



Post-Construction Wetland and Waterbody Monitoring Plan

Enbridge Energy, Limited Partnership • Line 3 Replacement Project

November 2020

ENBRIDGE®

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TABLES

ACRONYMS AND ABBREVIATIONS

Agencies	The U.S. Army Corps of Engineers, the Minnesota Pollution Control Agency, and the Minnesota Department of Natural Resources
BMPs	Best Management Practices
C	Coefficient of Conservatism
Enbridge	Enbridge Energy, Limited Partnership
EPP	Environmental Protection Plan
FQA	Floristic Quality Assessment
FQI	Floristic quality index
GIS	geographic information system
INS	Invasive and Noxious Species
L3R or Project	Line 3 Replacement Project
LIDAR	Light Detection and Ranging
MBS	Minnesota Biological Survey
MDNR	Minnesota Department of Natural Resources
MPCA	Minnesota Pollution Control Agency
NPCs	Native Plant Communities
PJD	preliminary jurisdictional determination
Plan	Post-Construction Wetland and Waterbody Monitoring Plan
PVC	polyvinyl chloride
PWI	Public Water Inventory
SOBS	Sites of Biodiversity Significance
SSRP	site-specific restoration plan
USACE	U.S. Army Corps of Engineers
USACE Permit Application	Enbridge's individual permit application under Section 404 of the Clean Water Act and Section 10 of Rivers and Harbors Act
USFWS	U.S. Fish and Wildlife Service
wC	Weighted Coefficient of Conservatism

1.0 INTRODUCTION

Enbridge Energy, Limited Partnership ("Enbridge") has prepared a Post-Construction Wetland and Waterbody Monitoring Plan ("Plan") that focuses on aquatic resources affected by the Line 3 Replacement Project ("L3R" or "Project") within the construction workspace[1] and along improved access roads/haul routes. This Plan has been developed with input from the U.S. Army Corps of Engineers ("USACE"), the Minnesota Pollution Control Agency ("MPCA"), and the Minnesota Department of Natural Resources ("MDNR") (collectively referred to as the "applicable Agencies").

Enbridge requested the USACE to review its individual permit application under Section 404 of the Clean Water Act and Section 10 of Rivers and Harbors Act ("USACE Permit Application") under a preliminary jurisdictional determination ("PJD") pursuant to Regulatory Guidance Letter No. 16-01. For purposes of computation of impacts, compensatory mitigation requirements, and other resource protection measure, a permit decision based on a PJD will treat all aquatic resources that will be affected in any way by the permitted activity as jurisdictional.

As a result, this Plan applies to the following aquatic resources:

- All wetlands[2] and waterbodies[3] identified during field surveys[4] included in the USACE Permit Application which is inclusive of:
    - Surface waters of the state regulated under the MPCA Section 401 Water Quality Certification;[5]
    - Minnesota Public Water Inventory ("PWI") waters and wetlands[6] regulated by the MDNR through the License to Cross Public Waters and Work in Public Waters Permit; and
    - Non-PWI wetlands and waterbodies located on MDNR-Administered state lands regulated by the License to Cross Public Lands.[7]

1 Construction workspace includes temporary workspace and additional temporary workspace.

2 Wetlands are those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

3 Lakes, rivers and streams.

4 Enbridge conducted wetland and waterbody field surveys according to the USACE Wetland Delineation Manual (Environmental Laboratory, 1987) and regional supplements (USACE, 2009 and 2010).

5 *See* Minnesota Rules, part 7050.0130, Subp. 6 which states: "'Surface waters' means waters of the state excluding groundwater as defined in Minnesota Statutes, section 115.01, subdivision 6."

6 Public waters as defined in Minnesota Statutes 103G.005, Subd. 15 and public waters wetlands defined in Minnesota Statutes 103G.005, Subd. 15a, and are depicted in PWI maps authorized by Minnesota Statutes 103G.201.

7 All tracts or lots of real property belonging to the state and under the control and supervision of the commissioner of natural resources.

Section 1.3 of this Plan describes the baseline data that has been gathered to inform the monitoring effort and to assist Enbridge and the Agencies in determining when the performance standards have been met.

Restoration activities that will occur immediately after construction to stabilize and seed the disturbed construction workspace are described in Enbridge's Environmental Protection Plan ("EPP"). Post-construction monitoring will begin during the first growing season after construction restoration work is complete and be conducted in years 1, 3, and 5 of the Plan. Some baseline vegetation monitoring efforts will also occur in year 0 (during construction), as feasible and safe to do so. Public watercourses will also be monitored during year 2. Corrective actions identified during monitoring will generally be completed in the even years (years 2 and 4) and as needed throughout the monitoring conducted in years 1, 3, and 5. Enbridge proposes to conduct on-the-ground monitoring efforts and restoration activities (e.g., corrective actions) supported by review of color infrared imagery as described in Section 2.0. Additional vegetation monitoring efforts in peatlands identified by the Agencies will also occur in years 0, 4, 8, 12, 16, and 20 (see Section 2.5.3).

Monitoring will not be considered complete until the performance standards have been met and reviewed, and approved by the applicable Agencies (see Section 3.0). In the case that the performance standards have not been met by year 5 of monitoring, Enbridge, as directed by the Agencies, will either extend monitoring at those sites, or provide additional mitigation.

A formal digital report of the monitoring detailed methods and results including all data and shapefiles will be submitted to the applicable Agencies by February 15 of each monitoring year (see Section 4.0). The first report for all methods and data types will be provided for the pre-construction baseline surveys including all information (year 0).

1.1 OBJECTIVES

The purpose of this Plan is to establish the monitoring procedures and performance standards that will be used to determine that the wetlands and waterbodies affected by the Project will be restored to pre-construction conditions.

The Plan addresses pre-construction data collected to establish aquatic resources baseline conditions; data, analyses, and procedures required to monitor hydrology and vegetation during specified time periods following completion of Project construction; performance standards to evaluate the success of restoration of aquatic resources to pre-construction conditions; and the contents of required monitoring reports, including, but not limited to conclusions regarding monitoring results and recommendations for appropriate steps to respond to deviations from baseline monitoring conditions, such as additional monitoring, adaptive management, and/or additional mitigation.

