MANITOBA-MINNESOTA TRANSMISSION PROJECT

Biophysical Technical Data Reports

1.2 Vegetation and Wetlands

Manitoba-Minnesota Transmission Project Vegetation and Wetlands Technical Report

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Sign-off Sheet

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Abbreviations

AAFC	Agriculture and Agri-Food Canada
CEAA	*Canadian Environmental Assessment Act,* 2012
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
EIS	environmental impact statement
EnvPP	Environmental Protection Plan
ESRI	Environmental Systems Research Institute
FRI	Forest Resource Inventory
GPS	global positioning system
ha	hectare(s)
km	kilometre(s)
kV	kilovolt
LAA	local assessment area
LCC	Land Classification Canada
m	metre(s)
MAFRD	Manitoba Agriculture, Food and Rural Development
MBCDC	Manitoba Conservation Data Centre
MBESEA	*The Endangered Species and Ecosystems Act*
MCWS	Manitoba Conservation and Water Stewardship
MHHC	Manitoba Habitat Heritage Corporation
NEB	National Energy Board
PA	protected area

PDA	Project development area
RAA	regional assessment area
ROW	right-of-way
RVTC	Riel–Vivian Transmission Corridor
S1	Subnational rank for rare plant species. Extremely rare. Five or fewer occurrences, or with very few individuals remaining.
S2	Subnational rank for rare plant species. Rare. Six to 20 occurrences, or with many individuals in fewer occurrences.
S3	Subnational rank for rare plant species. Rare to uncommon. Twenty-one to 100 occurrences and may be rare and local throughout the province, or its range might be restricted.
SAR	species at risk
SARA	*Species at Risk Act*
SOCC	species of conservation concern
SLTC	Southern Loop Transmission Corridor
the Project	Manitoba-Minnesota Transmission Project
VC	valued component

Glossary

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 (*e.g.*, jack pine and spruce species) forests or treed areas.
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.
Invasive species	Plants that are growing outside of 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 our native species whose populations are kept in check by native predators, competitors or disease.
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.
Mixedwood forest	Forest lands where 26% to 74% of the canopy is either 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	Burn occurring 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, which is established by easement from landowners
Shrub	A woody, multi-stemmed plant or tree, 3 m in height or less.
Shrubland	Land dominated by shrub species, 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*).
Species at risk (SAR)	Plant species that are federally listed at risk under the federal *Species at Risk Act* or provincially listed by *The Endangered Species and Ecosystems Act* 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 (very rare), S2 (rare), S1S2, S2S3 or S3 (uncommon).
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 which 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 capacity of a wetland to receive, store, moderate and release surface water and groundwater in a watershed.

1.0 INTRODUCTION

This technical report, which addresses vegetation and wetlands, has been prepared as a supporting document for the environmental impact statement (EIS) of the Manitoba-Minnesota Transmission Line Project (MMTP) (the Project).

1.1 BACKGROUND

1.1.1 Project Overview

Manitoba Hydro is proposing construction of the Manitoba-Minnesota Transmission 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 (RMs) 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.

1.1.2 Project Area

The Project is located in an area of southern Manitoba that spans three ecozones, four ecoregions and five ecodistricts (Map 1-1). The ecoregions are characterized by different climatic, geological, and land-use conditions that have shaped the current landscape. The Project is split into three sections, the Existing Transmission Corridor (Existing Corridor), the New ROW, and the stations. The Existing Corridor and associated stations (Dorsey Converter Station and Riel Converter Station) are located in a region that supports a large urban centre (*i.e.*, Winnipeg), two major rivers (*i.e.*, Assiniboine River, Red River), and a number of existing transmission lines (*e.g.*, M602F, R49R) (Map 1-1). After the Project departs Dorsey Converter Station, it turns east close to La Verendrye station and crosses the Red River and Red River floodway just south of the Winnipeg neighbourhood of St. Norbert. The Project will parallel the existing 500 kV transmission line M602F within the Riel–Vivian Transmission Corridor for approximately 24 km east of the Riel Converter Station (along the PTH 15 to just past PTH 12) (Map 1-1). The Riel-Vivian Transmission Corridor is within an agriculturally dominated portion of the Aspen Parkland and Lake Manitoba Plain ecoregions. The Project then moves south near Anola, MB into the New ROW, which parallels portions of a 230 kV line in the northern half of the New ROW (Map 1-1). The New ROW landscape is a mosaic of uplands and wetlands including the transitional Interlake Plain Ecoregion, which consists of mixedwood and coniferous forests

interspersed with fens, bogs and meandering streams. Just south of the town of Zhoda, the Project moves into the warmer and more humid Lake of the Woods Ecoregion, which includes large bogs, fens, swamps and forests (Smith *et al.* 1998). For additional descriptions of the ecoregions, see Section 2.1.1.

1.1.2.1 Stations (Glenboro South Station, Dorsey Converter Station and Riel Converter Station)

The Glenboro South Station (Glenboro South) is located approximately 137 km west of the Southern Loop Transmission Corridor, close to the Village of Glenboro. It lies within the Stockton Ecodistrict, which is part of the Aspen Parkland Ecoregion. The Aspen Parkland Ecoregion is dominated by trembling aspen (*Populus tremuloides*) stands and shrubs in moist areas with grasslands in dry areas. Marshes and shallow open water wetlands are the dominant wetland classes in the Aspen Parkland. Much of this ecoregion has been converted for agricultural production. The local area surrounding the station is converted to agriculture with several remnant prairie pothole wetlands. The greatest threats to vegetation and wetlands in this region are the loss and disturbance of wetlands from agriculture.

The Dorsey Converter Station (Dorsey) and Riel Converter Station (Riel) are located in areas dominated by agriculture (*i.e.,* cropland). Both stations are located within the Winnipeg Ecodistrict which is part of the Lake Manitoba Plain Ecoregion. Riel is surrounded by agricultural fields to the north and east, the Red River floodway to the west, and the Deacon Reservoir to the south. Dorsey is completely surrounded by cultivated lands.

1.1.2.2 Existing Transmission Corridor

The Existing Transmission Corridor is composed of the Southern Loop Transmission Corridor (SLTC) and the Riel–Vivian Transmission Corridor (RVTC) and lie within the Winnipeg Ecodistrict, part of the Lake Manitoba Plain Ecoregion. Prior to human settlement, the Lake Manitoba Plain Ecoregion consisted of plains rough fescue (*Festuca hallii*) grasslands with trembling aspen (*Populus tremuloides*) and bur oak (*Quercus macrocarpa*) groves. Currently, the ecoregion is dominated by agriculture. Within the Existing Corridor, lands are highly affected by residential, industrial and agriculture.

The Lake Manitoba Plain Ecodistrict is a highly modified agricultural and urban landscape with little to no grassland remaining. Native vegetation is generally limited to the margins of major watercourses such as the Red and Assiniboine Rivers and smaller watercourses such as the Rat and Seine Rivers.

1.1.2.3 New Right-of-Way

The New ROW spans the Interlake Plain and Lake of the Woods ecoregions, and three ecodistricts (*i.e.,* Steinbach, Stead and Piney). The portion of the New ROW running from just south of the town of Anola to just north of the junction of PTH 12 and PR 302 is located within the Steinbach Ecodistrict in the Interlake Plain Ecoregion. The Interlake Plain Ecoregion is dominated by forest and farmland. The extent of the forest has been reduced in this ecoregion because of increased agriculture and encroachment of urban areas. Low-lying areas include wetlands ranging from peatlands, fens and bogs, to mineral wetlands, swamps and marshes dominated by willows (*Salix* spp.) and sedges (*Carex* spp.). Larger wetlands in this ecodistrict include areas just north of Cooks Creek (near Monominto in the RM of Tache), north of PTH 1 (in the RM of Tache) and Richer wetland (just south of the town of Richer). In general, these intact patches of forest and wetlands provide good habitat potential for rare plant species.

The Stead and Piney ecodistricts are in the Lake of the Woods Ecoregion, which encompasses the southeastern extent of the Project. The Lake of the Woods Ecoregion is characterized by mixed forest, including peatlands (bogs and fens), with some of the region converted to forestry, agriculture, recreational use, and agricultural production. This ecoregion includes First Nations and Metis traditional use land for hunting, trapping and gathering. The forested areas are characterized by humid, mixedwood and black spruce forests that are low-lying and dotted with bogs, rocky outcrops, and meandering streams. In general, the relatively undisturbed landscape provides valuable areas of native vegetation with the potential to support rare plant species.

For a complete description of ecoregions, see Section 2.1.1.

1.1.2.4 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 the construction, operation and maintenance of the Project, including associated stations.
- **Local assessment area (LAA):** The LAA includes the PDA plus a 1-km buffer around each component (Map 1-1 - Spatial Boundaries of the Project 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 2013c). 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 1-1 - Spatial Boundaries of the Project 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).

1.2 PURPOSE

The purpose of this technical report is to provide information on desktop and field data collection methods and describe the existing conditions of vegetation and wetlands in the vicinity of the Project. Vegetation and wetlands were selected as a VC because the resources on the landscape, vegetation cover class (including wetlands) and species levels may be vulnerable to Project effects. The different types of intact patches of native vegetation and wetlands, habitats and plant species are valued for cultural, traditional, spiritual, ecological and regulatory reasons.

This report contains some of the information that was used to inform EIS predictions of potential Project-related effects on vegetation and wetlands. It also describes how desktop information was gathered, how information gaps were identified and addressed through additional desktop research, and Key Person Interviews and field surveys. Results of the field surveys are reported and summarized to provide an overview of existing conditions and baseline data for vegetation and wetlands.

Information presented in this report was guided by the vegetation and wetland potential effects identified in the VC (Table 1-1).

Table 1-1 Key Issues Identified for Vegetation and Wetlands

Potential Effects	Key Issues
Change in landscape intactness	Large intact patches of native vegetation and wetlands are important landscape elements as they support wildlife populations and maintain ecosystem functions. Public concern regarding the fragmentation of forests.
Change in native vegetation cover classes abundance, distribution and structure	Areas of undisturbed native vegetation are present in the Project LAA. Some native vegetation types have a high potential to support species at risk (SAR) and species of conservation concern (SOCC). Public comments and concerns regarding the loss of native forest and effects on protected areas, Crown land.
Change in wetland cover class abundance, distribution, structure and function	Large intact wetlands are present in the LAA in addition to smaller degraded wetlands in cultivated areas. Despite the decline in number and size of wetlands, regardless of size, wetlands offer many ecosystem services. Public concerns regarding effects on wetlands, especially wetlands in protected areas and unique wetlands, the effect of construction on wetlands, and the loss of benefits such as water retention and flood prevention.
Change in invasive plant species abundance and distribution	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 over increased weeds and increased chemical use.
Change in rare plant species abundance and distribution	SAR/SOCC exist in small numbers or have a restricted distribution. Rare species are protected federally and provincially. Public comments and concerns regarding the loss of rare plant species.
Change in traditional use plant species abundance and distribution	Comments and concerns received through the First Nation and Metis Engagement Proces s regarding the loss of medicinal plants, traditionally used plants, and berry patches.

2.0 VEGETATION AND WETLANDS

The vegetation and wetlands EIS focuses on six areas: landscape intactness, native vegetation, wetlands, invasive plant species, rare plant species, and traditional use plant species. Within these areas, focus has been given to particular features in response to key issues identified in Section 1.2. Sections 2.1 through 2.7 describe the methods and results of desktop and field studies.

2.1 OVERVIEW

2.1.1 Ecoregions and Ecodistricts

The Project from west to east, including the Glenboro South Station, lies within the following four ecoregions: the Aspen Parkland Ecoregion of the Prairies Ecozone (0.2%), the Lake Manitoba Plain Ecoregion of the Prairies Ecozone (61.7 %), the Interlake Plain Ecoregion of the Boreal Plain Ecozone (23.1%) and the Lake of the Woods Ecoregion of the Boreal Shield Ecozone (15.1%) of Manitoba (Map 1-2- Ecozones and Ecoregions Relative to the Project Components). The Glenboro South Station is the only Project component located in the Aspen Parkland Ecoregion. The following information on ecoregions and ecodistricts is from Acton *et al.* 1998; Smith *et al.* 1998.

The ecoregions transition from grassland to boreal forest in southern Manitoba, with the warmest and driest parts of Manitoba placed in the Prairies Ecozone. This includes both the Aspen Parkland and Lake Manitoba ecoregion portions of this Project, where grassland dominated as the natural vegetation prior to settlement. The Boreal Plain and Boreal Shield Ecozones contain the cooler and moister parts of southern Manitoba, which encompass the Interlake Plain and Lake of the Woods Ecoregion portions of the Project, respectively.

Since settlement, all four ecoregions have been heavily influenced by agricultural development and urban encroachment; most of each ecoregion is now dominated by agricultural, industrial and urban use, including valuable habitat for rare plant species, and tallgrass prairie. The Dorsey and Riel converter stations and Existing Corridor are located predominantly in what used to be tallgrass prairie but is now agricultural, industrial and urban land surrounding Winnipeg. The largest remnant tall grass prairie patches in Manitoba, the Manitoba Tall Grass Prairie Preserve, are located outside the RAA near the towns of Tolstoi and Gardenton. No known tallgrass prairie remnants are located in the PDA and LAA. Several remnant tallgrass priaire parcels are present in the RAA, with the closest located about 10 km from the New ROW.

Manitoba has lost 40–70% of wetlands since settlement (Government of Manitoba 2014c). It is estimated that Manitoba loses 0.5% of the remaining wetlands per year in agricultural areas (Government of Manitoba 2014d). Wetlands are highly valued for the services they provide and because their aerial extent has been reduced over the last 100 years as a result of agricultural expansion and other development.

There are several large waterbodies in the region, including the Red River, Assiniboine River, Lonesand Lake, Sundown Lake and the Richer Lakes.

2.1.1.1 Lake Manitoba Plain Ecoregion

The most northwestern portion of the Project occurs within the Lake Manitoba Plain Ecoregion. The native vegetation of this ecoregion originally consisted of a mosaic of trembling aspen/oak groves and rough fescue grasslands.

The ecoregion is made up of fairly flat to low lying bedrock covered by till with clay and sand deposits. The northern half of this ecoregion has a distinct ridge and swale topography, with thick deposits of silt and clay (Smith *et al.* 1998). Black Chernonzem soils (characterized by the presence of humus-enriched surface layers) dominate this ecoregion, ranging from sandy-loam to clay-loam in texture. As a result of the highly productive Black Chernozem soils in the Lake Manitoba Plain, almost the entire ecoregion is under cultivation.

Tree cover is not extensive, with trees and shrubs occurring on moister sites along the fringes of stream and rivers, where the lesser grasslands occupy the drier sites. Tree and shrub species vary along the rivers and streams that are typically made up of American elm (*Ulmus americana*), basswood (*Tilia americana)*, cottonwood (*Populus deltoides*), red ash (*Fraxinus pensylvanica*) and Manitoba maple (*Acer negundo* var. *interius*). On drier terrace sites, bur oak (*Quercus macrocarpa*) and trembling aspen (*Populus tremuloides*) occur with an often dense undergrowth of western snowberry (*Symphoricarpus occidentialis*), beaked hazelnut (*Corylus cornuta*), and red-osier dogwood (*Cornus sericea*).

Grasslands are dominated by fescue (*Festuca* spp.) and wheat (*Elymus* spp.) grasses along with June grass (*Koeleria macrantha*) and Kentucky bluegrass (*Poa pratensis*). On poorly drained sites, slough grass (*Spartina pectinata*), marsh reed grass (*Calamagrostis canadensis*), sedges (*Carex* spp.), common cat-tail (*Typha latifolia*) and shrubby willow (*Salix arbusculoides*) make up the dominant vegetation. The Project intersects the Winnipeg Ecodistrict in the Lake Manitoba Plain Ecoregion.

Winnipeg Ecodistrict

The Winnipeg Ecodistrict occupies most of the southeastern portion of the Lake Manitoba Plain Ecoregion. The ecodistrict lies in the central lowlands of the Red River Plain, with a level to very gently sloping (less than two percent) topography. The Red River meanders through the Red River Plain northward where it empties into Lake Winnipeg, a remnant of the former Lake Agassiz. The northwestern part of the ecodistrict is part of the Assiniboine River drainage system with the Assiniboine River flowing from the west. Poorly drained Black Chernozem soils dominate this ecoregion, with medium-textured soils occurring northwest of Winnipeg in the PDA.

Native vegetation for this ecoregion consisted of meadow grass and tall grass prairie communities, with only a very small portion of tall grass prairie remaining intact today. The signature species of the tall grass prairie was big bluestem (*Andropogon gerardii*), with the tallgrass prairie home to over 400 species of forbs and graminoids (Vance *et al.* 1999). While few of these species are considered rare or endangered, the tall grass prairie is one of the most endangered plant communities in North America. Cultivation and a network of drainage ditches have replaced most areas of native vegetation with only small parcels remaining.

2.1.1.2 Interlake Plain Ecoregion

The Interlake Plain Ecoregion lies between the Lake Manitoba Plain Ecoregion and the Lake of the Woods Ecoregion, stretching from the Canada–U.S. border northwest to the Saskatchewan border. The ecoregion is characterized by a level to rigid lake terrace complex that is underlain by calcareous, very stony till in the lowland of the north, and sandy to clayey glaciolacustrine sediments in the east and southeast (Smith *et al.* 1998). The Red River flows through this ecoregion, which also contains a number of large lakes, such as Lake Winnipeg, Lake Winnipegosis, and Lake Manitoba.

The north-central portion of the Project is within the Interlake Plain Ecoregion; it is dominated by forest in the south and commercial agriculture in the north and northeast. Closed trembling aspen forests, with balsam poplar (*Populus balsamifera*) as a secondary species and an understory of tall shrubs such as hawthorn (*Crataegus* spp.), willow, western snowberry, Wood's rose (*Rosa woodsii*), pin cherry (*Prunus pensylvanica*),choke cherry (*Prunus virginiana*), and mixed herbs, is the predominant native vegetation community. Jack pine (*Pinus banksiana*) forests are found on dry, sandy sites, whereas wet and poorly drained sites, transitioning into the Boreal Forest Ecozone, are dominated by sedges, willows, black spruce, and tamarack (Smith *et al.* 1998). Because it is a transition area, the Interlake Plain Ecoregion within the RAA contains a variety of wetland types, including bogs, fens, swamps and freshwater marshes, and many small streams and rivers (Smith *et al.* 2007).

Land use is predominantly agricultural production of cereal grains, oilseeds, and hay crops on glaciolacustrine soils with pasture and native rangeland on stony till soils (Smith *et al.* 1998). The Project intersects the Steinbach Ecodistrict and a very small portion of the Gimli Ecodistrict in the Interlake Plain Ecoregion.

Gimli Ecodistrict

To the southeast of the Winnipeg Ecodistrict, the northeastern portion of the Project intersects the Gimli Ecodistrict. This district is located between the Winnipeg and Steinbach ecodistricts along the southwestern shore of the south basin of Lake Winnipeg. The northern portion of the ecodistrict is part of the Lake Winnipeg drainage, and has well to imperfectly drained Dark Gray Chernozem soils. The dominant vegetation traversed by the Project components includes white spruce and trembling aspen stands (in the more northern sections), Manitoba maple, red ash, American elm and cottonwood along rivers with sedges, and willows and cattails in the low-lying and marsh areas.

Steinbach Ecodistrict

To the southeast of the Winnipeg Ecodistrict, the central portion of the Project is situated within the Steinbach Ecodistrict. The Steinbach Ecodistrict is a north–south elongated area extending from east of Winnipeg south to the Canada–U.S. border. The landform ranges from a smooth, level glaciolacustrine plain to a gently undulating, water-worked till, with extensive areas of sandy glaciolacustrine overtopping extremely calcareous, cobbly and gravelly loamy till. Slopes range from level to less than five percent. Native vegetation is dominated by trembling aspen and balsam poplar, with secondary species of willows, red-osier dogwood, and a ground cover of grasses and herbs. Poorly drained sites are dominated by willows and sedges, while well-drained sandy areas in the east support jack pine stands. Peatlands are common and are generally dominated by fen vegetation species (sedges and reed grasses). Bogs occur and generally support clumped tamarack and black spruce interspersed with mosses (Smith *et al.* 1998).

2.1.1.3 Lake of the Woods Ecoregion

The Lake of the Woods Ecoregion occupies the portion of the Boreal Shield that extends into the southeastern tip of Manitoba. The Lake of the Woods Ecoregion is cooler than the ecoregion to the west but with higher precipitation. The result is more forest vegetation. The ecoregion is made up of till (of variable thickness), glaciofluvial, and dominantly peat-covered, Glacial Lake Agassiz deposits. Bedrock outcroppings are located throughout the ecoregion, but are most common in the central and eastern portions.

This ecoregion is dominated by forests with the uplands a mix of species, including jack pine, trembling aspen, white birch (*Betula papyrifera*), white spruce, eastern white cedar (*Thuja occidentalis*), black ash (*Fraxinus nigra*) and American elm, with red pine (*Pinus resinosa*) and eastern white pine (*Pinus strobus*) present in the southwest. Bur oak, trembling aspen, red ash and jack pine are more common on warmer, drier sites in the western portion of the ecoregion. Peatlands and other poorly drained areas are dominated by black spruce and tamarack. Agriculture is mainly associated with clayey, artificially drained soils (Smith *et al.* 1998).

The dominant land use in the ecoregion is forestry; however, recreational activities related to camping and boating are very common and trapping and hunting represent important land uses of the First Nations people of the area. The Project intersects the Stead and Piney ecodistricts in the Lake of the Woods Ecoregion.

Stead Ecodistrict

The southcentral and southeasternmost Project components are in the Stead Ecodistrict in the Lakes of the Woods Ecoregion. The Stead Ecodistrict is the most western ecodistrict of the Lake of the Woods Ecoregion, and extends from the region's northern boundary south to the U.S. border. The Stead Ecodistrict is situated entirely within the borders of the Glacial Lake Agassiz basin. The landscape varies from a level to depressional glaciolacustrine plain dominated by peatlands, to a smooth level to gently undulating till plain.

The vegetation of the ecodistrict varies with drainage. Agricultural crops have replaced much of the native vegetation. Remaining native vegetation is dominated by meadow grasses (*Puccinellia spp*.), sedges, tall prairie grasses and trees along the streambanks on the poorly drained clayey soils. Fen peatlands support sedge-dominated vegetation with infrequent trees and shrubs, while bog peatlands support black spruce, shrub and moss vegetation. Extensive areas of fen have been converted to the commercial production of sod in the Stead area.

In the southern section of the ecodistrict, eastern white cedar and other shrubs are common on shallow organic soils and in swamps. The eastern margin of the ecodistrict includes mixed vegetation communities consisting of upland forest and peatlands. Jack pine, trembling aspen and white birch are the dominant tree cover on coarse textured soils. Balsam fir and white spruce are found throughout on favourable sites. Balsam poplar is common on wetter sites, and white elm, ash and bur oak dominate along streams (Smith *et al.* 1998).

Piney Ecodistrict

The south-central and southeast portions of the Project are within the Piney Ecodistrict. The ecodistrict occupies the southwestern part of Manitoba in the Lake of the Woods Ecoregion. Most of the ecodistrict is comprised of the sandy Bedford Hills. The landscape varies from smooth and level to gently hummocky with some sand dune uplands. Dominant soils are well drained sandy Brunisols, with Regosols in areas of sand dunes and poorly drained peaty Gleysols dominating the low lying areas.

The vegetation of the ecodistrict varies with drainage and soil texture. Forest dominated by jack pine, velvet-leaf blueberry (*Vaccinium myrtilloides*), and common bearberry (*Arctostaphylos uva-ursi*) occupy the sandy sites, with finer textured sites dominated by a mix of jack pine, black spruce, balsam fir and trembling aspen. Ground cover includes mosses, grasses, and forbs (Smith *et al.* 1998). Wetlands are predominantly peatlands that provide valuable habitat for moose and limited habitat for waterfowl.

2.1.1.4 Aspen Parkland Ecoregion

The Glenboro Station component of the Project occurs in the Aspen Parkland Ecoregion. The Aspen Parkland Ecoregion is a transition zone between the grasslands to the south and the forests to the north; it contains the greatest proportion of wetlands in the prairie ecoregions. The Manitoba portion of the ecoregion is warmer and higher in precipitation than the areas further west in Saskatchewan and includes some of the driest climates in Manitoba. The climate varies greatly, with precipitation levels increasing northward and eastward.

The landscape of the Aspen Parkland Ecoregion is level to gently undulating with loamy till and sandy deposits. The ecoregion is characteristically a woodland/grassland mosaic throughout with trembling aspen woodlands (or bur oak on drier sites) with grasslands and tree cover decreasing from moister to drier sites. The largest areas of natural vegetation are usually associated with sandy soils and typically used for grazing. Most of the landscape has been converted to cropland and pasture (Thorpe 2014).

The hilly landscapes of this ecoregion are usually wooded on lower slopes, and grassland areas occur on upper slopes. Woodlands are represented by trembling aspen with an understory of shrubs, primarily western snowberry, low prairie rose (*Rosa arkansana*), beaked hazelnut, saskatoon, meadow-sweet (*Spiraea alba* var. *alba*), poison-ivy (*Toxicodendron rydbergii*) and choke cherry; herbs such as wild sarsaparilla (*Aralia nudicaulis*), asters (*Aster* and *Symphyotrichum* spp.), wild peavine (*Lathyrus venosus*), Canada violet (*Viola canadensis* var. *rugulosa)* and dry-spike sedge (*Carex siccata*); and grasses, including bluegrasses and ricegrasses (*Oryzopsis* spp.). Balsam poplar and to a lesser extent, red ash, Manitoba maple, American elm, and cottonwood also occur in wooded areas of this ecoregion (Acton *et al.* 1998).

Stockton Ecodistrict

The Glenboro Station component is located in the Stockton Ecodistrict of the Aspen Parkland Ecoregion. The landscape of the area is level to hummocky in the South Cypress/Glenboro area ranging from kettled to gently undulating with loamy and sandy soils. Black Chernozem soils dominate this area. Native vegetation in this ecodistrict is mostly composed of grassland species with beaked hazelnut, juniper spp., white spruce, and trembling aspen, on the well- drained sites. Cool, north facing slopes have less grassland species and more forest species. The poorly drained areas commonly have trembling aspen, balsam poplar, and red-osier dogwood. Most of the ecodistrict is cropland and where it has not been cultivated it is a mixture of grassland, balsam poplar, and trembling aspen, with the saline areas used for grazing and pasture (Smith *et al.* 1998).

2.2 VEGETATION LANDSCAPE INTACTNESS

2.2.1 Methods

The number and area of intact patches of native vegetation, including both uplands and wetlands, was calculated using data from the Manitoba Forest Branch's Forest Resource Inventory (FRI) database (FRI 1965 - 2000). The database was used in the past to manage Manitoba's forests; it includes information on tree species cover (polygons and linear features) at a land classification scale of 1:15,840 and with a minimum polygon size of 2 ha. This database was selected over the Manitoba Land Initiative (MLI 2005/2006) database, which is at a 1:20,000 scale.

FRI landcover was reclassified to match the land cover categories used for the assessment (Table 2-3) and adjacent polygons of the same category were merged. Existing disturbances such as roads, transmission lines, utility lines, gas lines, oil and gas pipelines, railroads, and cutlines were then copied over the FRI database and the number, and total area of different patch sizes for native vegetation classes and wetlands were calculated for the RAA. Polygons that contained greater than 200 ha of native vegetation constituted large intact patches. This large patch size was determined based on biodiversity studies described in *How Much Habitat is Enough?* (Government of Canada 2013c). Patch size requirements differ based on land cover; grasslands have a target patch size of 50-100 ha whereas forests have a target patch size of 200 ha (Government of Canada 2013c). Two-hundred hectares was chosen as a conservative approach. 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 2013c). 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.

Landscape diversity is based on the assumption that the habitat needs of plant species can be provided by maintaining a natural distribution of patch sizes and edges on the landscape. Large patches provide important core habitat for rare plant species. Fragmentation occurs when large patches are converted to numerous small parcels through disturbances. This results in isolated patches with reduced connectivity, loss of habitat suitability for certain species, and an increase in the amount of edge habitat (Morrison *et al.* 1998).

2.2.2 Results

There are 21 large intact patches (> 200 ha) of native vegetation in the RAA that range in size from 212.8 ha to 2,687.4 ha (see Table 2-1 and Map Series 1-100 – Habitat Fragmentation in the Regional Assessment Area). The patches include uplands and wetlands, many of which are adjacent to other large intact patches in the RAA (Map Series 10-100 – Vegetation and Wetland Cover Classes in the Local/Regional Assessment Area). The Watson P. Davidson Wildlife Management Area (WMA) is not intersected by the PDA. However, there are several large intact patches of native vegetation adjacent the Watson P. Davidson WMA that are intersected by the PDA, including a 226.2 ha patch of shrubland and 1,052.4 ha of deciduous forest (Table 2-1). There are two large patches associated with the Lone Sand Area of Special Interest (ASI), a 404.2 ha patch of native vegetation dominated by coniferous forest and a 1,097.1 ha patch dominated by coniferous forest (Table 2-1). The Caliento Bog is a 639.5 ha wetland in the LAA that is dominated by coniferous forest and extends into the RAA (Table 2-1 and Map Series 1-100 – Vegetation and Wetland Cover Classes in the Local/Regional Assessment Area). The Sundown Bog includes two large intact patches in the LAA, a 303.8 ha patch of bog and a 2,687.4 ha patch of coniferous forest that includes the Piney Bog and extends into the RAA (Table 2-1 and Map Series 10-100).

Table 2-1 Large Intact Patches (> 200 ha) of Native Vegetation within the LAA Intersected by the PDA

Category	Dominant Cover Class	Original Patch Size (ha) in the LAA	Patches Adjacent to or Within Named Areas
Native Vegetation	Deciduous forest	212.8	-
Native Vegetation	Shrubland	225.1	Adjacent to the Watson P. Davidson WMA
Native Vegetation	Deciduous forest	228.1	-
Native Vegetation	Grassland	242.9	-
Wetland	Bog	303.8	Sundown Bog
Native Vegetation	Coniferous forest	310.0	-
Wetland	Fen	368.6	-
Native Vegetation	Deciduous forest	391.6	Wetland in the Lonesand ASI
Native Vegetation	Deciduous forest	396.7	-
Native Vegetation	Shrubland	414.6	-
Native Vegetation	Deciduous forest	469.6	-
Native Vegetation	Mixedwood forest	485.8	-
Wetland	Fen	523.9	Sundown Lake
Native Vegetation	Coniferous forest	639.5	south-east of the Caliento Bog, south of Rat River
Native Vegetation	Deciduous forest	791.1	Caliento Bog, near Sundown Lake
Native Vegetation	Deciduous forest	866.0	-
Native Vegetation	Deciduous forest	1,052.5	Wetlands adjacent to Watson P. Davidson WMA
Native Vegetation	Coniferous forest	1,097.1	Wetlands adjacent to Lonesand ASI
Native Vegetation	Coniferous forest	2,687.4	Sundown Bog/Piney Bog

In the Existing Corridor, intact native vegetation is limited due to agricultural conversion and development. The native vegetation patches are predominantly less than 100 ha (Figure 2-1). The wetland patches along the Existing Corridor are predominantly small patches that are less than 2 ha (Figure 2-3). The high frequency of small wetland patch sizes (0.1-1 ha) represents the pothole type marsh wetlands found in agricultural lands.

In the New ROW, there is a wide range of patch sizes of native vegetation and wetland in the RAA (see Figure 2-5 and 2-7). In addition, there is a greater number of patches larger than 200 ha that includes native vegetation and wetlands (see Map Series 1-100 – Habitat Fragmentation in the Regional Assessment Area).

Most of the native vegetation in the RAA is large intact patches, which make up approximately 80% of the RAA (Figure 2-6 and 2-8) and account for about 40% of the total remaining area of native vegetation and wetlands along the Existing Corridor (Figures 2-2 and 2-4).

