MANITOBA – MINNESOTA TRANSMISSION PROJECT
Environmental Impact Statement

ASSESSMENT OF POTENTIAL ENVIRONMENTAL EFFECTS ON VEGETATION AND WETLANDS

CHAPTER 10
SEPTEMBER 2015

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ABBREVIATIONS AND ACRONYMS

AAFC	Agriculture and Agri-food Canada
ASI	area of special interest
ATK	aboriginal traditional knowledge
ATV	all-terrain vehicle
CEnvPP	Construction Environmental Protection Plan
cm	centimetre(s)
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
Dorsey	Dorsey Converter Station
EDDMapS	Early Detection and Distribution Mapping System
EIS	Environmental Impact Statement
EPP	Environmental Protection Program
FNMEP	First Nation and Metis Engagement Process
FRI	Forest Resource Inventory
Glenboro South	Glenboro South Station
GPS	global positioning system
ha	hectare(s)
km	kilometre(s)
kV	kilovolt
LAA	local assessment area
LCC	Land Classification Canada
m	metre(s)
MB	Manitoba
MBCDC	Manitoba Conservation Data Centre
MCWS	Manitoba Conservation and Water Stewardship
MESEA	*The Endangered Species and Ecosystems Act* (Manitoba)
MHHC	Manitoba Habitat Heritage Corporation
MMTP	Manitoba–Minnesota Transmission Project

NEB	National Energy Board
PA	protected area
PAI	Protected Areas Initiative
PDA	Project development area
PTH	Provincial Trunk Highway
RAA	regional assessment area
Riel	Riel Converter Station
RVTC	Riel–Vivian Transmission Corridor
ROW	right-of-way
S1	subnational rank for rare plant species; very rare throughout its range or in the province (five or fewer occurrences, or very few remaining individuals); may be especially vulnerable to extirpation
S2	subnational rank for rare plant species; rare throughout its range or in the province (six to 20 occurrences); may be vulnerable to extirpation
S3	subnational rank for rare plant species; uncommon throughout its range or in the province (21 to 100 occurrences)
S4	subnational rank for rare plant species; widespread, abundant, and apparently secure throughout its range or in the province, with many occurrences, but the element is of long-term concern (> 100 occurrences)
S5	subnational rank for rare plant species; demonstrably widespread, abundant and secure throughout its range or in the province, and essentially impossible to eradicate under present conditions
SAR	species at risk
SARA	*Species at Risk Act*
SLTC	Southern Loop Transmission Corridor
SOCC	species of conservation concern
the Project	Manitoba–Minnesota Transmission Project
VC	valued component
WMA	Wildlife Management Area

GLOSSARY OF TECHNICAL TERMS

Agricultural land	Land that has been converted to cultivated crops, hayland or pasture
Biodiversity	The variety of ecosystems, species and genetic diversity, and the ecological process of which they are a part
Coniferous forest	75-100% of the canopy is coniferous forests (*e.g.*, jack pine and spruce species)
Circumneutral	Nearly neutral, with a pH of 6.5 to 7.5
Deciduous forest	75-100% of the canopy is broadleaf/deciduous forests (*e.g.*, poplar, including trembling aspen [*Populus tremuloides*] and birch [*Betula*] species)
Developed	Land that has been altered for residential, commercial or industrial use; includes buildings, regularly managed green space and associated roads, parking lots and trails
Graminoid	Dominated by grasses and grass-like plants (grasses, sedges, rushes)
Grassland	Lands of mixed native or tame prairie grasses and herbaceous vegetation. May also include scattered stands of shrub such as willow (*Salix* spp.), choke cherry (*Prunus virginiana*), saskatoon (*Amelanchier alnifolia*) and pincherry (*Prunus emarginata*). Both upland and lowland meadows are included in this class. There is normally (<10%) shrub and tree canopy.
Invasive plant species	Plants that are growing outside the country or region of origin and are outcompeting or even replacing native organisms. Since they come from ecosystems in other parts of the world, they have a distinct advantage over native species whose populations are kept in check by native predators, competitors or disease.
Meadow	Moist to wet grassland suitable for hay production (natural hay land), at least 51 percent of the area is covered by grass
Mixedwood forest	Forest lands in which 26% to 74% of the canopy is coniferous or deciduous trees

Native vegetation	Land dominated by native plant species, and the sod layer has never been tilled, seeded or converted to agricultural production. Native vegetation types include forest (coniferous, deciduous, mixedwood), grassland and shrubland.
No net loss	Balance of wetland loss or degradation with wetland rehabilitation or restoration in an area so that the total functions or area of wetlands are not reduced
Noxious weed	A weed named in the Schedule of *The Noxious Weeds Act,* C.C.S.M. c. N110 that is declared by a regulation of the Lieutenant Governor in Council to be a noxious weed or in the Manitoba Agriculture, Food and Rural Development *Declaration of Noxious Weeds*, and includes the seed thereof
Pasture	Land sown to cultivated tame grasses or legumes or invaded by non-native grass species which represent the dominant cover
Recent burns	Burns that occurred between 2010 and 2014; does not include cut or cleared areas
Right-of-way	The legal right to pass along a specific route for transportation purposes; *e.g.*, transmission lines through property that belongs to another landowner, and which are established by easement from the landowner
Shrub	A woody, multi-stemmed plant or tree, 3 m in height or less
Shrubland	Land dominated by shrub species, including willows, wolf willow (*Elaeagnus commutata*), snowberry (*Symphoricarpos occidentalis*), prairie rose (*Rosa arkansana*), beaked hazelnut (*Corylus cornuta* ssp. *cornuta*), saskatoon, meadow-sweet (*Spiraea alba* var. *alba*), and choke cherry
Species at risk (SAR)	Species that are listed as at risk under the federal *Species at Risk Act* or are provincially listed by *The Endangered Species and Ecosystems Act* (Manitoba) as Extirpated, Endangered or Threatened
Species of conservation concern (SOCC)	Species that are provincially tracked by the Manitoba Conservation Data Centre and are provincially listed as S1, S2, S3, S4 or S5, to classify differing levels of abundance

Tall grass prairie	An ecosystem dominated by tall grasses, such as big bluestem (*Andropogon gerardii*), prairie dropseed (*Sporobolus heterolepis*) and Indian grass (*Sorghastrum nutans*). It may include patches of trees and shrubs. Soil is typically dark and organic-rich.
Wetland	Land that is saturated with water long enough to promote wetland or aquatic processes, as indicated by poorly drained soils, hydrophytic vegetation and various kinds of biological activity that are adapted to a wet environment. Wetlands are generally less than about 2 m deep (National Wetlands Working Group 1997).
Wetland compensation	A variety of strategies for the rehabilitation, restoration, enhancement or creation of wetlands to offset adverse effects on other wetlands
Wetland function	Biogeochemical, habitat and hydrological aspects of wetlands. Biogeochemical functions are related to nutrient filtering, cycling and storage (*e.g.*, carbon storage). Habitat functions serve as resources to vegetation and wildlife. Hydrological functions are related to the capacity of a wetland to receive, store, moderate and release surface water and groundwater in a watershed.

10 Assessment of Potential Environmental Effects on Vegetation and Wetlands

10.1 Introduction

Manitoba Hydro is proposing construction of the Manitoba–Minnesota Transmission Project (MMTP, or the Project), which involves the construction of a 500 kilovolt (kV) AC transmission line in southeastern Manitoba. The transmission line would originate at the Dorsey Converter Station northwest of Winnipeg, continue south around Winnipeg and within the Existing Transmission Corridor, the Southern Loop Transmission Corridor (SLTC) and the Riel–Vivian Transmission Corridor (RVTC), to just east of Provincial Trunk Highway (PTH) 12. The transmission line then continues southward on a New Right-of-way (ROW) across the rural municipalities of Springfield, Tache, Ste. Anne, La Broquerie, Stuartburn and Piney to the Manitoba–Minnesota border crossing south of the community of Piney. The Project also includes the construction of terminal equipment at the Dorsey Converter Station, electrical upgrades within the Dorsey and Riel converter stations, and modifications at the Glenboro South Station requiring realignment of transmission lines entering the station.

Based on the above description, the assessment of the Project is divided into three components:

- transmission line construction in the Existing Transmission Corridor (Existing Corridor), extending from Dorsey Converter Station to just east of PTH 12
- transmission line construction in a New ROW, extending south from the Anola area to the border by Piney
- station upgrades—at Glenboro South Station (Glenboro South), Dorsey Converter Station (Dorsey) and Riel Converter Station (Riel)—and transmission line realignment work at Glenboro South

The effects of these Project components on vegetation and wetlands are addressed in this chapter.

Native vegetation and wetlands are important to the function of natural ecosystems. They also help maintain biodiversity, provide wildlife habitat, and support valued human activities, such as recreational activities (*e.g.*, hunting, hiking) and collection of traditional use plants.

The vegetation and wetlands valued component (VC) is comprised of native vegetation, wetlands, rare plant species and traditional use plant species. Native vegetation includes forest, shrubland and grassland communities. Wetlands are land that is saturated with water long enough to promote wetland or aquatic processes, as indicated by poorly drained soils, hydrophytic vegetation and various kinds of biological activity that are adapted to a wet environment.

Wetlands are generally less than about 2 m deep (National Wetlands Working Group 1997). Rare plant species may occur in these areas, and are of particular conservation concern. Through the public and First Nation and Metis engagement processes as well as through communications with representatives from conservation districts, and Manitoba Conservation and Water Stewardship (MCWS) (which represents wildlife, parks and Protected Areas Initiative [PAI]), interest in preserving wetlands and native vegetation types was expressed. Plant species at risk (SAR) are protected provincially under *The Endangered Species and Ecosystems Act* (Manitoba) (MESEA) (Government of Manitoba 2014a) and federally under the *Species at Risk Act* (SARA). Wetland conservation is a priority under *The Federal Policy on Wetland Conservation* (Government of Canada 1991).

In the Project region, native vegetation and wetlands have been disturbed by water drainage, conversion to agricultural land, and residential, commercial and industrial development. Conversion of native vegetation began more than 100 years ago. Approximately 66.3% of the PDA has been modified by human activity (Map Series 10-100 - Vegetation and Wetland Cover Classes in the LAA and RAA). Intact wetlands and native vegetation are common along the New ROW. The Existing Corridor is located largely in agricultural or developed land.

The presence of native vegetation and wetlands influenced routing of the Project. Routing considered large intact areas of native vegetation and wetlands, including protected areas, areas of special interest, and Wildlife Management Areas (WMAs), where possible. The routing process considered privately owned tall grass prairie parcels and Manitoba Tall Grass Prairie parcels located near Tolstoi and Gardenton, MB, approximately 18 km west of the Final Preferred Route. The Manitoba Tall Grass Prairie parcels are located almost wholly outside the Route Planning Area (Map 7-1 – Route Planning Area) in which alternative routes were evaluated. However, due to the need to balance other perspectives on the landscape, such as the presence of residences and farms, full avoidance of native vegetation and wetlands was not possible. Therefore, Project effects are anticipated. Project activities, such as ROW clearing and station upgrades, will result in vegetation loss and could affect local and regional vegetation diversity and ecosystem function.

This chapter presents baseline conditions for native vegetation and wetlands, and assesses potential Project effects and cumulative effects on vegetation and wetlands. Vegetation and wetlands have linkages to other VCs, including fish and fish habitat (Chapter 8), wildlife and wildlife habitat (Chapter 9), and traditional land and resource use (Chapter 11).

10.1.1 Regulatory and Policy Setting

10.1.1.1 Primary Regulatory Guidance

A list of the various regulatory requirements that were considered in developing this Environmental Impact Statement (EIS) can be found in Section 2.3 (Regulatory Approvals) of Chapter 2 (Project Description). Particular consideration was given to the following federal and provincial legislation and guidelines in the preparation of this environmental assessment:

- the Project Final Scoping Document, issued on June 24, 2015 by Manitoba Conservation and Water Stewardship's Environmental Approvals Branch, which represents the guidelines for this EIS;
- the relevant filing requirements under the *National Energy Board Act* (R.S.C., 1985, c. N-7), and guidance for environmental and socio-economic elements contained in the National Energy Board (NEB) Electricity Filing Manual, Chapter 6; and
- the *Canadian Environmental Assessment Act, 2012* (S.C. 2012, c. 19, s. 52) and its applicable regulations and guidelines.

10.1.1.2 Additional Federal Guidance

Project construction and operation is subject to SARA, which is part of a federal strategy for protecting species at risk. SARA applies to the following:

- all occurrences of species listed as *Extirpated, Endangered* or *Threatened*, listed on Schedule 1 and their critical habitat as designated under SARA species recovery plans;
- commitments under the National Accord for the Protection of SAR (Government of Canada 1996a); and
- activities under the Habitat Stewardship Program for SAR (Government of Canada 2014b).

Under SARA, it is prohibited to either kill, injure, or take an individual; or, destroy the critical habitat of a species designated as *Extirpated*, *Endangered* or *Threatened* on federally regulated lands or designated critical habitat elsewhere. On lands under provincial jurisdiction, SARA goals are typically reflected in provincial legislation, policy and guidelines.

10.1.1.3 Additional Provincial Guidance

The following provincial legislation addresses wetlands, forests and timber harvesting, rare species conservation, invasive species and general habitat conservation:

- *The Water Rights Act* regulates the construction of water control works (*e.g.,* culverts) that temporarily or permanently alter the level or flow of water in a waterbody, including wetlands. This includes changes caused by drainage. The Project is not anticipated to require drainage activities within a wetland; however, a Licence to Construct Water Control Works may be required for the construction of temporary or permanent culverts associated with temporary construction access or permanent station access roads (Government of Manitoba 2009).
- *The Conservation Agreements Act* allows landowners and conservation groups to voluntarily protect natural areas, such as wetlands or forested areas, on private lands through conservation agreements. Agreements can be established with conservation agencies such as Manitoba Habitat Heritage Corporation (MHHC), Ducks Unlimited Canada or Nature Conservancy of Canada. Limitations on development activities are based on the features to be protected. Specifically, drainage of wetlands, conversion of grasslands and clearing of wooded areas may be restricted.
- *The Forest Act* regulates and administers, with respect to Crown timber, all matters relating to forestry, including management, use and conservation of Crown forest lands and timber and afforestation, reforestation, tree preservation and tree improvement.
- The Threatened, Endangered and Extirpated Species Regulation (Government of Manitoba 1998) under MESEA provides a list of species that are protected as *Threatened*, *Endangered* or *Extirpated* in Manitoba. Species of conservation concern (SOCC) in Manitoba are listed as *S1-very rare*, *S2-rare* or *S3-uncommon* by the Manitoba Conservation Data Centre ([MBCDC] Government of Manitoba 2015a).
- Alvars and tall grass prairie were recently designated endangered ecosystems through regulation under MESEA. In Manitoba, remnant tall grass prairie and restoration areas are primarily located in preserves or other privately owned parcels. The Manitoba Tall Grass Prairie Preserve, a 2,200 ha preserve, made up of individual parcels of remnant tall grass prairie in Manitoba, is located near Tolstoi and Gardenton, Manitoba, which is outside the RAA and approximately 18 km west-southwest of the Project. Alvars have been identified in Manitoba's Interlake region, and north of the Project region. The Project is not routed in or through managed tall grass prairie parcels.
- *The Noxious Weeds Act* categorizes a number of plant species as noxious, which must be eradicated or controlled as specified in the legislation. Manitoba Agriculture, Food and Rural Development is updating the Act but has created a *Declaration of Noxious Weeds* (Government of Manitoba 2010) as an interim list of controlled species (Shaikh 2013, pers. comm.). Both lists, however, include native plant species. Because the control of native plant species is not a concern for this VC, only effects of noxious non-native species (hereafter referred to as invasive plant species) are considered in the assessment.

- A Pesticide Use Permit is required before a herbicide program is implemented. The permit is issued under *The Environment Act* (Manitoba).
- Manitoba Hydro has adopted a sustainable development policy and 13 guiding principles that influence corporate decisions, actions and day-to-day operations to achieve environmentally sound and sustainable economic development (Manitoba Hydro 1993). Manitoba Hydro applies the principles of sustainable development in all aspects of its operations. Through corporate decisions and actions to provide electrical services, Manitoba Hydro endeavours to meet the needs of the present without compromising the ability of future generations to meet their needs (Manitoba Hydro 1993).

10.1.2 Engagement and Key Issues

The following is an overview of key issues raised during the public and First Nation and Metis engagement processes. A summary of public and First Nation and Metis engagement processes are presented in Chapters 3 and 4, respectively.

10.1.2.1 First Nations and Metis

Manitoba Hydro invited First Nations and the MMF to conduct Aboriginal Traditional Knowledge (ATK) Studies throughout the engagement process. As of the date of EIS submission, the following self-directed ATK studies for MMTP have been submitted and the data used in this section:

- Preliminary Aboriginal Traditional Knowledge Study Community Report submitted by Black River First Nation, Long Plain First Nation, Swan Lake First Nation, 2014
- Aboriginal Traditional Knowledge Study Community Report submitted by Black River First Nation, Long Plain First Nation, Swan Lake First Nation, 2015
- Roseau River Anishinabe First Nation (2015c) Aboriginal Traditional Knowledge Report, 2015;
- Roseau River Anishinabe First Nation (2015a) Oral History Interview –May 13, 2015;
- Roseau River Anishinabe First Nation (2015b) Oral History Interview –May 19, 2015;
- Report to Peguis First Nation and Manitoba Hydro – Peguis First Nation Land Use and Occupancy Interview Project for the Manitoba-Minnesota Transmission Project, 2015

Although the spatial data included in these sources were considered for the assessment, in some cases the data were not released; therefore, they will not be reproduced in this section.

During the finalization of the EIS, Sagkeeng First Nation submitted their final report, which will help inform the Environmental Protection Program (EPP):

- SAGKEENG O-PIMATIZIIWIN 2 Traditional Knowledge Study - Manitoba-Minnesota Transmission Line Project

Manitoba Hydro has been engaging with the Manitoba Metis Federation since 2013. These discussions continue and currently the parties are working toward an agreement related to work to confirm Metis interests in the area, a land use study and related discussions regarding mitigation. Manitoba Hydro has committed to the Manitoba Metis Federation that if an agreement is reached, Manitoba Hydro will file the results of the Manitoba Metis Federation's work as a supplement to the MMTP EIS. This document would add to the understandings of the EIS and inform the EPP.

Of special note, in this chapter, there is reference to a literature review that Manitoba Hydro commissioned North/South Consultants to conduct that included a desktop review of available information on use of lands and resources by Metis. This literature review, *Manitoba Métis: A Review of Available Information on the Use of Lands and Resources for Traditional Purposes in the MMTP Study Area with Gap Analyses*, compiled existing baseline information on the use of land and resources by Metis in the Project area and is attached as an appendix to Chapter 11. Manitoba Hydro is still in discussions and is hopeful that information from the MMF will be received.

Information received through the Project First Nation and Metis Engagement Process (Chapter 4) was considered in determining baseline conditions of traditional land and resource use, as listed below:

- MMTP Alternative Routes - Round 1 First Nation Feedback
- MMTP First Nation and Metis Engagement What We Heard Round 1 and 2
- MMTP Roseau River Anishinabe First Nation Round 2 Feedback – Map A
- MMTP Roseau River Anishinabe First Nation Round 2 Feedback – Map B

Through the First Nation and Metis Engagement Process (FNMEP), plant harvesting was identified as one of the current uses of land and resources for traditional purposes. First Nations and Metis harvest native plants for food, medicinal and cultural purposes throughout the RAA. An ATK study undertaken jointly by Black River First Nation, Swan Lake First Nation and Long Plain First Nation (2015) identified concerns about Project effects on berries, wild rice, *wee-kai* (also referred to as *weke*, *weekay* [sweet flag, *Acorus americanus*]) and medicinal plants. Areas near La Broquerie, MB are of particular concern to Long Plain First Nation who noted rare orchids and Manitoba snapdragons grow in the area and require protection. Traditional knowledge holders noted that the medicinal properties of plants come from the roots, and expressed concern that if the roots removed away during construction, the plants will not come back, or if they do, it will take a long time for them to regrow. Traditional knowledge holders are also concerned about the permanent removal of berry patches and medicinal plants. Grubbing (*i.e.,* removal of roots) is generally not undertaken on the ROW, with the exception of tower footprints, the centreline access trail or where it is required to maintain worker health and safety (*i.e.,* tripping hazards).

Concerns about potential effects on bogs, including the removal of peat moss, the draining of bogs, and related effects on water quality and the water table, were expressed. Traditional knowledge holders also expressed concerns about the loss of plants for medicinal use, and about

Project effects on willows in low-lying, wet areas because these areas provide food for wildlife. Removal of vegetation within wetlands will be limited. Water will not be drained from wetland or bog areas during construction or operations.

Concerns were raised about the effects of accidental releases of contaminants on vegetation within the Project area, and the effects that access roads and the ROW will have on vegetation. Additionally, concerns were expressed about the use of herbicides to control vegetation and maintain the ROW after construction.

In their ATK study, Roseau River Anishinabe First Nation (2015c) indicated the need to work with Manitoba Hydro to protect and monitor traditional areas during Project construction. It was noted that clearcutting for residential and commercial buildings, and destruction of these areas by flooding has threatened many plants that are harvested for traditional purposes.

A Roseau River Anishinabe First Nation Elder indicated in an Oral History Interview on May 13, 2015 that they were concerned about the effect the Project will have on plants, and stated that specific ways to harvest plants must be followed—there is a responsibility to speak on behalf of the plants and you “can’t compensate what is going to be changed” (Roseau River Anishinabe First Nation 2015a).

Through the FNMEP (Manitoba Hydro 2014/2015, pers. comm.), Roseau River Anishinabe First Nation identified the areas around and between the Watson P. Davidson and Spur Woods WMAs as areas of concern with respect to berry picking and gathering practices and noted concerns about road access and effects on medicinal plants surrounding the Watson P. Davidson WMA and south of the Spur Woods WMA. Roseau River Anishinabe First Nation also identified Sandilands Provincial Forest as an area where sage and blueberries are harvested. The “bush” near St. Malo, MB west of the Project was identified as a highly used area. Cedar and sage are harvested near La Broquerie; cedar and berries are harvested near Watson P. Davidson WMA; Seneca root is harvested southeast of Sundown, MB; and berries are harvested south of Carrick, MB, northwest of Piney, and near Spur Woods WMA.

Through the FNMEP, Peguis First Nation identified concerns regarding harvesting of berries, sweet grass, eggs, ginger, rice, mushrooms and medicinal plants from the Riel Converter Station to south of Anola, north of Dufresne, along PTH 1, on the east and west sides of Watson P. Davidson WMA and from the southwest corner of the Watson P. Davidson WMA diagonally southeast to Spur Woods WMA.

Peguis First Nation indicated in their Draft Land Use and Occupancy Interview Project Report (Peguis First Nation 2015) that community members are concerned that their gathering rights are going to be affected.

Peguis First Nation identified concerns regarding the use of herbicides for the Project, including the potential for runoff and its effect on water. Peguis First Nation also expressed concern about potential effects on traditional medicines.

Swan Lake First Nation expressed concerns about vegetation management for the Project, and noted they do not want the area “clearcut.”

10.1.2.2 Public

During the Public Engagement Process, stakeholders, the public and regulatory bodies indicated that Project routing should avoid existing conservation projects, ecological reserves, existing and candidate protected areas (PAs) and WMAs. Concerns were expressed about the inadvertent clearing of these habitats, including the Caliento Bog Proposed Protected Area, and large wetland complexes (patterned fens and string bogs) with rare plants, orchids and harvested plants, such as ginger.

The public stated that if construction in wetlands could not be avoided, winter construction should be considered as an option to mitigate potential effects. Concern was also expressed about Project effects on groundwater, and the degradation of the water table, including the effects of pesticide use.

Additional concerns were expressed about potential vegetation destruction, particularly related to endangered plant species, orchid habitat and berry harvesting. The introduction and spread of weed species along the transmission line was also a concern. The public stated that the use of non-chemical weed management was preferred.

Public concerns were also expressed about the potential for increased fire risk; loss of forested areas on Crown land; effects on forestry; habitat loss and degradation, including edge effects and introduction of invasive plant species; and increases in all-terrain vehicle (ATV) traffic.

As a result of the routing process, ecological reserves, the Watson P. Davidson WMA, the Earls Block Area of Special Interest (ASI), the Hugo Wetland and the Boutang ASI were avoided (Map 10-1 - Designated Lands and Protected Areas). The Final Preferred Route avoided many candidate PAs with the exception of the Lone Sand ASI, Assiniboine River Clam Beds Proposed Ecological Reserve, and Somme ASI. Large areas of Crown land, such as the Sandilands Provincial Forest, were also avoided. Full avoidance of ASIs and wetlands was not possible due to the need to balance other perspectives on the landscape. No areas with conservation agreements are crossed.

For additional information, see Chapter 3: Public Engagement Process.

10.2 Scope of Assessment

The Project has limited potential to affect broad ecological processes at a regional level. However, it could affect local diversity due to vegetation clearing and ground disturbance. Therefore, the assessment focuses on the identification and protection of vegetation and wetland resources of potential importance to local biodiversity, and the evaluation of residual effects on these resources.

The assessment addresses Project effects at three ecological levels:

- landscape level
- local vegetation/cover class level, including wetlands
- plant species level

Further details on effects and measurable parameters are provided in Section 10.3.2.

10.2.1 Spatial Boundaries

The following spatial boundaries are used to assess residual environmental effects of the Project and cumulative environmental effects on vegetation and wetlands:

- **Project development area (PDA):** The PDA encompasses the Project footprint and is the anticipated area of physical disturbance associated with Project construction, operation and maintenance, including associated stations (Map 10-2 – Project Components for Vegetation and Wetlands).
- **Local assessment area (LAA):** The LAA includes the PDA plus a 1-km buffer around each component (Map 10-2 – Project Components for Vegetation and Wetlands). The LAA is used to evaluate local effects from the Project on vegetation and wetlands, and to inform changes in wildlife habitat. The LAA was chosen so that it was large enough to include large intact patches of native vegetation (larger than 200 ha) as they are important in supporting biodiversity (Government of Canada 2013b). Grassland patches of 50 to 100 ha in size can meet the needs of bird and plant species, but 200 ha is used to be conservative. This buffer is consistent with that used in the wildlife and wildlife habitat assessment (Chapter 9) and traditional land and resource use assessment (Chapter 11).
- **Regional assessment area (RAA):** The RAA includes a 15-km buffer around each component of the PDA (Map 10-2 - Project Components for Vegetation and Wetlands).The RAA is considered large enough to appropriately characterize regional vegetation and land use patterns. The RAA is used to assess Project contributions to cumulative effects, including the effects of past, present and reasonably foreseeable future activities. This buffer is consistent with that used in the wildlife and wildlife habitat assessment (Chapter 9) and traditional land and resource use assessment (Chapter 11).

10.2.2 Temporal Boundaries

The current Project construction schedule is provided in the Project Description (Chapter 2). Subject to regulatory approval, transmission line construction for the SLTC will start in 2017 and is targeted for completion in late 2018. During this period, construction activities will peak in November and December. Construction of the transmission line from Riel to the US border will commence in the 2018 and completion is targeted for 2020. During this time, activities will peak in winter of 2019.

Modifications to the Dorsey Converter Station are planned for the period from the mid 2018 to late 2019. Modifications to the Riel Converter Station are scheduled to begin mid-2017 and to be completed in late 2019. Modifications to the Glenboro South Station will span from early to late 2019. The Project is expected to have a service life of at least 100 years.

Vegetation in the RAA has been subject to agricultural conversion and human-related clearing for more than 100 years (Henderson and Koper 2014). Over the past 150 years, the length of the fire cycle in parts of Manitoba has increased from 55 to 200 years, which potentially raises the risk of large fires occurring (Tardif 2004; Flannigan *et al*. 2005a) as more vegetation is available to burn. The last large fire in the RAA occurred in 2011; it burned approximately 15,000 ha in total (Manitoba Conservation and Water Stewardship 2014). Fires that have burned approximately 600–800 ha are the next largest on record, they occurred twice between 1928 and 2013: once in 1976 and once in 2012.

This assessment considers a past temporal boundary of approximately 100 years; however, greater emphasis is placed on changes in conditions since 1976, the oldest large fire on record in the RAA. Five to 10 years beyond the end of the construction phase is used for a future temporal boundary. Most natural vegetation is expected to recover during this 5–10 year period, with the exception of any tall growing vegetation that will be maintained through an integrated vegetation management plan (Chapter 22) (*i.e.*, tall trees and shrubs) to facilitate the safe and reliable operation of the transmission line.

10.2.3 Learnings from Past Assessments

Based on the Bipole III Transmission Project, the Keeyask Generation Project, the Riel Reliability Improvement Initiative Project, the Wuskwatim Transmission Project, the North-Montney Mainline Project, the Western Alberta Transmission Project, and associated regulatory processes, Manitoba Hydro confirmed that the potential Project-related effects on vegetation and wetlands assessed in this EIS were appropriate and comprehensive. This information was used to understand the effects of linear infrastructure construction on vegetation and wetlands and to reduce residual effects through Project-based mitigation, which demonstrates Manitoba Hydro's commitment to continual improvement of its Environmental Management System and to sustainable development.

Effects on wetlands from transmission projects have been shown to be limited (Stantec Consulting Ltd. 2014). As a result of these recent findings, regulatory requirements in Alberta for transmission projects that intersect wetlands are being reviewed and will likely be relaxed (A Fulton. pers. com. 2015).

Manitoba Hydro adopted the following for this application because of the learnings from other projects:

- Temporal and spatial boundaries for vegetation and wetlands were selected based on interactions with related VCs, including wildlife and wildlife habitat.

- An ecosystem-based (rather than species-based) approach was used in this assessment because the Bipole III EIS (Manitoba Hydro 2012b) was criticized for identifying multiple, individual plant species as VCs.
- Landscape fragmentation/intactness was included as an environmental effect.
- A field program was designed to include both vegetation and wetland surveys on alternative routes to capture baseline information on vegetation and wetlands prior to final route selection.
- Detailed wetland mapping using orthophotography imagery was completed for the Final Preferred Route.
- This assessment considers landscape-level effects (*e.g.*, intactness and fragmentation), local community-level effects valued by the public (*e.g.,* loss of native vegetation such as forested areas), and species-level effects valued by regulators (*e.g.*, loss of rare plants) and the loss of traditional use plants.
- Mitigation measures in this EIS build upon those described in Chapter 8 of the Bipole III EIS (Manitoba Hydro 2012b)

Monitoring programs allow predicted effects in the assessment to be compared with the actual outcome of the Project. An adaptive management strategy will be implemented for this Project; the monitoring program will aid in this regard.

10.3 Methods

10.3.1 Existing Conditions

This section identifies information sources used to establish baseline conditions and describe existing conditions of vegetation and wetlands in the RAA.

For more detailed information about methods or findings, see the Biophysical Technical Data Reports - Vegetation and Wetlands.

10.3.1.1 Sources of Information

Information sources reviewed to collect vegetation and wetland baseline information for the PDA, LAA and RAA included:

- publicly available reports on provincial forests, park reserves, ecological reserves, WMAs and ASIs, and grasslands;
- government databases that included information on rare plant species (MBCDC), *Species at Risk Act* (SARA) and invasive plant species (Early Detection and Distribution Mapping System [EDDMapS 2014]);
- published scientific papers;

- previous Manitoba Hydro environmental assessments (*i.e.*, Wuskwatim Transmission Project, Bipole III Transmission Project and Keeyask Generation Project) and public and regulatory feedback reports;
- Project-specific self-directed ATK studies (Section 10.1.2.1);
- information from the Project FNMEP (Section 10.1.2.1);
- ESRI World Imagery (ESRI 2014);
- Agriculture and Agri-Food Canada (AAFC) annual crop inventory, 2013 (optical imagery [Landsat-5, Landsat-8, AWiFS, DMC, SPOT and RapidEye] and radar imagery [Radarsat-2]) (AAFC 2013);
- Manitoba version of Land Classification Canada (LCC) from 2005 (Land Sat Thematic Mapper) imagery (30 m resolution) ([LCC 2005);
- orthophotography imagery (50 cm) (Manitoba Hydro 2007–2012);
- Manitoba Forest Resource Inventory (FRI 2000) aerial photography (digitized 1:15,840);
- Bing Maps® (2014);
- Google Earth® (2015).

