Attachment E

Post-Construction Vegetation Management Plan for Public Lands and Waters





Post-Construction Vegetation Management Plan for Public Lands and Waters

Enbridge Energy, Limited Partnership • Line 3 Replacement Project

November 2020

ENBRIDGE®

TABLE OF CONTENTS

TABLES

APPENDIX

ACRONYMS AND ABBREVIATIONS

BMPs	best management practices
Enbridge	Enbridge Energy, Limited Partnership
EPP	Environmental Protection Plan
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
PCMP	Post-Construction Wetland and Waterbody Monitoring Plan for Public Lands and Waters
SOBS	Sites of Biodiversity Significance
USACE	U.S. Army Corps of Engineers
VMP	Post-Construction Vegetation Management Plan for Public Lands and Waters

INTRODUCTION

This Post-Construction Vegetation Management Plan for Public Lands[1] and Waters[2] ("VMP") outlines post-construction monitoring procedures and operation-related policies, regulations, procedures, and best management practices ("BMPs") for Enbridge Energy, Limited Partnership's ("Enbridge") Line 3 Replacement Project ("L3R" or "Project") as it relates to the management of vegetation resources within the construction workspace, permanent easement and temporary and permanent access roads on public lands owned or administered by the Minnesota Department of Natural Resources ("MDNR"). Monitoring will not be considered complete until the performance standards have been met, reviewed, and approved by the MDNR. In the case that the performance standards have not been met by year 5 of monitoring, Enbridge, as directed by MDNR, will either extend monitoring at those sites, or provide additional mitigation.

Enbridge has also prepared a Post-Construction Wetland and Waterbody Monitoring Plan ("PCMP") that applies to all surface waters[3] crossed by the Project, including public waters. The PCMP has been developed with input from the U.S. Army Corps of Engineers ("USACE"), Minnesota Pollution Control Agency ("MPCA"), and MDNR. All public water crossings will be monitored in accordance with the PCMP. The PCMP: (i) requires pre-construction data collected to establish aquatic resources baseline conditions; (ii) establishes the data, analyses, and procedures required to monitor topography, hydrology and vegetation[4] following completion of Project construction; (iii) establishes objective and verifiable ecological performance standards to evaluate the success of restoration of aquatic resources to pre-construction conditions; (iv) requires the submission of annual monitoring reports to the USACE, MPCA, and MDNR and an annual meeting with the agencies to review the results; and (v) includes an adaptive management approach which specifies types of corrective actions that may be employed in the event that monitoring identifies a problem in achieving the final goal of restoring the temporarily impacted wetlands to pre-construction conditions. Post-construction monitoring of public waters will not be discussed further in this Plan. However, the operational procedures described in Section 2.0 of this VMP also apply to public waters crossed by the Project and subject to the License to Cross Public Waters.

Enbridge's statements, policies, procedures, and protection measures regarding the construction of the Project, including those measures that are unique to public lands, are described in Enbridge's Environmental Protection Plan ("EPP"). Section 7.0 of the EPP describes the revegetation procedures that will occur during restoration within the Project area, including specific requirements for public lands. Appendix A of this VMP includes the Planting Plan, which describes the seed mixes and/or woody vegetation to be planted on public lands and waters.

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

2 Public water or public waters means those waters of the state identified under Minnesota Statutes, section 103G.005, subdivision 15 or 15a, or 103G.201, as shown on the public water inventory maps.

3 *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."

4 Shallow groundwater and its relationship to wetland plant communities is also being monitored at some locations as described in the PCMP.

1.0 POST-CONSTRUCTION MONITORING

The following monitoring procedures and performance standards will be used to determine that the uplands located on public lands that are affected by the Project, including temporary access roads administered by the MDNR, are restored to pre-construction conditions. Restoration activities will occur immediately after construction to stabilize and seed the disturbed construction workspace. 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. Some baseline vegetation monitoring efforts will also occur in year 0 (during construction), as feasible and safe to do so. Corrective actions identified during monitoring will generally be completed in the even years (years 2 and 4) and as needed after the monitoring conducted in years 1 and 3. Enbridge proposes to conduct on-the-ground monitoring efforts and restoration activities (e.g., corrective actions) supported by review of color infrared imagery.

Monitoring will not be considered complete until the performance standards have been met and reviewed by the MDNR. In the case that the performance standards have not been met by year 5 of monitoring, Enbridge, in consultation with the MDNR, will either extend monitoring at those sites, or provide additional mitigation. A formal report of the monitoring results will be submitted to the MDNR by December 31 of each monitoring year.

1.1 QUALIFICATIONS

Post-construction monitoring of restored uplands 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 in botany, ecology, or other vegetation, soils, or hydrology-related science field. Alternatively, personnel should have 10 years of equivalent botany, ecology, or soils professional or academic experience.

- Personnel 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, and ability to identify plants during multiple life stages. Personnel should be qualified to identify unknown plant species using a dichotomous key, herbarium records, field guides, or consultation with other experts, as appropriate, and to the extent practicable, based on plant growth stage. Personnel must also demonstrate familiarity with soils and hydrology.

1.2 PRE-CONSTRUCTION BASELINE DATA

Enbridge conducted pre-construction surveys between 2013 through 2020 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 on public lands. Enbridge gathered the following baseline information for the uplands 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, as needed:

- Visual spectrum and color infrared aerial imagery of the Project route (see Section 1.3.2);

- Light Detection and Ranging ("LIDAR")[5] of the Project route;
- Field-delineated waterbody locations and riparian vegetation community types and dominant species;
- Invasive and noxious species ("INS")[6] surveys;
- Ground elevation civil survey data[7] collected at regular intervals along the centerline; and
- Measurements of existing soil compaction levels at MDNR-administered temporary access roads.

1.3 POST-CONSTRUCTION MONITORING AND RESTORATION ACTIVITIES

1.3.1 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, 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 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. Implementing beaver or muskrat deterrents (this method will be discussed with the MDNR prior to use);
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.

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

[6] 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.

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

Enbridge will hold annual meetings with MDNR to plan for the next monitoring year, review the results of monitoring reports (see Section 1.9), and to discuss corrective actions and adaptive management strategies that may require implementation during the forthcoming growing season. Enbridge will work with the MDNR 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 the MDNR and implemented until the standards are met.

1.3.2 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 pre-construction color infrared imagery of the Project route including: spring leaf-off (publicly available data from various years), fall leaf-off (September 2019), and mid-summer leaf-on (July 2020). Enbridge will also collect color infrared imagery during monitoring years 2 and 5, and during spring (leaf-off) and late summer/fall (leaf-on) in year 5.

Review of the color infrared imagery will facilitate an evaluation of upland conditions and will facilitate the identification of issues such as areas that require erosion and sediment control BMPs, areas void of vegetation that should have achieved some level of cover, or INS infestations. 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,[8] and based on the U.S. Department of Agricultural, Natural Resources Conservation Service (1997) methodology.[9]

Pre-construction imagery can be used for comparison during post-construction monitoring. Enbridge may also utilize publicly-available imagery, including summer, spring, and fall true-color and infrared 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.

1.4 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[10] is established in all disturbed areas. Erosion events will be noted. 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

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

[9] 650.1903 Supplemental data for remote sensing (pages 19-24 through 19-26).

[10] 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).

stabilization will be evaluated during each monitoring year but will be a primary focus of year 1 monitoring.

1.4.1 Potential Corrective Actions

Enbridge will address site stabilization issues that are identified during monitoring. Erosion or erosion and sediment control BMP deficiencies 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 MDNR immediately if any BMP deficiency or failure results in impacts on public land and will describe the corrective action taken to address this condition.

1.5 MONITORING OF TOPOGRAPHY AND HYDROLOGY

Year 1 post-construction monitoring will be focused on evaluating topography and stabilization. Crowning left for anticipated settling will be evaluated to determine 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 LIDAR and/or baseline civil survey conditions to identify any other potential deviations in site conditions (see Section 1.2). MDNR-administered temporary access roads will also be evaluated for compaction by utilizing a cone penetrometer post-construction. All public land uplands and MDNR-administered access roads will be visited in year 1. Survey results will be documented in a data form.

Monitoring during years 3 and 5 will be focused on both landscape level and on-the-ground assessments of whether conditions on- and off-right-of-way are similar and consistent with the baseline conditions identified during pre-construction field surveys (refer to Section 1.2). 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 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 1.8.

1.5.1 Potential Corrective Actions

Examples of topography or hydrology-related issues that may require additional restoration include: unexpected ponding or unexpected drainage. Corrective actions, such as regrading or recontouring and/or addition of subsoil and/or topsoil, 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. 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.

1.6 REVEGETATION MONITORING

On-the-ground revegetation monitoring is proposed during year 1 monitoring. Meander surveys will occur on each public land parcel included within the License to Cross Public Lands. Enbridge will:

- Estimate absolute percent vegetation ground cover;
- Estimate percent composition of ground cover by dominant species;
- Identify INS observations; and
- Identify dominant species by strata.

The results of these surveys will be documented in a data forms that will be presented in the Monitoring Report (see Section 1.9). Representative photos will also be collected during each monitoring year and included in the monitoring report.

Forested communities within the permanent right-of-way will not be allowed to regenerate in order to preserve the integrity of the pipeline and comply with inspection requirements during pipeline operation. These sites will be seeded with MDNR-approved seed mixes identified in Appendix A, and will be monitored to ensure revegetation. Year 1 monitoring efforts will include reporting on the condition of the replanting at these sites. Monitoring and corrective actions to promote revegetation will be continued until the revegetation release criteria established in Section 1.8 have been met.

Although forested communities within the temporary workspace[11] will be allowed to regenerate, the vegetation community structure and composition will not recover within the 5 years of post-construction monitoring. In order to mitigate for these long-term or permanent impacts, Enbridge will provide compensation to the MDNR to replant woody species within the temporary workspace, including additional temporary workspace,[12] in a method and manner of MDNR's choosing. These reforested areas will not be monitored by Enbridge.

Acceptable cover of INS will be determined by comparing the absolute percent cover of INS 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 Implementation Plan for Public Lands (attachment to the INS Management Plan provided in Appendix B of the EPP) throughout construction, restoration, and during post-construction monitoring efforts.

1.6.1 Special Upland Communities Vegetation Monitoring

Enbridge proposes to conduct advanced monitoring at a subset of the following upland community types impacted by the Project:

1. Uplands 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).

[11] Temporary workspace is land located adjacent to and contiguous with the proposed right-of-way.

[12] Additional temporary workspace is temporary construction workspace needed when encountering environmental features that require special construction methods.

2. Uplands 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. Uplands 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.

Enbridge proposes to conduct the timed-meander sampling and Relevé methods (MDNR, 2013) at approximately 25 percent of the uplands identified as special communities in bullets 1 through 3, selected in coordination with the MDNR. Timed-meander surveys will be conducted to estimate the percent composition of dominant species by strata (minimum 10 species, if present). The Relevé method uses a plot to list species by cover abundance according to height classes and life forms (such as deciduous woody plants, forbs, graminoids, etc.). This method also collects information on substrate and other abiotic features in the plot. Plant communities will be classified according to the Minnesota's Native Plant Community Classification (Version 2.0).[13] Enbridge developed a protocol for the timed-meander and Relevé methods, which will establish the specific methods, measurements, and parameters for analysis or comparison to support the results for both the timed-meander and the Relevé methods, and the final locations where these methods will be conducted. The final design of methods and analysis will be approved by the MDNR.

Relevé plots will be subjectively located within the construction workspace by vegetation community. The number of plots within the vegetation community will be dependent upon the size of the community affected. Enbridge will also place reference plots within the survey corridor outside of the construction workspace, but within the same community type as the selected plot within the construction workspace ("reference plots"). Based on the plot data collected, the reference and disturbed communities will be given a condition rating as described in Table 1.6-1. Reference plots will be monitored during year 1 using the Relevé plot method to establish the baseline condition rating. At the disturbed sites, Enbridge will conduct the timed-meander sampling method during year 1. As appropriate, Enbridge will establish reference plots prior to construction completion (year 0) where feasible and safe for staff.

[13] https://www.dnr.state.mn.us/npc/classification.html.

Table 1.6-1
Condition Ranking of the Native Plant Community

Condition Category	Description
A	Community composition, structure, and ecological processes and functions 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.
B	Community composition and structure similar to natural community, and good ecological integrity. 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. May include communities degraded in the past but that have recovered.
C	Moderate changes in community structure and fair ecological integrity. Sensitive taxa are replaced as the abundance distribution shifts towards more tolerant taxa. Extent of expected native composition for the community type diminished. Potential for recovery with protection and management.
D	Large to extreme changes in community structure resulting from large abundance distribution shifts towards more tolerant taxa. Poor ecological integrity. Extent of expected native composition for the community type reduced to isolated pockets and/or wholesale changes in composition. Little chance of recovery to their natural or historic condition.
Source: Adapted from the MPCA Floristic Quality Assessment (MPCA, 2014) and the MDNR Condition Ranking Guidelines for Native Plant Communities (see https://www.dnr.state.mn.us/npc/classification.html.)	

Because Enbridge is limited to conducting construction, restoration, and post-construction monitoring activities within the construction workspace, site selection will need to consider the ability to obtain landowner or land-managing agency permissions to conduct assessments off of the right-of-way.

Enbridge will continue to collect data using the Relevé method at both the reference and disturbed plots during monitoring Years 3 and 5 to account for external variables (e.g., drought/flooding, climate changes, land use activities) at the reference sites, and to monitor the progress of vegetation recovery at the disturbed plots. The plot data and 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 1.9). Monitoring and corrective actions to promote revegetation will be continued until the revegetation release criteria established in Section 1.8 have been met.

When identified, Enbridge will manage new or spreading INS in accordance with Enbridge's INS Management Plan and INS Implementation Plan for Public Lands (attachment to the INS Management Plan provided in Appendix B of the EPP) throughout construction, restoration, and during post-construction monitoring efforts.

1.6.2 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 wildlife, competition from INS, or erosion. Enbridge will reseed areas that are not adequately revegetated during the monitoring period. 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 foraging, implementing Enbridge's INS Management Plan (Appendix B of the EPP), timed top-clipping for weedy species, and/or supplementing seed mixes.

1.7 MONITORING SCHEDULE

Similar to the PCMP, 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 and 3. 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 1.3.2) during years 2 and 5, and during late summer (leaf-on) in year 5. Enbridge will also collect LIDAR data during monitoring year 3. As upland areas 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 1.7-1 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 the MDNR and implemented until the standards are met.

