



Line 5 Wisconsin Segment Relocation Project

Wetland and Waterbody Restoration and Post-Construction Monitoring Plan

DRAFT

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Rev 3.1

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ACRONYMS AND ABBREVIATIONS

Name	Description
ASNRI	Areas of Special Natural Resource Interest
BMP	Best Management Practice
Bad River Band	Bad River Band of Lake Superior Chippewa Tribe
ECD	Erosion and Sediment Control Device
Enbridge	Enbridge Energy, Limited Partnership
EPP	Environmental Protection Plan
GPS	Global Positioning System
LiDAR	Light Detection and Ranging
Monitoring Plan	Wetland and Waterbody Restoration and Post-Construction Monitoring Plan
Project	Enbridge Energy Line 5 Wisconsin Segment Relocation Project
Reservation	Bad River Reservation
ROW	Right-of-Way
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
WDNR	Wisconsin Department of Natural Resources
WQMP	Water Quality Monitoring Plan
WRAM	Wisconsin Wetland Rapid Assessment Methodology

1 PROJECT INTRODUCTION

Enbridge Energy, Limited Partnership (“Enbridge”) owns the U.S. portion of the world’s longest liquid petroleum pipeline system. Combined with the Canadian portion, the operationally integrated pipeline system spans approximately 3,200 miles across North America and has been in operation since 1950.

Enbridge’s existing Line 5 pipeline is a 645-mile interstate pipeline that originates in Superior, Wisconsin, traverses northern Wisconsin and the Upper and Lower Peninsulas of Michigan, and terminates near Sarnia, Ontario, Canada. The Wisconsin portion of the existing Line 5 pipeline crosses Douglas, Bayfield, Ashland, and Iron Counties. Within Ashland County, the existing Line 5 crosses through approximately 12 miles of the Bad River Reservation (“Reservation”) of the Bad River Band of Lake Superior Chippewa Tribe (“Bad River Band”).

Enbridge and the Bad River Band have been in discussions for several years regarding renewal of pipeline easements on 15 parcels of land through the Reservation. In January of 2017, the Bad River Tribal Council announced their decision to deny renewal of Enbridge’s easements. Enbridge entered into mediation with the Bad River Band and in July 2019, the Bad River Band terminated mediation discussions and filed suit against Enbridge seeking removal of the pipeline from the Reservation. In response to the discussions with the Bad River Band and litigation filed in July 2019, Enbridge developed the Line 5 Wisconsin Segment Relocation Project (“Project”).

The Project will relocate the existing Line 5 pipeline around the Reservation and replaces approximately 20 miles of the existing Line 5 pipeline, including the segment of the existing Line 5 pipeline that traverses through the Reservation, with approximately 41 miles of new, 30-inch outside diameter pipeline segment located entirely outside the Reservation.

Enbridge has prepared this Wetland and Waterbody Restoration and Post-Construction Monitoring Plan (“Monitoring Plan”) to evaluate and determine the success of wetland and waterbody restoration within the affected workspace following construction of the Project.

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”). Enbridge’s Environmental Inspectors (EIs) will continue to conduct inspections of the Project workspace (pipeline right-of-way, access roads, yards, and valve sites) for the first-year post-construction, as needed, to document compliance with applicable environmental permits, plans, and Enbridge commitments such as documenting successful stabilization of the Project workspace including revegetation of disturbed areas. The EIs will develop lists of items that require further restoration work, such as areas of bare soil where seed did not germinate or is sparse. Enbridge will use information from the EI generated lists to assess and prioritize the additional restoration efforts to be implemented. Post-construction wetland and waterbody monitoring will begin during the first growing season after the restoration work is complete. Monitoring will not be considered complete until the performance standards described in this Plan have been met and reviewed and approved by the applicable agencies. If the performance standards have not been met by the end of the planned monitoring period (e.g., six years for wetlands), Enbridge, as directed by the applicable agencies, will either extend monitoring at those sites, develop a site-specific restoration plan, or provide additional mitigation.

1.1 MONITORING PLAN OBJECTIVES

The purpose of this Monitoring Plan is to establish the monitoring procedures and performance standards that will be used to:

- determine the status of wetlands and waterbodies restoration;
- document where successful wetland and waterbody restoration has been achieved; and
- identify additional mitigative measures that may be warranted if successful restoration has not been achieved.

This Monitoring Plan is based on pre-construction data already collected to document aquatic resources; including previous data, analyses, and procedures submitted in support of Enbridge’s U.S. Army Corps of Engineers

(“USACE”) and Wisconsin Department of Natural Resources (“WDNR”) applications to help establish baseline conditions. The Monitoring Plan also: describes the monitoring methodology to be followed during specified time periods following completion of the Project; identifies performance criteria to evaluate the success of wetland and waterbody restoration; and describes the contents of required monitoring reports, including, but not limited to conclusions regarding monitoring results and recommendations for appropriate next steps such as additional monitoring, adaptive management, and/or additional mitigation, to respond to areas that are not successfully restored during the planned monitoring period.

2 QUALIFICATIONS

Post-construction monitoring of restored wetlands and waterbodies will be performed using personnel under contract with Enbridge who meet the following requirements:

- Personnel leading the monitoring activities for a given monitoring team will hold a bachelor’s degree or higher in biological/natural resources and/or soil 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 collecting the data shall demonstrate knowledge of local flora prior to fieldwork, including the identification of a 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.

3 PRE-CONSTRUCTION BASELINE DATA

Enbridge completed wetland surveys along the Project route in 2019 and 2020 and submitted a 2019 Wetland and Waterbody Survey Report and an addendum report that included the information collected during the 2020 field season to both the USACE and the DNR. As described in more detail in Sections 3 and 4, Enbridge collected and compiled in its reports the following pre-construction baseline data for wetlands and waterbodies within the proposed workspace of the Project:

- Field-delineated wetland community types according to Cowardin et al. (1979), Circular 39 (U.S. Fish and Wildlife Service [“USFWS”], 1956), Wisconsin Wetland Inventory (1992), and Eggers and Reed (2014) classification systems;
- Publicly available data, such as aerial imagery, U.S. Geological Survey topographic maps and U.S. Geological Survey gage data;
- Field-delineated dominant plant species by stratum at sampling points;
- Field-characterization of hydric soil types and wetland hydrology (e.g., inundated, saturated soils);
- Field-determined wetland functional assessments within an environmental survey corridor;
- Representative photos of wetland sample point locations and associated plant communities;
- Field-delineated waterbody locations;
- Waterbody characterizations, including top of bank width water depth, ordinary high-water mark, dominant substrate type, flow regime, and dominant riparian vegetation;
- Visual assessments of streambed characteristics (observed streambed materials and characteristics such as gravel, cobble, riffles, pools);
- Visual assessments of fish habitat such as undercut banks, instream structures (e.g., logs), potential spawning gravel; and
- Visual evidence of bank erosion at or near the proposed centerline crossing.

- Waterbody bank vegetation community type (i.e., Eggers and Reed, 2014), where applicable;
- Representative photos of both wetlands and waterbody at the time of survey;
- Quantified and qualitative assessments of wetland and waterbody impacts.

Baseline data collected in 2019 and 2020 for each wetland and waterbody can be found in the Wetland and Waterbody Survey Report (Line 5 Wisconsin Segment Relocation Project Wetland and Waterbody Delineation Report February 2020 and Line 5 Wisconsin Segment Relocation Project Wetland and Waterbody Delineation Report 2020 Supplement, July 2020). Additional data on wetlands and waterbodies can also be found in other Project reports including:

- Invasive Species Survey Report;
- Wetland Timed Meander Survey Report;
- Rare Plant Survey Report;
- 2023 Water Quality Monitoring Report; and,
- 2024 Water Quality Monitoring Report.

Enbridge's goal is to restore areas disturbed during the Project as near as practicable to the conditions encountered pre-construction. To meet that objective, Enbridge will augment the existing baseline data, with the following additional information that either has been or will be collected prior to construction:

Elevation Surveys

Enbridge has conducted elevation data surveys beginning in 2019 and throughout the pipeline design process. This elevation data was developed using a combination of civil survey methods and Light Detection and Ranging ("LiDAR") along the ~~proposed~~ Project route (pipeline construction corridor). LiDAR is flown with a fixed wing aircraft during leaf-off periods with no snow cover and uses a high-performance laser scanning system to bounce laser pulses off the ground and measure the return time to establish a distance and elevation contour. LiDAR information gathered to-date had an average pulse rate of 39 pulses per square meter (ppsm). LiDAR data was verified along the flight path utilizing civil survey equipment and techniques. Analyzing the over 71 billion LiDAR collected points against the ground survey, the vertical accuracy was +/- 4.0 cm. LiDAR data was acquired in 2020 and again in 2023.

Ground surveys completed by civil survey crews followed civil survey standards and practices, under the supervision and direction of a duly licensed professional surveyor. The procedures and methodologies employed throughout the project adhere to stringent civil survey guidelines and protocols and reflect the highest standards of professional integrity and accuracy. The following equipment was used to complete the civil survey work to date with the below stated accuracy per the manufacturer's spec:

- Leica GS16 & GS18 GPS 8mm +1ppm horizontal and 15mm +1ppm vertical accuracy;
- Leica TS16 Total stations 3" Angular and 2mm +1ppm Distance accuracy.