10.3.1.2 Desktop Analysis

Data and literature were reviewed, and the results were mapped to determine native vegetation and wetland characteristics.

For more information on methods, see the Biophysical Technical Data Reports - Vegetation and Wetlands.

10.3.1.2.1 Intactness

Intactness of native vegetation cover was evaluated using data from the Manitoba Forest Branch's FRI database (FRI 2000). The database (1965–2000) was used to manage Manitoba's forests. It includes tree cover data such as tree species (polygons and linear features) with land classification at a scale of 1:15,840. Existing disturbances were overlaid with the FRI data, and the number of patches of native vegetation, the patch sizes and the total area of each patch were calculated within the RAA.

10.3.1.2.2 Land Cover Class and Wetland Mapping

Mapping was based on LCC data (a scale of 1:20,000) because they are the most recent data (2005/2006). The polygons were refined based on available imagery, the FRI database, the AAFC database, and field data. Cover classes (including wetlands) were developed from the LCC and FRI databases, and are based on dominant land use, vegetation cover and broad wetland classes (Table 10-1).

Table 10-1 Land Cover and Wetland Classes Identified for the Project

Land Cover Category	Land Cover Class	Definition
Agriculture	Cultivated	Land that has been converted to cultivated crops, and which is annually tilled, seeded or cut; includes annual cropland, perennial crops and hayland
	Pasture	Introduced tame grasses, used primarily for grazing
Developed	Roads	Human-constructed routes for vehicles; includes surfaced/paved highways and non-surfaced trails
	Industrial	Land that is predominantly built-up or developed, including commercial and industry plants and mine structures; vegetation is not associated with this land cover category.
	Railway	Railroad surfaces
	Buildings	Populated urban areas and farmsteads
Native Vegetation	Grassland	Lands of native prairie grasses or mixed native and tame prairie grasses and herbaceous vegetation. May also include scattered stands of shrub such as willow, choke-cherry, Saskatoon and pincherry. Both upland and lowland meadows fall into this class. There is normally (<10%) shrub and tree canopy
	Shrubland	Land dominated by woody, multi-stemmed plants or trees 3 m in height or less, including willows (*Salix* spp.), wolf willow (*Elaeagnus commutata*), snowberry (*Symphoricarpos occidentalis*), prairie rose (*Rosa arkansana*), beaked hazelnut (*Corylus cornuta* ssp. *cornuta*), Saskatoon berry (*Amelanchier alnifolia*), meadow-sweet (*Spiraea alba* var. *alba*), and choke cherry (*Prunus virginiana*)
	Deciduous forest	Forest lands where 75–100% of the canopy is broadleaf/deciduous or hardwood forests (*e.g.*, poplar, including trembling aspen [*Populus tremuloides*] and birch species)
	Mixedwood forest	Forest lands where 26–74% of the canopy is a mix of coniferous and broadleaf/deciduous forests
	Coniferous forest	Forest lands where 75–100% of the canopy is coniferous or softwood forests (*e.g.*, jack pine and spruce species)

Land Cover Category	Land Cover Class	Definition
	Sand dunes	Sand-dominated upland that can include dominant vegetation ranging from shrub to grass species, or barren land with limited vegetation cover. Sand dunes can be unstable or stabilized by vegetation.
Recently Cleared	Recently cleared (cutting)	Forested areas cleared in the last 5 years; cut class 0 (based on FRI database definition)
Wetland	Dugout	Human-constructed holding area for water; typically used as a livestock or household water source
	Bog types[1]	Peatland that receives water exclusively from precipitation and is not influenced by groundwater; Sphagnum-dominated vegetation
		Graminoid: dominated by grass-like plants (rushes, sedges, tall rush) Shrub: dominated by shrub species (low, mixed and tall shrubs) Treed: dominated by tree species (coniferous, deciduous and mixed wood)
	Fen types[1]	Peatland that receives water rich in dissolved minerals; vegetation cover is composed predominantly of graminoid species and brown mosses, shrubs or trees
		Graminoid: dominated by grass-like plants (rushes, sedges, tall rush) and forb species Shrub: dominated by shrub species (low, mixed and tall shrubs); comprised of woody species < 3 m in height Treed: dominated by tree species (coniferous, deciduous and mixed wood); comprised of woody species > 3 m in height
	Marsh types[1, 2]	Periodic or persistent standing water or slow-moving surface water that is circumneutral to alkaline and generally mineral nutrient rich; vegetation is dominated by graminoids and forbs; system is non-peat accumulating
		Class I & II: ephemeral ponds and temporary ponds Class III & IV: seasonal and semi-permanent ponds Class V: permanent ponds

Land Cover Category	Land Cover Class	Definition
	Swamp types[1]	Periodically standing surface water or gently moving, mineral nutrient-rich groundwater; waters are rich in dissolved minerals; vegetation is dominated by woody plants often more than 1 m in height; system may or may not accumulate peat
		Graminoid: dominated by grass-like plants (rushes, sedges, tall rush) Shrub: dominated by shrub species (low, mixed and tall shrubs. Treed: dominated by tree species (coniferous, deciduous and mixed wood)
	Shallow open water[1]	Wetlands with free surface water up to 2 m deep; present for all or most of the year; less than 25% of the surface water area is covered by standing emergent or woody plants; submerged or floating aquatic plants usually dominate the vegetation
Water	Channel	A human-constructed ditch or trench diversion of flowing water
	River	Flowing water forms: rivers, streams and creeks
Lake		

NOTE:
[1] Based on National Wetlands Working Group (1997)
[2] Based on Stewart and Kantrud (1971)

The FRI database was used to determine and compare land cover in the PDA, LAA and RAA because it provides common cover classes for all spatial boundaries (Table 10-1). This database was also used to assess Project-related change in landscape, cover and plant species in the LAA and RAA. The FRI data are at a 1:15,848 scale, which is a finer scale than the 1:20,000 scale of the LCC data. However, the FRI data were collected prior to 2000 and do not include a class for swamp and shallow open water wetlands. The FRI data also under-represent the area (ha) of wetlands in the LAA and RAA, likely because the data were developed with the objective of providing an inventory of productive forests. Swamp wetlands are included within forest classes, whereas shallow open water wetlands may be included within marshes or lakes. Additionally, the FRI data do not provide land cover mapping within the boundaries of the City of Winnipeg; therefore, they over-represent developed (buildings) land cover.

Land cover mapping was further refined for the PDA to provide greater detail and certainty about potential Project-related effects on vegetation and wetlands and to develop appropriate mitigation measures. Native vegetation and wetland mapping in the PDA was completed to a 1:3,000 scale with a minimum 10 m x 10 m polygon size. Wetland class, type and boundaries within the PDA were interpreted and delineated using land cover data and air photograph imagery from wet and dry years (2007–2012), in conjunction with data from rare plant, wetland and soils surveys undertaken for the Project. Wetlands were classified according to *The Canadian Wetland Classification System* (National Wetlands Working Group 1997), which is the standard national classification system for wetlands in Canada. Wetlands were further classified by type to assist with the assessment of potential Project effects on wetland structure and function. Marshes were further classified based on the inferred duration and frequency of flooding. Three classes were used: ephemeral/temporary (Class I/II), seasonal/semi-permanent (Class III/IV) and permanent (Class V). These classes were determined based on a review of available imagery, and on dominant vegetation and water permanence, following Stewart and Kantrud (1971).

10.3.1.2.3 Invasive Plant Species

A database search for historical occurrences of invasive plant species in the PDA, LAA, and RAA was conducted using EDDMapS (2014). Only invasive plant species listed on the *Declaration of Noxious Weeds* (Government of Manitoba 2010) that were non-native plant species (Brouillet *et al*. 2010+) were used in this assessment. For additional details on the invasive plant species considered for this assessment, see the Biophysical Technical Data Reports - Vegetation and Wetlands.

10.3.1.2.4 Rare Plant Species

The SARA Public Registry (Government of Canada 2015) and MESEA (Government of Manitoba 2014a) were searched and reviewed to identify species at risk that potentially occur in the RAA. Seven species have potential to occur in the RAA based on known habitat preferences (Table 10-2). The MBCDC was also asked for a list of species at risk and SOCC recorded within 15 km of the PDA (Friesen, 2014a pers. comm.). These data were used to identify occurrences intersected by the Project and SOCC with potential to occur in the PDA.

Table 10-2 Species at Risk with Potential to Occur in the RAA

Scientific Name	Common Name	Federal[1]		Provincial	
		COSEWIC Status[2]	SARA Status[2]	MESEA Status[3]	MBCDC Rank[4]
Agalinis aspera	rough purple false-fox-glove	*Endangered*	*Endangered*	*Endangered*	S1S2
Cypripedium candidum	small white lady's-slipper	*Endangered*	*Endangered*	*Endangered*	S2
Platanthera praeclara	western prairie fringed orchid	*Endangered*	*Endangered*	*Endangered*	S1
Solidago riddellii	Riddell's goldenrod	*Special Concern*	*Special Concern*	*Threatened*	S2
Spiranthes magnicamporum	Great Plains ladies'-tresses	–	–	*Endangered*	S1S2
Symphyotrichum sericeum	western silvery aster	*Threatened*	*Threatened*	*Threatened*	S2S3
Vernonia fasciculata	western ironweed	–	–	*Endangered*	S1

Category	Definition
Endangered	Threatened with imminent extirpation or extinction
Threatened	Likely to become endangered if the factors leading to its endangerment are not reversed
Special Concern	May become a threatened or an endangered species because of threats and its biological characteristics

NOTES:

[1] All species noted are listed on Schedule 1 of SARA.

[2] Committee on the Status of Endangered Wildlife in Canada; Government of Canada 2015

[3] Government of Manitoba 2014a

[4] **MBCDC (2014a) provincial ranks:**

S1 – Very rare throughout its range or in the province (5 or fewer occurrences, or very few remaining individuals). May be especially vulnerable to extirpation.

S2 – Rare throughout its range or in the province (6 to 20 occurrences). May be vulnerable to extirpation.

S3 – Uncommon throughout its range or in the province (21 to 100 occurrences).

S4 – Widespread, abundant, and apparently secure throughout its range or in the province, with many occurrences, but the element is of long-term concern (> 100 occurrences).

S5 – Demonstrably widespread, abundant, and secure throughout its range or in the province, and essentially impossible to eradicate under present conditions.

? – Inexact or uncertain; for numeric ranks, denotes inexactness.

S#S# - Numeric range rank: A range between two of the numeric ranks. Denotes range of uncertainty above the exact rarity of the species.

SNA – A conservation status rank is not applicable to this element.

10.3.1.2.5 Traditional Use Plant Species

The following documents were reviewed to determine which traditional use plant species could be affected by the Project:

- Preliminary Aboriginal Traditional Knowledge Study Community Report submitted by Black River First Nation, Long Plain First Nation, Swan Lake First Nation, 2014;
- Aboriginal Traditional Knowledge Study Community Report submitted by Black River First Nation, Long Plain First Nation, Swan Lake First Nation, 2015; and
- Roseau River Anishinabe First Nation Aboriginal Traditional Knowledge Report, 2015;
- Roseau River Anishinabe First Nation Oral History Interview – May 13, 2015;
- Roseau River Anishinabe First Nation Oral History Interview – May 19, 2015;
- Draft Report to Peguis First Nation and Manitoba Hydro – Peguis First Nation Land Use and Occupancy Interview Project for the Manitoba-Minnesota Transmission Project, 2015;
- MMTP Alternative Routes - Round 1 First Nation Feedback;
- MMTP Roseau River Anishinabe First Nation Round 2 Feedback – Map A;
- MMTP Roseau River Anishinabe First Nation Round 2 Feedback – Map B; and
- Manitoba Métis: A Review of Available Information on the Use of Lands and Resources for Traditional Purposes in the MMTP Study Area with Gap Analyses.

During rare plant surveys, a complete plant species list, including traditional use species, was compiled at each site. The lists were cross-referenced with the documents reviewed to determine the abundance and distribution of traditional use plant species in the PDA, LAA and RAA.

10.3.1.3 Key Person Interviews

No key person interviews specific to vegetation and wetlands were conducted; however, numerous personal communications were undertaken. In the absence of provincial guidelines, the MBCDC recommended setback distances for Project activities from locations of known SOCC (*i.e.,* provincially ranked S1, S2 and S3 species) based on federal *Activity Set-back Distance Guidelines for Prairie Plant Species at Risk* (Henderson 2011) (Friesen 2014b, pers. comm.). The Parks and Protected Spaces Branch reviewed the proposed routes for the Project and recommended avoiding several proposed ecological reserves (Kelly 2013, pers. comm.). In addition, in a meeting with a representative from the Protected Areas Initiative, the importance of avoiding various conservation areas, including ecological reserves, protected parks, conservation lands (*e.g.*, WMAs), candidate protected areas, ASIs and wetlands, was discussed (Roberge 2013, pers. comm.). A representative from the Manitoba Conservation and Water Stewardship, Wildlife Branch reviewed the proposed routes for the Project and recommended avoiding certain wetlands, including the Caliento Bog, and other areas of habitat for several species, including the western prairie fringed orchid (*Platanthera praeclara*) (Meuckon 2014, pers. comm.).

10.3.1.4 Field Studies

Field surveys were conducted for rare plants, non-native species and wetlands. Two surveys (spring and summer) were conducted for rare plants and invasive plant species, while wetland surveys were conducted throughout the growing season. These surveys are described further below.

10.3.1.4.1 Rare Plant Surveys

Rare plant surveys were conducted in the PDA in areas dominated by native vegetation and pasture that had the potential to support SAR and SOCC. In total, 103 transects were surveyed along the alternative routes. Transects were located in wetland, grassland, forest and pasture cover classes, and were at least 100 m away from any disturbance (*e.g.,* roads). The transects were 100 m in length and were perpendicular to the centerline (*i.e.,* 50 m on either side of the centerline). One transect was completed per quarter section in target areas.

Two rare plant surveys were conducted to account for differences in species growth and flowering times. An early blooming survey, consisting of 45 transects, was conducted in June 2014; a late blooming survey, consisting of 58 transects, was conducted in August 2014. Fifty-six of the transects surveyed were within the LAA of the Final Preferred Route.

During each survey, a comprehensive plant species list (including traditional use plant species) was compiled, the locations and numbers of SAR and SOCC and associated species were recorded (including photos, and global positioning system [GPS] points), and occurrences of invasive plant species listed in the *Declaration of Noxious Weeds* (Government of Manitoba 2010) were recorded.

Field work was constrained by land access permission in some areas. For more information, see Section 10.3.1.5.

10.3.1.4.2 Wetland Surveys

A subsample of wetlands in areas of native vegetation was surveyed to aid in desktop mapping and to collect information about general wetland conditions along the ROW of the preliminary and alternative routes. Wetland boundaries were not delineated in the field due to the large size of many wetlands. Dominant plant species, any rare plants and wetland class were documented at each wetland. In total, 87 wetland surveys were completed in the PDA throughout the growing season from May to early October 2014; 39 of the survey sites were within the LAA of the Final Preferred Route. In addition, a site visit to Dorsey was conducted on July 21, 2015 to evaluate a mapped wetland. Dominant plant species were recorded and GPS tracks were collected.

10.3.1.5 Addressing Uncertainty

The following identifies uncertainties in the vegetation and wetlands baseline information and associated assessment, and the methods used to address them:

- Age of FRI base mapping data: The FRI database used for the intactness assessment is based on imagery taken prior to 2000. More recent disturbance data were overlaid onto the FRI data to provide a more accurate estimation of disturbance level and native vegetation patch intactness.
- Wetlands in FRI mapping data: The FRI database used for the land cover classification in the LAA and RAA under-represents the area occupied by wetlands, particularly marshes, shallow open water wetlands and swamps. As a result, the PDA was mapped at a finer scale (1:3,000) using detailed aerial photography interpretation, which includes wetlands, to provide a more accurate estimation of the area of wetlands and other land cover classes within the PDA and to assist with mitigation planning.
- Gaps in rare plant field surveys: Field surveys were limited largely to provincially owned land because access permission to privately owned lands was delayed or not granted in some target locations. Therefore, some areas along the Final Preferred Route were not surveyed for rare plants. As a result, it was assumed that cover classes in which SAR/SOCC were observed had a high likelihood of supporting SAR/SOCC.
- Gaps in wetland field surveys: Surveys were completed for a subsample of wetlands in native vegetation along the route, and the data were used to inform wetland mapping. Wetlands in agricultural land were not surveyed, mainly due to access constraints and aerial imagery, which showed many were already heavily impacted. As a result, some wetlands may be under-represented in the wetland mapping of the PDA, particularly low class ephemeral to seasonally flooded wetlands.
- Lack of certainty regarding historical data on rare plant locations: The MBCDC identifies historical occurrences of SOCC using points, lines and polygons. Polygons represent the level of uncertainty associated with the data recorded (*e.g.,* expertise of the collector, differences in survey techniques and technology, and amount/type of information collected). Historical occurrences could occur anywhere in the polygon; the larger the polygon, the greater the uncertainty about the species location. For this reason, the intersection of a historical occurrence polygon with the PDA was considered an interaction.

The number of towers that will be built and their exact locations will not be known until the route is finalized and tower “spotting” is undertaken. Therefore, the extent and location of complete vegetation removal (including roots) within the PDA are unknown. Full ROW clearing will occur with trees and shrubs cleared to a height of 10 cm along the ROW. Ground and standing vegetation will be grubbed only at the tower footprints and along the ROW centreline access trail. Natural regeneration will be allowed following construction, and tall tree and shrub regrowth will be managed for reliability and safe line operation.

10.3.2 Assessment Methods

The overall environmental effects methods are presented in Chapter 7. Specific techniques used to assess effects on vegetation and wetlands are presented in this section. These include:

- assessment approach
- environmental effects description criteria for the VC
- significance thresholds for residual environmental effects

10.3.2.1 Assessment Approach

Project effects on vegetation were assessed at the landscape, cover class (including wetlands) and species levels. At each level, features most vulnerable to potential Project effects were identified, and the level of risk of potentially affecting their viability within the RAA was assessed based on the predicted severity of Project effects and the occurrence of comparable features elsewhere in the RAA.

10.3.2.1.1 Landscape Intactness

The conversion of native vegetation for agriculture and development has reduced the number and size of intact vegetation patches on the landscape. Further fragmentation of large intact patches could result from vegetation clearing at tower sites and from vegetation management along the ROW. These effects are of concern in terms of maintaining native vegetation integrity, wildlife and wildlife habitat, and biodiversity, particularly species of forest birds that require large intact habitat (*e.g.,* ovenbird). Potential Project effects on landscape intactness were assessed by examining changes in the number of vegetation patches of different sizes and the total area of each patch size category in the RAA as a result of vegetation clearing.

The public and regulators stated that large intact patches within the RAA are important landscape elements (*e.g.,* Caliento Bog). Based on the Government of Canada's document, "How Much Habitat is Enough?" (2013b), patch size requirements to sustain wildlife populations and maintain ecosystem functions and attributes differ based on land cover; grasslands have a target patch size of 50-100 ha, whereas target patch size for forests is 200 ha (Government of Canada 2013b). Patches larger than 200 ha are critical for supporting biodiversity (Government of Canada 2013b); therefore, they are the focus of this assessment. In addition to patch size, other factors may be of value, but not considered in the vegetation assessment, including patch shape, proximity to other intact patches, connectivity on the landscape, landscape heterogeneity and forest/grassland quality (Government of Canada 2013b). These items are not included as the value to many plant species, particularly rare plants, is unknown or variable depending on the species and region.

10.3.2.1.2 Land Cover Class Assessment

Past land conversion has reduced the abundance and distribution of distinct native vegetation, such as grassland and wetland. The occurrence of these cover classes may become even more limited as a result of the Project. This is of particular concern for cover classes that have restricted distributions within the RAA (*e.g.,* grassland). Cover classes were considered less prevalent if they had a restricted distribution in the RAA. The number of less prevalent cover classes, including grassland and wetlands (including marshes, swamps and shallow open water wetlands), intersected by the PDA, the level of residual effects on those classes, and the relative abundance of comparable features elsewhere in the RAA were factored into the characterization of Project effects on vegetation cover classes.

Several large wetland complexes (*e.g.,* the Caliento Bog) are located within the RAA southeast of Caliento, MB (Map Series 10-100 – Vegetation and Wetland Cover Classes in the LAA and RAA). Potential Project effects on the function of these wetland complexes are assessed. Numerous, smaller wetlands, representing a variety of wetland sizes and classes, also occur in the RAA. The number of less prevalent wetland classes intersected by the PDA, the level of residual effects on those classes, and the relative abundance of comparable features elsewhere in the RAA were factored into the characterization of Project effects on wetlands.

10.3.2.1.3 Invasive Plant Species

Land conversion has also affected the abundance and distribution of native plant species, and threatened the viability of many species. The introduction of aggressive invasive plant species has further modified and, in some cases, threatened native plant community structure and species diversity. Potential Project effects were assessed by quantifying baseline invasive plant species occurrences along the proposed route and reviewing published literature on the susceptibility of different vegetation classes to invasive plant species.

10.3.2.1.4 Rare Plant Species

A number of native plant species have become rare as a result of agricultural conversion and development over the past 100 years. SAR and SOCC have been identified provincially and federally based on their limited abundance and distribution, and ongoing threats to their viability due to habitat loss, woody species encroachment and spread of invasive plant species.

Localized disturbance associated with the development of linear facilities can further affect the viability of native species that have restricted distributions. The assessment of potential Project effects on rare plant species focused on SAR and SOCC.

SAR are species:

- listed as *Endangered*, *Threatened* or *Special Concern* under Schedule 1, Schedule 2 or Schedule 3 of SARA (Government of Canada 2013a)

- listed as *Endangered*, *Threatened* or *Special Concern* by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) (Government of Canada. 2013a) but not yet listed under SARA
- listed as *Endangered* or *Threatened* in under the Manitoba Threatened, Endangered and Extirpated Species Regulation (Government of Manitoba 2014a)

SOCC are species:

- assigned a ranking of *S1*, *S2* or *S3* by MBCDC

Potential Project effects on rare plant species were assessed by quantifying the number of SAR and SOCC occurrences recorded historically and during the plant surveys in the PDA, and evaluating the relative abundance of their occurrences elsewhere in the RAA.

10.3.2.1.5 Traditional Use Plant Species

During the FNMEP, concerns were expressed about the decreasing availability of native plants of traditional use (Section 10.1.2.1).

The assessment of potential Project effects on the abundance and distribution of traditional use plant species focused on representative species identified during the FNMEP, specifically the self-directed ATK study undertaken jointly by Black River First Nation, Long Plain First Nation and Swan Lake First Nation (2015), which included a list of traditional use plant species identified by community members during a survey of the RAA (Table 10-2).This list was cross-referenced with a list of plant species identified during field studies for the Project (Map Series 10-200 – Traditional Use Plant Species Observed).

Potential Project effects on traditional use plant species were assessed by evaluating the abundance of these species, and the potential alteration of associated land cover classes in the RAA.

10.3.2.2 Potential Environmental Effects, Effect Pathways and Measurable Parameters

Highly varied vegetation and land use conditions occur along the length of the PDA. ROW clearing to support construction, ground work associated with tower installations and station modifications, and on-going vegetation maintenance during operation could alter vegetation composition and structure along the narrow transmission corridor.

Potential key issues related to vegetation and wetlands are fragmentation of native vegetation and wetland areas, loss of native vegetation areas and alteration of community structure, loss of wetland function, introduction or spread of invasive plant species, loss of rare plant species and loss of traditional use plant species.

Linear developments such as transmission lines can alter vegetation characteristics at the landscape level by creating edge habitat where native areas are bisected. This changes the size and distribution of intact native vegetation patches, which can affect native vegetation integrity and wildlife sustainability. Patch size, distance between native patches and the association of different patch types (*e.g.*, riparian adjacent to upland) can all influence diversity and species abundance, but patterns are variable depending on the species and region (Government of Canada 2013b).

The loss of native vegetation areas and wetlands is a concern for maintaining biodiversity and wildlife habitat. Changes in plant community structure (*e.g.*, loss of trees or shrubs) can also affect plant community composition and wildlife habitat suitability.

Wetlands provide habitat, hydrological and biogeochemical functions (Halsey *et al.* 1997, Hanson *et al.* 2008). Alterations to one of these functions can affect the others, and can result in a loss of overall wetland function. This in turn can affect services valued by society, such as flood attenuation, and hunting and fishing.

Invasive plant species are a subset of weedy plant species that require control or eradication based on provincial or federal legislation. These species are of concern because they can cause economic losses, damage to native plant communities, or human illness or injury (Royer and Dickinson 1999). Effects on agriculture are not covered here; the focus is on effects on native vegetation.

Rare plant species are vulnerable to disturbance, and are protected by provincial and federal legislation. Threats to rare plant species include wetland draining and modifying, recreational activities, trampling, invasive plant species encroachment, woody species encroachment, changes in fire regimes, lack of grazing, soil compaction from vehicle use, and habitat loss due to agricultural development (Henderson 2011). Loss of native vegetation areas is correlated with increases in the number of endangered species (Kerr and Deguise 2004) and is considered the greatest threat to endangered species in Canada (Venter *et al.* 2006).

The potential environmental effects, effect pathways and measureable parameters used in the assessment of effects on vegetation and wetlands, and the rationale for their selection, are provided in Table 10-3.

Effects pathways for vegetation and wetlands are presented in Figure 10-1.

Table 10-3 Potential Environment Effects, Pathways and Measurable Parameters for Vegetation and Wetlands

Potential Environmental Effect	Effect Pathway	Measurable Parameter(s) and Units of Measurement	Notes or Rationale for Selection of the Measureable Parameter
Change in Landscape Intactness	Fragmentation of large intact areas of native vegetation from clearing activities	Number of large "intact" patches of native vegetation classes (# of patches by size)	Large intact patches of native vegetation and wetlands are important landscape elements as they support wildlife populations and maintain ecosystem functions. Public concern about forest fragmentation
Change in Native Vegetation Cover Class Abundance, Distribution and Structure	Disturbance to native vegetation from clearing and surface disturbance related to construction and operational activities	Area (ha) and spatial distribution of native vegetation cover classes	Areas of undisturbed native vegetation are present in the LAA. Public concern about the loss of forested areas, and effects on protected areas, Crown land
Change in Wetland Cover Class Abundance, Distribution, Structure and Function	Disturbance to wetlands and wetland function from clearing and surface disturbance related to construction and operational activities	Area (ha) and spatial distribution of wetland cover classes	Large intact wetlands are present in the LAA; smaller degraded wetlands are present in cultivated areas. Public concern about effects on wetlands, especially those in protected areas; effects of construction on wetlands; and loss of benefits such as water retention and flood prevention

Potential Environmental Effect	Effect Pathway	Measurable Parameter(s) and Units of Measurement	Notes or Rationale for Selection of the Measureable Parameter
Change in Invasive Plant Species Abundance and Distribution	Introduction of invasive plant species from clearing, surface disturbance and traffic related to construction and operational activities	Qualitative evaluation of risk of introduction or spread of invasive plant species	Listed invasive plant species can out-compete native plant species for habitat and rapidly spread in areas disturbed by construction. The abundance and distribution of invasive plants are subject to The Noxious Weeds Act and the Declaration of Noxious Weeds. Public concern about increased weed occurrences and increased chemical use
Change in Rare Plant Species Abundance and Distribution	Disturbance to native vegetation from clearing and surface disturbance related to construction and operational activities	Number and location of occurrences of SAR/SOCC (or designated critical habitat)	SAR/SOCC exist in small numbers or have a restricted distribution. Listed species are protected federally and provincially. Public concern about the loss of rare plant species
Change in Traditional Use Plant Species Abundance and Distribution	Disturbance to native vegetation supporting traditionally used plants from clearing and surface disturbance related to construction and operational	Occurrences of traditional use plant species (presence) Area (ha) and spatial distribution of native vegetation cover classes which potentially support traditionally used plants	Comments and concerns received through the First Nations and Metis Engagement Process regarding the loss of medicinal plants, traditionally used plants and berry patches

