MANITOBA – MINNESOTA TRANSMISSION PROJECT
Environmental Impact Statement

CHAPTER 16
SEPTEMBER 2015

ASSESSMENT OF POTENTIAL ENVIRONMENTAL EFFECTS ON LAND AND RESOURCE USE

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ABBREVIATIONS AND ACRONYMS

AAC	annual allowable cut
AC	alternating current
ASI	Area of Special Interest
ATK	Aboriginal traditional knowledge
ATKS	Aboriginal traditional knowledge study
ATV	all-terrain vehicle
Bipole III	Bipole III Transmission Project
CEC	Clean Environment Commission
CEnvPP	Construction Environmental Protection Plan
CHRS	Canadian Heritage Rivers System
D604I	Dorsey to Iron Range 500 kV Transmission Line
dB	decibels
DLS	Dominion Land Survey
EIS	environmental impact statement
ESS	environmentally sensitive sites
FDAV	Forest Damage Appraisal and Valuation
FMU	Forest Management Unit
FNMEP	First Nation and Metis engagement process
FRI	Forest Resource Inventory
GBHZ	Game Bird Hunting Zone
GDP	gross domestic product
GHA	Game Hunting Area
GIS	geographic information system
ha	hectare
Keeyask	Keeyask Infrastructure Project
km	kilometre
KPI	key person interview

kV	kilovolt
LAA	local assessment area
m	metre
m^3	cubic metre
MAI/ha	mean annual increment per hectare
mbgs	metres below ground surface
MB CEC	Manitoba Clean Environment Commission
MCWS	Manitoba Conservation and Water Stewardship
MIT	Manitoba Infrastructure and Transportation
MLOA	Manitoba Lodges and Outfitters Association
MMTP	Manitoba–Minnesota Transmission Project
MOA	Memorandum of Agreement
NCC	Nature Conservancy of Canada
NEB	National Energy Board
NPA	*Navigation Protection Act* (RSC 1985, c. N-22)
OTA	Open Trapping Area
PAI	Protected Areas Initiative
PDA	Project development area
PEP	public engagement process
PRA	Prairie Research Associates
PTH	Provincial Trunk Highway
PVWC	Pembina Valley Water Cooperative
RAA	regional assessment area
RM	Rural Municipality
ROW	right-of-way
RVTC	Riel–Vivian Transmission Corridor
SEWPCC	South End Water Pollution Control Centre
TLE	Treaty Land Entitlement
U.S.	United States

VC	valued component
WMA	Wildlife Management Area
Wuskwatim	Wuskwatim Generating Station and Transmission Projects

GLOSSARY OF TECHNICAL TERMS

Access	The ability to enter an area or reach a particular location
Access road	A road that affords access into and out of a construction or maintenance area
Aesthetics	Characteristics relating the appearance or attractiveness of something
Afforestation	The establishment of a forest or stand of trees by sowing, planting or natural regeneration on an area not previously forested, or in areas where forests were cleared long ago and other land use patterns have dominated the landscape for many generations (Dunster and Dunster 1996)
Aggregate	A quarry mineral that is used solely for construction purposes or as a constituent of concrete other than in the manufacturing of cement and includes sand, gravel, clay, crushed stone and crushed rock
Annual allowable cut	The volume of wood that can be harvested in one year from any area of forest under a sustained yield management regime. The term allowable cut is generic and represents a class of models applied when substantial inventories of mature timber exist and the management focus is on harvest volumes (Dunster and Dunster 1996)
Aquifer	A body of rock or sediment that is sufficiently porous and permeable to store, transmit and yield quantities of groundwater to wells and springs
Casual quarry permit	An annual permit issued for the production of a specified quantity of Crown quarry mineral (Quarry Minerals Regulation 1992)
Commercial forest zone	The geographic area, defined by Forestry and Peatland Management Branch, that is capable of producing trees large enough for commercial harvesting. The Commercial Forest Zone includes most of the Prairie, Boreal Plains and Boreal Shield ecozones. It is also referred to as the Productive Forest Zone