Enbridge will also use civil survey techniques and tools throughout construction to record pipeline location and depth data and to document post-construction elevations. For perennial streams that will be crossed using a trenching technique (dry crossing method) Enbridge will collect additional information using civil survey methods of the stream longitudinal and cross-sectional channel elevations within the isolated section of the waterbody crossing (between the upstream and downstream dams). This information will be acquired at the time of construction after the dams have been installed and the isolated segment of stream has been dewatered.

Enbridge will also complete a LiDAR survey of the pipeline construction corridor following completion of the pipeline installation (Year 1 Post-Construction). A comparison of pre-construction and post-construction elevation data will be used to assess:

- successful restoration of approximate contours in wetlands that may affect hydrology or natural drainage and to identify areas that may require additional grade work;
- successful restoration of approximate waterbody bank contours and/or document where bank slopes have been modified to address stability concerns;

- successful reconstruction of steep slope areas and/or document where slopes have been modified to address stability concerns; and
- successful restoration of approximate ephemeral and intermittent waterbody bed elevations.;

Photographs

Enbridge will collect additional photographs at the same general location pre-construction and post-construction documenting each bank crossing at the proposed centerline as well as at locations approximately 100 feet upstream and 100 feet downstream of the Project workspace, corresponding to pre-established stream water quality sampling locations. Photographs will be taken of each wetland crossed at the proposed centerline, within the construction workspace, crossed by access roads, or within workspaces at the valve locations and yards. The photographs will be taken at approximately the same area within the wetland pre-construction and post-construction and the photographs will be taken in each cardinal direction to document changes within the workspace.

4 WETLAND IDENTIFICATION, FUNCTIONAL ASSESSMENT, AND DISTURBANCE

4.1 WETLAND IDENTIFICATION

Table 4.1-1 summarizes the Cowardin wetland classification types, the corresponding Wisconsin Wetlands Inventory classification system, and the Eggers & Reeds classifications of wetlands (natural features) affected by the Project. Additional information regarding the specific wetland types identified during the field surveys is provided below. Enbridge also developed a Compensatory Wetland Mitigation Plan that addresses temporal wetland impacts, wetland conversion (e.g., conversion of forested wetland to emergent wetland), and permanent wetland fill. The Compensatory Wetland Mitigation Plan has been submitted to and reviewed by the respective agencies. Refer to the Compensatory Wetland Mitigation Plan for further wetland definitions.

Table 4.1-1: Wetland Classification Types

Cowardin Classification	Wisconsin Wetlands Inventory	Eggers & Reed Classification
PEM (palustrine emergent)	Emergent/Wet Meadow Scrub/Shrub (Broad-leaved evergreen)	Bog; Deep Marsh; Farmed Wetland; Fresh Meadow; Open Bog; Seasonally Flooded Basin; Sedge Meadow; Shallow Marsh; Shallow Open Water; Wet Meadow
PSS (palustrine scrub-shrub)	Scrub/Shrub (Broad-leaved deciduous, Needle-leaved deciduous, Needle-leaved evergreen)	Alder Thicket; Bog; Coniferous Swamp; Shrub-Carr
PFO (palustrine forested)	Forested (Broad-leaved deciduous, Needle-leaved deciduous, Needle-leaved evergreen)	Coniferous Bog; Coniferous Swamp; Floodplain Forest; Hardwood Swamp

As noted in the Wetland and Waterbody Survey Report, some of the wetlands included multiple Cowardin and/or Eggers and Reed classifications within the same wetland system. Where this occurred, Cowardin community types within the wetland were mapped according to community type.

4.2 WETLAND FUNCTIONAL ASSESSMENT

The wetland delineation data forms specifically referenced the area being sampled. Because, this measure alone does not address the condition and functional value of the sample area or the entire feature, field crews also

evaluated each wetland complex using the Wisconsin Wetland Rapid Assessment Methodology (“WRAM”)¹ as applied to the features of the wetland observed within the linear survey corridor. WRAM was applied to determine wetland functions, including: Floristic Integrity; Human Use Values; Wildlife Habitat; Fish and Aquatic Life Habitat, Shoreline Protection, Flood and Stormwater Storage, Water Quality Protection, and Groundwater Processes of the surveyed area and buffer. The floristic integrity assessment was focused on answering primary questions pertaining to invasive species cover, strata, Natural Heritage Inventory plant community ranking, and relative frequency of the plant community within the watershed. Excluded from this assessment was the optional documentation of vascular plant species and cover/abundance. The WRAM data sheets for these assessments were included in Enbridge’s Wetland and Waterbody Survey Report.

Enbridge then used the WRAM data sheets to assign an overall functional value rating of: Low, Low-invasive, Medium, or High to each wetland complex. The assignment process was conservative, and the highest potential overall general functional value was assigned to each wetland complex. The overall assigned WRAM Functional Value Rating for each wetland complex is an average of the eight individual component ratings. Where ratings were similar between levels (i.e., 3 high ratings, 3 medium rating, 1 low rating, and 1 N/A rating) the overall rating was generally “rounded up” to High.

Additional vegetation surveys were conducted during the 2022 field season on a subset of wetlands within the Project area to expand the assessment of floristic integrity. These additional surveys were restricted to wetlands that were determined to be of medium to high overall functional value based on the data collected during the initial wetland delineation field efforts completed in 2019 and 2020 ([Line 5 Wisconsin Segment Relocation Project Wetland and Waterbody Delineation Report 2019](#)~~February 2020~~[and Line 5 Wisconsin Segment Relocation Project Wetland and Waterbody Delineation Report 2020 Supplement, July 2020](#)~~2020~~).

The 2022 evaluations used a modified timed-meander survey method that deviated from the WDNR timed-meander approach in several ways.

1. Traditional timed-meander surveys evaluate entire features. However, Enbridge does not have unlimited access to all lands outside the Project survey corridor, such as wetland areas that extend beyond the Project’s workspace. The “assessment area” for each evaluated wetland feature was restricted to areas that would be disturbed by construction (Project limits of disturbance). Thus, the survey effort only reflects the portion of the wetland area within the Project workspace.
2. Under the traditional method in Wisconsin², species are recorded in 5-minute increments, noting which increment a species was first observed (e.g., 0-5 minutes, 5-10 minutes, etc.). It is suggested that surveys occur for a minimum of 30 minutes. This process can continue beyond 30 minutes under different scenarios, but the process is also flexible and allows the practitioner to stop before reaching a full 30 minutes. The approach implemented for this Project was to evaluate the entire defined assessment area and record every vascular plant species encountered.
3. Abundance codes were not collected for this survey since they are non-numerical and cannot be used for analysis purposes.
4. The WRAM methodology, regarding estimation of percent cover, is not specific other than just indicating “Estimates of percent cover may be based upon a visual estimation or quantitative data.” As implemented here, broad cover categories were utilized via the Braun-Blanquet cover and abundance scale since this approach promotes “agreement among different observers when estimating cover³.” Under the approach implemented here, which was not plot based, six different cover and abundance categories were used for

¹ Minnesota Natural Heritage and Nongame Research Program, and Ecological Land Classification Program. Biological Report 92. St. Paul: Minnesota Department of Natural Resources.

² Timed-Meander Sampling Protocol for Wetland Floristic Quality Assessment, WDNR

³ Minnesota Department of Natural Resources. 2013. A handbook for collecting vegetation plot data in Minnesota: The relevé method. 2nd ed. Minnesota Biological Survey, Minnesota Natural Heritage and Nongame Research Program, and Ecological Land Classification Program. Biological Report 92. St. Paul: Minnesota Department of Natural Resources.

this specific assessment (single individual with less than 5% cover, multiple individuals with less than 5% cover, 5-25% cover, 25-50% cover, 50-75% cover, and 75-100% cover).

Separate and independent timed-meander surveys were conducted for each wetland community type. As such, multiple surveys were often conducted within a wetland with multiple community types as mapped during wetland delineation efforts.

4.3 CONSTRUCTION IMPACTS

The primary impacts of pipeline construction and right-of-way maintenance activities on wetlands are (i) the temporary removal of wetland vegetation during active construction; (ii) temporary placement of construction matting; (iii) excavation; (iv) use of heavy equipment within the wetland; (v) blasting; and ~~(vi)~~ the conversion of forested and shrub-scrub wetland vegetation to emergent wetland vegetation within the permanent right-of-way. Additional temporary impacts include diminishment of the recreational and aesthetic value of the wetlands crossed and a temporary removal or alteration of wetland wildlife habitat. There is also a potential for impacts on groundwater and surface water hydrology particularly in the vicinity of blasting, or as a result of changes in topography. These effects would be greatest during and immediately following construction and most, except for vegetation and habitat impacts, will cease after the trench is backfilled, trench breakers are installed, contours are restored, and erosion controls are installed. In emergent (“PEM”) wetlands, the impact of construction vegetation and habitat is relatively brief since herbaceous vegetation will typically regenerate within one or two growing seasons. In forested (“PFO”) and scrub-shrub (“PSS”) wetlands, the vegetation and habitat impacts last longer due to the longer period required for the establishment of these vegetation life forms (i.e., broad-leaved deciduous or coniferous species).