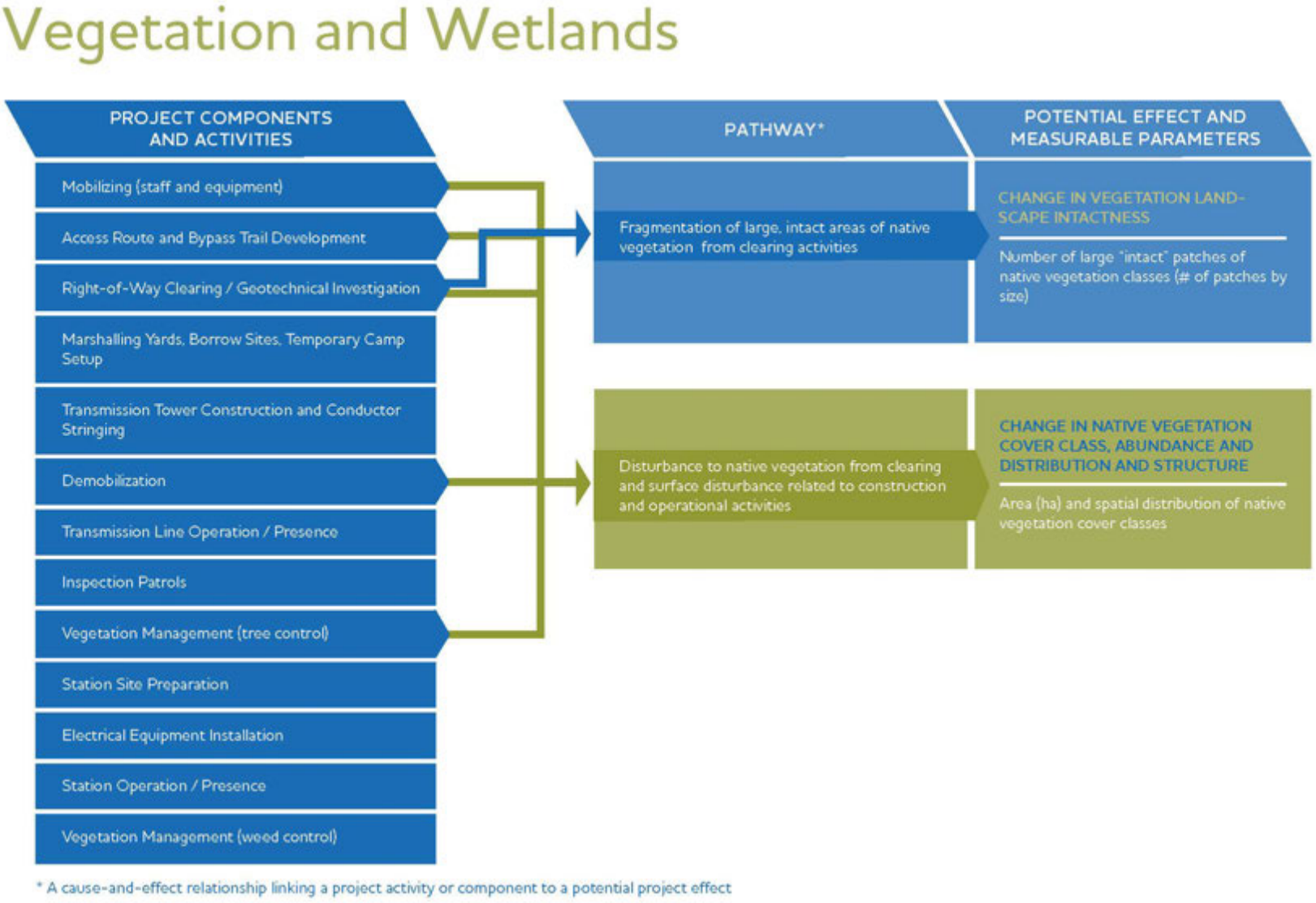

Figure 10-1 Effects Pathways for Vegetation and Wetlands

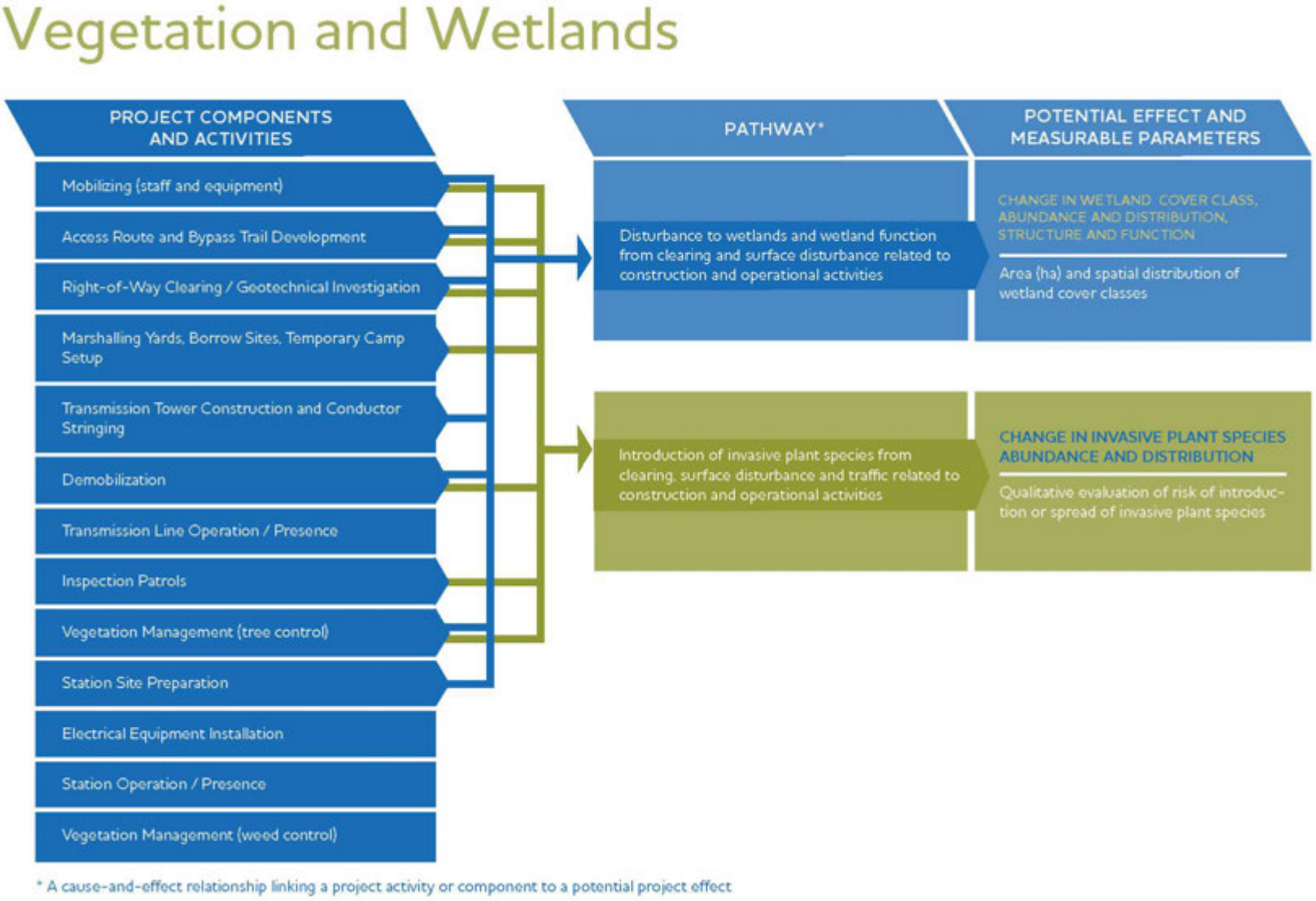

Figure 10-1 Effects Pathways for Vegetation and Wetlands (continued)

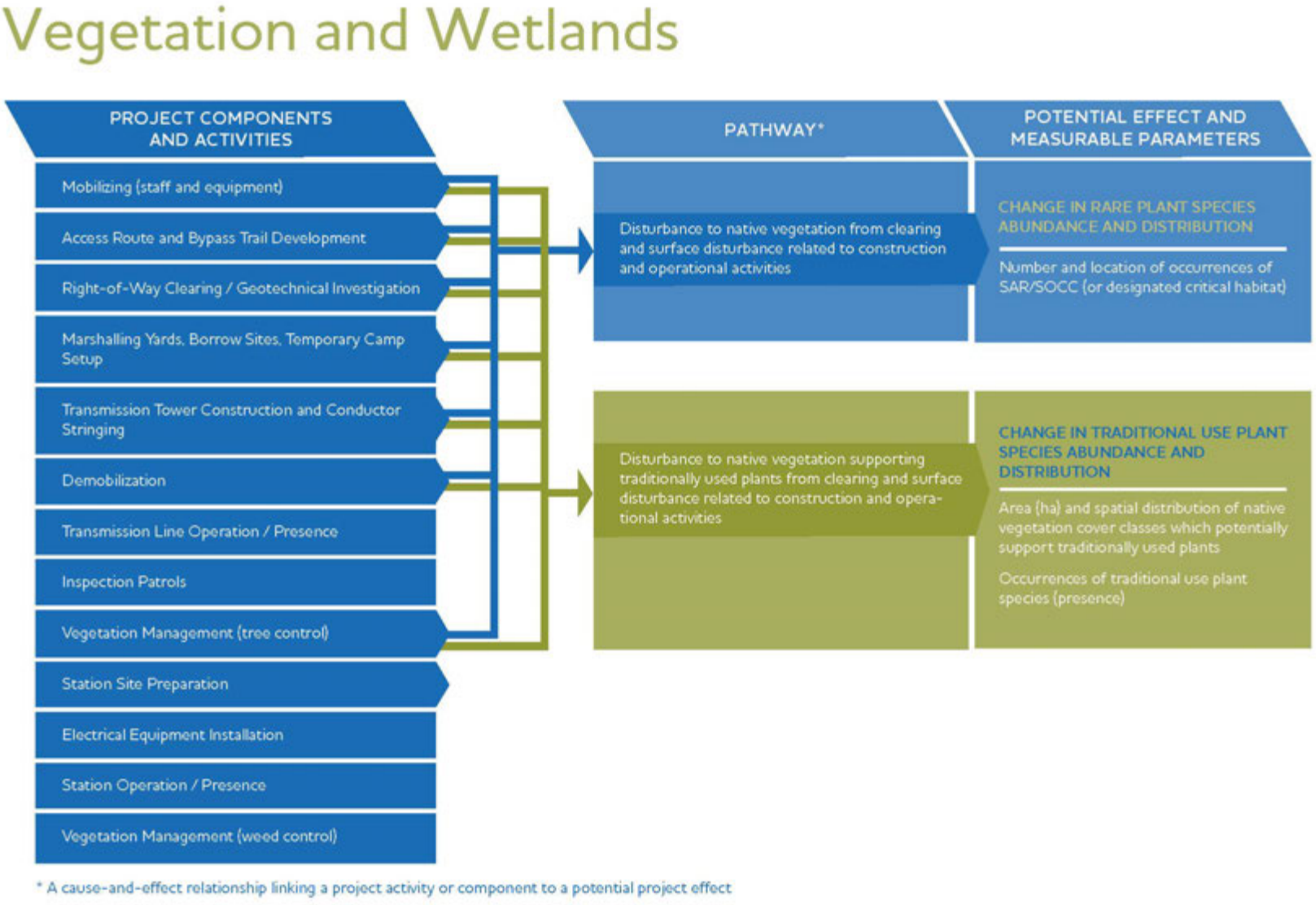

Figure 10-1 Effects Pathways for Vegetation and Wetlands (continued)

10.3.2.3 Residual Environmental Effects Description Criteria

Terms used to characterize residual environmental effects on vegetation and wetlands are summarized in Table 10-4.

Table 10-4 Characterization of Residual Environmental Effects on Vegetation and Wetlands

Characterization	Description	Quantitative Measure or Definition of Qualitative Categories
Direction	The trend of the residual effect	**Positive**— an increase in landscape intactness, an increase in area/spatial distribution of native vegetation cover classes, an increase in area/spatial distribution of wetland cover classes, a decrease in invasive plant species occurrences, an increase in plant SAR/SOCC occurrences, or an increase in traditional use plant species occurrences **Adverse**—a decrease in landscape intactness, a decrease in area/spatial distribution of native vegetation cover classes, a decrease in area, spatial distribution, or function of wetland cover classes, an increase in/spread of invasive plant species in native vegetation cover classes, a decrease in plant SAR/SOCC occurrences, or a decrease in traditional use plant species occurrences **Neutral**—no net change in measurable parameters from baseline conditions and trends
Magnitude	The amount of change in measurable parameters of the VC relative to existing conditions	**Negligible**—no measureable change from baseline conditions and trends **Low**—changes in the distribution and abundance but no loss within the LAA of: • large intact native vegetation patches (>200 ha), • native vegetation cover classes, • wetland cover classes • SAR/SOCC plant species or • traditional use plant species Changes in the distribution of invasive plant species in the LAA but no new species introductions are likely **Moderate**—loss within the LAA of: • large intact native vegetation patches (>200 ha) • native vegetation cover classes, • wetland cover classes,

Characterization	Description	Quantitative Measure or Definition of Qualitative Categories
		• SAR/SOCC plant species or • traditional use plant species These features are well represented in the RAA. Changes in distribution of invasive plant species in the LAA, including likely introductions of new species **High**—loss in the RAA (*i.e.,* features lost in the RAA have no known occurrences elsewhere in the RAA) of: • large intact native vegetation patches (>200 ha), • native vegetation cover classes, • wetland cover classes, • SAR/SOCC plant species, or • traditional use plant species Changes in distribution of invasive plant species in the RAA, including likely introductions of new species
Geographic Extent	The geographic area in which an environmental effect occurs	**PDA**—residual effects are restricted to the PDA **LAA**—residual effects extend into the LAA **RAA** – residual effects extend beyond the LAA and potentially interact with those of other projects in the RAA
Duration	The period of time required until the measurable parameter or the VC returns to its existing condition, or the effect can no longer be measured or otherwise perceived	**Short-term**—the residual effect is restricted to the construction phase **Medium-term**—the residual effect extends beyond the construction phase **Permanent**—the residual effect extends for the lifetime of the Project or longer
Frequency	Identifies when the residual effect occurs and how often during the Project or in a specific phase	**Single event**—the residual effect occurs once throughout the construction and operation/maintenance phases **Multiple irregular event (no set schedule)**—the residual effect occurs sporadically (and intermittently) throughout the construction and operation/maintenance phases **Multiple regular event**—the residual effect occurs repeatedly and regularly throughout the construction and operation/maintenance phases **Continuous**—the residual effect occurs continuously through the construction and operation/maintenance phases

Characterization	Description	Quantitative Measure or Definition of Qualitative Categories
Reversibility	Pertains to whether a measurable parameter or the VC can return to its existing condition after the Project activity ceases	**Reversible**—the residual effect is likely to be reversed after activity completion and natural revegetation **Irreversible**—the residual effect is unlikely to be reversed
Ecological Context	Existing condition and trends in the area where environmental effects occur	**Undisturbed**—the area is relatively undisturbed or not adversely affected by human-related development **Disturbed**—the area has been substantially disturbed previously by human-related development, or human-related development is still present

10.3.2.4 Significance Thresholds for Residual Environmental Effects

An overall determination of significance is made for the Project residual effects on vegetation and wetlands after mitigation measures are implemented. There are no specific provincial or federal regulations that set thresholds for determining the significance of environmental effects on vegetation and wetlands.

Consequently, an environmental effect on vegetation and wetlands is considered significant if the environmental effects of the Project result in:

- an effect that threatens the long-term persistence or viability, including effects that are contrary to, or inconsistent with, federal (including recovery strategies and critical habitat) and provincial management objectives, in the RAA of:
    - intact native vegetation patches larger than 200 ha, or
    - native vegetation cover classes, or
    - rare plant species (including SAR), or
    - traditional use plant species,
- an effect that results in a net loss of wetland function in the RAA that cannot be mitigated

10.4 Existing Conditions for Vegetation and Wetlands

This section presents information about the existing conditions of native vegetation and wetlands in the LAA/RAA, provides a brief summary of field surveys and data analyses, and concludes with a summary of existing conditions based on desktop information and field data collected for the Project.

For more detailed information about field surveys and findings, see the Biophysical Technical Data Reports - Vegetation and Wetlands.

10.4.1 Overview

Vegetation along the Project transitions from the Prairie Ecozone into the Boreal Plain Ecozone. The Existing Corridor originates at the Dorsey Converter Station near Rosser, MB and occurs within the Lake Manitoba Plain Ecoregion in the Prairie Ecozone. Since European settlement, grassland areas have been heavily influenced by agricultural development, and many wetlands have been drained and converted to agriculture (Henderson and Koper 2014).

The Existing Corridor is located predominantly on agricultural land (84% of PDA) but also extends through areas of riparian vegetation where it crosses the Assiniboine, Red and La Salle rivers. Moving eastward, the Existing Corridor parallels the Red River Floodway, which is dominated by hayland. The Existing Corridor turns eastward from the Red River Floodway at Deacon's corner near the Riel Converter Station, paralleling PTH 15 to just past PTH 12. This portion of the Existing Corridor is predominantly cultivated and hayland, but smaller amounts of native vegetation (5.7%) and wetlands (1.3%) are scattered throughout the area.

As the Project turns south near Anola, MB, it changes from the Existing Corridor to the New ROW, and from the Prairie Ecozone to the Boreal Plain Ecozone. The New ROW is a mosaic of upland and wetland areas. The New ROW LAA is dominated by native vegetation (65.1%) and is relatively undisturbed: only 28.2% of the LAA is agricultural land; 3.8% is other development. The Interlake Plain Ecoregion, which begins east of PTH 12 just south of Springfield, consists of agricultural land around La Broquerie and Marchand, with scattered patches of native vegetation dominated by mixedwood and coniferous forests, interspersed with fens, bogs and meandering streams (Smith *et al.* 1998). As the New ROW continues south and crosses PTH 12 again, southeast of the town of Zhoda, there is a transition to the Lake of the Woods Ecoregion within the Boreal Shield Ecozone. Around the U.S. border near the town of Piney, MB, the area is dominated by humid, transitional mixedwood forests (Smith *et al.* 1998). This area also has large wetland complexes, including the Caliento, Sundown and Piney bogs, and large patches of intact native vegetation, including tamarack and black spruce bogs, which is important habitat for rare and traditional use plant species, such as ginger *(Asarum canadense)*.

Dorsey and Riel are located in areas dominated by agriculture (*i.e.,* cropland). Both converter stations are located within the Winnipeg Ecodistrict, which is part of the Lake Manitoba Plain Ecoregion.The Glenboro South Station is located 1.5 km south of Glenboro, MB, west of Winnipeg. Glenboro South is in the Aspen Parkland, and the LAA is dominated by agricultural land. Additional descriptions of the ecoregions are provided in the Biophysical Technical Data Reports - Vegetation and Wetlands.

Large intact patches of native vegetation occur south of the town of Richer, MB, and where the New ROW transitions into the Lake of the Woods Ecoregion. The preservation of less prevalent cover classes, such as grassland, was identified and considered during the transmission line routing process. A study conducted in 2007–2008 revisited sites that supported grassland in the late 1980s; it showed that 37% of those grasslands had been converted to other land use classes (Koper *et al.* 2009). Grasslands provide habitat for plant and wildlife species, including grassland song birds (*e.g.,* bobolink and western meadowlark require a minimum 50 ha patch size with at least one 100 ha patch, with bird abundance and nest productivity increasing with an increase in grassland area [Environment Canada 2013]). Currently, grasslands are threatened by development, lack of grazing and fire, shrub encroachment and spread of invasive plant species.

The New ROW intersects some large intact wetlands, including the Caliento, Sundown and Piney bogs, all of which are located in the most southeastern portion of the New ROW, in the area surrounding Piney (northwest and southwest). In the Existing Corridor PDA, the most common wetland class is marsh wetlands; however, most have been affected by development and agriculture. Manitoba has lost 40–70% of marsh and shallow open water wetlands since settlement (Government of Manitoba 2014b). The *Federal Policy on Wetland Conservation* indicates that the area where the LAA is located includes areas with moderate to high wetland loss (Government of Canada 1991). It is estimated that Manitoba loses 0.5% of the remaining wetlands per year in agricultural areas (Government of Manitoba 2014c). Other wetlands such as fens and bogs are threatened by peat extraction industries (Government of Manitoba 2014b). However, there are currently two peat moratoriums in place in Manitoba: one on the issuance of new peat quarry leases and another on the issuance of *Environment Act* licenses for existing peat leases in Manitoba (MCWS n.d.).

Wetlands are highly valued for the services they provide and for their potential to support species of conservation concern. However, there are several threats to wetlands, and their extent has been continuously reduced over the last 100 years as a result of land drainage, agricultural expansion and runoff, forestry and other development, including roads, railway, transmission lines and residential development (Government of Canada 1996). The preservation of large wetland patches was a consideration during routing for the Project.

10.4.2 Vegetation Landscape Intactness

This section addresses landscape intactness in the PDA. It includes information about natural disturbances that shape the landscape and details about the number and size of intact patches prior to Project construction.

In the past, landscape intactness was influenced largely by the natural fire disturbance regime. In the Boreal Shield and Boreal Plain ecozones, forest fires are frequent events that shape vegetation dynamics in these ecosystems (Smith *et al.* 1998). Fire is considered the keystone process; it affects vegetation composition and succession, and directly influences stand life cycles, regeneration and patchiness (Weber and Flannigan 1997; Stocks *et al.* 2003). This results in a mosaic of successional stages and age structures, which creates greater landscape diversity and provides an array of habitats for flora and fauna (Perry 1994). Data indicate that from 1928 to 2013, fire size in the RAA ranged from less than 1 ha to 5042 ha (1953); average fire size was 59 ha, and median fire size was 11 ha (Government of Manitoba 2015b).

Along the Existing Corridor, intact native vegetation consists primarily of patches that are less than 100 ha; most patches are less than 2 ha. Wetlands are also generally less than 2 ha, and are most commonly 0.1–1 ha.This high level of fragmentation along the Existing Corridor is most likely due to development and agriculture (Map 10-3 – Habitat Fragmentation in the RAA). However, patches larger than 200 ha are present at the transition from the Existing Corridor to the New ROW near Vivian, MB. Patches larger than 200 ha are critical for supporting biodiversity (Government of Canada 2013b).

Compared to the Existing Corridor, intactness is much higher in the New ROW RAA; there is a more even distribution of patch sizes and a greater number of patches larger than 200 ha for both native vegetation and wetlands (Map 10-3 – Habitat Fragmentation in the RAA). The total area of intact native vegetation patches and wetlands is composed primarily of patches larger than 200 ha (about 80% of the remaining area). The largest intact patch of native vegetation intersected by the LAA is the Sundown Bog: 2687 ha. Other large intact patches intersected by the LAA include a 1097 ha patch east of the Lone Sand ASI, a 1052 ha patch east of the Watson P. Davidson WMA, and a 815 ha patch that includes Sundown Lake (Table 10-5 and Map 10-3 – Habitat Fragmentation in the RAA).

Table 10-5 Large Intact Patches (> 200 ha) of Native Vegetation in the LAA Intersected by the PDA

Category	Dominant Cover Class	Original Patch Size (ha) in the LAA	Area Intersected by the PDA (ha)	Patches Adjacent to or Within Named Areas
Native Vegetation	Deciduous forest	212.8	11.3	–
Native Vegetation	Shrubland	225.1	16.1	Adjacent to the Watson P. Davidson WMA
Native Vegetation	Deciduous forest	228.1	0.0	–
Native Vegetation	Grassland	242.9	10.1	–
Wetland	Bog	303.8	0.1	Sundown Bog
Native Vegetation	Coniferous forest	310.0	8.0	–
Wetland	Fen	368.6	0.0	–
Native Vegetation	Deciduous forest	391.6	18.2	Wetland in the Lonesand ASI
Native Vegetation	Deciduous forest	396.7	22.7	–
Native Vegetation	Shrubland	414.6	19.4	–
Native Vegetation	Deciduous forest	469.6	22.3	–
Native Vegetation	Mixedwood forest	485.8	22.2	–
Wetland	Fen	523.9	38.0	Sundown Lake
Native Vegetation	Coniferous forest	639.5	37.6	Southeast of the Caliento Bog, south of Rat River
Native Vegetation	Deciduous forest	791.1	35.9	Caliento Bog, near Sundown Lake
Native Vegetation	Deciduous forest	866.0	55.9	–
Native Vegetation	Deciduous forest	1,052.5	63.9	Wetlands adjacent to Watson P. Davidson WMA
Native Vegetation	Coniferous forest	1,097.1	54.2	Wetlands adjacent to Lonesand ASI
Native Vegetation	Coniferous forest	2,687.4	135.7	Sundown Bog/Piney Bog

10.4.3 Native Vegetation Cover Class Abundance, Distribution, and Structure

This section presents baseline information on native vegetation cover classes in the PDA, LAA and RAA.

Native vegetation cover classes calculations for the LAA and RAA are based on the FRI database (Section 10.3.1). Native vegetation cover classes (*i.e.,* coniferous, deciduous and mixedwood forests, grassland, shrubland and sand dune) make up approximately 32% in each of the LAA and RAA (Table 10-6, Map Series 10-100 – Vegetation and Wetland Cover Classes in the LAA and RAA). This native vegetation is located primarily along the section of the New ROW that extends from just south of the town of Anola through La Broquerie to southeast of the town of Piney, which encompasses the south and southeastern extent of the Project (Map Series 10-100 – Vegetation and Wetland Cover Classes in the LAA and RAA). Large areas of native vegetation types are present in the LAA and RAA despite disturbance by agriculture (41% of LAA and 48% of RAA, Table 10-6), and other developed lands, including industry, transportation, and urban and rural development (18% of LAA and 13% of RAA, Table 10-6).

Land cover mapping was refined for the PDA to provide greater detail and certainty as described in Section 10.3.1, and assessment of effects on native vegetation within the PDA is based on this refined desktop mapping (Table 10-7). Presentation of vegetation cover classes based on refined desktop mapping and FRI-based data is useful to bridge the comparison of vegetation cover within the PDA based on refined desktop mapping and the FRI-based data presented for the LAA and RAA (Table 10-7). Examples of discrepancies between these two data sets are as follows:

- Based on FRI data, more than 22% of the PDA is considered developed land; however, the amount of land under the buildings cover type is over-estimated at 19% of the PDA as all land within the boundary of the City of Winnipeg are classed as buildings land cover. The refined desktop mapping provides a more accurate estimate of land cover under buildings at less than 1% of the PDA.
- Areas of agricultural land are higher based on desktop mapping likely due to the classification of areas of cultivated and pasture land associated with the Red River Floodway (but outside the flooded area) as channels.
- Areas of native vegetation are lower based on desktop mapping likely due to the fine scale wetland classification used for desktop mapping.
- Areas of wetlands are greater for desktop mapping when compared to FRI largely due to the addition of the swamp class (swamps are probably included in the deciduous forest and shrubland classes in the FRI data) and an increase in areas mapped as marsh due to the finer scale of desktop mapping (1:3,000 compared to 1:15,000).

Table 10-6 Vegetation Cover Class Abundance in the PDA, LAA, and RAA Based on FRI Data

Land Cover Category	Class Name	Area Occupied[1] (ha)			Proportion of Assessment Area (%)		
		PDA	LAA	RAA	PDA	LAA	RAA
Native Vegetation	Grassland	91	1,805	27,923	2.9	3.9	3.9
	Shrubland	111	2,239	32,146	3.5	4.4	4.4
	Deciduous forest	365	7,389	116,357	11.6	2.1	16.1
	Coniferous forest	169	3,384	47,905	5.4	10.1	6.6
	Mixedwood forest	15	557	11,628	0.5	11.4	1.6
	Sand dune	0.0	0.0	362	0.0	0.0	0.1
	Total Native Vegetation	***752***	***15,373***	***236,321***	***23.8***	***32.9***	***32.7***
Wetland	Bogs	21	511	5,805	0.7	1.1	0.8
	Fens	35	1,111	21,383	1.1	2.4	3.0
	Marshes	0.6	163	5,694	0.0	0.4	0.8
	Dugouts	0.2	99	313	0.0	0.2	0.0
	Total Wetland	***56***	***1,884***	***33,194***	***1.8***	***4.0***	***4.6***
Water	River	7.4	90.5	2,091	0.2	0.2	0.3
	Channels	232	1,266	5,934	7.3	2.7	0.8
	Lake	0.0	33	1,864	0.0	0.1	0.3
	Total Water	***239***	***1,390***	***9,890***	***7.6***	***3.0***	***1.4***

Land Cover Category	Class Name	Area Occupied[1] (ha)			Proportion of Assessment Area (%)		
		PDA	LAA	RAA	PDA	LAA	RAA
Agriculture	Cultivated	1,171	16,983	311,136	37.0	36.3	43.0
	Pasture	213	2,025	33,872	6.7	4.3	4.7
	Total Agriculture	***1,384***	***19,007***	***345,008***	***43.8***	***40.6***	***47.7***
Developed	Roads	101	1,295	22,220	3.2	2.8	3.1
	Buildings	595	6,947	66,512	18.8	14.9	9.2
	Industrial	5.6	154	3,086	0.2	0.3	0.4
	Recreation Sites	0.0	70	503	0.0	0.2	0.1
	Total Developed	***701***	***8,466***	***92,320***	***22.2***	***18.1***	***12.8***
Undefined	Undefined	0.2	3.0	45	0.0	0.0	0.0
Recently Cleared	Recently cleared	28	659	6,448	0.9	1.4	0.9
Total Project Area[2]		**3,161**	**46,782**	**723,227**	**100.0**	**100.0**	**100.0**

NOTES:
[1] Vegetation cover class abundance for the PDA, LAA and RAA are based on FRI data.
[2] Total cover, including developed, native vegetation, agriculture, wetland, water, undefined and recently cleared.
Numbers in table may be higher due to rounding.

Table 10-7 Vegetation Cover Class Abundance in the PDA Based on Desktop Mapping and FRI Data

Land Cover Category	Class Name	Area Occupied (ha)		Proportion of Assessment Area (%)	
		PDA Desktop Mapping[1]	PDA FRI[2]	PDA Desktop Mapping	PDA FRI
Native Vegetation	Grassland	57	91	1.8	2.9
	Shrubland	25	111	0.8	3.5
	Deciduous forest	278	365	8.8	11.6
	Coniferous forest	85	169	2.7	5.4
	Mixedwood forest	150	15	4.8	0.5
	Sand dune	0.0	0.0	0.0	0.0
	Total Native Vegetation	***596***	***752***	***18.8***	***23.8***
Wetland	Bogs	25	21	0.8	0.7
	Fens	93	35	3.0	1.1
	Marshes	250	0.6	7.9	0.0
	Shallow open water	0.3	0.0	0.0	0.0
	Swamp	88	0.0	2.8	0.0
	Dugouts	1.4	0.2	0.0	0.0
	Total Wetland	***458***	***56***	***14.5***	***1.8***

Land Cover Category	Class Name	Area Occupied (ha)		Proportion of Assessment Area (%)	
		PDA Desktop Mapping[1]	PDA FRI[2]	PDA Desktop Mapping	PDA FRI
Water	River	6.2	7.4	0.2	0.2
	Channels	1.7	232	0.1	7.3
	Lake	0.0	0.0	0.0	0.0
	Total Water	***7.9***	***239***	***0.3***	***7.6***
Agriculture	Cultivated	1,675	1,171	53.0	37.0
	Pasture	307	213	9.7	6.7
	Total Agriculture	***1,982***	***1,384***	***62.6***	***43.8***
Developed	Roads	67	101	2.1	3.2
	Buildings	11	595	0.3	18.8
	Industrial	20	5.6	0.6	0.2
	Recreation sites	0.0	0.0	0.0	0.0
	Total Developed	***98***	***701***	***3.1***	***22.2***
Undefined	Undefined	0.0	0.2	0.0	0.0
Recently Cleared	Recently cleared	20	28	0.6	0.9
Total Project Area[2]		**3,161**	**3,161**	**100.0**	**100.0**

NOTES:
[1] Vegetation cover class abundance based on desktop mapping conducted for the Project.
[2] Vegetation cover class abundance based on the FRI.
[3] Total cover, including developed, native vegetation, agriculture, wetland, water, undefined and recently cleared.
Numbers in table may be higher due to rounding.

Based on refined desktop mapping, native vegetation cover classes (*i.e.,* coniferous, deciduous and mixedwood forests, grassland, and shrubland) make up approximately 576 ha or 18.3% of the PDA. This equates to just over two sections of land (Table 10-7, Map Series 10-100 – Vegetation and Wetland Classes in the LAA and RAA [a more detailed map of native vegetation distribution is provided in the Biophysical Technical Data Reports - Vegetation and Wetlands]). Agriculture occupies approximately 63% of PDA, while other developed lands, including industry, transportation, and urban and rural development, occupy 3.1 % of the PDA (Table 10-7).

In the past, Manitoba listed native vegetation communities that were considered rare in the province. However, the MCWS Wildlife Branch is revising these communities of conservation concern, so they are no longer listed by the MBCDC (Friesen 2014b, pers. comm.). Therefore, communities of conservation concern are not discussed further in this assessment.

The Existing Corridor PDA is dominated by agricultural lands (51.3% [1021.2 ha]); small patches of native vegetation (2.6% [52.5 ha]) are located at the easternmost extent of the ROW, south of Anola, MB. The Existing Corridor PDA is also comprised of wetlands (less than 0.1% [0.2 ha]), although they are under-represented in the FRI database, developed land (34.0% [677.1 ha]) and water (11.8% [235.6 ha]) (see Vegetation and Wetlands Technical Report for additional details). Due to the lack of undisturbed habitat, there is a lower potential for rare and traditional use plant species to occur along the Existing Corridor compared to the New ROW.

Native vegetation in the PDA occurs predominantly along the New ROW; it comprises most of the New ROW (64.1% [699.1 ha], and is followed by wetlands (5.2% [56.2 ha]), agricultural land (26.1% [284.3 ha]), recently cleared land (2.3% [25.1 ha]), developed land (2.0% [21.8 ha]) and water (0.3% [3.8 ha]).

The area around Glenboro South, Dorsey and Riel is primarily agriculture land (cultivated or pasture) (96.9% [78.9 ha]), followed by developed land (3.1% [2.6 ha]). The FRI database does not classify any wetlands in the Stations PDA; however, the desktop mapping revealed that small wetlands are associated with the stations (0.7% [0.6 ha]). The area around the stations does not include any native upland vegetation (Map Series 10-100 – Vegetation and Wetland Cover Classes in the LAA and RAA). There is little potential for rare and traditional use plant species to occur in the area around the stations due to the lack of suitable habitat. Detailed maps of the land cover classes in the PDA are included in the Biophysical Technical Data Reports - Vegetation and Wetlands.

10.4.3.1 Native Vegetation

Native vegetation comprises 24% (752 ha) of the Final Preferred Route PDA, 33% (15,373 ha) of the LAA, and 33% (236,321 ha) of the RAA. Native vegetation in the PDA is comprised primarily of deciduous forest, followed by coniferous forest and shrubland.

10.4.3.1.1 Forests

Deciduous forests are dominated by trembling aspen or American elm (*Ulmus americana*) and shrub species such as choke cherry, and have an understory of herbaceous and graminoid species, including two-leaved Solomon's seal (*Maianthemum canadense*), wild sarsaparilla (*Aralia nudicaulis*) and narrow reed grass (*Calamagrostis stricta*).

