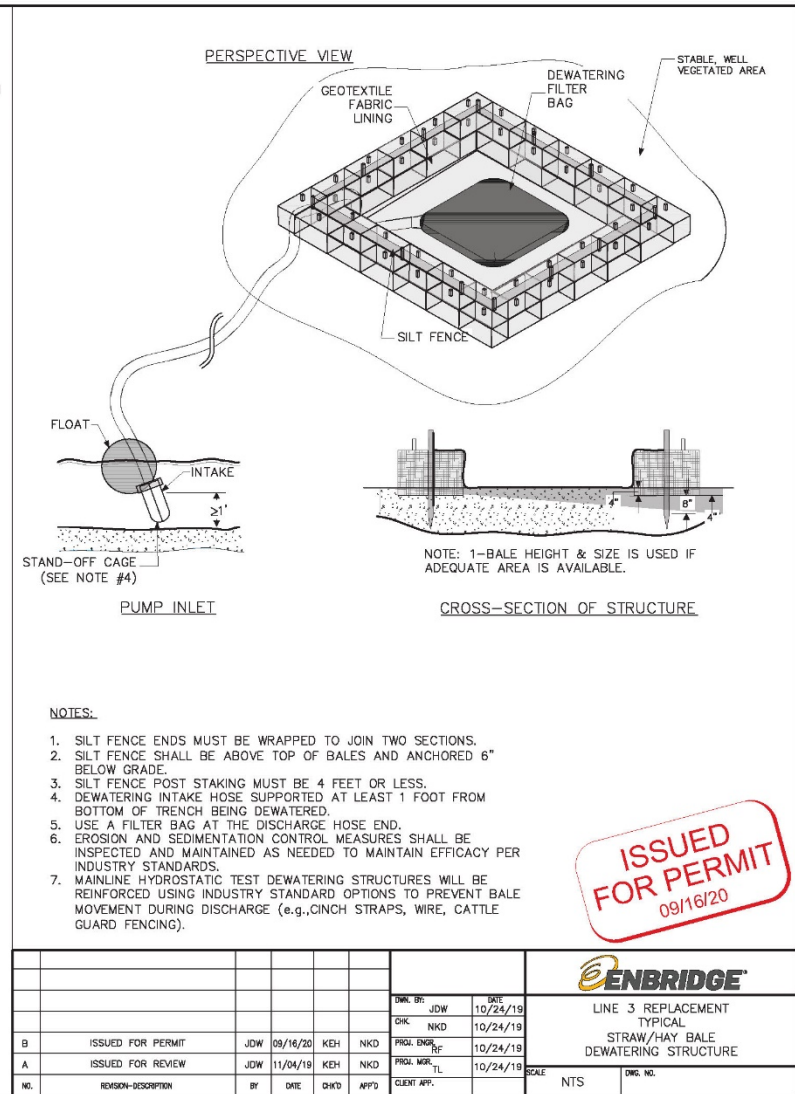
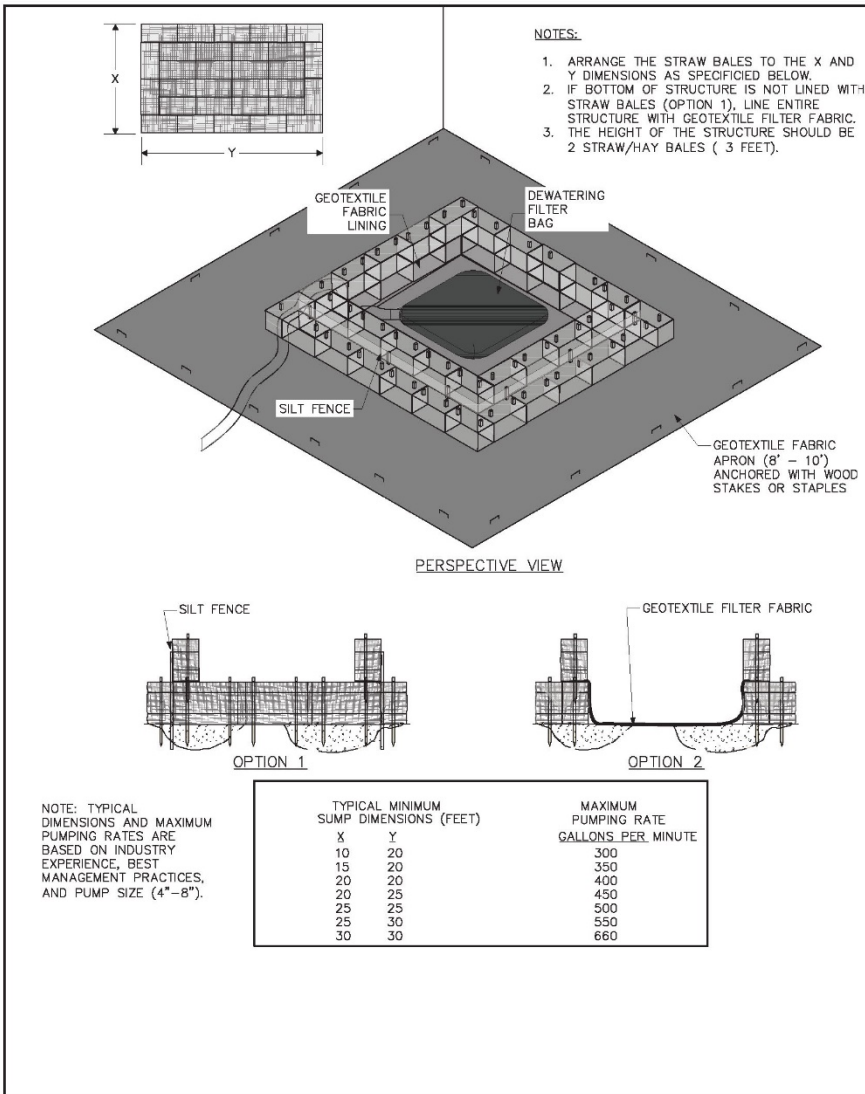