Project construction activities will result in approximately 101.1 acres of temporary wetland disturbance associated with clearing, pipeline installation activities, and the establishment of temporary access roads. As indicated in Table 3-2, PEM wetlands and more than half of the affected PFO and PSS wetlands (totaling together approximately 67.2 acres of wetlands) will be allowed to revert to their original cover type after construction. The remaining approximately 33.9 acres of PFO and PSS wetland will be converted to PEM wetland within the permanent right-of-way as a result of vegetation maintenance during operation of the pipeline. A total of approximately 0.02 acre of PEM and PSS wetland will be filled for construction of aboveground facilities permanent access roads.

Table 4.3-1: Summary of Line 5 Wetland Impacts

Wetland Type ^a	Impact Areas <u>Wetlands Area</u> Allowed to Revert to Pre- construction Wetland Cover Type (Acres) ^{b, c}	Impact Area <u>Conversion</u> from <u>PFO/PSS to PEM</u> Wetland Type (Acres) ^{b, d}	Permanent Impact (Acres) ^{b, e}
Palustrine Emergent (PEM)	28.1	0	0.02
Palustrine Forested (PFO)	32.8	30.1	0
Palustrine Scrub/Shrub (PSS)	6.3	3.9	<0.01
TOTAL	67.2	33.9	0.02
^a Wetland type based on Cowardin, 1979. ^b The numbers in this table have been rounded for presentation purposes. As a result, the totals may not reflect the sum of the addends. ^c Based on temporary workspace disturbance due to construction activities. ^d Based on permanent right-of-way (“ROW”) with conversion from PSS and PFO to PEM. ^e Based on permanent wetland impacts (fill).			

4.4 WETLAND RESTORATION

To the extent practicable, Enbridge will restore affected wetlands to preconstruction conditions, which is considered in-place compensation, but not in-kind in all wetland types and not in-advance compensation. Enbridge will also provide compensatory wetland mitigation for unavoidable Project-related impacts including temporary loss of wetland cover, permanent conversion of wetland type, and permanent wetland fill by acquiring credits from a wetland mitigation bank.

Emergent wetlands (including converted features) will be seeded using the seed mix provided in Appendix B of the Project's EPP. Enbridge's seed mix will ~~to~~ provide temporary cover and supplement natural revegetation via the seeds and rhizomes in the topsoil spread back over the excavated area after pipe installation with perennial native wetland species documented in the Project area during wetland delineation surveys. No fertilizer, lime, or mulch will be applied in wetlands.

Enbridge does not intend to seed wetlands with standing surface water (e.g., open water) as most wetland seed will float⁴. Re-establishment of vegetation in ~~these types of~~ standing water wetlands occurs best through natural process without supplemental seeding. Where the Year 1 Post-Construction monitoring identifies locations within standing water wetlands where vegetation is not progressing through natural recruitment, Enbridge will revisit these standing water wetlands during the dry season to determine if supplemental seeding and/or use of live plantings is necessary to establish vegetation in associated bare areas, consistent with the standards in Tables 4.8-1 through 4.8-3.

Enbridge plans to allow natural reforestation of the temporary workspace area within forested and shrub wetlands via stump sprouting, root sprouting, and natural recruitment. As discussed further below, Enbridge will evaluate the success of woody species reestablishment in forest/shrub wetlands throughout the monitoring period and will work with the respective agencies to determine if the reestablishment of woody species is not progressing.

4.5 WETLAND MONITORING OBJECTIVES

The goal of the post-construction wetland monitoring program will be to assess quantitatively and/or qualitatively the success of post-construction wetland restoration through documentation of wetland elevations, hydrology, plant cover, plant distribution, and species composition of plant communities in the wetlands impacted by pipeline construction and operation. The following protocol was developed to establish a standardized monitoring procedure that can be repeated and used to evaluate the effectiveness of wetland restoration efforts and to identify areas that may require additional management.

4.6 WETLAND MONITORING METHODOLOGY

Enbridge will generally maintain a 50-foot-wide operational corridor along the pipeline in an herbaceous state to facilitate aerial monitoring and pipeline access. This maintained corridor has been reduced to a 30-foot-wide area in most locations where the pipeline will be installed using the HDD or Direct Pipe method. Maintaining the operational corridor/permanent easement (that portion of the construction workspace to be maintained as part of the permanent easement) will result in that portions of a forested and/or shrub dominated wetlands being permanently converted to emergent wetlands by routine clearing within the permanent easement. The status of revegetation in these permanently converted forested/shrub-dominated areas will be described, inventoried, and assessed similar to naturally occurring emergent wetlands during post-construction monitoring. The remaining portion of the construction workspace will be allowed to revert back to pre-construction conditions (e.g., forested or shrub) and will not be maintained as herbaceous habitat by Enbridge following completion of the Project.

⁴ Minnesota Board of Water and Soil Resources. Native Vegetation Establishment and Enhancement Guidelines. 2019.

In accordance with this Monitoring Plan, data will be collected to determine the revegetation success of wetlands located within the Project workspace. Monitoring will involve a general methodology strategy for ~~most~~-affected wetland features, with a more intensive methodology for a subset of wetland features. This subset includes those wetland features having either a high overall functional value or a medium overall functional value with a high floristic quality rating, as well as select wetland adjacent to Areas of Special Natural Resource Interest (“ASNRI”) waterbodies (see Table 4.6-1 for a list of select ASNRI to be monitoring using the more intensive methodology). Additional chemical and physical analysis will be performed in accordance with Enbridge’s Water Quality Monitoring Plan (“WQMP”), Version 4.2 dated June 2024).

Table 4.6-1: Summary of Select ANSRI Wetlands to be Monitored using Plot Sampling

Feature ID ^a	Approximate Milepost	Cowardin ^b	Circular 39 ^c	Eggers and Reed ^d	WRAM Overall Functional Value Rating
wasw012f	29.77	PFO	Type 7	Hardwood Swamp	Medium
wasw013ss	29.79	PSS	Type 6	Shrub-Carr	Medium
wirb037s	34.04	PSS	Type 6	Shrub-Carr	Medium
wirc023f	31.75	PFO	Type 1	Hardwood Swamp	Medium
wirc022f	34.08	PFO	Type 7	Hardwood Swamp	Medium
wird015f	38.59	PFO	Type 7	Hardwood Swamp	Medium
wird015e	38.78	PEM	Type 2	Fresh (wet) Meadow	Medium
^a Wetland/waterbody unique identification is based on 2019/2020 field survey data and Wisconsin Wetland Inventory Desktop Mapping (WDNR, 1992). ^b PEM = Palustrine Emergent; PSS=Palustrine Scrub Shrub; PFO = Palustrine Forested (Cowardin, 1979). ^c Type 1 = Seasonally flooded basin or flat; Type 2 = Inland fresh meadow; Type 6 = Shrub swamp; Type 7 = Wooded swamp (USFWS, 1956). ^d (Eggers and Reed, 2015).					

4.6.1 Year 1 Post-Construction Monitoring

General Monitoring Approach

Post-construction monitoring activities will begin during the growing season in the first year following construction (“Year-1 monitoring”). During the Year-1 monitoring period, Enbridge will visit each wetland within the pipeline workspace (wetlands along the pipeline construction ~~corridor~~workspace, access roads, yards, and valve sites). Year-1 monitoring will initially focus on landscape related issues as well as general observations including vegetation. Landscape related issues will involve evaluating the topography and stabilization of wetland crossings, specifically crowning or subsidence, particularly over the trench. Enbridge will record site conditions in each wetland including:

- Initial establishment of wetland vegetation, exposed or bare areas devoid of vegetative cover;
- Observations of hydrologic indicators (relevant primary and secondary indicators);
- Incidental wildlife observation including listing what wildlife was observed (avian, herpetological, mammal);
- Observations of elevation changes that affect wetland hydrology (high or low grade as visually compared to surrounding areas);
- Representative landscape-oriented photographs positioned approximately five feet above the ground, will be taken within each wetland and locations recorded using GPS. These photographs will serve to document conditions during the first-year post-construction;

- Status of erosion controls and general site stabilization (e.g., erosion); and
- Visual evidence of rutting, compaction, or erosion; status of erosion controls; off-road vehicle activity and/or other third-party disturbances⁵.

Any issues observed will be documented for follow-up corrective action.

Timed Meander Surveys

During Year 1 monitoring, Enbridge will also conduct a modified timed-meander survey in each wetland within the mainline corridor. As discussed in Section 4.2, the timed-meander survey will be restricted to the construction ~~workspace~~corridor, deviating from traditional meander methods that involve evaluation of the entire feature in question. These efforts will involve evaluating permanent and temporary workspace segments of the Project right-of-way separately as restoration goals for the permanently maintained right-of-way are different than the temporary workspace areas that will not be maintained by Enbridge following completion of the project (i.e., PFO and PSS wetland areas will be allowed to regenerate into PFO/PSS wetlands within the non-maintained areas of the construction workspace while the permanent easement will be maintained as PEM). The meander survey within the permanent easement will primarily focus on the area disturbed during excavation for the pipeline. Furthermore, wetland features with multiple pre-construction wetland communities (based on Cowardin classification) will be sampled by community class/type (e.g., wetland wase1021e and wase1021s will be sampled separately).