Table 1.7-1
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 Relevé method at special upland community reference sites selected in coordination with the MDNR, where feasible and safe to do so	• Conduct on-the-ground monitoring of uplands on public lands • Conduct Relevé method at special upland community reference sites and timed-meander surveys at disturbed sites selected in coordination with MDNR (see Section 1.6.1)	• Color infrared imagery (spring) • 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: ○ Sites that did not meet performance standards during year 1 monitoring ○ Potential landscape level issues identified in color infrared imagery • Conduct Relevé method at special upland community references and disturbed sites selected in coordination with MDNR (see Section 1.6.1)	• Implementation of on-the-ground corrective actions identified in year 3; interim monitoring as needed based on potential issues identified during year 3	• Color infrared imagery (spring leaf-off and late summer/ fall leaf-on) • Conduct on-the-ground monitoring of the following: ○ Sites that did not meet performance standards during year 3 monitoring ○ Potential landscape level issues identified in color infrared imagery • Conduct Relevé method at special upland community references and disturbed sites selected in coordination with Agencies (see Section 1.6.1)	• Ongoing monitoring and implementation of corrective actions where need established by Enbridge and MDNR

1.7.1 Year 1 Monitoring Activities

Year 1 of post-construction monitoring will include on-the-ground monitoring of all public land uplands supported by imagery flown prior to on-the-ground assessments (see Section 1.3.2). Enbridge will record local weather data at each site during monitoring. The first year of monitoring will focus on:

- Stabilization (see Section 1.4);
- Evaluating topography/restoration to pre-construction contours (e.g., crowning, subsidence, compaction) (see Section 1.5);
- Evaluating revegetation cover and type (see Section 1.6); and
- Conducting Relevé method at reference and timed-meander surveys at disturbed special upland community sites (see Section 1.6.1).

1.7.2 Year 3 Monitoring Activities

Year 3 of post-construction monitoring will include on-the-ground monitoring of a subset of public land uplands supported by imagery flown prior to on-the-ground assessments (see Section 1.2). Enbridge will record local weather data at each site during monitoring. Year 3 monitoring will focus on:

- Reviewing potential landscape level issues using color infrared imagery (see Section 1.3.2);
- Reconfirming site stabilization (see Section 1.4);
- Reconfirming topography/restoration to pre-construction contours (e.g., crowning, subsidence, compaction) (see Section 1.5);
- Evaluating revegetation cover and type at uplands where performance standards were not achieved during year 1 monitoring (see Section 1.6); and
- Conducting Relevé method at reference and disturbed special upland community sites (see Section 1.6.1).

1.7.3 Year 5 Monitoring Activities

Year 5 of post-construction monitoring will include on-the-ground monitoring of uplands that have not achieved the performance standards established in Section 1.8. Monitoring will be supported by imagery (see Section 1.3.2). Enbridge will record local weather data at each site during monitoring. Year 5 monitoring will focus on:

- Reviewing color infrared imagery to identify potential landscape level issues for ground verification (see Section 1.3.2);
- Reconfirming site stabilization (see Section 1.4);

- Reconfirming topography/restoration to pre-construction contours (e.g., crowning, subsidence, compaction) (see Section 1.5);

- Evaluating revegetation cover and type at where performance standards were not achieved during year 3 monitoring (see Section 1.8.2); and.

- Conducting Relevé method at reference and disturbed special upland community sites (see Section 1.6.1).

1.7.4 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 MDNR 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 1.4.1, 1.5.1, and 1.6.1.

1.8 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. For sites that do not meet the performance standards, additional monitoring and/or corrective actions beyond year 5 will be determined in consultation with MDNR and implemented until the standards are met. If the MDNR determines that no further monitoring or corrective actions will result in restoration, Enbridge will provide options for additional mitigation. For sites that do not meet the performance standards, additional monitoring and/or corrective actions beyond year 5 will be determined in consultation with the MDNR and implemented until the standards are met.

1.8.1 Stabilization, Topography, and Hydrology

Performance standards will be met when the construction workspace has been stabilized and no landscape-level issues, such as ponding, draining, run-off, or erosion, 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.

For MDNR-administered temporary access roads, the performance standards for compactions will be considered addressed when the cone penetrometer readings for the access road are within 10 percent of pre-construction readings.

1.8.2 Vegetation

Enbridge proposes the following performance standards for vegetation communities in upland areas on public lands (see Section 1.6):

1. Total areal cover equates to at least 80 percent of the ground cover of the adjacent undisturbed areas of the same community type, except for woody vegetation community types located within the operational right-of-way, which will be permanently converted to herbaceous communities.

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.

For special upland communities (see Section 1.6.1):

3. Disturbed and corresponding reference special upland sites have the same condition ranking for the Native Plant Community (see Table 1.6-1).

Enbridge will meet with the MDNR 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.

1.9 MONITORING REPORTS

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

- Digital copies of geo-rectified imagery and LIDAR;
- High-level summary table of sites evaluated, how sites were evaluated, date of assessment, restoration status, and any corrective actions identified.
- For each public land parcel and MDNR-administered access road assessed:
    - Status of stabilization efforts (i.e., conditions of erosion and sediment control BMPs and any corrective actions);
    - Summary of any relevant baseline data documented during pre-construction surveys, including local weather data recorded at time of the monitoring efforts;
    - Summary of vegetation data documented during monitoring year;
    - 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.
- List of proposed monitoring sites for the next monitoring period.
- Access to full monitoring data collected.

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

2.0 OPERATIONS AND RIGHT-OF-WAY MAINTENANCE

Title 49 Code of Federal Regulations 195.412 (a) states that "each operator shall, at intervals not exceeding 3 weeks, but at least 26 times each calendar year, inspect the surface conditions on or adjacent to each pipeline right-of-way. Methods of inspection include walking, driving, flying or other appropriate means of traversing the right-of-way." Enbridge's preferred method to perform these required inspections is flying. To perform these inspections aerially, the right-of-way needs to be adequately cleared to be able to identify abnormal surface conditions. Enbridge will maintain the operational right-of-way by removing woody shrubs and trimming branches overhanging the right-of-way approximately every 5 years to preserve pipeline integrity and to facilitate inspection of the pipeline. Other maintenance activities (e.g., maintenance digs) may occur as necessary over the life of the pipeline. Routine vegetation maintenance along the operational right-of-way may include mowing, grubbing, and treatment/mitigation of undesirable species once identified, including herbicide treatment as approved by the appropriate agencies.

Enbridge will generally maintain a 50-foot-wide operational right-of-way centered over the pipeline following restoration. At trenched waterbodies, Enbridge will maintain a 10-foot-wide corridor centered on the pipeline free of woody shrubs, and a 30-foot-wide corridor free of trees within the riparian area of the waterbody crossing to maintain the integrity of the pipeline. At horizontal directional drill crossings, Enbridge will maintain a 30-foot-wide corridor centered on the pipeline free of woody vegetation to maintain the integrity of the pipeline and to facilitate aerial inspection. Enbridge will utilize manual control / hand labor tactics within the ordinary high water level at all public water crossings, as described in Section 2.1.2.

The following sections provide an overview of the how vegetation is typically managed along the operational pipeline right-of-way; however, prior to initiating any Vegetation Management Program, Enbridge Operations staff will prepare a Vegetation Management Plan; conduct necessary federal, state, Tribal, and local consultations; and obtain the appropriate authorizations and permits. This will include reviewing Natural Heritage Information System data and consulting with the MDNR on the appropriate avoidance and minimization measures.

2.1 MECHANICAL VEGETATION MAINTENANCE

Vegetation maintenance will occur approximately every 5 years and as necessary to accommodate maintenance activities (e.g., maintenance digs). All equipment will arrive on-site and leave in a clean condition to minimize the risk of invasive and noxious plant transfer. A clean condition means all soil and vegetation pieces are removed from the equipment. Brush growth will be mechanically controlled by mowing or mulching. Slash and burn may be acceptable under certain conditions (i.e., well away from station and valve sites and bodies of water), and with the appropriate authorizations or permissions. Mechanical control of invasive and noxious plants and brush is preferable to herbicide control.

Some mechanical operations, if conducted in wetlands, may require additional regulatory permits. Generally, Enbridge's routine maintenance of pipelines is covered under existing permits. However, if non-routine work is planned, Enbridge will consult with the applicable agencies.

Brush, trees, vegetation, or other fill materials will not be left in wetland areas under any circumstance.

2.1.1 Mowing

Brush cutter mowing of brush and/or non-woody vegetation is the most common control technique employed within the operational right-of-way. Mowing uses vehicles with rotating cutter heads or blades to cut down smaller trees (less than about 3 inches in diameter) and other vegetation and will occur after August 1. Mower blade height will be set at 6 to 8 inches above the ground, or 10 or 12 inches after September 1 to reduce wildlife injury and mortality and prevent erosion. If vegetation management is required in wetland areas, it will be done by hand as described in Section 2.1.2; mowing will not typically occur in wetlands.

2.1.2 Manual Control/Hand Labor

Manual or hand control tactics are used to remove vegetation selectively in areas where motorized equipment or other methods are not practical or could cause greater environmental harm (i.e., where motorized equipment could cause erosion/rutting in wet conditions) than good. This technique includes individuals using mechanical tools to hand slash, prune, or remove undesirable brush and trees, and the cutting, girdling, or chipping of large woody stems and limbs with power saws, chippers, hand saws, axes, and pruning tools. Manual control methods allow for individual plants to be selected and managed or removed.

2.2 INVASIVE AND NOXIOUS SPECIES MANAGEMENT

Similar to the approach of Enbridge's INS Management Plan (see Appendix B of the EPP), Enbridge will develop site-specific management plans that may include the use of mowing, herbicide applications, mulching, and/or biological controls to achieve the desired management goal. Management techniques will be based on anticipated effectiveness, environmental impact, site characteristics, economic considerations, and safety of the public and staff. Enbridge will monitor and manage INS within the licensed easement throughout the life of the license. This will include documenting occurrences, avoidance of mowing in expansive invasive infestations while those infestations are seeded out, and management of infestations as they occur.

Enbridge will only utilize those pesticides (including herbicides) and methods of application approved by the Minnesota Department of Agriculture, MDNR, and the U.S. Environmental Protection Agency in the state of Minnesota. Herbicide use on public lands will comply with MDNR herbicide use guidelines, forest certification standards, and the Forest Stewardship Banned Pesticide list.

Enbridge will contact MDNR to obtain approval for the use of pesticide (including herbicides) at least 14 days prior to any application on public land. MDNR will review and approve all pre-treatment plans prior to the application of herbicide on public lands. Enbridge will keep proper documentation of the locations where pesticides have been used.

Appendix A

Planting Plan





Planting Plan

Enbridge Energy, Limited Partnership • Line 3 Replacement Project

November 2020

ENBRIDGE®

TABLE OF CONTENTS

ATTACHMENTS

ACRONYMS AND ABBREVIATIONS

AMA	Aquatic Management Area
ATWS	additional temporary workspace
BWSR	Minnesota Board of Water & Soil Resources
Enbridge	Enbridge Energy, Limited Partnership
L3R or Project	Line 3 Replacement Project
MDNR	Minnesota Department of Natural Resources
NPC	Native Plant Community
Plan	Planting Plan
ROW	right-of-way
SOBS	Sites of Biodiversity Significance
SSRP	Site-Specific Restoration Plan
TWS	temporary workspace

INTRODUCTION

This Planting Plan ("Plan") prepared by Enbridge Energy, Limited Partnership ("Enbridge") is a guide to seeding and woody vegetation planting on public lands and at public waters requiring revegetation following construction of the Line 3 Replacement Project ("L3R" or "Project"). This Plan describes the seed mix selection criteria, identifies State of Minnesota Seed Mixes and provides a summary table, and outlines plant material sourcing guidelines. The Plan is applicable to the following construction zones on public lands:

- Permanent right-of-way ("ROW");
- Temporary workspace ("TWS");
- Additional temporary workspace ("ATWS"); and
- Access roads.

The Plan also applies to the following:

- Site-Specific Restoration Plans ("SSRPs") prepared for select public waters (Attachment B of Enbridge's License to Cross Public Waters);

- Environmental Crossing Plans developed for public water wetlands on private lands (Attachment F of Enbridge's Work in Public Waters Application); and

- Peatland/Wetland Construction and Restoration Plans (Attachment B of Enbridge's License to Cross Public Lands).

Areas requiring revegetation are hereby referred to as Project areas. An example seeding plan, as a figure and table, is provided for a representative Project area on public lands in Attachment A. A final map set delineating proposed seeding zones on public lands, with call-outs to SSRPs that overlap with public lands, and Peatland/Wetland Construction and Restoration Plans, will be provided prior to construction.

1.0 PERMANENT SEED MIX SELECTION CRITERIA

Seed mixes, species substitutions, and seed sourcing will be based on climate, geology, topography, soils, drainage, and pre-construction and adjacent plant communities. Criteria are proposed below for selection of existing State of Minnesota Seed Mixes.[1] Seed mixes shall be based on evaluation of readily available sources of biotic and environmental data, including field wetland boundaries, county soil survey, Native Plant Community ("NPC"), and Sites of Biodiversity Significance ("SOBS") mapping. The Minnesota Department of Natural Resources ("MDNR")-modified State of Minnesota Seed Mixes are included in Attachment B; if an MDNR-added milkweed species is not readily available, Enbridge will substitute with a different milkweed species appropriate to the site, region, and soil, as feasible.

[1] https://bwsr.state.mn.us/seed-mixes.

1.1 STEP 1: DEFINE ECOREGIONS AND STATE OF MINNESOTA SEEDING ZONES

Selection or modification of State of Minnesota Seed Mixes will be based on established ecoregion and seed zone boundaries.

1.1.1 MDNR Ecological Classification System

The MDNR Ecological Classification System mapping is useful for acknowledging ecological patterns associated with selection of suitable species across the overall Project. All Project areas are located within the Laurentian Mixed Forest Province. Most Project areas are located within the Northern Minnesota Drift and Lakes Plains section, with smaller components to the east within the Northern Superior and Western Superior sections. As ecological sections are defined based on surficial geology, elevation/topography, plant distribution, and regional climate, they are relevant to decisions on species substitutions and for seed sourcing.

1.1.2 State of Minnesota Seed Mixes

The State of Minnesota seed mix zones represent established criteria for seed mix selection that are generally in alignment with MDNR Ecological Classification System. Project areas are located within the Northeast Zone, Central Zone, and South and West Zone. As such, for this Project, preference will be given to sourcing State of Minnesota seed mixes developed specifically for these zones. General statewide mixes may also apply at Project areas where site conditions (soil drainage class, soil texture, land cover) dictates a more generalized approach to meet revegetation goals.

1.2 STEP 2: DELINEATE CONSTRUCTION WORK ZONES

Work zones including the construction workspace and access roads, as follows.

1.2.1 Construction Workspace

The construction workspace includes the permanent ROW, TWS, and ATWS. For high-level planning purposes, this Plan assumes all areas within the construction workspace may potentially be disturbed and therefore suitable for permanent seeding.

The final approach and assessment of potential existing seedbank response will be assessed at the onset of restoration as seasonal conditions allow. In general, matted areas, including wetlands, and TWS and ATWS with minimal soil disturbance, are more likely to passively revegetate from existing seedbank.

1.2.2 Access Roads

Access roads that are graded (widened) and roads that are not graded will be distinguished.

- Not graded: These access roads are expected to revegetate from existing seed bank and are not expected to require permanent seeding. A basic native seed mix may be used as needed, as defined in Step 3.

- Graded: These access roads are not expected to display a seedbank response and will likely require seeding, as defined in Step 3

1.3 STEP 3: DISTINGUISH UPLANDS AND WETLANDS

Pre-construction delineated wetland boundaries are used to distinguish wetlands and uplands as a primary means to differentiate seeding zones. Per Step 2, wetland and uplands are subdivided based on whether the seeding areas are associated with construction workspace (ROW, TWS, ATWS) or access roads.