Mixedwood forests include conifers such as jack pine (*Pinus banksiana*), and deciduous species such as green ash (*Fraxinus pennsylvanica*), trembling aspen, balsam poplar (*Populus balsamifera*) and paper birch (*Betula papyrifera*). The structure of mixedwood forests is similar to that of deciduous forests, and includes a shrub layer and understory dominated by herbaceous and graminoid species.

Coniferous forests are dominated by black spruce (*Picea mariana*) and an understory of low shrub species such as Labrador tea (*Rhododendron groenlandicum*), bog cranberry (*Vaccinium vitis-idaea*) and low sweet blueberry (*Vaccinium angustifolium*), and have a sparse understory of herbaceous and graminoid species, including two-leaved Solomon's seal.

10.4.3.1.2 Grasslands

Grasslands comprise 2.9% (91 ha or just over one quarter section of land) of the Final Preferred Route PDA, 3.9% (1,805 ha) of the LAA and 3.9% (27,923 ha) of the RAA. Grassland sites included one site that was located in a cleared patch of forest and had grass species such as big bluestem, poverty oat grass (*Danthonia spicata*) and purple oat grass (*Schizachne purpurascens*); other sites were degraded/invaded native grasslands dominated by smooth brome (*Bromus inermis*) and Kentucky bluegrass (*Poa pratensis*). Grasslands also include herbaceous species such as goldenrod (*Solidago* spp.), spreading dogbane (*Apocynum androsaemifolium*) and fleabane (*Erigeron* spp.).

10.4.3.1.3 Shrublands

Shrublands make up approximately 3.5% (111 ha) of the Final Preferred Route PDA, 4.4% (2,239 ha) of the LAA and 4.4% (32,146 ha) of the RAA. Shrublands are dominated by dwarf birch (*Betula pumila*), green alder (*Alnus viridis* ssp. *crispa*), Arctic dwarf birch (*Betula nana*) and trembling aspen. The understory includes graminoids such as fringed brome (*Bromus ciliatus*), sedges (*Carex* spp.) and narrow reed grass, and herbaceous species such as wild sarsaparilla, sweet-scented bedstraw (*Galium triflorum*) and pale vetchling (*Lathyrus ochroleucus*).

10.4.3.2 Wetlands

Wetlands comprise approximately 1.8% (56 ha) of the Final Preferred Route PDA, 4.0% (1,884 ha) of the LAA and 4.6% (33,194 ha) of the RAA. Wetlands are discussed further in Section 10.4.4.

10.4.3.3 Other Cover Classes

10.4.3.3.1 Agricultural Land

Agricultural land is widespread throughout the Project area and occurs around all Project components. Agriculture land comprises approximately 43.8% (1384 ha) of the Final Preferred Route PDA, 40.6% (19,007 ha) of the LAA and 47.7% (345,008 ha) of the RAA. For additional information on agricultural lands, see Chapter 15: Agriculture.

10.4.3.3.2 Developed Land

Developed land comprises approximately 22.2% (701 ha) of the Final Preferred Route PDA, 18.1% (8466 ha) of the LAA and 12.8% (492,320 ha) of the RAA.

Roads are the most prevalent developed land cover class in the Final Preferred Route PDA, followed by industrial and buildings, whereas buildings are the most prevalent developed land cover class in the LAA and RAA, followed by roads and industrial. Developed areas in the PDA are concentrated primarily in the Existing Corridor around Winnipeg and the surrounding area of the Project.

10.4.3.3.3 Water

The water category makes up approximately 7.6% (239 ha) of the Final Preferred Route PDA, 3.0% (1390 ha) of the LAA and 1.4% (9,890 ha) of the RAA. There is no land (0 ha) classed as water within the PDA of Glenboro South, Dorsey or Riel.

10.4.4 Wetland Cover Class Abundance, Distribution, Structure, and Function

Approximately 1.8% (56 ha) of the Final Preferred Route PDA is wetland (Table 10-6) and the Biophysical Technical Data Reports – Vegetation and Wetlands, Map Series 2-300 – Vegetation and Wetland Observations. Large intact patches of wetlands (larger than 200 ha) exist at the southern extent of the New ROW south of Rat River; they include the Caliento Bog, Sundown Bog and Piney Bog (Map Series 10-100 – Vegetation and Wetland Cover Classes in the LAA and RAA). These wetlands are important features on the landscape because they are large (larger than 200 ha) and provide habitat for many species.

Marshes are the most common wetland class in the PDA, followed by swamps.

Fens are the dominant wetland cover class in the LAA (1110 ha) and RAA (21,383 ha) (Table 10-6). Bogs occupy 511 ha and 5805 ha of the LAA and RAA, respectively; marshes occupy 163 ha and 5694 ha, respectively (Table 10-6). However, the FRI database does not classify swamps; they are likely included in the adjacent forest cover class because the data were mapped at a scale of 1:15,000. Shallow open water wetlands are also not classified in the FRI database and are likely included in the marsh wetland cover class.

One Class III marsh wetland was desktop mapped on the west side of the switch yard at Dorsey (southern exterior of Dorsey); it occupies 0.14 ha (9%) of the PDA. A field site visit completed on July 21, 2015, confirmed the presence of the wetland at Dorsey. The wetland was dominated by common cattail (*Typha latifolia*).

Riel is not located near wetlands. One shallow open water wetland (0.15 ha [2.6%]) is located within the Glenboro South Station transmission line realignment area. Shallow open water wetlands are less than 2 m deep in mid-summer and generally do not have vegetation at their centre. They function in water flow moderation and water quality treatment, and may provide habitat for unique plant species (Hanson *et al.* 2008).

10.4.4.1 Additional Data Sources

Wetlands in the PDA were further evaluated using Project desktop mapping, MHHC mapping and the FRI database. The MHHC mapping was used to compare the wetland data across the New ROW PDA, and to determine the quality of wetland classification in the FRI database. The MHHC mapped wetlands in the area of the New ROW are based on eCognition Developer object-based software classification of 30 m pixel LANDSAT-8 imagery. Wetland polygons in the desktop mapping product were delineated at a scale of 1:3,000 and were classified following the Canadian Wetland Classification System (National Wetlands Working Group 1997).

Desktop mapping of wetlands incorporated field survey results and was conducted using a conservative approach. The FRI database is an older database (prior to 2000) that was used primarily for forest inventory, and the mapping was conducted at a 1:15,840 scale. The wetland classification used for the FRI database does not follow the Canadian Wetland Classification System.

The total wetland area mapped in the New ROW based on the MHHC data set was larger than that based on the FRI database but less than that based on the desktop mapping (Table 10-8). This is likely due to several factors, including:

- swamps are not classified in the FRI database and are probably included in the deciduous forest and shrubland classes
- many of the smaller wetlands (*e.g.*, marshes) are under-represented in the FRI database because the forest inventory did not include mapping of wetland areas in agricultural lands
- the area of wetlands mapped decreases with coarser scale mapping

The MHHC data supports the higher wetland abundance identified from the desktop mapping compared to FRI data. The more detailed desktop mapping of the PDA will be used to aid mitigation planning.

Table 10-8 Wetland Cover Class Abundance Comparison in the PDA

Class Name	Area Occupied (ha)			Proportion of PDA (%)		
	Desktop Mapping[1]	FRI[2]	MHHC[3]	Desktop Mapping[1]	FRI[2]	MHHC[3]
New ROW						
Bogs	24.9	20.6	0.0	2.3	1.9	0.0
Fens	93.3	35.0	52.8	8.6	3.2	4.8
Marshes	128.4	0.6	32.7	11.8	0.1	3.0
Shallow open water	0.1	N/A	1.4	0.0	N/A	0.1
Swamp	88.1	N/A	59.1	8.1	N/A	5.4
Dugouts	0.0	0.2	N/A	0.0	0.0	N/A
Total Wetland Area	**334.9**	**56.4**	***146.0***	***30.7***	***5.2***	***13.4***
Existing Corridor						
Bogs	0.0	0.0	nd[4]	0.0	0.0	nd
Fens	0.0	0.0	nd	0.0	0.0	nd
Marshes	121.4	0.0	nd	6.1	0.0	nd
Shallow open water	0.0	N/A	nd	0.0	N/A	nd
Swamp	0.0	N/A	nd	0.0	0.0	nd
Dugouts	1.4	0.2	nd	0.1	0.0	nd
Total Wetland Area	***122.7***	***0.2***	nd	***6.2***	***0.0***	nd
Final Preferred Route						
Bogs	24.9	20.6	nd	0.8	0.7	nd
Fens	93.3	35.0	nd	3.0	1.1	nd
Marshes	249.8	0.6	nd	8.1	0.0	nd
Shallow open water	0.1	N/A	nd	0.0	N/A	nd
Swamp	88.1	N/A	nd	2.9	0.0	nd
Dugouts	1.4	0.4	nd	0.0	0.0	nd
Total Wetland Area	***457.7***	***56.6***	nd	***14.9***	***1.8***	nd

NOTES:
[1] Desktop mapping conducted by Stantec
[2] Based on FRI 2000
[3] Based on MHHC 2015
[4] nd: no data. MHCC data were available only for the New ROW.
Numbers in table may be higher due to rounding.
N/A: not available

10.4.4.2 Wetland Descriptions

10.4.4.2.1 Marshes

Marshes are the most common wetland class; they account for 56% of the total wetland area in the PDA. Class I/II (ephemeral/temporary) and Class III/IV (seasonal/semi-permanent) marshes are located primarily adjacent to agricultural land throughout the New Corridor and Existing Corridor, whereas Class V (permanent) marshes are located mainly in the New ROW adjacent to native vegetation or within wetland complexes.

Marshes are characterized by fluctuating water levels and have a low vegetation structure dominated by graminoid and herbaceous species. Marshes can receive water from surface runoff, groundwater discharge and precipitation; therefore, hydrology can vary dramatically throughout a season. Depending on the geomorphic setting, marshes can provide functions such as water retention, flood storage, erosion protection, climate regulation, water quality treatment, and ground water recharge (Brinson 1993; Hanson *et al*. 2008). Marshes also provide important habitat for wildlife such as waterfowl.

10.4.4.2.2 Swamps

Swamps are the next most common wetland class. They comprise 3.4% (107.9 ha) of the PDA, and include shrub swamps (18.9 ha) and treed swamps (5.8 ha) (Table 10-8). Swamps are forested wetlands dominated either by trees (paper birch, black spruce, trembling aspen, balsam fir [*Abies balsamea*], green alder) or by shrubs (beaked willow [*Salix bebbiana*], shining willow [*Salix lucida*], red-osier dogwood [*Cornus stolonifera*] and bunchberry [*Cornus canadensis*]). Swamps occur on mineral and peat soils, and can function in moderating water flow (flood prevention), erosion protection, water quality treatment and carbon sequestration (Hanson *et al.* 2008). Swamps provide habitat for some unique plant species such as prickly sedge (*Carex tribuloides*), woolly sedge (*C. pellita*), dry-spike sedge (*C. siccata*), Dewey's sedge (*C. deweyana*), snakeroot (*Sanicula marilandica*) and wild sarsaparilla, as well as rare plants.

10.4.4.2.3 Fens

Fens within the PDA include herbaceous/graminoid fens (40.2 ha), shrub fens (1.9 ha) and treed fens (31.9 ha) (Table 10-8). Fens are peatland wetlands, which can be dominated by trees (tamarack, black spruce, bog birch [*Betula glandulosa*]), shrubs, willow, graminoid/herbaceous species, peat moss and sedge (*Carex* spp.). Fens are connected to both groundwater and surface water, and maintain water flow between other wetlands or waterbodies (Brinson 1993). Fens also accumulate peat, maintain water quality, export nutrient and organic matter (Hanson *et al*. 2008). Fens also provide habitat for unique plant species.

10.4.4.2.4 Bogs

There are 24.9 ha of bogs within the PDA, including shrub-dominated and tree-dominated bogs (Table 10-8). Bogs have canopies comprised of trees (tamarack [*Larix laricina*], black spruce and balsam fir) or shrubs (small bog cranberry [*Vaccinium oxycoccos*]), and are dominated by a Sphagnum moss understory. Bogs accumulate peat and are nutrient poor; therefore, they have unique plant communities. Bogs receive water from precipitation, fog and snowmelt, which makes bogs acidic (National Wetlands Working Group 1997). Bog wetlands are important because they store surface water, conserve groundwater, export nutrients and organic matter, and accumulate peat (*i.e.,* they play a role in carbon sequestration) (Brinson 1993; Hanson *et al.* 2008).

10.4.5 Invasive Plant Species

This section refers to invasive plant species that have been recorded historically in the PDA and that were observed during field surveys for the Project.

During the rare plant and wetland surveys, 10 invasive plant species were recorded at 36 locations in the PDA (Table 10-9). Twenty-seven of these occurrences were recorded in the Existing Corridor, six were located at the stations, and four were located in the New ROW. About half of the invasive plant species were encountered in disturbed areas (cleared areas, gravel pits, roads, ATV trail edges) or near agricultural areas (cultivated, pasture). Fifteen of the occurrences were located in native vegetation, specifically deciduous forest (mostly in the Existing Corridor), mixedwood forest and shrubland.

A number of the invasive plant species recorded during the surveys are very common and invade native areas. They include common dandelion (*Taraxacum officinale*), Canada thistle, quack grass (*Elymus repens*) and field sow-thistle (*Sonchus arvensis*); therefore, these species are not described further in this section (Table 10-9).

Because the rare plant and wetland surveys targeted intact native plant communities, few invasive plant species were encountered, and no large infestations were observed. However, it is anticipated that invasive plant species are more abundant in agricultural areas (cultivated and pasture) or in cover classes that border these areas. This is addressed in Chapter 15: Agriculture.

EDDMapS had two historical records of ox-eye daisy (*Leucanthemum vulgare*) in the PDA. The Invasive Species Council of Manitoba (2014) lists this species as Category 2, localized presence, which means it must be reported and eradicated.

Table 10-9 Invasive Plant Species Observed during the 2014 Field Surveys

Scientific Name	Common Name	Number of Occurrences in the PDA
Arctium minus	common burdock	1
Chenopodium album	lamb's-quarters	1
Cirsium arvense	Canada thistle	9
Elymus repens	quack grass	8
Fagopyrum tataricum	tartary buckwheat	1
Galeopsis tetrahit	common hemp-nettle	1
Lactuca serriola	prickly lettuce	1
Lappula squarrosa	bristly stickseed	2
Sonchus arvensis	field sow-thistle	3
Taraxacum officinale	common dandelion	9

Although invasive plant species are present in the PDA, the overall population and effect of these species in the PDA is low. Intact patches of bogs and coniferous forests may not be susceptible to invasive plant species because they have little open canopy space, a thick organic layer, and nutrient deficient soils. However, grassland communities can be vulnerable to weed invasions because the environmental conditions are more conducive to invasion in the prairie ecosystems, including having higher available nutrients than bogs and forests.

10.4.6 Rare Plant Species Abundance and Distribution

This section summarizes information on the SAR and SOCC that were recorded historically in the PDA, LAA and RAA, and that were observed during field surveys in the PDA.

There are 14 plant SAR in Manitoba, but none have been recorded historically or have designated critical habitat within the PDA or LAA. However, the MBCDC database has records of three herbaceous SAR within the RAA: Great Plains ladies' tresses (*Spiranthes magnicamporum*), Riddell's goldenrod (*Solidago riddellii*) and rough purple false-foxglove (*Agalinis aspera*) (Appendix 10A).

Great Plains ladies' tresses has been recorded in three locations in the RAA; it has been found in pasture and adjacent to roads/railways/trails. Riddell's goldenrod has been recorded in six locations in the RAA, including in mixedwood forest, recently cleared, dugout, cultivated and pasture cover classes, and adjacent to roads/railways/trails. Rough purple false-foxglove has been recorded 34 times in the RAA; it has been found in native vegetation (mixedwood forest and grassland) and pasture cover classes, and adjacent to roads/railways/trails. No SAR were found during 2014 field surveys.

The MBCDC database has records of two SOCC, arethusa (*Arethusa bulbosa*) and ram's head lady's slipper (*Cypripedium arietinum*), within the PDA; they were recorded at three locations (Appendix 10A). Six SOCC have been recorded historically within the LAA (at 15 locations); they include five herbs (false indigo [*Amorpha fruticose*], arethusa, white boltonia [*Boltonia asteroids* var. *recognita*], ram's head lady's-slipper and dog violet [*Viola conspersa*]) and one graminoid species (green needle grass [*Nassella viridula*]) (Table 10-10 and Appendix 10A). Sixty-two SOCC have been recorded historically within the RAA (at 660 locations) (Table 10-10 and Appendix 10A); most are herbaceous and graminoid species.

Table 10-10 Historical Occurrences of SAR and SOCC in the PDA, LAA and RAA

Vegetation Form	Provincial Rank[1]	Number of Species Listed by the MBCDC[2]		
		PDA	LAA	RAA
Graminoid	S1	–	–	1
	S2	–	–	3
	S2?	–	–	2
	S2S3	–	–	1
	S3	–	1	4
	S3?	–	–	5
Herb	S1	–	–	2
	S1S2	–	1	5
	S2	1	1	16
	S2?	–	–	2
	S2S3	1	2	6
	S3	–	–	7
	S3?	–	1	1
Shrub	S3	–	–	1
Tree	S2	–	–	1
	S2S3	–	–	1
	S3	–	–	1
Vine	S1	–	–	1
	S2	–	–	1
	S3	–	–	1
Grand Total		2	6	62

NOTE:
[1]See Table 10-2 for Provincial Rank Status definitions
[2] Based on the MBCDC polygon data set

During the 2014 field surveys, three SOCC were observed at eight locations in the PDA (Table 10-11). None are listed under SARA, COSEWIC or MESEA, but they are tracked by the MBCDC (Government of Manitoba 2014a). Moonseed (*Menispermum canadense*) was located in deciduous forest on the northern side of the Assiniboine River within the Existing Corridor. Compact groundsel (*Packera tridenticulata*) was observed in deciduous forest along the south side of the Assiniboine River within the Existing Corridor, and in shrubland along the New ROW. Black ash (*Fraxinus nigra*) was found in deciduous forest and shrubland, and adjacent to pasture.

A detailed map of SOCC occurrences (Map Series 2-300 – Vegetation and Wetland Observations) and a comprehensive species list (Appendix 10A) are presented in in the Biophysical Technical Data Reports - Vegetation and Wetlands.

With the exception of riparian areas, there is little potential for SAR and SOCC to occur along the Existing Corridor and at station locations because these areas are dominated by agricultural lands. There is greater potential for SAR and SOCC to occur along the New ROW because most of this portion of the route is comprised of native vegetation and wetlands.

Table 10-11 Plant SOCC Observed in the PDA during the 2014 Field Surveys

Vegetation Form	Scientific Name	Common Name	Provincial Rank[1]	Number of Occurrences	Associated Land Cover Class
Forb	*Menispermum canadense*	moonseed	S3	1	deciduous forest
Forb	*Packera tridenticulata*	compact groundsel	S3	2	deciduous forest, shrubland
Tree	*Fraxinus nigra*	black ash	S3	5	deciduous forest, shrubland, adjacent to pasture

NOTE:
[1]See Table 10-2 for Provincial Rank Status definitions

10.4.7 Traditional Use Plant Species

Through the FNMEP plant harvesting was identified as a traditional land and resource use throughout the RAA; this includes harvesting native plants for food, medicinal and cultural purposes (Chapter 11).

In a self-directed Aboriginal Traditional Knowledge Study Community Report submitted by Black River First Nation, Long Plain First Nation, Swan Lake First Nation (2015) the communities compiled a list of traditional use plant species identified in the RAA (Table 10-12) which was cross-referenced with the list of plant species found during field surveys by the Vegetation and Wetlands team (Map Series 10-200 – Traditional Use Plant Species Observed). Due to this concern regarding traditional plant species, the Black River, Long Plain and Swan Lake First Nation group were supported to develop a self-direct botanical study. A Preliminary Botanical Report was provided in an appendix of the draft ATK study led by the group. At the time of writing this study had not been formally received; however, key understandings in the Preliminary report indicate that of the 300 plant species identified during the field surveys commissioned by the three First Nations, 95% of those species are known medicinal plants by members of the group (2015).

Table 10-12 Traditional Use Plant Species Identified by Black River, Long Plain and Swan Lake First Nations

Provincial Scientific Name	Traditional Use Plant Name[1]	Provincial Rank[2]
Abies balsamea	balsam fir	S5
Achillea millefolium	yarrow	S5
Acorus americanus	weke	S5
Actaea racemosa	black snakeroot	not listed by the MBCDC
Actaea rubra	baneberry	S5
Agastache foeniculum	giant hyssop	S5
Alnus incana	speckled alder	S5
Amelanchier alnifolia	saskatoon berry	S5
Apocynum androsaemifolium	dogbane	S5
Aquilegia sp.	columbine	–
Aralia nudicaulis	wild sarsaparilla	S5
Arctostaphylos uva-ursi	common bearberry	S5
Artemisia sp.	sage	–
Asarum canadense	wild ginger	S3S4
Asclepias incarnata	swamp milkweed	S4

Provincial Scientific Name	Traditional Use Plant Name[1]	Provincial Rank[2]
Asclepias syriaca	common milkweed	S4
Betula papyrifera	paper birch	S5
Caltha palustris	marsh marigold	S5
Campanula sp.	harebell	–
Cannabis sativa	hemp	SNA
Chamerion angustifolium	fireweed	S5
Conyza canadensis	Canada fleabane	S5
Cornus canadensis	bunchberry	S5
Cornus sericea	red osier dogwood	S5
Corylus americana	American hazelnut	S4
Corylus cornuta	beaked hazelnut	S5
Corylus sp.	hazelnut	–
Cratagus sp.	hawthorn	–
Dasiphora fruticosa	shrubby cinquefoil	S5
Fragaria virginiana	wild strawberry	S5
Geranium bicknellii	Bicknell's geranium	S5
Geum aleppicum	yellow avens	S5
Heuchera richardsonii	alumroot	S5
Hierochloe odorata	sweet grass	S5
Hypericum perforatum	St. John's wort	SNA
Larix laricina	tamarack	S5
Rhododendron groenlandicum	Labrador tea	S5
Lilium philadelphicum	wood lily	S4
Lycopus uniflorus	northern bugle-weed	S5
Maianthemum canadense	Canada mayflower	S5
Mentha sp.	wild mint	–
Oenothera flava	yellow evening primrose	SNA
Polygala senega	Seneca	S4
Populus balsamifera	balsam poplar	S5
Potentilla arguta	tall cinquefoil	S5
Prenanthes sp.	rattlesnake root	–
Prunella vulgaris	self-heal	S4
Prunus nigra	Canada wild plum	S4

Provincial Scientific Name	Traditional Use Plant Name[1]	Provincial Rank[2]
Prunus pensylvanica	pin cherry	S5
Prunus pumila	sand cherry	S4
Prunus sp.	plum	–
Prunus virginiana	choke cherry	S5
Pyrola sp.	wintergreen	–
Quercus macrocarpa	bur oak	S5
Ribes americanum	wild black currant	S5
Ribes oxyacanthoides ssp. *oxyacanthoides*	northern gooseberry	S5
Rosa arkansana	prairie rose	S4
Rosa sp.	wild rose	–
Rubus pubescens	dewberry	S5
Rubus sp.	blackberry	not listed by MBCDC
Rubus idaeus	raspberry	–
Rubus sp.	wild raspberry	–
Sibbaldiopsis tridentata	three-toothed cinquefoil	S5
Solidago canadensis	Canada goldenrod	S5
Solidago gigantea	smooth goldenrod	S5
Spiraea alba	meadowsweet	S5
Stachys palustris	marsh hedge-nettle	S5
Symphoricarpos albus	snowberry	S5
Thuja occidentalis	cedar	S4
Trifolium pratense	red clover	SNA
Vaccinium sp.	blueberry	–
Viburnum opulus	highbush cranberry	S5
Viburnum rafinesquianum	downy arrow-wood	S4
Vitis riparia	wild grapes	S3S4
Zizania palustris	wild rice	S4

NOTE:

[1] Traditional use plant names taken from the *Aboriginal Traditional Knowledge Study Community Report* submitted by Black River First Nation, Long Plain First Nation, and Swan Lake First Nation (May 2015).

[2] See Table 10-2 for Provincial Rank Status definitions,

"-" indicates rank is dependent upon the species identified under the genus listed, where each genus could have numerous species with different ranks.

During the 2014 rare plant surveys, 39 traditional use plant species were recorded at 106 locations in the PDA; 35 locations were along the New ROW, 26 were along the Existing Corridor, and three were at the stations. In the PDA, 26 traditional use plant species were recorded on Crown land at 47 locations. Thirty-nine species were recorded on private land at 59 locations. Many of these species are common plant species in southern Manitoba. In the Existing Corridor PDA, traditional use plant species were observed in deciduous forest and pasture, and adjacent to roads/railways/trails. In the New ROW PDA, these species were observed in deciduous and mixedwood forests, pasture and shrubland. Traditional use plant species were also observed in the PDA at Dorsey. Within the LAA, 63 traditional use plant species were recorded at 529 locations (48 species at 252 locations on Crown land); 68 traditional use plant species were recorded at 1179 locations in the RAA (55 species at 521 locations on Crown land)(Table 10-13 and Map Series 10-200 – Traditional Use Plant Species Observed). For additional information on the traditional use plant species recorded during the 2014 rare plant survey, see the Biophysical Technical Data Reports - Vegetation and Wetlands.

Table 10-13 Occurrences of Traditional Use Plant Species in the PDA, LAA and RAA

Scientific Name	Common Name	Number of Occurrences		
		PDA	LAA	RAA
Abies balsamea	balsam fir	2	4	7
Achillea millefolium	common yarrow	5	18	38
Actaea rubra	red baneberry	–	4	5
Agastache foeniculum	blue giant hyssop	1	2	6
Alnus incana	speckled alder	–	4	4
Amelanchier alnifolia	**saskatoon**	**4**	**18**	**48**
Apocynum androsaemifolium	spreading dogbane	3	12	33
Aralia nudicaulis	wild sarsaparilla	6	30	58
Arctostaphylos uva-ursi	common bearberry	–	4	22
Artemisia biennis	biennial wormwood	–	–	1
Artemisia campestris	field sagewort	–	1	6
Artemisia ludoviciana	prairie sage	–	–	1
Artemisia vulgaris	mugwort	–	1	1
Asarum canadense	wild ginger	2	6	10
Asclepias incarnata	swamp milkweed	–	4	11
Asclepias syriaca	common milkweed	1	1	1
Betula papyrifera	white birch	2	6	14

Scientific Name	Common Name	Number of Occurrences		
		PDA	LAA	RAA
Caltha palustris	marsh marigold	2	13	31
Campanula aparinoides	marsh bellflower	–	3	10
Campanula rotundifolia	bluebell	3	13	33
Chamerion angustifolium ssp. *angustifolium*	fireweed	2	8	25
Conyza canadensis	horse-weed	3	4	9
Cornus canadensis	bunchberry	3	14	30
Cornus sericea	red osier dogwood	5	21	35
Corylus americana	American hazelnut	1	1	2
Corylus cornuta	beaked hazelnut	4	18	31
Crataegus sp.	hawthorn species	–	1	1
Dasiphora fruticosa	shrubby cinquefoil	1	13	42
Drymocallis arguta	tall cinquefoil	–	1	4
Fragaria virginiana	**smooth wild strawberry**	**3**	**14**	**27**
Geranium bicknellii	Bicknell's geranium	–	–	3
Geum aleppicum	yellow avens	–	4	11
Heuchera richardsonii	alumroot	–	1	4
Hierochloe odorata	sweet grass	–	–	1
Larix laricina	tamarack	–	4	17
Lilium philadelphicum	wood lily	–	3	11
Lycopus uniflorus	northern bugle-weed	2	10	16
Maianthemum canadense	two-leaved Solomon's-seal	5	27	63
Mentha arvensis	common mint	1	17	36
Polygala senega	Seneca snakeroot	–	2	2
Populus balsamifera	balsam poplar	3	19	33
Prenanthes alba	white lettuce	–	1	1
Prunella vulgaris	heal-all	–	7	17
Prunus pensylvanica	**pin cherry**	**1**	**6**	**18**
Prunus pumila	**sand cherry**	**–**	**2**	**2**
Prunus virginiana	**choke cherry**	**6**	**18**	**37**
Pyrola sp.	pyrola species	–	1	1

Scientific Name	Common Name	Number of Occurrences		
		PDA	LAA	RAA
Quercus macrocarpa	bur oak	3	18	38
Rhododendron groenlandicum	Labrador tea	–	4	13
Ribes americanum	**wild black currant**	**1**	**6**	**11**
Ribes oxyacanthoides	**bristly wild gooseberry**	**3**	**11**	**18**
Rosa sp.	rose species	1	2	2
Rubus idaeus	**wild red raspberry**	**7**	**22**	**47**
Rubus pubescens	**dewberry**	**5**	**30**	**64**
Sibbaldiopsis tridentata	three-toothed cinquefoil	1	4	8
Solidago canadensis	Canada goldenrod	4	20	46
Solidago gigantea	late goldenrod	2	11	17
Spiraea alba	meadowsweet	2	9	17
Stachys palustris	marsh hedge-nettle	–	5	13
Symphoricarpos albus	snowberry	–	2	4
Thuja occidentalis	eastern white cedar	–	1	3
Trifolium pratense	red clover	2	9	16
Vaccinium angustifolium	**low sweet blueberry**	**2**	**9**	**34**
Vaccinium myrtilloides	**velvet-leaved blueberry**	**–**	**1**	**1**
Vaccinium oxycoccos	**small cranberry**	**–**	**–**	**1**
Vaccinium vitis-idaea	**bog cranberry**	**–**	**1**	**2**
Viburnum opulus	**highbush-cranberry**	**1**	**1**	**2**
Viburnum rafinesqueanum	**downy arrow-wood**	**1**	**2**	**3**
Total Number of Observations		106	529	1179
Total Number of Species		39	63	68

NOTE:
"–" indicates no recorded occurrence within specified assessment area.
Berry species are **bolded**
Source: Stantec Consulting Ltd. 2015

10.4.8 Summary

The Existing Corridor is located predominantly on agricultural land (84% of PDA), but it also extends through areas of riparian vegetation where it crosses the Assiniboine, Red and La Salle rivers. After paralleling the Red River Floodway, which is dominated by hayland, the Existing Corridor turns eastward and remains predominantly on cultivated and hayland with small amounts of native vegetation (5.7%) and wetlands (1.3%).

The New ROW LAA is dominated by native vegetation and can be characterized as a mosaic of forested areas, wetlands, agricultural and rural residential development. This area also has large wetland complexes, including the Caliento, Sundown and Piney bogs, and large patches of intact native vegetation.

Dorsey and Riel are located in areas dominated by agriculture.

Native vegetation comprises 24% of the Final Preferred Route PDA, 33% of the LAA and 33% of the RAA. Native vegetation in the PDA and LAA is comprised primarily of deciduous forest, followed by coniferous forest and shrubland. No areas with conservation agreements are crossed.

Approximately 1.8% of the Final Preferred Route PDA is wetland. At the southern extent of the New ROW south of Rat River, large intact patches of wetlands (larger than 200 ha) exist. Wetlands occupy 4% of the LAA. This is a low estimate because the FRI database is at a coarse scale and under-represents wetland presence.

Along the Existing Corridor, intact native vegetation consists primarily of patches that are less than 100 ha; with most being less than 2 ha. Wetlands are also generally less than 2 ha. Compared to the Existing Corridor, intactness is much higher in the New ROW RAA: there is a more even distribution of patch sizes and more patches of native vegetation and wetlands that are larger than 200 ha.