For timed meander purposes, species will be recorded in 5-minute increments, noting which increment a species was first observed (e.g., 0-5 minutes, 5-10 minutes, etc.)⁶. Unless otherwise noted, plant nomenclature, in general, will follow Flora of North America. The duration of each timed-meander will be adjusted by the practitioner based on site conditions and the level of revegetation (e.g., sparse vegetation or species diversity encountered). Species' cover/abundance will be recorded using the Braun-Blanquet cover/abundance scale. Cover will consist of five cover classes (0-5%, 5-25%, 25-50%, 50-75%, and 75-100%). Abundance will be recorded for species having less than 5% cover, either noting a single individual or more than one individual observed. Additionally, species distribution will be noted (i.e., localized, throughout etc.). Representative photographs will be taken looking down the construction right-of-way from the upland-wetland boundary as well as from within each wetland.

Monitoring Plots

In addition to the collection of the Year 1 Post-Construction baseline information described above, Enbridge will establish 10 m² plots (monitoring plot locations will be selected by field personnel during the first monitoring season in areas that are representative of the wetland) to conduct additional vegetation monitoring in future years (see Figure 1). Monitoring plots will be established in 50 percent of the low and medium overall functional value wetlands. Where a wetland is intersected by the Project workspace in more than one location, the representative sample plot will be selected based on professional judgement within one of the intersected areas. The specific wetlands will be randomly selected prior to conducting the first-year post-construction monitoring field work.

Monitoring plots will also be established in all high overall functional value wetlands, medium overall functional value wetlands with high floristic quality, as well as in select wetlands adjacent to ASNRI waterbodies (see Table 4.6-1). Wetlands located between the HDD entry and exit points where Enbridge reduced the construction right-of-way to 30 feet and activities were restricted to only vegetation clearing (which will be maintained as part of the permanent easement) will be monitored using the modified timed meander survey methods to document the general condition of the wetland and to identify noxious and invasive species locations, general vegetation density

⁵ Other third-party disturbances could include excavations, filling, tree clearing/forestry activity, and livestock grazing.

⁶ Timed-Meander Sampling Protocol for Wetland Floristic Quality Assessment, WDNR

(estimated percent cover using the Braun-Blanquet cover/abundance scale), and extent. No plots would be established in these wetlands.

At a minimum, two representative plots will be established for approximately every one-acre of affected wetland (within Project mainline workspace), ~~wetland~~ with each wetland considered separately for acreage calculations. One monitoring plot will be established within the permanent easement and one monitoring plot will be established within the temporary workspace. (see Figure 1). The monitoring plot within the permanent easement will be centered on the area excavated/backfilled for installation of the pipeline. Additional monitoring plots will be established in larger wetlands having multiple Cowardin communities (e.g., both PFO and PEM) and/or wetlands with greater than one acre of wetland disturbance associated with Project mainline construction. An additional sample plot will be established for each 0.5-acre of wetland disturbance over one acre. If a wetland is not large enough to accommodate the respective sample plots ~~or the entire wetland is located within the construction ROW,~~ monitoring will be conducted using the modified timed meander survey method. Additionally, if a wetland does not extend into the permanent easement, a plot will be established only in the temporary workspace.

The location of each plot will be recorded by global positioning system (“GPS”) and marked on aerial-based maps. Where allowed by landowners and/or land managing agencies, small markers, such as 0.5-inch diameter PVC markers, will be installed at the corners of the respective sample plots to maintain consistent plot locations for the duration of the monitoring efforts. Actual sampling of plots should occur within the months of June – August, but resampling should occur within three weeks of on either side of the original sampling date.

For each monitoring plot, all species observed within the plot will be recorded as well as the overall native cover and invasive species cover. As described in the modified meander surveys methods, plant nomenclature will follow Flora of North America unless otherwise noted. Species cover/abundance will be recorded using the Braun-Blanquet cover/abundance scale. Cover will consist of five cover classes (<5%, 5-25%, 25-50%, 50-75%, and 75-100%). Species with an abundance under 5% will be divided into three designations: one single individual, 2 to 20 individuals, and greater than 20 individuals.

Multiple plot photos will be recorded at fixed points, taken at roughly 5 feet above the ground surface in a landscape-oriented position. Generally, the southwest (or as near as possible) plot corner will serve as the fixed photo location. Additional photographs will be taken looking down the construction right-of-way from the upland-wetland boundary.

4.6.2 Wetland Monitoring Years 2 through 6

Enbridge will continue to monitor the revegetation of affected wetlands (wetlands within the construction workspace, yards, and access roads) annually for up to 6 years to assess wetland restoration as described in the Year 1 Post Construction Monitoring - General Monitoring Approach ~~Wetland Conditions~~ effort (see Section 4.6.1). Enbridge will visit each wetland annually during the monitoring period to assess general site conditions, as listed in Table 4.6.2-1. Enbridge will conduct the modified timed-meander survey in each wetland within the ~~mainline Project workspace corridor~~ during the Year 1, 3, and 5 monitoring events. Enbridge will conduct the plot monitoring during Year 2, 4, and 6 monitoring events. Wetland monitoring during years 2 through 6 will also focus on both landscape level and on-the-ground assessments of whether hydrology on and off the right-of-way are similar (e.g., ponding on ROW, water backed up off ROW due to elevated grade on ROW). Enbridge will also revisit any areas of crowning or subsidence, or other sites identified during previous monitoring events where restoration has not met the performance standards established in Section 4.7. If possible, the subsequent monitoring will be performed during the same season/time of year as the Year 1 monitoring.

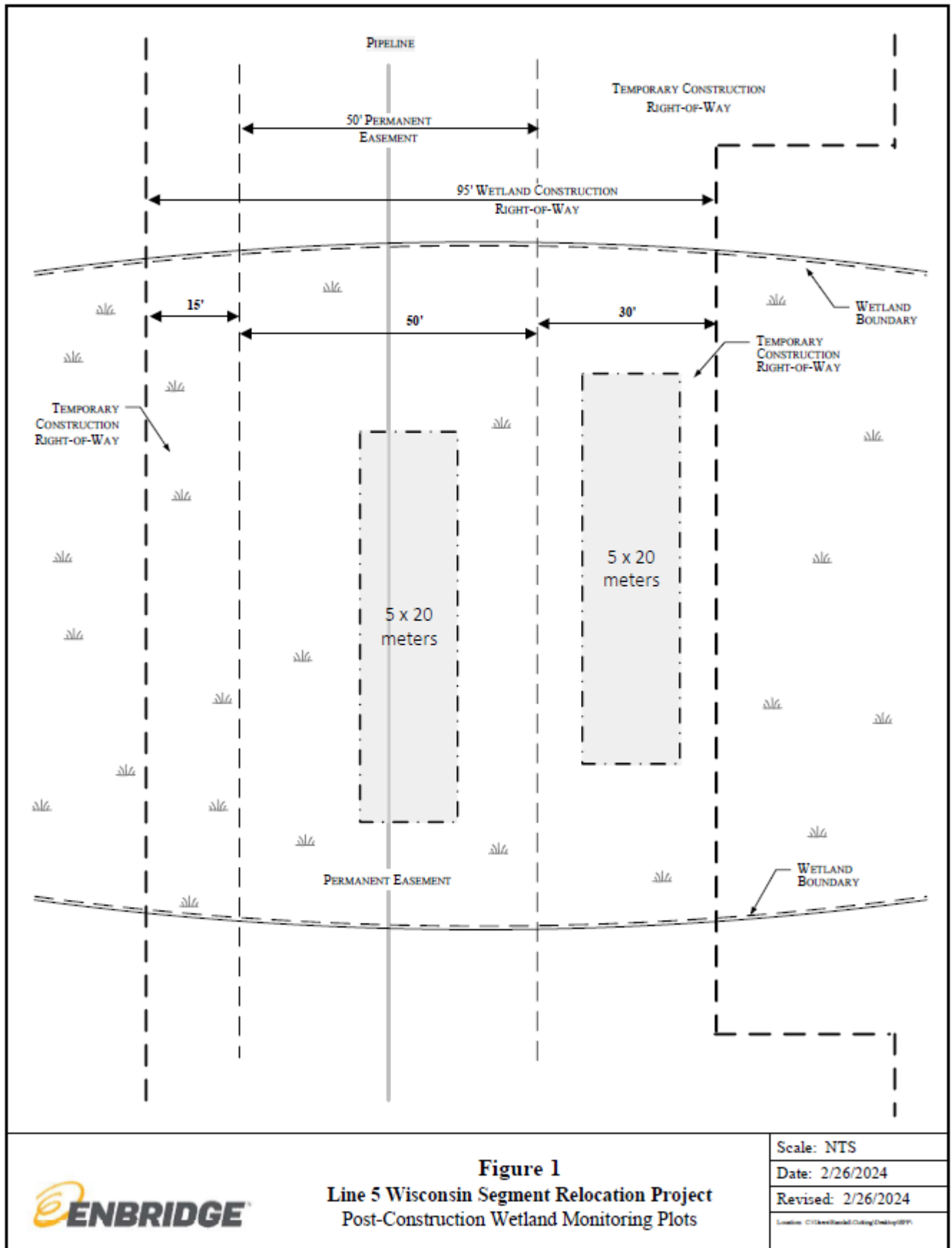


Table 4.6.2-1: Year 2 through 6 Wetland Monitoring

Monitoring Activities	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
General Revegetation Success	X	X	X	X	X	X
Topography (crowning/subsidence/rutting/elevation changes)	X	X	X	X	X	X
Stabilization	X	X	X	X	X	X
Photos taken in each direction	X	X	X	X	X	X
Observations of Hydrologic Indicators	X	X	X	X	X	X
Status of erosion controls	X	X	X	X	X	X
Observations of off-road vehicle activity	X	X	X	X	X	X
Incidental wildlife observations	X	X	X	X	X	X
Noxious/invasive species presence/ comparison against preconstruction condition	X	X	X	X	X	X
Plot sampling (select wetlands)	X ^a	X		X		X
Timed-meander survey	X		X		X	
Access Roads, Yards MLV 1, 2, and 7	X	X	X			
Hydrologic Monitoring ^b	X	X	X			
^a Plot locations to be established in select wetlands during the Year 1 Post Construction Monitoring period however, plot sampling will not occur during the first year.						
^b <u>Monitoring of hydrology at select locations using shallow monitoring wells.</u>						