1.2 QUALIFICATIONS

Post-construction monitoring of restored wetlands and waterbodies will be performed using personnel from an organization or company under contract with Enbridge meeting the following requirements:

- Personnel leading the monitoring activities for a given monitoring team will hold a bachelor's degree or higher in biological and or geological science, field research

experience including project design sampling and analysis, experience/knowledge in wetland plant community ecology, and vegetation sampling/identification. Alternatively, personnel will have 10 years of field research, project design, and analytical experience; and experience/knowledge in wetland plant community ecology and vegetation sampling/identification. Personnel leading the Peatland/Wetland Complex Monitoring (Section 2.5.3) must have a Master's degree or higher in addition to the experience requirements identified above.

- Personnel collecting the data shall demonstrate knowledge of local flora prior to fieldwork, including the identification of the range of native and non-native plant species expected to be encountered onsite. Personnel should be qualified to identify unknown plant species with a regional dichotomous key and/or herbarium work. Personnel must also demonstrate familiarity with soils and hydrology.

1.3 PRE-CONSTRUCTION BASELINE DATA

Enbridge conducted pre-construction wetland and waterbody field surveys between 2013 through 2020[8] within an approximate 350- to 450-foot-wide survey corridor of the Project route inclusive of the construction workspace, and improved access roads/haul routes. Surveys were conducted according to the USACE Wetland Delineation Manual (Environmental Laboratory, 1987) and regional supplements (USACE, 2009 and 2010). Enbridge gathered the following baseline information for the wetlands and waterbodies crossed by the construction workspace and improved access roads/haul routes to be utilized as a basis for comparison during construction, restoration, and post-construction monitoring. The following information will be included in the pre-construction monitoring report.

1.3.1 General Pre-Construction Baseline Data

- Visual spectrum aerial imagery of the Project route (see Section 2.2);
- Color infrared imagery of the Project route (see Section 2.2);
- Light Detection and Ranging ("LIDAR")[9] of the Project route; and
- Ground elevation civil survey data[10] collected at regular intervals along the centerline through wetland and waterbody features.

[8] 2013 Minnesota Wetland and Waterbody Field Survey Report (February 19, 2014);
2014 Minnesota Wetland & Waterbody Field Survey Report (March 3, 2015);
2015 Minnesota Wetland & Waterbody Field Survey Report (December 22, 2015);
2016 Minnesota Wetland & Waterbody Field Survey Report (November 2, 2016);
2017 Minnesota Wetland & Waterbody Field Survey Report (November 7, 2017); and
2018 Minnesota Wetland & Waterbody Field Survey Report (December 2018);
2019 Minnesota Wetland & Waterbody Field Survey Report (December 2019); and
2020 Minnesota Wetland & Waterbody Field Survey Report (October 2020).

[9] LIDAR data has a vertical accuracy of approximately +/- 4 inches.

[10] Ground elevation data collected by civil surveyors generally have accuracy within +/- 1 inch.

1.3.2 Wetland Pre-Construction Baseline Data

- All Minnesota Wetland and Waterbody Field Survey Reports;
- Field-delineated wetland community types according to Cowardin (1979), Circular 39 (U.S. Fish and Wildlife Service ["USFWS"], 1956), and Eggers and Reed (2014) classification systems;
- Field-delineated dominant plant species by stratum;
- Field characterization of hydric soil types and wetland hydrology (e.g., inundated, saturated soils); and
- Representative photos of wetlands and associated plant communities.

1.3.3 Waterbody Pre-Construction Baseline Data

- Field-delineated waterbody locations;
- Waterbody characterizations, including top of bank width and height, ordinary high water mark, substrate type, flow regime, and dominant riparian vegetation;
- Vegetation community type (i.e., Eggers and Reed, 2014); and
- Representative photos of waterbody at the time of survey.

Publicly available data, such as aerial imagery or U.S. Geological Survey gage data, will also be consulted as needed.

1.4 Sensitive Waters Site-Specific Restoration Plans

Enbridge will propose to the MPCA for approval a site-specific restoration plan ("SSRP") for each of the sensitive waters identified in Attachment O (Sensitive Waters and Riparian Vegetation Communities) of the Antidegradation Assessment, dated November 2020, which Enbridge prepared in support of their request for the MPCA 401 Water Quality Certification. Enbridge will not commence trench crossing activities at a sensitive water crossing for which Attachment O identifies that a SSRP must be provided to the MPCA until after such MPCA approval has been provided.

2.0 POST-CONSTRUCTION MONITORING AND RESTORATION ACTIVITIES

2.1 ADAPTIVE MANAGEMENT AND COORDINATION

Post-construction restoration activities will be adaptive, based on the results of monitoring, changing site conditions (e.g., land use) and geared toward the final goal of restoring pre-construction characteristics of the resource (i.e., vegetation and hydrology). Possible corrective measures that may be implemented include:

1. Implementing barriers to prevent off-road vehicle use or fencing to limit cattle or wildlife browsing in areas of active restoration;

2. Implementing integrated approach to invasive or noxious weed infestations as outlined in Enbridge's Invasive and Noxious Species ("INS") Management Plan (Appendix B of the EPP);

3. Reseeding and/or fertilizing areas with germination problems or supplementing the original seed mix to meet success criteria;

4. Implementing infrastructure to enhance the capture of surface runoff from precipitation events in an effort to reduce erosion;

5. Supplemental plantings of tree and/or shrubs in selected areas to enhance stabilization or vegetation diversity;

6. Pipeline lowering or other needed pipeline construction modifications;

7. Regrading or recontouring areas to address topography or hydrology issues; and

8. Continued monitoring beyond year 5 if performance standards have not been met, but the area is adequately trending toward the target success criteria.