1.3.1 Wetland

Wetland Construction Workspace

- Wetlands are further subdivided based on whether they are associated with organic or mineral substrates, based on county soil survey data. For disturbed soils in wetlands:
    - If organic substrate,[2] chose Wet Meadow Northeast (34-371, Current State Seed Mix) for sites in the Northeast Minnesota Board of Water & Soil Resources ("BWSR") zone, or Wet Meadow South and West (34-271), or Wet Prairie (34-262) for sites in the South and West Minnesota BWSR zone or Emergent (34-181, Current State Seed Mix) based on site-specific conditions.
    - If mineral substrate, chose Riparian Northeast (34-361, Current State Seed Mix) for sites in the Northeast BWSR zone, or Riparian South and West (34-261) on the South and West Minnesota BWSR zone.
    - Other seed mixes identified in Enbridge's Environmental Protection Plan may be used with MDNR approval.
- In general, many wetlands outside of the trenching areas may be expected to passively revegetate from seedbank. This will be assessed at the onset of restoration as seasonal conditions allow.

Wetland Access Roads

- Minimal disturbance is expected at access roads through wetlands since they will be matted. Revegetation from existing seedbank is anticipated.
- Rapid establishment of native cover may be warranted in some cases. On an as needed basis, chose Wetland Rehabilitation (34-171, Current State Seed Mix, Statewide).

[2] A field-based evaluation is recommended to identify Sphagnum peatlands. In these cases, mulching only may be recommended or use of a modified wetland seed mix (such as a suitable Wetland Rehabilitation mix). In addition, seeding of existing emergent wetlands may be warranted in some wetlands based on predominant hydrologic regime and existing plant community; use Emergent (34-181, Current State Seed Mix). Inundated areas will not be seeded.

1.3.2 Upland

Upland Construction Workspace

- If the pre-construction condition is an existing upland wooded NPC and/or there is an adjacent upland wooded NPC following construction.
    - If in the western Northern Minnesota Drift and Lake Plains Section, choose Woodland Edge South and West (36-211, Current State Seed Mix).
    - Otherwise, choose Woodland Edge Northeast (36-311, Current State Seed Mix).
- If the pre-construction condition is an existing upland open plant community and there is an adjacent upland open plant community following construction, choose an appropriate Statewide seed mix based on soil texture and soil drainage class from county soil survey data.
    - If loamy sand or sand/very well to excessively well drained soils, chose Dry Prairie Northwest (35-421, Current State Seed Mix) if in the Northwest BWSR zone or Dry Prairie General (35-221, Current State Seed Mix, Statewide).
    - If sandy loamy or finer textured/well drained to somewhat poorly drained soils, choose Mesic Prairie Northwest (35-441, Current State Seed Mix) if in the Northwest BWSR zone or Mesic Prairie General (35-241, Current State Seed Mix, Statewide).

1.3.3 Upland Access Roads

- Upland access roads that are not graded are likely to revegetate from existing seedbank. On an as needed basis, chose Native Construction (32-241, Current State Seed Mix, Statewide; as appropriate by county).
- Upland access roads that are graded are likely to require seeding. Chose Native Construction (32-241, Current State Seed Mix, Statewide).
- The location of seed mixes will not be specified on planting plan maps. The seeding locations and seed mixes will be selected at the time of disturbance or restoration based on actual disturbed areas and a field assessment of potential native seedbank response.

2.0 COVER CROP SELECTION CRITERIA

Cover crops will be used to assist with stabilizing soils and for grow-in establishment of permanent seed mixes.

2.1 STEP 1: ACKNOWLEDGE RESTRICTIONS

Agricultural cover crops are expected to provide benefits to native seedings, including initial erosion control, enhancement of soil structure, and shading of native seedlings during dry, hot periods.

1. Enbridge will minimize the use of agricultural cover crops through combining or replacing mixes with native quick cover mixes and using natural soils covers to assist with germination of permanent mixes.

    a. For sandy/poor soils, suitable seed mixes include Native Construction (32-241) with modifications (to remove some mesic tall grasses and replace with quickly established species with affinity for dry, sandy soils, such as those in Sand Mine Reclamation South and West (pilot seed mix).

2. Agricultural cover crop selection varies based on timing of seeding, as follows:

    a. Oats (*Avena sativa*; ~800 seeds per ounce) are suitable for planting a nurse/cover crop in late spring-early fall (June – early September) for growing season cover, but not in sandy/poor soils. Oats may be included in nurse/cover crop mixes at a rate of less than 20 pounds/acre (or about 6 seeds/square foot, or 64 seeds/square meter for oats at 800 seeds per ounce), depending on timing of seeding.

    b. Winter wheat (*T. aestivum subsp. aestivum*) is suitable for planting as a cover crop in late summer-early fall (late August – mid September) for overwintering winter cover, but not in sandy/poor soils. Winter wheat may be included in nurse/cover crop mixes at a rate of less than 20 pounds/acre (or about 6 seeds/square foot, or 64 seeds/ square meter for oats at 800 seeds per ounce), depending on timing of seeding.

    c. Annual rye (*Lolium multiflorum*) may be included as a nurse/cover crop at less than 6 pounds/acre or less. Annual rye is suitable for planting in spring-early summer (April – June) for growing season cover or fall (September – October) for overwintering winter cover, but not in sandy/poor soils.

3. Enbridge will utilize certified weed free mulch will be utilized (e.g., certified weed-free straw, wood fiber), as appropriate.

4. Where appropriate, Enbridge will utilize wildlife-friendly erosion and sediment control best management practices that contain biodegradable netting (Category 3N or 4N natural fibers[3]) and will avoid the use of plastic mesh.

5. No fertilizer will be applied on public lands.

6. No hydro-mulch will be applied on public lands, except at steep slopes as needed.

7. Consider timing restrictions on use of temporary (annual) cover crop species.

2.2 STEP 2: DISTINGUISH UPLANDS AND WETLANDS (NON-INUNDATED)

Similar to permanent mixes, location of a seeding area in wetland or upland is a primary factor in cover crop seed mix selection.

[3] Category 3N or 4N as described in Table 3885-2 (3885.2A Erosion Control Blanket Requirements) in Minnesota Department of Transportation Standard Specifications for Construction, 2018 Edition (http://www.dot.state.mn.us/pre-letting/spec/2018/2018-spec-book-final.pdf).

2.2.1 Wetland (Non-Inundated)

If located in a wetland, add Wetland Rehabilitation (34-171, Current State Seed Mix, Statewide) to areas where a permanent seed mix is installed.

In addition, in areas where existing seedbank is expected to revegetate an area long-term, but where rapid vegetation establishment is desired, also chose this mix.

2.2.2 Upland

If sandy/poor soils (defined as loamy sands or sands based on county soil survey data or field evaluation), chose a modified Native Construction (32-241, Current State Seed Mix, Statewide) (see Section 2.1).

Tillage radish may be added to temporary or permanent upland seed mixes to assist with decompaction as needed depending on site conditions and timing.

3.0 PUBLIC WATER CROSSINGS AND STATE-SPECIFIC PLANS

3.1 SEED

Seed mixes are identified on the site-specific plans mentioned in the Introduction, including the SSRPs, Environmental Crossing Plans, and Peatland/Wetland Restoration Plans. These seed mixes are also identified in Attachment A. Enbridge has also selected seed mixes for the remaining public water crossings without SSRPs, which are also presented in Attachment A. Seed mixes are assigned following protocol outlined above, but with consideration of additional site-specific considerations such as stream geomorphic setting (bank slope and shape) for water crossings.

- For public water crossings, seed mixes for adjacent upland or wetland riparian areas are selected as described in Section 1.3. In addition to the above: If a sod recovery zone, chose Wetland Rehabilitation (34-171, Current State Seed Mix, Statewide).

- At Peatland/Wetland Restoration Plan crossings, mulching only may be recommended or use of a modified wetland seed mix (such as a suitable Wetland Rehabilitation mix) based on field evaluation.

3.2 WOODY PLANT MATERIALS

Tree planting is applicable for SSRPs at Willard Munger State Trail, Paul Bunyan State Trail, Little Otter Creek Aquatic Management Area (“AMA”), and some public water crossings.

- State trails: Disturbed TWS within the MDNR trail easements will be replanted with trees. The sites have been surveyed for trees within the disturbed TWS and equivalent species will be planted in the restored TWS, as described in the SSRPs.

- Little Otter Creek AMA: Disturbed TWS from this and previous pipeline installations and access path use that are not currently in forested condition will be planted in accordance with the SSRP.

- Any public waters identified by the MDNR as requiring woody vegetation will be identified in the applicable SSRPs, and plant material will be sourced as described in Section 5.5.

4.0 SEED MIX SUMMARY

The following State of Minnesota Seed Mixes are expected to be applicable to the Project:

Northwest Zone Mixes

- Dry Prairie Northwest (35-421)
- Mesic Prairie Northwest (35-441)
- Woodland Edge Northwest (36-411)

Northeast Zone Mixes

- Wet Meadow Northeast (34-371, Current State Seed Mix)
- Riparian Northeast (34-361, Current State Seed Mix)
- Woodland Edge Northeast (36-311, Current State Seed Mix)

South and West Zone Mixes

- Wet Meadow South and West (34-271)
- Woodland Edge South and West (36-211, Current State Seed Mix)
- Riparian South and West (34-261, Current State Seed Mix)

Statewide Mixes

- Wetland Rehabilitation (34-171, Current State Seed Mix, Statewide)
- Native Construction (32-241, Current State Seed Mix, Statewide) with modifications
- Dry Prairie General (35-221, Current State Seed Mix, Statewide)
- Mesic Prairie General (35-241, Current State Seed Mix, Statewide)
- Emergent (34-181, Current State Seed Mix)

Other Mixes

Additional seed mixes and changes to existing seed mixes may be proposed based on additional review of Project areas, including site-specific conditions at waterbody crossings, herbicide treatment areas, and eroding banks,

Mixes may further be customized based on outreach to nurseries to assess potential supply and provenance.

5.0 SEED AND PLANT SPECIFICATIONS

5.1 SEED MIX DIVERSITY

All permanent seed mixes shall have a minimum of 15-25 species.

5.2 SPECIES RANGE

All species within a permanent seed mix should be native on MN Taxa to the county where it is to be planted.

5.3 SPECIES SUBSTITUTIONS

Native seed will be procured from regional vendors specializing in native seed production and procurement. Given the scale of the Project and typical sourcing challenges on species within the specified mixes, substitutions are likely to be needed. All substitutions shall be native to the county in which it is to be planted. Should Enbridge have difficulties in sourcing seed mixes per the requirements outlined herein, Enbridge will contact the MDNR to discuss other options.

5.4 SEED PROVENANCE

For seeding on public lands, seed sourcing standards shall follow Operational Order 113 – Plant Materials Standard for Native Plant Community Restoration (2013), with slight modification to Condition 4, as follows:

1. Collect plant materials from areas with similar site conditions that are within or immediately adjacent to the restoration or reconstruction site or nearby (“nearby” is defined by the division and generally is considered to be within the same zone).

2. Obtain plant materials from areas with similar site conditions and within the same Seed Zone.

3. Obtain plant materials from areas with similar site conditions in an adjacent Seed Zone.

4. Obtain plant materials from areas with similar site conditions in a Seed Zone that adjoins one of the adjacent Seed Zones, out to a maximum of 150 miles. Seed shall be procured from native seed vendors operating in Minnesota, western and northwestern Wisconsin for public lands, and from Minnesota, western and northwestern Wisconsin, and eastern North Dakota for public waters.

5. Substitute another species with similar attributes when seed/plant material cannot be found.

Seed Zones are identified on page 8 of the Operational Order.

5.5 WOODY PLANT PROVENANCE

For woody planting on public lands, seed sourcing standards shall follow Operational Order 124 – Plant Materials Standards for Native Plant Community Restoration (2016). Zone maps are provided on page 6 of the Operational Order.

Attachment A

Seeding Plan

Attachment A
Proposed Seed Mixes at Public Water Features - License to Cross Public Waters