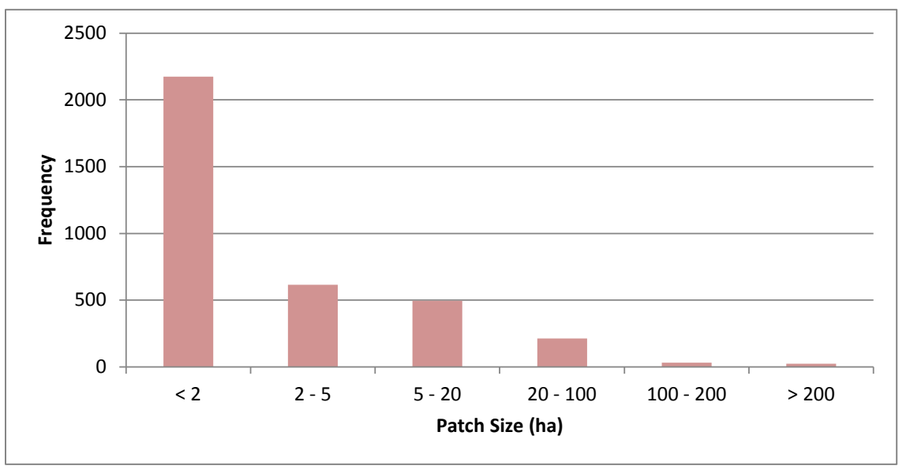

Figure 2-1 Frequency of Native Vegetation Patch Sizes in the Existing Corridor RAA

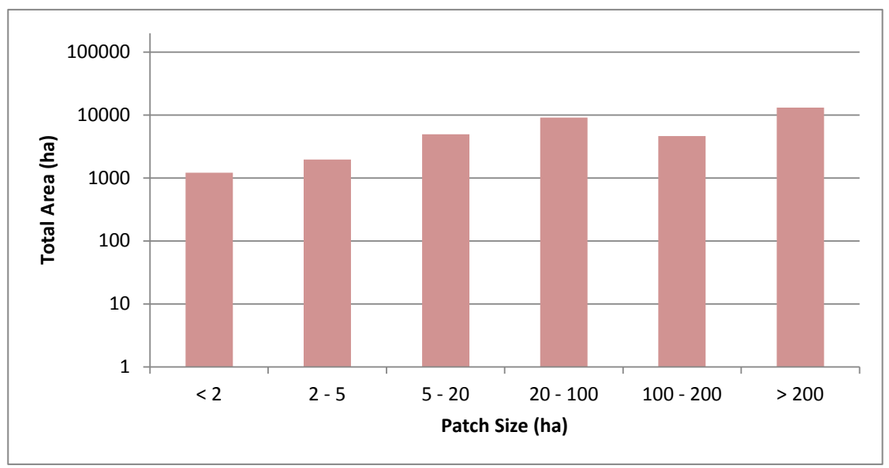

Figure 2-2 Total Area of Native Vegetation Patches in the Existing Corridor RAA

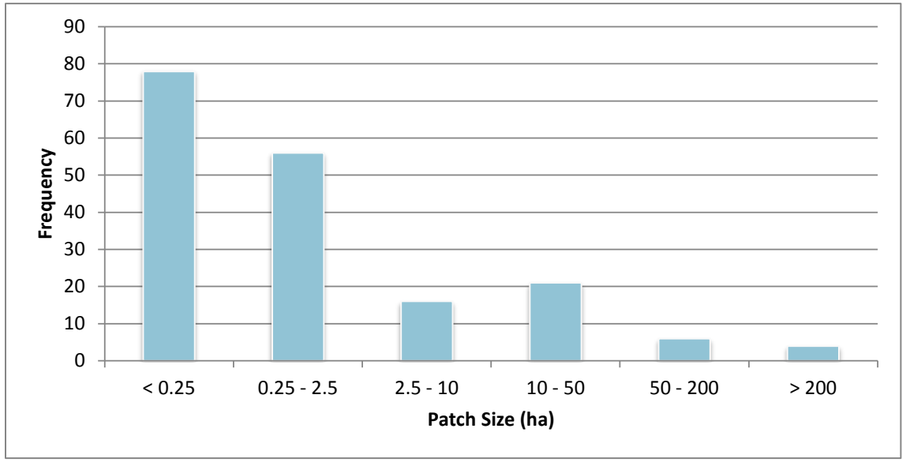

Figure 2-3 Frequency of Wetland Patch Sizes in the Existing Corridor RAA

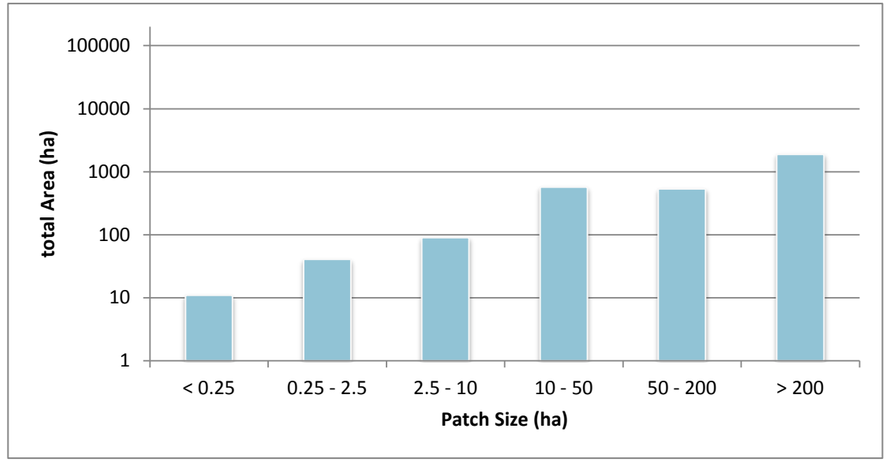

Figure 2-4 Total Area of Existing Wetland Patches in the Existing Corridor RAA

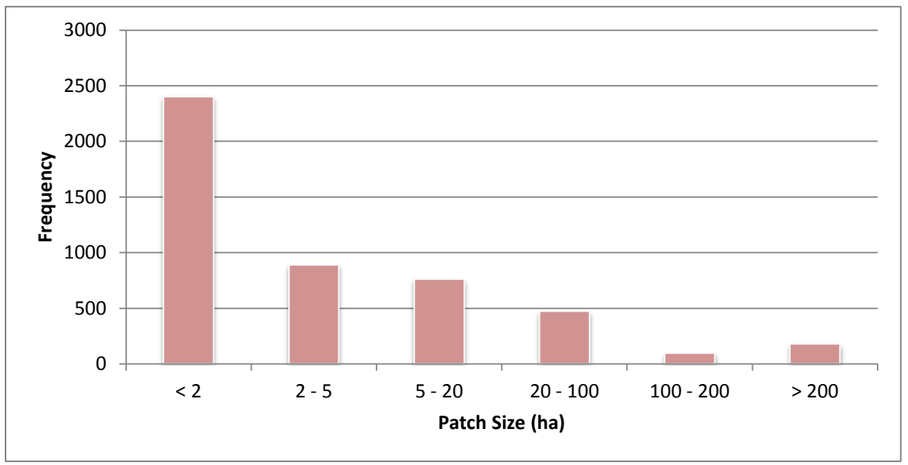

Figure 2-5 Frequency of Native Vegetation Patch Sizes in the New ROW RAA

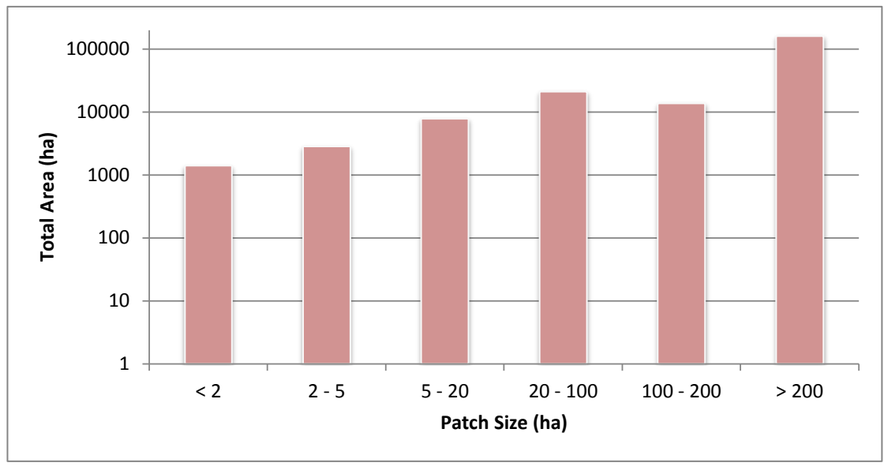

Figure 2-6 Total Area of Native Vegetation Patches in the New ROW RAA

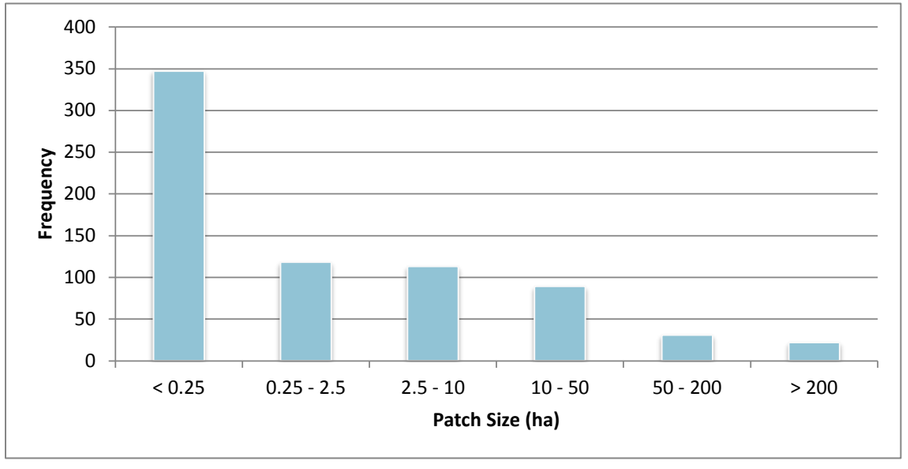

Figure 2-7 Frequency of Wetland Patch Sizes in the New ROW RAA

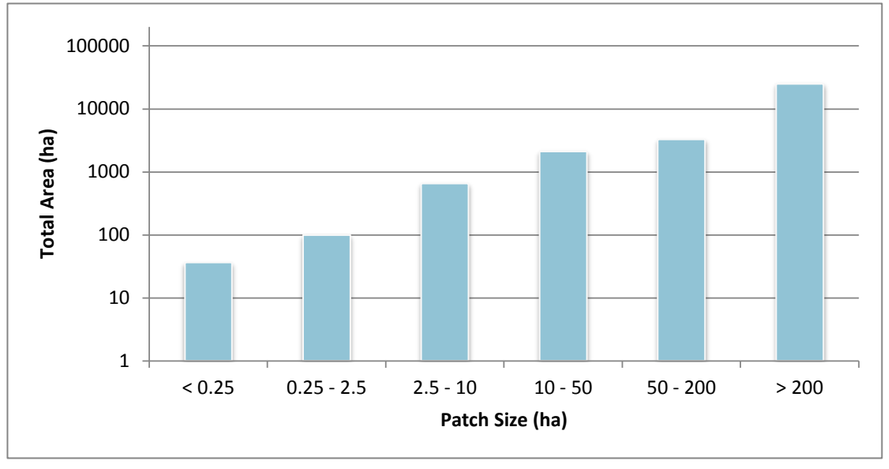

Figure 2-8 Total Area of Wetland Patches in the New ROW RAA

2.3 NATIVE VEGETATION COVER CLASSES

2.3.1 Desktop Mapping

2.3.1.1 Methods

Land cover mapping was refined for the PDA to provide greater detail and certainty for assessment of Project-related effects. Native vegetation and wetland mapping was completed at a 1:3,000 scale (0.04 ha minimum polygon size). Manitoba provincial databases, historical data, aerial photography, 2014 field survey data and relevant literature sources were reviewed to determine existing land cover in the PDA. The desktop mapping of landcover in the PDA was completed in May 2015.

The following data were reviewed to complete desktop mapping of land cover categories in the PDA:

- ESRI World Imagery (Environmental Systems Research Institute, Inc. [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 (TM) imagery(30 m resolution, 1:20,000 scale) (MLI 2005)
- Orthophotography Imagery (50 cm) (Manitoba Hydro 2007-2012)
- Manitoba Forest Resource Inventory (FRI 2000)aerial photography (1:15,840 scale)
- Bing Maps (2014)

Seven land cover categories were identified for the Project; they were categorized into 23 land cover classes (Table 2-2). These classes were modified from the LCC and FRI databases, and are based on dominant land use, vegetation cover and broad wetland classes. A hybrid product was created using the LCC database as a base. The polygons were refined based on available imagery, the FRI database, the AAFC database and field data to provide greater detail of wetland abundance.

Table 2-2 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 hayland that is annually tilled, seeded or cut. Includes annual cropland, perennial crops and hayland.
	Pasture	Introduced tame grasses, primarily used for grazing.
Developed	Roads	Human-made routes for driving vehicles; includes surfaced/paved highways and non-surfaced trails.
	Industrial	Land that is predominantly built-up or developed and vegetation is not associated with these land covers. This includes commercial and industry plants and mine structures.
	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 herbaceious 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 Dominated by shrub species, 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	75-100% of the canopy is broadleaf/deciduous or "hardwood" (*e.g.*, poplar, including trembling aspen (*Populus tremuloides*) and birch species) forests.
	Mixedwood forest	Forest lands where 26–74% of the canopy is a mix of coniferous and broadleaf/deciduous forests.
	Coniferous forest	Predominately 75–100% of the canopy is coniferous or "softwood" (*e.g.*, jack pine and spruce species) forests.
	Sand Dunes	Sand-dominated upland that can include dominant vegetation ranging from shrub to grass species or barren 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).

Table 2-2 Land Cover and Wetland Classes Identified for the Project

Land Cover Category	Land Cover Class	Definition
Wetland	Dugout	Human-made holding area for water, typically used as a livestock or household water source.
	Bog[1] Types	Peatland receiving water exclusively from precipitation and 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[1] Types	Peatland receiving water rich in dissolved minerals; vegetation cover 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[1] Types[2]	Periodic or persistent standing water or slow moving surface water which is circumneutral to alkaline and generally mineral nutrient-rich. Vegetation is dominated by graminoids and forbs, system is non-peat accumulating.
		Class 1 & 2: ephemeral ponds and temporary ponds. Class 3 & 4: seasonal and semi-permanent ponds. Class 5: permanent ponds.
	Swamp[1] Types	Periodically standing surface water or gently moving, mineral nutrient-rich groundwater, waters are rich in dissolved minerals with vegetation 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).

Table 2-2 Land Cover and Wetland Classes Identified for the Project

Land Cover Category	Land Cover Class	Definition
Wetland (cont'd)	Shallow Open Water[1]	Wetlands with free surface water up to 2 m deep, present for all or most of the year, with less than 25% of the surface water area covered by standing emergent or woody plants. Submerged or floating aquatic plants usually dominate the vegetation.
Water	Channel	A human-made ditch or trench diversion of flowing water.
	River	Flowing water forms: rivers, streams and creeks.
Lake	Open Water	

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

In order to understand the plant communities that were observed in the surveyed land cover classes, the dominant plant species observed at the start of each transect were determined based on field notes and photos. These species are summarized by each land cover class in Section 2.3.2.

2.3.1.2 Results

Desktop mapping results for the PDA are presented in Table 2-3. The Final Preferred Route PDA is dominated by agricultural land (62.7%) followed by native vegetation (18.8%), wetlands (14.5%), developed land (3.1%), recently cleared land (0.6%), and water (0.2%)(Table 2-3). For additional information on wetlands see Section 2.4.

The Existing Corridor is dominated by agricultural land (84.3%) followed by wetlands (6.2%), native vegetation (5.3%), developed land (3.9%), and water (0.4%). The native vegetation includes 65.8 ha of deciduous forest, 37.4 ha of grassland, and 2.0 ha of shrubland. Wetlands along the Existing Corridor include marshes (121.4 ha) and dugouts (1.4 ha).

The New ROW is dominated by native vegetation (45.0%) followed by wetlands (30.7%), agricultural land (21.5%), recently cleared (1.8%), and developed land (1.0%). The native vegetation along the New ROW includes deciduous forest (212.3 ha), mixedwood forest (150.2 ha), coniferous forest (85.3 ha), shrubland (23.4 ha), and grassland (19.3 ha). Wetlands along the New ROW consists of marshes (128.4 ha), swamps (88.1 ha), fens (93.3 ha), bogs (24.9 ha), and shallow open water wetlands (0.1 ha).

The stations PDA is dominated by agricultural land (87.2%) followed by developed land (12.4%), and wetlands (0.4%). The Dorsey station PDA includes 1.5 ha of developed land and 0.14 ha of wetlands. The Riel station PDA consists of 65.9 ha of agricultural land and 8.4 ha of developed

land. The Glenboro South Station includes 1.0 ha of agricultural land and 0.1 ha of developed land. The Glenboro transmission line ROW includes 4.1 ha of agricultural land, 0.2 ha of developed land, and 0.1 ha of wetlands.

Table 2-3 Desktop Mapping for Native Vegetation Cover in the PDA

Category	Class	Area (ha)	Proportion (%)
Native Vegetation	Grassland	56.6	1.8
	Shrubland	25.4	0.8
	Deciduous forest	278.0	8.8
	Coniferous forest	85.3	2.7
	Mixedwood forest	150.2	4.8
	Sand dune	0.0	0.0
	Total Native Vegetation	***595.5***	***18.8***
Wetland	Bogs	24.9	0.8
	Fens	93.3	3.0
	Marshes	250.2	7.9
	Shallow Open Water	0.3	0.0
	Swamp	88.1	2.8
	Dugouts	1.4	0.0
	Total Wetland	**458.2**	**14.5**
Water	River	6.2	0.2
	Channels	1.7	0.1
	Lake	0.0	0.0
	Total Water	**7.9**	**0.2**
Agriculture	Cultivated	1674.7	53.0
	Pasture	306.9	9.7
	Total Agriculture	**1981.6**	**62.7**
Developed	Roads	67.1	2.1
	Buildings	11.0	0.3
	Industrial	19.6	0.6
	Recreation Sites	0.0	0.0
	Total Developed	**97.7**	**3.1**
Undefined	Undefined	0.0	0.0
Recently Cleared	Recently cleared	20.2	0.6
Total Project Area[2]		**3,161.0**	**100.0**

2.3.2 PDA, LAA, and RAA Analysis

2.3.2.1 Methods

The FRI database was used to determine the land cover classes for the PDA, LAA, and RAA because the data can be compared across the three assessment areas. In addition, the FRI data contains classification data that is similar to those used in the desktop mapping (Table 2-2). The FRI data are at a 1:15,840 scale, which is a finer scale than the 1:20,000 scale of the LCC. However, the existing FRI data is from prior to 2000 and contains some discrepencies compared to the desktop mapping. These discrepencies are likely due to the original purpose of the FRI data, which was to develop a forest inventory. The FRI data underrepresent the area of wetlands in the PDA, LAA and RAA, likely because the data focus on productive forests. The FRI data lacks a class for swamp and shallow open water wetlands. Swamp wetlands are likely lumped within forest classes whereas the shallow open water wetlands maybe lumped within marshes or lakes. In addition, the FRI data classes all land within the boundary of the City of Winnipeg as buildings, which is not an accurate representation of the land cover in this area. Moreover, the FRI data classifies areas of cultivated and pasture land associated with the Red River Floodway (but outside the flooded area) as channels.

2.3.2.2 Results

The Existing Corridor PDA based on FRI data is dominated by agricultural lands, 51.3% (1,021.2 ha), with small patches of native vegetation (2.6% [52.5 ha]), 34.0% (677.1 ha) developed land, 11.8% (235.6 ha) water, and less than 0.1% (0.2 ha) wetlands (Map Series 1-300 – Vegetation and Wetland Observations).

The native vegetation in the PDA is predominantly found along the New ROW (64.1% [699.1 ha). The New ROW PDA also consists of 26.1% (284.3 ha) agriculture, 2.0% (21.8 ha) developed land, 2.3% (25.1 ha) recently cleared, 0.3% (3.8 ha) water, and 5.2% (56.2 ha) wetlands (Map Series 1-300 – Vegetation and Wetland Observations). For additional information on wetlands see Section 2.4.

The stations PDA consists of 96.9% (78.9 ha) agricultural land and 3.1% (2.6 ha) developed land. The stations are not associated with any native vegetation (Map Series 1-300 – Vegetation and Wetland Observations).

Agricultural land comprises approximately 1,384.4 ha (43.8%) of the PDA, 19,007.4 (40.6%) of the LAA, and 345,008.1 ha (47.7%) of the RAA (Table 2-4).

Developed land comprises approximately 701.5 ha (22.2%) of the PDA, 8,465.7 ha (18.1%) of the LAA, and 92,320.3 ha (12.8%) of the RAA (Table 2-4).

Native vegetation comprises approximately 751.7 ha (23.8%) of the PDA, 15,373.3 ha (32.9%) of the LAA, and 236,321.2 ha (32.7%) of the RAA (Table 2-4).

Wetlands comprise approximately 56.4 ha (1.8%) of the PDA, 1,883.7 ha (4.0%) of the LAA, and 33,194.4 ha (4.6%) of the RAA (Table 2-4).

Water comprises approximately 239.4 ha (7.6%) of the PDA, 1,390.1 ha (3.0%) of the LAA, and 9,889.6 ha (1.4%) of the RAA (Table 2-4).

Table 2-4 Vegetation Cover Class Abundance in the PDA, LAA, and RAA

Land Cover Category	Class Name	Area Occupied[1] (ha)			Proportion of Assessment Area (%)		
		PDA	LAA	RAA	PDA	LAA	RAA
Native Vegetation	Grassland	91.1	1,80.49	27,923.2	2.9	3.9	3.9
	Shrubland	111.1	2,238.7	32,145.8	3.5	4.4	4.4
	Deciduous forest	365.1	7,388.9	116,357.4	11.6	2.1	16.1
	Coniferous forest	169.2	3,383.9	47,904.8	5.4	10.1	6.6
	Mixedwood forest	15.1	556.9	11,627.7	0.5	11.4	1.6
	Sand dune	0.0	0.0	362.4	0.0	0.0	0.1
	Total Native Vegetation	***751.7***	***15,373.3***	***236,321.2***	***23.8***	***32.9***	***32.7***
Wetland	Bogs	20.6	511.0	5,804.8	0.7	1.1	0.8
	Fens	35.0	1,110.8	21,383.0	1.1	2.4	3.0
	Marshes	0.6	162.9	5,69.7	0.0	0.4	0.8
	Dugouts	0.2	99.0	312.9	0.0	0.2	0.0
	Total Wetland	***56.4***	***1,883.7***	***33,194.4***	***1.8***	***4.0***	***4.6***
Water	River	7.4	90.5	2,091.4	0.2	0.2	0.3
	Channels	231.9	1,266.3	5,933.7	7.3	2.7	0.8
	Lake	0.0	33.3	1,864.4	0.0	0.1	0.3
	Total Water	***239.4***	***1,390.1***	***9,889.6***	***7.6***	***3.0***	***1.4***
Agriculture	Cultivated	1,171.2	16,982.6	311,135.8	37.0	36.3	43.0
	Pasture	213.2	2,024.8	33,872.3	6.7	4.3	4.7
	Total Agriculture	***1,384.4***	***19,007.4***	***345,008.1***	***43.8***	***40.6***	***47.7***
Developed	Roads	101.1	1,294.6	22,219.8	3.2	2.8	3.1
	Buildings	594.8	6,947.1	66,512.2	18.8	14.9	9.2
	Industrial	5.6	153.9	3,085.6	0.2	0.3	0.4
	Recreation Sites	0.0	70.2	502.8	0.0	0.2	0.1
	Total Developed	***701.5***	***8,465.7***	***92,320.3***	***22.2***	***18.1***	***12.8***

Table 2-4 Vegetation Cover Class Abundance in the PDA, LAA, and RAA

Land Cover Category	Class Name	Area Occupied[1] (ha)			Proportion of Assessment Area (%)		
		PDA	LAA	RAA	PDA	LAA	RAA
Undefined	Undefined	0.2	3.0	45.4	0.0	0.0	0.0
Recently Cleared	Recently cleared	27.5	659.0	6,447.9	0.9	1.4	0.9
Total Project Area[2]		**3,161.0**	**46,782.2**	**723,226.9**	**100.0**	**100.0**	**100.0**

NOTES:

[1] Vegetation cover class abundance for PDA, LAA and RAA are based on FRI data.

[2] Total cover, including developed, native vegetation, agriculture, wetland, water, undefined and recently cleared.

The dominant plant species observed in each land cover class during the 2014 rare plant surveys within the LAA are listed in Table 2-5. Black spruce (*Picea mariana*) dominated coniferous forest. The deciduous forest surveyed was largely dominated by trembling aspen (*Populus tremuloides*) or American elm (*Ulmus americana*) (Appendix B). Mixedwood forest include a combination of conifers species, 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*) (Appendix B). The grassland sites included one site within a cleared area of forest with grass species such as big bluestem (*Andropogon gerardii*), poverty oat grass (*Danthonia spicata*), and purple oat grass (*Schizachne purpurascens*), and other sites in more degraded/invaded grassland dominated by smooth brome (*Bromus inermis*) and Kentucky bluegrass (*Poa pratensis*) (Appendix B). Shrubland was dominated by species, including dwarf birch (*Betula pumila*), green alder (*Alnus viridis* ssp. *crispa*), arctic dwarf birch (*Betula nana*) and trembling aspen (Appendix B). Pasture sites were largely dominated by smooth brome, Kentucky bluegrass and quack grass (*Elymus repens*) (Appendix B). Wetlands included marshes and swamps. The dominant plants associated with the marsh wetlands includes sedges (*Carex* spp.), narrow-leaved cattail (*Typha angustifolia*), and reed canary grass (*Phalaris arundinacea*) (Appendix B). Plant species that were dominant in swamps include willows (*Salix* spp.), balsam fir (*Abies balsamea*), paper birch and speckled alder (*Alnus incana*) (Appendix B).

Table 2-5 Dominant Plant Species by Land Cover Classes in the PDA

NATIVE VEGETATION						
Coniferous Forest						
1	black spruce (*Picea mariana*)	Labrador-tea (*Rhododendron groenlandicum*)	bog cranberry (*Vaccinium vitis-idaea*)	low sweet blueberry (*Vaccinium angustifolium*)	two-leaved Solomon's-seal (*Maianthemum canadense*)	
Deciduous Forest						
1	trembling aspen (*Populus tremuloides*)	black ash (*Fraxinus nigra*)	bush-honeysuckle (*Diervilla lonicera*)	alder-leaved buckthorn (*Rhamnus alnifolia*)	dewberry (*Rubus pubescens*)	
2	trembling aspen (*Populus tremuloides*)	dewberry (*Rubus pubescens*)	beaked hazelnut (*Corylus cornuta*)	bunchberry *(Cornus canadensis)*	veiny meadow rue *(Thalictrum venulosum)*	northern bedstraw *(Galium boreale)*
3	trembling aspen *(Populus tremuloides)*	green alder *(Alnus viridis)*	black ash *(Fraxinus nigra)*	wild red raspberry *(Rubus idaeus)*	highbush-cranberry *(Viburnum opulus* var. *americanum)*	
4	trembling aspen *(Populus tremuloides*)	blasam poplar *(Populus balsamifera)*	red-osier dogwood *(Cornus sericea)*	dwarf birch *(Betula pumila)*	choke cherry *(Prunus virginiana)*	
5	red ash *(Fraxinus pennsylvanica)*	Manitoba maple *(Acer negundo)*	beaked hazelnut *(Corylus cornuta)*	wild red raspberry *(Rubus idaeus)*	western snowberry *(Symphoricarpos occidentalis)*	
6	American elm *(Ulmus americana)*	wild sarsaparilla *(Aralia nudicaulis)*	smooth brome *(Bromus inermis)*	meadow rue *(Thalictrum* sp.)	bur oak *(Quercus macrocarpa)*	common scouring-rush *(Equisetum hyemale)*
7	trembling aspen *(Populus tremuloides)*	fringed brome *(Bromus ciliatus)*	white-grained mountain rice grass *(Oryzopsis asperifolia)*	bracken *(Pteridium aquilinum)*	speckled alder *(Alnus incana)*	highbush-cranberry *(Viburnum opulus* var. *americanum)*
8	trembling aspen *(Populus tremuloides)*	red-osier dogwood *(Cornus sericea)*	choke cherry *(Prunus virginiana)*	marsh reed grass *(Calamagrostis canadensis)*	Kentucky blue grass *(Poa pratensis)*	northern bedstraw *(Galium boreale)*
9	trembling aspen (*Populus tremuloides*)	green alder (*Alnus viridis* ssp. *crispa*)	wild red raspberry (*Rubus idaeus*)	dewberry (*Rubus pubescens*)	marsh reed grass (*Calamagrostis canadensis*)	two-leaved Solomon's-seal (*Maianthemum canadense*)
10	trembling aspen (*Populus tremuloides*)	pin cherry (*Prunus pensylvanica*)	choke cherry (*Prunus virginiana*)	twining honeysuckle (*Lonicera dioica*)	fringed loosestrife (*Lysimachia ciliata*)	wild sarsaparilla (*Aralia nudicaulis*)
11	American elm (*Ulmus americana*)	wild sarsaparilla (*Aralia nudicaulis*)	smooth brome (*Bromus inermis*)	tall meadow rue (*Thalictrum dasycarpum*)	Kentucky blue grass (*Poa pratensis*)	poison-ivy (*Toxicodendron rydbergii*)
12	trembling aspen (*Populus tremuloides*)	red-osier dogwood (*Cornus sericea*)	beaked willow (*Salix bebbiana*)	balsam poplar (*Populus balsamifera*)	dewberry (*Rubus pubescens*)	northern bedstraw (*Galium boreale*)
13	trembling aspen (*Populus tremuloides*)	beaked hazelnut (*Corylus cornuta*)	American elm (*Ulmus americana*)	wild sarsaparilla (*Aralia nudicaulis*)	wild ginger (*Asarum canadense*)	dewberry (*Rubus pubescens*)
Mixedwood Forest						
1	red ash (*Fraxinus pennsylvanica*)	trembling aspen (*Populus tremuloides*)	blasam poplar (*Populus balsamifera*)	white birch (*Betula papyrifera*)	green alder (*Alnus viridis*)	red-osier dogwood (*Cornus sericea*)
2	jack pine (*Pinus banksiana*)	trembling aspen (*Populus tremuloides*)	Kentucky blue grass (*Poa pratensis*)	wild red raspberry (*Rubus idaeus*)	green alder (*Alnus viridis*)	marsh reed grass (*Calamagrostis canadensis*)

Table 2-5 Dominant Plant Species by Land Cover Classes in the PDA

NATIVE VEGETATION (cont'd)						
Grassland						
1	Smooth brome (*Bromus inermis*)	spreading dogbane (*Apocynum androsaemifolium*)	Kentucky blue grass (*Poa pratensis*)	trembling aspen (*Populus tremuloides*)	beaked willow (*Salix bebbiana*)	narrow reed grass (*Calamagrostis stricta*)
2	big bluestem (*Andropogon gerardii*)	poverty oat grass (*Danthonia spicata*)	hairy goldenrod (*Solidago hispida*)	trembling aspen (*Populus tremuloides*)	daisy fleabane (*Erigeron strigosus*)	late goldenrod (*Solidago gigantea*)
3	big bluestem (*Andropogon gerardii*)	Kentucky blue grass (*Poa pratensis*)	trembling aspen (*Populus tremuloides*)	purple oat grass (*Schizachne purpurascens*)	green alder (*Alnus viridis* ssp. *crispa*)	
Shrubland						
1	trembling aspen (*Populus tremuloides*)	green alder (*Alnus viridis*)	fringed brome (*Bromus ciliatus*)	wild red raspberry (*Rubus idaeus*)	narrow reed grass (*Calamagrostis stricta*)	wild sarsaparilla (*Aralia nudicaulis*)
2	dwarf birch (*Betula pumila*)	northern bog sedge (*Carex gynocrates*)	lakeshore sedge (*Carex lacustris*)	bog willow (*Salix pedicellaris*)	tamarack (*Larix laricina*)	
3	trembling aspen (*Populus tremuloides*)	wild sarsaparilla (*Aralia nudicaulis*)	bur oak (*Quercus macrocarpa*)	dewberry (*Rubus pubescens*)	pale vetchling (*Lathyrus ochroleucus*)	
4	green alder (Alnus viridis ssp. Crispa)	trembling aspen (Populus tremuloides)	sweet-scented bedstraw (Galium triflorum)	marsh reed grass (Calamagrostis Canadensis)	big bluestem (Andropogon gerardii)	
5	bog birch (*Betula nana*)	beaked willow (*Salix bebbiana*)	basket willow (*Salix petiolaris*)	sedge sp. (*Carex sp.*)	northern reed grass (*Calamagrostis stricta ssp. inexpansa*)	tamarack (*Larix laricina*)
AGRICULTURE						
Pasture						
1	smooth brome (*Bromus inermis*)	quack-grass (*Elymus repens*)	aster (*Symphyotrichum* sp.)	sandbar willow (*Salix interior*)	reed canary grass (*Phalaris arundinacea*)	tufted vetch (*Vicia cracca*)
2	quack-grass (*Elymus repens*)	western wheatgrass (*Pascopyrum smithii*)	Kentucky blue grass (*Poa pratensis*)	dandelion (*Taraxacum officinale*)	slender wheatgrass (*Elymus trachycaulus* ssp. *subsecundus*)	
3	Kentucky blue grass (*Poa pratensis*)	fringed brome (*Bromus ciliatus*)	Timothy-grass (*Phleum pratense*)	reed canary grass (*Phalaris arundinacea*)	trembling aspen (*Populus tremuloides*)	calico aster (*Symphyotrichum lateriflorum*)
4	smooth brome (*Bromus inermis*)	alfalfa (*Medicago sativa*)	quack-grass (*Elymus repens*)	reed canary grass (*Phalaris arundinacea*)	Canada thistle (*Cirsium arvense*)	
5	Kentucky blue grass (*Poa pratensis*)	Timothy-grass (*Phleum pratense*)	dandelion (*Taraxacum officinale*)	trembling aspen (*Populus tremuloides*)	marsh reed grass (*Calamagrostis canadensis*)	
6	Kentucky blue grass (*Poa pratensis*)	smooth brome (*Bromus inermis*)	Indian-hemp (*Apocynum cannabinum*)	dandelion (*Taraxacum officinale*)	reed canary grass (*Phalaris arundinacea*)	
7	Kentucky blue grass (*Poa pratensis*)	dandelion (*Taraxacum officinale*)	western wheatgrass (*Pascopyrum smithii*)	rough-leaved goldenrod (*Solidago rugosa*)	three-toothed cinquefoil (*Sibbaldiopsis tridentata*)	
Industrial (Dorsey Converter Station)						
1	quack-grass (*Elymus repens*)	dandelion (*Taraxacum officinale*)	alfalfa (*Medicago sativa*)	alsike clover (*Trifolium hybridum*)	wild barley (*Hordeum jubatum*)	black medick (*Medicago lupulina*)

Table 2-5 Dominant Plant Species by Land Cover Classes in the PDA

WETLANDS						
Marsh						
1	reed canary grass (*Phalaris arundinacea*)	fowl mannagrass (*Glyceria striata*)	panicles aster (*Symphyotrichum lanceolatum*)	marsh reed grass (*Calamagrostis canadensis*)	fowl bluegrass (*Poa palustris*)	basket willow (*Salix petiolaris*)
2	northern bog sedge (*Carex gynocrates*)	lakeshore sedge (*Carex lacustris*)	arrow-leaved colt's-foot (*Petasites frigidus var. sagittatus*)	basket willow (*Salix petiolaris*)	late goldenrod (*Solidago gigantea*)	blue flag (*Iris versicolor*)
3	narrowleaf cattail (*Typha angustifolia*)	Baltic rush (*Juncus balticus*)	bog willow (*Salix pedicellaris*)	basket willow (*Salix petiolaris*)	marsh reed grass (*Calamagrostis canadensis*)	
Swamp						
1	beaked willow (*Salix bebbiana*)	heart-leaved willow (*Salix eriocephala*)	fringed brome (*Bromus ciliatus*)	prickly sedge (*Carex tribuloides*)	marsh reed grass (*Calamagrostis canadensis*)	
2	shining willow (*Salix lucida*)	beaked willow (*Salix bebbiana*)	northern reed grass (*Calamagrostis stricta ssp. inexpansa*)	wolly sedge (*Carex pellita*)	dry-spike sedge (*Carex siccata*)	fowl blue grass (*Poa palustris*)
3	balsam fir (*Abies balsamea*)	white birch (*Betula papyrifera*)	bunchberry (*Cornus canadensis*)	black spruce (*Picea mariana*)	Dewey's sedge (*Carex deweyana*)	dewberry (*Rubus pubescens*)
4	trembling aspen (*Populus tremuloides*)	speckled alder (*Alnus incana*)	black ash (*Fraxinus nigra*)	white birch (*Betula papyrifera*)	snakeroot (*Sanicula marilandica*)	wild sarsaparilla (*Aralia nudicaulis*)

2.3.2.3 Data Gaps

Areas of native vegetation including forested classes are overrepresented in the FRI data, which is likely due to the underrepresentation of wetlands. See section 2.4.3.3 for a more detailed discussion on wetlands. Information on plant communities was not included in the FRI dataset. Therefore the field survey data was used to supplement the FRI data to determine the dominant plant species observed in each land cover class.

2.4 WETLAND COVER CLASSES

2.4.1 Field Studies

Wetland field surveys for the Project were completed during the growing season in 2014. Field surveys were conducted to verify existing wetland data for the PDA.

2.4.1.1 Methods

Wetland surveys were completed for the preferred and alternative routes. Wetland surveys focused on classifying wetlands in native vegetation cover classes. Surveys were conducted for the preferred and alternative routes in order to aid in the final route selection. Wetland locations and classes were later used to guide the desktop mapping of the Final Preferred Route PDA.

Wetland surveys were conducted on foot by two experienced ecologists. Dominant plant species and wetland class were determined for each wetland. Wetlands were classified according to *The Canadian Wetland Classification System* (National Wetlands Working Group1997), which is the standard national classification system for wetlands in Canada (Table 2-6). Five classes of wetlands are differentiated based on genetic origin or nature of the wetland ecosystem. Each class is distinguished by the characteristics of soil, water, and vegetation associated with the wetland. See Table 2-6 for a description of the wetland classes and their characteristic plant species typically found in Manitoba.