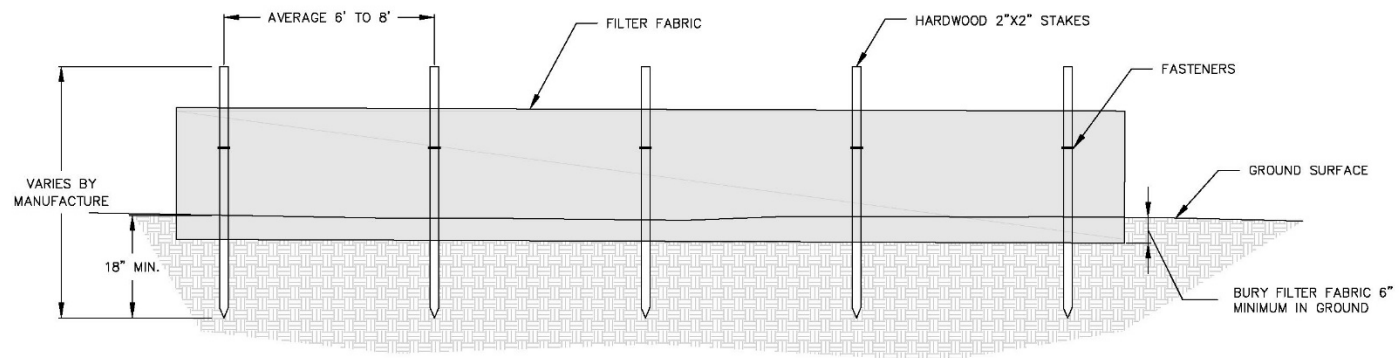
Appendix C

Infiltration BMP Decision Tree and Erosion and Sediment Control BMP Typical Figures