Crown closure	The percentage of the ground covered by a vertical projection of the outermost perimeter of the natural spread of the foliage of plants. Crown closure is estimated from aerial photographs by a photo-interpreter
Cutting class	Cutting class is based on size, vigour, state of development and maturity of a forest stand for harvesting purposes (Manitoba Conservation 2007a)
Double line	A GIS feature that forms a polygon for which an area can be calculated
Encumbrance	A charge or lien on land, other than a mortgage
Footprint	The surface area occupied by a structure or activity
Forest	A collection of landscape types, each characterized by a unique combination of soils and surficial geology (landforms)
Forest succession	A series of dynamic changes in ecosystem structure, function and species composition over time as a result of which one group of tree species succeeds another through stages leading to a potential natural community or climax stage (Dunster and Dunster 1996)
Game bird hunting zone	Designated areas in Manitoba in which game bird hunting is regulated by species, means, seasons
Game hunting area	Designated areas in Manitoba in which game hunting is regulated by species, quota, means, seasons
Groundwater	Water that occurs beneath the land surface and fills the pore spaces of soil or rock below the saturated zone
Growing stock	The trees growing in a forest or stand, usually measured as number of trees or volume per unit area (Dunster and Dunster 1996)
High-value forest sites	Includes enhanced silviculture sites, research and monitoring sites, privately managed woodlots, plantations, shelterbelts and productive forest areas
Landscape	Pertains to the visible features of an area of land
Mean annual increment	The average annual accrual of total volume on live trees (at measurement) since stand establishment (Canadian Council of Forest Ministers 2004)
Mineral disposition	A claim, mineral exploration licence or a quarry permit

Open trapping zone area	Areas of the province so designated for the trapping of furbearers
Polygon	In GIS terms, a stream of digitized points approximating the delineation (perimeter) of an area (*e.g.*, forest type) on a map (Dunster and Dunster 1996)
Precommercial thinning	A silvicultural treatment to reduce the number of trees in young stands (improve spacing), carried out before the stems are large enough to be used or sold as a forest product (Dunster and Dunster 1996)
Private quarry permit	A permit for private aggregate or quarry operations issued by Manitoba Mineral Resources
Productive forestland	Includes all forest land capable of producing merchantable wood regardless of its existing stage of productivity (Manitoba Conservation 2007b). It includes commercial forest area, timber sales and timber permits, AAC and the volume of standing timber
Protected area	A protected area prohibits, through legal means, logging, mining (including aggregate extraction), and oil, petroleum, natural gas or hydro-electric development
Provincial forest	Provincial forests have been established for the perpetual growth of timber, the preservation of forest cover and to provide for a reasonable use of the resources contained on the forestlands (Manitoba Government 2011)
Quarry	An open excavation or pit from which stone, gravel or sand is obtained by digging, cutting or blasting
Quarry lease	A 10-year term lease granted by the Crown with the exclusive rights to excavate quarry minerals (e.g., sand, gravel, clay, shale, gypsum, peat, salt, rock or stone)
Reforestation	The natural or artificial restocking of an area with forest trees. Typically, refers to planting (Dunster and Dunster 1996)
Silviculture	The art, science and practice of controlling the establishment, composition, health, quality and growth of the vegetation of forest stands (Dunster and Dunster 1996)
Single line	A GIS feature represented by a line, for which area cannot be calculated

Stand stock volume table	Compiled from provincial volume sampling data, the table is comprised of forest stand volume estimates by type of aggregate, diameter at breast height class and species for specific areas throughout the Province. Volumes are provided at various utilization levels for cutting classes 3, 4 and 5 stands
Strata	A subdivision of the forest area or population to be inventoried. Sample populations are usually stratified (divided into strata) to obtain separate estimates (volume yield curves) for each stratum (Dunster and Dunster 1996)
Type of ownership	Nine ownership codes define provincial Crown land (0, 1 & 2), federal Crown land (3), municipal (4), patented (5), local government district (6), Indian Reserve (7) and other (8). (Manitoba Conservation 2007b)
Vadose zone	unsaturated zone above the water table
Yield curves	In its simplest form, a plot of expected fibre yield in terms of volume per unit area, against the stand age (Dunster and Dunster 1996)