During 2014 field surveys, 10 invasive plant species were recorded at 36 locations in the PDA. Twenty-seven of these occurrences were recorded in the Existing Corridor, six were located at the stations, and four were located in the New ROW. About half of the invasive plant species were encountered in disturbed areas or near agricultural areas; the remaining occurrences were located in native vegetation, including deciduous forest, mixedwood forest and shrubland. EDDMapS had two historical records of ox-eye daisy (*Leucanthemum vulgare*) in the PDA.

No SAR have been recorded historically or have designated critical habitat within the PDA or LAA. However, the MBCDC database has records of three herbaceous SAR within the RAA: Great Plains ladies' tresses, Riddell's goldenrod and rough purple false-foxglove. No SAR were found during 2014 field surveys.

The MBCDC database has records of two SOCC within the PDA, arethusa and ram's head lady's slipper, and six SOCC have been recorded historically within the LAA; they include five herbs (false indigo, arethusa, white boltonia, ram's head lady's-slipper and dog violet) and one

graminoid species (green needle grass). Sixty-two SOCC have been recorded historically within the RAA (at 660 locations); most are herbaceous and graminoid species. During the 2014 field surveys, three SOCC were observed at eight locations in the PDA of the Existing Corridor and the New ROW. None are listed under SARA, COSEWIC or MESEA, but they are tracked by the MBCDC (Government of Manitoba 2014a).

During 2014 field surveys, 39 traditional use plant species were recorded at 106 locations in the PDA. In the Existing Corridor, traditional use plant species were observed in deciduous forest and pasture, and adjacent to roads/railways/trails. In the New ROW, these species were observed in deciduous and mixedwood forests, pasture and shrubland. Traditional use plant species were also observed at Dorsey.

10.5 Assessment of Project Environmental Effects on Vegetation and Wetlands

There is the potential for the Project to result in a:

- change in vegetation landscape intactness
- change in native vegetation cover class abundance, distribution and structure
- change in wetland cover class abundance, distribution, structure and function
- change in rare plant, traditional use plant and invasive plant species abundance and distribution

The Project EPP will limit or eliminate potential effects on SOCC and identified traditional use plant harvesting areas, as well as the potential introduction and spread of invasive plant species. Additional information on the EPP is provided in Section 10.9.

10.5.1 Project Interactions with Vegetation and Wetlands

Table 10-14 identifies Project physical activities that might interact with vegetation and wetlands, and the potential effect of these interactions. These interactions, standard and Project-specific mitigation, and residual effects are discussed in detail in Sections 10.5.2 –10.5.7.

Table 10-14 Potential Project-Environment Interactions and Effects on Vegetation and Wetlands

Project Components and Physical Activities	Potential Environmental Effects					
	Change in Vegetation Landscape Intactness	Change in Native Vegetation Cover Class Abundance, Distribution and Structure	Change in Wetland Cover Class Abundance, Distribution, Structure and Function	Change in Invasive Plant Species Abundance and Distribution	Change in Rare Plant Species Abundance and Distribution	Change in Traditional Use Plant Species Abundance and Distribution
Transmission Line Construction Activities						
Mobilization (staff and equipment)	–	✓	✓	✓	✓	✓
Access Route and Bypass Trail Development	–	✓	✓	✓	✓	✓
Right-of-way Clearing/Geotechnical Investigations	✓	✓	✓	✓	✓	✓
Marshalling Yards/Borrow Sites/Temporary Camp Setup	–	–	–	✓	✓	✓
Transmission Tower Construction and Conductor Stringing	–	–	✓	–	✓	✓
Demobilization	–	✓	✓	✓	✓	✓
Transmission Line Operation/Maintenance						
Transmission Line Operation/Presence	–	–	–	–	–	–
Inspection Patrols	–	–	–	✓	–	–
Vegetation Management (tree control)	–	✓	✓	✓	✓	✓
Station Construction						
Site Preparation	–	–	✓	–	–	–
Electrical Equipment Installation	–	–	–	–	–	–

Project Components and Physical Activities	Potential Environmental Effects					
	Change in Vegetation Landscape Intactness	Change in Native Vegetation Cover Class Abundance, Distribution and Structure	Change in Wetland Cover Class Abundance, Distribution, Structure and Function	Change in Invasive Plant Species Abundance and Distribution	Change in Rare Plant Species Abundance and Distribution	Change in Traditional Use Plant Species Abundance and Distribution
Station Operation/Maintenance						
Station Operation/Presence	–	–	–	–	–	–
Vegetation Management (weed control)	–	–	–	–	–	–

NOTES:
"✓" = Potential interactions that might cause an effect
"–" = Interactions between the Project and the VC are not expected.

Marshalling yards, borrow sites and temporary construction camps will not interact with landscape intactness, native vegetation or wetlands because they will be located within cleared areas, such as the ROW, natural clearings or existing borrow sources, and not within wetlands. Demobilization will not interact with vegetation and wetlands because the ROW will already be cleared, and station demobilization will occur on land that has been converted to agriculture. Changes in intactness, native vegetation cover classes, invasive plant species, rare plant species and traditional use plants will not occur during station modification or expansion because these activities will be conducted on agricultural land, or within existing fenced compounds (*e.g.*, Riel Converter Station), which have little native vegetation and little potential to provide habitat for rare plants or traditional use plants.

Transmission line operation/presence will not interact with landscape intactness because the fragmentation will occur during construction. Vegetation will be managed during the operation and maintenance phase, but the initial disturbance will occur during construction as most of the vegetation is cleared to facilitate tower installation and conductor stringing. Once in operation, compatible shrub, herb and grass vegetation will be allowed to recolonize the ROW. Effects will be limited to alterations in native vegetation, wetlands and rare/traditional use plants due to the mowing and/or spraying of the ROW to reduce tree growth and the potential introduction or spread of invasive plant species by vehicles and equipment travelling on the ROW. No

interactions with vegetation and wetlands are anticipated during station operation because the initial disturbance will have occurred during station construction.

10.5.2 Assessment of Change in Vegetation Landscape Intactness

The Project has the potential to divide intact patches of native vegetation into smaller patches, and thus increase landscape fragmentation. This could affect biodiversity if species that require largely intact habitat begin to decline in numbers (Wilcox and Murphy 1985). The effect pathways, mitigation measures and characterization of these potential effects are described below.

10.5.2.1 Pathways for Change in Vegetation Landscape Intactness

Vegetation clearing in the ROW could change landscape intactness by fragmenting areas of native or wetland vegetation. Of particular interest are areas that are larger than 200 ha, are locally or provincially protected, are important to wildlife habitat, or have high potential to support SOCC.

10.5.2.1.1 Construction

Construction of the transmission line, including access route and bypass trail development and ROW clearing could change landscape intactness as a result of vegetation clearing (Appendix 10B). Therefore, the Project may result in large vegetation and wetland patches becoming more fragmented, which would lead to an increase in the number of patches and a decrease in patch size in the RAA.

10.5.2.1.2 Operation and Maintenance

Operation and maintenance of the Project is not expected to have further effects on landscape intactness because no additional fragmentation will occur after construction.

10.5.2.2 Mitigation for Change in Vegetation Landscape Intactness

Transmission line routing for the Project considered and ultimately avoided areas of large intact native vegetation patches, including Watson P. Davidson WMA, Earls Block ASI, Hugo Wetland and Boutang ASI. To the degree possible, the route is located parallel to existing linear features or within existing utility corridors (*i.e.,* SLTC and RVTC).

In addition to transmission line routing, the development of an Access Management Plan (Chapter 22) considered the use of existing access routes where possible to further reduce fragmentation effects from the Project during construction.

10.5.2.3 Characterization of Residual Environmental Effect for Change in Vegetation Landscape Intactness

The following discussion outlines the residual environmental effects for change in landscape intactness as a result of Project construction, and operation and maintenance.

10.5.2.3.1 Construction

There are 202 patches of native vegetation larger than 200 ha in the RAA; 22 of those patches will be fragmented by the Project.

Project construction along the Existing Corridor will result in a net loss of one native vegetation patch that is larger than 200 ha located on the easternmost portion of the Existing Corridor northeast of Richland (Figure 10-2 and Map 10-3 – Habitat Fragmentation in the RAA). This will reduce the total area of the Existing Corridor that supports native vegetation patches that are larger than 200 ha by about 4% (Figure 10-3). Most effects on native vegetation patches affect patches that are 2–5 ha. There will be no effects on wetland patches that are larger than 200 ha in the Existing Corridor (Figure 10-6). Only a small decrease in the total area of wetland patches that are smaller than 0.25 ha is expected (Figure 10-7).

Construction along the New ROW will intersect native vegetation patches that are larger than 200 ha. Twenty-one patches larger than 200 ha will be fragmented by the New ROW PDA. Some patches will become less than 200 ha; other large patches will be fragmented into several patches larger than 200 ha, which will result in a net increase in the number of these patches by four (Figure 10-4). The Project will however reduce the total area of patches greater than 200 ha in size by 2271 ha (Figure 10-5 and Map 10-3 – Habitat Fragmentation in the RAA). Construction will cause only about a 1% reduction in the total area in the RAA that is occupied by patches larger than 200 ha (Figure 10-5). Smaller patches will also be affected; the greatest effect will be on patches smaller than 2 ha.

Project effects on wetlands along the New ROW will occur primarily on patches that are smaller than 2 ha (Figure 10-8). The number of wetland patches larger than 200 ha will not be affected because the Project routes mainly along their edges and leaves most of their areas intact. The total area of these large patches will be slightly reduced as a result of the Project (less than 1%) (Figure 10-9). The Project will intersect the Caliento, Sundown and Piney bogs (Table 10-5). These landscape features are important because they contribute to landscape diversity, are near other large intact patches of native vegetation in the RAA (*i.e.,* they provide connectivity), and provide habitat for plants such as orchids and wildlife species, including birds such as yellow rails (see Chapter 9: Wildlife and Wildlife Habitat).

The LAA intersects primarily large patches of native vegetation, most of which are dominated by forest (Table 10-5). Tree clearing and maintenance on the ROW will change vegetation structure along the PDA for the life of the Project. One large patch is dominated by grassland; it is northeast of Richer. The structure of this patch should not change because the vegetation will be allowed to naturally regenerate after construction and ROW maintenance will not affect grasses.

Based on the limited Project effects on large patches of native vegetation and wetlands along the Existing Corridor and New ROW, potential residual effects on landscape intactness during transmission line construction are characterized as follows:

- Direction is adverse: landscape intactness will decrease because the total area of patches larger than 200 ha will be reduced.
- Magnitude is moderate: although Project construction will result in increased fragmentation in the Existing Corridor and New ROW, patches smaller than 200 ha will mainly be affected; the total area of large patches lost will be 4% or less. Although some large patches will be lost, there will be a net increase in patches larger than 200 ha due to fragmentation of very large patches.
- Geographical extent: will be confined to the RAA.
- Frequency is a single event: residual effects will occur once during construction.
- Duration is permanent: residual effects will extend throughout construction, and although herbaceous and shrubby vegetation will be allowed to naturally recover following construction, vegetation will be managed for the life of Project.
- The effect is reversible: the effect will be reversible since the ROW will be allowed to naturally revegetate, except for trees. After the life of the Project, the trees/shrubs could be allowed to regenerate along the ROW.
- Ecological context is disturbed and undisturbed: the Existing Corridor has already been disturbed by human-related development (*i.e.*, agriculture, permanent facilities, roads, trails). Areas of undisturbed intact native vegetation occur primarily along the New ROW.

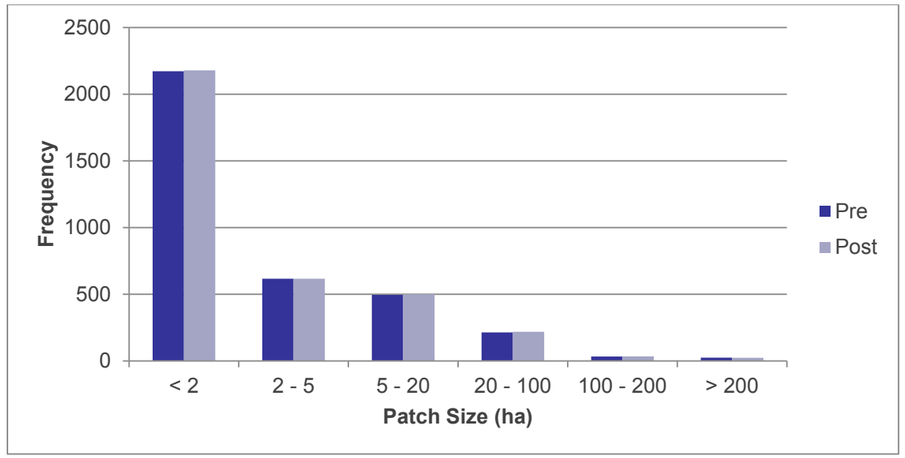

Figure 10-2 **Frequency of Native Vegetation Patch Sizes in the Existing Corridor RAA Pre- and Post-Construction**

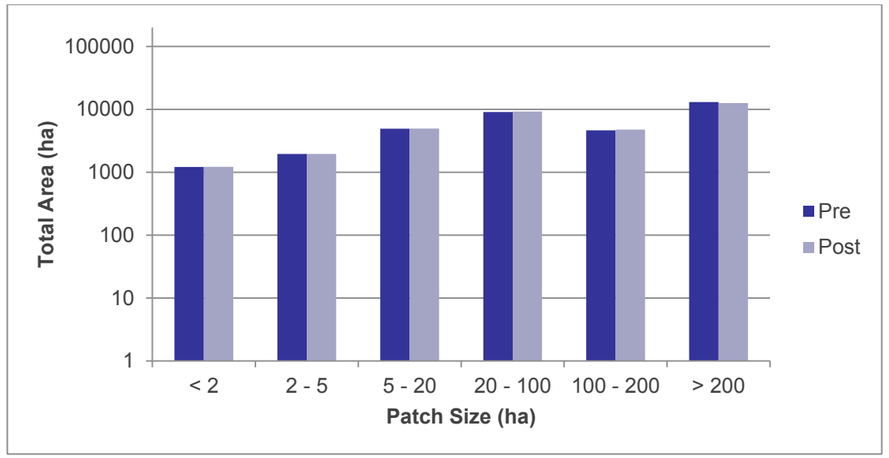

Figure 10-3 **Total Area of Native Vegetation Patch Sizes in the Existing Corridor RAA Pre- and Post-Construction**

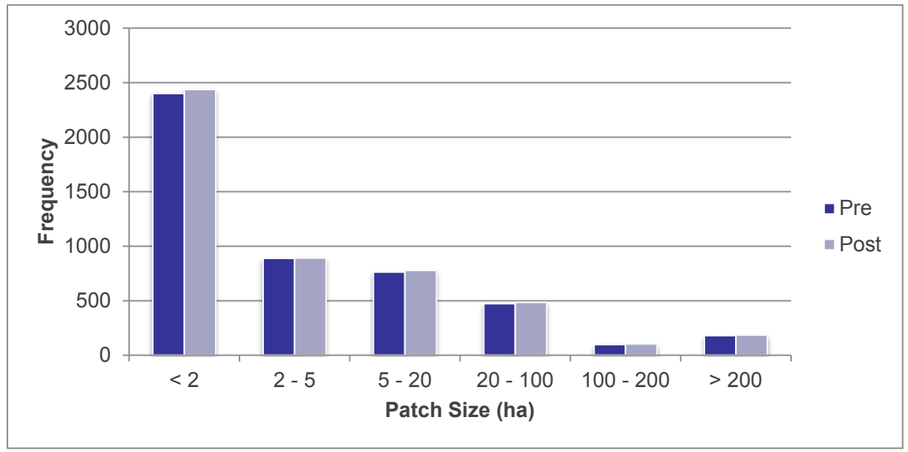

Figure 10-4 **Frequency of Native Vegetation Patch Sizes in New ROW RAA Pre- and Post-Construction**

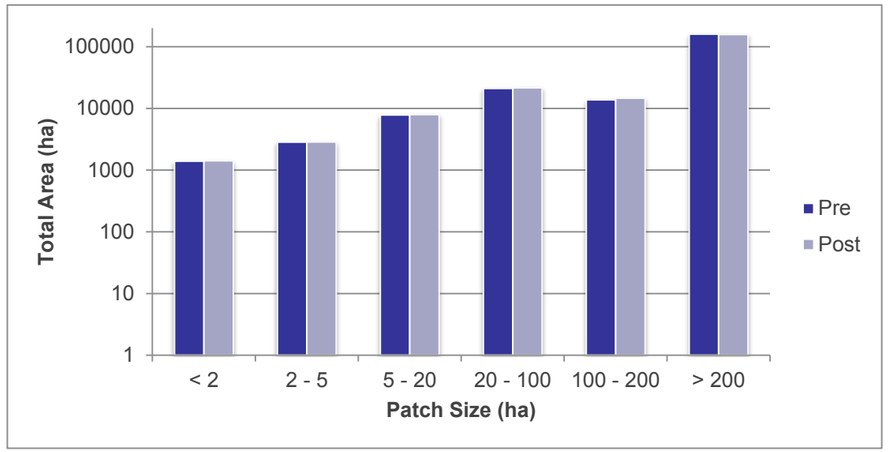

Figure 10-5 **Total Area of Native Vegetation Patch Sizes in the New ROW RAA Pre- and Post-Construction**

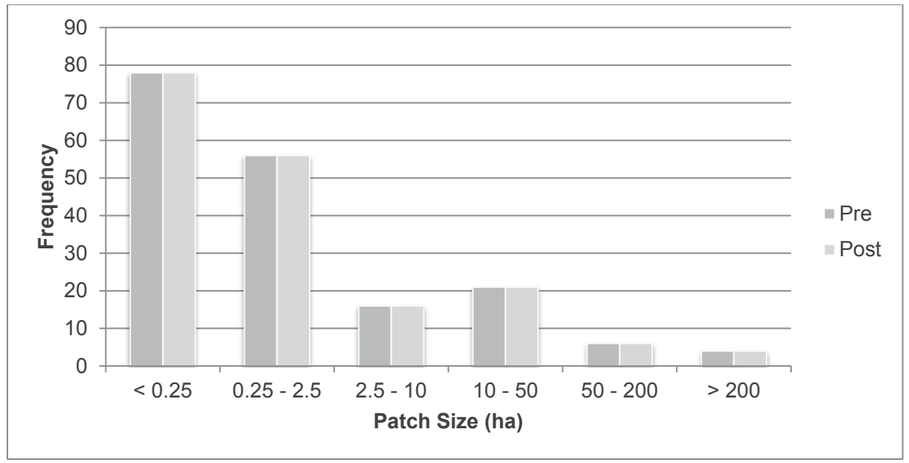

Figure 10-6 **Frequency of Wetland Patch Sizes in the Existing Corridor RAA Pre- and Post-Construction**

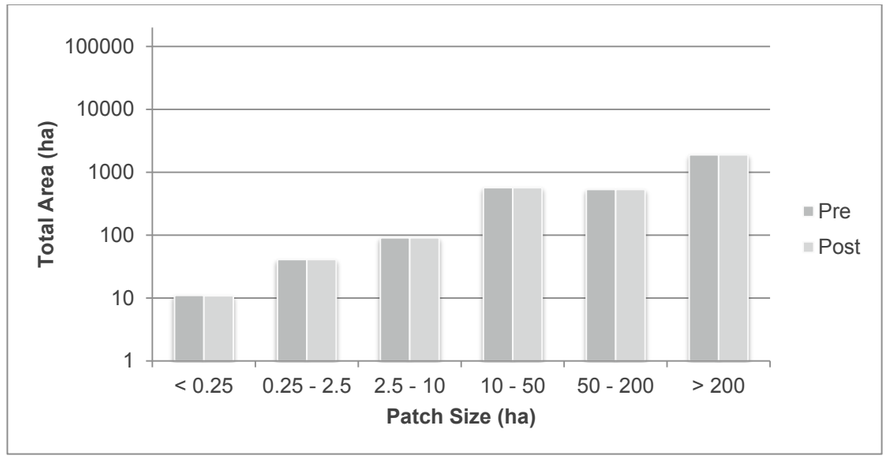

Figure 10-7 **Total Area of Wetland Patch Sizes in the Existing Corridor RAA Pre- and Post-Construction**

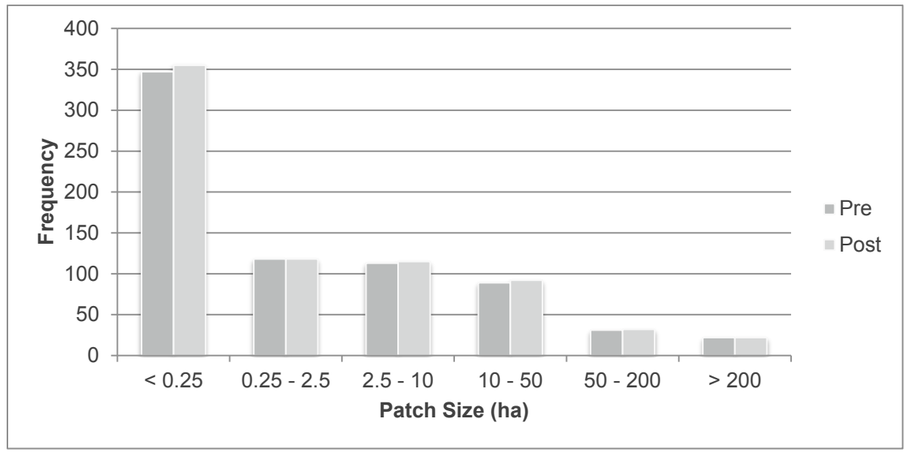

Figure 10-8 **Frequency of Wetland Patch Sizes in the New ROW RAA Pre- and Post-Construction**

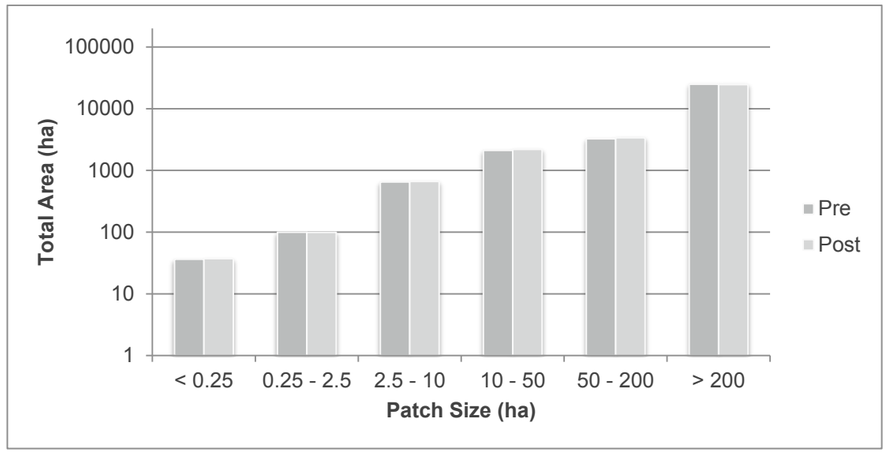

Figure 10-9 **Total Area of Wetland Patch Sizes in the New ROW RAA Pre- and Post-Construction**

10.5.2.3.2 Operation and Maintenance

No additional effects are anticipated during the Project operation and maintenance phase. Some of the effects of fragmentation may be reduced over time as the ROW is allowed to naturally revegetate.

10.5.2.4 Summary

Project route selection avoided many large patches of intact vegetation, including WMAs and ASIs. Permanent effects on landscape intactness will occur in areas cleared and fragmented by construction of the transmission line. The effects will be mainly to patches smaller than 200 ha, and the total area of patches larger than 200 ha lost will be 4% or less. Twenty-two large patches of native vegetation or wetlands will be fragmented, however there will be no loss of patches larger than 200 ha. The number of large patches (larger than 200 ha) in the RAA will increase following Project construction because very large patches will be split. The Project will not affect the current viability or long-term persistence of large patches of native vegetation or wetlands and associated biodiversity in the RAA.

10.5.3 Assessment of Change in Native Vegetation Cover Class Abundance, Distribution and Structure

The Project has the potential to change native vegetation cover class abundance and distribution. This may include a change in vegetation structure. The pathways, mitigation measures, and characterization of these potential effects are described below.

10.5.3.1 Pathways for Change in Native Vegetation Cover Class Abundance, Distribution and Structure

Clearing vegetation in the ROW could change native vegetation cover class abundance, distribution and structure by removing the tree or shrub component of the canopy and, in areas of tree cover including shrubland, deciduous, mixedwood, and coniferous forest (660 ha or 20% of the PDA) changing the cover class to low shrub and/or graminoid dominated vegetation. Changes in species composition may also occur, but due to the complexity of species interactions and data limitations, assessment is restricted largely to the cover class level.

10.5.3.1.1 Construction

Construction of the transmission line, including bypass trail development and ROW clearing, could change native vegetation as a result of vegetation clearing. Trees along the ROW and “danger trees” adjacent to the ROW will be cut (to 10 cm above ground) (Appendix 10B).

Clearing of the ROW will result in the loss of tree and shrub habitat, which will change vegetation structure in the cleared areas. Removal of the canopy will cause a shift in species composition from trees to deciduous shrubs, and a shift in understory vegetation from shade-tolerant plants to less shade-tolerant plants. Disturbances to the native vegetation will cause forested areas along the PDA to change to graminoid or short shrub (*i.e.,* grassland) for the life of the Project. Removal of trees and shrubs will affect all cover classes that have a shrub or tree component in the canopy (*i.e.,* shrubland, deciduous, coniferous and mixedwood forests). There is a small amount of grassland along the PDA (91 ha). Clearing of the ROW will not result in the loss or change in vegetation structure in grasslands. Removal of grassland along the PDA will be limited to tower construction and the centerline trail.

10.5.3.1.2 Operation and Maintenance

During Project operation and maintenance, the ROW will be maintained as a low shrub, graminoid or herbaceous dominated vegetation. This will allow for safe and reliable operation of the transmission line. Tree regeneration will be restricted by vegetation management activities, and the native vegetation cover types will remain altered for the life of the Project.

10.5.3.2 Mitigation for Change in Native Vegetation Cover Class Abundance, Distribution and Structure

Standard industry practices and avoidance measures, along with Project-specific mitigation measures, will be implemented during Project construction, and operation and maintenance, as listed in the Construction Environmental Protection Plan (CEnvPP) (Chapter 22).

Transmission line routing for the Project considered sensitive and less prevalent native vegetation, including areas with high potential to support SOCC, critical wildlife habitat areas and large areas of intact forest, and avoided areas protected by local or provincial legislation. The routing process also considered privately owned tall grass parcels, and the Manitoba Tall Grass Prairie Preserve located near Tolstoi and Gardenton, MB, approximately 18 km west of the Final Preferred Route. The Preserve is located almost wholly outside the Route Planning Area in which alternative routes were evaluated. To the degree possible, the Final Preferred Route is located within existing, planned utility corridors (*i.e.*, SLTC and RVTC) or parallels existing linear features. These areas are largely in agriculture lands and were chosen for a large component of the Final Preferred Route.

Key mitigation measures to avoid or reduce potential Project effects on native vegetation cover classes include the following:

- Rights-of-way will be cleared when the ground is frozen or dry to limit rutting and erosion where applicable. In situations where the ground is not dry or completely frozen, alternative methods, such as the use of construction mats, will be employed during ROW clearing.
- Buffers and sensitive areas (where applicable) will be clearly marked with stakes and/or flagging tape prior to clearing.

- Necessary work permit(s) will be obtained, as required under *The Crown Lands Act, The Provincial Parks Act* and *The Forest Act* for work on Crown, designated and provincial forest land, respectively.
- Windrows of grubbed materials will be piled at least 15 m from standing timber.
- Grubbing will not be permitted within 2 m of standing timber to prevent damage to root systems and to limit the occurrence of blow down.
- Grubbing will be limited within the ROW to reduce root damage, except at tower foundation sites and centerline trail.
- Only water and approved dust suppression products will be used to control dust on access roads, where required. Oil or petroleum products will not be used.
- Weed control along access roads and trails, at temporary construction camps, marshalling yards and borrow sites will be conducted in accordance with the Rehabilitation and Weed Management Plan.
- Approach grades to waterbodies will be reduced to limit disturbance to riparian areas.
- Non-herbicide methods such as hand cutting, mechanical cutting or winter shearing will be used to clear the transmission line ROW and other sites. If herbicides are required to control vegetation growth, such as noxious/invasive weeds during construction, all applicable permits and provincial regulations (*The Noxious Weed Act*) will be followed.
- Trees will be felled toward the middle of rights-of-way or cleared areas to avoid damaging standing trees. Trees will not be felled into waterbodies. Danger trees will be flagged or marked for removal using methods that do not damage soils and adjacent vegetation.
- Contractors will be restricted to established roads and trails, and cleared construction areas in accordance with the Access Management Plan (Chapter 22).
- Disturbed areas along transmission line rights-of-way will be rehabilitated in accordance with the Rehabilitation and Weed Management Plan.
- The Rehabilitation and Weed Management Plan will include objectives for the restoration of natural conditions, wildlife habitat and aesthetic values, and for erosion protection, sediment control, non-native and invasive plant species management, as required.

10.5.3.3 Characterization of Residual Environmental Effect for Change in Native Vegetation Cover Class Abundance, Distribution and Structure

The following discussion outlines the residual environmental effects for change in native vegetation cover as a result of Project construction, and operation and maintenance.

10.5.3.3.1 Construction

During transmission line construction, native vegetation cover will be disturbed in 23.8% (753 ha) of the Final Preferred Route PDA (Table 10-6). Taller shrub and tree cover within this area will be cleared for the life of the Project, which will change vegetation composition and structure.

Table 10-15 shows cover classes intersected and potentially affected by the Project. Most disturbance will occur in the deciduous forest cover class: 11.6% (365 ha) of deciduous forest will be cleared in the Final Preferred Route PDA. This represents disturbance of 6.9% of available deciduous forest in the Existing Corridor, 4.9% in the New ROW LAA and 0.3% in the RAA. This cover class will not be disturbed by construction activities at the Stations (Table 10-15).

Coniferous forest will be disturbed in 5.4% (169 ha) of the Final Preferred Route PDA (Table 10-6). This represents disturbance of 5.0% of available coniferous forest in the New ROW LAA and 0.4% in the RAA. This cover class will not be disturbed by construction activities at the Stations (Table 10-15).

Mixedwood forest will be disturbed in 0.5% (15 ha) of the Final Preferred Route PDA (Table 10-6). This represents disturbance of 4.5% of available mixedwood forest in the Existing Corridor, 2.7% in the New ROW LAA and 0.1% in the RAA. This cover class will not be disturbed by construction activities at the Stations (Table 10-15).

Shrubland will be disturbed in 3.5% (111 ha) of the Final Preferred Route PDA (Table 10-6). This represents disturbance of 9.1% of available shrubland in the Existing Corridor, 5.0% in the New ROW LAA and 0.3% in the RAA (Table 10-15). This cover class will not be disturbed by construction activities at the Stations (Table 10-15).

Grassland will be disturbed in 2.9% (91 ha) of the Final Preferred Route PDA (Table 10-6). This represents a disturbance of 4.6% of available grassland in the Existing Corridor LAA, 5.4% in the New ROW LAA, and 3.2% at the Stations (Table 10-15). The area of grassland has the potential to increase after construction as shrubland and forest will regenerate as grassland. The Project is not routed in or through managed tall grass prairie parcels.

Sand dunes will not be affected in the PDA (Table 10-15).

Clearing of the ROW will change forested areas to shrub or graminoid vegetation. Table 10-15 only shows areas intersected by the ROW that may be altered by construction. An increase in shrub and grassland areas will likely happen, but is not shown as the composition of these areas may not be directly comparable to native communities. The Final Preferred Route avoids protected sensitive areas, such as the Watson P. Davidson WMA, and areas considered habitat for sensitive plant and wildlife species (*e.g.,* Hugo Wetland. A large area of the Existing Corridor has been cleared or cultivated; therefore, relatively less has to be cleared for construction in the PDA of the Existing Corridor than in the New ROW. The stations are located on developed or agricultural lands; no new clearing will occur within these areas).