Wetlands sometimes include two or more wetland classes, and these are referred to as a "wetland complex" (*e.g.,* swamps with areas of shallow water). In this situation, the wetland class that is the dominant or largest portion of the wetland complex is the wetland class assigned to the wetland (*e.g.*, a wetland complex with large area of fen and fringing areas of swamp would be classed as a fen).

Additionally, when rivers and streams (flowing water) were encountered, they were identified as water and are discussed in Ssection 2.3.

In total, 74 wetland survey sites were completed in 2014, 44 of which were located in the LAA and 13 within the PDA of the Final Preferred Route. Seven of the sites were located in the Existing Corridor and six were located along the New ROW. Wetland surveys were conducted throughout the growing season in 2014, between June 21 and October 3, 2014.

An additional site visit to Dorsey was conducted on July 21, 2015 to evaluate the presence of two mapped wetlands.

Table 2-6 Canadian Wetland Classification System

Wetland Class[1]	Description[2]
Bog	Peatlands characterized by an accumulation of peat, dominated by bryophytes and graminoids. Peatland receives water exclusively form precipitation and not influenced by groundwater. In Manitoba, common plant species in a bog may include peat moss (*Sphagnum* spp.), tamarack (*Larix larcina*), black spruce (*Picea mariana*), balsam fir (*Abies balsamea*), bog rosemary (*Andromeda polifolia*), leatherleaf (*Chamaedaphne calyculata*), Labrador tea (*Rhododendron groenlandicum*), small bog cranberry (*Vaccinium oxycoccos*), bog laurel (*Kalmia polifolia*), and pitcher plant (*Sarracenia purpurea*).
Fen	Peatlands characterized by an accumulation of peat, dominated by shrubs and graminoids, with water flow on the surface or through the subsurface with a fluctuating water table. Peatland receives water rich in dissolved minerals. In Manitoba, common plant species in a fen may include peat moss, tamarack, black spruce, bog birch (*Betula glandulosa*), willows (*Salix* spp), grasses, and sedges (Carex spp.).
Swamp	Peatlands or wetlands characterized by >30% trees or shrubs. In Manitoba common plant species in a swamp may include peat moss, paper birch (*Betula papyrifera*), black spruce, trembling aspen (*Populus tremuloides*), balsam fir, green alder (*Alnus crispa*), red-osier dogwood (*Cornus stolonifera*), bunchberry (*Cornus canadensis*), and interrupted fern (*Osmunda claytoniana*).
Marsh	Wetlands characterized by standing water that fluctuates daily, seasonally, or annually. Marshes are typically mineral wetlands, neutral to alkaline, nutrient rich, and dominated by emergent aquatic plant species such as rushes, reeds, sedges, and grasses in addition to floating or submerged aquatic plant species. In Manitoba common plant species in marshes may include mint (*Mentha arvensis*), duckweed (*Lemna minor*), cattails (*Typha* spp.), sedges, rushes (*Juncus* spp.), and bulrushes (*Scirpus* spp.).
Shallow Water	Shallow water wetlands are transitional wetlands between the wetlands that are seasonal (*e.g.*, bog, fend, swamp or marsh) and permanent deep water bodies(*e.g.*, lakes) and are often referred to as ponds, pools, shallow lakes, oxbows, sloughs, reaches or channels. They are characterized by minimal or no accumulation of peat, often with thin layers of mineral and organic muck. Free surface water is present for all or most of the year, up to 2 m deep. Less than 25% of surface area covered in emergent or woody plants. Dominated by submerged or floating aquatic vegetation such as duckweed and pondweeds (*Potamogeton* spp.).

NOTES:

[1] National Wetlands Working Group 1997

[2] Species names in this table conform to descriptions in the National Wetlands Working Group 1997 document

2.4.1.2 Results

During field surveys, a total of 42 wetlands were classified within the LAA (Table 2-7). The most common class of wetland surveyed was marsh followed by swamps, bogs, and shallow open water.

Table 2-7 Wetlands Observed during Field Surveys

Wetland Class	Number of Wetlands
Bog	3
Marsh	25
Swamp	12
Shallow open water	2
Total	42

2.4.2 Desktop Mapping

Desktop mapping of wetland extent and class was completed after the field surveys. Field survey information was used to guide the desktop mapping.

2.4.2.1 Methods

Wetland class, type and boundaries were reviewed and interpreted at a 1:3,000 scale (0.04 ha minimum polygon size) within the PDA using the following available imagery in conjunction with data from wetland and soils surveys:

- ESRI® World Imagery (ESRI 2014)
- AAFC annual crop inventory, 2013 (optical imagery (Landsat-5, Landsat-8, AWiFS, DMC, SPOT and RapidEye) and radar imagery (Radarsat-2)) (AAFC 2013)
- LCC from 2005, (Land Sat Thematic Mapper (TM) imagery(30 m resolution, 1:20,000 scale) (MLI 2005)
- Orthophotography Imagery (50 cm) (Manitoba Hydro 2007-2012)
- FRI (2000)aerial photography (digitized 1:15840)
- Bing Maps® (2014)
- Google Earth Pro®
- soils surveys data (see the Soil and Terrain Technical Report)

Wetland boundaries and classes were assessed and estimated through a detailed review of the above sources. The wetland mapping was completed for the Final Preferred Route in May 2015. 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) with marshes further classified using Stewart and Kantrud (1971). Imagery

used was 50 cm full spectrum provided by Manitoba Hydro (Manitoba Hydro 2007-2012, derived from Provincial Ortho Refresh Program). Imagery from both wet and dry years was used to make a conservative estimate of the wetland boundary (the age of the imagery available differed along the route). Wetlands were further classified to type based on whether they were dominated by tree species, shrub species, or herbaceous/graminoid species. Marshes were further classified based on water permanency according to Stewart and Kantrud (1971) (Table 2-8). Three groups were used: ephemeral/temporary (Class 1/2), seasonal/semi-permanent (Class 3/4), and permanent (Class 5). Desktop mapping incorporated the field survey results.

This product may not identify every wetland in the field. Wetlands smaller than 0.04 ha were not identified during desktop mapping. Moreover, desktop mapping is limited by the imagery. The wetland classes were refined based on the wetland field surveys.

Table 2-8 Stewart and Kantrud (1971) Wetland Classification

Wetland Class	Central Zone	Description
Class I – ephemeral ponds	low prairie zone	Ephemeral ponds occur in small swales and contain species such as Kentucky bluegrass (*Poa pratensis*).
Class II – freshwater temporary ponds	wet meadow zone	In freshwater temporary ponds, the central wet meadow zone is the deepest part of the wetland area and is usually dominated by western wheatgrass (*Pascopyrum smithii*) and foxtail barley (*Hordeum jubatum*).
Class III –seasonal ponds	shallow marsh zone	Seasonal ponds are wetlands with a shallow marsh zone dominating the deepest part of the wetland area. These ponds are frequently surrounded by a ring of willows with a wet centre containing sedges (*Carex* spp.).
Class IV – semi-permanent ponds	deep marsh zone	In semi-permanent ponds and lakes, the deep marsh zone dominates the deepest part of the wetland area. Common cattail (*Typha latifolia*) and bulrushes (*Scirpus* spp.) are typical emergent species.
Class V –permanent ponds	permanent open water zone	The permanent open water zone dominates the deepest part of the wetland area and is devoid of emergent vegetation.

2.4.2.2 Results

Table 2-9 includes results based on the desktop mapping of the PDA and includes wetland class and type. The most dominant wetland in the PDA is marsh (250.2 ha) followed by fens (93.3 ha), swamps (88.1 ha), bogs (24.9 ha), dugouts (1.4 ha), and shallow open water (0.3 ha).

Table 2-9 Wetlands in the PDA based on Desktop Mapping

Wetlands	PDA		
Wetland Class[1] / **Wetland Type**	**Area (ha)**	**% of Wetlands**	**% of the Total PDA**
Dugout	**1.4**	**0.3**	**0.0**
Marsh[2]	250.2	54.6	8.1
Class I / Class II	89.0	19.4	2.9
Class III / Class IV	40.6	8.9	1.3
Class V	120.6	26.3	3.9
Shallow Open Water	**0.3**	**0.1**	**0.0**
Swamp	**88.1**	**19.2**	**2.9**
Shrub	46.3	10.1	1.5
Treed	41.9	9.1	1.4
Bog	**24.9**	**5.4**	**0.8**
Shrub	18.8	4.1	0.6
Treed	6.0	1.3	0.2
Fen	**93.3**	**20.4**	**3.0**
Herbaceous / Graminoid	40.2	8.8	1.3
Shrub	21.3	4.6	0.7
Treed	31.9	7.0	1.0
Total	**458.2**	**100.0**	**14.9**

NOTES:
Data are based on desktop mapping.
[1] National Wetlands Working Group 1997
[2] Stewart and Kantrud 1971

Existing Corridor: there are 122.7 ha (6.2%) of wetlands in the Existing Corridor PDA including dugouts (1.4 ha) and marshes (121.4 ha).

New ROW: there are 334.9 ha (30.7%) of wetlands in the New ROW PDA including marsh (128.4 ha), swamp (88.1 ha), fen (93.3 ha), bog (24.9 ha), and shallow open water wetlands (0.1 ha).

Glenboro South Station: there is one shallow open water wetland (0.1 ha) in the PDA of the transmission line ROW but no wetlands in the station expansion.

Dorsey Converter Station: there is one marsh wetland (0.14 ha) in the PDA.

Riel Converter Station: there are no wetlands in the PDA.

2.4.3 PDA, LAA, and RAA Analysis

2.4.3.1 Methods

The FRI database was used to determine the wetland cover classes for the PDA, LAA, and RAA so that they could be directly compared. The desktop mapping data for the PDA is more detailed, but it cannot be used to make direct comparisons between the LAA and RAA. As previously stated, the existing FRI data is from prior to 2000, underrepresents wetlands, and lacks a class for swamp and shallow open water wetlands.

2.4.3.2 Results

Wetlands based on FRI data comprise approximately 1.8% (56.4 ha) of the Final Preferred Route PDA, 4.0% (1,883.7 ha) of the LAA and 4.6% (33,194.4 ha) of the RAA (Table 2-10). The dominant wetland in the PDA is fens (35.0 ha) followed by bogs (20.6 ha), marshes (0.6 ha), and dugouts (0.2 ha) (Table 2-10).

The LAA intersects approximately 1,883.7 ha of wetlands, 56.4 ha of which are within the PDA (see Table 2-10 and Map Series 1-300 – Vegetation and Wetland Observations).

Existing Corridor: there are 0.2 ha of wetlands in the PDA, 96.7 ha of wetlands in the LAA, 3,138.1 ha of wetlands in the RAA.

New ROW: there are 56.2 ha of wetlands in the PDA, 1,785.1 ha wetlands in the LAA, and 31,078.3 ha of wetlands in the RAA.

Glenboro South Station: there are no wetlands in the PDA, 2.0 ha of wetlands in the LAA, and 1,250.7 ha of wetlands in the RAA.

Dorsey Converter Station: there are no wetlands in the PDA, 0.0 ha of wetlands in the LAA, and 406.9 ha of wetlands in the RAA.

Riel Converter Station: there are no wetlands in the PDA, 89.1 ha of wetlands in the LAA, and 156.1 ha of wetlands in the RAA.

Table 2-10 Wetland Classes in the PDA, LAA, and RAA

Wetland Class	Area Occupied[1] (ha)			Proportion of Assessment Area (%)		
	PDA	LAA	RAA	PDA	LAA	RAA
Bogs	20.6	511.0	5,804.8	0.7	1.1	0.8
Fens	35.0	1,110.8	21,383.0	1.1	2.4	3.0
Marshes	0.6	162.9	5,693.7	0.0	0.3	0.8
Dugouts	0.2	99.0	312.9	0.0	0.2	0.0
Total Wetland	**56.4**	**1,883.7**	**33,194.4**	**1.8**	**4.0**	**4.6**

NOTES:
[1] Based on the FRI dataset.

2.4.3.3 Data Gaps

The FRI dataset is an older dataset (prior to 2000) that was used primarily for forest inventory and mapped at a 1:15,000 scale. The FRI database does not include a classification for swamps and shallow open water wetlands. The data for swamps are likely included with the deciduous forest and shrubland cover class data. Similarly, shallow open water is likely grouped within the marsh data. In addition, due to the coarseness of the data and the focus on forestry, marsh wetlands are underrepresented in the FRI data. Therefore, the more detailed desktop mapping of the PDA was presented and will be used to aid mitigation planning.

2.4.4 Additional Data Sources

Wetlands in the PDA were further evaluated using Manitoba Habitat Heritage Corporation (MHHC) mapping. Due to the gaps present in the FRI dataset and the overall underrepresentation of wetlands, the MHHC mapping was used to compare the classification of the desktop mapping and to understand the shortcomings of the FRI data. The MHHC mapping was available only for the New ROW portion of the Project including the PDA, LAA, and RAA.

The MHHC mapped wetlands in the area of the New ROW based on the *Canadian Wetland Classification System* (National Wetlands Working Group 1997) using eCognition Developer object-based software to classify 30 m pixel LANDSAT-8 imagery.

The MHHC dataset mapped a larger total wetland area in the New ROW in comparison to the FRI dataset; however, the desktop mapping includes the largest area of mapped wetlands (Table 2-11). This is likely due to several factors including:

- FRI dataset does not use the Canadian Wetland Classification System
- swamps are not classified in the FRI dataset and are probably included in the deciduous forest and shrubland classes
- shallow open water wetlands are not classified in the FRI dataset and are probably included in the marsh class
- many of the smaller wetlands (e.g., marshes) are under-represented in the FRI data as the forest inventory did not include mapping of most wetland areas in agricultural lands
- the area of wetlands mapped is lower with coarser scale mapping

Table 2-11 Wetland Cover Class Abundance Comparison in the PDA of the Final Preferred Route

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[4]
Fens	0.0	0.0	nd[4]	0.0	0.0	nd[4]
Marshes	121.4	0.0	nd[4]	6.1	0.0	nd[4]
Shallow Open Water	0.0	0.0	nd[4]	0.0	0.0	nd[4]
Swamp	0.0	N/A	nd[4]	0.0	0.0	nd[4]
Dugouts	1.4	0.2	nd[4]	0.1	0.0	nd[4]
Total Wetland Area	***122.7***	***0.2***	nd[4]	***6.2***	***0.0***	nd[4]

Table 2-11 Wetland Cover Class Abundance Comparison in the PDA of the Final Preferred Route

Class Name	Area Occupied (ha)			Proportion of PDA (%)		
	Desktop Mapping[1]	FRI[2]	MHHC[3]	Desktop Mapping[1]	FRI[2]	MHHC[3]
Final Preferred Route						
Bogs	24.9	20.6	nd[4]	0.8	0.7	nd[4]
Fens	93.3	35.0	nd[4]	3.0	1.1	nd[4]
Marshes	249.8	0.6	nd[4]	8.1	0.0	nd[4]
Shallow Open Water	0.1	0.0	nd[4]	0.0	0.0	nd[4]
Swamp	88.1	N/A	nd[4]	2.9	0.0	nd[4]
Dugouts	1.4	0.4	nd[4]	0.0	0.0	nd[4]
Total Wetland Area	***457.6***	***56.6***	nd[4]	***14.9***	***1.8***	nd[4]

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.
N/A: not available

Presentation of wetland classes based on desktop mapping, MHHC, and FRI-based data is useful to bridge the comparison of wetland cover within the PDA based on desktop mapping and the FRI-based data presented for the LAA and RAA. The more detailed desktop mapping of the PDA will be used to aid with mitigation planning.

2.5 INVASIVE PLANT SPECIES

Plant species which have been identified as *noxious* under *The Noxious Weeds Act* (Government of Manitoba 2010a) must be controlled or eradicated as specified in the legislation. The Act includes native species (*e.g.*, "sedges") and is currently being updated by Manitoba Agriculture, Food and Rural Development (MAFRD). While the Act is under revision, the *Declaration of Noxious Weeds* (Government of Manitoba 2010b) was identified by MAFRD as the acting list of controlled species enforced by MAFRD (N. Shaikh 2013, pers. comm.). Desktop

2.5.1.1 Methods

A desktop review was conducted to search for historical occurrences of invasive plant species in the PDA, LAA and RAA. Early Detection and Distribution Mapping System (EDDMapS 2014) for the Prairies Region was searched for historical occurrences of invasive plant species. For the Project, the *Declaration of Noxious Weeds* was used as the operational list for occurrences of invasive plant species (Table 2-12). However, of the 103 invasive plant species listed under the *Declaration of Noxious Weeds*, 28 are native plant species. Although these species may become "weedy" in agricultural lands, these species are not considered invasive for this assessment. In addition, four species have not yet been recorded in Manitoba and are listed as "absent" by VASCAN (Brouillet *et al.* 2010+).

Table 2-12 Invasive Plant Species Listed under the Manitoba Declaration of Noxious Weeds

ITIS Accepted Scientific Name	Common Name	Declaration of Noxious Weeds Name[1]	Status of Species[3]
Centaurea diffusa	diffuse knapweed	*Centaurea diffusa*	absent
Centaurea stoebe ssp. *micranthos**	spotted knapweed	*Centaurea maculosa*	absent
Cyperus esculentus	yellow nutsedge	*Cyperus esculentus*	absent
Toxicoscordion venenosum var. *gramineum**	death camas	*Zygadenus gramineus*	absent
Amaranthus albus	tumble pigweed	*Amaranthus albus*	non-native
Arctium lappa	great burdock	*Arctium lappa*	non-native
Arctium minus	common burdock	*Arctium minus*	non-native
Arctium tomentosum	woolly burdock	*Arctium tomentosum*	non-native
Artemisia absinthium	wormwood	*Artemisia absinthium*	non-native
Artemisia biennis	biennial wormwood	*Artemisia biennis*	non-native
Artemisia vulgaris	mugwort	*Artemisia vulgaris*	non-native
Avena fatua	wild oats	*Avena fatua*	non-native
Axyris amaranthoides	Russian pigweed	*Axyris amaranthoides*	non-native
Berberis vulgaris	common barberry	*Berberis vulgaris*	non-native
Bromus tectorum	downy chess	*Bromus tectorum*	non-native
Capsella bursa-pastoris	shepherd's purse	*Capsella bursa-pastoris*	non-native
Carduus nutans	nodding thistle	*Carduus nutans*	non-native
Cerastium fontanus ssp. *vulgatum*	mouse-eared chickweed	*Cerastium vulgatum*	non-native
Chenopodium album	lamb's-quarters	*Chenopodium album*	non-native
Cirsium arvense	Canada thistle	*Cirsium arvense*	non-native

Table 2-12 Invasive Plant Species Listed under the Manitoba Declaration of Noxious Weeds

ITIS Accepted Scientific Name	Common Name	Declaration of Noxious Weeds Name[1]	Status of Species[3]
Cirsium vulgare	bull thistle	*Cirsium vulgare*	non-native
Convolvulus arvensis	field bindweed	*Convolvulus arvensis*	non-native
Crepis tectorum	narrow-leaved hawk's beard	*Crepis tectorum*	non-native
*Cyclachaena xanthifolia**	false ragweed	*Iva xanthifolia*	non-native
Datura stramonium	jimson weed	*Datura stramonium*	non-native
Descurainia sophia	flixweed	*Descurainia sophia*	non-native
Echinochloa crus-galli ssp. *crus-galli*	barnyard grass	*Echinochloa crusgalli*	non-native
Echium vulgare	viper's bugloss	*Echium vulgare*	non-native
*Elymus repens**	quack-grass	*Agropyron repens*	non-native
Erodium cicutarium	stork's-bill	*Erodium cicutarium*	non-native
Erucastrum gallicum	dog mustard	*Erucastrum gallicum*	non-native
Euphorbia cyparissias	cypress spurge	*Euphorbia cyparissias*	non-native
Euphorbia esula	leafy spurge	*Euphorbia esula*	non-native
Fagopyrum tataricum	tartary buckwheat	*Fagopyrum tataricum*	non-native
*Fallopia convolvulus**	wild buckwheat	*Polygonum convolvulus*	non-native
Galeopsis tetrahit	common hemp-nettle	*Galeopsis tetrahit*	non-native
Gypsophila paniculata	baby's breath	*Gypsophila paniculata*	non-native
Hypericum perforatum	St. John's wort	*Hypericum perforatum*	non-native
Kochia scoparia	summer cypress	*Kochia scoparia*	non-native
Lactuca serriola	prickly lettuce	*Lactuca serriola*	non-native
Lamium amplexicaule	henbit	*Lamium amplexicaule*	non-native
*Lappula squarrosa**	bluebur	*Lappula echinata*	non-native
*Leucanthemum vulgare**	ox-eye daisy	*Chrysanthemum leucanthemum*	non-native
Linaria dalmatica	dalmatian toadflax	*Linaria dalmatica*	non-native
Linaria vulgaris	yellow toadflax	*Linaria vulgaris*	non-native
Lolium persicum	Persian darnel	*Lolium persicum*	non-native
Lythrum salicaria	purple loosestrife	*Lythrum spp.*	non-native
Malva pusila	round-leaved mallow	*Malva pusilla*	non-native
Neslia paniculata	ball mustard	*Neslia paniculata*	non-native
Odontites vulgaris	red bartsia	*Odontites serotina*	non-native
*Pennisetum glaucum**	yellow foxtail	*Setaria glauca*	non-native

Table 2-12 Invasive Plant Species Listed under the Manitoba Declaration of Noxious Weeds

ITIS Accepted Scientific Name	Common Name	Declaration of Noxious Weeds Name[1]	Status of Species[3]
*Persicaria maculosa**	spotted lady's-thumb	*Polygonum persicaria*	non-native
Rhamnus cathartica	common buckthorn	*Rhamnus cathartica*	non-native
Rhamnus frangula	alder-buckthorn	*Rhamnus frangula*	non-native
*Rhaponticum repens**	Russian knapweed	*Centaurea repens*	non-native
Salsola kali	Russian thistle	*Salsola kali*	non-native
Senecio vulgaris	common groundsel	*Senecio vulgaris*	non-native
Setaria viridis	green foxtail	*Setaria viridis*	non-native
Silene cserei	smooth catchfly	*Silene cserei*	non-native
*Silene latifolia**	white cockle	*Lychnis alba*	non-native
Silene noctiflora	night-flowering catchfly	*Silene noctiflora*	non-native
*Silene vulgaris**	bladder campion	*Silene cucubalus*	non-native
Sinapis arvensis	wild mustard	*Sinapis arvensis*	non-native
Sisymbrium altissimum	tumble mustard	*Sisymbrium altissimum*	non-native
Solanum spp.	nightshade species	*Solanum spp.*	non-native
Solanum triflorum	wild tomato	*Solanum triflorum*	non-native
*Sonchus arvensis**	field sow-thistle	*Sonchus glabrescens*	non-native
Sonchus oleraceus	annual sow-thistle	*Sonchus oleraceus*	non-native
Stellaria media	common chickweed	*Stellaria media*	non-native
Tanacetum vulgare	common tansy	*Tanacetum vulgare*	non-native
Taraxacum officinale	common dandelion	*Taraxacum officinale*	non-native
Thlaspi arvense	field pennycress	*Thlaspi arvense*	non-native
*Tragopogon dubius**	goat's-beard	*Tragopogon pratensis*	non-native
*Tripleurospermum inodurum**	scentless mayweed	*Matricaria maritima* var. *agrestis*	non-native
*Vaccaria hispanica**	cow-cockle	*Saponaria vaccaria*	non-native
Amaranthus retroflexus	redroot pigweed	*Amaranthus retroflexus*	native
Ambrosia artemisiifolia	common ragweed	*Ambrosia artemisiifolia*	native
Ambrosia trifida	giant ragweed	*Ambrosia trifida*	native
Apocynum androsaemifolium	spreading dogbane	*Apocynum androsaemifolium*	native
Artemisia frigida	pasture sage	*Artemisia frigida*	native
Asclepias speciosa	showy milkweed	*Asclepias speciosa*	native
Asclepias syriaca	common milkweed	*Asclepias syriaca*	native

Table 2-12 Invasive Plant Species Listed under the Manitoba Declaration of Noxious Weeds

ITIS Accepted Scientific Name	Common Name	Declaration of Noxious Weeds Name[1]	Status of Species[3]
Bidens frondosa	common beggarticks	*Bidens frondosa*	native
Cerastium arvense	field chickweed	*Cerastium arvense*	native
Cerastium nutans	long-stalked chickweed	*Cerastium nutans*	native
Cicuta spp.	water-hemlock species	*Cicuta* spp.	native
Cirsium flodmanii	Flodman's thistle	*Cirsium flodmanii*	native
Cirsium undulatum	wavy leaf thistle	*Cirsium undulatum*	native
Cuscuta spp.	dodder species	*Cuscuta spp.*	native
*Descurainia incana**	gray tansy mustard	*Descurainia richardsonii*	native
Dracocephalum parviflorum	American dragonhead	*Dracocephalum parviflorum*	native
Galium aparine	cleavers	*Galium aparine*	native
Grindelia squarrosa	curly-cup gumweed	*Grindelia squarrosa*	native
Hordeum jubatum	foxtail barley	*Hordeum jubatum*	native
Lygodesmia juncea	skeletonweed	*Lygodesmia juncea*	native
*Mulgedium oblongifolium**	wild lettuce	*Lactuca pulchella*	native
Oxytropis campestris	late yellow locoweed	*Oxytropis campestris*	native
Oxytropis sericea	early yellow locoweed	*Oxytropis sericea*	native
Oxytropis splendens	showy locoweed	*Oxytropis splendens*	native
Persicaria lapathifolia[2,4]	pale smartweed	*Polygonum lapathifolium*/ *Polygonum scabrum*	native
Toxicodendron radicans ssp. *radicans**	poison-ivy	*Rhus radicans*	native
Urtica dioica	stinging nettle	*Urtica dioica*	native
Xanthium strumarium	cocklebur	*Xanthium strumarium*	native

NOTES:

Scientific names updated to conform to ITIS nomenclature.

* Species names updated to equivalent ITIS accepted name.

[1] Government of Manitoba 2010b

[2] Species are now combined on ITIS and considered the same species.

[3] Absent species are not reported from Manitoba; Native species are present as a result of natural processes only, without human agency; and, non-native species are established (naturalized) in a region outside of its original range, as a result of human activity, either deliberate or accidental. Taxa are considered introduced in Canada when they became established after European colonization (Brouillet *et al.* 2010+).

2.5.1.2 Results

A search of historical occurrences of invasive plant species from the EDDMapS database shows 2 occurrences within the PDA, 26 occurrences in the LAA, and 3,367 occurrences in the RAA (Table 2-13). The occurrences of invasive plant species in the RAA by land cover class are presented in Table 2-14.

Table 2-13 Historical Records of Invasive Plant Species in the PDA, LAA and RAA

Scientific Name	Common Name	Number of Species		
		PDA	LAA	RAA
Centaurea stoebe ssp. *micranthos*	spotted knapweed	-	4	120
Cirsium arvense	Canada thistle	-	-	15
Euphorbia esula	leafy spurge	-	12	1,691
Leucanthemum vulgare	ox-eye daisy	2	5	274
Linaria vulgaris	yellow toadflox	-	-	31
Lythrum salicaria	purple loosestrife	-	5	1,015
Odontites vernus	red bartsia	-	-	3
Rhamnus cathartica	common buckthorn	-	-	212
Tanacetum vulgare	common tansy	-	-	6
Total		**2**	**26**	**3,367**

Table 2-14 Historical Records of Invasive Plant Species Occurrences in the RAA by Land Cover Class

Scientific Name	Common Name	Land Cover Category	Cover Class	Number of Occurrences in the RAA
Centaurea stoebe* ssp. *micranthos	**spotted knapweed**	Agriculture	Cultivated	6
			Subtotal	**6**
		Developed	Industrial	9
			Roads/Railways/Trails	57
			Subtotal	**66**
		Native Vegetation	Coniferous Forest	14
			Deciduous Forest	3
			Mixedwood Forest	16
			Shrubland	15
			Subtotal	**48**
		Total		**120**

Table 2-14 Historical Records of Invasive Plant Species Occurrences in the RAA by Land Cover Class

Scientific Name	Common Name	Land Cover Category	Cover Class	Number of Occurrences in the RAA
Cirsium arvense	**Canada thistle**	Agriculture	Pasture	2
			Subtotal	**2**
		Native Vegetation	Mixedwood Forest	12
			Shrubland	1
			Subtotal	**13**
		Total		**15**
Euphorbia esula	**leafy spurge**	Agriculture	Cultivated	316
			Pasture	44
			Subtotal	**360**
		Developed	Buildings	903
			Recreation Sites	6
			Roads/Railways/Trails	86
			Subtotal	**995**
		Native Vegetation	Coniferous Forest	58
			Deciduous Forest	8
			Mixedwood Forest	71
			Grassland	134
			Sand Dune	10
			Shrubland	23
			Subtotal	**304**
		Recently Cleared	Recently Cleared (cutting)	4
			Subtotal	**4**
		Water	Channel	5
			River	21
			Subtotal	**26**
		Wetland	Dugout	2
			Subtotal	**2**
		Total		**1691**

Table 2-14 Historical Records of Invasive Plant Species Occurrences in the RAA by Land Cover Class

Scientific Name	Common Name	Land Cover Category	Cover Class	Number of Occurrences in the RAA
Leucanthemum vulgare	**ox-eye daisy**	Agriculture	Cultivated	11
			Subtotal	**11**
		Developed	Buildings	202
			Roads/Railways/Trails	46
			Subtotal	**248**
		Native Vegetation	Coniferous Forest	1
			Deciduous Forest	1
			Grassland	1
			Subtotal	**3**
		Water	River	12
			Subtotal	**12**
		Total		**274**
Linaria vulgaris	**yellow toadflax**	Agriculture	Cultivated	3
			Subtotal	**3**
		Developed	Buildings	27
			Roads/Railways/Trails	1
			Subtotal	**28**
		Total		**31**
Lythrum salicaria	**purple loosestrife**	Agriculture	Cultivated	29
			Pasture	5
			Subtotal	**34**
		Developed	Buildings	582
			Roads/Railways/Trails	80
			Subtotal	**662**
		Native Vegetation	Coniferous Forest	23
			Deciduous Forest	3
			Mixedwood Forest	9
			Grassland	12
			Subtotal	**47**
		Water	River	272
			Subtotal	**272**
		Total		**1015**

Table 2-14 Historical Records of Invasive Plant Species Occurrences in the RAA by Land Cover Class

Scientific Name	Common Name	Land Cover Category	Cover Class	Number of Occurrences in the RAA
Odontites vernus	**red bartsia**	Developed	Roads/Railways/Trails	3
			Subtotal	**3**
			Total	**3**
Rhamnus cathartica	**common buckthorn**	Developed	Buildings	188
			Subtotal	**188**
		Water	River	24
			Subtotal	**24**
			Total	**212**
Tanacetum vulgare	**common tansy**	Developed	Buildings	5
			Roads/Railways/Trails	1
			Subtotal	**6**
		Total		**6**
Grand Total				**3367**

2.5.2 Field Studies

No formal weed surveys completed, but all invasive plant species were documented during the rare plant and wetland surveys in 2014. At each survey site, all invasive plant species listed in the *Declaration of Noxious Weeds* (Government of Manitoba 2010b) were recorded (Table 2-14). No cultivated cover classes were surveyed.

Invasive plant species were scattered throughout the PDA and were observed more frequently in areas with surrounding pre-existing disturbance, including agricultural land (pasture), and developed land (industrial, roads, railways, buildings, and recreational sites). Invasive plant species were observed in some native vegetation cover classes, including deciduous forest, mixedwood forest, and shrubland. Invasive plant species were observed less frequently in areas with less disturbance such as forested Crown land.

Ten invasive plant species were observed at 36 locations in the PDA for the Final Preferred Route during the 2014 field studies (Table 2-15). The most common invasive plant species encountered during field surveys were Canada thistle (*Cirsuim arvense*), common dandelion (*Taraxacum officinale*) and quack-grass (*Elymus repens*). No distinct patterns or patches of invasive plant species were found in the PDA.

Table 2-15 Invasive Plant Species Observed in the PDA during 2014 Field Surveys

Category		Native Vegetation			Developed		Agriculture	
Cover Class		Shrubland	Deciduous Forest	Mixedwood Forest	Roads, Railway, Buildings, Recreation Sites	Industrial	Pasture	Total
Scientific Name	**Common Name**							
Arctium minus	common burdock	-	1	-	-	-	-	1
Chenopodium album	lamb's-quarters	-	1	-	-	-	-	1
Cirsium arvense	Canada thistle	-	3	1	2	1	2	9
Elymus repens	quack-grass	1	1	-	2	1	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	-	1	1	-	3
Taraxacum officinale	common dandelion	-	2	1	2	1	3	9
Total		**1**	**12**	**2**	**8**	**5**	**8**	**36**

2.6 RARE PLANT SPECIES

2.6.1 Species at Risk and Species of Conservation Concern

Rare plant species are plant species that exist in small numbers or have a limited global or provincial distribution that are considered by regulatory agencies to be of conservation concern. The determination of which species are rare is governed by federal and provincial assessment, and regulatory mechanisms.

The relevant agencies and legislation that determine which plant species are federally listed species at risk (SAR) include the *Species at Risk Act* (SARA) (Government of Canada 2013a), and the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) (Government of Canada 2013b). Provincially, SAR are listed as *threatened*, *endangered*, or *extirpated* in *The Endangered Species and Ecosystems Act* (MBESEA) (Government of Manitoba 2014a).

Plant species of conservation concern (SOCC) in Manitoba are provincially ranked as *S1*-very rare in Manitoba, *S2*-rare in Manitoba, or *S3*-uncommon in Manitoba by the Manitoba Conservation Data Centre (MBCDC) (Government of Manitoba 2014c). MBCDC also provides information on the historical occurrence of native plant species in the province. Table 2-16 lists the provincial rankings and definitions used by MBCDC.

Table 2-16 Manitoba Conservation Data Centre Species Ranks

Provincial Rank	Provincial Definition
S1	Very Rare. Five or fewer occurrences, or with very few individuals remaining. May be especially vulnerable to extirpation.
S2	Rare. Six to 20 occurrences, or with many individuals in fewer occurrences. May be vulnerable to extirpation.
S3	Rare to Uncommon. Twenty-one to 100 occurrences and may be rare and local throughout the province, or its range might be restricted.
S4	Widespread and abundant, common. Secure under present conditions and with more than 100 occurrences but might be rare in part of its range or a long-term concern.
S5	Demonstrably widespread, very common. Secure under present conditions and throughout its range with more than 100 occurrences, essentially impossible to eradicate.
SH	Historical occurrence but without recent verification (*e.g.*, within 20 years).
SU	Possibly in peril, status uncertain, and species unrankable due to lack of information.
SX	A species that is believed to be extinct or extirpated. Historical records only.
SNA	Conservation status is not applicable to this species (*e.g.*, exotic species).
SNR	Species is not yet ranked.
S?	Can be added to any rank to denote an inexact numeric rank (*e.g.*, S1? = believed to be 5 or fewer occurrences, but some doubt exists concerning status).
SOURCE: MBCDC 2014b	

Many, but not all, species that are listed by COSEWIC are also included under SARA. SARA affords protection for plant species and their residence if they are listed as *Extirpated, Endangered* or *Threatened* under Schedule 1 of the Act (Table 2-17). It also provides protection for the critical habitat of these species, where it occurs on federally regulated land. Critical habitat is defined as the habitat necessary for the survival or recovery of a listed species and is identified in the recovery strategy or an action plan for the species (Government of Canada 2013a). In Manitoba, many of the rare plants listed under the MBESEA are also listed under SARA (Table 2-17).