Enbridge will hold annual meetings with the applicable Agencies to plan for the next monitoring year, review the results of monitoring reports (see Section 4.0), and to discuss corrective actions and adaptive management strategies that may require implementation during the forthcoming growing season. Enbridge will work with the applicable Agencies to identify the appropriate schedule for implementing the corrective actions. For sites that do not meet the performance standards, additional monitoring and/or corrective actions beyond year 5 will be determined in consultation with applicable Agencies and implemented until the standards are met.

2.2 COLOR INFRARED IMAGERY

Color infrared imagery provides a broadscale view of the landscape that is difficult to capture during on-the-ground field surveys. Enbridge has acquired spring leaf-off, mid-summer leaf-on, and fall leaf-on color infrared imagery of the Project route prior to construction. Enbridge has also committed to acquiring spring leaf-off color infrared imagery during monitoring years 2 and 5, and during late summer (leaf-on) in year 4.

Review of the color infrared imagery will facilitate an evaluation of wetland and waterbody conditions and will facilitate the identification of issues such as ponding/flooding, potential drainage, erosion and sediment control Best Management Practices ("BMPs"), or areas void of vegetation that should have achieved some level of cover. Enbridge will determine antecedent precipitation for the Project using the approximate date of the color infrared imagery flight. Antecedent precipitation will be evaluated using the Minnesota State Climatology Office Wetland

Delineation Precipitation Data Retrieval from a Gridded Database,[11] and based on the U.S. Department of Agricultural, Natural Resources Conservation Service (1997) methodology.[12]

The pre-construction color infrared imagery of the Project can be used for comparison during post-construction monitoring. As mentioned above, Enbridge has obtained pre-construction color infrared imagery of the Project. Enbridge may also utilize publicly-available imagery, including summer, spring, and fall true-color imagery to supplement Project imagery. On-the-ground assessments will be directed to areas of concern to validate the issues observed on color infrared imagery, and to facilitate preparation of a corrective action plan, as needed.

2.3 SITE STABILIZATION

Monitoring will evaluate the condition of any remaining temporary erosion and sediment control BMPs, such as silt fence, straw bales, mulch (see Section 1.9 of the EPP), and permanent erosion and sediment control BMPs such as slope breakers (see Section 1.17 of the EPP). BMPs will remain in place until permanent cover[13] is established in all disturbed areas. Erosion events will also be noted in upland areas and along banks and slopes of wetlands and waterbodies. Monitoring methods will include the use of imagery and on-the-ground assessment, which may be completed using low-ground pressure vehicles and pedestrian survey. Site stabilization will be evaluated during each monitoring year but will be a primary focus of year 1 monitoring.

2.3.1 Potential Corrective Actions

Enbridge will address site stabilization issues that are identified during monitoring. Erosion or erosion and sediment control BMP deficiencies that have the potential to allow silt-laden water to enter wetlands or waterbodies will be prioritized and promptly addressed to prevent resource impacts. If the selected erosion and sediment control BMP is not effective at a particular location (e.g., continued failure), other solutions will be evaluated, such as re-contouring an area to alleviate a drainage flow pattern that is causing erosion or adding additional erosion and sediment control BMPs to divert drainage to a well-vegetated area. Enbridge will notify the appropriate agencies immediately if any BMP deficiency or failure results in impacts to wetlands or waterbodies and will describe the corrective action taken to address this condition.

2.4 MONITORING OF TOPOGRAPHY AND HYDROLOGY

Clearing, grading, and backfilling of wetlands will proceed as described in Section 3.0 and Appendix A of the EPP. Waterbody crossing procedures are described in Section 2.0 and Appendix A of the EPP.

Year 1 post-construction monitoring will be focused on evaluating the topography and stabilization of all wetland crossings. Crowning left for anticipated settling will be evaluated to determine

[11] http://climateapps.dnr.state.mn.us/gridded_data/precip/wetland/wetland.asp.

[12] 650.1903 Supplemental data for remote sensing (pages 19-24 through 19-26).

[13] Permanent cover as defined by the Minnesota Construction Stormwater General Permit means surface types that will prevent soil failure under erosive conditions. Permittees must establish a uniform perennial vegetative cover (i.e., evenly distributed, without large bare areas) with a density of 70 percent of the native background vegetative cover on all areas not covered by permanent structures, or equivalent permanent stabilization measures. Permanent cover does not include temporary BMPs such as wood fiber blanket, mulch, and rolled erosion control products (Minnesota Rules 7090).

whether soils are returning to the native elevation within the expected timeframe. Areas where subsidence has occurred over the trench will also be noted for potential restoration. Enbridge will also utilize the baseline conditions documented during the pre-construction wetland surveys to identify any other potential deviations in site hydrology (see Sections 1.3.1 and 1.3.2). All wetlands will be visited in year 1. Survey results will be documented in an adapted USACE wetland determination data form.

Wetland monitoring during years 3 and 5 will be focused on both landscape level and on-the-ground assessments of whether hydrology on and the off-right-of-way are similar and consistent with the baseline conditions identified during pre-construction field surveys (refer to Section 1.3.1). Enbridge will utilize the color infrared imagery flown during spring (leaf-off) and LIDAR data collected during year 3 monitoring to support on-the-ground surveys in identifying any hydrological issues that may require corrective actions. Enbridge will also revisit any areas of crowning or subsidence, or other sites identified during years 1 and 3 monitoring where restoration did not meet the performance standards established in Section 3.0.

Enbridge will conduct on-the-ground visual inspections of all waterbodies during monitoring years 1, 3 and 5 to confirm the successful stabilization of streambanks during high and low flow regimes, and restoration of waterbody flow relative to the pre-construction baseline data (see Section 1.3.2). In addition, on-the-ground visual inspections will occur at all public watercourses during year 2. The pre-construction course, condition, and capacity of ditches, streams, and rivers will be maintained during Project construction and will be reconfirmed during post-construction monitoring. Survey results will be documented in an adapted USACE wetland determination data form. Selected waterbodies may have site-specific restoration plans prepared in coordination with the applicable Agencies; in those cases, Enbridge will assess the site according to the restoration goals established for those waterbodies.