Table 10-15 Native Vegetation Land Cover in the LAA and RAA Potentially Effected by the Project

Native Cover Class	Project Component	LAA			RAA		
		Pre-Construction	Post-Construction		Pre-Construction	Post-Construction	
		Area (ha)	Area (ha)	Percent Change (%)	Area (ha)	Area (ha)	Percent Change (%)
Grassland	Existing Corridor	230.3	219.7	4.6	5,916.2	5,894.5	0.4
	New ROW	1,608.6	1,521.1	5.4	17,336.4	17,246.9	0.5
	Stations	30.8	29.8	3.2	9,691.8	9,690.6	0.0
Shrubland	Existing Corridor	61.6	56.0	9.1	3,055.8	3,042.0	0.5
	New ROW	2,187.7	2,078.9	5.0	30,741.8	30,633.0	0.4
	Stations	1.6	1.6	0.0	1,073.9	1,073.9	0.0
Deciduous forest	Existing Corridor	628.0	584.8	6.9	24,638.8	24,536.7	0.4
	New ROW	6,910.6	6,572.3	4.9	99,860.6	99,496.0	0.4
	Stations	0.0	0.0	-	13,360.2	13,358.1	0.0
Mixedwood forest	Existing Corridor	15.4	14.7	4.5	444.5	443.8	0.2
	New ROW	540.1	525.6	2.7	10,794.6	10,779.4	0.1
	Stations	3.1	3.1	0.0	751.2	751.2	0.0
Coniferous forest	Existing Corridor	0	0	-	849.5	847.4	0.2
	New ROW	3,383.9	3,214.7	5.0	47,628.2	47,459.0	0.4
	Stations	0.0	0.0	-	173.4	173.4	0.0

Native Cover Class	Project Component	LAA			RAA		
		Pre-Construction	Post-Construction		Pre-Construction	Post-Construction	
		Area (ha)	Area (ha)	Percent Change (%)	Area (ha)	Area (ha)	Percent Change (%)
Sand dune	Existing Corridor	0.0	0.0	–	0.0	0.0	–
	New Row	0.0	0.0	–	0.0	0.0	–
	Stations	0.0	0.0	–	362.4	362.4	0.0

NOTE:

Data are based on the FRI database.

Areas are larger than reported in Table 10-6 due to splitting the LAA and RAA into project components (*i.e.*, Existing Corridor, New ROW, Stations). Splitting resulted in overlaps of the LAA and RAA and duplication of some areas.

Numbers in table may be higher due to rounding.

Potential residual effects on native vegetation cover class abundance, distribution and structure during construction are characterized as follows:

- Direction is adverse: the area of native vegetation cover classes will be altered. There will be a change in the plant community to an early successional stage following construction. Later stages in the PDA will develop all cover classes excluding those dominated by trees.
- Magnitude is low: the Project will affect the abundance and distribution of cover classes, but no cover classes will be eliminated in the LAA. After construction, forested areas will be allowed grow back as shrub and grassland areas, thus increasing the abundance of these cover classes.
- Geographic extent: will be confined to the LAA.
- Duration is permanent: residual effects will extend for the life of the Project.
- Frequency is a single event: native vegetation cover will be affected once, during construction.
- The effect is reversible: the effect will be reversible after the life of the Project and the native vegetation is allowed to regenerate.
- Ecological context is disturbed and undisturbed: a large area of the Existing Corridor and stations has been disturbed by agriculture and development. The New ROW is relatively undisturbed or not adversely affected by human activity.

10.5.3.3.2 Operation and Maintenance

Operational activities will prevent areas cleared of native vegetation from returning to the pre-construction state. Operation and maintenance of the transmission line will require vegetation be managed according to Manitoba Hydro's vegetation clearance standards, including mowing or spraying. Operation and maintenance activities will be restricted to the ROW and will have no new effect on the availability and distribution of native cover classes within the LAA. A shift in species composition may occur from on-going vegetation management, with some species decreasing in abundance and others increasing, but changes in cover classes are not anticipated.

Potential residual effects on native vegetation cover class abundance and distribution during operation and maintenance are characterized as follows:

- Direction is adverse: vegetation management activities will prevent native vegetation cover classes that have tree species to regenerate to their pre-construction level of abundance and distribution.
- Magnitude is low: the Project will affect the abundance and distribution of cover classes, but no cover classes will be eliminated in the LAA. The abundance of grasslands will increase, but species composition may differ from native areas.
- Geographic extent: will be confined to the LAA

- Duration is permanent: residual effects will extend for the life of the Project.
- Frequency is multiple irregular events (no set schedule): ROW maintenance activities will occur sporadically throughout the life of the Project.
- The effect is reversible: effects will be reversible after the life of the Project as a result of natural revegetation.
- Ecological context is disturbed and undisturbed: a large area of the Existing Corridor and stations has been disturbed by agriculture and development. The New ROW contains areas that are relatively undisturbed or not adversely affected by human activity.

10.5.3.4 Summary

Project route selection helped reduce the alteration of native vegetation cover classes. In addition, the use of standard construction and mitigation methods will reduce Project residual effects on the abundance of native vegetation. There will be long-term effects on areas cleared during construction of the transmission line because areas of native vegetation in the PDA will be converted from tree and shrub cover to low shrub or graminoid cover. However, after the life of the Project, the effects are considered reversible. Less prevalent cover classes (*e.g.,* sand dunes) will not be eliminated from the LAA or RAA as a result of Project effects.

10.5.4 Assessment of Change in Wetland Cover Class Abundance, Distribution, Structure and Function

The Project has the potential to change wetland cover class abundance, distribution, structure and function. The pathways, mitigation measures and characterization of these potential Project effects are described below.

10.5.4.1 Pathways for Change in Wetland Cover Class Abundance, Distribution, Structure and Function

Transmission lines affect wetlands primarily through vegetation clearing, grubbing and installation of tower foundations (Stantec 2014). Because only localized surface disturbance occurs during construction of transmission lines, they have limited potential to influence functional elements of wetlands, such as hydrology/hydrogeology or biogeochemistry.

10.5.4.1.1 Construction

Vegetation clearing and soil compaction due to construction activities could affect wetlands along the ROW and access routes and bypass trails. According to refined desktop mapping, approximately 477.5 ha (15.1%) of the PDA is wetland. However, FRI data indicated that wetlands occupy 56 ha (1.8%) of the PDA. For the purpose of the assessment and evaluation of effects in the LAA and RAA, FRI data were used. The FRI database was used as it covers all

spatial boundaries and therefore allows for a more complete assessment of effects. The desktop mapped data will be used to design and implement mitigation measures.

Vegetation clearing will alter vegetation structure in some wetlands because treed areas will be converted to shrub or herbaceous/graminoid cover (Appendix 10B). This could reduce the interception and uptake of water, and increase runoff velocity. Construction may also affect wetland habitat (for both plants and wildlife) and hydrology due to localized soil disturbance and vegetation removal. In turn, these effects could alter water quality. Total wetland loss is not likely, but as part of a conservative assessment approach, full vegetation removal is assumed along the ROW.

10.5.4.1.2 Operation and Maintenance

During Project operation and maintenance, wetlands will be affected by vegetation management such as mowing or spraying along the ROW. In addition, vehicles and equipment used for inspection and maintenance may need to traverse wetlands, which may cause rutting and soil compaction.

10.5.4.2 Mitigation for Change in Wetland Cover Class

Standard industry practices and avoidance measures, along with Project-specific mitigation measures, will be implemented during construction, as listed in the CEnvPP (Chapter 22).

Transmission line routing considered effects on large wetlands and wetlands that provide wildlife habitat, such as the Hugo Wetland. The ROW limits effects on the Caliento, Sundown and Piney bogs by routing along their edges. Key mitigation measures to avoid or reduce potential Project effects on wetland cover classes include the following:

- Rights-of-way will be cleared when the ground is frozen or dry to limit rutting and erosion where applicable. In situations where the ground is not dry or completely frozen, alternative methods, such as the use of construction mats, will be employed during ROW clearing.
- Riparian Buffers shall be a minimum of 30 m and increased in size based on slope of land entering waterway (See Riparian Buffer Table in CEnvPP). Within these buffers, shrub and herbaceous understory vegetation will be maintained along with trees that do not violate Manitoba Hydro Vegetation Clearance Requirements.
- Surface water runoff will be directed away from disturbed and erosion-prone areas but not directly into waterbodies.
- Natural drainage patterns and flows will be maintained to the extent possible.
- Clearing methods that do not disturb soil will be employed in areas that have to be cleared within the 30 m buffer zone.

- Erosion protection and sediment control measures will be implemented prior to grading, in accordance with the Erosion Protection and Sediment Control Plan. Grading will be directed away from wetlands. Stockpiled materials from grubbing will not block natural drainage patterns.
- Temporary berms, cross ditches or silt fences will be installed between wetlands and disturbed areas when deemed necessary by the Environmental Inspector. Subsoil and topsoil material will be replaced, and pre-construction contours and drainage patterns will be re-established within wetland boundaries as soon as possible following construction.
- Vehicle, equipment and machinery maintenance and repairs will be conducted in designated areas located at least 100 m from the normal high water mark of a waterbody, riparian area or wetland. Vehicle, equipment and machinery operators will perform a daily inspection for fuel, oil and fluid leaks, and will immediately shutdown and repair any leaks found. All machinery working near watercourses will be kept clean and free of leaks.
- Environmental protection measures for working in and around wetlands will be reviewed with the Contractor and employees prior to commencement of any construction activities.

10.5.4.3 Characterization of Residual Environmental Effect for Change in Wetland Cover Class Abundance, Distribution, Structure and Function

The following discussion outlines the residual environmental effects for change in wetland cover class abundance, distribution, structure and function as a result of Project construction, and operation and maintenance.

10.5.4.3.1 Construction

Tower construction and vegetation clearing during Project construction could reduce the abundance, distribution and function of wetlands in the PDA. It is conservatively assumed that full vegetation clearing will occur along the Existing Corridor and New ROW. This is a conservative assumption because full vegetation clearing will not be undertaken within riparian buffers or grass and shrub dominated locations, where full vegetation is to be temporarily removed it will be restricted to tower locations and the centreline trail. The New Row will have the greatest effect on wetlands; it will affect 2% (56 ha) of available wetlands in the New ROW LAA and RAA.

Construction-related effects on wetlands will be slightly higher along the New ROW than along the Existing Corridor. Within the New ROW LAA, the greatest effect will be on bogs (4.1% [20.7 ha] reduction), followed by fens (3.2% [35 ha] reduction) and marshes (0.4% [0.6 ha] reduction) (Table 10-16). Within the Existing Corridor, effects will be restricted to dugouts (0.2% [0.2 ha] reduction). One Class III marsh wetlands (0.14 ha) at the switch yard at Dorsey (southern exterior of Dorsey) will also be lost. FRI data likely underestimate the abundance of wetlands, including marshes, due to the coarseness of the data and because a higher abundance of these classes were identified in the PDA during Project mapping. Topography and climatic conditions are similar

in the PDA and LAA, though; therefore, wetland abundance is expected to be similar in the two areas.

Vegetation clearing will have the greatest effect on wetland areas at tower locations along the Existing Corridor and New ROW. An area of about 80 m × 100 m will be grubbed to the ground at each guyed tower location. Trees will be cut to a height of 10 cm along the Existing Corridor and New ROW during construction, and will be maintained at a safe height during line operation. An approximately 20–22 m wide centreline trail will be bladed in treed areas along the length of the ROW. This will affect vegetation structure in swamps, bogs and fens that are intersected, but the wetlands will not be removed. All other compatible vegetation, including that at tower locations, will be allowed to revegetate naturally. Wetland loss may occur only at tower locations that require foundation excavation (as opposed to screw piles), and only in the immediate area of excavation. Tower siting will be adjusted where possible to avoid wetlands or towers will be located near wetland edges.

For guyed tower construction, up to five excavations, equaling about 2 m^2, are expected to be required. This will likely have the greatest effect on wetland habitat quality and availability because trees and shrubs will be removed. Vegetation removal could also increase the potential for erosion and weed species establishment (Hansen *et al.* 2008); however, the implementation of erosion protection and sediment control measures, and the cleaning of equipment before arrival onsite are measures in place to limit these effects. Effects on wetland hydrology are not expected because the excavations will generally be small in relation to the size of the wetland intersected, and because vegetation clearing surrounding excavations will be temporary. Towers will not be located in areas of moving water. Biogeochemical effects associated with vegetation removal include reduced sediment stability, photosynthesis, biological uptake and processing of nutrients, and denitrification (Hansen *et al.* 2008). These effects will be short term because vegetation will be allowed to re-establish within the wetland after disturbance and will be restricted to the area of vegetation removal and excavation. Biogeochemical effects at the wetland level are not anticipated.

Approximately 56.4 ha of wetlands will be intersected by the PDA, including the Caliento bog complex, which is made up of marshes, treed bogs and shrub swamps, and the Sundown and Piney bog complexes, which are predominantly treed fens (Map 10-3 – Habitat Fragmentation in the RAA). However, the function of these wetlands will not be measurably reduced or eliminated due to their large size, and because routing has largely avoided the wetlands except for the surrounding upland vegetation. All three wetland complexes are large intact patches which extend beyond the LAA into the RAA. The PDA intersects only a small area along the edge of each wetland. In addition, construction in these wetlands will occur under frozen ground conditions, which will reduce potential effects on wetland function.

Table 10-16 Area of Wetlands Disturbed in the LAA and RAA

Wetland Class	Project Component	LAA Pre-Construction	LAA Post-Construction		RAA Pre-Construction	RAA Post-Construction	
		Area (ha)	Area (ha)	% change	Area (ha)	Area (ha)	% change
Bog	Existing Corridor	0	0	–	455.4	455.4	0.0
	New ROW	511.0	490.3	4.1	5,777.8	5,757.2	0.4
	Stations	0.0	0.0	–	0.0	0.0	–
Fen	Existing Corridor	0.0	0.0	–	1,313.8	1,313.8	0.0
	New ROW	1,110.8	1,075.8	3.2	21,202.2	21,167.2	0.2
	Stations	0.0	0.0	–	0.0	0.0	–
Swamp[1]	Existing Corridor	0.0	0.0	–	0.0	0.0	–
	New ROW	0.0	0.0	–	0.0	0.0	–
	Stations	0.0	0.0	–	0.0	0.0	–
Marsh	Existing Corridor	0.0	0.0	–	1,170.7	1,170.7	0.0
	New ROW	160.9	160.3	0.4	4,008.0	4,007.4	0.0
	Stations	2.0	2.0	0	1,668.9	1,668.9	0.0
Shallow open water[1]	Existing Corridor	0.0	0.0	–	0.0	0.0	–
	New ROW	0.0	0.0	–	0.0	0.0	–
	Stations	0.0	0.0	–	0.0	0.0	–
Dugout	Existing Corridor	96.7	96.5	0.2	198.1	197.9	0.1
	New ROW	2.4	2.4	0	90.3	90.3	0.0
	Stations	89.1	89.1	0	196.5	196.5	0.0

Wetland Class	Project Component	LAA Pre-Construction	LAA Post-Construction		RAA Pre-Construction	RAA Post-Construction	
		Area (ha)	Area (ha)	% change	Area (ha)	Area (ha)	% change
Total	Existing Corridor	96.7	96.5	0.2	3,138.1	3,137.9	0.0
	New ROW	1,785.1	1,728.8	3.2	31,078.3	31,022.1	0.2
	Stations	91.1	91.1	0	1,865.4	1,865.4	0.0

NOTE:
[1] The FRI database, used to calculate the area of wetlands in the LAA, does not include the swamp and shallow open water as wetland classes.
Numbers in table may be higher due to rounding.

The location of large wetlands were considered during the transmission line route selection process. Furthermore, towers will not be placed within wetlands unless they are too large to span. All affected wetland classes are well represented in the RAA, and no class will be removed as a result of the Project. Project effects will be small relative to the availability of each wetland class in the LAA and RAA (Table 10-16). Potential residual effects of construction on wetland cover classes are characterized as follows:

- Direction is adverse: wetland abundance and distribution will be reduced in the LAA and RAA, and function will decline at tower locations.
- Magnitude is low: the Project will affect the abundance, distribution and function of some wetland classes, but no wetland classes will be eliminated in the LAA, and the function of the Caliento, Sundown and Piney bogs, and other large intact wetlands that extend into the RAA will not be threatened.
- Geographical extent: will be confined to the LAA, with the exception of the Caliento, Sundown and Piney bogs, and other large intact wetlands that extend into the RAA.
- Duration is permanent: residual effects will extend for the life of the Project.
- Frequency is single event: residual effects will occur once during construction.
- The effect is reversible: the effect will likely be reversible after the life of the Project as a result of natural revegetation.
- Ecological context is disturbed and undisturbed: the Existing Corridor and stations have been disturbed by human-related development, including agricultural activities. The New ROW contains areas that are relatively undisturbed or not adversely affected by human activity.

10.5.4.3.2 Operation and Maintenance

Operation and maintenance of the transmission line will require vegetation to be managed according to Manitoba Hydro's vegetation clearance standards. Operation and maintenance activities, including mowing or spraying, will have an effect on wetland vegetation structure and wetland function.

Potential residual effects on wetland cover class abundance, distribution, structure and function during operation and maintenance are characterized as follows:

- Direction is adverse: vegetation management activities will prevent wetland vegetation, tree species, from returning to pre-construction condition. In addition, vegetation management to control tree growth may remove broadleaf plant species from the wetland, which may affect wetland function.
- Magnitude is low: the Project will have a measurable effect on the structure of wetland vegetation within the PDA. Operation and maintenance activities such as vegetation management may reduce the cover of broadleaf plant species, including herbaceous plants, trees and shrubs, along the PDA.

- Geographic extent: will be confined to the PDA.
- Duration is permanent: residual effects will extend for the life of the Project.
- Frequency is multiple irregular events (no set schedule): ROW maintenance activities will occur sporadically throughout the life of the Project.
- The effect is reversible: effects will be reversible after the life of the Project as a result of natural revegetation.
- Ecological context is disturbed and undisturbed: a large area of the Existing Corridor and stations has been disturbed by agriculture and development. The New ROW contains areas that are relatively undisturbed or not adversely affected by human activity.

10.5.4.4 Summary

The route selection process considered potential effects on large wetlands and wetlands that provide valuable wildlife habitat, such as on the Caliento, Sundown and Piney bogs. The use of standard construction and mitigation methods will reduce Project residual effects on wetland abundance, function and structure. There will be permanent effects on wetlands in which trees/shrubs are cleared for construction of the transmission line. Natural plant regrowth will reduce effects. Towers will be placed within large wetlands that cannot be spanned by the transmission line; this may locally alter the wetland function. Although the wetland located at Dorsey will be permanently lost due to construction, this wetland class is well represented elsewhere in the LAA and RAA.

10.5.5 Assessment of Change in Invasive Plant Species Abundance and Distribution

The Project has the potential to change the abundance and distribution of invasive plant species in the area. The pathways, mitigation measures and characterization of these potential effects are described below.

10.5.5.1 Pathways for Change in Invasive Plant Species Abundance and Distribution

Vegetation clearing along the ROW could change the species composition of native vegetation and create areas that are vulnerable to invasive plant species invasion.

10.5.5.1.1 Construction

Construction of the transmission line, including vegetation clearing for ROW preparation, access route and bypass trail development, and station development, in addition to vehicle traffic, may introduce or spread invasive plant species, which could alter native plant community composition (Gelbard and Belnap 2003; Hansen and Clevenger 2005). Vegetation removal along the PDA

could provide pathways for invasive plant species to invade native vegetation by exposing mineral soil and disturbing established plants. Equipment and vehicle movement along the Existing and New ROW could also introduce and spread invasive plant species.

Many invasive plant species aggressively invade disturbed areas. Because they are habitat generalists, invasive plant species can often establish in even small disturbed areas. The spread of invasive plant species is a potential threat to diversity because they can out-compete native vegetation (Boylen *et al.* 1999).

10.5.5.1.2 Operation and Maintenance

During operation and maintenance of the transmission line, invasive plant species could be introduced and spread by equipment and vehicles during inspection patrols and vegetation management (tree control), which will be conducted over the life of the Project.

10.5.5.2 Mitigation for Change in Invasive Plant Species Abundance and Distribution

Standard industry practices and avoidance measures, along with Project-specific mitigation measures, will be implemented during construction and operation, as listed in the CEnvPP (Chapter 22). Implementation of the Biosecurity Standard Operating Procedures will help limit the spread of invasive plant species into the PDA during and post construction. Rehabilitation of disturbed native vegetation cover classes will also help control the introduction and spread of invasive plant species.

The following key mitigation measures for avoiding or reducing potential effects of invasive plant species on native vegetation during Project construction will also be considered during the operation and maintenance phase, where applicable. Mitigation for change in invasive plant species abundance and distribution includes the following:

- All equipment must arrive at the ROW or Project site clean and free of soil or vegetation debris.
- Large areas identified as having invasive plant and non-native weed species occurrences prior to the start of construction will be mapped. Weed control along access roads and trails will be conducted in accordance with the Rehabilitation and Weed Management Plan.
- Equipment will be cleaned before moving from locations with identified invasive weed infestation. Manitoba Hydro employees and contractors will follow the Transmission Business Unit's Agricultural Biosecurity Standard Operating Procedures to prevent the spread of invasive weeds.
- Where appropriate, regional native grass mixtures will be used to assist revegetation of disturbed areas in order to control erosion and prevent invasion of non-native species. The mixtures will not contain non-native or invasive species.

10.5.5.3 Characterization of Residual Environmental Effect for Change in Invasive Plant Species Abundance and Distribution

The following discussion outlines the residual environmental effects for change in invasive plant species abundance and distribution as a result of Project construction, and operation and maintenance.

10.5.5.3.1 Construction

Nine invasive plant species were recorded in the PDA during the 2014 field surveys (Table 10-17). Common dandelion, Canada thistle and quack-grass were the most common species found. These species are very common, they invade native areas, and they can modify and reduce the integrity of native areas. Historical records (EDDMapS) revealed two occurrences of ox-eye daisy in the PDA, 29 occurrences of six species in the LAA, and 4,130 occurrences of 21 species in the RAA (see the Biophysical Technical Data Reports – Vegetation and Wetlands for a full list of species). The occurrences of invasive plant species in the RAA were located in developed land (68%), agriculture (11%), native vegetation (11%) and water (9%) cover classes.

Table 10-17 Invasive Plant Species Observed in the PDA during 2014 Field Surveys

Invasive Plant Species		Native Vegetation	Developed	Agriculture	Total
Scientific Name	**Common Name**				
Arctium minus	common burdock	1	–	–	**1**
Chenopodium album	lamb's-quarters	1	–	–	**1**
Cirsium arvense	Canada thistle	4	3	2	**9**
Elymus repens	quack-grass	2	3	3	**8**
Fagopyrum tataricum	tartary buckwheat	–	1	–	**1**
Galeopsis tetrahit	common hemp-nettle	1	–	–	**1**
Lactuca serriola	prickly lettuce	–	1	–	**1**
Lappula squarrosa	bristly stickseed	2	–	–	**2**
Sonchus arvensis	field sow-thistle	1	2	–	**3**
Taraxacum officinale	common dandelion	3	3	3	**9**
Total		**15**	**12**	**8**	**35**

No distinct patterns, locations or patches of invasive plant species were found in the PDA. This indicates that the native vegetation surveyed has not been heavily invaded by invasive plant species because only small patches of these species were found. Non-natural disturbances (*e.g.,* clearcutting, top soil removal) can create areas where native vegetation is vulnerable to invasion. Because invasive plant species are habitat generalists, they can often establish in even small disturbed areas, which can threaten local biodiversity. Therefore, the implementation of mitigation that will control invasive plant species occurrences in the PDA and surrounding areas will be an important component of the Project.

Construction activities could introduce or spread species plants that are listed in provincial regulations (*The Noxious Weeds Act*).

Potential residual effects on invasive plant species abundance and distribution during construction are characterized as follows:

- Direction is adverse: invasive plant species may increase/spread in native vegetation cover classes.
- Magnitude is low: the Project has the potential to change the distribution of invasive plant species in the LAA, but the implementation of mitigation should prevent the introduction of new invasive plant species.
- Geographic extent: will be confined to the LAA.
- Duration is permanent: residual effects will extend for the life of the Project or beyond.
- Frequency is single event: the residual effect will occur once throughout the construction phase.
- The effect is irreversible: if invasive plant species become established, it will generally not be possible to eradicate them without altering the natural plant community.
- Ecological context is disturbed and undisturbed: a large area of the Existing Corridor and stations has been disturbed by agriculture, development, roads and industry. The New ROW contains areas that are relatively undisturbed or not adversely affected by human activity.

10.5.5.3.2 Operation and Maintenance

During the operation and maintenance phase, invasive plant species could be spread along the ROW and potentially invade the LAA. Equipment used for maintenance and inspection purposes could transport seeds and roots of invasive plant species. Furthermore, continual maintenance of tree vegetation along the ROW will create a long-lasting disturbance, which could provide an opportunity for invasive plant species to invade adjacent undisturbed areas. Equipment will also arrive at the ROW or Project site clean and free of soil or vegetation debris, and will be cleaned before moving from locations with invasive plant species infestation.

Potential residual effects on invasive plant species abundance and distribution during operation and maintenance are characterized as follows:

- Direction is adverse: invasive plant species may increase in distribution in native vegetation cover classes because of disturbance to native cover classes. Invasive plant management during operation of the Project will be conducted by Manitoba Hydro in urban areas. Landowners will be responsible for invasive plant control in agricultural areas.
- Magnitude is low: the Project has the potential to change the distribution of invasive plant species in the LAA, but the implementation of mitigation should successfully prevent the introduction of new invasive plant species.
- Geographic extent: will be confined to the LAA.
- Duration is permanent: residual effects will extend for the life of the Project or beyond.
- Frequency is multiple irregular events: residual effects of the invasion and spread of invasive plant species have the potential to occur repeatedly and regularly throughout operation and maintenance
- The effect is irreversible: effects can be reversible with effective rehabilitation. However, once invasive plant species become established, it is generally not possible to eradicate them without altering the native plant community; therefore, the effect is considered irreversible.
- Ecological context is disturbed and undisturbed: a large area of the Existing Corridor and stations has been disturbed by agriculture, development, roads and industry. The New ROW contains areas that are relatively undisturbed or not adversely affected by human activity.

10.5.5.4 Summary

Overall, the surveyed native vegetation cover classes in the PDA had a low density of invasive plant species. The use of standard construction and mitigation methods, such as equipment cleaning, will reduce Project residual effects associated with invasive plant species during construction. Therefore, the Project-related introduction or spread of invasive plant species is not expected to threaten the viability of native vegetation cover classes in the RAA. Additionally, Manitoba Hydro will remain compliant with provincial legislation and will review guidelines pertaining to the management of invasive plant species.

10.5.6 Assessment of Change in Rare Plant Species Abundance and Distribution

The Project could change rare plant species abundance and distribution, including SOCC populations and locations. The pathways, mitigation measures and characterization of these potential effects are described below.

10.5.6.1 Pathways for Change in Rare Plant Species Abundance and Distribution

Vegetation clearing along the ROW during construction, and for vegetation management during operation, could remove identified and unidentified local occurrences of rare plant species.

10.5.6.1.1 Construction

Construction of the transmission line could change the abundance and distribution of rare plant species as a result of vegetation clearing, vehicle/heavy equipment use within the PDA, and tower construction. Heavy equipment and vehicle use on access trails and temporary workspaces could remove or crush rare plant species, or affect them through soil compaction and rutting.

Tower construction requires the removal of vegetation at tower footprints, and at foundation excavations at some locations. Direct loss of vegetation will occur only at the tower locations in a maximum area of 80 m × 100 m at guyed locations but may be as small as the tower footings (10 m × 10 m area), depending on the type of foundation required. Tower locations have not been confirmed; however, towers will likely be positioned approximately every 400 m. Final tower siting will avoid locations of SOCC, where possible.

10.5.6.1.2 Operation and Maintenance

Vegetation management and vehicle/heavy equipment use within the PDA during operation and maintenance of the transmission line could change the abundance and distribution of rare plant species. Vegetation management activities such as herbicide application or mowing could kill or remove rare plants. Heavy equipment and vehicle use could remove or damage rare plants by crushing them or by causing soil compaction and rutting.

10.5.6.2 Mitigation for Change in Rare Plant Species Abundance and Distribution

Standard industry practices and avoidance measures, along with Project-specific mitigation measures, will be implemented during construction and operation, as listed in the CEnvPP (Chapter 22).

Avoidance of rare plant species is the ideal mitigation strategy. Route selection considered many known occurrences of SOCC, based on the 2014 field surveys.

This section focuses on key mitigation measures for avoiding or reducing potential Project effects on rare plant species abundance and distribution during the construction phase. Mitigation for change in rare plant species abundance and distribution includes the following:

- SAR and critical habitat will be protected in accordance with provincial and federal legislation and provincial and federal guidelines. A 30 m setback distance will be applied to known SAR and a 10 m buffer will be applied to SOCC occurrences within the PDA (Appendix 10-B). Setbacks and buffers along the ROW will be clearly identified by signage or flagging prior to construction, and signage or flagging will be maintained during construction to alert crews to the presence of the setback.
- Final tower siting will avoid confirmed locations of SOCC, where possible.
- If avoidance of listed rare plant species is not possible, Manitoba Conservation and Water Stewardship will be contacted to determine the most appropriate mitigation action. This could include harvesting seed from the PDA, salvaging and transplanting portions of sod, collecting cuttings or transplanting whole plants.
- Additional surveys will be conducted in the PDA prior to construction to identify new occurrences of rare plants. If previously unidentified plant SAR or SOCC are found on the ROW prior to or during construction, the occurrences will be flagged for avoidance (Section 10.9).
- Rights-of-way will be cleared when the ground is frozen or dry to limit rutting and erosion, where applicable. In situations where the ground is not dry or completely frozen, alternative methods, such as the use of construction mats, will be employed during ROW clearing.
- Environmentally sensitive sites, features and areas will be identified and mapped prior to clearing, and are outlined in the CEnvPP (Chapter 22).

10.5.6.3 Characterization of Residual Environmental Effect for Rare Plant Species Abundance and Distribution

The following discussion outlines the residual environmental effects for change in rare plant species abundance and distribution as a result of Project construction, and operation and maintenance.

10.5.6.3.1 Construction

The extensive loss of native species over the past 200 years has created SAR and SOCC (Koper 2009). Rare plant species are now restricted largely to undisturbed areas in native vegetation cover classes. Therefore, agricultural land is not addressed in this assessment.

Vegetation clearing during construction may result in the loss of rare plant species in the PDA. There are no known occurrences of SAR or critical habitat along the PDA, but during the 2014 field surveys, three SOCC—moonseed, black ash and compact groundsel—were found in eight different locations along the PDA. These SOCC are ranked S3, which means they are uncommon

throughout their range or in Manitoba and have only 21–100 occurrences in the province (MBCDC 2015b). Moonseed was found at only one location along the PDA, and may be avoided by tower placement. The MBCDC has four historical records of moonseed in the RAA, but beyond the LAA boundaries. Black ash and compact groundsel were locally abundant and found at several locations within the LAA and RAA (based on the 2014 field surveys along the alternative routes). The MBCDC has two records of black ash in the RAA (Appendix 10A). Black ash is a tree species, and therefore will be removed during vegetation clearing. The MBCDC also has historical records of SOCC in the PDA: Ram's head lady's slipper, which is ranked S2S3, and arethusa, which is ranked S2 (Appendix 10A). The MBCDC has records of these species in the LAA and RAA (Appendix 10A); the recorded occurrences in the PDA may be avoided by tower placement, but their locations have not yet been confirmed.

Transmission line routing for the Project considered and ultimately avoided many known occurrences of rare plants, including 28 species at 81 locations recorded during the 2014 field surveys along the alternative routes.