MDNR ID No.	Survey ID	Milepost	Public Water Name (Kittle Number when Assigned)	Public Water Type	WID	County	Proposed Crossing Method [a]	Bank (watercourse) / Wetland (Basin) Vegetation	Community List N/W Bank	Community List S/E Bank	Land Use N/W Bank / Basin	Land Use S/E Bank / Basin	Proposed Seed Mix [b]
1	s-160n50w5-a	801.8	Red River of the North (H-026)	Watercourse	09020311-560	Kittson	HDD	Phalaris arundinacea, Persicaria amphibia, Carex vesicaria, Salix interior	N/A - North Dakota	3B - Fresh (wet) Meadow, RVx32 - River Shore System	Wetland	Wetland	Wet Meadow S&W (34-271)
2	s-160n50w23-a	805.4	Unnamed Creek / County Ditch 27 (H-026-011-001)	Watercourse	09020311-509	Kittson	Dry Crossing	Bolboschonus fluviatilis, Persicaria amphibia, Sagittaria latifolia, Carex emoryii, Carex lacustris, Phalaris arundinacea	3A - Sedge Meadows	3A - Sedge Meadows	Wetland, Agricultural	Wetland	Wet Meadow S&W (34-271)
3	s-159n49w36-a	815.6	Judicial Ditch 10 (H-026-011)	Watercourse	09020311-521	Kittson	Dry Crossing	Spartina pectinata, Symphoricarpos occidentalis, Phragmites australis	N/A - Upland	N/A - Upland	Agricultural	Two-Track Road, Agricultural	Riparian S&W (34-261)
4a	s-157n47w16-aa	828.6	Tamarac River (H-026-019)	Watercourse	09020311-503	Marshall	HDD	Acer negundo, Phalaris arundinacea, Carex stricta	7- Floodplain Forests	7- Floodplain Forests	Wetland, Forested	Wetland	Riparian S&W (34-261)
4b	s-157n47w16-aa	828.6	Tamarac River (H-026-019)	Watercourse	09020311-503	Marshall	HDD	Acer negundo, Phalaris arundinacea, Carex stricta	7- Floodplain Forests	7- Floodplain Forests	Wetland, Forested	Wetland	Riparian S&W (34-261)
5a	s-156n46w7-c	836.0	Middle River (H-026-021-004)	Watercourse	09020309-540	Marshall	HDD	Phalaris arundinacea, Fraxinus pennsylvanica, Salix interior, Bromus inermis, Carex emoryii	RVx32 - River Shore System	RVx32 - River Shore System	Forested / Fallow Floodplain	Agricultural	Riparian S&W (34-261)
5b	s-156n46w7-c	836.0	Middle River (H-026-021-004)	Watercourse	09020309-540	Marshall	HDD	Phalaris arundinacea, Fraxinus pennsylvanica, Salix interior, Bromus inermis, Carex emoryii	RVx32 - River Shore System	RVx32 - River Shore System	Forested / Fallow Floodplain	Agricultural	Riparian S&W (34-261)
6	s-155n46w12-a	843.2	Snake River (H-026-021)	Watercourse	09020309-543	Marshall	HDD	Phalaris arundinacea, Carex retrorsa	3B - Fresh (wet) Meadow, 7 - Floodplain Forest	3B - Fresh (wet) Meadow, 7 - Floodplain Forest	Wetland	Wetland, Forested	Riparian S&W (34-261)
7	s-155n45w28-a	847.2	South Branch Snake River (H-026-021-010)	Watercourse	09020309-546	Marshall	Dry Crossing	Phalaris arundinacea, Acer negundo, Solidago gigantea, Rudbeckia lacinata, Sagittaria latifolia, Fraxinus pennsylvanica	3B - Fresh (wet) Meadow, 7 - Floodplain Forest	3B - Fresh (wet) Meadow, 7 - Floodplain Forest	Wetland, Agricultural	Wetland	Riparian S&W (34-261)
8	s-153n43w29-a	864.3	Red Lake River (H-026-030)	Watercourse	09020303-513	Pennington	HDD	Phalaris arundinacea, Carex emoryi	RVx32 - River Shore System	RVx32 - River Shore System	Fallow Floodplain	Forested Floodplain	Riparian S&W (34-261)
9	w-152n43w4-a	866.2	Unnamed Creek (H-026-030-030)	Watercourse	09020303-999	Pennington	Modified Upland - Wetland Open Cut	Typha angustifolia, Panicun virgatum, Setaria pumila	8 - Seasonally Flooded Basin	8 - Seasonally Flooded Basin	Road	Agricultural	Riparian S&W (34-261)
10	s-152n43w14-b	869.7	Unnamed Creek (H-026-030-028)	Watercourse	09020303-999	Pennington	Bore	Typha angustifolia, Panicun virgatum, Setaria pumila, Melilotus officinalis	3B - Fresh (wet) Meadow, Ditch-side Meadow	N/A - Road	Wetland	Road	Riparian S&W (34-261)
11	s-151n42w4-a	875.4	Clearwater River (H-026-030-019)	Watercourse	09020305-648	Red Lake	HDD	Acer negundo, Fraxinus pennsylvanica , Carex emoryi, Phalaris arundinacea	3B - Fresh (wet) Meadow, 7 - Floodplain Forest	3B - Fresh (wet) Meadow, 7 - Floodplain Forest	Wetland, Fallow Field	Wetland	Riparian S&W (34-261)
12	s-150n41w1-b	885.8	Lost River (H-026-030-019-007)	Watercourse	09020305-646	Red Lake	Dry Crossing	Schoenoplectus tabernaemontani, Zizania palustris, Salix interior, Salix petiolaris, Phalaris arundinecea, Salix nigra	RVx32 - River Shore System	RVx32 - River Shore System	Agricultural	Fallow Field, Agricultural	Riparian S&W (34-261)
13	s-149n38w8-a	902.0	Unnamed Ditch (H-026-030-019-007-007)	Watercourse	09020305-999	Clearwater	Dry Crossing	NA - Swale in soybean field	N/A - Agricultural	N/A - Agricultural	Agricultural	Agricultural	Native Construction (32-241)
14	s-149n38w15-a	904.0	Lost River (H-026-030-019-007)	Watercourse	09020305-512	Clearwater	Dry Crossing	Phalaris arundinacea, Schoenoplectus tabernaemontani, Sparganium eurycarpum	3B - Fresh (wet) Meadow, RVx32 - River Shore System	3B - Fresh (wet) Meadow, RVx32 - River Shore System	Wetland	Wetland/ Agricultural	Riparian NE (34-361)
15	CL018bWB	907.1	Silver Creek (H-026-030-019-007-005)	Watercourse	09020305-527	Clearwater	Dry Crossing	Scirpus atrovirens., Poa pratensis, Phalaris arundinacea, Salix sp.	RVx32 - River Shore System	RVx32 - River Shore System	Wetland/ Pasture	Pasture	Riparian NE (34-361)
16	CL019bWB	907.4	Silver Creek (H-026-030-019-007-005)	Watercourse	09020305-527	Clearwater	Dry Crossing	Poa pratensis, Phalaris arundinacea, Salix interior, Carex lacustris, Bromus intermis	RVx32 - River Shore System	RVx32 - River Shore System	Pasture	Pasture	Riparian NE (34-361)
17	s-149n37w30-a	907.7	Silver Creek (H-026-030-019-007-005)	Watercourse	09020305-527	Clearwater	Dry Crossing	Phalaria arundinacea, Scirpus microcarpus, Agrostis gigantea, Calamagrostis canadensis	MHn35/MHn46 - Hardwood Forest, UPn23 - Upland Prairie System	MHn35/MHn46 - Hardwood Forest, UPn23 - Upland Prairie System	Pasture, Woodland	Pasture, woodland	Riparian NE (34-361)
18a	s-149n37w29-a_DESKTOP	908.8	Unnamed Creek (H-026-030-019-007-005-001)	Watercourse	09020305-571	Clearwater	Dry Crossing	Typha angustifolia, Phalaris arundinacea	2B - Shallow Marshes	2B - Shallow Marshes	Wetland	Wetland	Wet Meadow NE (34-371)
18b	s-149n37w29-a_DESKTOP	910.1	Unnamed Creek (H-026-030-019-007-005-001)	Watercourse	09020305-571	Clearwater	Dry Crossing	Typha angustifolia, Phalaris arundinacea	2B - Shallow Marshes	2B - Shallow Marshes	Wetland	Wetland	Wet Meadow NE (34-371)
19	s-149n37w32-b	910.9	Unnamed Stream (H-026-030-019-007-005-001)	Watercourse	09020305-999	Clearwater	Dry Crossing	Typha angustifolia, Scirpus atrovirens	3B - Fresh (wet) Meadow	3B - Fresh (wet) Meadow	Wetland	Wetland	Wet Meadow NE (34-371)
20	CLC5037aWB	922.2	Clearwater River (H-026-030-019)	Watercourse	09020305-517	Clearwater	HDD	Calamagrostis canadensis, Typha latifolia	3B - Fresh (wet) Meadow	3B - Fresh (wet) Meadow	Wetland	Wetland	Wet Meadow NE (34-371)
21	CLC5048aWB	924.2	Walker Brook (H-026-030-019-029)	Watercourse	09020305-509	Clearwater	Modified Dry Crossing	Typha spp., Calamagrostis canadensis, Carex lacustris	3B - Fresh (wet) Meadow	3B - Fresh (wet) Meadow	Wetland	Wetland	Wet Meadow NE (34-371)
22	CLC5051aWB	925.4	Unnamed Creek (H-026-030-019-029-001)	Watercourse	09020305-999	Clearwater	Dry Crossing	Carex lacustris	2B - Shallow Marshes	2B - Shallow Marshes	Wetland	Wetland	Wet Meadow NE (34-371)
23	s-146n36w8-a	928.5	Walker Brook (H-026-030-019-029)	Watercourse	09020305-999	Clearwater	Modified Dry Crossing	Lemna minor, Carex stricta, Phalaris arundinacea, Calamagrostis canadensis	6A - Hardwood Swamps	3B - Fresh (wet) Meadow,	Wetland	Wetland	Riparian NE (34-361)
24	s-146n36w15-a	931.7	Unnamed Stream (M-161-004-009)	Watercourse	07010101-738	Clearwater	Dry Crossing	Fraxinus nigra, Alnus incana, Populus tremuloides, Phalaris arundinacea, Calamagrostis canadensis	2 - Deep and Shallow Marshes, 5A - Shrub-Carrs, 6A - Hardwood Swamps	2 - Deep and Shallow Marshes, 5A - Shrub-Carrs, 6A - Hardwood Swamps	Wetland	Wetland	Riparian NE (34-361)
25	s-146n36w23-b	932.6	Unnamed Stream (M-161-004-009)	Watercourse	07010101-738	Clearwater	Bore	Alnus incana, Phalaris arundinacea, Salix petiolaris	5A - Shrub-Carrs	5A - Shrub-Carrs	Road	Wetland	Riparian NE (34-361)
26	s-146n36w23-c_DESKTOP	933.1	Unnamed Stream (M-161-004-009)	Watercourse	07010101-738	Clearwater	Modified Dry Crossing	Typha spp., Carex lacustris	2B - Shallow Marsh	2B - Shallow Marsh	Wetland	Wetland	Emergent (34-181)
27	CLC5095aWB	940.1	Bear Creek (M-164)	Watercourse	07010101-631	Clearwater	Dry Crossing	Pharlaris arundinacea, Solidago gigantea, Carex lacustris, Alnus incana	3B - Fresh (wet) Meadow	3B - Fresh (wet) Meadow	Wetland	Wetland	Riparian NE (34-361)
28	CLC5098aWB	941.0	Mississippi River (M)	Watercourse	07010101-753	Clearwater	HDD	Calamagrostis canadensis, Pharlaris arundinacea	3B - Fresh (wet) Meadow	3B - Fresh (wet) Meadow	Wetland	Wetland	Wet Meadow NE (34-371)
29	HUC5002aWB	946.0	LaSalle Creek (M-163)	Trout Stream	07010101-635	Hubbard	Dry Crossing	Calamagrostis canadensis, Carex lacustris, Carex stricta	3B - Fresh (wet) Meadow	3B - Fresh (wet) Meadow	Wetland	Wetland	Wet Meadow NE (34-371)
30	HUC5074aWB	962.2	Unnamed Creek (M-096-035-002-004-000.5)	Watercourse	07010106-999	Hubbard	Dry Crossing	Phalaris arundinacea, Alnus incana, Fraxinus nigra	3B - Fresh (wet) Meadow, 6A - Hardwood Swamps	3B - Fresh (wet) Meadow, 6A - Hardwood Swamps	Wetland	Wetland	Wet Meadow NE (34-371)
31	HUC5081aWB	963.7	Hay Creek (M-096-035-002)	Watercourse	07010106-618	Hubbard	HDD	Typha spp., Carex lacustris	4A - Open Bogs	4A - Open Bogs	Wetland	Wetland	Emergent (34-181); Wet Meadow NE (34-371)
32	HUC5098a1W	967.7	Portage Lake - Public Water Basin	Basin	N/A	Hubbard	Modified Upland - Wetland Open Cut	Carex lacustris, Caltha palustris, Equisetum arvense, Alnus incana, Larix laricina	3A - Sedge Meadow, 6B - Coniferous Swamp	3A - Sedge Meadow, 6B - Coniferous Swamp	Upland Forest, Utility Corridor	Upland Forest, Utility Corridor	Wet Meadow NE (34-371)
33	HUC5122_200aWB	974.2	Straight River (M-096-035-002-002)	Watercourse	07010106-558	Hubbard	HDD	Typha spp., Gylceria grandis, Calamagrostis canadensis, Phalaris arundinacea	2B - Shallow Marshes	2B - Shallow Marshes	Wetland	Wetland	Wet Meadow NE (34-371)
34	HUC5130aWB	976.6	Shell River (M-096-035-004)	Watercourse	07010106-537	Hubbard	Dry Crossing	Sparganium eurycarpum, Phalaris arundinacea, Carex lacustris, Salix petiolaris	5A - Shrub-Carrs	5A - Shrub-Carrs	Wetland	Wetland	Wet Meadow NE (34-371)
35	HUC5162aWB	981.4	Shell River (M-096-035-004)	Watercourse	07010106-537	Hubbard	Dry Crossing	Pharlaris arundinacea, Carex lacustris	3B - Fresh (wet) Meadow	3B - Fresh (wet) Meadow, 5A - Shrub-Carrs	Wetland	Wetland	Wet Meadow NE (34-371)

Attachment A
Proposed Seed Mixes at Public Water Features - License to Cross Public Waters