2.4.1 Peatland Groundwater Monitoring Wells

Enbridge installed peatland monitoring wells at locations identified by the Agencies (Table 2.4-1) in summer 2020 prior to construction. Monitoring wells were installed in nests to allow for the determination of groundwater flow direction and to assess if there are changes in groundwater conditions upgradient and downgradient of the pipeline. Each nest consists of at least 3 monitoring wells installed in a triangular pattern with at least one of the monitoring wells located on the opposite side of the pipeline.

Table 2.4-1
Proposed Wetland/Peatland Monitoring Wells

Peatland ID	Approximate Milepost	County	General Crossing Location	Well Type
N/A	946.0	Hubbard	LaSalle Creek	Wetland Piezometers [a]
P01-V	996.2	Wadena	Big Swamp Creek	Peatland Piezometer
P05-V	1000.8	Wadena	Big Swamp Creek	Peatland Piezometer
P06-V	1056.6	Aitkin	Unnamed Tributary to Moose Lake	Stilling Well
P06-V	1056.8-1056.9	Aitkin	Moose Lake	Peatland Piezometer
P14-V	1060.5	Aitkin	Willow River	Peatland Piezometer
P16-V	1062.9	Aitkin	Willow River	Peatland Piezometer
P25-V	1075.0	Aitkin	Headwaters to West Savanna River	Peatland Piezometer
P29-V	1075.7-1075.8	Aitkin	Headwaters to West Savanna River	Stilling Well
P29-V	1075.8	Aitkin	Headwaters to West Savanna River	Peatland Piezometer
P32-V	1076.9-1077.0	Aitkin	West Savanna River	Stilling Well
P33-V	1077.1	Aitkin	West Savanna River	Peatland Piezometer
P40-V	1083.5	Aitkin	Headwaters to East Savanna River (Floodwood Bog)	Peatland Piezometer
P41-V	1100.7	St. Louis	Stoney Brook (Fond du Lac Reservation)	Peatland Piezometer
P42-V	1105.4	St. Louis	Stoney Brook (Fond du Lac Reservation)	Peatland Piezometer

[a] Refer to the LaSalle Creek Construction and Restoration Plan for further details on the long-term groundwater monitoring effort at LaSalle Creek.

Peatland monitoring wells are constructed of 2-inch, 10-slot, screened polyvinyl chloride (“PVC”) or stainless-steel pipe with a point (for direct push of the well into the peat) equipped with a 2-inch solid riser. Either the riser pipe or the expandable plug is vented to allow atmospheric equilibrium to develop in the well. The monitoring wells were installed by either direct push into undisturbed peat or by direct push into a previously bored pilot hole.

Enbridge also agreed to install stilling wells and the locations identified in Table 2.4-1. The stilling wells are constructed of 2-inch, schedule 80, 10-slot, PVC installed with a thread on point to the mineral soil bed of the stream channels. The screened section of pipe is wrapped in filter sock. The wells are secured to T-posts to provide stability. A solid, 2-inch, schedule 80 PVC rise extends above the ground surface and also is secured to the T-post. Either the riser or the expandable plug is vented to allow atmospheric equilibrium to develop in the well.

Wells will be monitored using non-vented, pressure-based loggers (e.g. In-Site™ or HOBO®), installed in the wells and programmed to record absolute pressure at 1-hour intervals. Barometric pressure data will be collected using pressure-based loggers programmed to record absolute pressure at 1-hour intervals installed in an above-ground vented well riser. One barometric pressure logger will be installed in a monitoring well at each of the following milepost monitoring ranges: 996.0-996.1; 1074.7-1075.0; and 1105.1-1105.9. Water levels will be measured manually by a water level meter (e.g., Solinst®) at least bi-annually during installation and retrieval of the water level loggers from the monitoring wells. The wells will be resurveyed on an annual basis.

Data loggers will be installed following spring thaw and retrieved after the end of each growing season. Enbridge will continue to collect data on an annual basis during construction and post-

construction during the frost-free period or until the performance standards have been met and reviewed by the applicable Agencies (see Section 3.1.1). Where performance standards at specific sites have not been met by year 5 of monitoring, Enbridge, in consultation with the Agencies, may extend monitoring at those sites.

Enbridge has worked with the MDNR and MPCA to develop a long-term groundwater data collection effort around the LaSalle Creek crossing (see Table 2.4-1). Enbridge has completed two hand auger borings adjacent to the construction workspace, one on each side of the LaSalle Creek crossing. Enbridge installed two nested vibrating wire piezometers in each boring. One of the vibrating wire piezometers was installed in the surficial organic deposits and one in the deeper mineral deposits. These piezometers will be monitored with data loggers with built in telemetry systems to transmit data back from the field. The long-term monitoring locations were determined in coordination with MPCA and MDNR and will be completed as shown in Appendix D of the LaSalle Creek Construction and Restoration Plan. Enbridge will report data back to MDNR and MPCA on a bi-annual basis.

2.4.2 Potential Corrective Actions

Examples of topography or hydrology-related issues that may require additional restoration include: unexpected ponding, unexpected drainage, and/or disruptions to flow patterns causing changes in pre-construction wetland hydrology. Corrective actions, such as regrading or recontouring, will be implemented if crowning, subsidence, or the restored grade is determined to be interfering with the goal of re-establishing vegetative communities according to the local ecotype, or pre-construction wetland hydrology. Where such issues have been identified, Enbridge will reference pre-construction LIDAR data and/or pre-construction ground elevation data collected at regular intervals along the centerline through wetland and waterbody features. Another factor in determining corrective action is the assessment of potential resource impacts from additional restoration as compared to taking no action with continued monitoring. Actions that may require additional temporary impacts on a wetland or waterbody will be conducted according to pertinent permit requirements and in consultation with applicable Agencies.