Enbridge's Operations will also conduct aerial patrols of the pipeline right-of-way in accordance with federal frequency requirements (set forth at 49 CFR §195.412). Aerial patrol personnel will inspect the surface conditions at intervals not exceeding 3 weeks, but at least 26 times each calendar year on or adjacent to each pipeline right-of-way. Personnel are trained to look for signs of potential erosion and/or changes to waterways that could affect the pipeline such as stream scouring/bank failure, new beaver dam impoundments, or similar changes. If any issues are identified during aerial patrols, Enbridge will dispatch ground personnel to investigate the locations further. Aerial patrols will continue as long as the pipeline is in operation and/or in accordance with applicable federal requirements. Table 4.6.2-1 outlines monitoring activities taking place post- construction Year 1 through Year 6.

If adjustments in the monitoring parameters or methodology are needed, the respective changes will be discussed with the applicable agencies prior to implementing the change and will be in the respective annual monitoring reports. Additionally, for wetlands that have met the restoration goals prior to the end of the monitoring period, Enbridge will discuss discontinuing monitoring of those specific wetlands with the respective agencies.

4.6.3 Wetland Hydrological Monitoring

Agencies have expressed concern that construction of the pipeline, including areas of potential blasting, could alter the hydrology of seeps and groundwater discharge wetlands. To address this concern, Enbridge will install shallow groundwater monitoring wells within select wetlands to monitor for changes in near-surface saturation and hydrology. Enbridge reviewed high to medium functional wetlands for the potential to install site-specific groundwater elevation monitoring wells. Criteria used to select the list of wetlands where groundwater elevation monitoring wells could be installed included:

- (1) Wetland is located within the mainline construction corridor (excludes temporary access roads, pipe yards, valve sites);
- (2) Wetland will be crossed by the pipeline centerline (excludes wetlands that are within the temporary workspace, but will not be excavated to install the pipeline);

- (3) Pipeline centerline crossing distance was at least 100 feet in length to provide appropriate locations for groundwater monitoring well placement;
- (4) Preference was assigned to wetlands with permanent conversion within the permanent easement (PFO to PEM or PSS to PEM conversion);
- (5) Preference was assigned to wetlands located on Tri-State Holdings parcels, public land parcels, followed by select private parcels;
- (6) Preference was assigned to wetlands without access concerns (i.e., no large river crossings);
- (7) Preference was assigned to wetlands with an overall WRAM Functional Value Rating of either High Quality or Medium Quality with High Floristic Integrity; and
- (8) Selected wetlands include both features where blasting is anticipated as well as features where blasting is not anticipated.

A list of wetlands where monitoring wells are proposed (pending landowner permission) is included in Appendix A. Enbridge will attempt to acquire landowner permission for those wells that are proposed on private lands. Enbridge will work with USACE to finalize the well installation locations within the selected wetlands.

Groundwater elevation monitoring wells will be installed in 2024 within the selected wetlands on either side of the construction ROW but located outside of the construction workspace (where landowners have provided approval). Well locations will be protected during active construction to prevent potential damage. Groundwater monitoring wells will be installed in pairs upgradient and downgradient of the pipeline to assess if there are changes in groundwater elevations near the pipeline. Each monitoring well pair will be installed to a depth of 15 inches. Monitoring wells may be installed at shallower depths if restrictive soil layers are encountered within the installation depth, or a new installation location will be selected. Monitoring wells will not be installed through any such restrictive layer. Wells will be installed in accordance with the USACE document “Guidance on Design, Installation and Interpretation of Monitoring Wells for Wetland Hydrology Determinations”⁷.

Following trench backfill and establishment of final grade, a third well will be installed at each monitoring well site, within the area excavated for installation of the pipeline. Enbridge will also attempt to identify a comparable reference wetland in the Project area for installation of a monitoring well to assist in identifying groundwater elevation trends associated with natural groundwater fluctuations due to precipitation events.

Data loggers will be used to collect groundwater elevation data during the frost-free period prior to construction and in Years 1, 2, and 3 post-construction or until the performance standards (see Section 4.8.1) have been met and reviewed by the applicable agencies. Where performance standards at specific sites have not been met by Year 3 of monitoring, Enbridge, in consultation with the agencies, may extend monitoring at those sites and/or investigate potential reasons for the difference in groundwater elevations.

4.6.4 Access Roads, Yards, and Valve Sites

Temporary wetland impacts associated with access roads, yards, and mainline valve sites 1, 2, and 7 will be minimized to the extent practicable by the placement of timber mats (or equivalent) and will not require excavation within a wetland. Project workspace associated with access roads, yards, and valve sites 1, 2, and 7 will be restored in accordance with Project plans, landowner agreements, and applicable permit conditions. As discussed in Section 4.6.1 – General Monitoring Approach, during the Year-1 Post Construction monitoring period, Enbridge will visit each wetland within the Project construction workspace associated with access roads, yards, and valve sites 1, 2, and 7. Year-1 Post Construct monitoring will initially focus on landscape related issues (e.g., rutting, compaction, depressions, erosion) as well as general observations including reestablishment of vegetation. See Section 4.6.1 for a further description of site conditions to be recorded at each wetland. Any issues observed will be documented for follow-up corrective action. Enbridge will also monitor these locations for introduction and/or

⁷ Guidance on Design, Installation and Interpretation of Monitoring Wells for Wetland Hydrology Determinations (ERDC TN-WRAP-05-2 June 2005)

expansion of existing invasive and noxious species populations for the first three years post construction. Monitoring will consist of walking each site to document presence/absence of invasive/noxious species as well as overall abundance as compared to documented pre-construction species and extent and as compared to adjacent, undisturbed areas. Enbridge will address invasive species issues in accordance with its Invasive and Noxious Species Control Plan.

4.7 WETLAND ANALYSIS

As discussed above, for each plant species identified, Enbridge will record the cover value based on the Braun-Blanquet cover/abundance scale. Species abundance will only be a factor when cover is less than 5%, with cover and abundance weighted values presented in Table 4.7-1. A cumulative cover will be recorded for those woody species with multiple height classes. Additionally, Enbridge will record the wetland indicator status rating as listed in the National Wetland Plant List and the relative cover of hydrophytes [obligate (“OBL”)⁸, facultative wet (“FACW”), or facultative (“FAC”)]. The total coverage of hydrophytes (OBL–FAC) will be summed across strata, divided by the total coverage of all plant species (OBL–UPL) across all strata, and multiplied by 100 to calculate the percentage of hydrophytic species present.

Table 4.7-1: Absolute Cover and Abundance Scale

Cover Range	Defined	Numerical Weight
75-100%	Assigned to a species within a physiognomic group when that species’ cover is between 75% and 100% of the relevé plot area.	5
50-75%	Assigned to a species within a physiognomic group when that species’ cover is between 50% and 75% of the relevé plot area.	4
25-50%	Assigned to a species within a physiognomic group when that species’ cover is between 25% and 50% of the relevé plot area.	3
5-25%	Assigned to a species within a physiognomic group when that species’ cover is between 5% and 25% of the relevé plot area.	2
<5%	Assigned to a species within a physiognomic group when there are numerous individuals of the species, but those individuals collectively cover less than 5% of the relevé plot area.	1
	Assigned to a species within a physiognomic group when there are only a few (approximately 2–20) individuals of the species and those individuals collectively cover less than 5% of the relevé plot area.	0.5
	Assigned to a species within a physiognomic group when there is only a single individual of the species (a plant with two stems arising from the same	0.25

In addition to the analyses described above, in Years 4 and 6 Enbridge will further evaluate life form⁹ information in the sample plots located within the temporary workspace in PFO/PSS wetlands. Woody species within the sample plots will be identified and recorded as well as the respective height classes for broadleaf deciduous and

⁸ Obligate Wetland (OBL), Facultative Wetland (FACW), Facultative (FAC), Facultative Upland (FACU), and Upland (UPL).