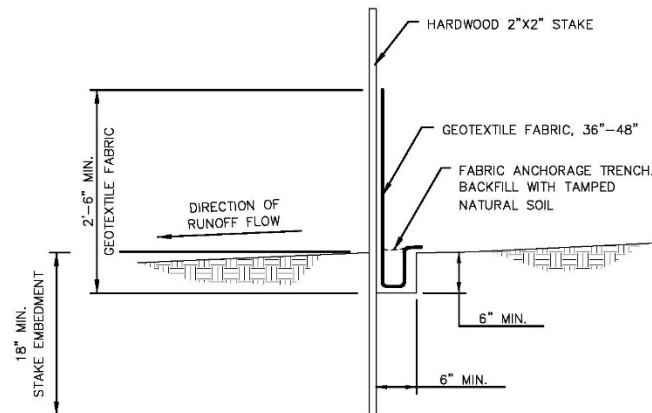
Infiltration Best Management Practice (BMP) Decision Tree








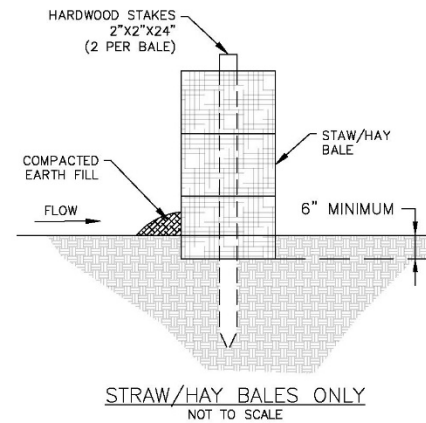
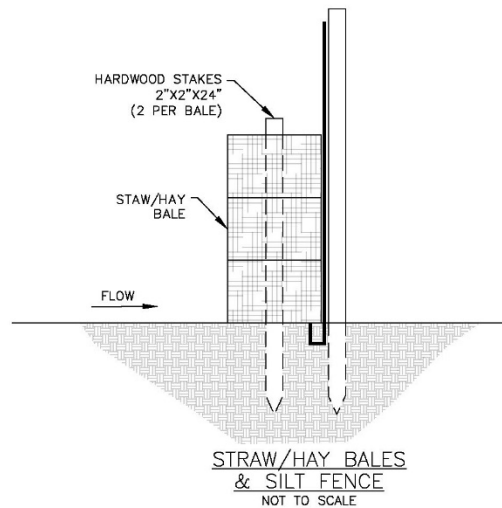
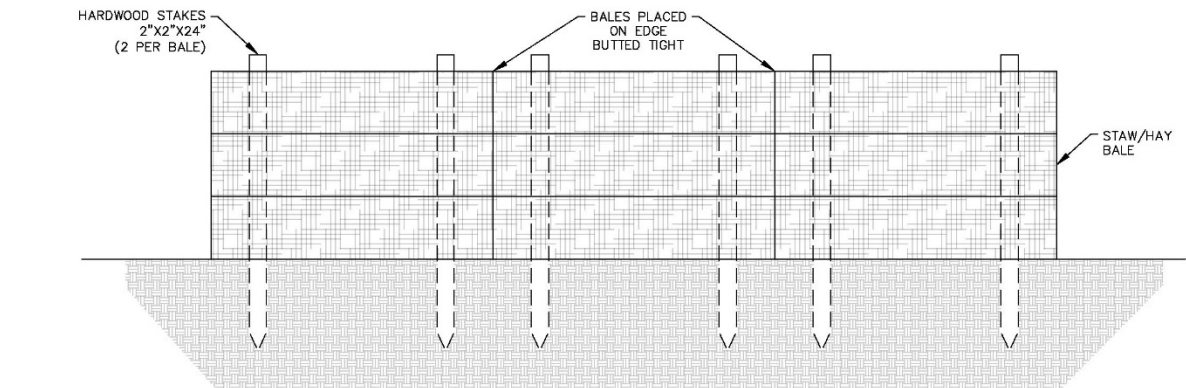
SILT FENCE
PLAN