Examples of topography or hydrology-related issues specific to peatlands identified in Section 2.4.1 that may require additional restoration include: unexpected ponding from peat compaction and alterations to groundwater flow that could result in unexpected drainage or damning. Corrective actions for unexpected compaction and ponding, may include adding a peat substrate for site preparation, harvest and spreading of a “live” donor peat, and the spreading of mulch in applicable settings. Corrective actions for unexpected alterations to groundwater flow resulting from the pipe acting as an impediment to water flow may include the installation of cross-drainage ditches or structures at the depth of normal groundwater flow within the affected area. Corrective actions for unexpected alterations to groundwater flow related to changes in topography will include regrading or recontouring.

2.5 REVEGETATION MONITORING

2.5.1 Wetland and Waterbody Crossing Vegetation Monitoring

On-the-ground revegetation monitoring is proposed at all wetland and waterbody crossings during year 1 monitoring. The intent of this monitoring is to assess initial restoration progress in terms of plant community recovery and to confirm recovering wetland boundaries and extent. Meander surveys within each disturbed wetland site or riparian vegetation community will be conducted.

Enbridge will follow the USACE Wetland Delineation Manual (Environmental Laboratory, 1987) and regional supplements at all wetlands and waterbodies (riparian areas) occurring in non-agricultural areas to:

- Estimate absolute percent vegetation ground cover;
- Estimate percent composition of ground cover by dominant species;
- Identify dominant species by strata;
- Make hydrophytic vegetation determinations; and
- Determine wetland community type (Cowardin [1979], Circular 39 [USFWS, 1956], and Eggers and Reed [2014]).

The results of these surveys will be documented in an USACE wetland determination data form that has been adapted to include INS observations and presented in the Monitoring Report (see Section 4.0) and compared to the baseline data collected during pre-construction surveys at each site (see Sections 1.3.1 and 1.3.2). Geographic information system ("GIS") data points of meander survey locations will be provided. Representative photos of each wetland and waterbody site will also be collected during each monitoring year and included in the monitoring report. At sites that were identified as forested during pre-construction surveys and were converted during construction through removal of the tree strata, year 1 monitoring efforts will include reclassifying the community to its new wetland community type. Monitoring and corrective actions to promote revegetation will be continued until the revegetation release criteria established in Section 3.0 have been met.

Acceptable cover of INS will be determined by comparing the absolute percent cover of INS[14] within the construction workspace to absolute percent cover in adjacent undisturbed areas outside of the construction workspace and within the same community type. Enbridge cannot implement treatment or control methods for these species outside of the construction workspace; therefore, if there is an existing infestation on either or both sides of the construction workspace, Enbridge will be unable to prevent spread onto the right-of-way. When identified, Enbridge will manage new or spreading INS in accordance with Enbridge's INS Management Plan throughout construction, restoration, and during post-construction monitoring efforts.

2.5.2 Special Wetland Communities Vegetation Monitoring

Enbridge proposes to conduct MPCA Rapid Floristic Quality Assessment ("FQA") (MPCA, 2014) monitoring at the following wetland community types impacted by the Project:

1. Wetlands with S1, S2, or S3 Native Plant Communities ("NPCs"): NPCs are defined by the MDNR's Minnesota Native Plant Community Classification (Version 2.0) (2003). The conservation rankings are assigned by MDNR plant ecologists based on a methodology developed by NatureServe and its member natural heritage programs: critically imperiled (S1), imperiled (S2), or vulnerable to extirpation (S3).

[14] Plant species identified as "eradicate" or "control" under the "Prohibited Noxious Weed" category by the Minnesota Department of Agriculture, and plants identified on the MDNR Operational Order 113.

2. Wetlands with High or Outstanding Sites of Biodiversity Significance ("SOBS"): SOBS are established by the Minnesota Biological Survey ("MBS") and are selected based on the landscape, presence of NPCs, and rare species. SOBS that are ranked as Outstanding by MBS ecologists contain the best occurrences of the rarest species, the most outstanding examples of the rarest NPCs, and/or the largest, most ecologically intact or functional landscapes. High-ranked SOBS contain very good quality occurrences of the rarest species, high-quality examples of rare NPCs, and/or important functional landscape.

3. Wetlands with Known Occurrences of MDNR State-Listed Plant Species: Enbridge has conducted annual surveys to identify state-listed plant species within the Project survey corridor.

4. Sensitive Waters: Sensitive wetland areas identified in Section 7.3 and Attachment O of the Antidegradation Assessment.

5. Other: Any additional areas identified by the Agencies.

The Rapid FQA method uses a plotless meander method by Eggers and Reid (2014) community type to identify species by stratum on a "Rapid Species List" (see Appendix A of MPCA, 2014). Each species on the list has been assigned a Coefficient of Conservatism ("*C*"), which is a numerical rating from 0-10 that indicates a species preference for specific habitats and tolerance of disturbance. An introduced, highly invasive species, such as reed canary grass, has a *C* of 0, while a high quality native wetland species, such as sage willow, has a *C* of 9. The maximum *C* rating is a 10. Surveyors also estimate the absolute percent cover by species. The MPCA (2014) recommends that Rapid FQAs are completed generally between June and September in Minnesota to capture the ideal sampling period for wetland plant species.

Once the field data has been collected, the data is loaded into the MPCA's Rapid FQA calculator,[15] which produces the metric calculations by wetland community, including:

- Native species richness
- Introduced species richness
- Mean *C*
- Floristic quality index ("*FQI*")
- Weighted *C* ("*wC*")
- Total midpoint percent cover
- Introduced species percent cover
- Introduced species proportion

Once the *wC* scores are calculated, a condition category assessment is assigned for each community based on the Biological Condition Gradient (see Table 2.5-1).

[15] https://www.pca.state.mn.us/water/floristic-quality-assessment-evaluating-wetland-vegetation.