MDNR ID No.	Survey ID	Milepost	Public Water Name (Kittle Number when Assigned)	Public Water Type	WID	County	Proposed Crossing Method [a]	Bank (watercourse) / Wetland (Basin) Vegetation	Community List N/W Bank	Community List S/E Bank	Land Use N/W Bank / Basin	Land Use S/E Bank / Basin	Proposed Seed Mix [b]
36	HUC5165a1W	981.7	Unnamed Basin	Basin	N/A	Hubbard	Modified Upland - Wetland Open Cut	Carex atherodes, Phalaris arundinacea, Calamagrostis canadensis	3B - Fresh (wet) Meadow	3B - Fresh (wet) Meadow	Upland Forest, Utility Corridor	Upland Forest, Utility Corridor	Wet Meadow NE (34-371
37	HUC5175aWB	983.7	Shell River (M-096-035)	Watercourse	07010106-536	Hubbard	HDD	Leerzia oryzoides, Typha sp., Phalaris arundinacea, Calamagrostris canadensis	3A - Sedge Meadows	3B - Fresh (wet) Meadow	Wetland	Wetland	Wet Meadow NE (34-372
38	HUC5179_240aWB	985.3	Shell River - Oxbow Pond (M-096-035)	Watercourse	07010106-679	Hubbard	HDD	Pharlaris arundinacea	3A - Sedge Meadows	3A - Sedge Meadows	Wetland	Wetland	Wet Meadow NE (34-373
39	WA002aWB	991.2	Shell River (M-096-035)	Watercourse	07010106-681	Wadena	HDD	Typha X glauca, Phalaris arundinacea, Cornus alba, Alnus incana	7 - Floodplain Forest, RVx32 - River Shore System	7 - Floodplain Forest, RVx32 - River Shore System	Forested	Forested	Riparian NE (34-361)
40	WA006aWB	993.3	Crow Wing River (M-096)	Watercourse	07010106-516	Wadena	HDD	Zizania palustris, Sparganium eurycarpum, Phalaris arundinacea, Cornus alba, Cicuta maculata, Sagittaria latifolia	7 - Floodplain Forest, RVx32 - River Shore System	7 - Floodplain Forest, RVx32 - River Shore System	Forested, Wetland	Wetland	Riparian NE (34-361)
41	CAC5007aWB	1000.5	Big Swamp Creek (M-096-030)	Watercourse	07010106-531	Cass	Modified Dry Crossing	Carex lacustris, Typha spp., Calamagrostis canadensis	3B - Fresh (wet) Meadow	3B - Fresh (wet) Meadow	Wetland	Wetland	Wet Meadow NE (34-371)
42	CA019eW	1005.3	Unnamed Public Water Basin	Basin	N/A	Cass	Modified Upland - Wetland Open Cut	Nymphaea odorata	1 - Shallow, Open Water	1 - Shallow, Open Water	Upland Forest	Upland Forest	Emergent (34-181)
44	CA063aWB	1017.4	Pine River (M-106)	Watercourse	07010105-669	Cass	HDD	Phalaris arundinacea, Alnus incana, carex stricta	5B - Alder Thickets	3A - Sedge Meadows, 5B - Alder Thickets, 6A - Hardwood Swamps	Forested, Wetland	Forested, Wetland	Riparian NE (34-361)
45	CA085aWB	1026.4	Blind Lake Creek (M-106-014-002)	Watercourse	07010105-601	Cass	Dry Crossing	Phalaris arundinacea, Leersia oryzoides	3B - Fresh (wet) Meadow	3B - Fresh (wet) Meadow	Wetland	Wetland	Riparian NE (34-361)
46	CA094aW	1028.5	Peterson Lake - Public Water Basin	Basin	N/A	Cass	Modified Upland - Wetland Open Cut	Calamagrostis canadensis, Carex lacustris, Typha x glauca	2B - Shallow Marsh	2B - Shallow Marsh	Agricultural	Upland Forest	Wet Meadow NE (34-371)
47	CA133aWB	1037.4	Daggett Brook (M-106-004)	Watercourse	07010105-562	Cass	HDD	Carex lacustris	2B - Shallow Marshes	2B - Shallow Marshes	Wetland	Wetland	Wet Meadow NE (34-371)
48	CA147_525a1WB	1041.3	Spring Brook (M-106-004-002-001)	Watercourse	07010105-519	Cass	Dry Crossing	Alnus incana, Carex lacustris, Typha angustifolia	5A - Shrub-Carrs	5A - Shrub-Carrs	Wetland	Wetland	Wetland Rehabilitation (34-171)
49	CA163aWB	1048.0	Moose River (M-117-012)	Watercourse	07010103-749	Cass	Modified Dry Crossing	Phalaris arundinacea, Calamagrostis canadensis, Alnus incana	3B - Fresh (wet) Meadow	3B - Fresh (wet) Meadow	Wetland	Wetland, Forested	Riparian NE (34-361)
50	AI020aWB	1053.4	Unnamed Stream (M-117-012-002)	Watercourse	07010103-999	Aitkin	Dry Crossing	Carex stricta, Scirpus cyprinus, Calamagrostis canadensis, Solidago gigantea	3B - Fresh (wet) Meadow, 5B - Alder Thickets	3B - Fresh (wet) Meadow, 5B - Alder Thickets	Wetland	Wetland	Wet Meadow NE (34-371)
51	w-51n26w33-b	1056.6	Moose Lake (Public Water Basin) / Tributary to Moose Lake (Non-Public Water)	Basin	N/A	Aitkin	Modified Upland - Wetland Open Cut (Basin) / Modified Dry Crossing (Tributary)	Calamagrostis canadensis, Carex lacustris, Carex stricta, Alnus incana	3B - Fresh (wet) Meadow	3B - Fresh (wet) Meadow	Wetland	Wetland	Wet Meadow NE (34-371)
52	s-51n24w31-b	1066.5	Willow River (M-117)	Watercourse	07010103-748	Aitkin	HDD	Acer Saccharinum, Ulmus americana, Phalaris arundinacea	3B - Fresh (wet) Meadow, 7 - Floodplain Forest	3B - Fresh (wet) Meadow, 7 - Floodplain Forest	Wetland	Wetland	Riparian NE (34-361)
53	s-51n24w27-a	1069.7	Mississippi River (M)	Watercourse	07010103-708	Aitkin	HDD	Phalaris arundinacea	7 - Floodplain Forest, 3B - Fresh (wet) Meadow	7 - Floodplain Forest, 3B - Fresh (wet) Meadow	Wetland, Forested	Wetland, Forested	Riparian NE (34-361)
54	s-51n24w26-a	1070.9	Unnamed Stream (M-122-001)	Watercourse	07010103-676	Aitkin	Modified Dry Crossing	Typha x glauca, Calamagrostis canadensis, Phalaris arundinaceae, Carex lacustris, Alnus incana	1 - Shallow Open Water	1 - Shallow Open Water	Wetland	Wetland	Wet Meadow NE (34-371)
55	s-51n23w27-a	1075.5	Unnamed Stream (M-120-005-001-005)	Watercourse	07010103-514	Aitkin	Modified Dry Crossing	Calamagrostis canadensis, Carex lacustris, Salix petiolaris	2B - Shallow Marshes	2B - Shallow Marshes	Wetland	Wetland	Wet Meadow NE (34-371)
56	s-51n23w23-a	1076.9	West Savanna River (M-120-005-001)	Watercourse	07010103-999	Aitkin	Dry Crossing	Phalaris arundinacea, Typha x glauca, Calamagrostis canadensis	1 - Shallow Open Water, 2B - Shallow Marshes, 3B - Fresh (wet) Meadow	1 - Shallow Open Water, 2B - Shallow Marshes, 3B - Fresh (wet) Meadow	Wetland	Wetland	Wet Meadow NE (34-371)
57	s-51n21w20-a	1085.9	East Savanna River (S-002-031)	Watercourse	04010201-561	St. Louis	HDD	Calamagrostis canadensis, Fraxinus nigra, Phalaris arundinacea	3B - Fresh (wet) Meadow, 7 - Floodplain Forest	3B - Fresh (wet) Meadow, 7 - Floodplain Forest	Wetland	Wetland	Riparian NE (34-361)
58	s-51n20w27-a	1094.0	Unnamed Stream (S-002-028)	Watercourse	04010201-A07	St. Louis	Dry Crossing	Calamagrostis canadensis, Alnus incana, Salix petiolaris, Phalaris arundinacea	5A - Shrub-Carrs	5A - Shrub-Carrs	Wetland	Wetland	Riparian NE (34-361)
59	s-51n20w35-a	1095.9	Unnamed Stream (S-002-027)	Watercourse	04010201-999	St. Louis	Dry Crossing	Carex lacustris, Scirpus cyperinus, Scirpus atrovirens	2B - Shallow Marshes, UPn23 - Upland Prairie System	2B - Shallow Marshes, UPn23 - Upland Prairie System	Agricultural, Wetland	Agricultural, Wetland	Riparian NE (34-361)
60	s-50n20w2-a	1096.7	Ahmik River (S-002-026)	Watercourse	04010201-B08	St. Louis	Dry Crossing	Calamagrostis canadensis, Phalaris arundinacea, Spiraea alba, Alnus incana	3B - Fresh (wet) Meadow, 5A - Shrub-Carrs	3B - Fresh (wet) Meadow, 5A - Shrub-Carrs	Wetland	Wetland	Riparian NE (34-361)
63a	s-48n17w6-a	1115.6	Unnamed Stream (S-002-009-001-002)	Watercourse	04010201-999	Carlton	Dry Crossing	Alnus incana Calamagrostis canadensis, Phalaris arundinacea, Spirea alba	5B - Alder Thickets	5B - Alder Thickets	Wetland	Wetland	Wet Meadow NE (34-371)
63b	s-48n17w6-a	1115.6	Unnamed Stream (S-002-009-001-002)	Watercourse	04010201-999	Carlton	Dry Crossing	Alnus incana Calamagrostis canadensis, Phalaris arundinacea, Spirea alba	5B - Alder Thickets	5B - Alder Thickets	Wetland	Wetland	Wet Meadow NE (34-371)
65	s-48n17w16-f	1118.4	Little Otter Creek (S-002-009-001)	Watercourse	04010201-628	Carlton	Modified Dry Crossing	Calamagrostis canadensis, Salix petiolaris, Alnus incana, Phalaris arundinacea	5B - Alder Thickets	5B - Alder Thickets	Wetland	Wetland	Riparian NE (34-361)
67	CR144aWB	1126.2	Unnamed Stream (S-001.5-007)	Watercourse	04010301-999	Carlton	Dry Crossing	Alnus incana, Phalaris arundinacea, and Thalictrum dasycarpum, Laportea canadensis	3B - Fresh (wet) Meadow, 5A - Shrub-Carrs	3B - Fresh (wet) Meadow, 5A - Shrub-Carrs	Wetland	Wetland, Fallow Field	Riparian NE (34-361)

[a] Herbaceaous vegetation at HDD crossing locations will remain undisturbed. The proposed or Wetland Rehabilitation (34-171) seed mix will be used to supplement the existing vegetation as needed.

[b] Other MDNR approved seed mixes may be utlized based on site conditions. Inundated or areas with woody vegetation willl be allowed to naturally revegetate. Natural revegetation may be supplemented with MDNR approved seed mixes based on site conditions.

Attachment A

Proposed Seed Mixes at Public Waters - Work in Public Waters Permit

Survey ID	Milepost	Public Water Name	Public Water Type	County	Proposed Crossing Method	Wetland Vegetation	Wetland Community	Land Use N/W	Land Use S/E	Proposed Seed Mix [1]
CLC5004o1W	912.1	Unnamed	Wetland	Clearwater	N/A - ATWS: Temporary soil storage on top of mats	Alnus incana, Phalaris arundinacea	5A - Shrub-Carr	Road	Wetland	Wetland Rehabilitation (34-171)
w-154n44w18-f	853.7	Unnamed	Wetland	Pennington	Open Cut	Phalaris arundinacea, Carex pellita, Carex sartwellii, Phragmites australis, Typha x glauca	2B - Shallow Marsh	Agricultural	Agricultural	Wetland Rehabilitation (34-171)
w-139n34w34-a	988.3	Frandsen Slough	Wetland	Hubbard	Open Cut	Typha x glauca, Calamagrostis canadensis, Salix petiolaris	2A - Deep Marsh	Agricultural	Agricultural / Upland Forest	Wetland Rehabilitation (34-171)
CA147_525b1W	1041.2	Scout Camp Pond	Wetland	Cass	Wetland - Open Cut; Waterbody - Dry Crossing	Fraxinus nigra, Populus trmuloides, Alnus incana, Abies balsamea, Impatiens capensis	6A - Hardwood Swamp, 5A - Shrub-Carr	Upland Forest / Wetland	Upland Forest	Wetland Rehabilitation (34-171), Native Construction (32-241)
CR101a1W	1120.2	Unnamed	Wetland	Carlton	Open Cut	Alnus incana, Carex lacustris, Carex utriculata	5A - Shrub-Carr	Upland Forest	Upland Forest / Two-Track road	Wetland Rehabilitation (34-171) / Natural Revegetation

[1] Other MDNR approved seed mixes may be utlized based on site conditions. Inundated or areas with woody vegetation willl be allowed to naturally revegetate. Natural revegetation may be supplemented with MDNR approved seed mixes based on site conditions.

Seed Mix Location Table - Companion to Public Lands Seeding Plan Example Map

Seed Mixes for Different Location Situations

Wetland or Upland	Wetland Soil Type	Upland Native Plant Community ("NPC") Overlap	Permanent Seed Mix	Seed Mix Number
Wetland	Mineral	None	Riparian Northeast	34-361
Wetland	Organic	None	Wet Meadow Northeast	34-371
Upland		MHn35 - Northern Mesic Hardwood Forest	Woodland Edge Northeast	36-311
Upland		MHn35 - Northern Mesic Hardwood Forest	Woodland Edge Northeast	36-311
Upland		None	Woodland Edge Northeast	36-311

Explanation of Columns:

Wetland or Upland – Layer based upon Enbridge-field delineated wetlands shapefile.

Wetland Soil Type – Wetland soil type was determined by county soil survey data. Organic soils were listed as those designated as muck soils.

Upland NPC Overlap – NPC's that overlap with uplands within the construction workspace.

Data Sources: DNR, MNGeo, Enbridge
Minnesota Composite Aerial Imagery

dmn 9-29-2020

L3R MDNR Seeding Plan Example (DRAFT)

MDNR Seeding Plan

Permanent Seed Mix

- Riparian Northeast 34-361
- Wet Meadow Northeast 34-371
- Woodland Edge Northeast 36-311

Delineated Wetlands

Wetland Soil Type

- Mineral
- Organic
- Construction Workspace Boundary

Native Plant Communities

- APn81 - Northern Poor Conifer Swamp
- APn81a - Poor Black Spruce Swamp
- MHn35 - Northern Mesic Hardwood Forest
- MHn44 - Northern Wet-Mesic Boreal Hardwood-Conifer Forest
- MHn46 - Northern Wet-Mesic Hardwood Forest
- OPn92 - Northern Rich Fen (Basin)
- WMn82a - Willow - Dogwood Shrub Swamp

N

0 0.5 1 Miles

193707205 Stantec

L3R MDNR Seeding Plan Example (DRAFT)

Data Sources: DNR, MNGeo, Enbridge
Minnesota Composite Aerial Imagery

dmn 9-29-2020

MDNR Seeding Plan

Permanent Seed Mix

- Riparian Northeast 34-361
- Wet Meadow Northeast 34-371
- Woodland Edge Northeast 36-311

Delineated Wetlands

Wetland Soil Type

- Mineral
- Organic
- Construction Workspace Boundary

N

0 0.5 1 Miles

193707205

Stantec

Attachment B

Seeding Mixes

Dry Prairie General [1]

35-221

Common Name	Scientific Name	Rate (kg/ha)	Rate (lb/ac)	% of Mix (% by wt)	Seeds/ sq ft
big bluestem	*Andropogon gerardii*	0.78	0.70	1.92%	2.57
side-oats grama	*Bouteloua curtipendula*	3.36	3.00	8.22%	6.61
blue grama	*Bouteloua gracilis*	0.56	0.50	1.37%	7.35
kalm's brome	*Bromus kalmii*	0.82	0.73	2.00%	2.14
nodding wild rye	*Elymus canadensis*	1.12	1.00	2.74%	1.91
junegrass	*Koeleria macrantha*	0.28	0.25	0.69%	18.37
little bluestem	*Schizachyrium scoparium*	3.36	3.00	8.22%	16.53
Indian grass	*Sorghastrum nutans*	0.78	0.70	1.92%	3.09
prairie dropseed	*Sporobolus heterolepis*	0.13	0.12	0.34%	0.73
	Total Grasses	**11.21**	**10.00**	**27.42%**	**59.30**
blue giant hyssop	*Agastache foeniculum*	0.07	0.06	0.17%	2.07
lead plant	*Amorpha canescens*	0.10	0.09	0.26%	0.42
dwarf milkweed	*Asclepias ovalifolia*	0.02	0.02	0.18%	0.05
common milkweed	*Asclepias syriaca*	0.01	0.01	0.14%	1.10
butterfly milkweed	*Asclepias tuberosa*	0.07	0.06	0.17%	0.10
whorled milkweed	*Asclepias verticillata*	0.02	0.02	0.18%	0.05
green comet milkweed	*Asclepias veridiflora*	0.02	0.02	0.18%	0.05
Canada milk vetch	*Astragalus canadensis*	0.07	0.06	0.18%	0.40
bird's foot coreopsis	*Coreopsis palmata*	0.07	0.06	0.16%	0.21
white prairie clover	*Dalea candida*	0.07	0.06	0.15%	0.39
purple prairie clover	*Dalea purpurea*	0.21	0.19	0.51%	1.02
Canada tick trefoil	*Desmodium canadense*	0.07	0.06	0.18%	0.13
stiff sunflower	*Helianthus pauciflorus*	0.07	0.06	0.17%	0.09
rough blazing star	*Liatris aspera*	0.04	0.04	0.12%	0.25
wild bergamot	*Monarda fistulosa*	0.07	0.06	0.15%	1.42
stiff goldenrod	*Oligoneuron rigidum*	0.07	0.06	0.15%	0.83
large-flowered beard tongue	*Penstemon grandiflorus*	0.07	0.06	0.17%	0.32
black-eyed susan	*Rudbeckia hirta*	0.35	0.31	0.84%	10.32
gray goldenrod	*Solidago nemoralis*	0.04	0.04	0.10%	3.86
heath aster	*Symphyotrichum ericoides*	0.04	0.04	0.10%	2.58
smooth aster	*Symphyotrichum laeve*	0.07	0.06	0.17%	1.26
hoary vervain	*Verbena stricta*	0.15	0.13	0.34%	1.29
	Total Forbs	**1.68**	**1.50**	**4.09%**	**26.96**
~~Oats~~	~~*Avena sativa*~~	~~28.02~~	~~25.00~~	~~68.49%~~	~~11.13~~
Tillage radish			1.0 - 2.0		
	Total Cover Crop	**~~28.02~~**	**~~25.00~~**	**~~68.49%~~**	**~~11.13~~**
	Totals:	**40.91**	**36.50**	**100.00%**	**97.39**
Purpose:	General dry prairie mix for native roadsides, ecological restoration, or conservation program plantings.				
Minimum Number of Species:	25				
Planting Area:	Tallgrass Aspen Parklands, Prairie Parkland, and Eastern Broadleaf Forest Provinces. Mn/DOT Districts 2(west), 3B, 4, Metro, 6, 7 & 8.				