Table 2-17 Federally and Provincially Listed SAR in Manitoba

Scientific Name	Common Name	Federal*		Provincial	
		COSEWIC Status[1]	SARA Status[1]	MBESEA Status[2]	MBCDC Rank[3]
Agalinis aspera	rough purple false-fox-glove	Endangered	Endangered	Endangered	S1S2
Agalinis gattingeri	Gattinger's agalinis	Endangered	Endangered	Endangered	S1
Buchloe dactyloides	buffalograss	Special concern	Threatened	Threatened	S1
Celtis occidentalis	hackberry	-	-	Threatened	S1
Chenopodium subglabrum	smooth goosefoot	Threatened	Threatened	Endangered	S1
Cypripedium candidum	small white lady's-slipper	Endangered	Endangered	Endangered	S2
Dalea villosa	silky prairie-clover	Special concern	Threatened	Threatened	S2S3
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
Tradescantia occidentalis	western spiderwort	Threatened	Threatened	Threatened	S1
Vernonia fasciculata	western ironweed	-	-	Endangered	S1
Veronicastrum virginicum	Culver's-root	-	-	Threatened	S1

Table 2-17 Federally and Provincially Listed SAR in Manitoba

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 biological characteristics

NOTES:
* All species noted are listed on Schedule 1 of SARA
[1] Government of Canada 2013b
[2] Government of Manitoba 2014a
[3] MBCDC 2014b

2.6.2 Key Person Interviews

Chris Friesen of the MBCDC was contacted regarding setback distances for SOCC. There are no provincial regulations regarding setback distances for SOCC (provincially ranked S1, S2, and S3 species) (Friesen 2014, pers. comm.); however, the federal *Activity Set-back Distance Guidelines for Prairie Plant Species at Risk* (Henderson 2011), which pertains to SAR, was provided as guidance. These guidelines will help avoid the following:

- killing, harming, or harassing endangered or threatened plant species at risk individuals (sections 32 and 36 of SARA)
- destroying any part of the critical habitat of an endangered or threatened plant species at risk (sections 58, 60, and 21 of SARA)
- contravention of any other regulations established from an action plan (section 53), management plan (section 71), or otherwise established to protect critical habitat (section 59 of SARA)

2.6.3 Desktop

Manitoba provincial databases, historical data, and relevant literature sources were reviewed for baseline environmental data. Databases were reviewed to determine any historical occurrences of plant SAR and SOCC within the RAA. This information provided baseline data in addition to the rare plant surveys.

2.6.3.1 Methods

Historical occurrences of SAR and SOCC within the LAA and RAA were researched in the SAR Public Registry (Government of Canada 2013b), the MBCDC (Government of Manitoba 2014a) databases and the University of Manitoba Herbarium. The MBCDC also track SOCC that are

provincially S-ranked S1 to S3 based on the species' risk of extirpation. These searches were used to create a list of SAR and SOCC that could be intersected by the Project.

Species names used in this report follow the Integrated Taxonomic Information System (ITIS 2014), except for rare varieties that are recognized by MBCDC but are not included in the ITIS database; in those cases, the MBCDC naming convention was followed. Common names conform to the MBCDC naming convention.

2.6.3.2 Results

The LAA overlaps potential habitat for eight plant SAR, as identified in the SAR Public Registry (2014) (Table 2-18). However, there are no historical occurrences of plant SAR in the PDA, LAA or RAA according to the SARA Public Registry or the MBCDC.

Table 2-18 Plant SAR with Potential to Occur in the LAA and RAA

Scientific name	Common name	Federal*		Provincial	
		COSEWIC Status[1]	SARA Status[2]	MBESEA Status[3]	MBCDC Rank[4]
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	none	none	Endangered	S1S2
Symphyotrichum sericeum	western silvery aster	Threatened	Threatened	Threatened	S2S3
Tradescantia occidentalis	western spiderwort	Threatened	Threatened	Threatened	S1
Vernonia fasciculata	western ironweed	none	none	Endangered	S1
Veronicastrum virginicum	Culver's root	none	none	Threatened	S1

NOTES:
* All species noted are listed on Schedule 1 of SARA
[1] Government of Canada 2013b
[2] Government of Canada 2013a
[3] Government of Manitoba 2014a
[4] MBCDC 2014b

The following historical records of SOCC within the PDA, LAA and RAA (Table 2-19) were found in the MBCDC databases:

- two species within the PDA
- seven species within the LAA
- 62 species within the RAA

Table 2-19 MBCDC Historical Occurrences of Rare Plant Species in the PDA, LAA or RAA

Vegetation Form	Scientific Name	Common Name	Provincial Rank	Number of Occurrences[1]		
				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 fruticosa*	false indigo	S1S2	-	2	55
herb	*Ranunculus cymbalaria var. saximontanus*	seaside crowfoot	S1S2	-	-	3
herb	*Spiranthes magnicamporum*	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

Table 2-19 MBCDC Historical Occurrences of Rare Plant Species in the PDA, LAA or RAA

Vegetation Form	Scientific Name	Common Name	Provincial Rank	Number of Occurrences[1]		
				PDA	LAA	RAA
herb	*Heteranthera dubia*	water star-grass	S2	-	-	3
tree	*Ostrya virginiana*	hop-hornbeam	S2	-	-	2
herb	*Platanthera hookeri*	hooker's orchid	S2	-	-	2
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 riddellii1*	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

Table 2-19 MBCDC Historical Occurrences of Rare Plant Species in the PDA, LAA or RAA

Vegetation Form	Scientific Name	Common Name	Provincial Rank	Number of Occurrences[1]		
				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	19	703
Total number of species				2	7	62

NOTES:
[1] Number of occurrences based on polygon file provided by MBCDC.

2.6.4 Field Studies

Rare plant field surveys were completed during the growing season in 2014. Field surveys were conducted to verify landcover and SAR and SOCC that may occur in the PDA. Surveys focused on areas with native vegetation, including grasslands and forests, pasture and wetland areas.

2.6.4.1 Methods

Rare plant surveys were conducted in areas of native vegetation for SAR and SOCC. The surveys (95 sites, including 43 early rare plant and 52 late rare plant surveys) were completed for both the preferred route and alternative routes to aid in the final route selection. Late rare plant surveys (six sites, including three at towers and three on the transmission line) were also completed on an existing transmission line, M602F, located in deciduous forest, mixedwood forest and coniferous forest adjacent to the Project within the RAA. Fieldwork was constrained by land access permission. Most survey locations were on provincially owned land because many private landowners could not be contacted prior to the field surveys.

Rare plant surveys were conducted on foot by two experienced vegetation ecologists. Survey transects were 100 m in length, with one or two parallel transects per quarter section located perpendicular to the ROW. Transects started at the edge of the PDA and continued perpendicular across the ROW to the opposite end of the PDA. Transect survey speed ranged from approximately 0.5 km per hour to 5 km per hour depending on how dense the vegetation was at each site. Each transect was placed at least 100 m away from any disturbance (*e.g.*, roads). Transect locations were determined in the field. All vascular plant species observed along each transect were recorded. Survey protocol followed the *Species Detection Survey Protocols for Rare Prairie Plant Surveys* from the Government of Saskatchewan (2014) and modified based on the *Occupancy Survey Guidelines for Prairie Plant Species at Risk* (Henderson 2009). There are no survey protocols for Manitoba; so in consultation with the MBCDC, the Saskatchewan protocols were used (Friesen 2014b, pers. comm.).

Field data collected included comprehensive vascular plant species lists and detailed occurrence data for SOCC. Data were collected using FLINT dataloggers (FLINT S Series [Model S812]) using a Stantec Consulting Ltd. (2015) program called *VINES* (*Vegetation Inventory Notation and Ecological Surveys*, Version 5.0.2.6 [Software]). Additional data collected included global positioning system (GPS) waypoints (UTM coordinates) of the start and end points of the transects, the legal sub division (quarter section), nearest town/city, surface expression (*e.g.*, hummocky, depressional, level, rolling, undulating), slope (%) and position, aspect, and light level (*e.g.*, open, partial, filtered, shade). Photos were taken at the start and end of each transect. A photo of the ground cover was taken, followed by a photo in each of the four cardinal directions. The dataloggers collected the tracks of the transects. Where SOCC species were found, GPS coordinates for the plant locations were recorded and the approximate location was marked on the field maps. Photographs were taken of the plant species showing defining characteristics, when visible, to document the occurrence. A population count was

done and an area of 25 m or more on all sides of the initial location was searched for additional occurrences of the species, based on the presence of suitable habitat. Dataloggers were uploaded to the database each night (Stantec Consulting Ltd. [2015] VegSYS: Vegetation SYStem [version 3.0.0.0, Software] Edmonton, AB, Canada) as well as photos and waypoints.

Two sets of rare plant surveys were completed: early season (June 2014) and late season (August 2014) to capture both early and late-blooming native plant species. Rare plant surveys were completed for the preferred route and the alternative routes. There are 55 sites completed within the Final Preferred Route LAA, which included 23 early rare plant sites and 32 late rare plant sites. For the Final Preferred Route PDA, there are seven early rare plant sites and nine late rare plant sites.

Most early rare plant sites were revisited during the late rare plant surveys. Exceptions were sites that had low rare plant potential, such as those located adjacent to the Red River floodway, as determined during the early rare plant surveys. Late rare plant surveys included additional sites that were not included in the early rare plant surveys due to access issues or time constraints. Rare plant surveys were conducted on the following dates:

- June 21 through July 11, 2014
- August 11 through August 20, 2014

2.6.4.2 Results

A total of 215 vascular plant species at 503 locations were identified in the PDA. The complete list of vascular plant species is provided in Map Series 1-300 – Vegetation and Wetland Observations.

One-hundred and eighty-nine occurrences of 31plant SOCC were observed along all the alternative routes. All of them have MBCDC conservation status rankings including 31 SOCC ranked S1 to S3S4 (MBCDC 2014); none are listed by SARA or MBESEA. No SAR were observed during field surveys in 2014.

Along the Final Preferred Route, three plant SOCC were found in eight locations in the PDA (Table 2-20). Many of the SOCC observed during field surveys were avoided during the route selection process.

Table 2-20 Rare Plant Species Observed in the PDA during the 2014 Field Surveys

Vegetation Form	Scientific Name	Common Name	Provincial Rank	Number of Occurrences	Land Cover
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

Moonseed (*Menispermum canadense*) is a herbaceous species provincially ranked S3. It was observed once in deciduous forest on the northern side of the Assiniboine River along the Existing Corridor PDA. Moonseed is a perennial vine that may be found in deciduous thickets and woodlands in southeastern Manitoba. It is sometimes found along streams, rocky hillsides or in fencerows.

Compact groundsel (*Packera tridenticulata*) is a herbaceous species that is provincially ranked S3. It was observed in deciduous forest along the south side of the Assiniboine River in the Existing Corridor PDA as well as along the New ROW PDA within shrubland. Compact groundsel was also observed at sites located in the LAA and RAA during field surveys. Compact groundsel is a perennial forb that inhabits dry prairie and sandhills in the southern part of Manitoba. It grows in clumps in open dry areas such as shrubland, short prairie, roadsides, or sandy/gravelly slopes.

Black ash (*Fraxinus nigra*) is a deciduous tree species that is provincially ranked S3. It was found abundant in deciduous forest, shrubland, and adjacent to pasture at five sites in the PDA. Black ash was also observed at sites located in the LAA and RAA. Black ash is a small to medium sized perennial tree that grows in poorly drained soils such a peat and fine sandy loam. It grows in wet woods, near streambanks or other low-lying areas. In Manitoba, black ash occurs in the southeastern corner of the province to Lake Manitoba. This tree is shade intolerant and needs some soil disturbance prior to natural colonization.

2.6.4.3 Data Gaps

The following gaps (> 10 km) in the collection of field survey data along the New ROW occurred due to lack of road access, a lack of landowner consent, and time constraints (from north to south):

- ~12 km gap between northeast of St. Genevieve and the Cottonwood Golf Course
- ~20 km gap between the Richer South Station and south of La Broquerie
- ~15 km gap between north of Menisino and the Piney bog
- ~10 km gap between Piney bog and the Canada–U.S. border

In addition, some areas of the Final Preferred Route were not surveyed because they were not identified as candidate routes until after the 2014 survey window was closed.

2.7 TRADITIONAL USE PLANT SPECIES

2.7.1 Desktop

2.7.1.1 Methods

The following documents were reviewed to determine traditional use plant species potentially 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;
- 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 First Nation and Metis Engagement What We Heard Round 1 and 2;
- MMTP Roseau River Anishinabe First Nation Round 2 Feedback - Map A; and
- MMTP Roseau River Anishinabe First Nation Round 2 Feedback - Map B.
- 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

There were 76 traditional use plant species identified (Table 2-21). The number of occurrences where traditional use plant species were observed was taken from the rare plant survey data set described in section 2.6 (Appendix A).

Table 2-21 Traditional Use Plant Species Identified by the Black River, Long Plain and Swan Lake First Nations

Provincial Scientific Name	Traditional Use Plant Name[1]	Provincial Rank
Abies balsamea	balsam fir	S5
Achillea millefolium	yarrow	S5
Acorus americanus	weke	S5
Actaea racemosa	black snakeroot	not listed on 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
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	-
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

Table 2-21 Traditional Use Plant Species Identified by the Black River, Long Plain and Swan Lake First Nations

Provincial Scientific Name	Traditional Use Plant Name[1]	Provincial Rank
Hierochloe odorata	sweetgrass	S5
Hypericum perforatum	St. John's wort	SNA
Larix laricina	tamarack	S5
Ledum 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	-
Potentilla arguta	tall cinquefoil	S5
Prenanthes sp.	rattlesnake root	-
Prunella vulgaris	self-heal	S4
Prunus nigra	Canada wild plum	-
Prunus pensylvanica	pin cherry	S5
Prunus pumila	sand cherry	S4
Prunus sp.	plum	-
Prunus virginiana	chokecherry	S5
Pyrola sp.	wintergreen	-
Quercus macrocarpa	bur oak	-
Ribes americanum	wild black currant	S5
Ribes oxyacanthoides ssp. *oxyacanthoides*	northern gooseberry	-
Rosa arkansana	prairie rose	S4
Rosa sp.	wild rose	-
Rubus pubescens	dewberry	S5
Rubus sp.	blackberry	not listed on the MBCDC
Rubus sp.	raspberry	-
Rubus sp.	wild raspberry	-
Sibbaldiopsis tridentata	Three-toothed cinquefoil	S5
Solidago canadensis	Canada goldenrod	S5
Solidago gigantea	smooth goldenrod	S5

Table 2-21 Traditional Use Plant Species Identified by the Black River, Long Plain and Swan Lake First Nations

Provincial Scientific Name	Traditional Use Plant Name[1]	Provincial Rank
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 based on the Aboriginal Traditional Knowledge Study Community Report submitted by Black River First Nation, Long Plain First Nation, Swan Lake First Nation, 2015

2.7.1.2 Results

During the rare plant surveys, 39 traditional use plant species were recorded at 106 locations in the PDA (Table 2-22 and Map Series 1-200 - Traditional Use Plant Species Observed). Since the rare plant surveys were completed on the alternative routes, there are also data for the LAA and RAA. There were 529 occurrences of 63 traditional use species in the LAA and 1,179 occurrences of 68 traditional use species in the RAA (Table 2-22). In the Existing Corridor PDA, traditional use plant species were observed within deciduous forests, pasture, and adjacent to roads/railways/trails. In the New ROW PDA, these species were observed within deciduous and mixedwood forests, pasture, and shrubland cover classes. Traditional use plant species were also observed at the Dorsey Converter Station PDA.

Table 2-22 Traditional Use Plant Species Observed in the PDA, LAA and RAA during Rare Plant Surveys, 2014

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
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

Table 2-22 Traditional Use Plant Species Observed in the PDA, LAA and RAA during Rare Plant Surveys, 2014

Scientific Name	Common Name	Number of Occurrences		
		PDA	LAA	RAA
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
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**

Table 2-22 Traditional Use Plant Species Observed in the PDA, LAA and RAA during Rare Plant Surveys, 2014

Scientific Name	Common Name	Number of Occurrences		
		PDA	LAA	RAA
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
NOTES: **Bolded** species are berries.				

3.0 ENVIRONMENTALLY SENSITIVE SITES

Environmentally sensitive sites (ESS) are locations, features, areas, activities or facilities that are identified as environmentally, socially or economically important or sensitive to disturbance and require protection and mitigation during Project construction and operation and maintenance. Sensitive sites traversed by the Project or in the immediate vicinity of Project components and subject to effects from the Project are included. These sites are assessed for potential environmental effects and mitigation measures are identified within the EIS.

ESS features for vegetation and wetlands are summarized in Table 3-1, below.

Table 3-1 Environmentally Sensitive Sites for Vegetation and Wetlands

ESS Name	ESS Description	Rationale
MBCDC historical occurrences of rare plants	MBCDC identified records of rare plant species represented by SAR and SOCC	Vegetation clearing along the ROW during construction and vegetation management could remove identified rare plant species.
Rare plants	Locations of known rare plants represented by SAR and SOCC	Vegetation clearing along the ROW during construction and vegetation management could remove identified and unidentified rare plant species.
Wetlands	Wetlands as defined by the Canadian Wetland Classification System	Vegetation clearing, grubbing, and installing tower foundations could affect the function of wetlands.

4.0 SUMMARY

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.

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

The Existing Corridor is located predominantly on agricultural land (51.3% of PDA), but it also extends through areas of native vegetation where it crosses the Assiniboine, Red and La Salle rivers. There is one intact native vegetation patch larger than 200 ha in the Existing Corridor RAA that is intersected by the PDA at the easternmost edge of Existing Corridor.

The New ROW is dominated by native vegetation (64.1% of PDA) and is relatively undisturbed. This area also has large wetland complexes, including the Caliento, Sundown, and Piney bogs, and 21 patches of intact native vegetation larger than 200 ha along the New ROW.

The Dorsey and Riel stations are located in areas dominated by agricultural land use. Based on field surveys, the Dorsey South Station has one marsh wetland occupying 0.14 ha located west of the switch yard within the area of expansion. No rare plant species were observed at Dorsey. Traditional use plant species were observed at the station.

The Glenboro South Station is located in an area dominated by agricultural land use. The transmission line ROW for Glenboro South has a shallow open water wetland (0.1 ha) based on desktop mapping. Field surveys were not completed at the station.

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, four were located in the New ROW, and six were located at the stations. About half of the invasive plant species were encountered in disturbed areas or near agricultural areas and the remaining occurences 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 (*Spiranthes magnicamporum*), Riddell's goldenrod (*Solidago riddellii*) and rough purple false-foxglove (*Agalinis aspera*). No SAR were found during 2014 field surveys.

During the 2014 field surveys, three SOCC were observed at 8 locations in the PDA of the Existing Corridor and the New ROW. None are listed under COSEWIC or MESEA, but they are tracked by the MBCDC (Government of Manitoba 2014c). The MBCDC database has historical records of two SOCC within the PDA: arethusa and ram's head lady's slipper.

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 within deciduous forests, pasture, and adjacent to roads/railways/trails. In the New ROW, these species were observed within deciduous and mixedwood forests, pasture, and shrubland cover classes. Traditional use plant species were also observed at the Dorsey Converter Station.

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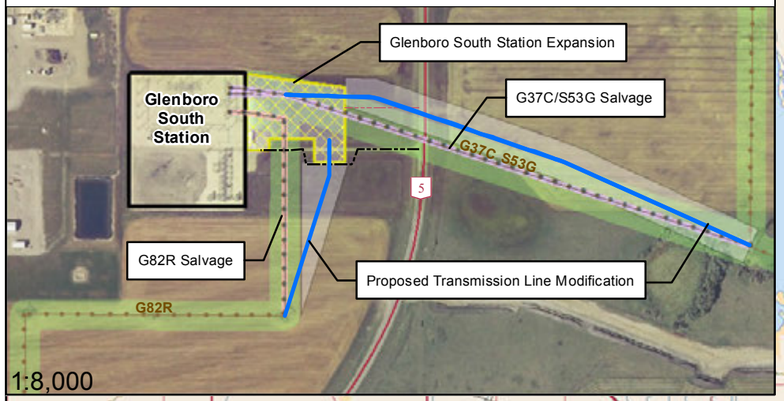
Inset 1: Glenboro South Station Expansion



Manitoba-Minnesota Transmission Project

Project Infrastructure
- Final Preferred Route (Existing Corridor)
- Final Preferred Route (New Right-of-way)
- Transmission Line (Salvage)
- M602F Modification (New)
- Existing/New Glenboro South Station Access
- New Glenboro South Station Access
- G37C Salvage
- G82R Salvage
- Station Expansion
- Existing ROW
- Project Development Area (PDA)

Infrastructure
- Existing 500kV Transmission Line
- Existing 230kV Transmission Line

Assessment Area
- Vegetation and Wetlands Local Assessment Area
- Vegetation and Wetlands Regional Assessment Area

Landbase
- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- City
- First Nation Lands
- Ecological Reserve
- Wildlife Management Area
- Provincial Park
- Provincial Boundary

Coordinate System: UTM Zone 14N NAD83
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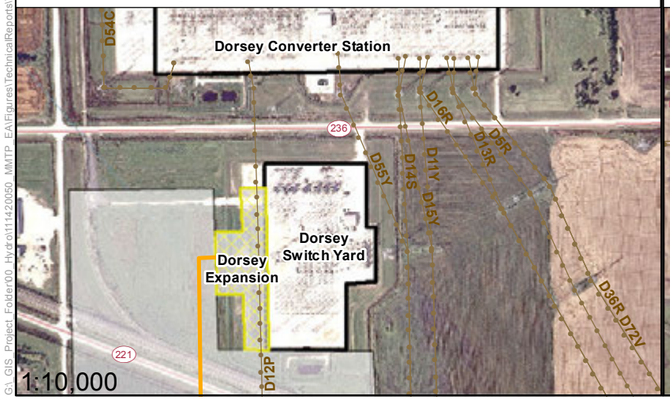

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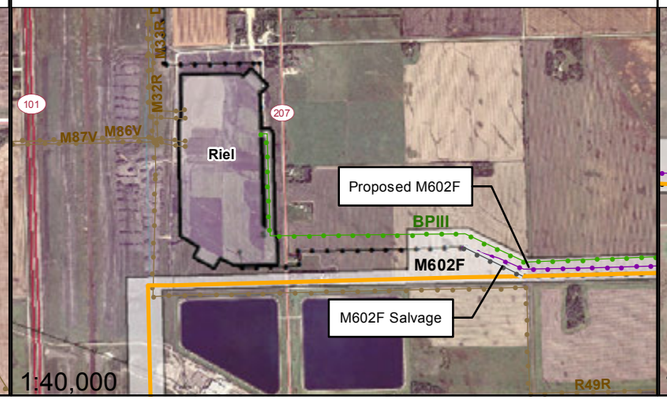
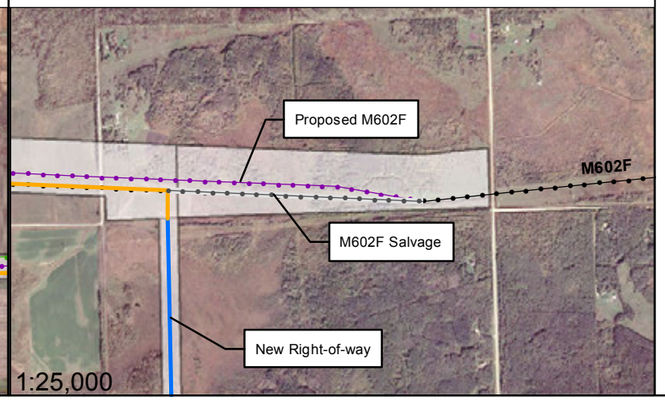


Inset 4: M602F Extension and Salvage



Spatial Boundaries of the Project for Vegetation and Wetlands

Map 1-1

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Manitoba Hydro

Manitoba-Minnesota Transmission Project

Project Infrastructure

- Converter Station (Existing)
- Final Preferred Route (FPR)

Infrastructure

- Existing 500kV Transmission Line
- Existing 230kV Transmission Line

Ecoregion - Ecozone

- Aspen Parkland Ecoregion - Prairie Ecozone
- Interlake Plain Ecoregion - Boreal Plain Ecozone
- Lake Manitoba Plain Ecoregion - Prairie Ecozone
- Lake of the Woods Ecoregion - Boreal Shield Ecozone
- Southwest Manitoba Upland Ecoregion - Prairie Ecozone

Assessment Area

- Vegetation and Wetlands Local Assessment Area
- Vegetation and Wetlands Regional Assessment Area

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- City
- First Nation Lands
- Ecological Reserve
- Wildlife Management Area
- Provincial Park

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: August 04, 2015

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Ecozones and Ecoregions Relative to the Project Components

Map 1-2

Glenboro South Station

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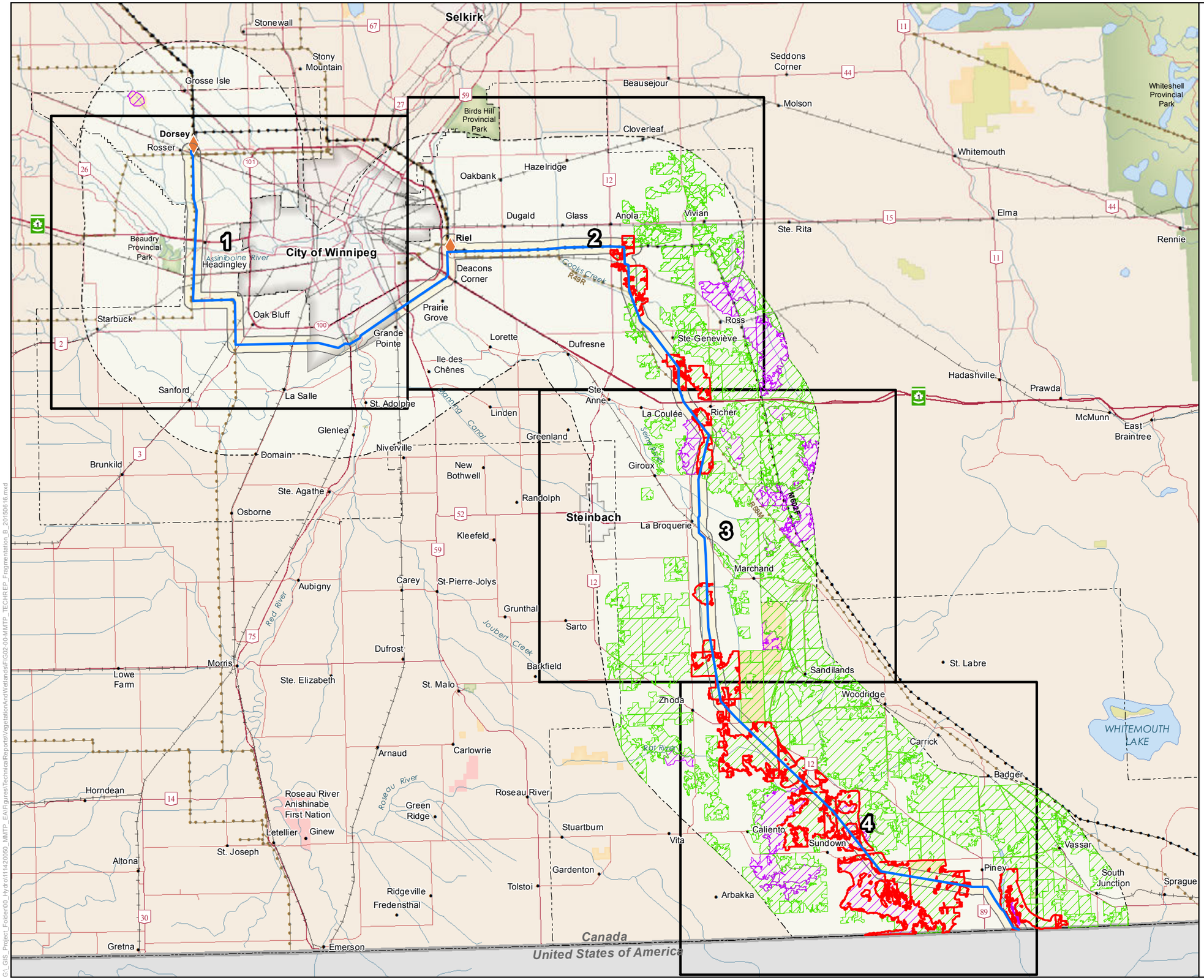

Manitoba Hydro

Manitoba-Minnesota Transmission Project

Project Infrastructure

- Final Preferred Route (FPR)
- Converter Station (Existing)

Infrastructure

- Existing 500kV Transmission Line
- Existing 230kV Transmission Line

Map Tile Index - 1:150,000

- Map Series Tile

Intact Patches >200 ha of Native Upland Vegetatation and Wetlands in the RAA[1]

- Native Upland Vegetation
- Wetland
- Patches Intersected by the PDA

Assessment Area

- Vegetation and Wetlands Local Assessment Area
- Vegetation and Wetlands Regional Assessment Area

Landbase

- Community
- Trans Canada Highway
- Provincial Highway
- Provincial Road
- City / Town
- First Nation Lands
- Rural Municipality
- Ecological Reserve
- Wildlife Management Area
- Provincial Park
- Watercourse
- Waterbody

Source:
1. Forest Resource Inventory, 1979-1983, Manitoba Conservation and Water Stewardship

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: July 29, 2015

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Index of Map Series
Habitat Fragmentation in the Regional Assessment Area

Map Series 1-100

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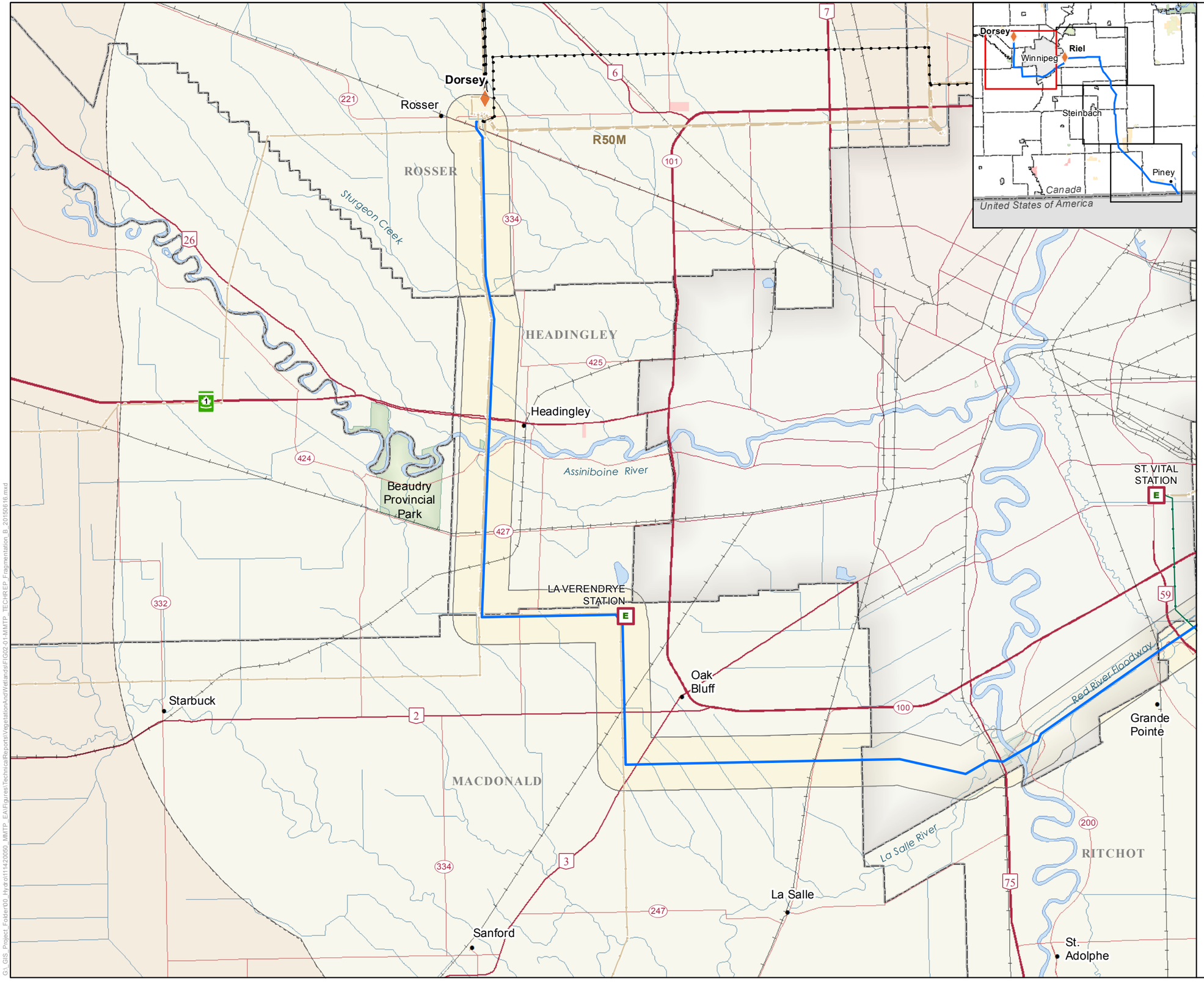

Manitoba-Minnesota Transmission Project

Project Infrastructure

- Converter Station (Existing)
- Final Preferred Route (FPR)

Infrastructure

- Electrical Station
- Bipole III Transmission Line (Approved)
- St. Vital Transmission Complex (V95L)
- Existing 500kV Transmission Line
- Existing 230kV Transmission Line

Assessment Areas

- Vegetation and Wetlands Local Assessment Area
- Vegetation and Wetlands Regional Assessment Area

Landbase

- Community
- Trans Canada Highway
- Provincial Highway
- Provincial Road
- City / Town
- First Nation Lands
- Rural Municipality
- Ecological Reserve
- Wildlife Management Area
- Provincial Park
- Watercourse
- Waterbody

Source:
1. Forest Resource Inventory, 1979-1983, Manitoba Conservation and Water Stewardship

Coordinate System: UTM Zone 14N NAD83
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Habitat Fragmentation in the Regional Assessment Area