Table 2.5-1
The General Wetland Vegetation Biological Condition Gradient

Condition Category	Description
Exceptional (1)	Community composition and structure as they exist (or likely existed) in the absence of measurable effects of anthropogenic stressors representing pre-European settlement conditions. Non-native taxa may be present in very low abundance and not causing displacement of native taxa.
Good (2)	Community structure similar to natural community. Some additional taxa present and/or there are minor changes in the abundance distribution from the expected natural range. Extent of expected native composition for the community type remains largely intact.
Fair (3)	Moderate changes in community structure. Sensitive taxa are replaced as the abundance distribution shifts towards more tolerant taxa. Extent of expected native composition for the community type diminished.
Poor (4)	Large to extreme changes in community structure resulting from large abundance distribution shifts towards more tolerant taxa. Extent of expected native composition for the community type reduced to isolated pockets and/or wholesale changes in composition.
Absent (5)	Plant life only marginally supported or soil/substrate largely devoid of hydrophytic vegetation due to ongoing severe anthropogenic impacts.

Source: Table 4 in MPCA, 2014.

The Rapid FQA inherently provides performance criteria. However, to apply these criteria the pre-impact condition must be identified. Enbridge will assume pre-impact condition to be "Exceptional." As Enbridge determines it necessary, a reference site may be established in the undisturbed area adjacent to the construction workspace of the same wetland community type (Eggers and Reid, 2014) to serve as an acceptable FQA comparison domain for vegetation performance standard (Section 3.2). As appropriate, Enbridge proposes to conduct Rapid FQA at the reference sites during construction (year 0), where feasible and safe for staff, and/or during the first year of post-construction monitoring. Rapid FQA sampling will be collected from the disturbed special wetland community sites starting year 3 of the post-construction monitoring. The condition category for the reference sites will be presented and compared to the corresponding disturbed sites for the applicable monitoring years in the Monitoring Report (see Section 4.0). Monitoring and corrective actions to promote revegetation will be continued until the revegetation release criteria established in Section 3.0 have been met.

When identified, Enbridge will manage new or spreading INS in accordance with Enbridge's INS Management Plan throughout construction, restoration, and during post-construction monitoring efforts.

Note that Enbridge has committed to post-construction monitoring at the Gully 30 calcareous fen as outlined in the Gully 30 Fen Management Plan submitted to the MDNR.

2.5.3 Peatland/Wetland Complex Monitoring

Enbridge will conduct additional vegetation monitoring at peatland/wetland complexes selected by the Agencies. This methodology will provide statistical rigor that is valid for the scientific method. The monitoring locations are currently in development by Enbridge in coordination with the Agencies and will be selected to minimize impacts on the plant community. The methodology will utilize sampling blocks established in hydrologically connected wetlands to 11 sample locations identified by the Agencies. Each block will be approximately 250 meters deep with two primary blocks on each side of the construction area. A third block between 500 meters and 1,000 meters will be used as a reference. Ten plots will be established per sampling block; the plot will be sized based on vegetation type (i.e., herbaceous, scrub-shrub). All locations will be sampled in year 0, preferably prior to construction at that location. If pre-construction surveys cannot occur, sampling will occur during year 1 of post-construction monitoring. The methodology will describe

the sample plot design and location, sampling approach and size, establishment of controls, and the statistical analysis to be used to evaluate the results. The methodology will also address how vegetation variation, potential sampling bias, and other variations will be addressed. Vegetation sampling will begin during the growing season during Project construction and will continue every 4 years for a total of 20 years. Data collected will be provided to the MDNR for review, and additional analysis will be completed as necessary. Enbridge will minimize its impacts on each sampling site by limiting sampling to one visit per sampling year. The final design of methods and analysis will be approved by the Agencies.

2.5.4 Potential Corrective Actions

Some sites will not successfully revegetate after the first seeding effort. Causes for seeding failure include poor germination or insufficient seeding take as a result of weather conditions, soil conditions, disturbance from cattle or wildlife, competition from INS, or erosion. Enbridge will reseed areas that are not adequately revegetated during the monitoring period. Changes in hydrology can also prevent successful restoration. If impacts on hydrology are identified, Enbridge will take actions to restore the hydrology. Other actions may also be taken, such as regrading areas to correct topography, fertilizing low nutrient soils, decompacting soils, setting up exclusion areas to stop grazing or foraging, implementing Enbridge's INS Management Plan, and/or supplementing seed mixes.

2.6 MONITORING SCHEDULE

Year 1 of the post-construction monitoring period will begin during the first full growing season after completion of restoration. Post-construction monitoring in years 1, 3, and 5 will consist of on-the-ground field assessment, and years 2 and 4 will involve implementing any necessary corrective actions at sites where issues were identified during monitoring years 1, 3, and 5. All public watercourses will also be monitored during year 2. Corrective actions may also be implemented during monitoring when identified as requiring immediate attention. Enbridge will capture and evaluate color infrared imagery in spring leaf-off conditions (see Section 2.2) during years 2 and 5, and during late summer (leaf-on) in year 4. Enbridge will also collect LIDAR data during monitoring year 3. Peatland groundwater monitoring data collection will occur years 1 through 5 (see Section 2.4.1) or until performance criteria has been met (see Section 3.1.1). As wetlands meet their performance standards, the amount of on-the-ground field assessments will decrease and become more selective as time progresses, as outlined in Table 2.6-1 and described in the sections below. For sites that do not meet the performance standards, additional monitoring and/or corrective actions beyond year 5 will be determined in consultation with applicable Agencies and implemented until the standards are met.