Potential residual effects on rare plant species abundance and distribution during construction are characterized as follows:

- Direction is adverse: the abundance and distribution of plant SOCC occurrences will decrease.
- Magnitude is moderate: the Project is anticipated to result in the loss of a SOCC (*i.e.,* black ash) within the LAA.
- Geographic extent: will be the LAA.
- Duration is permanent: residual effects will extend for the life of the Project or beyond.
- Frequency is single event: rare plants will be affected once during construction.
- The effect is irreversible: residual effects are unlikely to be reversed.
- Ecological context is disturbed and undisturbed: the Existing Corridor has been disturbed by human-related development, including agricultural activities. The New ROW contains areas that are relatively undisturbed or not adversely affected by human activity

10.5.6.3.2 Operation and Maintenance

During operation and maintenance, additional changes in rare plant species could occur in the PDA. Operation and maintenance activities, including mowing or spraying and vehicle traffic, will have an effect on rare plant species by causing a change in plant community structure and composition or direct damage to rare plants. For example, spraying with a herbicide is not selective and will kill all broadleaf plants. All known locations of SOCC will be protected in the Operations and Maintenance EnvPP.

Potential residual effects on rare plant species abundance and distribution during operation and maintenance are characterized as follows:

- Direction is adverse: rare plant species will decrease in abundance and distribution.
- Magnitude is low: the Project has the potential to change the abundance and distribution of rare plant species within the LAA, but no additional loss of rare plant species in the LAA or RAA is anticipated from operational activities.
- Geographic extent: is confined to the LAA.
- Duration is permanent: residual effects will extend for the life of the Project or beyond.
- Frequency multiple irregular events (no set schedule): ROW maintenance activities will occur sporadically throughout the life of the Project.
- The effect is irreversible: residual effects are unlikely to be reversed.
- Ecological context is disturbed and undisturbed: a large area of the Existing Corridor and stations has been disturbed by agriculture and development. The New ROW contains areas that are relatively undisturbed or not adversely affected by human activity.

10.5.6.4 Summary

The use of standard construction and mitigation methods will reduce Project residual effects on rare plant species abundance and distribution. However, there may be permanent effects on areas with SOCC, if occurrences (*i.e.,* one to several plants at a location) are destroyed by Project construction. Occurrences of SOCC could be avoided by tower placement or by flagging SOCC locations and not clearing vegetation in those areas. In addition, pre-construction surveys for rare plant species (SAR/SOCC) will be conducted in previously unsurveyed areas of native vegetation at tower locations and along the ROW.

Other SOCC found in the PDA were recorded elsewhere in the RAA, and their viability in the RAA would not be threatened by Project effects.

Project operation and maintenance, including vegetation management such as mowing or spraying, has the potential to effect unknown locations of SOCC. All known locations of SOCC will be protected in the Operations and Maintenance EnvPP. No additional loss of rare plant species in the LAA or RAA is anticipated from operational activities.

10.5.7 Assessment of Change in Traditional Use Plant Species Abundance and Distribution

The Project could change the abundance and distribution of traditional use plant species, including medicinal plants and berries. The pathways, mitigation measures and characterization of these potential effects are described below.

10.5.7.1 Pathways for Change in Traditional Use Plant Species Abundance and Distribution

10.5.7.1.1 Construction

Right-of-way clearing during construction will remove vegetation and alter communities that support traditional use plants. This may be adverse for some species, and positive for others. Surface disturbance due to equipment and vehicle movement could introduce or spread invasive plant species, and cause changes in vegetation communities that are relied on for traditional use purposes.

10.5.7.1.2 Operation and Maintenance

Operation and maintenance of the transmission line could change traditional land and resource use due to vegetation management on the ROW. For example, trees will be removed within the PDA, and herbicides will be used to control the growth of woody vegetation. Herbicide application will affect native plant species abundance and distribution, and vegetation communities that may be relied on for traditional use purposes. In addition, equipment and vehicles could spread invasive plant species during periodic maintenance work.

10.5.7.2 Mitigation for Change in Traditional Use Plant Species Abundance and Distribution

Standard industry practices and avoidance measures, along with Project-specific mitigation measures, will be implemented during construction and operation, as listed in the CEnvPP (Chapter 22).

This section focuses on key mitigation measures for avoiding or reducing potential Project effects on the abundance and distribution of traditional use plant species during the construction phase. Mitigation for change in the abundance and distribution of traditional use plant species includes the following:

- Rights-of-way will be cleared when the ground is frozen or dry to limit rutting and erosion where applicable. In situations where the ground is not dry or completely frozen, alternative methods, such as the use of construction mats, will be employed during ROW clearing.
- The Contractor will be restricted to established roads and trails and cleared construction areas in accordance with the Access Management Plan (Chapter 22).

- The Contractor will prepare Erosion Protection and Sediment Control Plans, which will be accepted by Manitoba Hydro prior to construction and will be updated annually.
- Weed control along access roads and trails will be in accordance with the Rehabilitation and Weed Management Plan.
- Disturbed areas along transmission line rights-of-way will be rehabilitated in accordance with the Rehabilitation and Weed Management Plan. Where appropriate, regional native grass mixtures will be used to help revegetate disturbed areas in order to control erosion or prevent invasion of non-native species. The mixtures will not contain non-native or invasive species.

10.5.7.3 Characterization of Residual Environmental Effect for Change in Traditional Use Plant Species Abundance and Distribution

The following discussion outlines the residual environmental effects for change in the abundance and distribution of traditional use plant species as a result of Project construction, and operation and maintenance.

10.5.7.3.1 Construction

Vegetation clearing during construction may result in the loss of traditional use plant species in the PDA. Thirty-nine traditional use plant species were recorded in the PDA, primarily in deciduous forest, shrubland and pasture cover classes. Based on the desktop mapping of the PDA, 258 ha of deciduous forest, 25 ha of shrubland and 307 ha of pasture will be cleared during construction. Within the LAA, deciduous forest will be affected most: 6.9% will be lost along Existing Corridor, and 4.9% will be lost along the New ROW (Table 10-15). Effects will likely be limited in shrubland and pasture areas because vegetation removal will be limited primarily to tower footprints and centerline access trails. Vegetation cover classes will be allowed to re-establish after disturbance. There will be no effects on the Watson P. Davidson and Spur Woods WMA because these areas are avoided by the Final Preferred Route.

Transmission line routing for the Project considered and ultimately avoided the many known areas with traditional use plant species, including 1073 observations recorded during the 2014 field surveys along the alternative routes in the RAA. All affected cover classes are well represented in the RAA (1,136,357 ha of deciduous forest, 32,145 ha of shrubland and 33,872 ha of pasture). Therefore, the effects of construction should not reduce the number of traditional use plant species in the RAA or effect the viability of traditional use species in the RAA.

Potential residual effects on traditional use plant species abundance and distribution during construction are characterized as follows:

- Direction is adverse: the abundance and distribution of traditional use plant species will decrease.

- Magnitude is low: the Project has the potential to change the distribution and abundance of traditional use plant species, but no loss of traditional use plant species or cover classes that support these species is anticipated.
- Geographic extent: will be confined to the PDA.
- Duration is permanent: residual effects will extend for the life of the Project or beyond.
- Frequency is single event: traditional use plants will be affected once during construction.
- The effect is reversible: residual effects are likely to be reversed after the life of the Project as a result of natural regeneration.
- Ecological context is disturbed and undisturbed: the Existing Corridor has been previously disturbed by human-related development, including agricultural activities. The New ROW contains areas that are relatively undisturbed or not adversely affected by human activity.

10.5.7.3.2 Operation and Maintenance

During operation and maintenance, additional changes in traditional use plant species could occur in the PDA. The continual vegetation management, including mowing or spraying, along the ROW could affect vegetation structure and remove traditional use plant species from the PDA.

Potential residual effects on traditional use plant species abundance and distribution during construction are characterized as follows:

- Direction is adverse: traditional use plant species will decrease in abundance and distribution.
- Magnitude is low: the Project has the potential to change the abundance and distribution of traditional use plant species, but no additional loss of traditional use plant species or cover classes that support these species is anticipated.
- Geographic extent: is confined to the PDA.
- Duration is permanent: residual effects will extend for the life of the Project or beyond.
- Frequency multiple irregular events (no set schedule): ROW maintenance activities will occur sporadically throughout the life of the Project.
- The effect is reversible: effects are reversible with natural regeneration after the life of the Project.
- Ecological context is disturbed and undisturbed: a large area of the Existing Corridor and stations has been disturbed by agriculture and development. The New ROW contains areas that are relatively undisturbed or not adversely affected by human activity.

10.5.7.4 Summary

The determination of the Final Preferred Route helped reduce the alteration of native vegetation cover classes supporting traditional use species. In addition, the use of standard construction and mitigation methods will reduce Project residual effects on the abundance of traditionally used plant species. There will be long-term effects on areas cleared during construction of the transmission line because areas of native vegetation in the PDA will be converted from tree and shrub cover to low shrub or herbaceous cover. This may have a positive effect on traditional use plant species that are herbs and shrubs. In addition, it may be possible to increase the period of time between mowing cycles which could reduce negative effects. After the life of the Project, effects are considered to be reversible. No vegetation cover classes that support traditional use plant species will be eliminated from the LAA or RAA as a result of Project activities.

10.5.8 Summary of Environmental Effects on Vegetation and Wetlands

The use of standard construction and mitigation methods is expected to reduce Project residual effects on vegetation and wetlands.

In summary, Project residual effects on vegetation and wetlands will be adverse and range from low to moderate magnitude (Table 10-18). The geographic extent of effects will be limited mainly to the PDA and LAA. Patch intactness will be altered at the RAA level as a result of fragmentation of large patches extending beyond the LAA. The frequency and duration of effects will range from medium term to permanent and a single event to multiple irregular events, depending on the vegetation/wetland feature. With the exception of possible effects on invasive plant species and rare plants, Project effects on vegetation and wetlands are predicted to be reversible.

Project effects on vegetation and wetlands are considered not significant.

Table 10-18 Summary of Residual Environmental Effects on Vegetation and Wetlands

Project Phase	Residual Environmental Effects Characterization						
	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Ecological Context
Change in vegetation landscape intactness							
Construction – Transmission Line	A	M	RAA	P	S	R	D/U
Operation and Maintenance – Transmission Line	No additional effects anticipated.						

Project Phase	Residual Environmental Effects Characterization						
	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Ecological Context
Change in native vegetation cover class abundance, distribution and structure							
Construction – Transmission Line	A	L	LAA	P	S	R	D/U
Operation and Maintenance – Transmission Line	A	L	LAA	P	IR	R	D/U
Change in wetland class abundance, distribution, structure and function							
Construction – Transmission Line and Stations	A	L	LAA	P	S	R	D/U
Operation and Maintenance	A	L	PDA	P	IR	R	D/U
Change in invasive plant species abundance and distribution							
Construction – Transmission Line	A	L	LAA	P	S	I	D/U
Operation and Maintenance- Transmission Line	A	L	LAA	P	IR	I	D/U
Change in rare plant species abundance and distribution							
Construction – Transmission Line	A	M	LAA	P	S	I	D/U
Operation and Maintenance- Transmission Line	A	L	LAA	P	IR	I	D/U
Change in traditional use plant species abundance and distribution							
Construction – Transmission Line	A	L	PDA	P	S	R	D/U
Operation and Maintenance- Transmission Line	A	L	PDA	P	IR	R	D/U

KEY

See Table 10-4 for detailed definitions

Direction: **P: Positive;** *A: Adverse; N: Neutral*

Magnitude: *N: Negligible; L: Low; M: Moderate; H: High*

Geographic Extent: *PDA; LAA; RAA*

Duration: *ST: Short-term; MT: Medium-term; P: Permanent*

Frequency: *S: Single event; IR: Irregular event; R: Regular event; C: Continuous*

Reversibility: *R: Reversible: I: Irreversible*

Ecological Context: *U:Undisturbed, D:Disturbed;*

N/A Not applicable

10.6 Assessment of Cumulative Environmental Effects on Vegetation and Wetlands

The Project residual effects that are likely to interact cumulatively with residual environmental effects of other projects and physical activities are identified in this section, and the resulting cumulative environmental effects are assessed. This is followed by an analysis of the Project contribution to residual cumulative effects.

Table 7-4 in Chapter 7: Assessment Methods identifies other projects and physical activities that might act cumulatively with the Project. Where residual environmental effects from the Project act cumulatively with those from other projects and physical activities (Table 10-19), a cumulative effects assessment is undertaken to determine their significance.

The assessment of cumulative effects considers residual effects from Project construction, and operation and maintenance.

The assessment of cumulative environmental effects that are likely to result from the Project in combination with other projects and physical activities is presented in this section. Environmental effects identified in Table 10-19 as not likely to interact cumulatively with residual effects of other projects and physical activities (no check mark) are not discussed further.

The Project is located in a region that has been substantially altered by agricultural conversion and residential development. Approximately 48% of the RAA consists of agricultural land, 13% developed land, 33% native vegetation and 5% wetland. Most of the native vegetation occurs in the New ROW portion of the RAA.

With the exception of resource use, all past and current projects and activities listed in Table 10-19 have contributed to a change in vegetation and wetlands within the RAA due to clearing, drainage and land conversion. Forestry activities, peat mines, quarries and other mining operations have contributed to landscape fragmentation, loss of native vegetation, loss of wetlands, loss of rare and traditional use plant species and increase in invasive plant species due to land clearing. Recreation activities (*e.g.*, ATV and snowmobile use) contribute to cumulative effects on vegetation and wetlands through the creation and use of trails in native vegetation and the introduction and spread of invasive plant species.

Table 10-19 Potential Cumulative Environmental Effects on Vegetation and Wetlands

Other Projects and Physical Activities with Potential for Cumulative Environmental Effects	Potential Cumulative Environmental Effects					
	Landscape Intactness	Native Vegetation	Wetland Cover Class	Invasive Plant Species	Rare Plant Species	Traditional Use Species
Past and Present Physical Activities and Resource Use						
Agriculture (Conversion, Livestock Operations, Cropping and Land Drainage)	✓	✓	✓	✓	✓	✓
Residential Developments	✓	✓	✓	✓	✓	✓
Existing Linear Developments	✓	✓	✓	✓	✓	✓
Other Resource Activities (Forestry, Mining, Hunting, Trapping, Fishing)	✓	✓	✓	✓	✓	✓
Recreational Activities	✓	✓	✓	✓	✓	✓
Project-Related Physical Activities	✓	✓	✓	✓	✓	✓
Future Physical Activities						
Bipole III Transmission Project	–	–	✓	–	–	–
St. Vital Transmission Complex	–	–	✓	–	✓	–
Dorsey to Portage South Transmission Project	–	–	✓	–	✓	–
Northwest Winnipeg Natural Gas Pipeline Project	–	–	--	–	–	–
Richer South Station to Spruce Station Transmission	✓	✓	✓	✓	✓	✓
Energy East Pipeline Project	–	–	–	–	–	–
Southend Water Pollution Control Centre Upgrade Project	–	–	–	–	–	–
St. Norbert Bypass	–	–	✓	–	–	–
Headingley Bypass	–	–	✓	–	–	–
Oakbank Corridor	–	–	✓	–	–	–
Residential Development	✓	✓	✓	✓	✓	✓
Natural Gas Upgrade Projects	–	–	–	–	–	–
MIT Capital Projects (Highway Renewal)	–	–	–	–	–	–
Piney-Pinecreek Border Airport Expansion	–	–	✓	–	–	–

NOTES:

"✓" = Other projects and physical activities whose residual effects are likely to interact cumulatively with Project residual environmental effects

"–" = Interactions between the residual effects of other projects and those of the Project residual effects are not expected.

Future projects and activities, such as the transmission line projects, Northwest Winnipeg Natural Gas Pipeline Project, bypass projects and Piney-Pinecreek Border Airport Expansion may overlap in time and space with the Project's residual effects on wetlands. Within the RAA, these projects are expected to alter vegetation and wetlands due to land clearing. Effects on landscape intactness, native vegetation cover classes, and rare/traditional use plants from these projects are not expected because, in the vicinity of MMTP, the projects are planned in previously disturbed areas (*i.e.*, agricultural and other modified land). The Richer South Station to Spruce Station Transmission Project and residential development may have a cumulative effect on landscape intactness, native vegetation cover classes, wetland cover classes, invasive plant species, and rare and traditional use. The Richer South Station to Spruce Station Transmission Project has not yet been formally proposed, and there is considerable uncertainty around its location, schedule and the details of the Project. The St. Vital Transmission Complex is predicted to have a cumulative effect on wetland cover classes and rare plant species.

The Energy East Pipeline Project, upgrades to the Southend Water Pollution Control Centre, natural gas upgrade projects and the Manitoba Infrastructure and Transportation Capital Projects are not expected to have residual effects on vegetation and wetlands (no check marks in Table 10-19) because they are planned to be undertaken in previously disturbed areas (*e.g.,* within Winnipeg or along an existing highway) and have localized effects outside the RAA.

10.6.1 Cumulative Effects Assessment for Change in Vegetation Landscape Intactness

Future projects in the RAA (Table 10-19) could interact cumulatively with the Project if their facilities are built in areas with large intact patches (larger than 200 ha) of native vegetation and wetlands. The magnitude of existing cumulative effects on landscape intactness in the RAA is high along the Existing Corridor due to past agricultural conversion and residential and commercial development. Cumulative effects in the New ROW portion of the RAA are also influenced by these past developments but to a lesser extent because many large intact patches of native vegetation remain. Based on the categories defined in Table 10-4, existing cumulative effects on landscape intactness are moderate to high in magnitude because important large patch categories, including both native vegetation and wetlands, have been eliminated in some portions of the RAA (and beyond).

10.6.1.1 Cumulative Effect Pathways for Cumulative Change in Vegetation Landscape Intactness

The cumulative effect pathways are similar to those of the effects of the Project. Vegetation clearing could change landscape intactness by fragmenting areas of native or wetland vegetation. Of particular interest are areas that are larger than 200 ha. The Richer South Station to Spruce Station Transmission Project could interact cumulatively with the Project because a linear disturbance may be created in large intact patches of native vegetation, although, as indicated

earlier, routing has not yet been completed for the project. Residential development could also interact cumulatively with the Project if clearing occurs in large intact patches of native vegetation.

10.6.1.2 Mitigation for Cumulative Effects for Cumulative Change in Vegetation Landscape Intactness

Consideration of large intact patches of native vegetation in transmission line routing can help to reduce fragmentation of these patches. Consideration of this in future developments can help to reduce additional native vegetation fragmentation.

Implementation of the mitigation measures described in Section 10.5.2 will further reduce effects on landscape intactness. Additional mitigation measures to reduce cumulative effects within the RAA include the use of existing access roads, trails or cut lines to the extent possible.

10.6.1.3 Residual Cumulative Effects for Change in Vegetation Landscape Intactness

With the addition of Project effects, cumulative effects on vegetation landscape intactness will remain moderate to high in magnitude. The Project will cause a small amount of fragmentation due to the clearing of native vegetation. However, there will be no net loss of large patches (*i.e.,* larger than 200 ha) of native vegetation or wetlands in the Existing Corridor or New ROW within the RAA; large patches intersected by the PDA will still be larger than 200 ha after Project clearing. In addition, during the life of the Project, native vegetation, except for trees, will be allowed to regenerate. Therefore, with mitigation the Project's contribution to cumulative environmental effects is not expected to measurably affect the viability of landscape intactness in the RAA.

Most of the future projects and activities within the RAA (Table 10-19) will likely occupy a combination of agricultural land and developed land (where there will be no loss of native vegetation, and therefore, no interaction with Project residual effects). Residential development has the potential to interact cumulative with the Project because permanent structures may be built within areas of large intact patches (greater than 200 ha). The Richer South Station to Spruce Station Transmission Project could interact cumulatively with the Project because a possible route originating at Richer South Station and extending east, would intersect large intact patches (larger than 200 ha) of native vegetation (Map 10-3 – Habitat Fragmentation in the RAA). However, the route would likely avoid existing and proposed candidate protected areas (*e.g.,* Balsam Willow Proposed Ecological Reserve). The effects of the Richer South Station to Spruce Station Transmission Project could act cumulatively with the Project residual effects by causing increased fragmentation of large patches of native vegetation within the RAA. Cumulative effects on landscape intactness will remain moderate to high in magnitude.

10.6.2 Cumulative Effects Assessment for Change in Native Vegetation Cover Class

Native vegetation covers approximately 33% (236,321 ha) of the RAA. Project effects on native vegetation are expected to act cumulatively with future projects in the RAA (Table 10-19). Parts of the RAA have already been disturbed by agricultural, industrial and residential development (Map Series 10-100 - Vegetation and Wetland Cover Classes in the LAA and RAA). Most of the remaining areas of native vegetation, including grassland, shrubland and forest (coniferous, deciduous and mixedwood) are located in the New ROW portion of the RAA. Based on the categories defined in Table 10-4, the effects of existing land use activities on native vegetation are moderate to high in magnitude because native vegetation cover classes have been eliminated from large portions or all of the RAA.

10.6.2.1 Cumulative Effect Pathways for Cumulative Change in Native Vegetation Cover Class

The cumulative effect pathways are similar to those of the effects of the Project. Vegetation clearing can change native vegetation cover class abundance, distribution and structure. The Richer South Station to Spruce Station Transmission Project could interact cumulatively with the Project because vegetation would be cleared and permanent structures (*i.e.,* transmission towers) may be built in areas of native vegetation cover classes.

10.6.2.2 Mitigation for Cumulative Effects for Cumulative Change in Native Vegetation Cover Class

The transmission line routing process considered large patches of native vegetation. The Richer South Station to Spruce Station Transmission project is also expected to use a route selection process that considers effects on native vegetation. Implementation of the mitigation measures described in Section 10.5.3.2 will further reduce effects on native vegetation cover classes. Additional mitigation measures to reduce cumulative effects on native vegetation cover classes within the RAA include the following:

- Existing access roads, trails or cut lines will be used to the extent possible.

10.6.2.3 Residual Cumulative Effects for Change in Native Vegetation Cover Class

With the addition of Project effects, cumulative effects on native vegetation cover classes will continue to be moderate to high in magnitude. Some restoration and protection of remaining native areas is occurring, however, over half of the RAA has been converted to anthropogenic land uses. The Project will cause a small loss of native vegetation (1%) in the RAA because the main above-ground structures (*i.e.*, towers) will be built in areas of native vegetation. Overall, the Project will have a negligible effect on native vegetation cover classes because areas of native

vegetation will be allowed to regenerate, except for those dominated by tall trees and shrubs. Therefore, with mitigation, the Project's contribution to cumulative environmental effects is not expected to measurably affect the viability of native vegetation cover classes in the RAA.

Most of the future projects and activities within the RAA (Table 10-19) will likely occupy a combination of agricultural land and developed land (where there will be no loss of native vegetation, and therefore, no interaction with Project residual effects). Residential development and the Richer South Station to Spruce Station Transmission Project could interact cumulatively with the Project because permanent structures (*i.e.,* houses and transmission towers) may be built in areas of native vegetation. The effects of residential development and the Richer South Station to Spruce Station Transmission Project could act cumulatively with the Project residual effects by causing the direct loss of areas of native vegetation. Therefore, cumulative effects on native vegetation cover classes will remain moderate to high in magnitude.

10.6.3 Cumulative Effects Assessment for Change in Wetland Cover Class Abundance, Distribution, Structure and Function

Wetlands occupy approximately 39,816 ha (3%) of the RAA. Project effects on wetlands are expected to act cumulatively with future projects in the RAA (Table 10-19). Parts of the RAA have been disturbed by agricultural, industrial and residential development (Map Series 10-100 - Vegetation and Wetland Cover Classes in the LAA and RAA). Most of the remaining areas of native vegetation, including wetlands, are located in the New ROW portion of the RAA. Based on the categories defined in Table 10-4, existing land use activities have had a moderate to high magnitude effect on wetland cover classes in the RAA because some wetland classes and their associated functions have been eliminated from portions or all of the RAA, most notably in the Existing Corridor due to agricultural conversion of native cover classes.

10.6.3.1 Cumulative Effect Pathways for Cumulative Change in Wetland Cover Class

The cumulative effect pathways are similar to those of the effects of the Project. Vegetation clearing could change the structure, plant species composition, and surface and subsurface runoff and drainage of existing wetlands. This could result in a change in wetland function. Many projects could interact cumulatively with the Project because they may cause ground disturbance, which could affect wetlands, and their in-ground or underground components could affect surface water and groundwater, which could affect wetland function.

10.6.3.2 Mitigation for Cumulative Effects for Cumulative Change in Wetland Cover Class

Consideration of wetland areas in transmission line routing can help to reduce potential effects on wetlands. Consideration of this in future developments in the RAA can help reduce additional effects on wetlands. Implementation of the mitigation measures described in Section 10.5.4.2 will further reduce the effects on wetlands. Additional mitigation measures to reduce cumulative effects within the RAA include using existing access roads, trails or cut lines to the extent possible.

10.6.3.3 Residual Cumulative Effects for Change in Wetland Cover Class

Effects on wetlands will occur during construction of the transmission line due to centerline trail clearing along the ROW, installation of tower foundations, and substation construction. Tree and shrub clearing may result in increased shrub density and herb and grass cover, and a shift in species composition. Vegetation and soil disturbance at tower locations is anticipated to be limited. Construction during dry or frozen ground conditions or the use of protective ground matting effectively limited the effects of the Western Alberta Transmission Line (Stantec 2015); the effects were restricted to the immediate area of the towers, and consisted mainly of small alterations in vegetation cover, and some rutting and raised vegetation and topsoil. Project towers will be placed only in large wetlands that cannot be spanned by the transmission line. Wetlands located at the stations will be permanently lost due to construction. The function of the large wetland complexes in the LAA will not be measurably affected by construction. With mitigation, incremental effects from the Project will not threaten the viability of the remaining wetland cover classes or wetland function in the RAA.

With the addition of Project effects, cumulative effects on wetlands will remain moderate to high in magnitude. Most of the future projects and activities within the RAA (Table 10-19) will likely occupy a combination of agricultural land and developed land. However, the agricultural land includes numerous prairie pothole marsh wetlands. Many projects could interact cumulatively with the Project because they may cause ground disturbance, which could affect wetlands. These projects include the Bipole III Transmission Project, Dorsey-Portage South Transmission Project, St. Vital Transmission Complex, Northwest Winnipeg Natural Gas Pipeline Project, St. Norbert Bypass, Headingley Bypass, Oakbank Corridor, Piney–Pinecreek Boarder Airport Expansion, Richer South Station to Spruce Station Transmission, as well as residential development. All of these projects will have permanent structures if they proceed that could affect wetland cover class abundance, distribution, structure and function. With the exception of the Piney–Pinecreek Boarder Airport Expansion and Richer South Station to Spruce Station Transmission, these projects will be located primarily in agricultural land within the Existing Corridor RAA. Consequently, they could reduce the number of marsh wetlands in this area. The Richer South Station to Spruce Station Transmission Project could interact cumulatively with the Project because a linear disturbance in areas of large intact patches (larger than 200 ha) of native

vegetation containing wetlands may be created. A possible Richer South Station to Spruce Station Transmission Project originates at Richer Station and extends east, could intersect large intact patches of native vegetation (Map 10-3 – Habitat Fragmentation in the RAA) and would consider existing and candidate protected areas (*e.g.*, Balsam Willows Proposed Ecological Reserve). The effects of the other proposed projects could act cumulatively with the Project residual effects on wetland abundance, distribution, structure and function in the RAA.

10.6.4 Cumulative Effects Assessment for Change in Invasive Plant Species Abundance and Distribution

Project effects associated with invasive plant species are expected to act cumulatively with future projects that will affect native vegetation, including wetlands, in the RAA (Table 10-19). Parts of the RAA have been disturbed by agricultural, industrial and residential development. This has degraded the remaining native vegetation and made it vulnerable to invasive plant species invasion. Within the RAA, 4130 occurrences of 21 invasive plant species have been recorded; 7% of these were recorded in the New ROW portion of the RAA. Based on the categories defined in Table 10-4, existing land use activities have had a moderate to high magnitude effect because invasive plant species have contributed to the loss of native vegetation classes in portions or all of the RAA.

10.6.4.1 Cumulative Effect Pathways for Cumulative Change in Invasive Plant Species Abundance and Distribution

The cumulative effect pathways are similar to those of the effects of the Project. Vegetation clearing could change the species composition of native vegetation and create areas that are vulnerable to invasive plant species invasion. The effects of the Richer South Station to Spruce Station Transmission Project could interact cumulatively with those of the Project because the Richer South Station to Spruce Station Transmission Project may involve the building of permanent structures (*i.e.,* transmission towers) in native vegetation cover classes.

10.6.4.2 Mitigation for Cumulative Effects for Cumulative Change in Invasive Plant Species Abundance and Distribution

Implementation of the mitigation measures described in Section 10.5.5.2 will help reduce Project effects associated with invasive plant species.

10.6.4.3 Residual Cumulative Effects on Change in Invasive Plant Species Abundance and Distribution

With the addition of Project effects, cumulative effects associated with invasive plant species will be moderate to high in magnitude. Over half of the RAA has been converted to anthropogenic land uses and invasive species were frequently recorded at Project survey sites. The Project may affect native vegetation in areas with known occurrences of invasive plant species. Invasive plant species could spread into adjacent areas of native vegetation that have been disturbed by Project construction. With mitigation, the incremental effects of the Project will not include the introduction or spread of invasive plant species beyond the LAA. As a result, the Project's contribution to cumulative environmental effects is not expected to measurably affect the viability of native vegetation cover classes in the RAA.

Most of the future projects and activities within the RAA (Table 10-19) will likely occupy a combination of agricultural land and developed land. These areas have already lost much of the native vegetation cover classes, and the remaining areas are threatened by the invasion of invasive plant species. Residential development may interact with the Project if within areas of native vegetation. The effects of the Richer South Station to Spruce Station Transmission Project could interact with the Project because the Richer South Station to Spruce Station Transmission Project may involve vegetation clearing in native vegetation cover classes. The cumulative effects of these projects could be associated with the invasion and spread of invasive plant species in native vegetation cover classes. Cumulative effects will remain moderate to high in magnitude.

10.6.5 Cumulative Effects Assessment for Change in Rare Plant Species Abundance and Distribution

Project effects on rare plant species abundance and distribution are expected to act cumulatively with future projects that will affect native vegetation or known occurrences or distributions of rare plant species in the RAA (Table 10-19). Parts of the RAA have been disturbed by agricultural, industrial and residential development, which is why some plant species are rare (Map Series 10-100 - Vegetation and Wetland Cover Classes in the LAA and RAA). Most of the remaining areas of native vegetation, including grassland, shrubland and forest (coniferous, deciduous and mixedwood), occur in the New ROW portion of the RAA. Rare plant species are now largely restricted to undisturbed areas, including native vegetation cover classes. Based on the categories defined in Table 10-4, existing land use activities have had a moderate to high magnitude effect on rare plant species, because many species now considered at risk have been eliminated from portions or all of the RAA.

10.6.5.1 Cumulative Effect Pathways for Cumulative Change in Rare Plant Species Abundance and Distribution

The cumulative effect pathways are similar to those of the effects of the Project. Vegetation clearing could remove or destroy local occurrences of rare plant species. The effects of residential development and the Richer South Station to Spruce Station Transmission Project could interact cumulatively with those of the Project because the projects may involve clearing areas in large intact native vegetation patches that could contain rare plant species. Because rare plant species generally occur in native vegetation cover classes, it is inferred that the loss of rare plant species will be directly correlated to the loss of native vegetation cover classes.

10.6.5.2 Mitigation for Cumulative Effects for Cumulative Change in Rare Plant Species Abundance and Distribution

Transmission line routing for the Project considered and ultimately avoided many known occurrences of SOCC, based on the 2014 field surveys. It is assumed that future developments will use route and site selection processes that consider SOCCs, and abide by federal and provincial legislation to reduce additional effects on rare plant species. For example, Manitoba Hydro will conduct surveys for rare plants during project planning for the Richer South Station to Spruce Station Transmission Project should it proceed and will avoid placing permanent structures on known rare plant occurrences, where possible.