⁹ Life Forms: The general morphologic category of plants including (A) broadleaf evergreen (B), broadleaf deciduous (D), needleleaf evergreen (E), graminoids (G), forbs (H), climbers (C), floating-leaved (F), submerged (S).

needleleaf evergreen species¹⁰. The overall ~~life form~~ cover for ~~broadleaf~~ deciduous and ~~needleleaf~~ evergreen ~~tree~~ species regardless of height classes will be evaluated to document the progression of woody species establishment in wetland areas having woody species pre-construction. Life form height classes of woody species will be assessed beginning in Year 4 to allow time for the woody species to establish and grow.

Additionally, Enbridge will document primary and secondary field hydrologic indicators, which can be made via visual assessments and without digging, along with identifying the primary driver of hydrology (i.e., recharge vs discharge). The relevant indicators are presented in Table 4.7-3.

Table 4.7-2: Hydrologic Indicators

Indicator	Indicator Class	Indicator Class
Surface Water	A1	Primary
Water Marks	B1	Primary
Sediment Deposits	B2	Primary
Drift Deposits	B3	Primary
Algal Mat or Crust	B4	Primary
Sparsely Vegetated Concave Surface	B5 B8	Primary
Water-Stained Leaves	B9	Primary
Aquatic Fauna	B13	Primary
Surface Soil Cracks	B6	Secondary
Moss Trim Lines	B16	Secondary
Crayfish Burrows	C8	Secondary
Stunted or Stressed Plants	D1	Secondary
Geomorphic Position	D2	Secondary
Microtopographic Relief	D4	Secondary
<u>FAC neutral test</u>	<u>D5</u>	<u>Secondary</u>

4.8 WETLAND PERFORMANCE CRITERIA

The following performance criteria is separated by those wetlands evaluated by means of timed meander surveys versus wetlands evaluated by means of plot monitoring. Wetland restoration shall be considered successful at the end of the monitoring period if all the following criteria are satisfied:

General Low Quality and Low-Invasives Wetlands

Table 4.8-1: General Wetland Performance Requirements – Low/Low Invasive Overall WRAM Quality Wetlands

Variable	Performance Criteria (Non-conversion Wetlands)
Native versus Non-native species cover	Relative vegetation cover of native, non- native invasive plant species should be at least 70 percent. Relative vegetation areal cover of non-native/ invasive species should not be greater than 30 percent of total cover or no greater than 15 percent non-native species coverage as compared to pre-construction conditions. Cover categories are specific to timed meander survey efforts only.
<u>Invasive Species</u>	<u>No introduction by the Project of any new invasive plant species (as listed in NR 40) that were not previously documented within the Project workspace; and no spread by the Project of existing invasive plant populations to previously uninfected areas along the Project workspace.</u>

¹⁰ 0-0.5m, 0.5-2m, 2-5m, and 5-20m

<u>Life Form Cover</u>	<u>This metric will not be used to directly measure success or failure but instead used to guide any prescribed adaptive management measures for TWS areas within previously PFO/PSS wetlands. This assumes that these systems will be dominated by graminoids with interrupted to continuous cover (50-100%), where forb cover is rare to patchy (5-50%)</u>
Maximum Unvegetated Area	No bare areas greater than 100 square feet <u>as observed while traversing the wetland</u> . Exceptions: vernal pools, drainage channels in floodplain forests, and sparsely-vegetated concave surfaces in hardwood swamps.
Relative Areal Cover of Hydrophytes (all strata cumulatively)	Relative areal coverage of hydrophytes should be at least 51 percent. Cover hydrophytes are specific to timed meander survey efforts only.

Medium Quality Wetlands

Table 4.8-2: General Wetland Performance Requirements – Medium Overall WRAM Quality Wetlands

Variable	Performance Criteria (Non-conversion Wetlands)
Native versus Non-native species cover	Relative vegetation cover of native, non- native <u>invasive</u> plant species should be at least 80 percent. Relative vegetation cover of non-native invasive species should not be greater than 20 percent of total cover or no greater than 10 percent non-native species coverage as compared to pre-construction conditions. Cover categories are specific to timed meander survey efforts only.
<u>Invasive Species</u>	<u>No introduction by the Project of any new invasive plant species (as listed in NR 40) that were not previously documented within the Project workspace; and no spread by the Project of existing invasive plant populations to previously uninfected areas along the Project workspace.</u>
<u>Life Form Cover</u>	<u>This metric will not be used to directly measure success or failure but instead used to guide any prescribed adaptive management measures for TWS areas within previously PFO/PSS wetlands. This assumes that these systems will be dominated by graminoids with interrupted to continuous cover (50-100%), where forb cover is rare to patchy (5-50%)</u>
Maximum Unvegetated Area	No bare areas greater than 100 square feet <u>as observed while traversing the wetland</u> . Exceptions: vernal pools, drainage channels in floodplain forests, and sparsely-vegetated concave surfaces in hardwood swamps.
Relative Areal Cover of Hydrophytes (all strata cumulatively)	Relative areal coverage of hydrophytes should be at least 75 percent. Cover hydrophytes are specific to timed meander survey efforts only.

Higher Quality Wetlands (and Medium Wetlands with High FQI Rating)

Table 4.8-3: High Overall Quality Wetland Performance Requirements

Variable	Performance Criteria (Non-conversion Wetlands)
Native versus Non-native species cover	Relative vegetation cover of native, non- native <u>invasive</u> plant species should be at least 90 percent. Relative vegetation cover of non-native invasive species should not be greater than 10% percent of total cover or no greater than five percent non-native species coverage as compared to pre-construction conditions. Cover categories are specific to plot survey results.
<u>Invasive Species</u>	<u>No introduction by the Project of any new invasive plant species (as listed in NR 40) that were not previously documented within the Project workspace; and no spread by the Project of existing invasive plant populations to previously uninfected areas along the Project workspace.</u>
Life Form Cover	This metric will not be used to directly measure success or failure but instead used to guide any prescribed adaptive management measures for TWS areas within previously PFO/PSS wetlands. This assumes that these systems will be dominated by graminoids with interrupted to continuous cover (50-100%), where forb cover is rare to patchy (5-50%)
Maximum Unvegetated Area	No bare areas greater than 100 square feet <u>as observed while traversing the wetland</u> . Exceptions: vernal pools, drainage channels in floodplain forests, and sparsely-vegetated concave surfaces in hardwood swamps.
Relative Areal Cover of Hydrophytes (all strata cumulatively)	Relative areal coverage of hydrophytes should be at least 75 percent. Cover of hydrophytes are specific to plot survey results.

Additional restoration criteria include:

- Wetland topography is restored as near as practicable to baseline conditions and/or similar to the topography of adjacent undisturbed wetland areas. Baseline topographic conditions shall be informed from pre- and Year 1 post-construction LiDAR surveys;
- there is no evidence of adverse changes to baseline hydrology and drainage; and
- if natural rather than active revegetation was used, the plant species composition and distribution is consistent with early successional wetland plant communities in the affected ecoregion.

4.8.1 Wetland Monitoring Well Hydrology

Wetland hydrology monitoring via monitoring wells will be considered successful if the in-trench and down-gradient well water table elevations are within 20 percent of the up-gradient water table elevations and exhibit similar fluctuations as compared to the reference monitoring well water table elevation changes.

5 WATERBODY IDENTIFICATION, ASSESSMENT, AND DISTURBANCE

5.1 WATERBODY IDENTIFICATION

Table 5.1-1 summarizes the number and types of waterbodies that are crossed by the pipeline centerline.

Table 5.1-1: Summary of Pipeline Centerline Waterbody Crossings

Delineated Waterbody Regime	Total Number of Waterbodies	Waterbodies Crossed by HDD/Direct Pipe Method	Waterbodies Crossed by Trenched Method
Perennial	29	16	13
Intermittent	40	9	31
Ephemeral	33	5	28
PROJECT TOTAL	102	30	72
Notes: Delineated waterbodies are based on 2019 and 2020 field surveys. Includes rivers, streams, swales, and ditches. Includes one WDNR 24K Hydrography Data waterway (WDH-18) where survey was not permitted in a highway median and 17 WDH waterbodies where a navigability determination by WDNR is requested.			

As indicated in Table 5.1-1, the proposed pipeline centerline (including HDD/Direct Pipe crossings) will cross 102 waterbodies. These include 29 perennial waterbodies, 40 intermittent waterbodies, and 33 ephemeral waterbodies. An additional 36 waterbodies are within the Project mainline workspace but are not crossed by the pipeline centerline. Sixty-two waterbodies will be crossed by temporary access roads.

5.2 WATERBODY IMPACTS AND MITIGATION

Enbridge will cross the majority of waterbodies using open-cut construction methods (open-cut [wet trench] method to cross ephemeral and intermittent waterbodies at that are dry at the time of construction, or a dry crossing method such as dam-and-pump or flume if water is present), which will require trenching to install the pipeline. Enbridge will cross the remaining waterbodies using a trenchless method, which will avoid direct impacts on the water, bed, and banks of these watercourses.