Map 1-100-01

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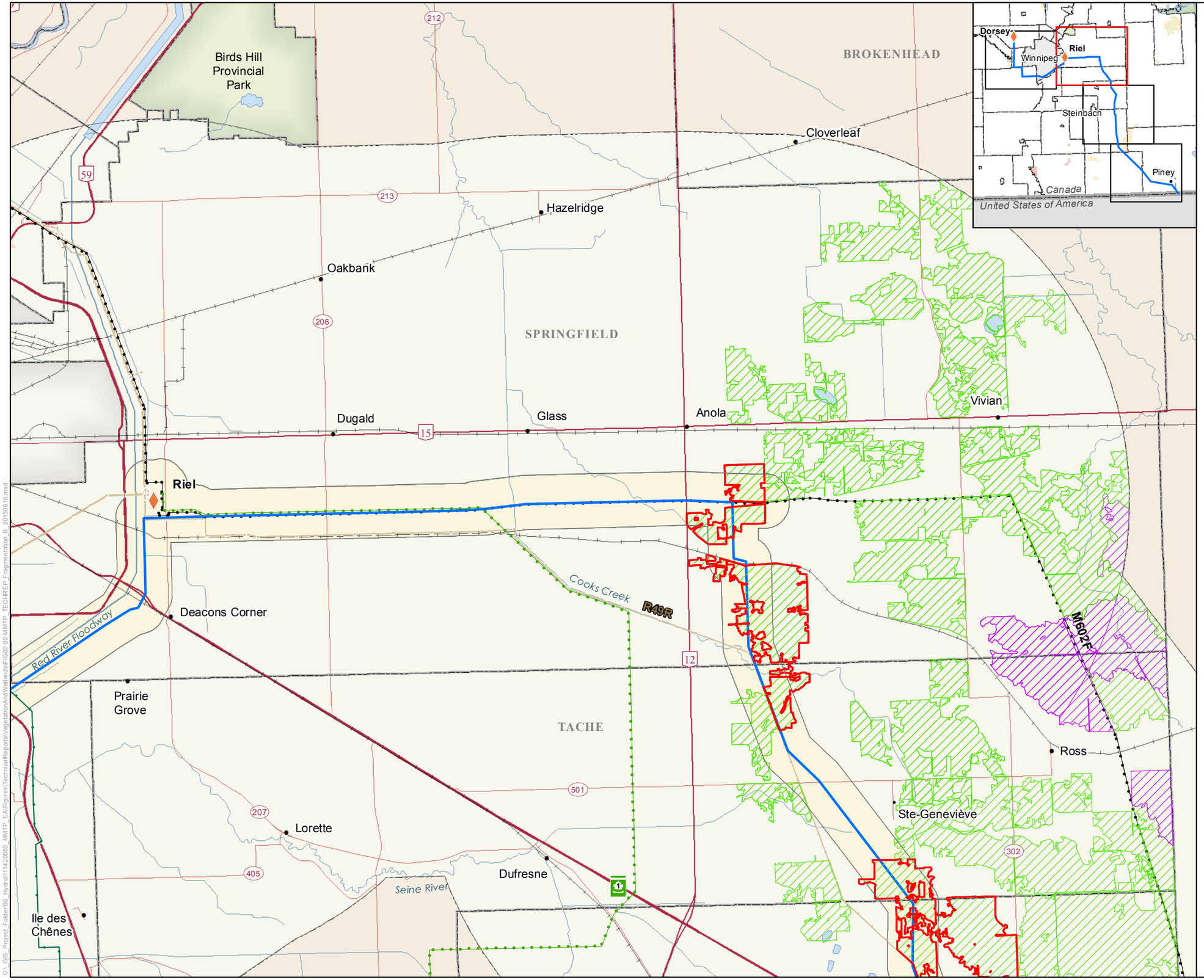

Manitoba Hydro

Manitoba-Minnesota Transmission Project

Project Infrastructure

- Converter Station (Existing)
- Final Preferred Route (FPR)

Infrastructure

- Bipole III Transmission Line (Approved)
- St. Vital Transmission Complex (V95L)
- Existing 500kV Transmission Line
- Existing 230kV Transmission Line

Intact Patches >200 ha of Native Upland Vegetatation and Wetlands in the RAA[1]

- Native Upland Vegetation
- Wetland
- Patches Intersected by the PDA

Assessment Areas

- Vegetation and Wetlands Local Assessment Area
- Vegetation and Wetlands Regional Assessment Area

Landbase

- Community
- Trans Canada Highway
- Provincial Highway
- Provincial Road
- City / Town
- First Nation Lands
- Rural Municipality
- Ecological Reserve
- Wildlife Management Area
- Provincial Park
- Watercourse
- Waterbody

Source:
1. Forest Resource Inventory, 1979-1983, Manitoba Conservation and Water Stewardship

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: July 29, 2015

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Habitat Fragmentation in the Regional Assessment Area

Map 1-100-02

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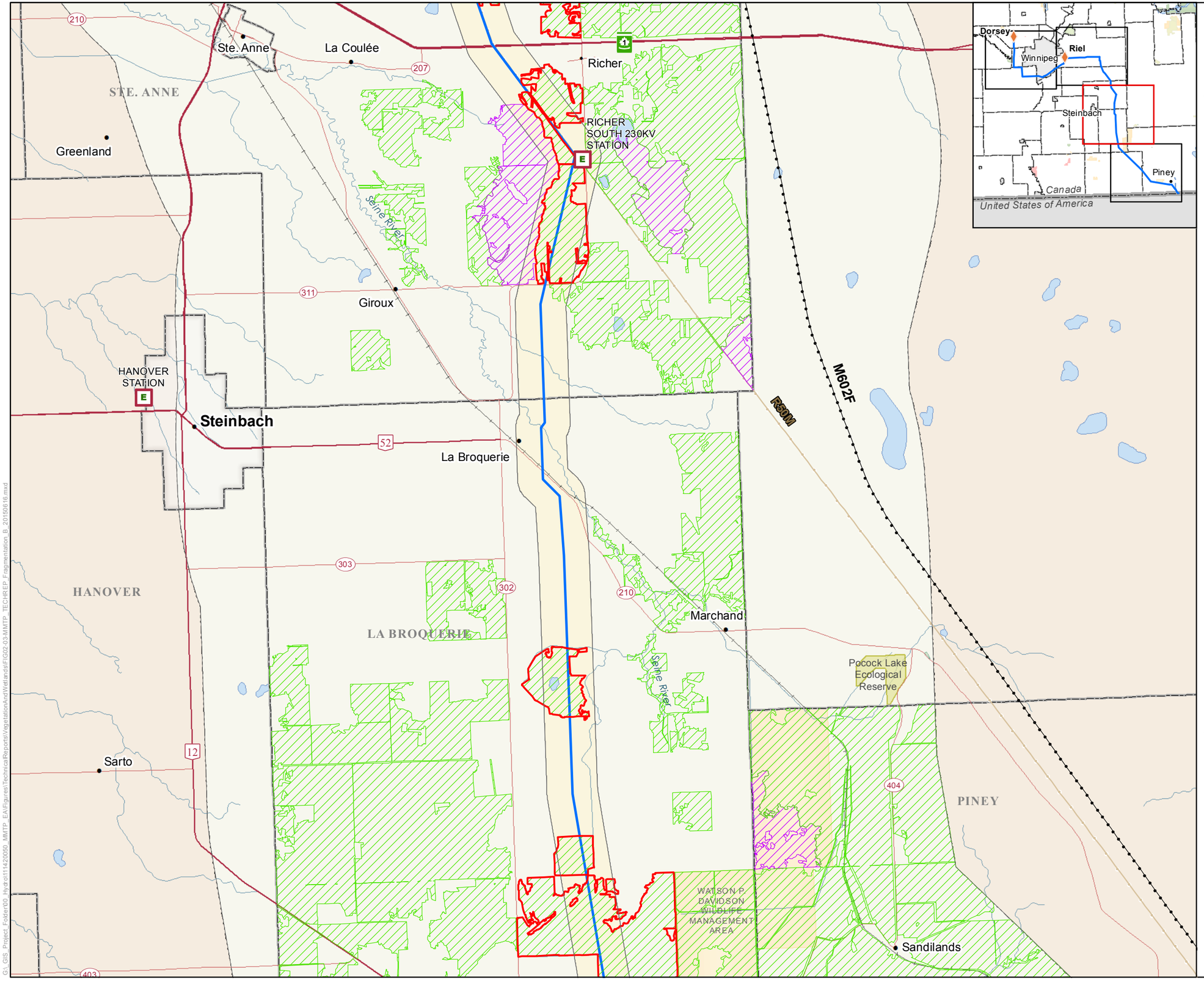

Manitoba-Minnesota Transmission Project

Project Infrastructure

- Converter Station (Existing)
- Final Preferred Route (FPR)

Infrastructure

- Electrical Station
- Bipole III Transmission Line (Approved)
- Existing 500kV Transmission Line
- Existing 230kV Transmission Line

Intact Patches >200 ha of Native Upland Vegetatation and Wetlands in the RAA[1]

- Native Upland Vegetation
- Wetland
- Patches Intersected by the PDA

Assessment Areas

- Vegetation and Wetlands Local Assessment Area
- Vegetation and Wetlands Regional Assessment Area

Landbase

- Community
- Trans Canada Highway
- Provincial Highway
- Provincial Road
- City / Town
- First Nation Lands
- Rural Municipality
- Ecological Reserve
- Wildlife Management Area
- Provincial Park
- Watercourse
- Waterbody

Source:
1. Forest Resource Inventory, 1979-1983, Manitoba Conservation and Water Stewardship

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: July 29, 2015

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Habitat Fragmentation in the Regional Assessment Area

Map 1-100-03

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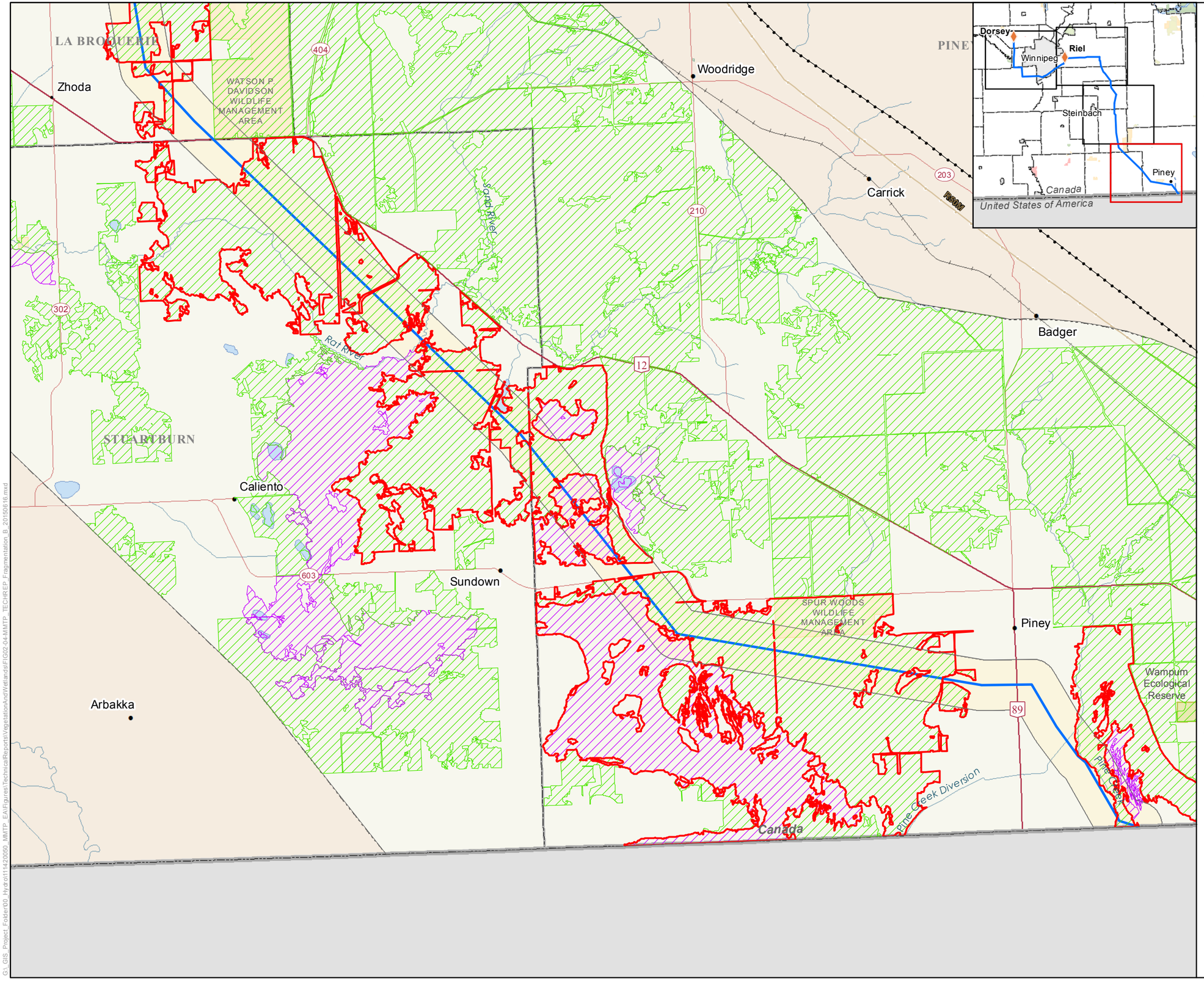

Manitoba-Minnesota Transmission Project

Project Infrastructure

- Converter Station (Existing)
- Final Preferred Route (FPR)

Infrastructure

- Existing 500kV Transmission Line
- Existing 230kV Transmission Line

Intact Patches >200 ha of Native Upland Vegetatation and Wetlands in the RAA[1]

- Native Upland Vegetation
- Wetland
- Patches Intersected by the PDA

Assessment Areas

- Vegetation and Wetlands Local Assessment Area
- Vegetation and Wetlands Regional Assessment Area

Landbase

- Community
- Trans Canada Highway
- Provincial Highway
- Provincial Road
- City / Town
- First Nation Lands
- Rural Municipality
- Ecological Reserve
- Wildlife Management Area
- Provincial Park
- Watercourse
- Waterbody

Source:
1. Forest Resource Inventory, 1979-1983, Manitoba Conservation and Water Stewardship

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: July 29, 2015

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Habitat Fragmentation in the Regional Assessment Area

Map 1-100-04

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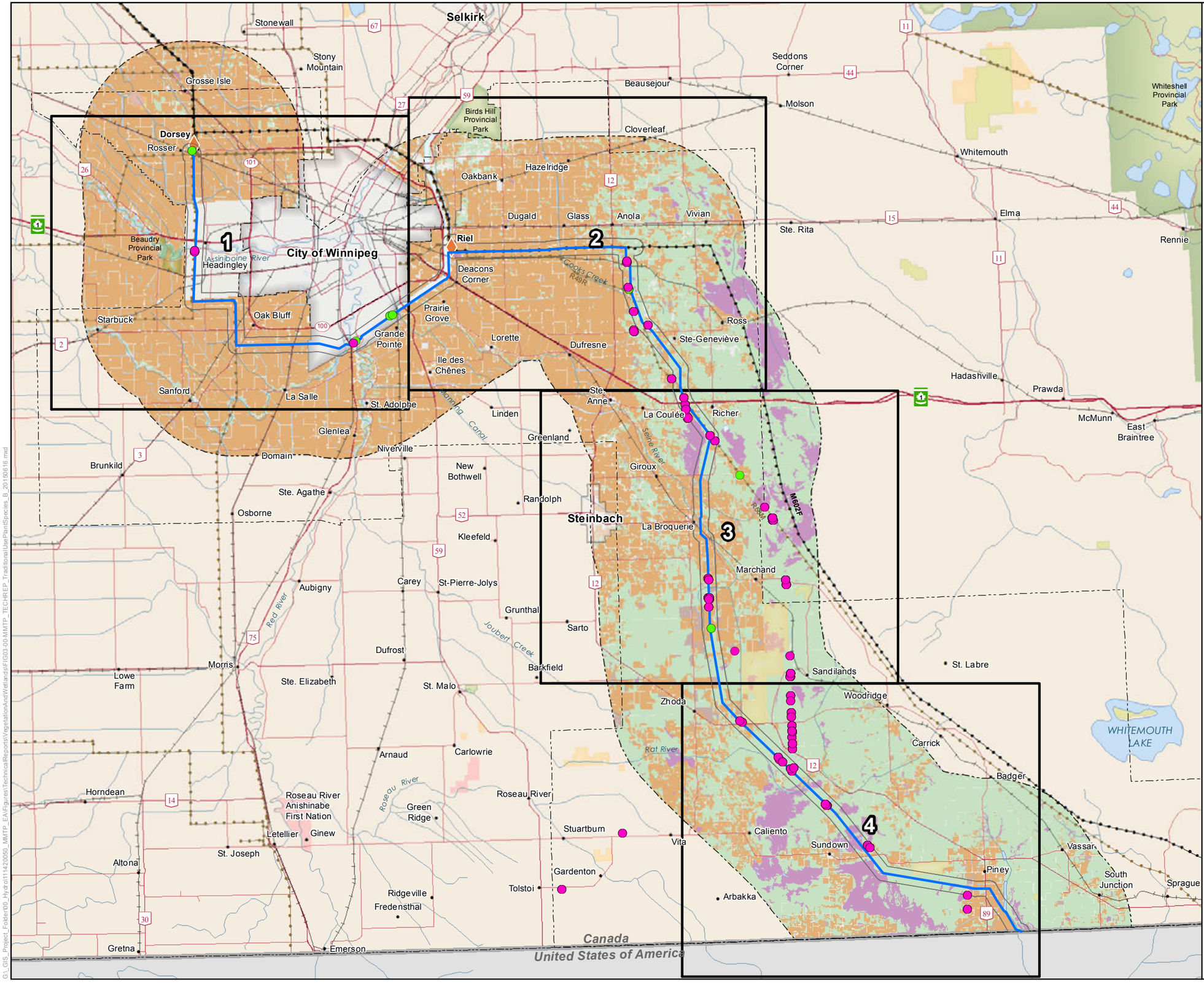


Manitoba-Minnesota Transmission Project

Project Infrastructure

- Final Preferred Route (FPR)
- Converter Station (Existing)

Infrastructure

- Existing 500kV Transmission Line
- Existing 230kV Transmission Line

Map Tile Index - 1:150,000

- Map Series Tile

Traditional Use Plant Species Observed

- Sites with Berries Observed
- Sites without Berries Observed

Land Cover[1]

- Developed
- Agriculture
- Recently Cleared
- Native Upland Vegetation
- Wetland
- Water

Assessment Area

- Vegetation and Wetlands Local Assessment Area
- Vegetation and Wetlands Regional Assessment Area

Landbase

- Community
- Trans Canada Highway
- Provincial Highway
- Provincial Road
- City / Town
- First Nation Lands
- Rural Municipality
- Ecological Reserve
- Wildlife Management Area
- Provincial Park
- Watercourse
- Waterbody

Source:
1. Forest Resource Inventory, 1979-1983, Manitoba Conservation and Water Stewardship

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: July 30, 2015

N

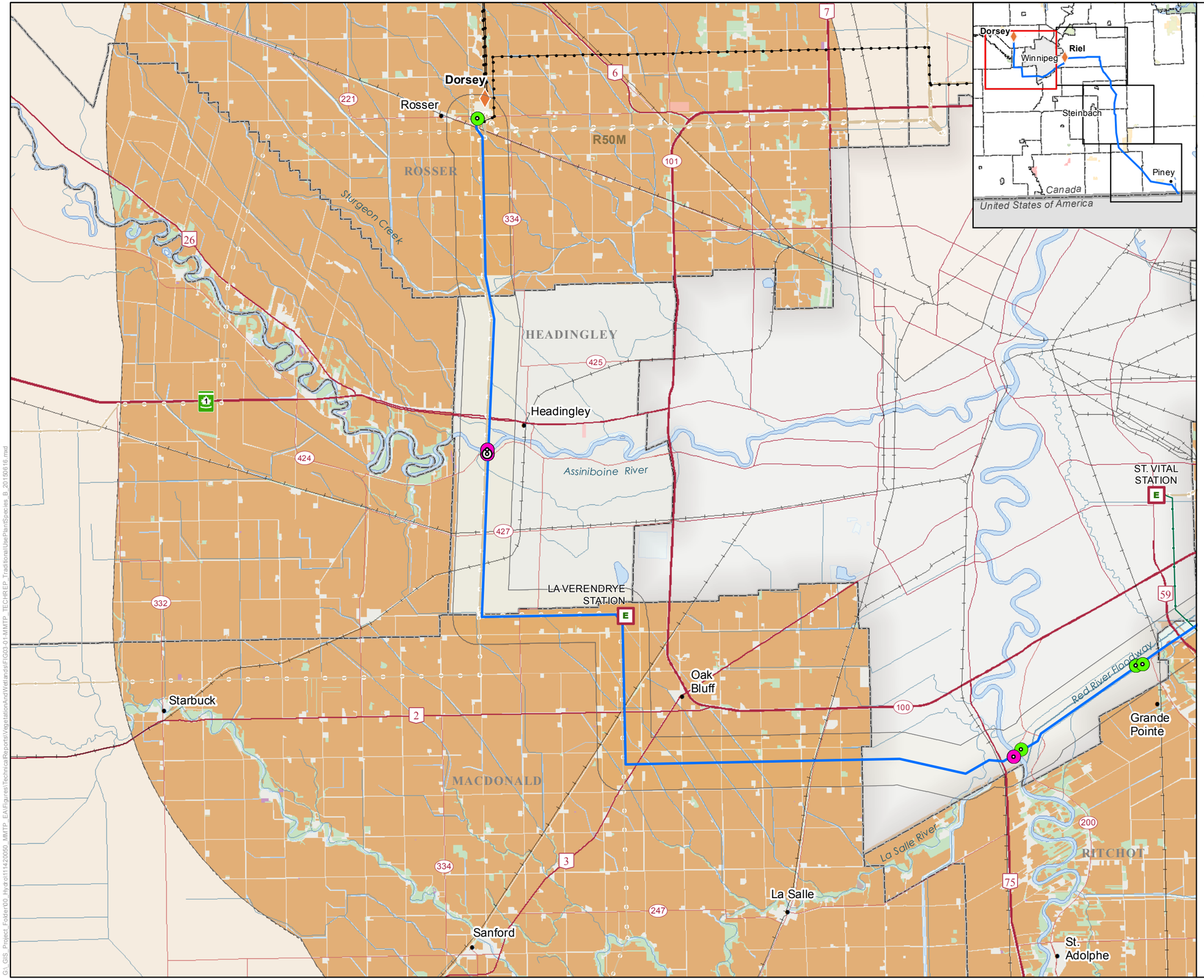
0 5 10 Kilometres
0 5 10 Miles

1:500,000

Index of Map Series
Traditional Use Plant Species Observed During Field Surveys

Map Series 1-200

G:_GIS_Project_Folder\00_Hydro\11142\0050_MMTP_EA\Figures\TechnicalReports\VegetationAndWetlands\FIG03-00-MMTP_TECHREP_TraditionalUsePlantSpecies_B_20150616.mxd



Manitoba-Minnesota Transmission Project

Project Infrastructure

- Converter Station (Existing)
- Final Preferred Route (FPR)

Infrastructure

- Electrical Station
- Bipole III Transmission Line (Approved)
- St. Vital Transmission Complex (V95L)
- Existing 500kV Transmission Line
- Existing 230kV Transmission Line

Traditional Use Plant Species Observed

- Sites with Berries Observed
- Sites without Berries Observed
- 1 - 5 Species Observed
- 6 - 10 Species Observed
- 11 - 15 Species Observed
- > 15 Species Observed

Land Cover[1]

- Developed
- Agriculture
- Recently Cleared
- Native Upland Vegetation
- Wetland
- Water

Assessment Areas

- Vegetation and Wetlands Local Assessment Area
- Vegetation and Wetlands Regional Assessment Area

Landbase

- Community
- Trans Canada Highway
- Provincial Highway
- Provincial Road
- Railway
- First Nation Lands
- City / Town
- Rural Municipality
- Watercourse
- Waterbody

Source:
1. Forest Resource Inventory, 1979-1983, Manitoba Conservation and Water Stewardship

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: July 30, 2015

N

0 2 4 Kilometres
0 1.5 3 Miles

1:150,000

Traditional Use Plant Species Observed During Field Surveys

Map 1-200-01

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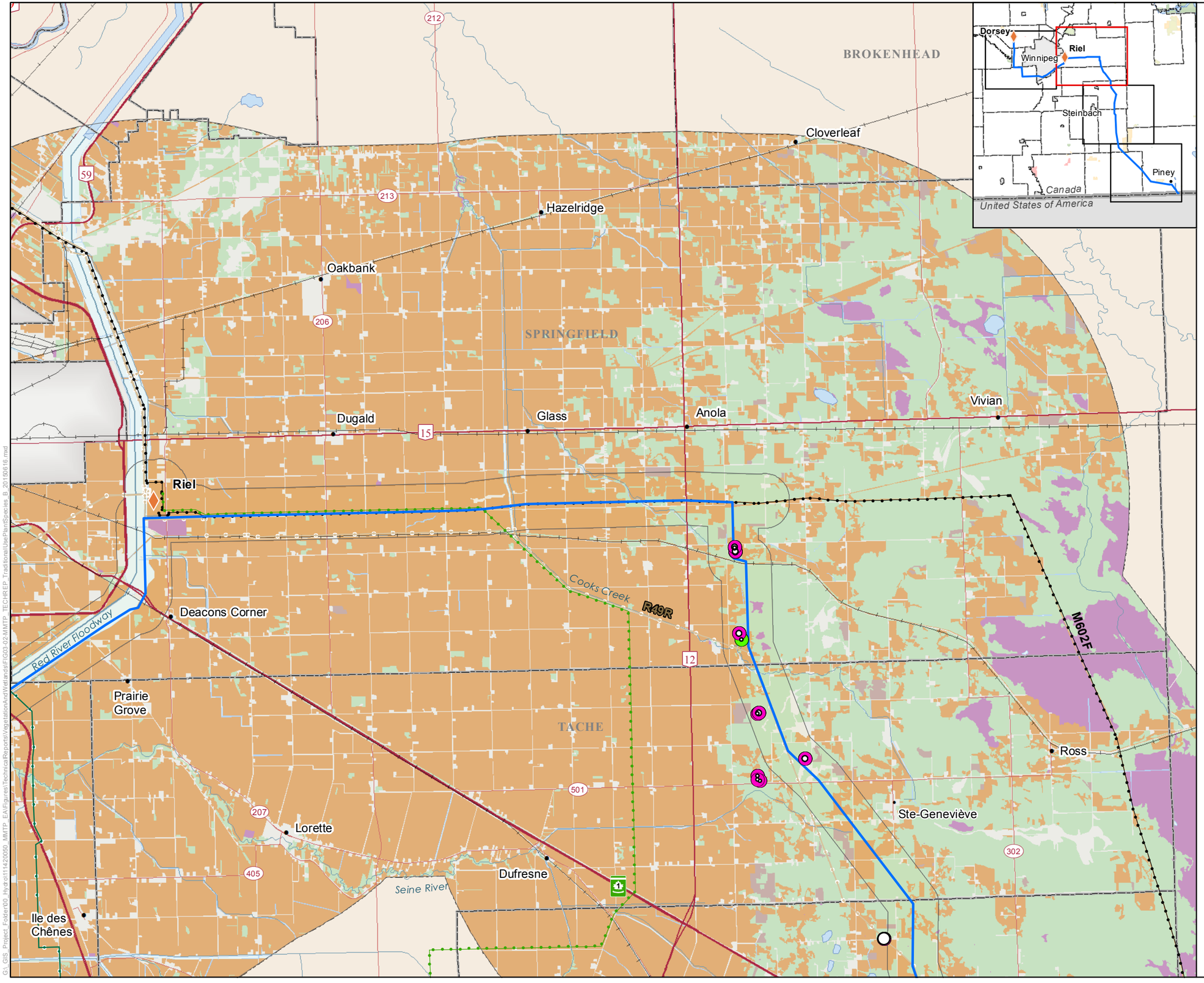

Manitoba Hydro

Manitoba-Minnesota Transmission Project

Project Infrastructure

- Converter Station (Existing)
- Final Preferred Route (FPR)

Infrastructure

- Bipole III Transmission Line (Approved)
- St. Vital Transmission Complex (V95L)
- Existing 500kV Transmission Line
- Existing 230kV Transmission Line

Traditional Use Plant Species Observed

- Sites with Berries Observed
- Sites without Berries Observed
- 1 - 5 Species Observed
- 6 - 10 Species Observed
- 11 - 15 Species Observed
- > 15 Species Observed

Land Cover[1]

- Developed
- Agriculture
- Recently Cleared
- Native Upland Vegetation
- Wetland
- Water

Assessment Areas

- Vegetation and Wetlands Local Assessment Area
- Vegetation and Wetlands Regional Assessment Area

Landbase

- Community
- Trans Canada Highway
- Provincial Highway
- Provincial Road
- Railway
- First Nation Lands
- City / Town
- Rural Municipality
- Watercourse
- Waterbody

Source:
1. Forest Resource Inventory, 1979-1983, Manitoba Conservation and Water Stewardship

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: July 30, 2015

N

0 2 4 Kilometres
0 1.5 3 Miles

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Traditional Use Plant Species Observed During Field Surveys

Map 1-200-02

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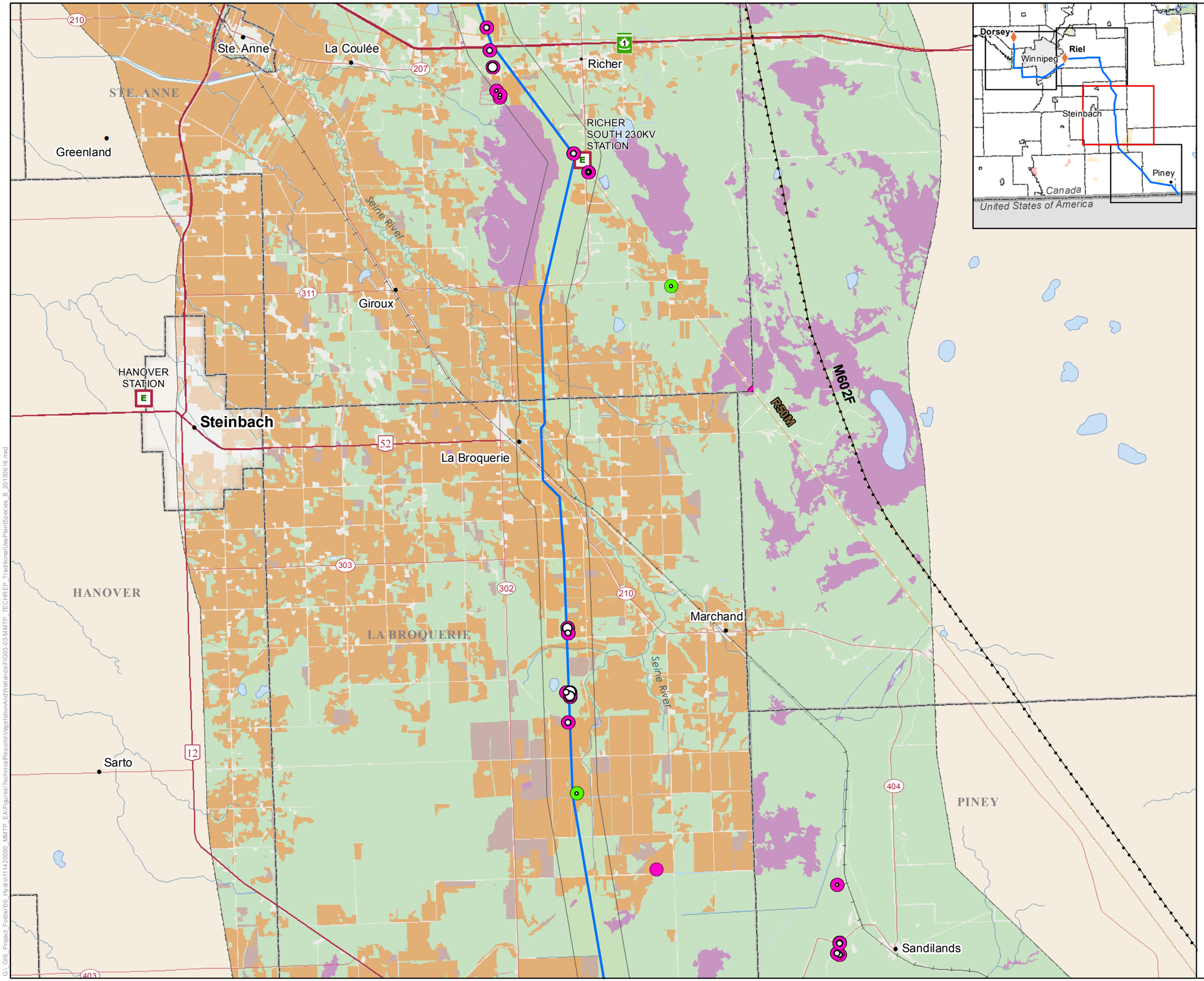

Manitoba-Minnesota Transmission Project

Project Infrastructure

- Converter Station (Existing)
- Final Preferred Route (FPR)

Infrastructure

- Electrical Station
- Bipole III Transmission Line (Approved)
- Existing 500kV Transmission Line
- Existing 230kV Transmission Line

Traditional Use Plant Species Observed

- Sites with Berries Observed
- Sites without Berries Observed
- 1 - 5 Species Observed
- 6 - 10 Species Observed
- 11 - 15 Species Observed
- > 15 Species Observed

Land Cover[1]

- Developed
- Agriculture
- Recently Cleared
- Native Upland Vegetation
- Wetland
- Water

Assessment Areas

- Vegetation and Wetlands Local Assessment Area
- Vegetation and Wetlands Regional Assessment Area

Landbase

- Community
- Trans Canada Highway
- Provincial Highway
- Provincial Road
- Railway
- First Nation Lands
- City / Town
- Rural Municipality
- Watercourse
- Waterbody

Source:
1. Forest Resource Inventory, 1979-1983, Manitoba Conservation and Water Stewardship

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: July 30, 2015

N

0 2 4 Kilometres
0 1.5 3 Miles

1:150,000

Traditional Use Plant Species Observed During Field Surveys

Map 1-200-03

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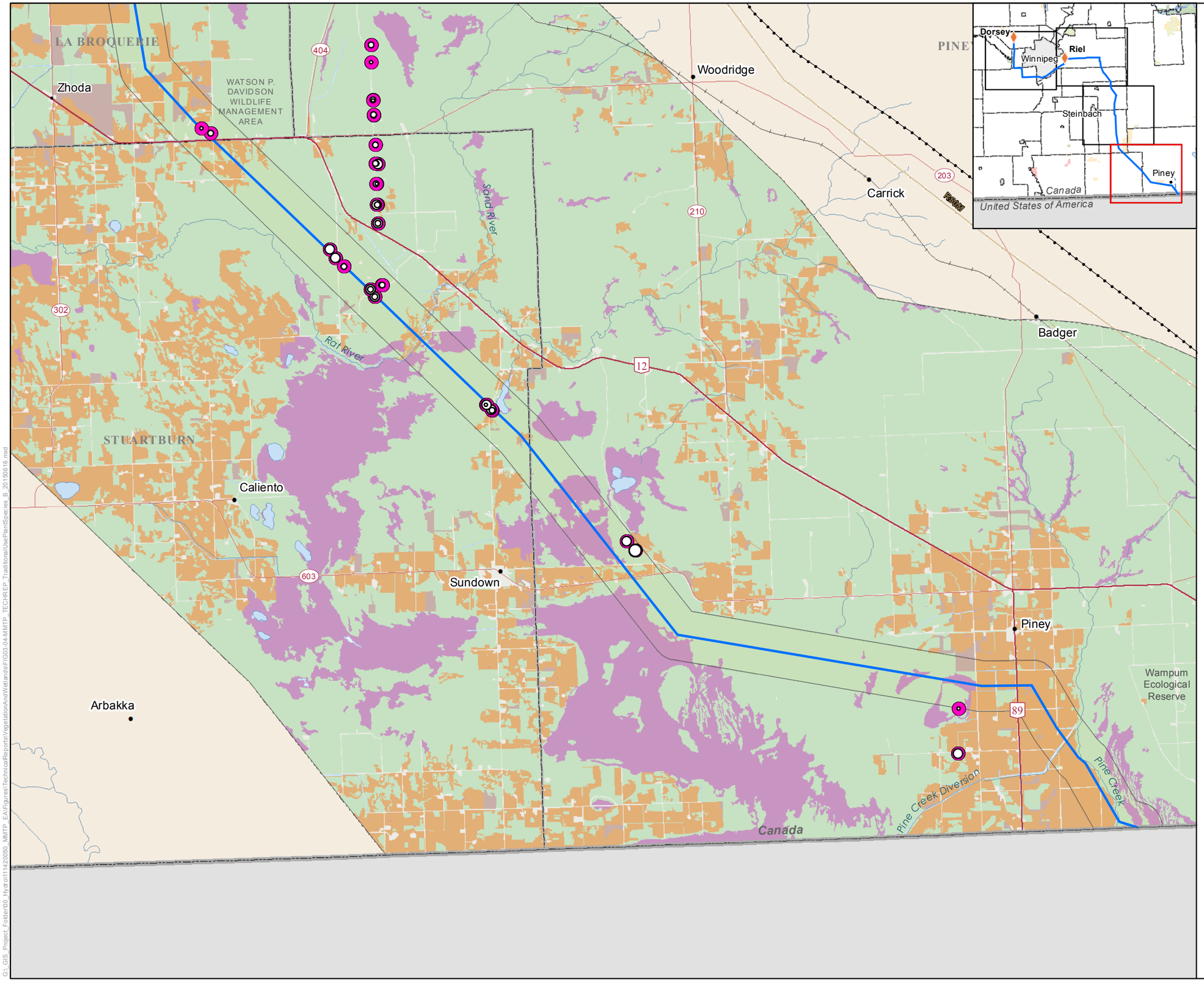