SILT FENCE
PROFILE

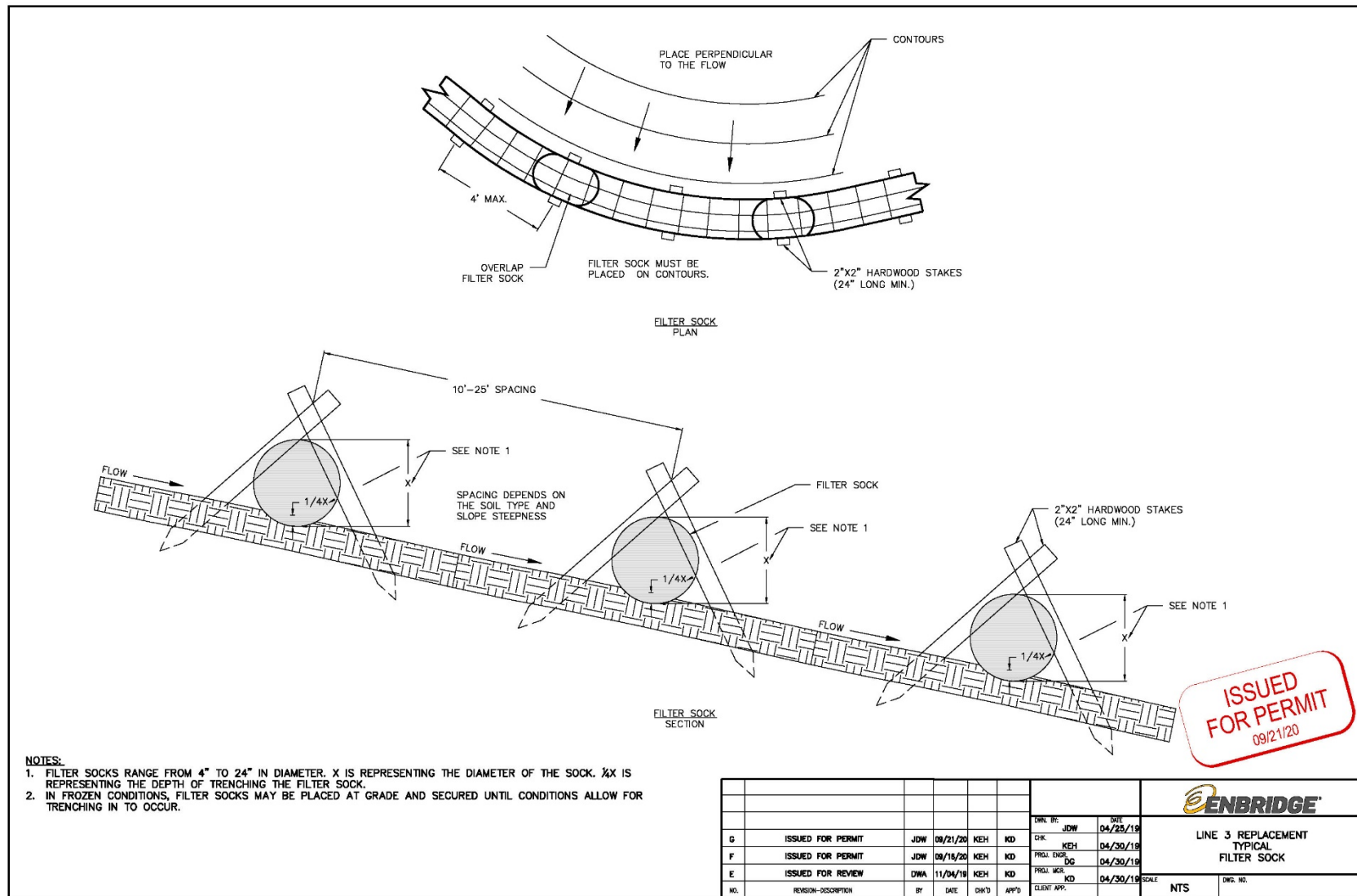
**ISSUED
FOR PERMIT**
09/21/20

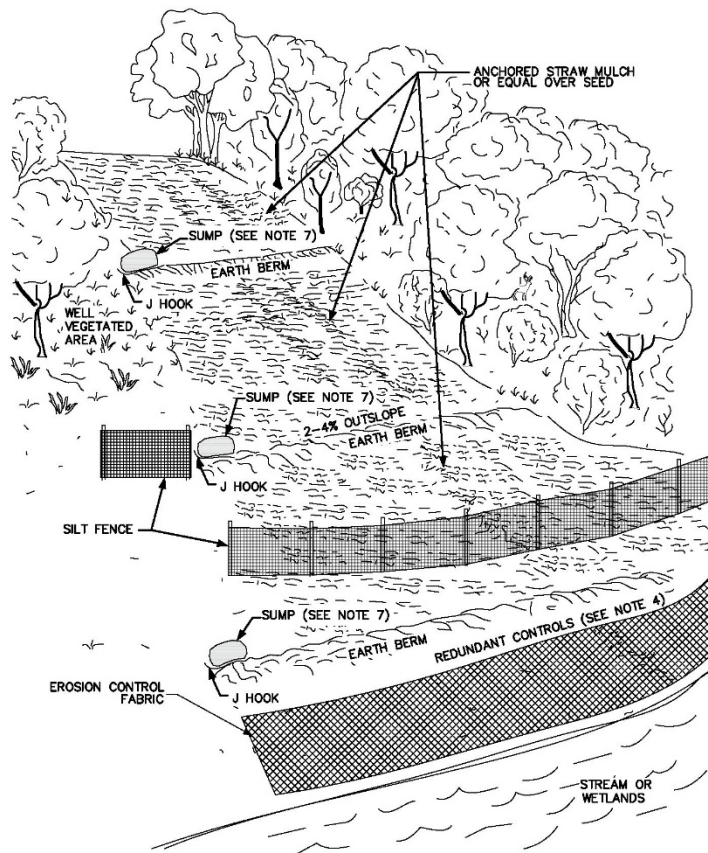
							
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B	ISSUED FOR PERMIT	JOW	06/16/20	ND	RF		
A	ISSUED FOR REVIEW	JOW	11/04/19	ND	RF		
NO.	REVISION-DESCRIPTION	BY	DATE	CHK'D	APP'D	CLIENT APP.	SCALE: NTS DWG. NO.:



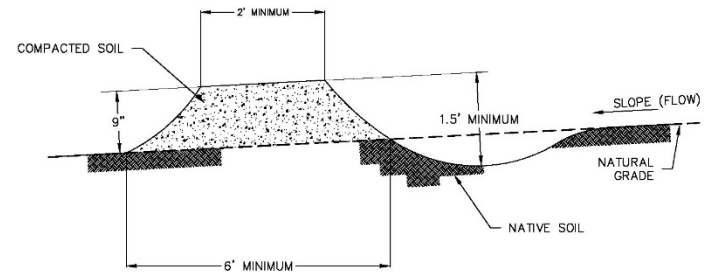
**ISSUED
FOR PERMIT**
09/16/20

						
					<div> <div>OWN. BY: JDW</div> <div>DATE: 04/04/19</div> </div>	<div> <div>LINE 3 REPLACEMENT TYPICAL STRAW/HAY-BALE INSTALLATION</div> </div>
					<div> <div>CHK: ND</div> <div>04/04/19</div> </div>	
					<div> <div>PROJ. ENR: KMD</div> <div>04/04/19</div> </div>	
					<div> <div>PROJ. MGR: BS</div> <div>04/04/19</div> </div>	
					<div> <div>CLIENT APP: [blank]</div> <div>04/04/19</div> </div>	<div> <div>SCALE: NTS</div> <div>DWG. NO: [blank]</div> </div>
NO.	REVISION-DESCRIPTION	BY	DATE	CHK'D	APP'D	
B	ISSUED FOR PERMIT	JDW	09/16/20	ND	KMD	
A	ISSUED FOR REVIEW	JDW	11/04/19	ND	KMD	





PERSPECTIVE VIEW




EARTH BERM DETAIL

NOTES:

1. BERMS SHALL BE CONSTRUCTED WITH 2 TO 4 PERCENT OUTSLOPE.
2. BERMS SHALL BE OUTLETED TO WELL VEGETATED STABLE AREAS, FILTER SOCKS, SILT FENCES, STRAW BALES, ROCK APRONS, OR SUMPS.
3. SILT FENCE REMOVED WHEN VEGETATION ESTABLISHED.
4. LOWEST BERM MAY BE OMITTED IF SILT FENCE OR STRAW BALES ARE INSTALLED AT THAT LOCATION, SUBJECT TO APPROVAL.
5. SEE SECTION 2.2 REGARDING ECD PLACEMENT AT SURFACE WATERS.
6. BERMS SHALL BE PLACED AS LISTED BELOW:
7. PERCENT OF SLOPE AND DISTANCE OF RUN WILL DETERMINE SIZE OF SUMP.

SLOPE%	APPROXIMATE SPACING (FT)
3-5	250
5-15	200
15-25	150
>25	<100



												<div>LINE 3 REPLACEMENT TYPICAL TEMPORARY SLOPE BREAKERS PERSPECTIVE & ELEVATION VIEW</div>			
										DWG. REV.				DATE	
										CHK.				DWA	10/25/19
										PRGL ENGR				KEH	10/25/19
C	ISSUED FOR PERMIT				JOW	08/15/20	KEH	KD			PRGL MGR	DG	10/25/19		
B	ISSUED FOR REVIEW				JOW	01/10/20	KEH	KD			PRGL MGR	DG	10/25/19		
A	ISSUED FOR REVIEW				DWA	11/04/19	KEH	KD			PRGL MGR	DG	10/25/19		
NO.	REVISION-DESCRIPTION				BY	DATE	CHK'D	APP'D	CLIENT APP.	SCALE	NTS	DWG. NO.			

Appendix D
Field Conditions Inspection Sheet

Field Conditions Inspection Sheet

Milepost: _____ Latitude/Longitude of observed area: _____

Date/Time: _____ Weather/Notes: _____

Form Completed by: _____

Site Conditions

Vegetation

Describe vegetation of the area (e.g., row crops, hay/pasture, wooded, grassy):

Topography

Review the topography and identify areas of potential ponding or channelized flow. Compare to the applicable large figure and note findings below:

Soil Type

Indicate on the applicable large figure where core samples were obtained. No less than two core samples (one high and one low spot) should be completed to a depth of 3 feet.

Indicate soil type for each core sample:

A B C D Combination (specify) _____

Review the soil type(s) and compare to the soil type reflected in the regional data used in this plan. Note findings below:

Note saturated soils found within the first 3 feet below ground surface. Note findings below:

Note whether restrictive layers within the first 3 feet below ground surface were observed. Note findings below:

Field Photographs; add minimum two photographs of area at time of inspection.

Pre-Discharge Conditions

Inspect best management practices installed. Are they installed per typical in Appendix C? Note any concerns and/or maintenance requirements:

Inspect piping, hoses, and connections to dewatering structure. Note any concerns and/or maintenance requirements:

Note frozen or saturated soils conditions, vegetation conditions, and drainage points:

Field Photographs; add minimum two photographs of area at time of inspection.

Active Discharge Conditions

Note discharge activity, approximate discharge volume (gallons), and expected discharge duration (days or hours). Note that, at a minimum, daily inspections and records are required:

Note average and maximum discharge rate (gallons per minute):

Note any run-off and vegetation conditions:

Inspect best management practices installed. Are they installed per typical in Appendix C? Note any concerns and/or maintenance requirements:

Inspect piping, hoses, and connections to dewatering structure. Note any concerns and/or maintenance requirements:

Field Photographs; add minimum two photographs of area at time of inspection.

Closure Inspection

Note description of the design of the treatment system and BMPs implemented during infiltration:

Note description of any changes undertaken to address operation needs:

Note summary of discharge conditions to include dates, rates, weather conditions, and times of the discharges:

Note operation and observation daily records, and any additional steps taken to close the land application site:

Field Photographs; add minimum two photographs of area at time of inspection.

Add a map of the site including the area used for infiltration as well as the final placement of the treatment systems(s).