Table 2.6-1
Post-Construction Monitoring and Implementation of Corrective Actions Schedule

Year 0 (Construction)	Year 1	Year 2	Year 3	Year 4	Year 5	Year 5(+)
• Conduct FQA reference site monitoring and peatland/wetland complex vegetation monitoring at the sites selected in coordination with Agencies (see Sections 2.5.2 and 2.5.3)	• Conduct on-the-ground monitoring of all wetlands and waterbodies • Collect peatland groundwater monitoring data • Conduct FQA monitoring at reference sites selected in coordination with Agencies (see Section 2.5.)	• Color infrared imagery (spring) • Collect peatland groundwater monitoring data • Visual inspection of all public watercourses to ensure stabilization • Implementation of on-the-ground corrective actions identified in year 1; interim monitoring as needed based on potential issues identified during year 1	• LIDAR • Conduct on-the-ground monitoring of the following: ○ Visual inspection of all waterbodies to ensure stabilization ○ Collect peatland groundwater monitoring data ○ Sites that did not meet performance standards during year 1 monitoring ○ Potential landscape level hydrology issues identified in color infrared imagery • Conduct FQA monitoring at sites selected in coordination with Agencies (see Section 2.5.2)	• Collect peatland groundwater monitoring data • Implementation of on-the-ground corrective actions identified in year 3; interim monitoring as needed based on potential issues identified during year 3 • Conduct peatland/ wetland complex vegetation monitoring at the sites selected in coordination with Agencies (see Section 2.5.3)	• Color infrared imagery (fall leaf-on) • Conduct on-the-ground monitoring of the following: ○ Visual inspection of all waterbodies to ensure stabilization ○ Collect peatland groundwater monitoring data ○ Sites that did not meet performance standards during year 3 monitoring ○ Potential landscape level hydrology issues identified in color infrared imagery ○ Conduct FQA monitoring at sites selected in coordination with Agencies (see Section 2.5.2)	• Ongoing monitoring and implementation of corrective actions where need established by Enbridge and the Agencies • Conduct peatland/ wetland complex vegetation monitoring at the sites selected in coordination with Agencies (see Section 2.5.3) during years 8, 12, 16, and 20

2.6.1 Construction Monitoring

During construction, Enbridge may conduct FQA monitoring at reference sites, and peatland/ wetland complex vegetation monitoring at sites selected in coordination with the Agencies (see Sections 2.5.2 and 2.5.3), where feasible.

2.6.2 Year 1 Monitoring Activities

Year 1 of post-construction monitoring will include on-the-ground monitoring of all regulated wetlands and waterbodies supported by color infrared imagery flown prior to construction (see Section 2.2). Enbridge will record local weather data at each site during monitoring. The first year of monitoring will focus on:

- Stabilization (see Sections 2.3 and 2.4);
- Evaluating wetland topography/restoration to pre-construction contours (e.g., crowning, subsidence) (see Section 2.4);
- Evaluating stream bank stabilization and waterbody flow (see Section 2.4);
- Collecting peatland groundwater monitoring data (see Section 2.4.1);
- Evaluating revegetation cover and type at wetlands and waterbodies (riparian vegetation) (see Section 2.5.1); and
- Conducting FQA monitoring at sites selected in coordination with the Agencies (see Section 2.5.2

2.6.3 Year 2 Monitoring Activities

Year 2 of post-construction monitoring will include collection of peatland groundwater monitoring data (see Section 2.4.1), and on-the-ground monitoring of public watercourses (see Section 2.4).

2.6.4 Year 3 Monitoring Activities

Year 3 of post-construction monitoring will include on-the-ground monitoring of a subset of regulated wetlands and waterbodies supported by spring-leaf off color infrared imagery flown prior to on-the-ground assessments (see Section 2.2). Enbridge will record local weather data at each site during monitoring. Year 3 monitoring will focus on:

- Reconfirming site stabilization (see Sections 2.3 and 2.4);
- Reconfirming wetland topography/restoration to pre-construction contours (e.g., crowning, subsidence) (see Section 2.4);
- Evaluating wetland hydrology where performance standards were not met during year 1 monitoring (see Section 2.4);
- Reviewing potential landscape level hydrology issues using color infrared imagery (see Sections 2.2 and 2.4);

- Reconfirming stream bank stabilization and waterbody flow (see Section 2.4);
- Collecting peatland groundwater monitoring data (see Section 2.4.1);
- Evaluating revegetation cover and type at wetlands and waterbodies (riparian vegetation) where performance standards were not achieved during year 1 monitoring (see Section 2.5); and
- Conducting FQA monitoring at special wetland communities to assess recovery of impacted vegetative communities (see Section 2.5.2).

2.6.5 Year 4 Monitoring Activities

Year 4 of post-construction monitoring will include collection of peatland groundwater monitoring data (see Section 2.4.1). Enbridge will also conduct peatland/wetland complex vegetation monitoring at sites selected in coordination with the Agencies (see Section 2.5.3).

2.6.6 Year 5+ Monitoring Activities

Year 5 of post-construction monitoring will include on-the-ground monitoring of those regulated wetlands and waterbodies that have not achieved the performance standards established in Section 3.0. Monitoring will be supported by color infrared imagery (see Section 2.2). Enbridge will record local weather data at each site during monitoring. Year 5 monitoring will focus on:

- Reconfirming site stabilization (see Sections 2.3 and 2.4);
- Reconfirming wetland topography/restoration to pre-construction contours (e.g., crowning, subsidence) (see Section 2.4);
- Evaluating wetland hydrology where performance standards were not met during year 3 monitoring (see Section 2.4);
- Reviewing color infrared imagery to identify potential landscape level hydrology issues for ground verification (see Sections 2.2 and 2.4);
- Reconfirming stream bank stabilization and waterbody flow (see Section 2.4);
- Collecting peatland groundwater monitoring data (see Section 2.4.1);
- Evaluating revegetation cover and type at wetlands and waterbodies (riparian vegetation) where performance standards were not achieved during year 3 monitoring (see Section 2.5.1); and
- Conducting FQA monitoring at special wetland communities sites that have not met the performance standards (see Section 2.5.2).

Enbridge will continue to conduct peatland/wetland complex vegetation monitoring at sites selected in coordination with the Agencies during years 8, 12, 16, and 20 (see Section 2.5.3).

2.6.7 Corrective Action Implementation

Corrective actions may be implemented on an ongoing basis throughout the post-construction monitoring program where immediate action is required; however, most actions may be implemented during the non-monitoring years 2 and 4. Corrective actions beyond monitoring year 5 will be determined in consultation with the applicable Agencies and implemented until performance standards are met. There are several types of corrective actions that may be identified and implemented during the post-construction monitoring period. The types of corrective actions are described in Sections 2.1, and 2.3 through 2.5.