10.6.5.3 Residual Cumulative Effects for Change in Rare Plant Species Abundance and Distribution

With the addition of Project effects, cumulative effects on rare plant species abundance and distribution will be moderate to high in magnitude. Over half of the RAA has been converted to anthropogenic land uses and this has contributed to the rarity of some plant species. There may be long-term permanent effects on areas where SOCC occurrences and individual plants are destroyed during Project construction; however, this can be mitigated through follow-up and monitoring (Section 10.9). SOCC recorded in the PDA have been found elsewhere in the RAA; therefore, the Project's contribution to cumulative environmental effects is not expected to measurably affect the viability of these SOCC in the RAA.

Most of the future projects and activities within the RAA (Table 10-19) will likely occupy a combination of cultivated and developed land (where there will be no loss of plant species, and therefore, no interaction with Project residual effects). The effects of the Richer South Station to Spruce Station Transmission Project and the St. Vital Transmission Complex could interact cumulatively with those of the Project because they involve vegetation clearing. In addition, the Richer South Station to Spruce Station Transmission Project may involve the building of permanent structures in areas with large intact native vegetation patches that could contain rare plant species. However, a rare plant survey will be conducted during project planning, and known locations of rare plants will be avoided, where possible. The effects of the other projects could act

cumulatively with the Project residual effects through the direct loss of rare plant species. Therefore, cumulative effects on rare plant species abundance and distribution will remain moderate to high in magnitude.

10.6.6 Cumulative Effects Assessment for Change in Traditional Use Plant Species Abundance and Distribution

Project effects on traditional use plant species abundance and distribution are expected to act cumulatively with future projects that will affect areas of native vegetation or known harvest locations of traditional use plant species in the RAA (Table 10-19). Since European settlement, there has been a loss in the abundance and distribution of traditional use plant species in the RAA due to agricultural conversion and industrial and residential development. In the Existing Corridor, many of the areas used for harvesting traditional use plant species have been removed due to agricultural conversion. The remaining areas where traditional use plant species are harvested are located along the New ROW portion of the RAA. Based on the categories defined in Table 10-4, existing land use activities have had a moderate to high magnitude effect on traditional use plant species because many of these species have been eliminated from portions or all of the RAA.

10.6.6.1 Cumulative Effect Pathways for Cumulative Change in Traditional Use Plant Species Abundance and Distribution

The cumulative effect pathways are similar to those of the effects of the Project. Vegetation clearing will alter and remove vegetation communities that support traditional use plants. Vegetation management and herbicide application will affect native plant species abundance and distribution, including vegetation communities that are relied on for traditional use purposes. The Richer South Station to Spruce Station Transmission project and residential development could interact cumulatively with the Project because they may involve clearing native vegetation and building permanent structures (*e.g.,* transmission towers) in areas of native vegetation.

10.6.6.2 Mitigation for Cumulative Effects for Cumulative Change in Traditional Use Plant Species Abundance and Distribution

An effective route selection process can be used to avoid areas of traditional use plant species. It is assumed that future developments will use appropriate route and site selection processes, where possible, to reduce additional effects on traditional use plant species.

10.6.6.3 Residual Cumulative Effects on Change in Traditional Use Plant Species Abundance and Distribution

With the addition of Project effects, cumulative effects on traditional use plant species abundance and distribution will remain moderate to high in magnitude. The Project may affect traditional use plant species, particularly trees and shrubs, or species that occur primarily in deciduous forests and grassland areas because some vegetation clearing will be required, particularly at structure (*i.e.,* towers) locations. However, the Project will cause only a small permanent loss of native vegetation (1%) in the RAA and some traditional use species may respond positively to vegetation clearing. Therefore, the Project's contribution to cumulative environmental effects is not expected to measurably affect the viability of traditional use plant species in the RAA.

The Richer South Station to Spruce Station Transmission project could interact cumulatively with the Project because it may involve clearing areas of native vegetation. The effects of the Richer South Station to Spruce Station Transmission project could act cumulatively with the Project residual effects through the direct loss of abundance and distribution of traditional use plant species.

10.6.7 Summary of Cumulative Effects

Table 10-20 summarizes cumulative environmental effects on vegetation and wetlands.

Table 10-20 Summary of Cumulative Environmental Effects on Vegetation and Wetlands

Cumulative Effect	Residual Cumulative Environmental Effects Characterization						
	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Ecological Context
Cumulative Effect on Landscape Intactness							
Cumulative environmental effect with the Project	A	M-H	RAA	P	C	I	D/U
Contribution from the Project to the cumulative environmental effect	Landscape intactness will be permanently adversely affected by the Project due to native vegetation clearing in the PDA. However, there will be no net loss of intact patches larger than 200 ha and native vegetation will be allowed to regenerate except for tall trees and shrubs.						

Cumulative Effect	Residual Cumulative Environmental Effects Characterization						
	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Ecological Context
Cumulative Effect on Native Vegetation Cover Class Abundance, Distribution and Structure							
Cumulative environmental effect with the Project	A	M-H	RAA	P	C	I	D/U
Contribution from the Project to the cumulative environmental effect	Native upland vegetation cover classes will be adversely affected in the LAA due to permanent losses due to vegetation clearing. However, there will be less than 1% change in the RAA as native vegetation will be allowed to regenerate along the PDA with the exception of tall trees and shrubs.						
Cumulative Effect on Wetland Cover Class Abundance, Distribution, Structure, and Function							
Cumulative environmental effect with the Project	A	M-H	RAA	P	C	I	D/U
Contribution from the Project to the cumulative environmental effect	Wetland cover classes will be adversely affected by the Project in the LAA due to the permanent loss of wetlands at Dorsey, change in wetland structure for those dominated by tall trees/shrubs, and an alteration of wetlands that are too large to span.						
Cumulative Effect on Invasive Plant Species Abundance and Distribution							
Cumulative environmental effect with the Project	A	M-H	RAA	P	C	I	D/U
Contribution from the Project to the overall cumulative environmental effect	Native vegetation cover classes will be adversely affected by the Project due to the potential spread or introduction of invasive plant species in the LAA.						
Cumulative Effect on Rare Plant Species Abundance and Distribution							
Cumulative environmental effect with the Project	A	M-H	RAA	P	C	I	D/U
Contribution from the Project to the overall cumulative environmental effect	Rare plant species will be adversely affected by the Project in the PDA due to the permanent loss of known rare plant occurrences.						

Cumulative Effect	Residual Cumulative Environmental Effects Characterization						
	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Ecological Context
Cumulative Effect on Traditional Use Plant Species Abundance and Distribution							
Cumulative environmental effect with the Project	A	M-H	RAA	P	C	I	D/U
Contribution from the Project to the overall cumulative environmental effect	Traditional use plant species will be adversely affected by the Project in the PDA due to a permanent loss of species, particularly trees and shrubs, due to clearing and vegetation maintenance.						

KEY

See Table 10-4 for detailed definitions

Direction: **P: Positive;** *A: Adverse; N: Neutral*

Magnitude: *N: Negligible; L: Low; M: Moderate; H: High*

Geographic Extent: *PDA: ROW/Site; LAA: Local; RAA: Regional*

Duration: *ST: Short-term; MT: Medium-term; P: Permanent*

Frequency: *S: Single event; IR: Irregular event; R: Regular event; C: Continuous*

Reversibility: *R: Reversible: I: Irreversible*

Ecological Context: U:Undisturbed, D:Disturbed;

N/A Not applicable

In summary, this Project and other known and reasonably foreseeable future projects will contribute to cumulative effects on landscape intactness, native upland vegetation cover classes, wetland cover classes, invasive plant species, rare plant species, and traditional use plant species that have already been reduced in abundance in the RAA. Many of the rare plant species in this assessment are of conservation concern due to past pressures on their habitat.

The on-going effects of new projects will be minor relative to existing pressures, and are not expected to threaten the viability of vegetation and wetland features in the RAA for the following reasons:

- Project PDA areas in native vegetation cover classes (including wetlands) will be small relative to the remaining native vegetation availability in the RAA.
- Project effects will be related primarily to the construction period and will largely be reversible.

10.7 Determinations of Significance

10.7.1 Significance of Environmental Effects from the Project

Most potential effects on vegetation and wetlands were mitigated during the planning and routing process by using an existing corridor, paralleling portions of existing transmission lines and Final Preferred Route avoiding large intact patches of native vegetation, including protected areas. A summary for each key effect is presented below:

Landscape Intactness

- Twenty-two large patches of native vegetation or wetlands will be fragmented as a result of PDA clearing; however, there will be no net loss of patches larger than 200 ha. The number of large patches (larger than 200 ha) in the RAA will increase following Project construction because very large patches will be split. The Project will not affect the long-term persistence of large patches of native vegetation or wetlands and associated biodiversity in the RAA.

Native Vegetation Cover Class

- Because less prevalent cover classes, such as sand dunes, will not be eliminated from the LAA or RAA, the Project will not affect the current viability of native vegetation cover classes and associated biodiversity in the RAA.

Wetland Class

- No wetland classes will be eliminated from the LAA or RAA. In addition, effects on wetland function will be highly localized and, in most cases, temporary. Wetland loss associated with Dorsey Converter Station will be appropriately addressed through offset mitigation. Consequently, the Project will not affect the current viability of wetland classes, function and associated biodiversity in the RAA.

Invasive Plant Species

- With the implementation of invasive plant species management measures, Project-related spread or introduction of invasive plant species is not expected to threaten the current viability of native vegetation cover classes in the RAA, and Manitoba Hydro will remain compliant with provincial legislation or guidelines pertaining to the management of invasive plant species.

Rare Plant Species

- With the implementation of mitigation measures, Project-related disturbance to SOCC is not expected to threaten the viability of SOCC in the RAA, and Manitoba Hydro will remain compliant with provincial legislation pertaining to rare plant species. It is highly probable that SOCC disturbances can be avoided by adjusting the locations where towers will be built once preconstruction surveys have confirmed locations.

Traditional Use Plant Species

- Because no cover classes will be eliminated from the LAA or RAA, the Project will not affect the current viability of native vegetation cover classes that support traditionally used plant species in the RAA.

Based on these summaries, potential Project effects on vegetation and wetlands are considered not significant.

10.7.2 Significance of Cumulative Environmental Effects

The existing land base in the RAA has been partially modified by agricultural conversion (48%) and, to a lesser extent, by industrial and residential development. Effects have been greatest in the Existing Corridor portion of the RAA. Human disturbances are present in the New ROW RAA, but most of the area is still composed of native vegetation and wetlands. Large fires, the keystone natural process in the area, still occur and the rate of native area loss appears to have decreased or stabilized since the oldest large fire, which occurred in 1976 (Natural Resource Canada 2015). The area used for agriculture in southern Manitoba has generally decreased since 1976 and the area of woodlots and wetlands was unchanged (AAFC and Manitoba Agriculture Food and Rural Initiatives 2009, 2011). The trend in grassland area is not clear but the area has likely decreased, although at a reduced rate. With the addition of Project effects, cumulative effects on vegetation and wetlands relative to existing conditions are assessed as being not significant.

10.7.3 Project Contribution to Cumulative Environmental Effects

The contribution of the Project residual effects to cumulative effects are not expected to further threaten the long-term persistence or viability of native vegetation in the RAA relative to current conditions. The Project is unlikely to have a measurable effect on landscape intactness, native vegetation, wetlands, rare plant species, traditional use plant species or invasive plant species spread within the LAA.

The Project will fragment intact patches of vegetation and wetlands causing an increase in the number of patches and a decrease in total patch size in the RAA; however, there will be no net loss of patches larger than 200 ha. Pathways of direct Project effects on landscape intactness are primarily associated with ROW clearing along parts of the New ROW. Some of the intact patches (larger than 200 ha) of native vegetation and wetlands will be fragmented. The Project's contribution to cumulative levels of landscape intactness on the Existing Corridor and New ROW is a loss of 0.4% of total patch area, which is a small increase over existing levels of fragmentation in the RAA.

The Project will result in a loss of 660 ha of tree or shrub dominated cover classes (shrubland, deciduous, mixedwood, and coniferous forest) in the RAA; however, other cover classes, including grassland, will not be lost or the structure changed and complete removal of vegetation will be limited to the tower locations and the centreline trail. Pathways of Project effects on native vegetation cover classes are primarily associated with ROW clearing along parts of the New ROW, which will change the cover class to one that is low shrub and/or graminoid dominated. The Project's contribution to cumulative levels of native vegetation cover class is a change of 753 ha (0.1%) change over existing cover classes in the RAA.

The Project will result in a reduction of the abundance, distribution of 56 ha of wetlands in the RAA. Pathways of Project effects on wetland cover classes are primarily associated with ROW clearing, grubbing, and installation of tower foundations. Permanent effects of the Project are restricted to wetlands dominated by tree or shrub species. In addition, wetland function may be locally altered if large wetlands cannot be spanned by the transmission line and towers will be placed within the large wetlands. The Project's contribution to cumulative levels of wetland cover class is a change in 56 ha (0.2%) of wetlands in the RAA from existing conditions.

The Project will not result in a loss of rare plant species (SAR and SOCC) in the RAA. Pathways of Project effects on rare plant species are primarily associated with ROW clearing and vegetation management during operation. The Project's contribution to cumulative levels of rare plant species is no change in rare plant species in the RAA from existing conditions.

The Project may affect native vegetation in areas with known occurrences of invasive plant species. Invasive plant species could spread into adjacent areas of native vegetation that have been disturbed by Project construction. With mitigation, the incremental effects of the Project will not include the introduction or spread of invasive plant species beyond the LAA. As a result, the Project's contribution to cumulative environmental effects is not expected to measurably affect the viability of native vegetation cover classes in the RAA.

The Project will not result in a loss of traditional use plant species in the RAA. Pathways of Project effects on traditional use plant species are primarily associated with ROW clearing and vegetation management during operation. Native vegetation along the ROW will be converted from tree or shrub cover to low shrub or herbaceous/graminoid cover, which may affect the occurrence of traditional use plant species at a local level. The Project's contribution to cumulative levels of traditional use plant species is no change in traditional use plant species in the RAA from existing conditions.

10.7.4 Sensitivity of Prediction to Future Climate Change

According to the climate change scenarios presented in the Biophysical Technical Data Reports - Historic and Future Climate Study, growing season (May to September) temperatures and precipitation are projected to increase into the future. Growing season monthly mean temperatures are projected to increase by 1.3°C, 2.5°C and 3.5°C in the 2020s, 2050s and 2080s, respectively. Total growing season precipitation is projected to increase by 2.5%, 1.5% and 2.8% in the 2020s, 2050s and 2080s, respectively. However, precipitation amounts are projected to be lower in July based on the scenarios for 2050s and 2080s, and lower in August based on all three scenarios.

Although additional precipitation is anticipated during the growing season, decreases in precipitation coupled with higher temperatures in July and August may result in increased water deficits for vegetation and wetlands during the summer. Therefore, plant species composition in the PDA may change in the future (Sauchyn and Kulshreshtha 2008). In addition, fire activity may increase due to climate change (Flannigan *et al.* 2000).

Wetlands, particularly peatlands (*i.e.*, bogs and fens), are sensitive to temperature and precipitation changes because they can alter wetland hydrology (Camill and Clark 2000). Also, areas that were too wet for agriculture in the past may be converted to agricultural land in the future due to climate change (Zhang and Cai 2011).

Projected climate change will not change the significance determinations for vegetation and wetlands because the projected changes are not expected to measurably increase the magnitude of Project effects on landscape intactness, native vegetation cover classes, wetland cover classes, rare or traditional use plant species, or the spread of invasive plant species. Landscape intactness will likely not be affected by a warmer climate as it is unlikely patches of native vegetation will be lost, although cover classes may shift. Abundance and distribution of native cover classes, rare plants and traditional use plants will likely change, but the Project is anticipated to effect a small portion. Grasslands, currently one of the less prevalent cover classes, may also increase in abundance, thereby reducing Project effects. Some invasive plant species may increase in abundance and established native cover will help reduce spread.

10.8 Prediction Confidence

The prediction confidence is based on the information compiled during desktop mapping and data collection, and field surveys, on data analyses and on an understanding of Project activities, location and schedule. Prediction confidence is considered moderate because there is some uncertainty about the abundance and distribution of plant species (SOCC, including SAR), native vegetation cover classes and wetlands within the RAA due to the coarseness of the data. In addition, the MBCDC's historical data for plant SOCC within the PDA, LAA and RAA are limited. Moreover, the locations of historical plant SOCC occurrences had not been obtained from the

MBCDC by the time the field work was conducted; therefore, historical occurrences could not be relocated or confirmed in the field.

There is a high level of confidence in the effectiveness of the mitigation measures, with the exception of rare plant transplants, which are of limited success.

10.9 Follow-up and Monitoring

This section describes monitoring and follow-up programs for vegetation and wetlands, how the programs will be implemented, and how information from these programs will be applied.

To address the uncertainty described above pre-construction surveys for rare plant species (SAR/SOCC) and invasive plant species will be conducted in previously unsurveyed areas of native vegetation at tower locations and along the ROW. These surveys can be used to confirm the location of rare plants and wetlands and to determine the need for buffers and setbacks.

Monitoring programs for vegetation and wetlands will be implemented as part of the CEnvPP. The CEnvPP is a framework for implementing, managing, monitoring and evaluating protection activities related to environmental effects identified in environmental assessments, in regulatory requirements and by the public. The CEnvPP prescribes measures and practices to avoid and reduce environmental effects on vegetation and wetlands (*e.g.*, activity timing; setbacks and buffers for sensitive sites, such as known SOCC occurrences). The CEnvPP will include an Environmental Monitoring Plan that will provide detailed methods on how predicted changes in vegetation and wetlands will be verified, and how the effectiveness of mitigation measures will be evaluated. The Environmental Monitoring Plan will also identify reporting commitments and schedules.The objectives of the monitoring plan are to:

- provide baseline information to evaluate long-term changes or trends
- confirm the nature and magnitude of predicted environmental effects
- evaluate the success of mitigation implemented
- identify unexpected environmental effects of the Project, if they occur, and identify mitigation measures to address unexpected environmental effects, where required
- confirm compliance with regulatory requirements, including approval terms and conditions.

Monitoring and follow-up commitments for vegetation and wetlands are summarized in Table 10-21.

Table 10-21 Vegetation and Wetlands Monitoring and Follow-up Activities

Component	Key Monitoring Activity	Phase	Task Description	Duration	Frequency
Rare Plants	Confirm and flag rare plant occurrences	Pre-clearing	Survey for SOCC and SAR plant species in areas not previously surveyed that have the potential to provide habitat for SOCC	Growing season prior to construction	Two surveys at least seven weeks apart: early blooming season (May 15–July 1) and late blooming season (July 2–Sept 15)
	Monitor changes in rare plant occurrences	Operation	Monitor changes in rare plant species occurrences in areas along the PDA	Growing season following construction	Two surveys at least seven weeks apart: early blooming season (May 15–July 1) and late blooming season (July 2–Sept 15)
Invasive plant species	Monitor invasive plant species invasions	Construction	Monitor existing invasive plant species at construction sites and equipment cleaning sites, if construction occurs during the growing season Monitor compliance for “clean equipment” arriving onsite during construction	Construction phase	Continuous
		Operation		Growing season following construction	Concurrent with rare plant surveys

Monitoring of construction activities will be conducted by onsite environmental inspectors. They will monitor activities for compliance with regulatory commitments and mitigation measures, as outlined in the CEnvPP (Chapter 22). Resource specialists (*e.g.*, vegetation ecologists) may be used to monitor selected activities, such as the identification of rare plant locations prior to vegetation clearing.

The Environmental Monitoring Plan will be applied to the measureable parameters for vegetation and wetlands. Available First Nation and Metis traditional and local knowledge will be included in the monitoring plan. The plan will be used to evaluate land rehabilitation success against baseline and adjacent representative site conditions, recommend corrective actions and apply adaptive management where deficiencies or unanticipated environmental effects are identified. Additional mitigation measures or modifications to existing mitigation measures may be required if unanticipated effects occur. Knowledge gained through ongoing monitoring and analysis will be used to improve assessment methods and analyses, mitigation measures and the monitoring plan. Manitoba Hydro conducts its monitoring programs in an integrated fashion across all current projects. This ensures knowledge gained from other project effects monitoring (*i.e.*, Bipole III Transmission Project) is available and applicable to this Project. The Environmental Monitoring Plan will identify triggers or thresholds for adaptive management actions that are required for vegetation and wetlands.

The Environmental Monitoring Plan will be used during post-construction monitoring to determine the success of site-specific mitigation measures or other requirements identified through additional field work and reporting.

10.10 Summary

Key issues for vegetation and wetlands include:

- loss of intact patches of native vegetation and wetlands larger than 200 ha in the RAA
- loss of native vegetation cover classes in the RAA
- loss of wetland function in the RAA
- spread or introduction of invasive plant species in the PDA
- loss of rare and traditional use plant species in the RAA
- effects that are contrary to, or inconsistent with, federal and provincial management objectives

Important design and routing mitigation that avoided potential effects on vegetation and wetlands include using an existing corridor, paralleling portions of existing transmission lines and the Final Preferred Route avoiding large intact patches of native vegetation, including protected areas.

The residual effects on vegetation and wetlands include:

- fragmentation of large intact patches of native vegetation (larger than 200 ha), including native vegetation and wetlands in the RAA
- changes in the abundance and distribution of native vegetation cover classes in the LAA, particularly tree- and shrub-dominated classes
- change in the abundance, distribution, structure and function of wetland cover classes in the LAA
- changes in the distribution of invasive plant species in the LAA
- loss of traditional use plant species in the PDA

Key Project-specific mitigation and monitoring that will limit effects include conducting vegetation clearing and construction during frozen or dry ground conditions, sighting towers outside of small wetlands, maintaining 30 m buffer zones around wetlands, maintaining 30 m buffers for listed plant species, ensuring vehicles are free of invasive plant species prior to construction, and allowing for natural revegetation following construction and rehabilitation.

In summary, Project residual effects on vegetation and wetlands are adverse and range from low to moderate magnitude. The geographic extent of effects will largely be limited to the PDA or LAA. Patch intactness will be altered at the RAA level as a result of fragmentation of large patches extending beyond the LAA. The frequency and duration of effects range from medium-term to permanent and a single event to multiple irregular events. With the exception of possible effects on invasive plant species and rare plants, Project effects on vegetation and wetlands are predicted to be reversible. Effects are assessed as not significant.

Projected climate changes will not alter the significance determinations for vegetation and wetlands because climate change is not expected to measurably increase the magnitude of Project effects.

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Appendix 10A
Rare Plant Species

Table 10A-1 MBCDC Historical Occurrences of Rare Plant Species for the Project

Vegetation Form	Scientific Name	Common Name	Provincial Rank	Number of Occurrences[2]		
				PDA	LAA	RAA
herb	*Anemone americana*	liverleaf	S1	–	–	1
herb	*Botrychium simplex*	least grapefern	S1	–	–	1
vine	*Clematis ligusticifolia*	western virgin's-bower	S1	–	–	34
graminoid	*Cyperus erythrorhizos*	red-root flatsedge	S1	–	–	22
herb	*Agalinis aspera*[1]	rough purple false-foxglove	S1S2	–	–	34
herb	*Agrimonia gryposepala*	common agrimony	S1S2	–	–	3
herb	*Amorpha fruticose*	false indigo	S1S2	–	2	55
herb	*Ranunculus cymbalaria* var. *saximontanus*	seaside crowfoot	S1S2	–	–	3
herb	*Spiranthes magnicamporum*[1]	great plains ladies'-tresses	S1S2	–	–	3
herb	*Arethusa bulbosa*	arethusa	S2	2	6	19
herb	*Arisaema triphyllum* ssp. *triphyllum*	jack-in-the-pulpit	S2	–	–	6
herb	*Calopogon tuberosus*	swamp-pink	S2	–	–	16
herb	*Canadanthus modestus*	large northern aster	S2	–	–	4
graminoid	*Carex cristatella*	crested sedge	S2	–	–	4
graminoid	*Carex tetanica*	rigid sedge	S2	–	–	25
vine	*Clematis virginiana*	virgin's-bower	S2	–	–	12
graminoid	*Cyperus houghtonii*	Houghton's umbrella-sedge	S2	–	–	4
herb	*Desmodium canadense*	beggar's-lice	S2	–	–	6
herb	*Gentiana puberulenta*	downy gentian	S2	–	–	16
herb	*Goodyera tesselata*	tesselated rattlesnake plantain	S2	–	–	1
herb	*Heteranthera dubia*	water star-grass	S2	–	–	3
tree	*Ostrya virginiana*	hop-hornbeam	S2	–	–	2
herb	*Platanthera hookeri*	hooker's orchid	S2	–	–	2

Vegetation Form	Scientific Name	Common Name	Provincial Rank	Number of Occurrences[2]		
				PDA	LAA	RAA
herb	*Polygala verticillata* var. *isocycla*	whorled milkwort	S2	–	–	28
herb	*Pyrola americana*	round-leaved pyrola	S2	–	–	8
herb	*Ranunculus hispidus* var. *caricetorum*	bristly buttercup	S2	–	–	1
herb	*Sanguinaria canadensis*	blood-root	S2	–	–	4
herb	*Solidago riddellii*[1]	Riddell's goldenrod	S2	–	–	6
herb	*Thermopsis rhombifolia*	golden bean	S2	–	–	2
herb	*Uvularia sessilifolia*	small bellwort	S2	–	–	8
graminoid	*Carex emoryi*	Emory's sedge	S2?	–	–	1
graminoid	*Carex projecta*	necklace sedge	S2?	–	–	3
herb	*Malaxis monophyllos*	white adder's-mouth	S2?	–	–	2
herb	*Malaxis unifolia*	green adder's-mouth	S2?	–	–	2
herb	*Agalinis tenuifolia*	narrow-leaved gerardia	S2S3	–	–	21
herb	*Boltonia asteroides* var. *recognita*	white boltonia	S2S3	–	1	43
graminoid	*Bouteloua curtipendula*	side-oats grama	S2S3	–	–	32
herb	*Chelone glabra*	turtlehead	S2S3	–	–	3
herb	*Corispermum americanum* var. *americanum*	American bugseed	S2S3	–	4	23
herb	*Cypripedium arietinum*	ram's head lady's-slipper	S2S3	1	4	13
tree	*Pinus resinosa*	red pine	S2S3	–	–	1
herb	*Symphyotrichum sericeum*	western silvery aster	S2S3	–	–	44
herb	*Asclepias verticillata*	whorled milkweed	S3	–	–	22
graminoid	*Calamagrostis montanensis*	plains reed grass	S3	–	–	6
graminoid	*Carex livida*	livid sedge	S3	–	–	33
shrub	*Ceanothus herbaceus*	New Jersey tea	S3	–	–	6
herb	*Diphasiastrum tristachyum*	ground-cedar	S3	–	–	4

Vegetation Form	Scientific Name	Common Name	Provincial Rank	Number of Occurrences[2]		
				PDA	LAA	RAA
herb	*Epigaea repens*	mayflower	S3	–	–	1
graminoid	*Festuca hallii*	plains rough fescue	S3	–	–	2
tree	*Fraxinus nigra*	black ash	S3	–	–	2
herb	*Hudsonia tomentosa*	false heather	S3	–	–	1
herb	*Leucophysalis grandiflora*	large white-flowered ground-cherry	S3	–	–	1
vine	*Menispermum canadense*	moonseed	S3	–	–	4
graminoid	*Nassella viridula*	green needle grass	S3	–	1	14
herb	*Platanthera orbiculata*	round-leaved bog orchid	S3	–	–	16
herb	*Verbena bracteata*	bracted vervain	S3	–	–	2
graminoid	*Carex douglasii*	Douglas sedge	S3?	–	–	2
graminoid	*Carex pedunculata*	stalked sedge	S3?	–	–	6
graminoid	*Carex vulpinoidea*	fox sedge	S3?	–	–	2
graminoid	*Leersia oryzoides*	rice cutgrass	S3?	–	–	7
graminoid	*Sporobolus neglectus*	annual dropseed	S3?	–	–	46
herb	*Viola conspersa*	dog violet	S3?	–	1	5
Total number of locations				3	15	703
Total number of species				2	6	62

NOTES:
[1] Listed as a SAR by SARA, COSEWIC or MESEA.
[2] Number of occurrences based on the polygon file from the MBCDC
"–" indicates that the species was not observed during field surveys

Appendix 10B
Photos

Photo 1 – Example of a tower installation in a wetland (Wuskwatim Transmission Project, August 21, 2010, vegetation monitoring)

Photo 2 – Example of ROW centreline traversing a bog (Bipole III ROW, summer 2014)

Photo 3 – Example of ROW centreline traversing a wetland (Wuskwatim Transmission Project, August 21, 2010, vegetation monitoring)

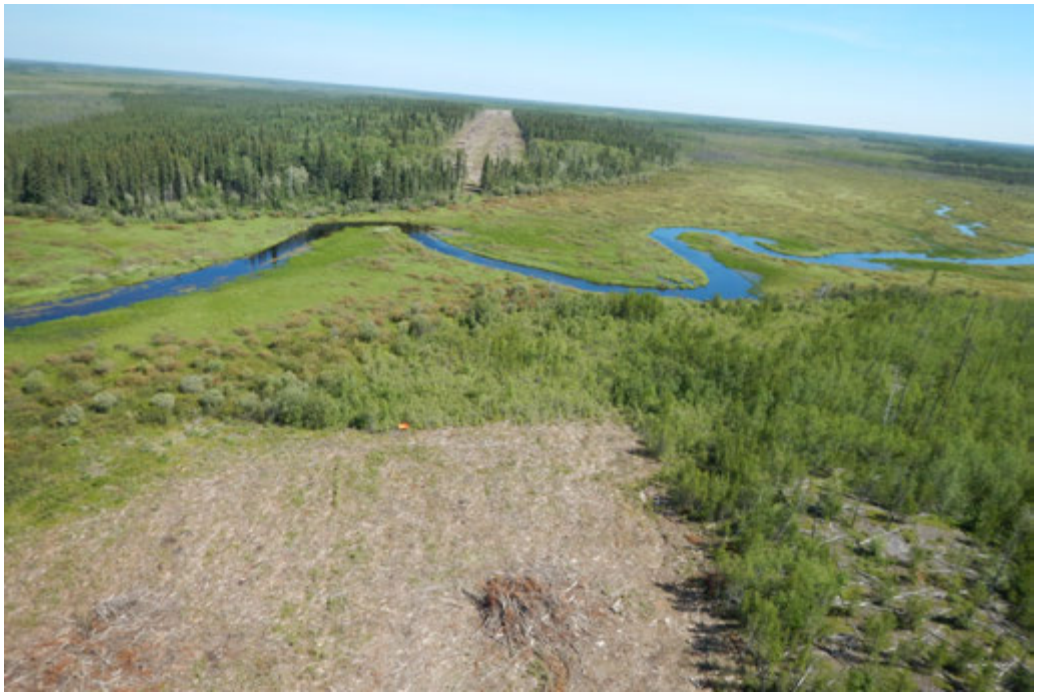

Photo 4 – Example of newly cleared ROW at water crossing (Biople III, July 24, 2014, vegetation survey)

Photo 5 – Example of newly cleared ROW traversing deciduous forest (Bipole III)

Photo 6 – Example of newly cleared ROW traversing coniferous forest (Bipole III, Septermber 17, 2014, amphibain/reptile survey)

Photo 7– Example of regenerated ROW with shrubs and herbs

Photo 8 – Example of ROW traversing native grassland (Bipole III, July 24, 2014, vegetation survey)

Photo 9 – Example of ROW traversing pasture (SC25/MC28 and PC3/PC4 ROW southwest of Selkirk, summer 2015)

Photo 10 – Example of winter ROW clearing activity (Bipole III, January 2015)