[1] All rates and percent of mix values are the preferred values but may be adjusted at the time of purchase based on seed availability.

[2] Cover crop selections will vary based on timing of seeding and will be selected as discussed under the "Cover Crop Selection Criteria" section in the Planting Plan for Public Lands.

Dry Prairie Northwest [1]

35-421

Common Name	Scientific Name	Rate (kg/ha)	Rate (lb/ac)	% of Mix (% by wt)	Seeds/ sq ft
side-oats grama	*Bouteloua curtipendula*	1.35	1.20	10.89%	2.64
blue grama	*Bouteloua gracilis*	0.84	0.75	6.81%	11.00
kalm's brome	*Bromus kalmii*	1.01	0.90	8.17%	2.64
nodding wild rye	*Elymus canadensis*	1.12	1.00	9.09%	1.91
slender wheatgrass	*Elymus trachycaulus*	1.12	1.00	9.11%	2.54
porcupine grass	*Hesperostipa spartea*	0.50	0.45	4.09%	0.11
junegrass	*Koeleria macrantha*	0.28	0.25	2.23%	18.00
little bluestem	*Schizachyrium scoparium*	1.68	1.50	13.63%	8.26
sand dropseed	*Sporobolus cryptandrus*	0.22	0.20	1.86%	15.00
	Total Grasses	**8.13**	**7.25**	**65.88%**	**62.10**
Prairie Wild Onion	*Allium stellatum*	0.03	0.03	0.27%	0.12
Canada milk vetch	*Astragalus canadensis*	0.08	0.07	0.61%	0.42
dwarf milkweed	*Asclepias ovalifolia*	0.02	0.02	0.18%	0.05
common milkweed	*Asclepias syriaca*	0.01	0.01	0.14%	1.10
whorled milkweed	*Asclepias verticillata*	0.02	0.02	0.18%	0.05
green comet milkweed	*Asclepias veridiflora*	0.02	0.02	0.18%	0.05
white prairie clover	*Dalea candida*	0.07	0.06	0.55%	0.42
purple prairie clover	*Dalea purpurea*	0.12	0.11	0.99%	0.60
Canada tick trefoil	*Desmodium canadense*	0.06	0.05	0.45%	0.10
stiff sunflower	*Helianthus pauciflorus*	0.03	0.03	0.31%	0.05
ox-eye	*Heliopsis helianthoides*	0.07	0.06	0.55%	0.14
rough blazing star	*Liatris aspera*	0.03	0.03	0.23%	0.15
dotted blazing star	*Liatris punctata*	0.02	0.02	0.18%	0.05
wild bergamot	*Monarda fistulosa*	0.03	0.03	0.27%	0.77
stiff goldenrod	*Oligoneuron rigidum*	0.03	0.03	0.27%	0.45
prairie coneflower	*Ratibida columnifera*	0.07	0.06	0.55%	0.93
black-eyed susan	*Rudbeckia hirta*	0.07	0.06	0.55%	2.03
gray goldenrod	*Solidago nemoralis*	0.02	0.02	0.17%	2.00
heath aster	*Symphyotrichum ericoides*	0.01	0.01	0.14%	1.10
smooth aster	*Symphyotrichum laeve*	0.03	0.03	0.27%	0.61
heart-leaved alexanders	*Zizia aptera*	0.06	0.05	0.50%	0.24
	Total Forbs	**0.84**	**0.75**	**6.86%**	**10.18**
~~Oats~~	~~*Avena sativa*~~	~~3.36~~	~~3.00~~	~~27.26%~~	~~1.34~~
Tillage radish			1.0 - 2.0		
	Total Cover Crop [2]	**~~3.36~~**	**~~3.00~~**	**~~27.26%~~**	**~~1.34~~**
	Totals:	**12.33**	**11.00**	**100.00%**	**73.62**
Purpose:	Regional dry prairie reconstruction for wetland mitigation, ecological restoration, or conservation program plantings.				
Minimum Number of Species:	25				
Planting Area:	Tallgrass Aspen Parklands Province, Red River Prairie Section, Hardwood Hills subsection of the MN & NE IA Morainal Section, far western portions of the Laurentian Mixed Forest Province. Mn/DOT Districts 2(west) & 4(north).				

[1] All rates and percent of mix values are the preferred values but may be adjusted at the time of purchase based on seed availability.

[2] Cover crop selections will vary based on timing of seeding and will be selected as discussed under the "Cover Crop Selection Criteria" section in the Planting Plan.

Emergent Wetland [1]

34-181

Common Name	Scientific Name	Rate (kg/ha)	Rate (lb/ac)	% of Mix (% by wt)	Seeds/ sq ft
American slough grass	*Beckmannia syzigachne*	0.78	0.70	14.07%	12.92
tall manna grass	*Glyceria grandis*	0.28	0.25	4.98%	6.40
rice cut grass	*Leersia oryzoides*	0.34	0.30	5.93%	3.70
	Total Grasses	**1.40**	**1.25**	**24.98%**	**23.02**
river bulrush	*Bolboschoenus fluviatilis*	0.85	0.76	15.20%	1.20
bristly sedge	*Carex comosa*	0.20	0.18	3.63%	2.00
lake sedge	*Carex lacustris*	0.07	0.06	1.19%	0.24
tussock sedge	*Carex stricta*	0.04	0.04	0.77%	0.75
least spikerush	*Eleocharis acicularis*	0.11	0.10	1.94%	2.50
marsh spikerush	*Eleocharis palustris*	0.11	0.10	2.03%	1.90
Torrey's rush	*Juncus torreyi*	0.04	0.04	0.85%	25.00
Three-square bulrush	*Schoenoplectus pungens*	0.26	0.23	4.54%	1.00
soft stem bulrush	*Schoenoplectus tabernaemontani*	0.49	0.44	8.78%	5.00
woolgrass	*Scirpus cyperinus*	0.06	0.05	1.02%	32.00
	Total Sedges and Rushes	**2.24**	**2.00**	**39.95%**	**71.59**
Sweet flag	*Acorus americanus*	0.31	0.28	5.53%	0.67
common water plantain	*Alisma triviale*	0.45	0.40	8.00%	9.70
marsh milkweed	*Asclepias incarnata*	0.31	0.28	5.67%	0.50
broad-leaved arrowhead	*Sagittaria latifolia*	0.34	0.30	6.07%	6.80
giant bur reed	*Sparganium eurycarpum*	0.55	0.49	9.80%	0.09
	Total Forbs	**1.96**	**1.75**	**35.07%**	**17.76**
	Totals:	**5.60**	**5.00**	**100.00%**	**112.37**
Purpose:	Emergent wetland restoration for use in wetland mitigation, shoreline restoration, wet stormwater ponds where emergent vegetation is desired.				
Planting Area:	Statewide				

[1] All rates and percent of mix values are the preferred values but may be adjusted at the time of purchase based on seed availability.

Mesic Prairie General [1]

35-241

Common Name	Scientific Name	Rate (kg/ha)	Rate (lb/ac)	% of Mix (% by wt)	Seeds/ sq ft
big bluestem	*Andropogon gerardii*	2.24	2.00	5.48%	7.35
side-oats grama	*Bouteloua curtipendula*	1.79	1.60	4.39%	3.53
kalm's brome	*Bromus kalmii*	0.56	0.50	1.37%	1.47
nodding wild rye	*Elymus canadensis*	1.31	1.17	3.20%	2.23
slender wheatgrass	*Elymus trachycaulus*	1.12	1.00	2.73%	2.53
switchgrass	*Panicum virgatum*	0.07	0.06	0.17%	0.32
little bluestem	*Schizachyrium scoparium*	1.79	1.60	4.39%	8.82
Indian grass	*Sorghastrum nutans*	2.24	2.00	5.48%	8.82
prairie dropseed	*Sporobolus heterolepis*	0.08	0.07	0.18%	0.39
	Total Grasses	**11.21**	**10.00**	**27.39%**	**35.46**
blue giant hyssop	*Agastache foeniculum*	0.07	0.06	0.15%	1.82
lead plant	*Amorpha canescens*	0.07	0.06	0.15%	0.25
common milkweed	*Asclepias syriaca*	0.04	0.04	0.10%	0.06
butterfly milkweed	*Asclepias tuberosa*	0.04	0.04	0.10%	0.06
Canada milk vetch	*Astragalus canadensis*	0.07	0.06	0.17%	0.39
white prairie clover	*Dalea candida*	0.07	0.06	0.17%	0.44
purple prairie clover	*Dalea purpurea*	0.21	0.19	0.51%	1.03
Canada tick trefoil	*Desmodium canadense*	0.07	0.06	0.18%	0.13
stiff sunflower	*Helianthus pauciflorus*	0.07	0.06	0.17%	0.09
ox-eye	*Heliopsis helianthoides*	0.15	0.13	0.34%	0.29
rough blazing star	*Liatris aspera*	0.03	0.03	0.08%	0.18
great blazing star	*Liatris pycnostachya*	0.03	0.03	0.09%	0.13
wild bergamot	*Monarda fistulosa*	0.07	0.06	0.17%	1.61
stiff goldenrod	*Oligoneuron rigidum*	0.07	0.06	0.17%	0.94
black-eyed susan	*Rudbeckia hirta*	0.35	0.31	0.86%	10.56
heath aster	*Symphyotrichum ericoides*	0.03	0.03	0.09%	2.30
smooth aster	*Symphyotrichum laeve*	0.07	0.06	0.17%	1.26
blue vervain	*Verbena hastata*	0.04	0.04	0.12%	1.50
hoary vervain	*Verbena stricta*	0.07	0.06	0.17%	0.64
golden alexanders	*Zizia aurea*	0.07	0.06	0.15%	0.23
	Total Forbs	**1.68**	**1.50**	**4.11%**	**23.89**
~~Oats~~	~~*Avena sativa*~~	~~28.02~~	~~25.00~~	~~68.50%~~	~~11.14~~
Tillage radish			1.0 - 2.0		
	Total Cover Crop [2]	**~~28.02~~**	**~~25.00~~**	**~~68.50%~~**	**~~11.14~~**
	Totals:	**40.91**	**36.50**	**100.00%**	**70.49**
Purpose:	General mesic prairie mix for native roadsides, ecological restoration, or conservation program plantings.				
Minimum Number of Species:	25				
Planting Area:	Tallgrass Aspen Parklands, Prairie Parkland, and Eastern Broadleaf Forest Provinces. Mn/DOT Districts 2(west), 3B, 4, Metro, 6, 7 & 8.				

[1] All rates and percent of mix values are the preferred values but may be adjusted at the time of purchase based on seed availability.

[2] Cover crop selections will vary based on timing of seeding and will be selected as discussed under the "Cover Crop Selection Criteria" section in the Planting Plan.

Mesic Prairie Northwest [1]

35-441

Common Name	Scientific Name	Rate (kg/ha)	Rate (lb/ac)	% of Mix (% by wt)	Seeds/ sq ft
big bluestem	*Andropogon gerardii*	1.12	1.00	9.08%	3.67
side-oats grama	*Bouteloua curtipendula*	1.35	1.20	10.89%	2.64
nodding wild rye	*Elymus canadensis*	1.12	1.00	9.09%	1.91
slender wheatgrass	*Elymus trachycaulus*	1.12	1.00	9.11%	2.54
porcupine grass	*Hesperostipa spartea*	0.47	0.42	3.82%	0.11
switchgrass	*Panicum virgatum*	0.20	0.18	1.59%	0.90
little bluestem	*Schizachyrium scoparium*	1.68	1.50	13.66%	8.28
Indian grass	*Sorghastrum nutans*	1.35	1.20	10.91%	5.29
	Total Grasses	**8.41**	**7.50**	**68.15%**	**25.33**
Prairie Wild Onion	*Allium stellatum*	0.03	0.03	0.27%	0.12
Canada milk vetch	*Astragalus canadensis*	0.07	0.06	0.54%	0.37
showy milkweed	*Asclepias speciosa*	0.02	0.02	0.18%	0.05
common milkweed	*Asclepias syriaca*	0.01	0.01	0.14%	1.10
butterfly weed	*Asclepias tuberosa*	0.02	0.02	0.18%	0.05
white prairie clover	*Dalea candida*	0.07	0.06	0.55%	0.42
purple prairie clover	*Dalea purpurea*	0.10	0.09	0.83%	0.50
Canada tick trefoil	*Desmodium canadense*	0.09	0.08	0.77%	0.17
ox-eye	*Heliopsis helianthoides*	0.07	0.06	0.55%	0.14
rough blazing star	*Liatris aspera*	0.03	0.03	0.28%	0.18
great blazing star	*Liatris pycnostachya*	0.07	0.06	0.54%	0.24
wild bergamot	*Monarda fistulosa*	0.03	0.03	0.27%	0.77
stiff goldenrod	*Oligoneuron rigidum*	0.03	0.03	0.27%	0.45
Virginia mountain mint	*pycnanthemum virginianum*	0.04	0.04	0.34%	3.00
prairie coneflower	*Ratibida columnifera*	0.07	0.06	0.55%	0.93
black-eyed susan	*Rudbeckia hirta*	0.08	0.07	0.59%	2.20
heath aster	*Symphyotrichum ericoides*	0.01	0.01	0.14%	1.10
smooth aster	*Symphyotrichum laeve*	0.03	0.03	0.27%	0.61
blue vervain	*Verbena hastata*	0.10	0.09	0.77%	2.91
golden alexanders	*Zizia aurea*	0.19	0.17	1.56%	0.70
	Total Forbs	**1.12**	**1.00**	**9.09%**	**14.81**
~~Oats~~	~~*Avena sativa*~~	~~2.80~~	~~2.50~~	~~22.76%~~	~~1.12~~
Tillage radish			1.0 - 2.0		
	Total Cover Crop	**~~2.80~~**	**~~2.50~~**	**~~22.76%~~**	**~~1.12~~**
	Totals:	**12.33**	**11.00**	**100.00%**	**41.25**
Purpose:	Regional mesic prairie reconstruction for wetland mitigation, ecological restoration, or conservation program plantings.				
Minimum Number of Species:	25				
Planting Area:	Tallgrass Aspen Parklands Province, Red River Prairie Section, Hardwood Hills subsection of the MN & NE IA Morainal Section, may extend into the far western portions of the Laurentian Mixed Forest Province. Mn/DOT Districts 2(west) & 4(north).				