16 Assessment of Potential Environmental Effects on Land and Resource Use

16.1 Introduction

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

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

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

Land and resource use was selected as a valued component (VC) because of regulatory considerations and its importance to communities, property owners, resource users (*e.g.,* hunters and trappers, commercial operators and the general public), and other stakeholders. Components of land and resource use are protected or otherwise regulated under various legislation, including, but not limited to, *The Crown Lands Act* (C.C.S.M. c. C340), *The Provincial Parks Act* (C.C.S.M. c. P20)*, The Forest Act* (C.C.S.M. c. F150) and *The Mines and Minerals Act* (C.C.S.M. c. M162). Manitoba Conservation and Water Stewardship (MCWS) and the National Energy Board (NEB) require land and resource use to be assessed, as outlined in Section 16.1.1.

The transmission line will intersect residential developments and areas currently used for both commercial (*e.g.*, forestry, mining, trapping and guide outfitting) and non-commercial (*e.g.*, sport hunting and fishing) land use. Agriculture, due to its importance in the RAA as a land use, is

addressed separately (Chapter 15). Traditional land and resource use is also addressed separately (Chapter 11).

Land and resource use comprises the following topic areas:

- Property and Residences – land tenure and property ownership (e.g., private, Crown land, municipal-owned land, land survey patterns [section-township-range, river lot]), residential development, proposed residential development (i.e., private subdivisions), private property value; other agro-intensive development (e.g., Hutterite colonies); industrial developments; and development and zoning controls
- Designated lands and protected areas – protected areas, proposed protected areas, Areas of Special Interest (ASIs), ecological reserves, provincial parks, provincial forests, wildlife management areas (WMAs), heritage rivers, non-governmental conservation lands, First Nation reserves and treaty land entitlements
- Recreation and tourism – trails (hiking, snowmobile, all-terrain vehicles [ATVs]), waysides/picnic sites, campgrounds, golf courses, recreational facilities, lodges, attractions/museums and tourism sites, canoeing/navigation
- Mining – quarry and aggregate sites/leases, permits, withdrawal areas, peat sites/leases
- Forestry – productive forest land, high value forest sites, private woodlots, shelterbelts
- Hunting and trapping (as distinguished from First Nation and Metis resource use covered in Chapter 11) comprised of activities within open trapping areas, game hunting areas, game bird hunting zones) and sport/recreational fishing
- Groundwater and surface water use

The transmission line routing process considered potential effects on land and resource uses, as discussed in Section 16.1.2.

This chapter presents baseline conditions for land and resource use and assesses the effects of Project activities on land and resource use from construction, operation and maintenance of the Project as well as an assessment of cumulative effects on land and resource use.

16.1.1 Regulatory and Policy Setting

16.1.1.1 Primary Regulatory Guidance

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

- the Project Final Scoping Document, issued on June 24, 2015 by Manitoba Conservation and Water Stewardship's Environmental Approvals Branch, which represents the Guidelines for this EIS

- the relevant filing requirements under the *National Energy Board Act* (R.S.C., 1985, c. N-7), and guidance for environmental and socio-economic elements contained in the National Energy Board (NEB) Electricity Filing Manual, Chapter 6
- the *Canadian Environmental Assessment Act, 2012* (S.C. 2012, c. 19, s. 52) and its applicable regulations and guidelines