Manitoba Hydro

Manitoba-Minnesota Transmission Project

Project Infrastructure

- Converter Station (Existing)
- Final Preferred Route (FPR)

Infrastructure

- Existing 500kV Transmission Line
- Existing 230kV Transmission Line

Traditional Use Plant Species Observed

- Sites with Berries Observed
- Sites without Berries Observed
- 1 - 5 Species Observed
- 6 - 10 Species Observed
- 11 - 15 Species Observed
- > 15 Species Observed

Land Cover[1]

- Developed
- Agriculture
- Recently Cleared
- Native Upland Vegetation
- Wetland
- Water

Assessment Areas

- Vegetation and Wetlands Local Assessment Area
- Vegetation and Wetlands Regional Assessment Area

Landbase

- Community
- Trans Canada Highway
- Provincial Highway
- Provincial Road
- Railway
- First Nation Lands
- City / Town
- Rural Municipality
- Watercourse
- Waterbody

Source:
1. Forest Resource Inventory, 1979-1983, Manitoba Conservation and Water Stewardship

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: July 30, 2015

N

0 2 4 Kilometres
0 1.5 3 Miles

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Traditional Use Plant Species Observed During Field Surveys

Map 1-200-04

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Manitoba Hydro

Manitoba-Minnesota Transmission Project

Project Infrastructure

- Converter Station (Existing)
- Final Preferred Route (FPR)

Infrastructure

- Existing 500kV Transmission Line
- Existing 230kV Transmission Line

Map Tile Index - 1:30,000

- Map Series Tile

Survey Sites and Occurences

- Rare Plant Transect Survey Site
- Wetland Survey Site

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- First Nation Lands
- Ecological Reserve
- Wildlife Management Area
- Provincial Park
- City

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: July 30, 2015

N

0 5 10 Kilometres
0 5 10 Miles

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Index of Map Series
Vegetation and Wetland Observations

Map Series 1-300

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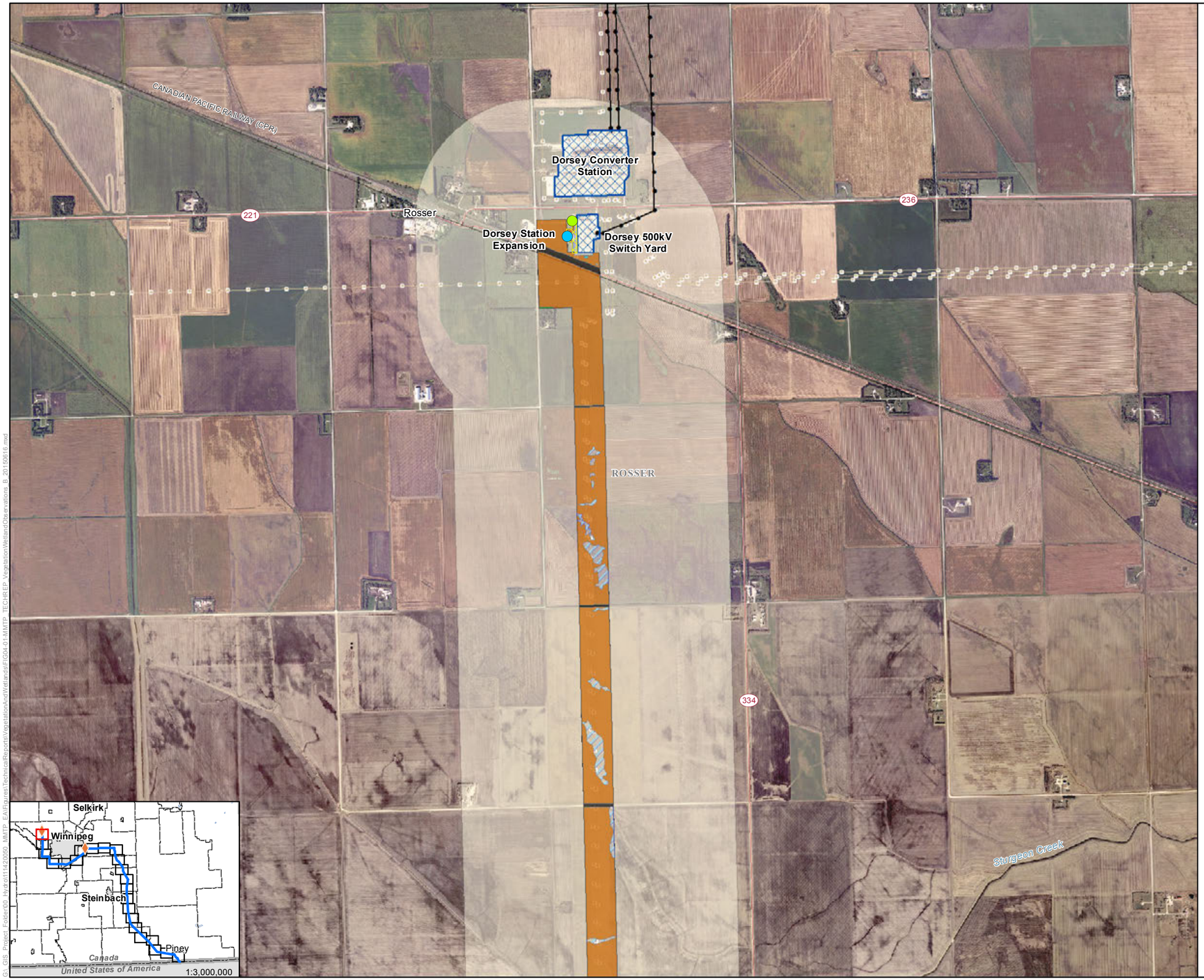

Manitoba-Minnesota Transmission Project

Project Infrastructure

- Station Expansion
- Converter Station Footprint

Infrastructure

- Existing 500 kV Transmission Line
- Existing 230kV Transmission Line

Survey Sites and Occurences

- Rare Plant Transect Survey Site
- Wetland Survey Site

Land Cover in the PDA[2]

Developed
- Roads / Railways / Trails
- Industrial

Agriculture
- Cultivated

Wetland
- Dugout
- Marsh

Native Vegetation
- Grassland
- Deciduous Forest

Assessment Area

- Project Development Area (PDA)
- Vegetation and Wetlands Local Assessment Area

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- Rural Municipality

Source:
1. Previously Known Weed, 2014. Early Detection & Distribution Mapping System
2. Vegetation and Wetland Land Cover, 2015. Stantec

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: July 30, 2015

N

0 0.5 1 Kilometres
0 0.25 0.5 Miles

1:30,000

Vegetation and Wetland Observations

Map 1-300-01

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Manitoba Hydro

Manitoba-Minnesota Transmission Project

Infrastructure

- Existing 230kV Transmission Line

Survey Sites and Occurences

- Rare Plant Transect Survey Site
- Rare Plant Count 1
- Wetland Survey Site
- Previously Known Weed[1]

Land Cover in the PDA[2]

Developed
- Roads / Railways / Trails
- Industrial
- Buildings / Residential

Agriculture
- Cultivated
- Pasture

Wetland
- Dugout
- Marsh

Water
- River
- Channel

Native Vegetation
- Shrubland
- Deciduous Forest

Assessment Area

- Project Development Area (PDA)
- Vegetation and Wetlands Local Assessment Area

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- Rural Municipality

Source:
1. Previously Known Weed, 2014. Early Detection & Distribution Mapping System
2. Vegetation and Wetland Land Cover, 2015. Stantec

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: July 30, 2015

N

0 0.5 1 Kilometres
0 0.25 0.5 Miles

1:30,000

Vegetation and Wetland Observations

Map 1-300-02

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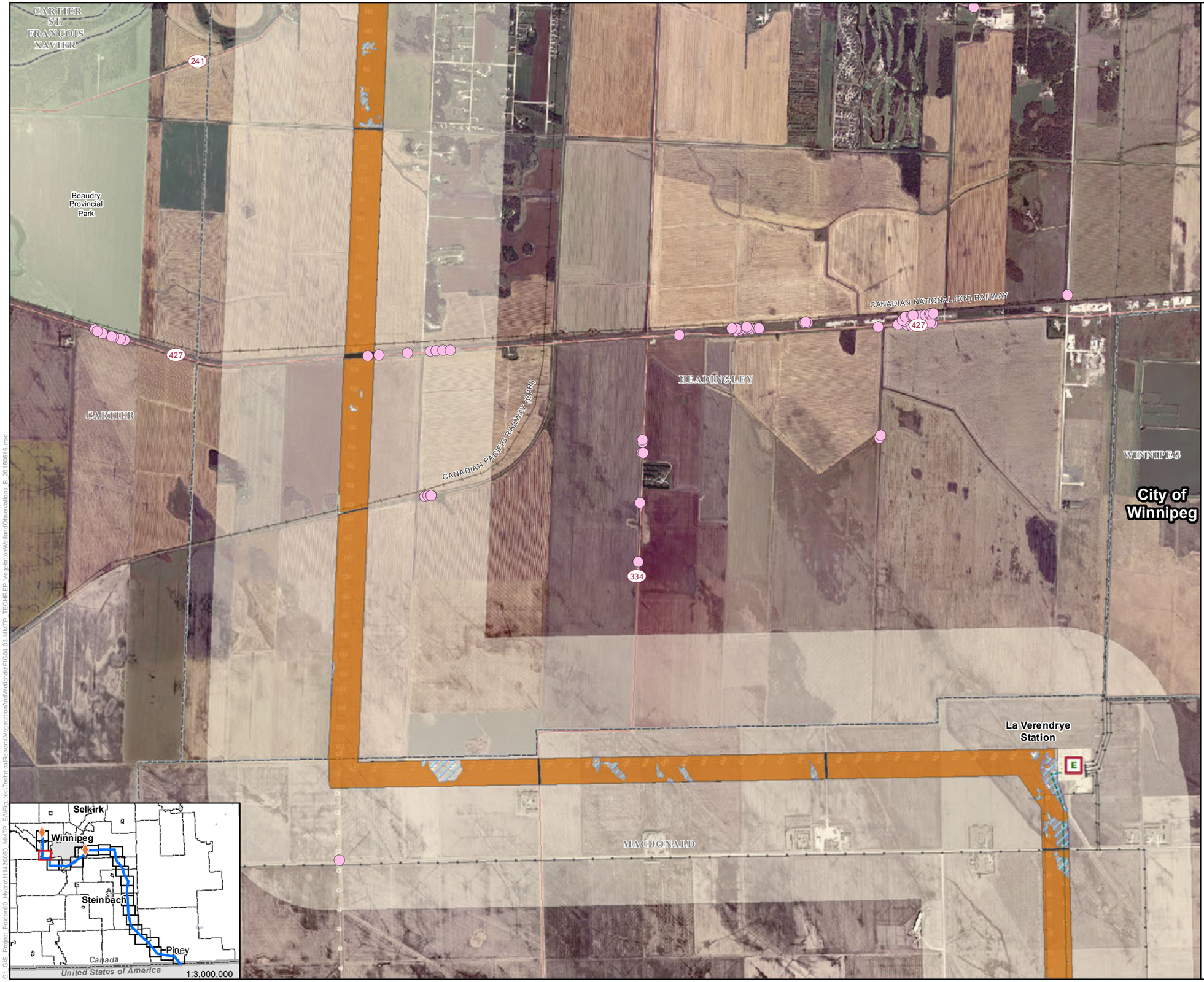

Manitoba Hydro

Manitoba-Minnesota Transmission Project

Infrastructure

- Electrical Station
- Existing 230kV Transmission Line
- St. Vital Transmission Complex (Proposed)
- Existing 115-230kV Transmission Line

Survey Sites and Occurences

- Previously Known Weed[1]

Land Cover in the PDA[2]

Developed
- Roads / Railways / Trails
- Industrial

Agriculture
- Cultivated
- Pasture

Wetland
- Marsh

Assessment Area

- Project Development Area (PDA)
- Vegetation and Wetlands Local Assessment Area

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- Rural Municipality

Source:
1. Previously Known Weed, 2014. Early Detection & Distribution Mapping System
2. Vegetation and Wetland Land Cover, 2015. Stantec

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: July 30, 2015

N

0 0.5 1 Kilometres
0 0.25 0.5 Miles

1:30,000

Vegetation and Wetland Observations

Map 1-300-03

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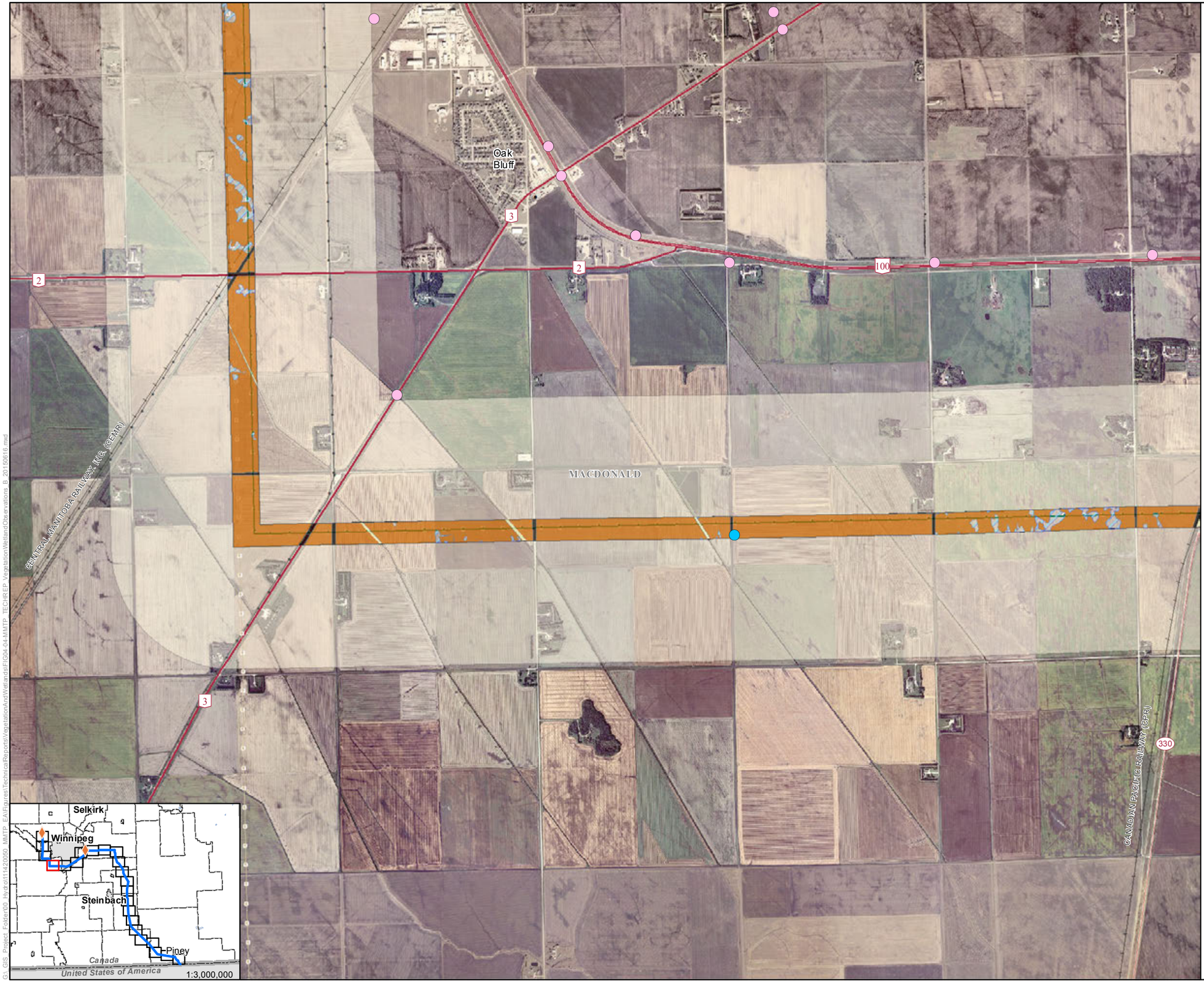

Manitoba Hydro

Manitoba-Minnesota Transmission Project

Infrastructure

- Existing 230kV Transmission Line
- St. Vital Transmission Complex (Proposed)
- Existing 115-230kV Transmission Line

Survey Sites and Occurences

- Wetland Survey Site
- Previously Known Weed[1]

Land Cover in the PDA[2]

Developed
- Roads / Railways / Trails
- Buildings / Residential

Agriculture
- Cultivated
- Pasture

Wetland
- Marsh

Assessment Area

- Project Development Area (PDA)
- Vegetation and Wetlands Local Assessment Area

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- Rural Municipality

Source:
1. Previously Known Weed, 2014. Early Detection & Distribution Mapping System
2. Vegetation and Wetland Land Cover, 2015. Stantec

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: July 30, 2015

N

0 0.5 1 Kilometres
0 0.25 0.5 Miles

1:30,000

Vegetation and Wetland Observations

Map 1-300-04

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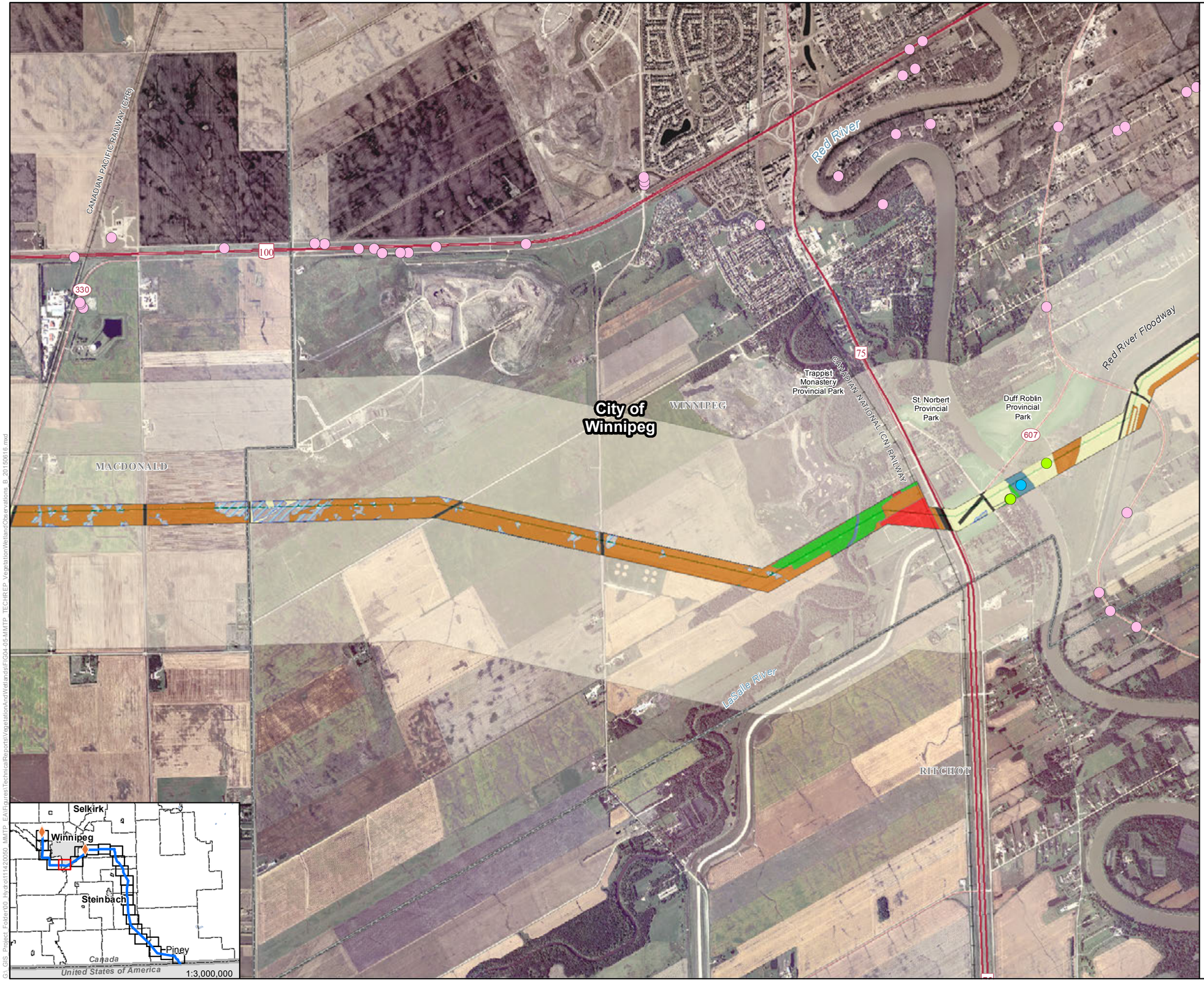

Manitoba Hydro

Manitoba-Minnesota Transmission Project

Infrastructure

- St. Vital Transmission Complex (Proposed)

Survey Sites and Occurences

- Rare Plant Transect Survey Site
- Wetland Survey Site
- Previously Known Weed[1]

Land Cover in the PDA[2]

Developed
- Roads / Railways / Trails
- Buildings / Residential

Agriculture
- Cultivated
- Pasture

Wetland
- Marsh

Water
- River

Native Vegetation
- Deciduous Forest

Assessment Area

- Project Development Area (PDA)
- Vegetation and Wetlands Local Assessment Area

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- Rural Municipality

Source:
1. Previously Known Weed, 2014. Early Detection & Distribution Mapping System
2. Vegetation and Wetland Land Cover, 2015. Stantec

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: July 30, 2015

N

0 0.5 1 Kilometres
0 0.25 0.5 Miles

1:30,000

Vegetation and Wetland Observations

Map 1-300-05

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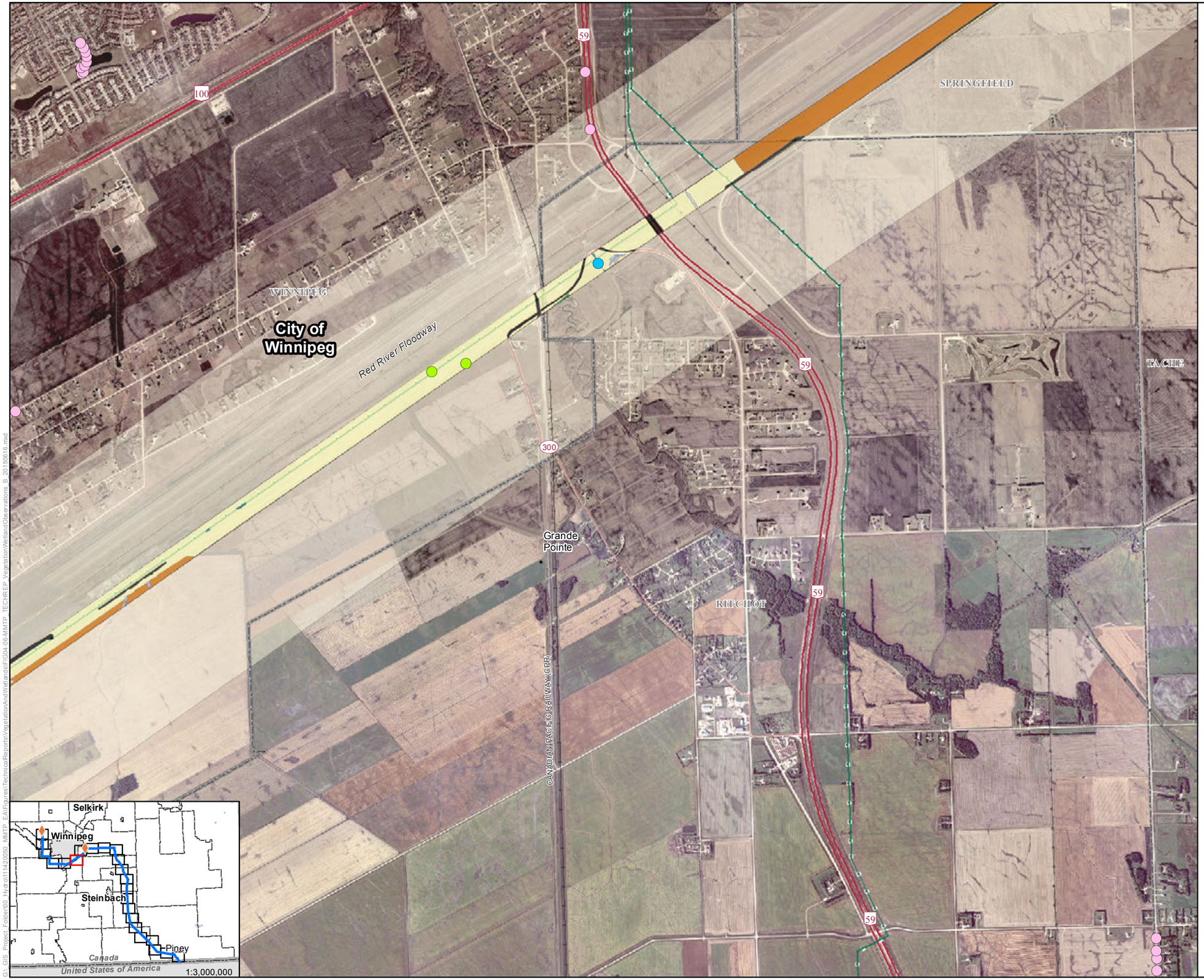

Manitoba-Minnesota Transmission Project

Infrastructure

- St. Vital Transmission Complex (Proposed)
- Existing 115-230kV Transmission Line

Survey Sites and Occurences

- Rare Plant Transect Survey Site
- Wetland Survey Site
- Previously Known Weed[1]

Land Cover in the PDA[2]

Developed
- Roads / Railways / Trails

Agriculture
- Cultivated
- Pasture

Wetland
- Marsh

Water
- River
- Channel

Native Vegetation
- Deciduous Forest

Assessment Area

- Project Development Area (PDA)
- Vegetation and Wetlands Local Assessment Area

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- Rural Municipality

Source:
1. Previously Known Weed, 2014. Early Detection & Distribution Mapping System
2. Vegetation and Wetland Land Cover, 2015. Stantec

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: July 30, 2015

N

0 0.5 1 Kilometres
0 0.25 0.5 Miles

1:30,000

Vegetation and Wetland Observations

Map 1-300-06

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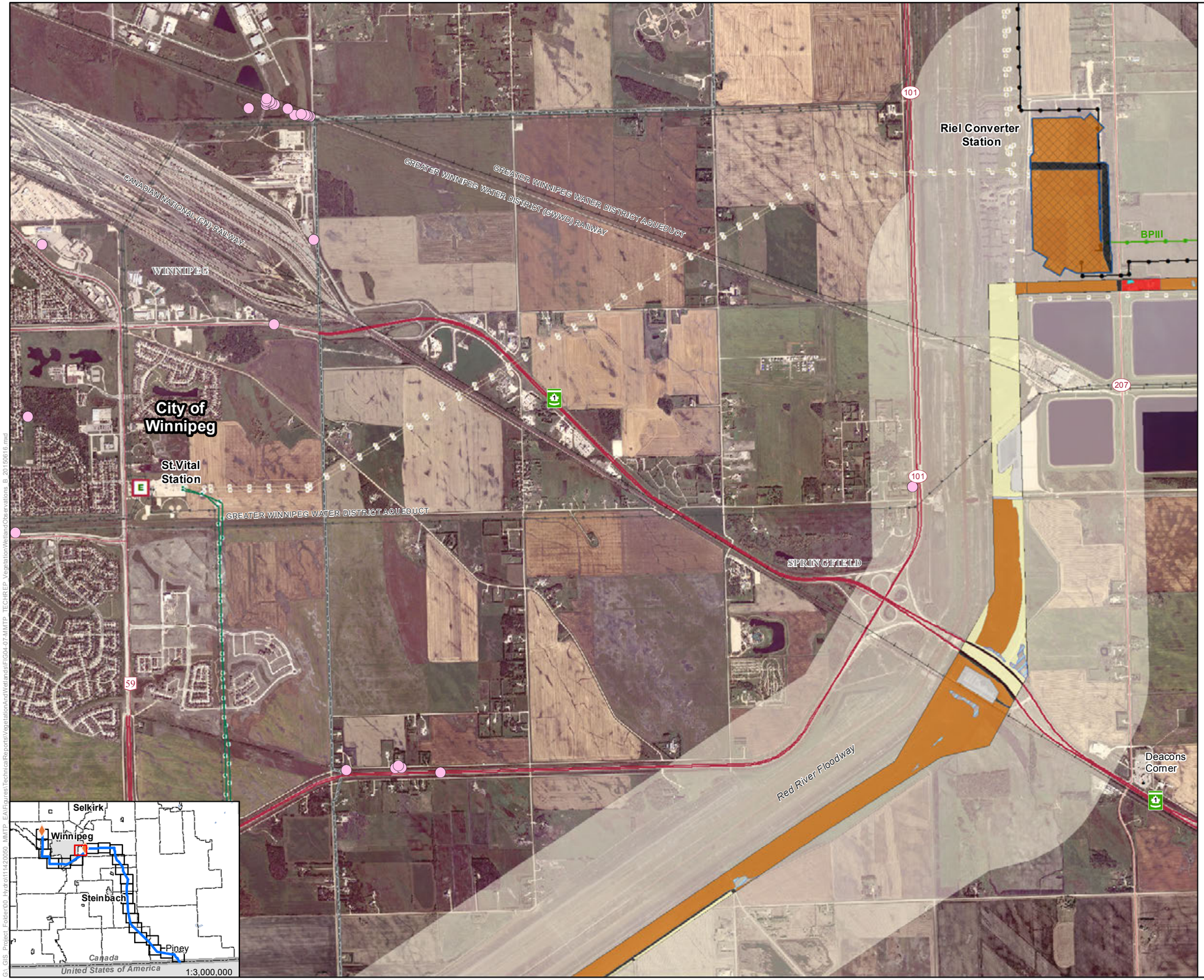

Manitoba-Minnesota Transmission Project

Project Infrastructure

- Converter Station Footprint

Infrastructure

- Electrical Station
- Existing 500 kV Transmission Line
- Existing 230kV Transmission Line
- Bipole III Transmission Line (Approved)
- St. Vital Transmission Complex (Proposed)
- Existing 115-230kV Transmission Line

Survey Sites and Occurences

- Previously Known Weed[1]

Land Cover in the PDA[2]

Developed
- Roads / Railways / Trails
- Industrial
- Buildings / Residential

Agriculture
- Cultivated
- Pasture

Wetland
- Dugout
- Marsh

Water
- Channel

Assessment Area

- Project Development Area (PDA)
- Vegetation and Wetlands Local Assessment Area

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- Rural Municipality

Source:
1. Previously Known Weed, 2014. Early Detection & Distribution Mapping System
2. Vegetation and Wetland Land Cover, 2015. Stantec

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: July 30, 2015

N

0 0.5 1 Kilometres
0 0.25 0.5 Miles

1:30,000

Vegetation and Wetland Observations

Map 1-300-07

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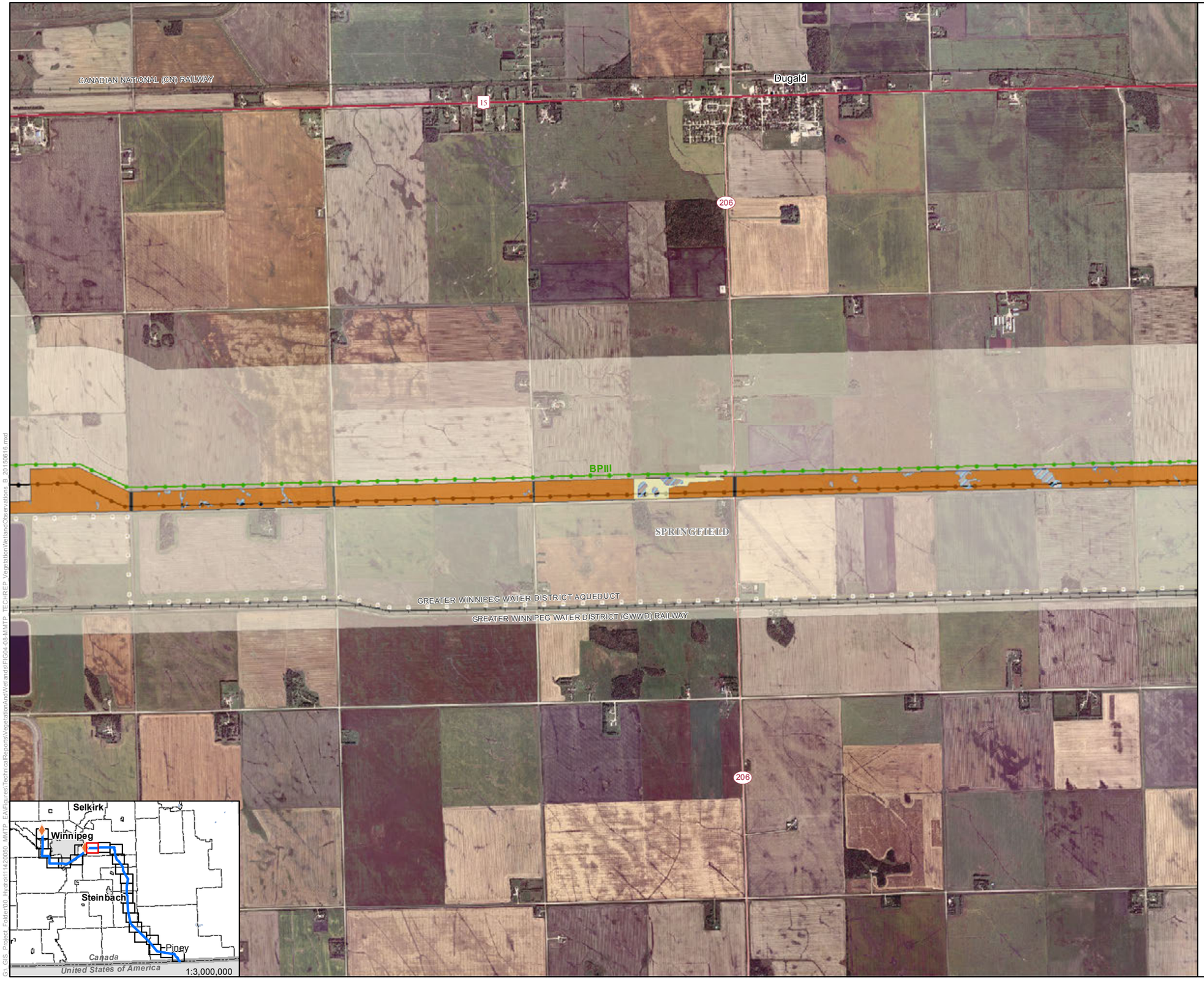