3.0 PERFORMANCE STANDARDS

If the performance standards are met for a site, restoration will be considered complete and the site will be removed from future monitoring. Hydrology for public waters and peatland hydrology monitoring will be conducted for a minimum of 5 years regardless of when the performance standard is met. For sites that do not meet the performance standards, additional monitoring and/ or corrective actions beyond year 5 will be determined in consultation with applicable Agencies and implemented until the standards are met. If the applicable Agencies determine that no further monitoring or corrective actions will result in restoration, Enbridge will provide options for additional mitigation.

3.1 Hydrology

Performance standards will be met when the site wetland and waterbody hydrology meets baseline conditions observed during pre-construction surveys (refer to Sections 1.3.1 and 1.3.2) (e.g., saturation, inundation) for at least two consecutive growing seasons in normal precipitation years,[16] and no landscape-level hydrological issues have been observed in ground surveys or color infrared imagery collected during monitoring years 1, 3, and 5 related to pipeline construction and operation activities.

3.1.1 Peatland Hydrology

Performance standards for peatlands will be met by comparing the wells in paired assessment areas located upgradient and downgradient of the pipeline. The performance standards will be met when water levels at paired assessment areas (wells located in a nest upgradient and downgradient of the pipeline) are within a 10 percent variability range after accounting for baseline variability for a minimum of two consecutive growing seasons in normal to wetter than normal precipitation years (USACE, 2019).[16]

Enbridge and the applicable agencies will evaluate the need for additional hydrologic monitoring based on the hydrologic monitoring results from prior years.

3.2 Vegetation

Enbridge proposes the following performance standards for wetland and riparian vegetation compared to the baseline conditions observed during pre-construction surveys.

[16] Enbridge will use the Minnesota State Climatology Office Wetland Delineation Precipitation Data Retrieval from a Gridded Database to determine “normal precipitation years.”

For all non-special riparian and wetland vegetation communities (see Section 2.5.1):

1. Total areal cover is at least 80 percent of either the ground cover documented for the vegetation community prior to construction or equates to at least 80 percent of the ground cover of the adjacent undisturbed areas of the same community type.

2. Absolute percent cover of INS within the construction workspace is within 10 percent of the absolute percent cover in adjacent undisturbed areas outside of the construction workspace and within the same community type (i.e., Eggers and Reed, 2014).

For temporarily affected herbaceous, and temporarily converted scrub-shrub, and forested wetland and riparian vegetation communities:

3. Herbaceous communities shall meet baseline dominants or be dominated by native grasses, sedges, rushes, forbs, and/or ferns, except as described in #2.

4. Temporarily converted scrub-shrub communities shall meet baseline dominants or shall be dominated (greater than 50 percent areal cover or stem density) by native shrubs (e.g., alders, willows, dogwoods, meadowsweet), except as described in #2.

5. Temporarily converted forested wetland community shall be dominated (greater than 50 percent areal cover or basal area) by native tree species (e.g., black ash, green ash, silver maple, eastern cottonwood), except as described in #2.

For permanently converted scrub-shrub and forested vegetation communities:

6. The permanently converted wetland community is dominated by native hydrophytic vegetation, except as described in #2.

For special wetland communities (see Section 2.5.2):

7. The disturbed community must achieve minimally one condition category below pre-impact condition based on the General Wetland Vegetation Biological Condition Gradient (Table 2.5-1). Pre-impact condition category is assumed to have been Exceptional, unless Enbridge provides evidence to the contrary. Reference FQA or other wetland specific plant community data are likely suitable evidence.

Enbridge will meet with the applicable Agencies at the end of each monitoring year to review the results of the Monitoring Report and to determine if additional actions are required to complete restoration.

3.3 FINANCIAL ASSURANCES

Enbridge proposes to provide no less than $27,377,298 in financial assurances in a manner acceptable to the Agencies, to ensure a high level of confidence that the restoration of wetlands and waters to pre-construction conditions will be successfully completed in accordance with the performance standards specified in this Plan. The financial assurances approved by the Agencies will be in place before Enbridge commences the activity permitted by the USACE permit, Section 401 Water Quality Certification and applicable MDNR licenses and leases. The permits, certifications, and authorizations, or the approved financial assurances instrument will clearly

specify the conditions under which the financial assurances will be released to Enbridge and/or other financial assurance provider, including, as appropriate, linkage to achievement of performance standards, adaptive management, or compliance with special conditions (33 Code of Federal Regulations § 332.3(n)).

4.0 MONITORING REPORTS

Enbridge will submit a report to the applicable Agencies that summarizes the results of each year of monitoring by December 31. The report will contain the following information:

- Digital copies of geo-rectified color infrared imagery and LIDAR;
- High-level summary table of sites evaluated, how sites were evaluated, date of assessment, restoration status, comparison to pre-construction conditions (baseline), and any corrective actions identified.
- For each wetland and waterbody site assessed:
    - Status of stabilization efforts (i.e., conditions of erosion and sediment control BMPs and any corrective actions);
    - Summary of baseline hydrology data documented during pre-construction surveys, including local weather data recorded at time of the monitoring efforts;
    - Summary of vegetation data documented during pre-construction surveys (i.e., classification, dominant vegetation);
    - Georeferenced photo documentation from pre-construction surveys;
    - Summary of post-construction monitoring hydrology data documented during monitoring year (see Section 2.4);
    - Summary of vegetation data documented during monitoring year (see Section 2.5);
    - Photo documentation from monitoring year;
    - Corrective action list with proposed restoration activities;
    - Additional recommended monitoring activities;
    - Status of restoration in accordance with the performance standards;
    - GIS data of meander survey locations; and
    - Raw data collected.
- All peatland groundwater monitoring data (i.e., downloaded data logger measurements and manual water-level measurements) (to be provided on an annual basis).
- List of proposed monitoring sites for the next monitoring period.

For sites that fail to meet performance standards, Enbridge will submit a plan by March 1 of the year following each monitoring report for continued monitoring and implementation of corrective measures for review and approval by the Agencies.

5.0 REFERENCES

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