16.1.1.2 Additional Federal Guidance

Overhead transmission lines are of potential interest to Transport Canada under the *Navigation Protection Act* (R.S.C. 1985, c. N-22) (NPA) with respect to Scheduled Waters. The purpose of the NPA is to regulate works and obstructions that risk interfering with the public right of navigation in scheduled navigable waters. The NPA requires owners who propose to construct or place a work in a waterway on the List of Scheduled Waters apply or prepare a Notice to the Minister unless the work meets criteria set out in a Minor Works Order. Works meeting the assessment criteria are classed designated works under the NPA and are subject to specific terms and conditions for construction. Classes of work that are considered for their effect to navigation as established by the Order include Aerial Cables – Power and Telecommunication. This class of work can proceed without Notice under the NPA as long as they comply with requirements of the Minor Works Order (Transport Canada 2014). The Assiniboine and Red rivers are both scheduled waters under the Act. Navigation is also protected in Canada (*i.e.*, the right to use navigable waters as a highway) for non-scheduled navigable waters not listed in the Act. Other permanent non-scheduled waterbody crossings where navigation is possible (*e.g.,* by canoe/kayak) include Cooks Creek and the La Salle, Seine and Rat rivers. However, according to section 58.301 of the *NEB Act*, an international power line is not considered a work to which the NPA applies. As such, the NEB will make the decision whether to approve proposed crossings as part of its review of the Project. No other relevant federal legislation, policy or agreements related to acquiring permits are considered in the land and resource use environmental assessment. No federal lands are affected by the Project.

16.1.1.3 Additional Provincial Guidance

Relevant provincial legislation, regulation, policy and agreements considered in the assessment of environmental effects for land and resource use include *The Environment Act* (C.C.S.M. c. E125), Pesticides Regulation, M.R. 94/88; *The Forest Act* (C.C.S.M. c. F150); *The Mines and Minerals Act* (C.C.S.M. c. M162); *The Peatlands Stewardship and Related Amendments Act* (C.C.S.M. c. P31); *The Provincial Parks Act* (C.C.S.M. c. P20); *The Ground Water and Water Well Act and Related Amendments Act* (not yet in force); *The Manitoba Hydro Act* (C.C.S.M. c. H190); *The Planning Act* (C.C.S.M. c. P80); MCWS Forest Damage Appraisal and Valuation (FDAV) Policy; and the Red River Floodway Agreement. Approximately 56 km of the existing and New ROW is on provincial Crown land. It is Manitoba Hydro's intention to apply for work permits from Manitoba Conservation for project activities occurring on provincial Crown lands.

The Forest Act

Administered by the MCWS Forestry Branch, *The Forest Act* (C.C.S.M. c. F150) was established to manage provincial Crown forests by setting forest harvest levels; monitor forest management activities; ensure forests are regenerated; provide protection from insects and disease; and collect revenue for use of Crown timber.

Permits are issued under the Act for activities such as commercial timber harvesting, general forestry and operating, Christmas tree cutting, personal use (fuelwood), timber permits and timber sale. It is Manitoba Hydro's intention to apply for a permit to cut down timber for the Project on provincial Crown land under the Act. Approximately 4.5 km of the ROW crosses through Sandilands Provincial Forest.

Manitoba Conservation's FDAV policy also applies to the Project. It outlines the parameters for calculating financial compensation to the Crown due to (i) the removal for the removal of timber and (ii) the effect on high value silviculture investments on productive Crown forestlands.

The Mines and Minerals Act

Administered by the Mines Branch, *The Mines and Minerals Act* (C.C.S.M. c. M162) governs the disposition of mineral rights (permits, claims and leases), exploration, development and production of the province's non-fuel mineral resources and the rehabilitation of mines and quarries. A quarry permit or quarry lease is first obtained to commence production of a quarry mineral (including aggregate) that is on Crown property or private land.

Permits to obtain quarry minerals (aggregate) are not anticipated to be applied for the Project. If Manitoba Hydro subsequently determines that such materials are required, details on borrow sources (*e.g.*, locations; quantities) will be provided in permit application to the Mines Branch.

The Peatlands Stewardship and Related Amendments Act

Administered by MCWS, *The Peatlands Stewardship and Related Amendments Act* (C.C.S.M. c. P31) or *The Peatlands Stewardship Act* takes over the administration of Crown peat and peatlands from *The Mines and Minerals Act* (C.C.S.M. c. M162). The first of its kind in Canada, the Act empowers MCWS to designate Provincially Significant Peatlands that are protected from all types of development. The Act also cancelled the applications for 119 new quarry leases. The moratorium related to peat mining will expire June 15, 2015 or sooner if new regulations under the legislation are in place before then. One mineral peat area is within the PDA.