Potential temporary waterbody impacts associated with pipeline construction include the clearing of bank vegetation and the disturbance of bed and banks; impacts on stream flow and water quality including the suspension and downstream transport of sediments; and direct and indirect loss of aquatic organisms and habitat. These effects are typically minor and short-term; generally limited to the construction and near downstream area and the periods of active construction; and quickly dissipate once the bed and banks are restored, stabilized, and revegetated.

Enbridge will mitigate waterbody impacts through implementation of the procedures set forth in the EPP and site-specific streambank restoration plans. Enbridge will cross larger waterbodies using a trenchless method. Enbridge will use a dry crossing method (either dam and pump or flume) at all other waterbodies if flowing or standing water is present. Enbridge's use of a dry crossing method will maintain flows and use temporary dams upstream and downstream of the pipeline crossing to isolate the waterflow from the work area. Enbridge will only use the open cut (wet trench) method, which does not isolate the work area from streamflow, to cross waterbodies that are dry at the time of construction. Enbridge has also reduced the width of the construction right-of-way at most waterbody crossings to 95 feet. The actual instream disturbance associated with excavation will typically be only 20 feet, depending on the cohesive nature of the substrate. For dry crossings, the isolated segment of the stream will be determined based on site-specific conditions, but typically is less than 50 feet wide. Enbridge's selective application of these methods and narrower right-of-way width will avoid or minimize instream work and the potential for sedimentation and other waterbody impacts.

5.3 WATERBODY RESTORATION

Waterbody restoration will be performed at open cut crossings. Following installation of the pipeline where open cut methods are used, Enbridge will backfill the pipeline using the native materials excavated from the trench. During initial excavation, the first material excavated from the trenchline will be segregated and used to cap the trenchline during backfilling; thereby preserving the native streambed material. Enbridge will restore the bed and banks of each stream. The bed elevations will be matched to adjacent bed elevations to avoid impediments to normal water flow. The streambanks will be restored as near as practicable to preconstruction conditions unless the original slope is determined to be unstable. If there is a potential for significant bank erosion, the Contractor may stabilize disturbed stream banks with rock riprap or other bank protection, with WDNR and USACE approval. Enbridge has identified areas where site-specific restoration methods will be used based on pre-construction bank conditions. Where dry crossing methods are used, the temporary dams, flumes/hoses and pumps will be removed after the bed and banks are restored.

Temporary slope breakers will be installed on all sloped approaches to streams in accordance with the spacing requirements outlined in the EPP. Trench breakers will also be installed at the stream banks, as necessary, where slopes are adjacent to the waterbodies to prevent subsurface water flow and erosion along the trench line. Trench breakers typically consist of geotextile-fabric sandbags filled with rock-free subsoil or sand and placed from the bottom of the trench to near the top surrounding the pipe. Other material such as bentonite filled bags or polyethylene foam may also be used. Permanent stabilization will be initiated within 24 hours unless site and weather conditions delay installation of permanent stabilization measures.

Once the banks are reshaped, the banks will be seeded and stabilized with erosion control Best Management Practices (“BMPs”) as specified in the EPP. Stream bank vegetation will be reestablished using the seed mix specified in Appendix B of the EPP, unless applicable agencies specify otherwise. Where a waterbody is within a wetland, the banks will be reseeded with the applicable wetland seed mix.

Enbridge has developed typical streambank restoration figures as well as site-specific bank restoration plans for select waterbodies that were determined to require additional bank remediation efforts beyond standard Best Management Practices (“BMPs”). The typical figures and site-specific restoration drawings were included in Enbridge’s application materials (EIR Attachment N and “SELECTED CHANNELS AND APPLICABLE REMEDIATION DRAWING(S)”, respectively).

The travel lane portion of the construction right-of-way and the temporary bridge will remain in place until pipeline construction activities are complete. Permanent slope breakers will be installed across the full width of the right-of-way during the final cleanup. The Contractor will remove temporary bridges during the final cleanup and restoration phase of construction after the installation of the new pipeline and right-of-way access is no longer required. Enbridge will maintain temporary erosion/sediment control devices (“ECDs”) across the construction right-of-way until final site stabilization. Temporary ECDs will only be removed after achieving vegetative cover, in accordance with permit conditions.

As part of Enbridge’s normal/routine operational activities, ~~No no routine~~ post-construction maintenance or work is anticipated to be conducted in waterbodies; however, Enbridge will generally maintain a 50-foot-wide operational corridor along the pipeline in an herbaceous state to facilitate aerial monitoring and pipeline access.

5.4 WATERBODY MONITORING OBJECTIVES

The goal of the post-construction waterbody monitoring program will be to assess quantitatively and/or qualitatively the success of post-construction waterbody restoration through documentation of physical waterbody parameters including bed and bank elevations and contours, bank and bed composition and stabilization, and water quality, depth, and flow. The following protocol was developed to establish a standardized monitoring procedure that will be used to evaluate the effectiveness of waterbody restoration efforts, to document overall success, and to identify areas that may require additional remediation.

5.5 WATERBODY MONITORING METHODOLOGY

Enbridge proposes to visually monitor each waterbody crossing during the growing season following construction to confirm the successful stabilization of streambanks and restoration of waterbody flow relative to the pre-construction baseline data. If possible, the subsequent monitoring will be performed during the same season/time of year as the Year 1 monitoring for wetlands.

During each visit Enbridge will document:

- bank and near bank (within 50 feet of bank) stabilization and revegetation;
- any observed soil slumping or erosion;
- bank height and width;
- waterbody depth, and flow;
- streambed characteristics and composition of the substrate; embeddedness; and presence of fish habitat such as undercut banks, instream structures (e.g., logs), potential spawning gravel.

Each of these physical parameters will be documented at the crossing location and recorded on data sheets along with the date, time, and location of the observation, the waterbody name, and additional notes on the condition of the surrounding right-of-way, any evidence of third-party activity (off-road-vehicles, grazing, recent construction, etc.), any evidence of erosion, flooding, or notable changes in bank or channel morphology. Enbridge will also conduct a LiDAR survey of the construction right-of-way during the Year 1 Post Construction monitoring period (during leaf-off with no snow cover).

In addition to recording physical attributes, during the first year of monitoring, Enbridge will collect grab samples approximately 100 feet upstream and downstream of the pipeline crossing locations of flowing streams. The chemical parameters sampled throughout post-construction monitoring and the sampling schedule is described in greater detail in the WQMP (Version 4.2, dated June 2024). Chemical parameter analysis will be completed by a certified laboratory using standard analytical methodologies (see the WQMP for chemical analytical analysis methodologies). DO, pH, conductivity, and temperature measurements will be collected in the field using standard analytical methodologies. Additional sampling will be conducted in subsequent monitoring years for any stream that exhibits substantial differences between the upstream and downstream samples for any of the measured attributes.

5.6 WATERBODY SUCCESS CRITERIA

As stated above, it is not practicable to restore a disturbed area “exactly” to pre-construction conditions (e.g., replace every single gravel stone in the same exact location as found); however, Enbridge’s goal is to restore the stream widths, depths, substrate composition and elevation as near as practicable to the conditions encountered pre-construction (i.e., similar). Flowing waterbodies are dynamic systems with natural variability and conditions that change over time. Enbridge’s instream restoration will focus on restoring the stream elevation so it does not impede natural flow or create a deep pool inconsistent with surrounding areas. Instream restoration will also focus on restoring the stream bed composition as near as practicable to pre-construction conditions. Stream banks will be restored as near as practicable to pre-construction heights and angles taking into consideration soil conditions. Where necessary, Enbridge will recontour the disturbed portion of the bank to a more stable angle to minimize the potential for future bank sloughing/erosion based on engineering evaluation and industry standards.

Waterbody restoration shall be considered successful if all of the following criteria are satisfied:

- the waterbody bank is stable and successfully revegetated (establishment of permanent vegetation based on the appropriate wetland/upland success criteria);
- the height, ~~and~~ width, and slope of the stream bank approximate preconstruction baseline conditions and/or adjacent undisturbed bank areas or have been restored to a stable slope angle;

- the stream bed elevations approximate preconstruction baseline conditions and/or adjacent undisturbed areas;
- the depth and flow characteristics (i.e., free flow without construction related impediment) of the waterbody approximates the preconstruction baseline conditions and/or adjacent undisturbed areas;
- the composition of the bed substrate approximates the preconstruction baseline conditions and/or adjacent undisturbed beds areas; and
- the collected water quality parameters at the upstream and downstream have similar resulting values.

6 WETLAND AND WATERBODY POST-CONSTRUCTION RESTORATION AND CORRECTIVE ACTIONS

Enbridge will work closely with the WDNR and the USACE to determine success or identify if additional restoration is required if performance standards are not reached after the planned monitoring is completed, or if an issue is identified during the monitoring period that may affect restoration success. 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). In determining whether corrective action is needed, Enbridge will evaluate the potential resource impacts from conducting the additional restoration compared to taking no action with continued monitoring.

Not every potential corrective action can be determined at this time but possible corrective measures that may need to be implemented include:

- Installation of additional erosion controls or sediment barriers to stabilize soils and capture or redirect runoff;
- Regrading or recontouring to address topography or hydrology issues;
- Implementation of integrated approaches to invasive or noxious weed infestations as outlined in Enbridge's Invasive and Noxious Species Management Plan and in accordance with Section 4.0 of Enbridge's EPP;
- Reseeding, ~~and/or the addition of soil amendments, or~~ supplementing the original seed mix with additional native species, or use of live plantings to meet success criteria if permanent vegetation is not showing signs of establishment during the first growing season following construction completion or during subsequent monitoring events; and
- Supplemental plantings of tree and/or shrubs in selected areas to enhance stabilization or vegetation diversity.