[1] All rates and percent of mix values are the preferred values but may be adjusted at the time of purchase based on seed availability.

[2] Cover crop selections will vary based on timing of seeding and will be selected as discussed under the "Cover Crop Selection Criteria" section in the Planting Plan.

Native Construction [1]

32-241

Common Name	Scientific Name	Rate (kg/ha)	Rate (lb/ac)	% of Mix (% by wt)	Seeds/ sq ft
big bluestem	*Andropogon gerardii*	1.40	1.25	3.30%	4.60
side-oats grama	*Bouteloua curtipendula*	1.12	1.00	2.64%	2.21
fringed brome	*Bromus ciliatus*	1.57	1.40	3.69%	5.67
nodding wild rye	*Elymus canadensis*	2.24	2.00	5.26%	3.82
slender wheatgrass	*Elymus trachycaulus*	2.80	2.50	6.57%	6.33
Virginia wild rye	*Elymus virginicus*	2.24	2.00	5.26%	3.09
switchgrass	*Panicum virgatum*	0.84	0.75	1.97%	3.85
fowl bluegrass	*Poa palustris*	0.67	0.60	1.57%	28.50
Indian grass	*Sorghastrum nutans*	1.12	1.00	2.63%	4.40
	Total Grasses	**14.01**	**12.50**	**32.89%**	**62.47**
common milkweed	*Asclepias syriaca*	0.02	0.02	0.18%	0.05
Canada tick trefoil	*Desmodium canadense*	0.08	0.07	0.20%	0.15
partridge pea	*Chamaecrista fasiculata*	0.30	0.27	0.72%	0.27
wild bergamot	*Monarda fistulosa*	0.02	0.02	0.04%	0.39
black-eyed susan	*Rudbeckia hirta*	0.10	0.09	0.23%	3.00
hoary vervain	*Verbena stricta*	0.06	0.05	0.13%	0.50
	Total Forbs	**0.56**	**0.50**	**1.32%**	**4.31**
~~Oats~~	~~*Avena sativa*~~	~~28.02~~	~~25.00~~	~~65.79%~~	~~11.14~~
Tillage radish			1.0 - 2.0		
	Total Cover Crop [2]	**~~28.02~~**	**~~25.00~~**	**~~65.79%~~**	**~~11.14~~**
	Totals:	**42.59**	**38.00**	**100.00%**	**77.91**
Purpose:	Mid-term soil stabilization using native species. Also suitable for sides of agricultural drainage ditches or low-diversity mesic prairie planting.				
Minimum Number of Species:	15				
Planting Area:	Tallgrass Aspen Parklands, Prairie Parkland, and Eastern Broadleaf Forest Provinces. Mn/DOT Districts 2(west), 3B, 4, Metro, 6, 7 & 8.				

[1] All rates and percent of mix values are the preferred values but may be adjusted at the time of purchase based on seed availability.

[2] Cover crop selections will vary based on timing of seeding and will be selected as discussed under the "Cover Crop Selection Criteria" section in the Planting Plan.

Riparian Northeast [1]

34-361

Common Name	Scientific Name	Rate (kg/ha)	Rate (lb/ac)	% of Mix (% by wt)	Seeds/ sq ft
American slough grass	*Beckmannia syzigachne*	1.68	1.50	4.78%	27.64
Bluejoint	*Calamagrostis canadensis*	0.07	0.06	0.19%	6.00
riverbank wild rye	*Elymus riparius*	0.56	0.50	1.57%	0.53
Virginia wild rye	*Elymus virginicus*	2.24	2.00	6.33%	3.08
tall manna grass	*Glyceria grandis*	0.28	0.25	0.80%	6.50
fowl manna grass	*Glyceria striata*	0.10	0.09	0.29%	3.00
rice cut grass	*Leersia oryzoides*	0.17	0.15	0.49%	1.93
fowl bluegrass	*Poa palustris*	0.78	0.70	2.23%	33.50
	Total Grasses	**5.88**	**5.25**	**16.68%**	**82.18**
tussock sedge	*Carex stricta*	0.04	0.04	0.13%	0.80
pointed broom sedge	*Carex scoparia*	0.07	0.06	0.21%	2.00
fox sedge	*Carex vulpinoidea*	0.22	0.20	0.65%	7.50
path rush	*Juncus tenuis*	0.03	0.03	0.09%	10.00
dark green bulrush	*Scirpus atrovirens*	0.13	0.12	0.38%	20.00
woolgrass	*Scirpus cyperinus*	0.06	0.05	0.15%	30.00
	Total Sedges and Rushes	**0.56**	**0.50**	**1.61%**	**70.30**
marsh milkweed	*Asclepias incarnata*	0.13	0.12	0.38%	0.21
flat-topped aster	*Doellingeria umbellata*	0.04	0.04	0.13%	1.00
common boneset	*Eupatorium perfoliatum*	0.06	0.05	0.16%	3.00
grass-leaved goldenrod	*Euthamia graminifolia*	0.08	0.07	0.22%	9.00
spotted Joe pye weed	*Eutrochium maculatum*	0.12	0.11	0.34%	3.70
giant sunflower	*Helianthus giganteus*	0.08	0.07	0.22%	0.25
spotted touch-me-not	*Impatiens capensis*	0.03	0.03	0.11%	0.05
blue monkey flower	*Mimulus ringens*	0.02	0.02	0.05%	13.00
giant goldenrod	*Solidago gigantea*	0.02	0.02	0.05%	1.50
blue vervain	*Verbena hastata*	0.25	0.22	0.68%	7.35
	Total Forbs	**0.84**	**0.75**	**2.34%**	**39.06**
~~Oats~~	~~*Avena sativa*~~	~~28.02~~	~~25.00~~	~~79.37%~~	~~11.14~~
Tillage radish			1.0 - 2.0		
	Total Cover Crop [2]	**~~28.02~~**	**~~25.00~~**	**~~79.37%~~**	**~~11.14~~**
	Totals:	**35.31**	**31.50**	**100.00%**	**202.67**
Purpose:	Native riparian and floodplain plantings for wetland mitigation, ecological restoration, or general permanent cover after culvert or bridge work. Tolerates partial shade.				
Minimum Number of Species:	20				
Planting Area:	Laurentian Mixed Forest Province. Mn/DOT Districts 1, 2(east) and 3A.				

[1] All rates and percent of mix values are the preferred values but may be adjusted at the time of purchase based on seed availability.

[2] Cover crop selections will vary based on timing of seeding and will be selected as discussed under the "Cover Crop Selection Criteria" section in the Planting Plan.

Riparian South and West [1]

34-261

Common Name	Scientific Name	Rate (kg/ha)	Rate (lb/ac)	% of Mix (% by wt)	Seeds/ sq ft
American slough grass	*Beckmannia syzigachne*	1.52	1.36	4.30%	24.90
riverbank wild rye	*Elymus riparius*	0.56	0.50	1.58%	0.53
Virginia wild rye	*Elymus virginicus*	1.96	1.75	5.56%	2.70
tall manna grass	*Glyceria grandis*	0.28	0.25	0.80%	6.50
fowl manna grass	*Glyceria striata*	0.10	0.09	0.29%	3.00
rice cut grass	*Leersia oryzoides*	0.18	0.16	0.51%	2.00
fowl bluegrass	*Poa palustris*	0.94	0.84	2.66%	40.00
prairie cordgrass	*Spartina pectinata*	0.34	0.30	0.96%	0.74
	Total Grasses	**5.88**	**5.25**	**16.66%**	**80.37**
tussock sedge	*Carex stricta*	0.04	0.04	0.13%	0.80
pointed broom sedge	*Carex scoparia*	0.07	0.06	0.21%	2.00
fox sedge	*Carex vulpinoidea*	0.22	0.20	0.65%	7.50
path rush	*Juncus tenuis*	0.03	0.03	0.09%	10.00
dark green bulrush	*Scirpus atrovirens*	0.13	0.12	0.38%	20.00
woolgrass	*Scirpus cyperinus*	0.06	0.05	0.15%	30.00
	Total Sedges and Rushes	**0.56**	**0.50**	**1.61%**	**70.30**
marsh milkweed	*Asclepias incarnata*	0.13	0.12	0.38%	0.21
common boneset	*Eupatorium perfoliatum*	0.03	0.03	0.11%	2.00
spotted Joe pye weed	*Eutrochium maculatum*	0.07	0.06	0.18%	2.00
autumn sneezeweed	*Helenium autumnale*	0.06	0.05	0.17%	2.50
giant sunflower	*Helianthus giganteus*	0.08	0.07	0.22%	0.25
spotted touch-me-not	*Impatiens capensis*	0.06	0.05	0.17%	0.08
great lobelia	*Lobelia siphilitica*	0.03	0.03	0.09%	5.00
blue monkey flower	*Mimulus ringens*	0.01	0.01	0.02%	5.07
Virginia mountain mint	*Pycnanthemum virginianum*	0.06	0.05	0.16%	4.00
tall coneflower	*Rudbeckia laciniata*	0.06	0.05	0.15%	0.25
giant goldenrod	*Solidago gigantea*	0.02	0.02	0.07%	2.00
blue vervain	*Verbena hastata*	0.17	0.15	0.46%	5.00
bunched ironweed	*Vernonia fasciculata*	0.07	0.06	0.18%	0.50
	Total Forbs	**0.84**	**0.75**	**2.36%**	**28.86**
~~Oats~~	~~*Avena sativa*~~	~~28.02~~	~~25.00~~	~~79.37%~~	~~11.14~~
Tillage Radish			1.0 - 2.0		
	Total Cover Crop [2]	~~**28.02**~~	~~**25.00**~~	~~**79.37%**~~	~~**11.14**~~
	Totals:	**35.31**	**31.50**	**100.00%**	**190.66**
Purpose:	Native riparian and floodplain plantings for wetland mitigation, ecological restoration, or general permanent cover after culvert or bridge work. Tolerates partial shade.				
Minimum Number of Species:	25 species				
Planting Area:	Tallgrass Aspen Parklands, Prairie Parkland, and Eastern Broadleaf Forest Provinces. Mn/DOT Districts 2(west), 3B, 4, Metro, 6, 7 & 8.				

[1] All rates and percent of mix values are the preferred values but may be adjusted at the time of purchase based on seed availability.

[2] Cover crop selections will vary based on timing of seeding and will be selected as discussed under the "Cover Crop Selection Criteria" section in the Planting Plan.

Wet Meadow Northeast [1]

34-371

Common Name	Scientific Name	Rate (kg/ha)	Rate (lb/ac)	% of Mix (% by wt)	Seeds/ sq ft
fringed brome	*Bromus ciliatus*	2.24	2.00	16.04%	8.10
Bluejoint	*Calamagrostis canadensis*	0.11	0.10	0.78%	10.00
Virginia wild rye	*Elymus virginicus*	1.68	1.50	11.99%	2.31
tall manna grass	*Glyceria grandis*	0.28	0.25	1.96%	6.30
fowl bluegrass	*Poa palustris*	0.73	0.65	5.19%	31.00
	Total Grasses	**5.04**	**4.50**	**35.96%**	**57.71**
tussock sedge	*Carex stricta*	0.04	0.04	0.35%	0.85
pointed broom sedge	*Carex scoparia*	0.06	0.05	0.39%	1.50
dark green bulrush	*Scirpus atrovirens*	0.22	0.20	1.56%	33.00
woolgrass	*Scirpus cyperinus*	0.07	0.06	0.51%	40.00
	Total Sedges and Rushes	**0.39**	**0.35**	**2.81%**	**75.35**
Canada anemone	*Anemone canadensis*	0.11	0.10	0.82%	0.30
marsh milkweed	*Asclepias incarnata*	0.27	0.24	1.95%	0.43
flat-topped aster	*Doellingeria umbellata*	0.11	0.10	0.81%	2.50
common boneset	*Eupatorium perfoliatum*	0.10	0.09	0.68%	5.00
grass-leaved goldenrod	*Euthamia graminifolia*	0.04	0.04	0.31%	5.00
spotted Joe pye weed	*Eutrochium maculatum*	0.16	0.14	1.15%	5.00
blue monkey flower	*Mimulus ringens*	0.03	0.03	0.24%	25.00
giant goldenrod	*Solidago gigantea*	0.03	0.03	0.20%	2.30
eastern panicled aster	*Symphyotrichum lanceolatum*	0.03	0.03	0.28%	2.00
	Total Forbs	**0.90**	**0.80**	**6.44%**	**47.53**
~~Oats~~	~~*Avena sativa*~~	~~7.68~~	~~6.85~~	~~54.79%~~	~~3.05~~
	Total Cover Crop [2]	**~~7.68~~**	**~~6.85~~**	**~~54.79%~~**	**~~3.05~~**
	Totals:	**14.01**	**12.50**	**100.00%**	**183.64**
Purpose:	Wet meadow / Sedge meadow reconstruction for wetland mitigation or ecological restoration.				
Planting Area:	Laurentian Mixed Forest Province. Mn/DOT Districts 1, 2(east) and 3A.				

[1] All rates and percent of mix values are the preferred values but may be adjusted at the time of purchase based on seed availability.

[2] Cover crop selections will vary based on timing of seeding and will be selected as discussed under the "Cover Crop Selection Criteria" section in the Planting Plan.