Manitoba Hydro

Manitoba-Minnesota Transmission Project

Infrastructure

- Existing 500 kV Transmission Line
- Existing 230kV Transmission Line
- Bipole III Transmission Line (Approved)
- Existing 115-230kV Transmission Line

Land Cover in the PDA[2]

Developed
- Roads / Railways / Trails

Agriculture
- Cultivated
- Pasture

Wetland
- Marsh

Assessment Area

- Project Development Area (PDA)
- Vegetation and Wetlands Local Assessment Area

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- Rural Municipality

Source:
1. Previously Known Weed, 2014. Early Detection & Distribution Mapping System
2. Vegetation and Wetland Land Cover, 2015. Stantec

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: July 30, 2015

N

0 0.5 1 Kilometres
0 0.25 0.5 Miles

1:30,000

Vegetation and Wetland Observations

Map 1-300-08

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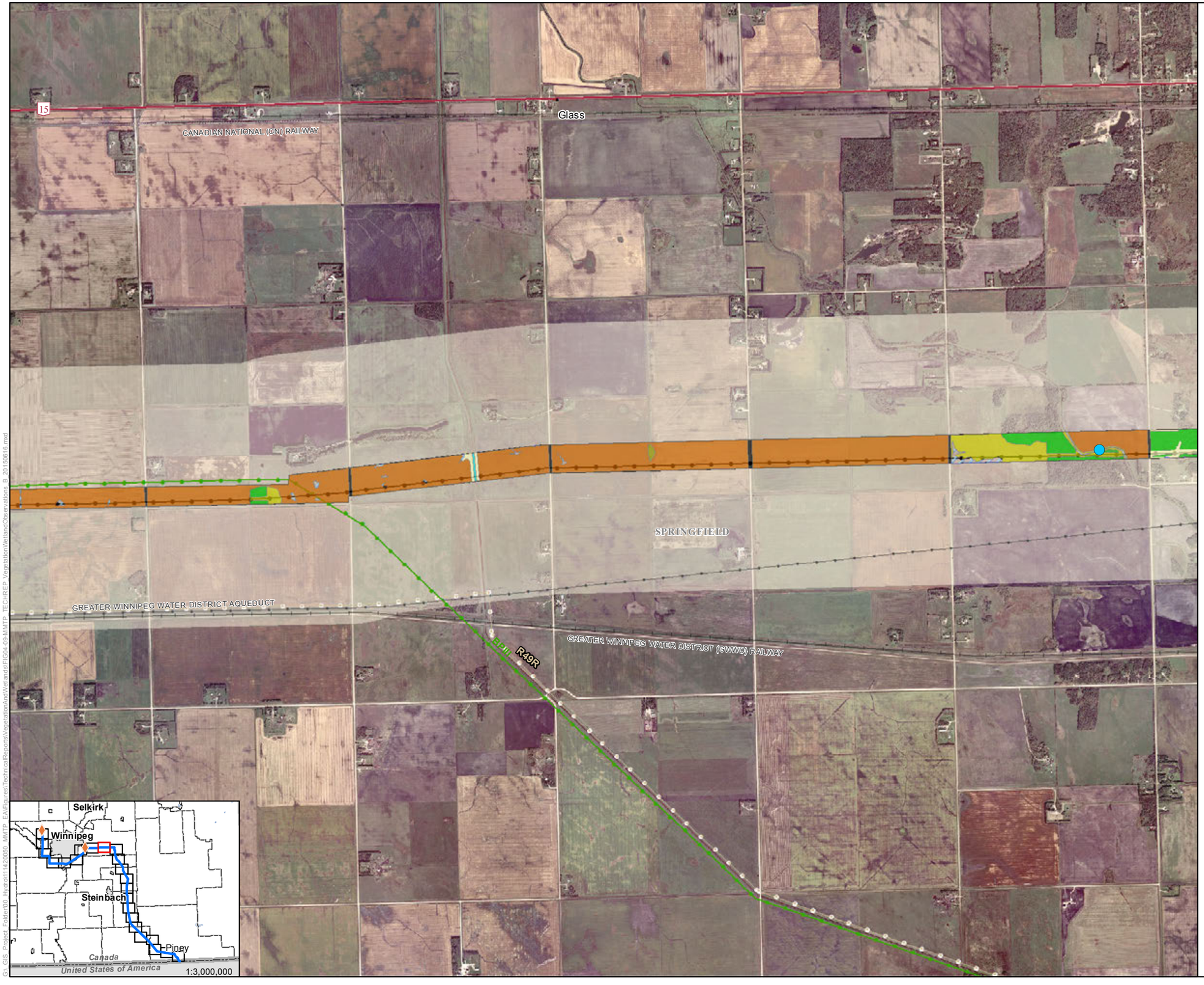

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Manitoba Hydro

Manitoba-Minnesota Transmission Project

Infrastructure

- Existing 500 kV Transmission Line
- Existing 230kV Transmission Line
- Bipole III Transmission Line (Approved)
- Existing 115-230kV Transmission Line

Survey Sites and Occurences

- Wetland Survey Site

Land Cover in the PDA[2]

Developed
- Roads / Railways / Trails

Agriculture
- Cultivated
- Pasture

Wetland
- Dugout
- Marsh

Water
- Channel

Native Vegetation
- Grassland
- Shrubland
- Deciduous Forest

Assessment Area

- Project Development Area (PDA)
- Vegetation and Wetlands Local Assessment Area

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- Rural Municipality

Source:
1. Previously Known Weed, 2014. Early Detection & Distribution Mapping System
2. Vegetation and Wetland Land Cover, 2015. Stantec

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: July 30, 2015

N

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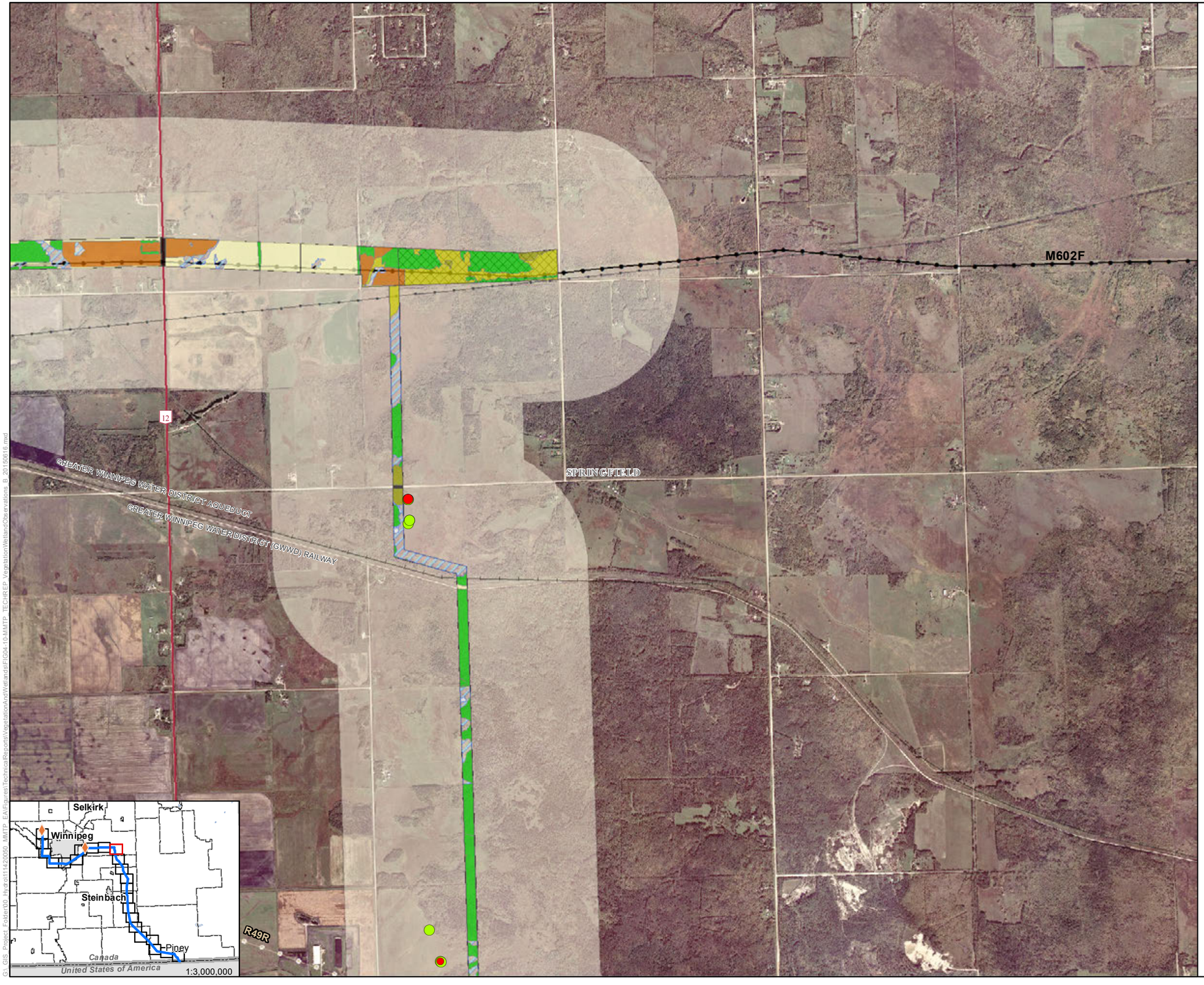
0 0.25 0.5 Miles

1:30,000

Vegetation and Wetland Observations

Map 1-300-09



Manitoba Hydro

Manitoba-Minnesota Transmission Project

Project Infrastructure

- M602F Extension and Salvage

Infrastructure

- Existing 500 kV Transmission Line
- Existing 230kV Transmission Line
- Existing 115-230kV Transmission Line

Survey Sites and Occurences

- Rare Plant Transect Survey Site
- Wetland Survey Site
- Rare Plant Count 1
- Rare Plant Count 2

Land Cover in the PDA[2]

Developed
- Roads / Railways / Trails
- Buildings / Residential

Agriculture
- Cultivated
- Pasture

Wetland
- Marsh
- Swamp

Native Vegetation
- Grassland
- Shrubland
- Deciduous Forest

Assessment Area

- Project Development Area (PDA)
- Vegetation and Wetlands Local Assessment Area

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- Rural Municipality

Source:
1. Previously Known Weed, 2014. Early Detection & Distribution Mapping System
2. Vegetation and Wetland Land Cover, 2015. Stantec

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: July 30, 2015

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Vegetation and Wetland Observations

Map 1-300-10

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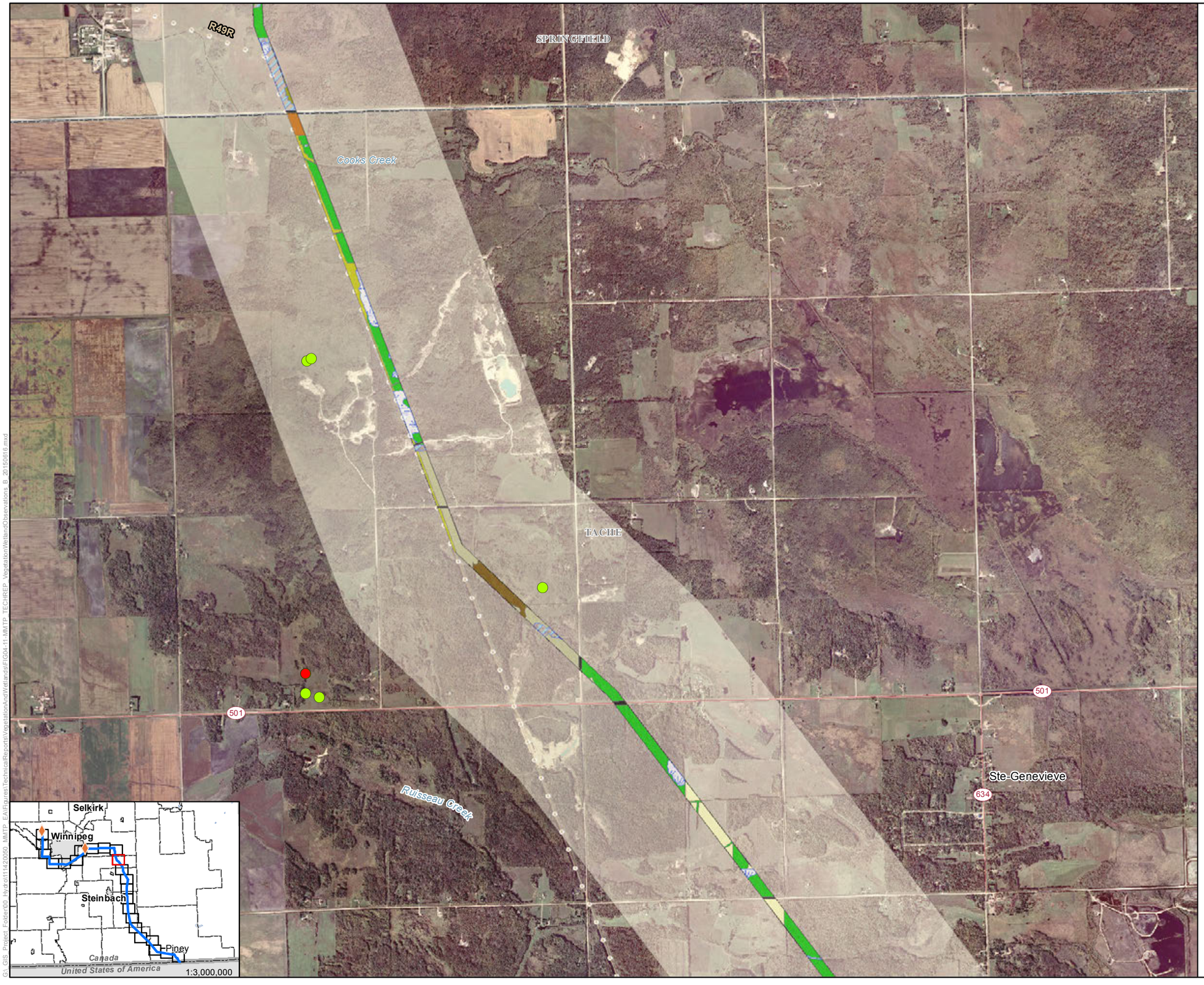

Manitoba Hydro

Manitoba-Minnesota Transmission Project

Infrastructure

- Existing 230kV Transmission Line

Survey Sites and Occurences

- Rare Plant Transect Survey Site
- Rare Plant Count 2

Land Cover in the PDA[2]

Developed
- Roads / Railways / Trails
- Industrial

Agriculture
- Cultivated
- Pasture

Wetland
- Shallow Open Water
- Marsh
- Swamp

Recently Cleared
- Recently Cleared (cutting)

Water
- River

Native Vegetation
- Grassland
- Shrubland
- Mixedwood Forest
- Deciduous Forest

Assessment Area

- Project Development Area (PDA)
- Vegetation and Wetlands Local Assessment Area

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- Rural Municipality

Source:
1. Previously Known Weed, 2014. Early Detection & Distribution Mapping System
2. Vegetation and Wetland Land Cover, 2015. Stantec

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: July 30, 2015

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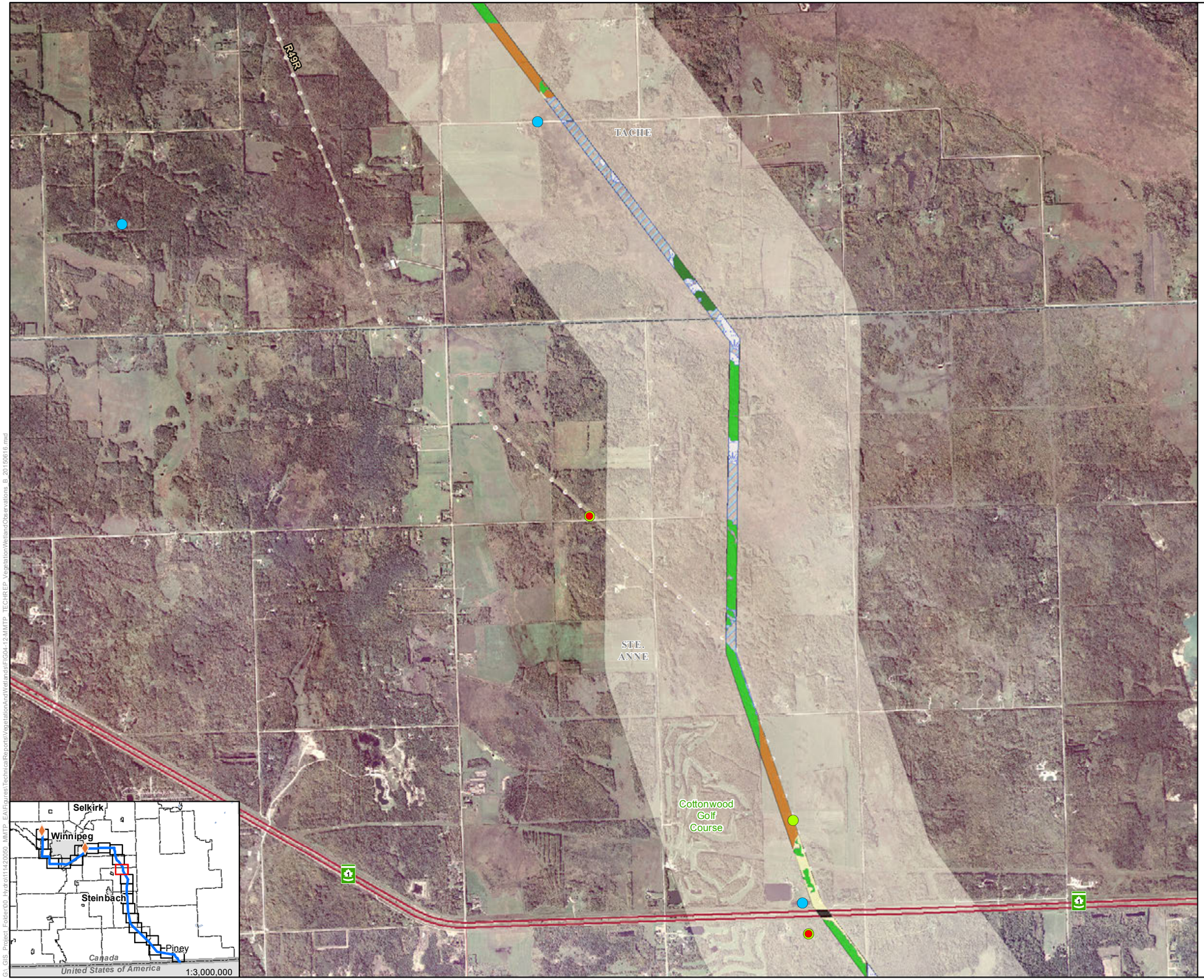
1:30,000

Vegetation and Wetland Observations

Map 1-300-11

G:_GIS_Project_Folder\00_Hydro\111420050_MMTP_EA\Figures\TechnicalReports\VegetationAndWetlands\FIG04-11_MMTP_TECHREP_VegetationWetlandObservations_B_20150816.mxd



Manitoba Hydro

Manitoba-Minnesota Transmission Project

Infrastructure

- Existing 230kV Transmission Line

Survey Sites and Occurences

- Rare Plant Transect Survey Site
- Rare Plant Count 1
- Wetland Survey Site

Land Cover in the PDA[2]

Developed
- Roads / Railways / Trails

Agriculture
- Cultivated
- Pasture

Wetland
- Marsh
- Swamp

Native Vegetation
- Grassland
- Deciduous Forest
- Coniferous Forest

Assessment Area

- Project Development Area (PDA)
- Vegetation and Wetlands Local Assessment Area

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- Rural Municipality

Source:
1. Previously Known Weed, 2014. Early Detection & Distribution Mapping System
2. Vegetation and Wetland Land Cover, 2015. Stantec

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: July 30, 2015

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1:30,000

Vegetation and Wetland Observations

Map 1-300-12

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Manitoba Hydro

Manitoba-Minnesota Transmission Project

Infrastructure

- Electrical Station
- Existing 230kV Transmission Line

Survey Sites and Occurences

- Rare Plant Transect Survey Site
- Wetland Survey Site
- Rare Plant Count 1
- Rare Plant Count 4

Land Cover in the PDA[2]

Developed
- Roads / Railways / Trails
- Buildings / Residential

Agriculture
- Cultivated
- Pasture

Wetland
- Fen
- Marsh
- Swamp

Recently Cleared
- Recently Cleared (cutting)

Native Vegetation
- Deciduous Forest

Assessment Area

- Project Development Area (PDA)
- Vegetation and Wetlands Local Assessment Area

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- Rural Municipality

Source:
1. Previously Known Weed, 2014. Early Detection & Distribution Mapping System
2. Vegetation and Wetland Land Cover, 2015. Stantec

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: July 30, 2015

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0 0.25 0.5 Miles

1:30,000

Vegetation and Wetland Observations

Map 1-300-13

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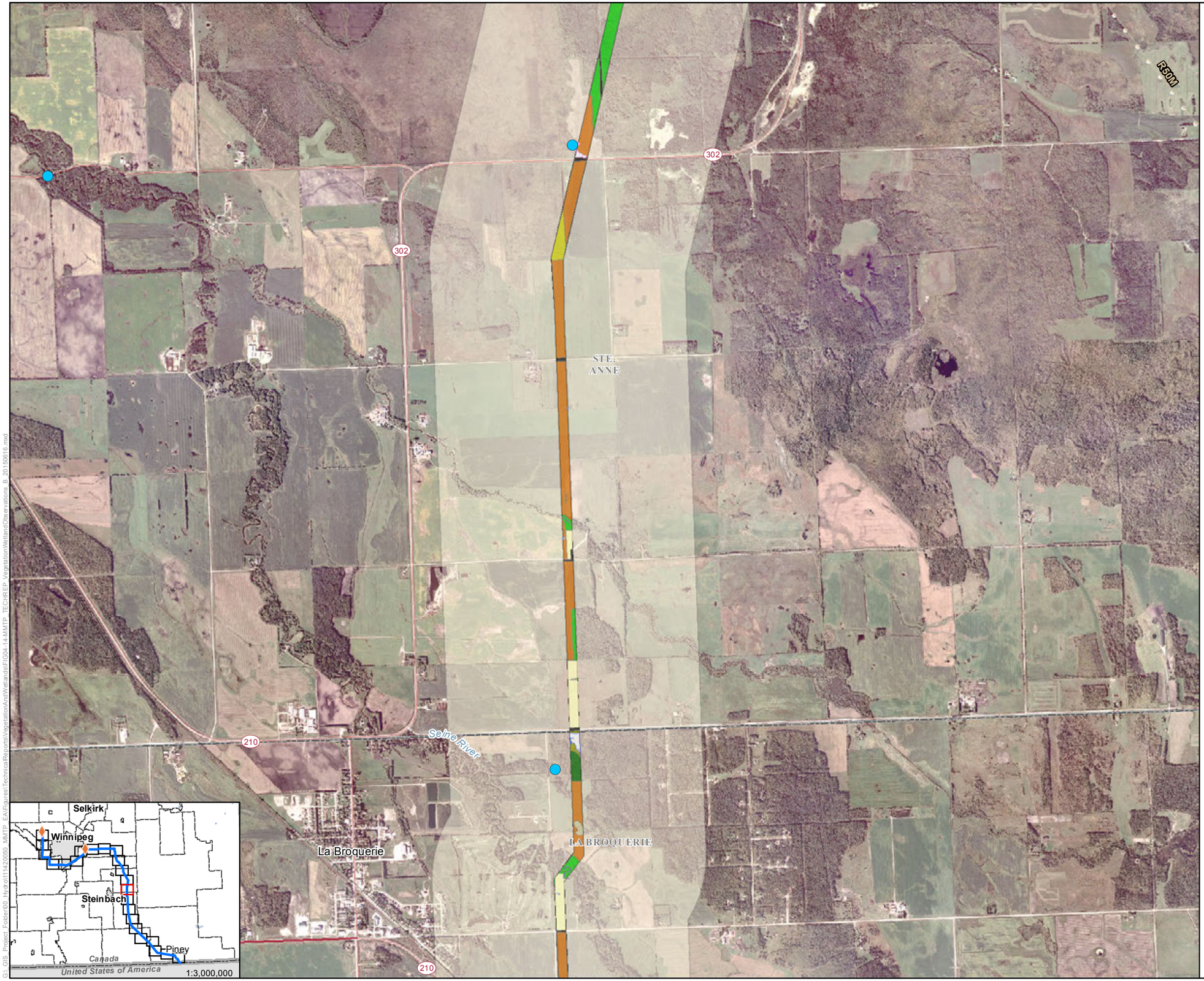

Manitoba Hydro

Manitoba-Minnesota Transmission Project

Infrastructure

- Existing 230kV Transmission Line

Survey Sites and Occurences

- Wetland Survey Site

Land Cover in the PDA[2]

Developed
- Roads / Railways / Trails

Agriculture
- Cultivated
- Pasture

Wetland
- Fen
- Marsh
- Swamp

Water
- River

Native Vegetation
- Grassland
- Shrubland
- Mixedwood Forest
- Deciduous Forest
- Coniferous Forest

Assessment Area

- Project Development Area (PDA)
- Vegetation and Wetlands Local Assessment Area

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- Rural Municipality

Source:
1. Previously Known Weed, 2014. Early Detection & Distribution Mapping System
2. Vegetation and Wetland Land Cover, 2015. Stantec

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: July 30, 2015

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0 0.25 0.5 Miles

1:30,000

Vegetation and Wetland Observations

Map 1-300-14

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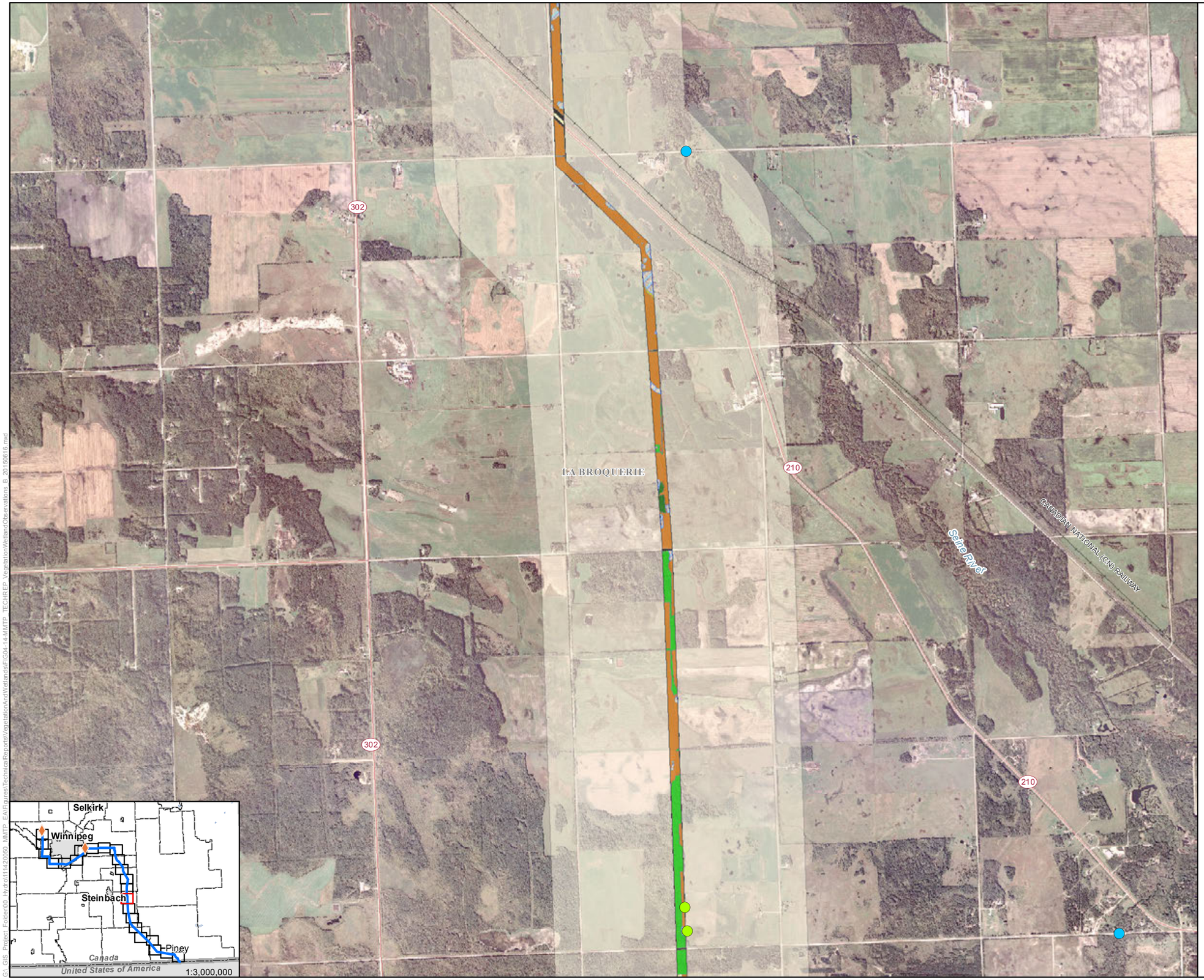

Manitoba Hydro

Manitoba-Minnesota Transmission Project

Survey Sites and Occurences

- Rare Plant Transect Survey Site
- Wetland Survey Site

Land Cover in the PDA[2]

Developed
- Roads / Railways / Trails

Agriculture
- Cultivated
- Pasture

Wetland
- Marsh

Native Vegetation
- Grassland
- Deciduous Forest
- Coniferous Forest

Assessment Area

- Project Development Area (PDA)
- Vegetation and Wetlands Local Assessment Area

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- Rural Municipality

Source:
1. Previously Known Weed, 2014. Early Detection & Distribution Mapping System
2. Vegetation and Wetland Land Cover, 2015. Stantec

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: July 30, 2015

N

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0 0.25 0.5 Miles

1:30,000

Vegetation and Wetland Observations

Map 1-300-15

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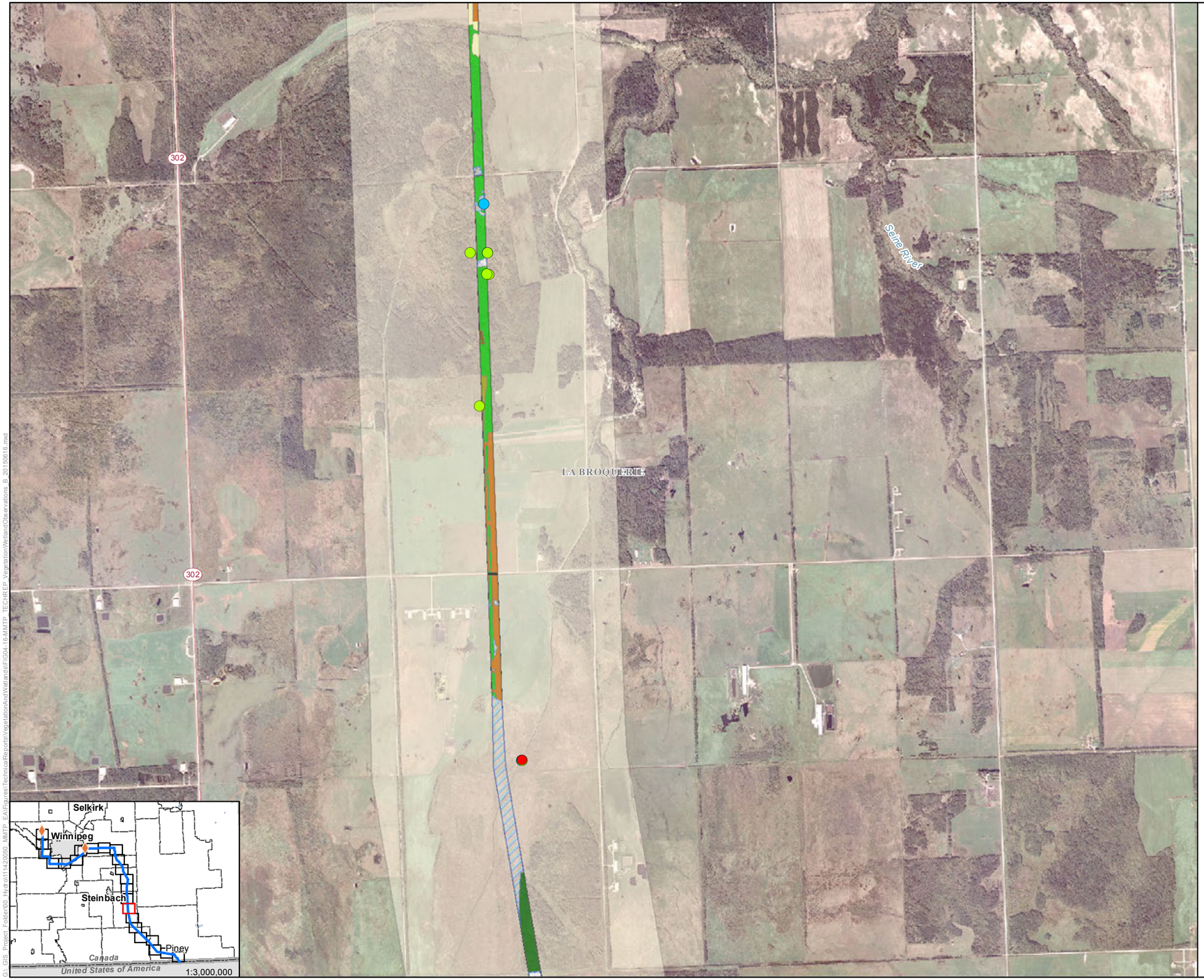

Manitoba Hydro

Manitoba-Minnesota Transmission Project

Survey Sites and Occurences

- Rare Plant Transect Survey Site
- Wetland Survey Site
- Rare Plant Count 2

Land Cover in the PDA[2]

Developed
- Roads / Railways / Trails
- Buildings / Residential

Agriculture
- Cultivated
- Pasture

Wetland
- Shallow Open Water
- Marsh
- Swamp

Recently Cleared
- Recently Cleared (cutting)

Native Vegetation
- Shrubland
- Deciduous Forest
- Coniferous Forest

Assessment Area

- Project Development Area (PDA)
- Vegetation and Wetlands Local Assessment Area

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- Rural Municipality

Source:
1. Previously Known Weed, 2014. Early Detection & Distribution Mapping System
2. Vegetation and Wetland Land Cover, 2015. Stantec