Enbridge will address site stabilization issues that are identified during monitoring. Areas identified as requiring additional seeding will be reseeded within the same growing season. -Standing water wetland requiring additional seeding will be addressed during dry periods to prevent seed loss due to floating or will be addressed with live plantings. -Introduction of undocumented invasives species and/or expansion of existing invasive species populations will also be addressed within the same growing season. Regrading/recontouring will be discussed with the applicable agencies prior to initiating site activities. 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.

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 baseline data including available pre-construction ground elevation data.

Corrective actions for unexpected alterations to groundwater flow related to changes in topography may include regrading or recontouring. Corrective actions that may result in additional temporary impacts on a wetland or waterbody will be conducted according to pertinent permit requirements and in consultation with applicable Agencies.

If the cover of invasive species within a particular community type is too high within the construction workspace compared to the percent cover of the same species in adjacent undisturbed areas outside of the construction workspace, Enbridge will manage the issue in accordance with its Invasive Species Management Plan.

Monitoring may determine that some areas have not successfully revegetated after the first growing season. Causes for seeding failure can include poor germination or insufficient seeding “take” as a result of adverse weather conditions, unfavorable soil conditions, disturbance from cattle or wildlife, competition from invasive species, 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 Invasive Species Management Plan, and/or supplementing seed mixes.

7 MACROINVERTEBRATES

The purpose of macroinvertebrate collection will be to document baseline and post-construction macroinvertebrate community condition (assemblage and diversity). Enbridge will collect macroinvertebrate samples at 13 perennial streams (where appropriate habitat exists) crossed by the pipeline using a dry crossing technique. Please see Enbridge’s WQMP for additional details.

8 REPORTING

The results of the wetland and waterbody monitoring efforts will be submitted to the USACE and WDNR following each survey year, no later than December 31. The report will include data forms, photographs, location maps, comparisons of upstream and downstream water quality parameters, an analysis of the results and any notable issues, and a recommendation for any additional restoration activities.

If any of the applicable success criteria discussed in Sections 4.8 for wetlands and 5.6 for waterbodies are not met following implementation of the corrective actions described in Section 6 above and/or by the end of six years of monitoring, a remedial revegetation plan will be developed and submitted to the USACE and WDNR.

9 REFERENCES

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. *Classification of Wetlands and Deepwater Habitats of the United States*. Washington, DC: U.S. Fish and Wildlife Service Pub., FWS/OBS-79/31. December.

Eggers, Steve D., and Reed, Donald M. 2014. *Wetland Plants and Plant Communities of Minnesota and Wisconsin*. Accessed May 2021. Available online at <https://www.mvp.usace.army.mil/Portals/57/docs/regulatory/WetlandBook/Part%201%20-%20Introduction,%20Key%20to%20Plant%20Communities,%20Shallow%20Open%20Water%20Communities.pdf>

WDNR. 2012. *Wisconsin's Ecological Landscapes*. Accessed December 2019. Available online at <https://dnr.wi.gov/topic/landscapes/index.asp?mode=Choose>.

APPENDIX A
WETLANDS WITH PROPOSED MONITORING WELLS

APPENDIX B

SAMPLE MONITORING DATA FORMS

PLOT SAMPLING DATA FORM – EMERGENT WETLANDS

Surveyors: _____

Line 5 Project Post-Construction Wetland Monitoring

Plot ID: _____

Date:_____

Monitoring Year: _____

Species	Wetland Status	Native Species (Y/N)	Percent Cover
Total Percent of Native Hydrophytes (FAC or wetter):			
Total Percent Cover:			
Relative Percent of Native Hydrophytes:			
Notes:			
Photo Number(s):			

Line 5 Project Post-Construction Wetland Monitoring

Surveyors:

Wetland ID: _____ Date: _____

Monitoring Year:

[illegible]

Linear Waterbody Data Sheet

Survey Description					
Project Name: Line 5 Relocation Project		Waterbody Name:		Waterbody ID:	Date:
State: WI	County:	Company: Enbridge	Crew Member Initials:	Photos:	
Tract Number(s):		Nearest Milepost		Associated Wetland ID(s):	
Survey Type: (check one) <input type="checkbox"/> Centerline <input type="checkbox"/> Re-Route <input type="checkbox"/> Access Road <input type="checkbox"/> Other:					
Physical Attributes					
Stream Classification: (check one) <input type="checkbox"/> Ephemeral <input type="checkbox"/> Intermittent <input type="checkbox"/> Perennial					
Waterbody Type: (check one) <input type="checkbox"/> River <input type="checkbox"/> Stream <input type="checkbox"/> Ditch <input type="checkbox"/> Canal <input type="checkbox"/> Other:					
OHWM Width: _____ ft. Height: _____ in. N/A <input type="checkbox"/>		OHWM Indicator: (check all that apply) <input type="checkbox"/> Clear line on bank <input type="checkbox"/> Shelving <input type="checkbox"/> Wrested vegetation <input type="checkbox"/> Scouring <input type="checkbox"/> Water staining <input type="checkbox"/> Bent, matted, or missing change vegetation <input type="checkbox"/> Wrack line <input type="checkbox"/> Litter and debris <input type="checkbox"/> Abrupt plant community change <input type="checkbox"/> Soil characteristic			
Width of Waterbody - Top of Bank to Top of Bank: _____ ft.		Width of Waterbody - Toe of Slope to Toe of Slope: _____ ft.		Width of Waterbody - Water Edge to Water Edge: _____ ft. N/A <input type="checkbox"/>	
Sinuosity: (check one) <input type="checkbox"/> Straight <input type="checkbox"/> Meandering		Water velocity: (Approx.) _____ fps N/A <input type="checkbox"/>		Bank height Right: _____ in. Left: _____ in.	
				Bank slope Right: _____ degrees Left: _____ degrees	
Qualitative Attributes					
Water Appearance: (check one) <input type="checkbox"/> No water <input type="checkbox"/> Clear <input type="checkbox"/> Turbid <input type="checkbox"/> Sheen on surface <input type="checkbox"/> Surface scum <input type="checkbox"/> Algal mats <input type="checkbox"/> Other:					
Substrate: (check all that apply) <input type="checkbox"/> Bedrock <input type="checkbox"/> Boulder <input type="checkbox"/> Cobble <input type="checkbox"/> Gravel <input type="checkbox"/> Sand <input type="checkbox"/> Silt/ clay <input type="checkbox"/> Organic <input type="checkbox"/> Other: % of Substrate: _____% _____% _____% _____% _____% _____% _____% _____%					
Width of Riparian Zone: _____ ft. N/A <input type="checkbox"/>		Vegetative Layers: (check all that apply) <input type="checkbox"/> Trees: _____ in. <input type="checkbox"/> Saplings/Shrubs: _____ in. <input type="checkbox"/> Herbs Avg. DBH of Dominants: (approx.) _____ in.			
Dominant Bank Vegetation (list):					
Aquatic Habitats (ex: submerged or emerged aquatic vegetation, overhanging banks/roots, leaf packs, large submerged wood, riffles, deep pools):					
Aquatic Organisms Observed (list):					
T&E Species Observed (list):					
Disturbances (ex: livestock access, manure in waterbody, waste discharge pipes):					
Waterbody is: (check one) <input type="checkbox"/> Natural <input type="checkbox"/> Artificial, man-made <input type="checkbox"/> Manipulated					
Stream Quality ^a : (check one) <input type="checkbox"/> High <input type="checkbox"/> Moderate <input type="checkbox"/> Low					

LINE 5 WISCONSIN SEGMENT RELOCATION PROJECT
WETLAND AND WATERBODY RESTORATION AND POST CONSTRUCTION MONITORING PLAN JUNE 2024
REV 3.1

Waterbody ID:

^a **High Quality:** Natural channel, natural vegetation extends at least one or two active channel widths on each side; banks stable and protected by roots; water color is clear to tea-colored; no barriers to fish movement; many fish cover types available; diverse and stable aquatic habitat; no disturbance by livestock or man.

Moderate Quality: Altered channel evidenced by rip-rap; natural vegetation extends 1/3-1/2 of the active channel width on each side; filtering function or riparian vegetation only moderately compromised; banks moderately unstable; water color is cloudy, submerged objects covered with greenish film; moderate odor; minor barriers to fish movement; fair aquatic habitat; minimum disturbance by livestock or man.

Low Quality: Channel is actively down cutting or widening; rip rap and channelization excessive; natural vegetation less than 1/3 of the active channel width on each side; lack of regeneration; filtering function severely compromised; banks unstable (eroding); water color is muddy and turbid; obvious pollutants (algal mats, surface scum, surface sheen); heavy odor; severe barriers to fish movement; little to no aquatic habitat; severe disturbance from livestock or man.

Notes:

Waterbody Sketch (Include north arrow, centerline, distance from centerline, data point location, survey boundary, and IDs of associated features)