Wet Meadow South and West [1]

34-271

Common Name	Scientific Name	Rate (kg/ha)	Rate (lb/ac)	% of Mix (% by wt)	Seeds/ sq ft
fringed brome	*Bromus ciliatus*	1.23	1.10	9.18%	4.45
bluejoint	*Calamagrostis canadensis*	0.06	0.05	0.41%	5.00
Virginia wild rye	*Elymus virginicus*	1.12	1.00	8.37%	1.55
rice cut grass	*Leersia oryzoides*	0.28	0.25	2.07%	3.10
tall manna grass	*Glyceria grandis*	0.17	0.15	1.26%	3.90
fowl manna grass	*Glyceria striata*	0.11	0.10	0.83%	3.30
fowl bluegrass	*Poa palustris*	0.39	0.35	2.88%	16.50
	Total Grasses	**3.36**	**3.00**	**25.00%**	**37.80**
bristly sedge	*Carex comosa*	0.24	0.21	1.78%	2.36
pointed broom sedge	*Carex scoparia*	0.06	0.05	0.43%	1.60
awl-fruited sedge	*Carex stipata*	0.19	0.17	1.40%	2.10
tussock sedge	*Carex stricta*	0.03	0.03	0.21%	0.50
fox sedge	*Carex vulpinoidea*	0.16	0.14	1.13%	5.00
path rush	*Juncus tenuis*	0.04	0.04	0.34%	15.00
dark green bulrush	*Scirpus atrovirens*	0.20	0.18	1.48%	30.00
woolgrass	*Scirpus cyperinus*	0.09	0.08	0.67%	50.00
	Total Sedges and Rushes	**1.01**	**0.90**	**7.44%**	**106.56**
marsh milkweed	*Asclepias incarnata*	0.27	0.24	2.03%	0.43
common boneset	*Eupatorium perfoliatum*	0.02	0.02	0.18%	1.30
grass-leaved goldenrod	*Euthamia graminifolia*	0.01	0.01	0.06%	1.00
spotted Joe pye weed	*Eutrochium maculatum*	0.02	0.02	0.18%	0.75
autumn sneezeweed	*Helenium autumnale*	0.03	0.03	0.23%	1.30
sawtooth sunflower	*Helianthus grosseserratus*	0.04	0.04	0.30%	0.20
great lobelia	*Lobelia siphilitica*	0.02	0.02	0.13%	2.90
blue monkey flower	*Mimulus ringens*	0.01	0.01	0.07%	6.80
Virginia mountain mint	*Pycnanthemum virginianum*	0.07	0.06	0.53%	5.10
giant goldenrod	*Solidago gigantea*	0.02	0.02	0.14%	1.50
eastern panicled aster	*Symphyotrichum lanceolatum*	0.03	0.03	0.22%	1.50
red-stemmed aster	*Symphyotrichum puniceum*	0.19	0.17	1.42%	5.00
tall meadow-rue	*Thalictrum dasycarpum*	0.01	0.01	0.12%	0.11
blue vervain	*Verbena hastata*	0.15	0.13	1.12%	4.61
bunched ironweed	*Vernonia fasciculata*	0.03	0.03	0.28%	0.30
Culver's root	*Veronicastrum virginicum*	0.01	0.01	0.12%	4.20
golden alexanders	*Zizia aurea*	0.28	0.25	2.06%	1.00
	Total Forbs	**1.23**	**1.10**	**9.19%**	**38.00**
~~Oats~~	~~*Avena sativa*~~	~~7.85~~	~~7.00~~	~~58.37%~~	~~3.12~~
	Total Cover Crop [2]	**~~7.85~~**	**~~7.00~~**	**~~58.37%~~**	**~~3.12~~**
	Totals:	**13.45**	**12.00**	**100.00%**	**185.48**
Purpose:	Wet meadow / Sedge meadow reconstruction for wetland mitigation or ecological restoration projects				
Planting Area:	Tallgrass Aspen Parklands, Prairie Parkland, and Eastern Broadleaf Forest Provinces. Mn/DOT Districts 2(west), 3B, 4, Metro, 6, 7 & 8.				

[1] All rates and percent of mix values are the preferred values but may be adjusted at the time of purchase based on seed availability.

[2] Cover crop selections will vary based on timing of seeding and will be selected as discussed under the "Cover Crop Selection Criteria" section in the Planting Plan.

34-262

Wet Prairie [1]

Common Name	Scientific Name	Rate (kg/ha)	Rate (lb/ac)	% of Mix (% by wt)	Seeds/ sq ft
big bluestem	*Andropogon gerardii*	1.12	1.00	6.89%	3.67
fringed brome	*Bromus ciliatus*	1.68	1.50	10.38%	6.08
bluejoint	*Calamagrostis canadensis*	0.04	0.04	0.27%	4.00
Virginia wild rye	*Elymus virginicus*	1.96	1.75	12.07%	2.70
tall manna grass	*Glyceria grandis*	0.17	0.15	1.02%	3.80
fowl manna grass	*Glyceria striata*	0.12	0.11	0.73%	3.50
switchgrass	*Panicum virgatum*	0.84	0.75	5.16%	3.85
fowl bluegrass	*Poa palustris*	0.22	0.20	1.39%	9.60
Indian grass	*Sorghastrum nutans*	0.56	0.50	3.44%	2.20
prairie cordgrass	*Spartina pectinata*	0.56	0.50	3.41%	1.20
	Total Grasses	**7.29**	**6.50**	**44.76%**	**40.60**
wooly sedge	*Carex pellita*	0.06	0.05	0.32%	0.47
tussock sedge	*Carex stricta*	0.02	0.02	0.17%	0.48
fox sedge	*Carex vulpinoidea*	0.11	0.10	0.66%	3.50
dark green bulrush	*Scirpus atrovirens*	0.11	0.10	0.72%	17.74
woolgrass	*Scirpus cyperinus*	0.03	0.03	0.18%	16.00
	Total Sedges and Rushes	**0.34**	**0.30**	**2.05%**	**38.19**
Canada anemone	*Anemone canadensis*	0.03	0.03	0.21%	0.09
marsh milkweed	*Asclepias incarnata*	0.09	0.08	0.55%	0.14
Canada tick trefoil	*Desmodium canadense*	0.56	0.50	3.41%	1.00
flat-topped aster	*Doellingeria umbellata*	0.06	0.05	0.34%	1.20
common boneset	*Eupatorium perfoliatum*	0.03	0.03	0.23%	2.00
grass-leaved goldenrod	*Euthamia graminifolia*	0.02	0.02	0.11%	2.00
spotted Joe pye weed	*Eutrochium maculatum*	0.04	0.04	0.30%	1.50
autumn sneezeweed	*Helenium autumnale*	0.06	0.05	0.35%	2.39
sawtooth sunflower	*Helianthus grosseserratus*	0.06	0.05	0.38%	0.30
great blazing star	*Liatris pycnostachya*	0.02	0.02	0.17%	0.10
great lobelia	*Lobelia siphilitica*	0.01	0.01	0.05%	1.40
blue monkey flower	*Mimulus ringens*	0.01	0.01	0.05%	6.40
Virginia mountain mint	*Pycnanthemum virginianum*	0.09	0.08	0.55%	6.50
red-stemmed aster	*Symphyotrichum puniceum*	0.09	0.08	0.56%	2.40
blue vervain	*Verbena hastata*	0.17	0.15	1.06%	5.25
bunched ironweed	*Vernonia fasciculata*	0.03	0.03	0.23%	0.30
Culver's root	*Veronicastrum virginicum*	0.02	0.02	0.14%	6.00
golden alexanders	*Zizia aurea*	0.28	0.25	1.76%	1.03
	Total Forbs	**1.68**	**1.50**	**10.45%**	**40.00**
~~Oats~~	~~*Avena sativa*~~	~~6.95~~	~~6.20~~	~~42.74%~~	~~2.76~~
	Total Cover Crop [2]	**~~6.95~~**	**~~6.20~~**	**~~42.74%~~**	**~~2.76~~**
	Totals:	**16.25**	**14.50**	**100.00%**	**121.55**
Purpose:	Wet prairie reconstruction for wetland mitigation or ecological restoration.				
Planting Area:	Tallgrass Aspen Parklands, Prairie Parkland, and Eastern Broadleaf Forest Provinces. Mn/DOT Districts 2(west), 3B, 4, Metro, 6, 7 & 8.				

[1] All rates and percent of mix values are the preferred values but may be adjusted at the time of purchase based on seed availability.

[2] Cover crop selections will vary based on timing of seeding and will be selected as discussed under the "Cover Crop Selection Criteria" section in the Planting Plan.

Wetland Rehabilitation [1]

34-171

Common Name	Scientific Name	Rate (kg/ha)	Rate (lb/ac)	% of Mix (% by wt)	Seeds/ sq ft
Virginia wild rye	*Elymus virginicus*	3.36	3.00	56.61%	4.63
fowl bluegrass	*Poa palustris*	1.12	1.00	18.89%	47.80
	Total Grasses	**4.48**	**4.00**	**75.50%**	**52.43**
fox sedge	*Carex vulpinoidea*	0.22	0.20	3.85%	7.50
path rush	*Juncus tenuis*	0.18	0.16	3.03%	59.00
dark green bulrush	*Scirpus atrovirens*	0.40	0.36	6.70%	60.00
woolgrass	*Scirpus cyperinus*	0.09	0.08	1.51%	50.00
	Total Sedges and Rushes	**0.90**	**0.80**	**15.09%**	**176.50**
nodding bur marigold	*Bidens cernua*	0.15	0.13	2.45%	1.00
Water Horehound	*Lycopus americanus*	0.37	0.33	6.29%	23.15
blue monkey flower	*Mimulus ringens*	0.04	0.04	0.67%	30.00
	Total Forbs	**0.56**	**0.50**	**9.41%**	**54.15**
	Totals:	**5.94**	**5.30**	**100.00%**	**283.08**
Purpose:	Interseeding into establishing wetlands after weed control spraying. Also suitable for two to five year short term soil stabilization for areas with saturated soils.				
Planting Area:	Statewide				

[1] All rates and percent of mix values are the preferred values but may be adjusted at the time of purchase based on seed availability.

Woodland Edge Northeast [1]

36-311

Common Name	Scientific Name	Rate (kg/ha)	Rate (lb/ac)	% of Mix (% by wt)	Seeds/ sq ft
fringed brome	*Bromus ciliatus*	2.24	2.00	5.98%	8.10
bluejoint	*Calamagrostis canadensis*	0.15	0.13	0.37%	12.90
poverty grass	*Danthonia spicata*	0.56	0.50	1.50%	4.60
nodding wild rye	*Elymus canadensis*	1.40	1.25	3.72%	2.38
slender wheatgrass	*Elymus trachycaulus*	2.24	2.00	5.96%	5.06
fowl bluegrass	*Poa palustris*	0.98	0.87	2.59%	41.50
False Melic	*Schizachne purpurascens*	0.28	0.25	0.75%	2.90
	Total Grasses	**7.85**	**7.00**	**20.87%**	**77.44**
common yarrow	*Achillea millefolium*	0.03	0.03	0.09%	2.00
pearly everlasting	*Anaphalis margaritacea*	0.02	0.02	0.05%	1.30
common milkweed	*Asclepias syriaca*	0.03	0.03	0.09%	2.90
flat-topped aster	*Doellingeria umbellata*	0.04	0.04	0.12%	1.00
tall cinquefoil	*Drymocallis arguta*	0.07	0.06	0.19%	5.30
large-leaved aster	*Eurybia macrophylla*	0.02	0.02	0.05%	0.18
stiff goldenrod	*Oligoneuron rigidum*	0.16	0.14	0.42%	2.10
smooth wild rose	*Rosa blanda*	0.18	0.16	0.47%	0.15
black-eyed susan	*Rudbeckia hirta*	0.29	0.26	0.77%	8.70
gray goldenrod	*Solidago nemoralis*	0.07	0.06	0.18%	6.80
upland white aster	*Solidago ptarmicoides*	0.04	0.04	0.13%	1.00
Lindley's Aster	*Symphyotrichum ciliolatum*	0.03	0.03	0.10%	1.00
smooth aster	*Symphyotrichum laeve*	0.16	0.14	0.43%	2.90
American vetch	*Vicia americana*	0.56	0.50	1.50%	0.38
	Total Forbs	**1.68**	**1.50**	**4.50%**	**32.81**
~~Oats~~	~~*Avena sativa*~~	~~28.02~~	~~25.00~~	~~74.63%~~	~~11.14~~
Tillage radish			1.0 - 2.0		
	Total Cover Crop [2]	**~~28.02~~**	**~~25.00~~**	**~~74.63%~~**	**~~11.14~~**
	Totals:	**37.55**	**33.50**	**100.00%**	**121.39**
Purpose:	Partly shaded grassland planting for native roadsides, reclamation, etc in north-central and northeast MN				
Minimum Number of Species:	20				
Planting Area:	Laurentian Mixed Forest Province excluding Chippewa Plains, Pine Moraines & Outwash Plains, and Mille Lacs Uplands subsections. Mn/DOT Districts 1 & 2(east).				

[1] All rates and percent of mix values are the preferred values but may be adjusted at the time of purchase based on seed availability.

[2] Cover crop selections will vary based on timing of seeding and will be selected as discussed under the "Cover Crop Selection Criteria" section in the Planting Plan.

Woodland Edge South & West [1]

36-211

Common Name	Scientific Name	Rate (kg/ha)	Rate (lb/ac)	% of Mix (% by wt)	Seeds/ sq ft
big bluestem	*Andropogon gerardii*	1.12	1.00	2.90%	3.68
side-oats grama	*Bouteloua curtipendula*	1.12	1.00	2.89%	2.20
kalm's brome	*Bromus kalmii*	1.68	1.50	4.34%	4.40
nodding wild rye	*Elymus canadensis*	1.40	1.25	3.61%	2.38
bottlebrush grass	*Elymus hystrix*	0.36	0.32	0.91%	0.88
slender wheatgrass	*Elymus trachycaulus*	1.40	1.25	3.64%	3.18
switchgrass	*Panicum virgatum*	0.07	0.06	0.17%	0.30
little bluestem	*Schizachyrium scoparium*	0.69	0.62	1.79%	3.40
Indian grass	*Sorghastrum nutans*	1.12	1.00	2.89%	4.40
	Total Grasses	**8.97**	**8.00**	**23.14%**	**24.82**
common yarrow	*Achillea millefolium*	0.03	0.03	0.09%	2.00
blue giant hyssop	*Agastache foeniculum*	0.11	0.10	0.28%	3.20
white snakeroot	*Ageratina altissima*	0.03	0.03	0.09%	1.70
common milkweed	*Asclepias syriaca*	0.03	0.03	0.09%	2.90
white prairie clover	*Dalea candida*	0.19	0.17	0.50%	1.20
Canada tick trefoil	*Desmodium canadense*	0.16	0.14	0.42%	0.29
ox-eye	*Heliopsis helianthoides*	0.15	0.13	0.38%	0.30
wild bergamot	*Monarda fistulosa*	0.07	0.06	0.18%	1.60
stiff goldenrod	*Oligoneuron rigidum*	0.07	0.06	0.17%	0.90
Clayton's sweet cicely	*Osmorhiza claytonii*	0.07	0.06	0.17%	0.06
smooth wild rose	*Rosa blanda*	0.07	0.06	0.17%	0.06
black-eyed susan	*Rudbeckia hirta*	0.20	0.18	0.52%	6.10
Lance-leaved Figwort	*Scrophularia lanceolata*	0.06	0.05	0.14%	3.20
zigzag goldenrod	*Solidago flexicaulis*	0.02	0.02	0.05%	0.50
showy goldenrod	*Solidago speciosa*	0.07	0.06	0.18%	1.80
smooth aster	*Symphyotrichum laeve*	0.07	0.06	0.19%	1.30
American vetch	*Vicia americana*	0.20	0.18	0.52%	0.14
golden alexanders	*Zizia aurea*	0.12	0.11	0.33%	0.46
	Total Forbs	**1.68**	**1.50**	**4.38%**	**24.80**
~~Oats~~	~~*Avena sativa*~~	~~28.02~~	~~25.00~~	~~72.48%~~	~~11.14~~
Tillage radish			1.0 - 2.0		
	Total Cover Crop [2]	**~~28.02~~**	**~~25.00~~**	**~~72.48%~~**	**~~11.14~~**
	Totals:	**38.67**	**34.50**	**100.00%**	**60.75**
Purpose:	Partly shaded grassland planting for native roadsides, reclamation, etc.				
Minimum Number of Species:	25				
Planting Area:	Tallgrass Aspen Parklands, Prairie Parkland, and Eastern Broadleaf Forest Provinces. Mn/DOT Districts 2(west), 3B, 4, Metro, 6, 7 & 8.				

[1] All rates and percent of mix values are the preferred values but may be adjusted at the time of purchase based on seed availability.

[2] Cover crop selections will vary based on timing of seeding and will be selected as discussed under the "Cover Crop Selection Criteria" section in the Planting Plan.