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: July 30, 2015

N

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0 0.25 0.5 Miles

1:30,000

Vegetation and Wetland Observations

Map 1-300-16

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Manitoba Hydro

Manitoba-Minnesota Transmission Project

Survey Sites and Occurences

- Rare Plant Transect Survey Site
- Wetland Survey Site

Land Cover in the PDA[2]

Developed
- Roads / Railways / Trails

Recently Cleared
- Recently Cleared (cutting)

Wetland
- Shallow Open Water
- Marsh
- Swamp

Native Vegetation
- Grassland
- Shrubland
- Coniferous Forest

Assessment Area

- Project Development Area (PDA)
- Vegetation and Wetlands Local Assessment Area

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- Rural Municipality

Source:
1. Previously Known Weed, 2014. Early Detection & Distribution Mapping System
2. Vegetation and Wetland Land Cover, 2015. Stantec

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: July 30, 2015

N

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0 0.25 0.5 Miles

1:30,000

Vegetation and Wetland Observations

Map 1-300-17

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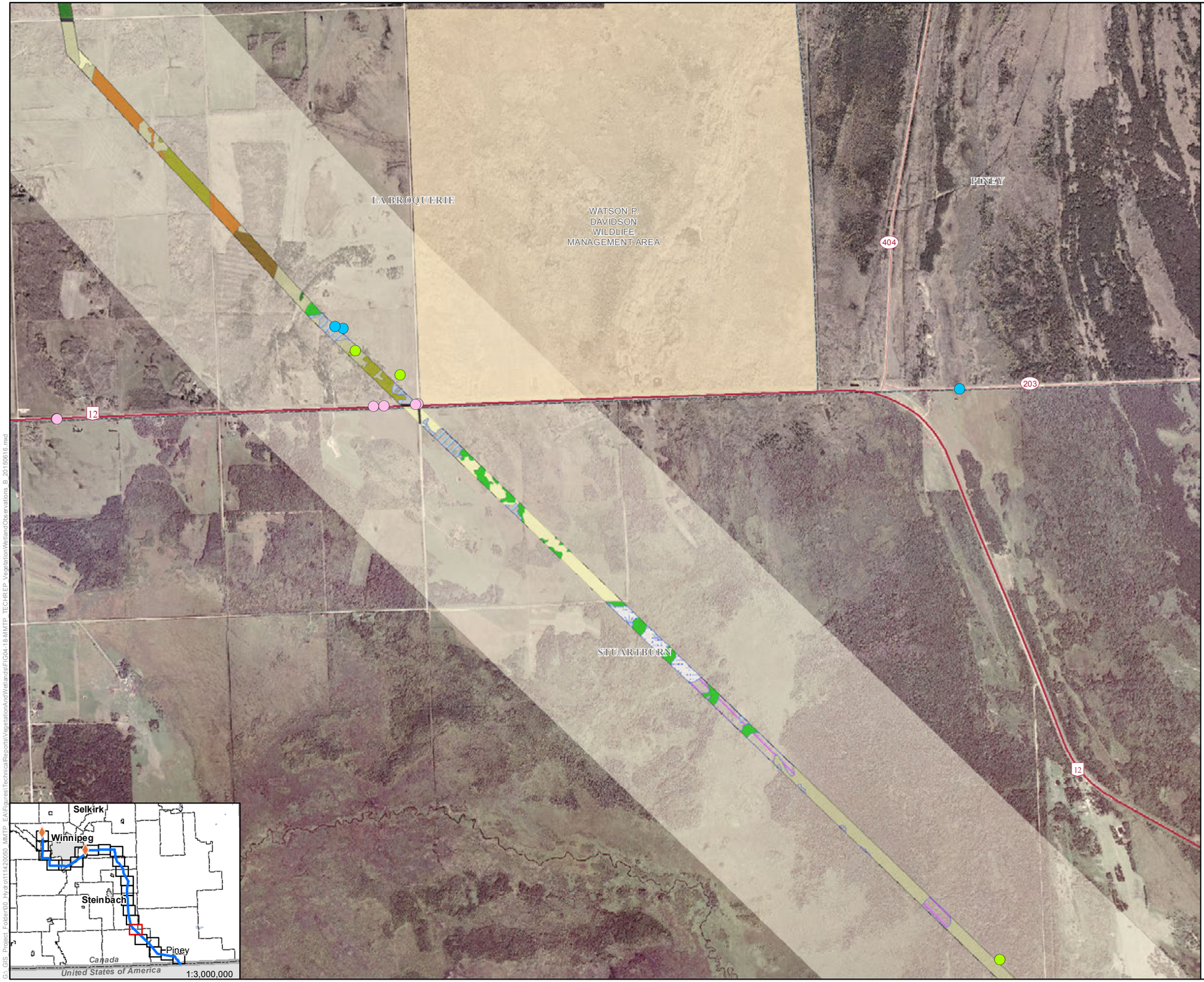

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Manitoba Hydro

Manitoba-Minnesota Transmission Project

Survey Sites and Occurences

- Rare Plant Transect Survey Site
- Wetland Survey Site
- Previously Known Weed[1]

Land Cover in the PDA[2]

Developed
- Roads / Railways / Trails

Agriculture
- Cultivated
- Pasture

Wetland
- Bog
- Marsh
- Swamp

Recently Cleared
- Recently Cleared (cutting)

Native Vegetation
- Grassland
- Shrubland
- Mixedwood Forest
- Deciduous Forest
- Coniferous Forest

Assessment Area

- Project Development Area (PDA)
- Vegetation and Wetlands Local Assessment Area

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- Rural Municipality

Source:
1. Previously Known Weed, 2014. Early Detection & Distribution Mapping System
2. Vegetation and Wetland Land Cover, 2015. Stantec

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: July 30, 2015

N

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0 0.25 0.5 Miles

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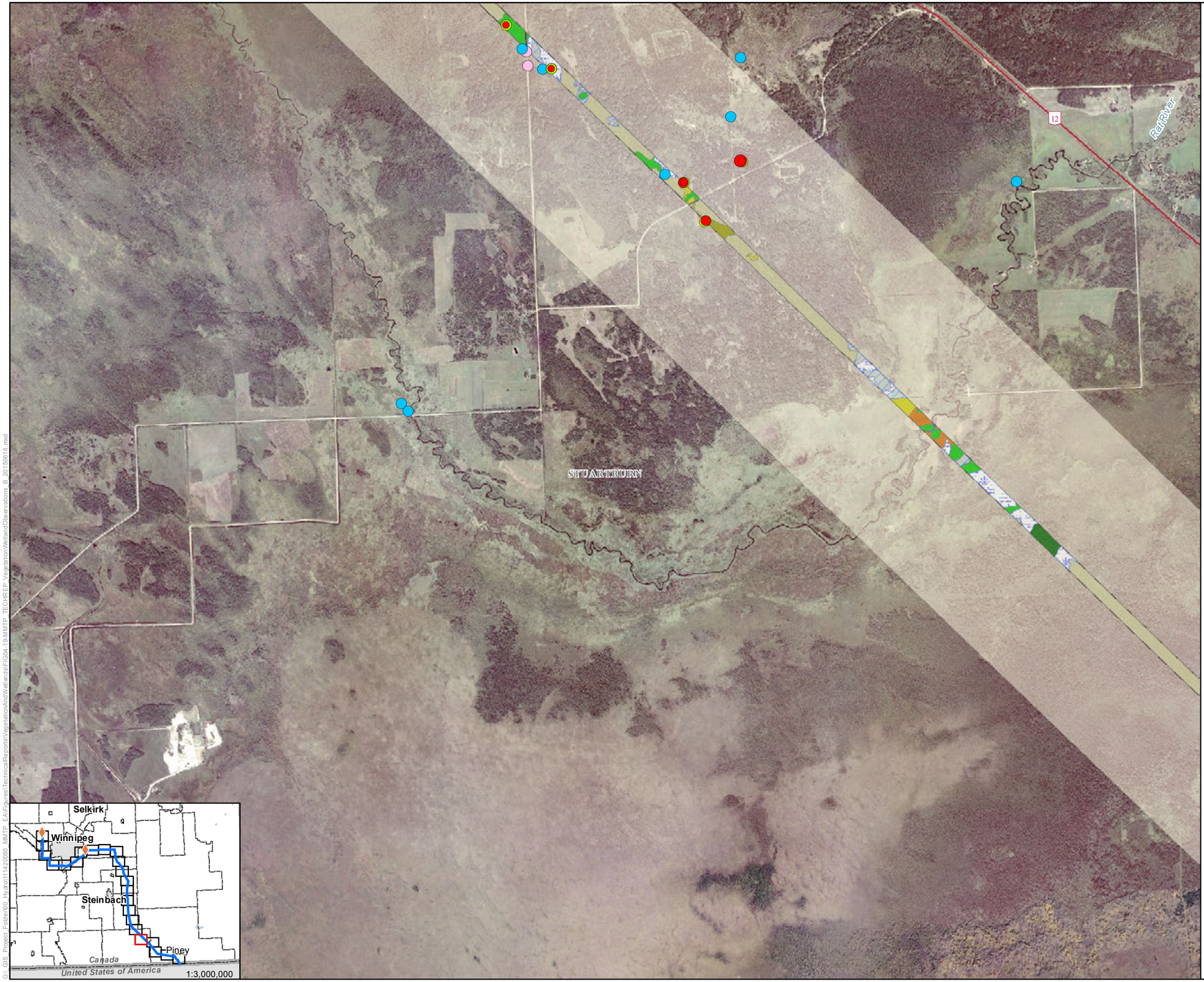
Vegetation and Wetland Observations

Map 1-300-18



Manitoba Hydro

Manitoba-Minnesota Transmission Project

Survey Sites and Occurences

- Rare Plant Transect Survey Site
- Wetland Survey Site
- Previously Known Weed[1]
- Rare Plant Count 1
- Rare Plant Count 2
- Rare Plant Count 3

Land Cover in the PDA[2]

Developed
- Roads / Railways / Trails

Agriculture
- Cultivated

Wetland
- Bog
- Marsh
- Swamp

Water
- River

Native Vegetation
- Grassland
- Shrubland
- Mixedwood Forest
- Deciduous Forest
- Coniferous Forest

Assessment Area

- Project Development Area (PDA)
- Vegetation and Wetlands Local Assessment Area

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- Rural Municipality

Source:
1. Previously Known Weed, 2014. Early Detection & Distribution Mapping System
2. Vegetation and Wetland Land Cover, 2015. Stantec

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: July 30, 2015

N

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0 0.25 0.5 Miles

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Vegetation and Wetland Observations

Map 1-300-19

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Manitoba Hydro

Manitoba-Minnesota Transmission Project

Survey Sites and Occurences

- Rare Plant Transect Survey Site
- Rare Plant Count 1
- Wetland Survey Site

Land Cover in the PDA[2]

Developed
- Roads / Railways / Trails

Wetland
- Bog
- Fen
- Marsh
- Swamp

Native Vegetation
- Grassland
- Shrubland
- Mixedwood Forest
- Deciduous Forest
- Coniferous Forest

Assessment Area

- Project Development Area (PDA)
- Vegetation and Wetlands Local Assessment Area

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- Rural Municipality

Source:
1. Previously Known Weed, 2014. Early Detection & Distribution Mapping System
2. Vegetation and Wetland Land Cover, 2015. Stantec

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: July 30, 2015

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0 0.25 0.5 Miles

1:30,000

Vegetation and Wetland Observations

Map 1-300-20

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Manitoba Hydro

Manitoba-Minnesota Transmission Project

Survey Sites and Occurences

- Rare Plant Transect Survey Site
- Wetland Survey Site
- Rare Plant Count 1
- Rare Plant Count 4

Land Cover in the PDA[2]

Developed
- Roads / Railways / Trails

Agriculture
- Cultivated

Wetland
- Bog
- Fen
- Marsh
- Swamp

Native Vegetation
- Grassland
- Mixedwood Forest
- Coniferous Forest

Assessment Area

- Project Development Area (PDA)
- Vegetation and Wetlands Local Assessment Area

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- Rural Municipality

Source:
1. Previously Known Weed, 2014. Early Detection & Distribution Mapping System
2. Vegetation and Wetland Land Cover, 2015. Stantec

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: July 30, 2015

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Vegetation and Wetland Observations

Map 1-300-21

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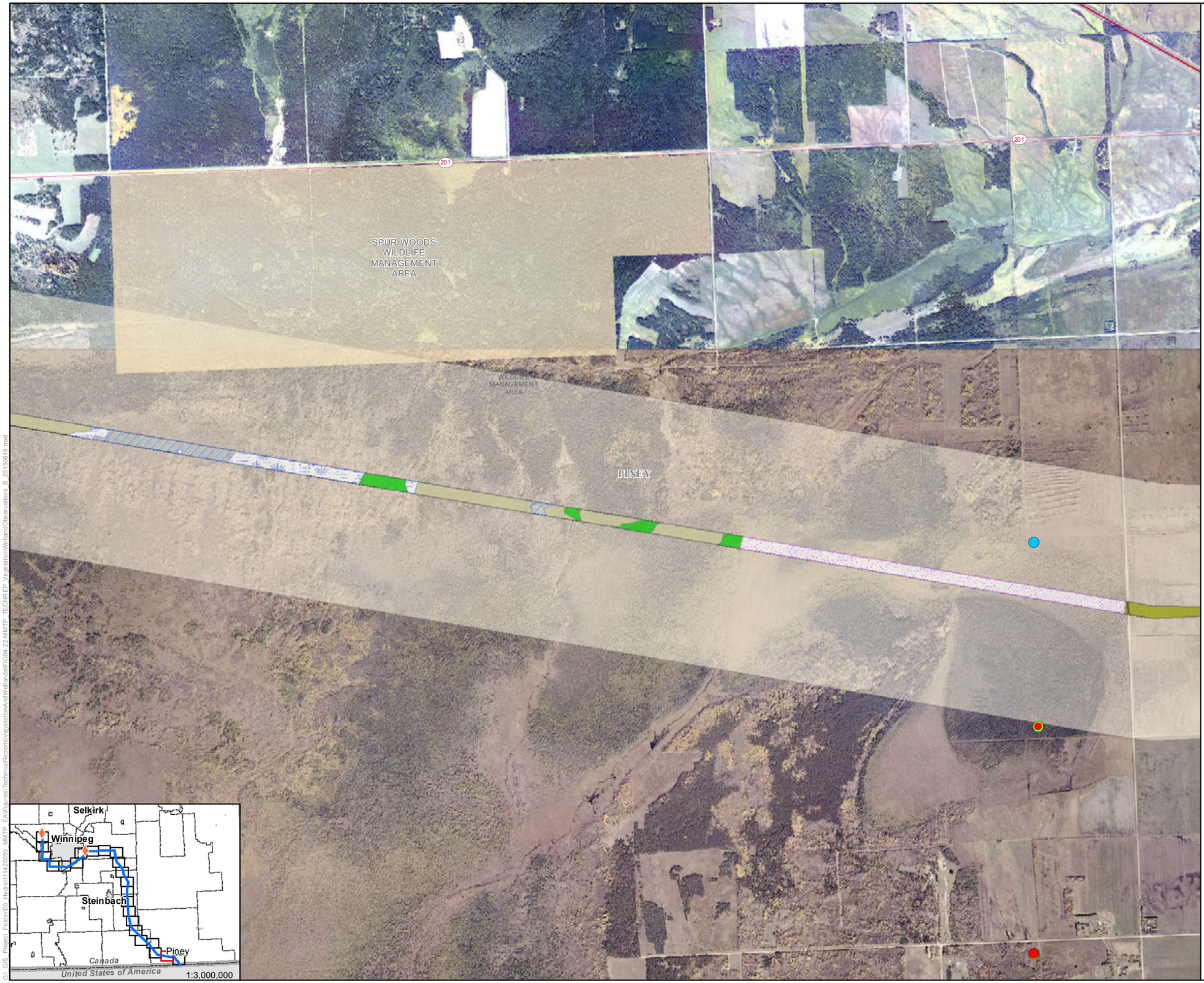

Manitoba Hydro

Manitoba-Minnesota Transmission Project

Survey Sites and Occurences

- Rare Plant Transect Survey Site
- Wetland Survey Site
- Rare Plant Count 1
- Rare Plant Count 2

Land Cover in the PDA[2]

Developed
- Roads / Railways / Trails

Wetland
- Fen
- Marsh
- Swamp

Native Vegetation
- Shrubland
- Mixedwood Forest
- Deciduous Forest

Assessment Area

- Project Development Area (PDA)
- Vegetation and Wetlands Local Assessment Area

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- Rural Municipality

Source:
1. Previously Known Weed, 2014. Early Detection & Distribution Mapping System
2. Vegetation and Wetland Land Cover, 2015. Stantec

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: July 30, 2015

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0 0.25 0.5 Miles

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Vegetation and Wetland Observations

Map 1-300-22

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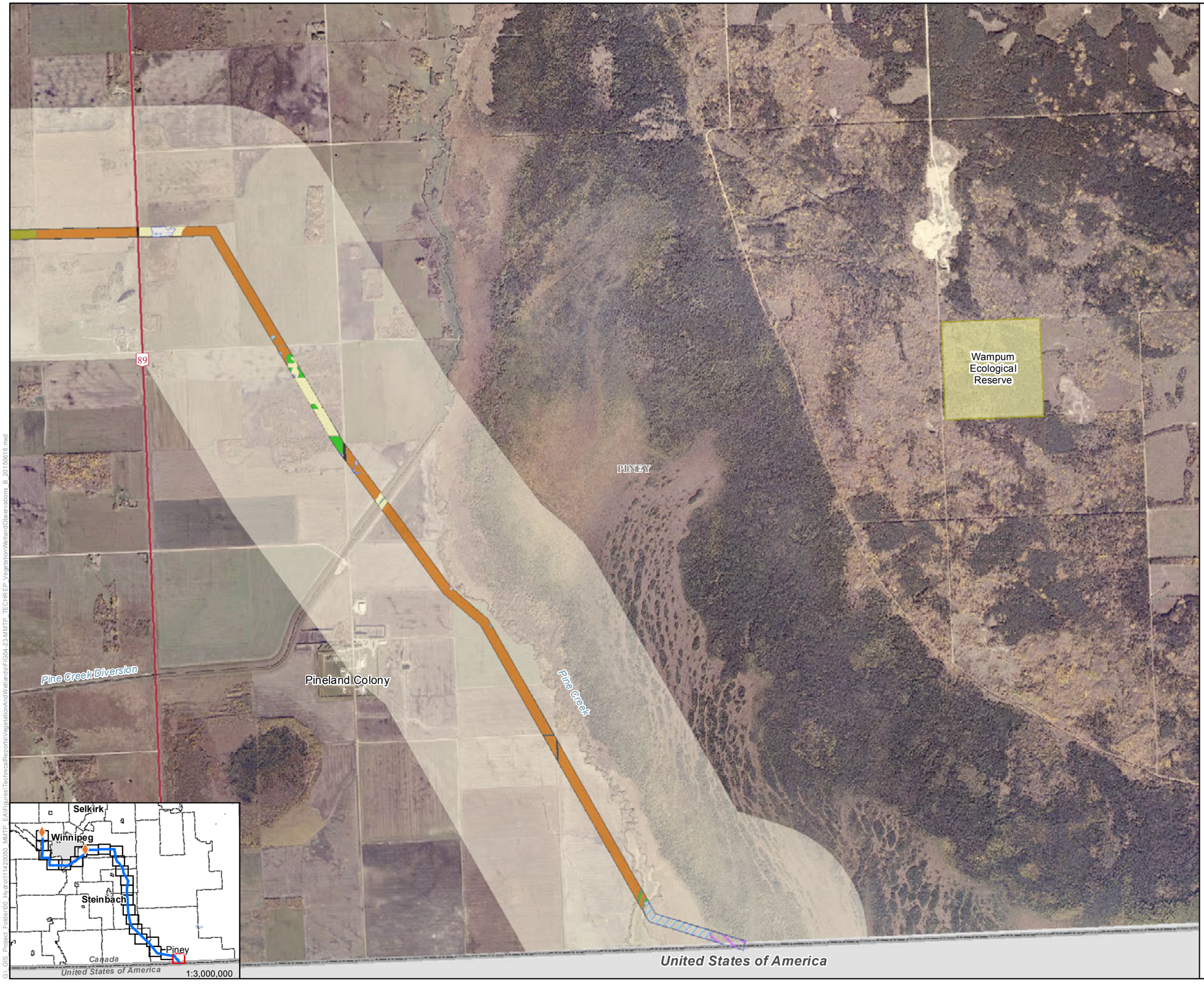

Manitoba-Minnesota Transmission Project

Land Cover in the PDA[2]

Developed
- Roads / Railways / Trails

Agriculture
- Cultivated
- Pasture

Wetland
- Dugout
- Bog
- Fen
- Marsh
- Swamp

Water
- River

Native Vegetation
- Shrubland
- Deciduous Forest

Assessment Area

- Project Development Area (PDA)
- Vegetation and Wetlands Local Assessment Area

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- Rural Municipality

Source:
1. Previously Known Weed, 2014. Early Detection & Distribution Mapping System
2. Vegetation and Wetland Land Cover, 2015. Stantec

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: July 30, 2015

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0 0.25 0.5 Miles

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Vegetation and Wetland Observations

Map 1-300-23

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APPENDIX A
ALL PLANT SPECIES OBSERVED IN THE PDA DURING FIELD SURVEYS

Stantec

Appendix A ALL PLANT SPECIES OBSERVED IN THE PDA DURING FIELD SURVEYS

Scientific Name	Common Name	Provincial Rank	Number of Occurrences in the PDA
Abies balsamea	balsam fir	S5	2
Acer negundo	Manitoba maple	S5	6
Achillea millefolium	common yarrow	S5	5
Actaea pachypoda	baneberry, white baneberry	SNR	1
Agastache foeniculum	blue giant hyssop	S5	1
Agrimonia striata	agrimony	S4	1
Agrostis gigantea	redtop	SNA	1
Alnus viridis	green alder	S5	3
Alnus viridis ssp. *crispa*	green or mountain alder	S5	2
Amelanchier alnifolia	Saskatoon	S5	4
Amphicarpaea bracteata	hog-peanut	S4	2
Andropogon gerardii	big bluestem	S5	2
Anemone canadensis	Canada anemone	S5	5
Anemone cylindrica	thimbleweed	S5	1
Anemone quinquefolia	wood anemone	S5	1
Anemone virginiana	Virginia anemone	S4	1
Antennaria neglecta	field cat's-foot	S5	1
Apocynum androsaemifolium	spreading dogbane	S5	3
Apocynum cannabinum	Indian-hemp	S4	1
Aquilegia canadensis	wild columbine	S5	1
Aralia nudicaulis	wild sarsaparilla	S5	6
Arctium minus[1]	common burdock	SNA	1
Asarum canadense	wild ginger	S3S4	2
Asclepias ovalifolia	dwarf milkweed	S4S5	1
Asclepias speciosa	showy milkweed	S4	1
Asclepias syriaca	common milkweed	S4	1
Athyrium filix-femina	lady fern	S5	1
Betula nana	arctic dwarf birch	SNA	1
Betula papyrifera	white birch	S5	2

Appendix A All Plant Species Observed in the PDA During Field Surveys
September 2015

Scientific Name	Common Name	Provincial Rank	Number of Occurrences in the PDA
Botrychium virginianum	rattlesnake fern	S4	1
Bromus ciliatus	fringed brome	S5	2
Bromus inermis	smooth brome	SNA	9
Calamagrostis canadensis	marsh reed grass	S5	3
Caltha palustris	marsh marigold	S5	2
Campanula rotundifolia	bluebell	S5	3
Caragana arborescens	common caragana	SNA	1
Carex alopecoidea	foxtail sedge	S3S4	1
Carex assiniboinensis	assiniboia sedge	S3S4	1
Carex atherodes	awned sedge	S5	1
Carex brunnescens	brownish sedge	S5	1
Carex capitata	capitate sedge	S4	1
Carex deweyana	Dewey's sedge	S5	1
Carex retrorsa	turned sedge	S5	1
Carex rostrata	beaked sedge	S4	1
Carex siccata	dry-spike sedge	S5	2
Carex sp.	sedge species	SNR	1
Carex sprengelii	Sprengel's sedge	S4	1
Carex utriculata	beaked sedge	S5	1
Chamerion angustifolium ssp. *angustifolium*	fireweed	S5	2
Chenopodium album[1]	lamb's-quarters	SNA	1
Cicuta bulbifera	bulb-bearing water-hemlock	S5	1
Cicuta maculata	water-hemlock	S5	1
Cirsium arvense[1]	Canada thistle	SNA	9
Cirsium muticum	swamp thistle	S4	2
Conyza canadensis	horse-weed	S5	3
Cornus canadensis	bunchberry	S5	3
Cornus sericea	red osier dogwood	S5	5
Cornus sericea ssp. *sericea*	red-osier dogwood	S5	3
Corylus americana	American hazelnut	S4S5	1
Corylus cornuta	beaked hazelnut	S5	4
Dactlyis glomerata	orchard grass	SNA	1
Danthonia spicata	poverty oat grass	S5	2

Appendix A All Plant Species Observed in the PDA During Field Surveys
September 2015

Scientific Name	Common Name	Provincial Rank	Number of Occurrences in the PDA
Dasiphora fruticosa	shrubby cinquefoil	S5	1
Diervilla lonicera	bush-honeysuckle	S5	1
Doellingeria umbellata	flat-topped white aster	S5	1
Dryopteris sp.	woodfern species	SNR	1
Echinochloa crus-galli var. *crus-galli*[1]	barnyard grass	SNA	1
Elymus curvatus	Virginia wild-rye	S4	1
Elymus repens[1]	quack-grass	SNA	8
Elymus wiegandii	northern riverbank wildrye	SU	1
Epilobium ciliatum ssp. *glandulosum*	willow-herb	S5	1
Equisetum arvense	common horsetail	S5	3
Equisetum hyemale	common scouring-rush	S5	1
Equisetum pratense	meadow horsetail	S4S5	2
Equisetum sylvaticum	wood horsetail	S5	1
Erigeron philadelphicus	Philadelphia fleabane	S5	3
Euphorbia esula	leafy spurge	SNA	1
Eutrochium maculatum	spotted joepyeweed	S5	1
Fagopyrum tataricum[1]	tartary buckwheat	SNA	1
Fragaria vesca	woodland strawberry	S4S5	2
Fragaria virginiana	smooth wild strawberry	S5	3
Fraxinus nigra	**black ash**	**S3**	**5**
Fraxinus pennsylvanica	red ash	S5	4
Fraxinus sp	ash	SNR	1
Galeopsis tetrahit[1]	common hemp-nettle	SNA	1
Galium boreale	northern bedstraw	S5	6
Galium triflorum	sweet-scented bedstraw	S5	5
Geocaulon lividum	northern comandra	S5	2
Geum macrophyllum	large-leaved avens	S4S5	2
Glyceria striata	fowl manna grass	S5	2
Glycyrrhiza lepidota	wild licorice	S5	1
Grindelia squarrosa	curly-cup gumweed	S5	2
Hackelia deflexa	beggar's lice	S5	1
Halenia deflexa	spurred gentian	S5	1
Hesperis matronalis	dame's-violet	SNA	2

Appendix A All Plant Species Observed in the PDA During Field Surveys
September 2015

Scientific Name	Common Name	Provincial Rank	Number of Occurrences in the PDA
Hieracium umbellatum	hawkweed	S5	3
Hordeum jubatum	wild barley	S5	3
Impatiens capensis	spotted touch-me-not	S5	2
Iris versicolor	blue flag	S4	3
Juncus sp.	rush	SNR	1
Lactuca serriola[1]	prickly lettuce	SNA	1
Laportea canadensis	wood nettle	S4	1
Lappula squarrosa[1]	bristly stickseed	SNA	2
Lathyrus venosus	wild peavine	S5	1
Lithospermum canescens	hoary puccoon	S5	2
Lobelia spicata	pale-spike lobelia	S4	1
Lonicera dioica	limber or twining honeysuckle	S5	3
Lonicera hirsuta	hairy honeysuckle	SNA	1
Lonicera involucrata	black twinberry	S4	2
Lotus corniculatus	bird's-foot trefoil	SNA	3
Lycopus uniflorus	northern bugle-weed	S5	2
Maianthemum canadense	two-leaved Solomon's-seal	S5	5
Maianthemum stellatum	star-flowered Solomon's-seal	S5	4
Matteuccia struthiopteris	ostrich fern	S5	1
Medicago lupulina	black medick	SNA	3
Medicago sativa	alfalfa	SNA	3
Melilotus albus	white sweet clover	SNA	2
Melilotus officinalis	yellow sweet clover	SNA	5
Menispermum canadense	**moonseed**	**S3**	**1**
Mentha arvensis	common mint	S5	1
Mitella nuda	mitrewort	S5	1
Oryzopsis asperifolia	white-grained mountain rice grass	S5	2
Osmundastrum cinnamomea	cinnamon fern	SNR	1
Oxalis sp.	oxalis species	SNR	1
Packera tridenticulata	**compact groundsel**	**S3**	**2**
Pascopyrum smithii	western wheat grass	S4	1
Persicaria amphibia	water smartweed	S5	3
Petasites frigidus	arctic butterbur	S5	1

Appendix A All Plant Species Observed in the PDA During Field Surveys
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Scientific Name	Common Name	Provincial Rank	Number of Occurrences in the PDA
Petasites frigidus var. *palmatus*	palmate-leaved colt's-foot	S5	1
Petasites frigidus var. *sagittatus*	arrow-leaved colt's-foot	S5	3
Phalaris arundinacea	reed canary grass	S5	12
Phleum pratense	common timothy	SNA	6
Phragmites australis	common reed	S5	1
Picea glauca	white spruce	S5	4
Pinus banksiana	jack pine	S5	1
Plantago major	common plantain	SNA	1
Poa compessa	Canada blue grass	SNA	1
Poa glauca	glaucous spear-grass	S5	1
Poa interior	inland bluegrass	SNR	1
Poa palustris	fowl blue grass	S5	1
Poa pratensis	Kentucky blue grass	S5	10
Polygonatum pubescens	hairy Solomon's seal	SNR	2
Populus balsamifera	balsam poplar	S5	3
Populus tremuloides	trembling aspen	S5	8
Potentilla anserina	silverweed cinquefoil	SNR	3
Potentilla norvegica	rough cinquefoil	S5	1
Prunus pensylvanica	pin cherry	S5	1
Prunus virginiana	choke cherry	S5	6
Pteridium aquilinum	bracken	S4S5	1
Quercus macrocarpa	bur oak	S5	3
Rhamnus alnifolia	alder-leaved buckthorn	S5	2
Ribes americanum	wild black currant	S5	1
Ribes hirtellum	smooth gooseberry	S4	2
Ribes oxyacanthoides	bristly wild gooseberry	S5	3
Ribes triste	wild red currant	S5	2
Rosa acicularis	prickly rose	S5	2
Rosa sp.	rose species	SNR	1
Rosa woodsii	wood's rose	S4	7
Rubus idaeus	wild red raspberry	S5	7
Rubus pubescens	dewberry	S5SNR	5
Rudbeckia hirta	black-eyed Susan	S5	1

Scientific Name	Common Name	Provincial Rank	Number of Occurrences in the PDA
Rumex crispus	yellow or curled dock	SNA	1
Rumex occidentalis	western dock	S5	4
Salix bebbiana	Bebb's or beaked willow	S5	2
Salix discolor	pussy willow	S5	1
Salix exigua	sandbar willow	S5	1
Salix interior	sandbar willow	SNR	2
Salix petiolaris	basket willow	S4	3
Salix planifolia	tea-leaved willow	S5	1
Sanicula marilandica	snakeroot	S5	6
Schizachne purpurascens	purple oat grass	S5	2
Scirpus cyperinus	wool-grass	S5	1
Scutellaria galericulata	hooded skullcap	S5	1
Setaria pumila	yellow foxtail	SNA	1
Shepherdia canadensis	soapberry	S5	1
Sibbaldiopsis tridentata	three-toothed cinquefoil	S5	1
Smilax lasioneura	carrion flower	S4	2
Solidago canadensis	Canada goldenrod	S5	4
Solidago gigantea	late goldenrod	S5	2
Solidago rugosa	rough-leaved goldenrod	SNA	1
Sonchus arvensis[1]	field sow-thistle	SNA	3
Spartina gracilis	alkali cord grass	S4	1
Spiraea alba	meadowsweet	S5	2
Spiraea alba var. *latifolia*	meadowsweet	SNA	1
Symphoricarpos occidentalis	western snowberry	S5	4
Symphyotrichum laeve	smooth aster	S5	2
Symphyotrichum lanceolatum	panicles aster	S5	2
Symphyotrichum lateriflorum	calico or wood aster	S4	1
Symphyotrichum puniceum var. *puniceum*	purple-stemmed aster	S5	1
Symphyotrichum sp.	aster	SNR	1
Taraxacum officinale[1]	common dandelion	SNA	9
Thalictrum dasycarpum	tall or purple meadow-rue	S5	6
Thalictrum sp.	meadow-rue, meadowrue	SNR	1
Thalictrum venulosum	veiny meadow-rue	S5	5

Appendix A All Plant Species Observed in the PDA During Field Surveys
September 2015

Scientific Name	Common Name	Provincial Rank	Number of Occurrences in the PDA
Thinopyron intermedium	wheat grass	SNR	1
Tilia americana	basswood	S4	2
Toxicodendron rydbergii	poison-ivy	SNR	6
Trientalis borealis	northern starflower	S5	3
Trifolium hybridum	alsike clover	SNA	3
Trifolium pratense	red clover	SNA	2
Trisetum spicatum	trisetum sp.	SNR	1
Typha angustifolia	narrow-leaved cat-tail	S4	1
Typha latifolia	common cat-tail	S5	1
Ulmus americana	American or white elm	S4	6
Urtica dioica	stinging nettle	S5	2
Vaccinium angustifolium	low sweet blueberry	S4	2
Viburnum lentago	nannyberry	S4	2
Viburnum opulus	highbush-cranberry	S5	1
Viburnum opulus var. *americanum*	highbush-cranberry	S5	5
Viburnum rafinesqueanum	downy arrow-wood	SNR	1
Viburnum rafinesquianum	downy arrow-wood	S4	2
Vicia americana	common vetch	S5	9
Vicia cracca	tufted vetch	SNA	1
Zizia aptera	heart-leaved alexanders	S5	1
Grand Total			501

APPENDIX B
PHOTOS

Appendix B PHOTOS

Photo 1 – Example of a wetland assessed along the D604I transmission line route(s); classified as "Bog" under the National Wetlands Working Group (1997) wetland classification system.

Photo 2 – Example of a wetland assessed along the D604I transmission line route(s); classified as "Marsh" under the National Wetlands Working Group (1997) wetland classification system.

Photo 3 – Example of a wetland assessed along the D604I transmission line route(s); classified as "Swamp" under the National Wetlands Working Group (1997) wetland classification system.

Photo 4 – Example of a wetland assessed along the D604I transmission line; classified as "Shallow Open Water" under the National Wetlands Working Group (1997) wetland classification system.

Photo 5 – Example of a site classified as pasture along the D604I transmission line route(s).

Photo 6 – Example of a site classified as grassland along the D604I transmission line route(s).

Photo 7 – Example of a site classified as deciduous forest along the D604I transmission line route(s).

Photo 8 – Example of a site classified as mixedwood forest along the D604I transmission line route(s).

Photo 9 – Example of a site classified as coniferous forest along the D604I transmission line route(s).