The Provincial Parks Act

Administered by the Parks and Natural Areas Branch of MCWS, *The Provincial Parks Act* (C.C.S.M. c. P20) was established to protect natural lands and the quality of life; manage existing and future provincial parks so representative examples of natural and cultural heritage are conserved; and allow economic opportunities to contribute to the protection of the province's natural regions.

The Act provides for the designation and management of provincial parks as part of a system plan. The system plan sets out proposed boundaries, classifications and land use categories of provincial parks. Provincial park classifications include wilderness park, natural park, recreation park or heritage park. Land in provincial parks is categorized into one or more of the following land use categories: wilderness, backcountry, resource management, recreational development, heritage or access. An Access category can accommodate certain types of existing and future infrastructure, including transmission lines and right-of-way. The ROW crosses through Duff Roblin Heritage Provincial Park east of PTH 75 within the City of Winnipeg for 0.56 km.

The Groundwater and Water Well and Related Amendments Act

Administered by Manitoba Conservation and Water Stewardship, components of *The Groundwater and Water Well and Related Amendments Act* (not yet in force) that are relevant to groundwater resources pertain to issues of: contamination, sealing of wells, control of well flow (*i.e.,* artesian or test hole), and sensitive groundwater areas.

The purposes of the Act is: (a) to provide for the protection and stewardship of Manitoba's aquifers and groundwater; (b) to ensure that the construction, maintenance and sealing of wells and test holes meet standards that protect (i) the environmental quality of Manitoba's aquifers and groundwater, (ii) human health and safety; and (c) to provide for the collection and sharing of well, aquifer and groundwater information to better understand, manage, conserve, protect, develop and use Manitoba's aquifers and groundwater.

The Planning Act and Provincial Planning Regulation

Administered in cooperation by Manitoba Municipal Government and the associated municipal councils, *The Planning Act* (C.C.S.M. c. P80) provides a framework for land use planning strategies at the provincial, regional and local scale. The Provincial Planning Regulation, M.R. 81/2011 provides a framework to guide development planning. Requirements of the Act and its regulations do not apply to the Crown or Crown agencies. Manitoba Hydro notes that, as a Crown Corporation, they are not directly subject to the legislative provisions and are generally exempt from them in terms of development planning.

The Manitoba Hydro Act

The purposes of the Act are to:

… provide for the continuance of a supply of power adequate to the needs of the province and to engage in and to promote economy and efficiency in the development, generation, transmission, distribution, supply and end-use of power and, in addition, are (a) to provide and market products, services and expertise related to the development, generation, transmission, distribution, supply and end-use of power, within and outside the province; and (b) to market and supply power to persons outside the province on terms and conditions acceptable to the board (*The Manitoba Hydro Act*, C.C.S.M. c. H190).

Section 23(1) of the Act allows Manitoba Hydro to construct, operate, and maintain its infrastructure anywhere on, under, over, across, or along public highways, streets, lanes, or other public places. This Act supersedes municipal level powers granted under legislation such as *The Planning Act* (C.C.S.M. c. P80) and *The Municipal Act* (C.C.S.M. c. M225).

Red River Floodway Agreement

A Memorandum of Agreement (MOA) was signed between Her Majesty the Queen, in the Right of the Province of Manitoba and the Manitoba Hydro Electric Board (Red River Floodway Agreement 1985) granting Manitoba Hydro an easement or ROW for the construction and use of certain transmission lines and related facilities within the boundaries of the floodway (Appendix 16A). In addition, the MOA provided Manitoba Hydro with the right to unimpeded access to and from the right-of-way over and upon property adjoining the ROW, subject to stipulations regarding maintaining routes and costs and risk associated with access assigned solely to Manitoba Hydro. The transmission line crosses onto the floodway east of PTH 75 and then parallels the floodway channel on the south and east sides of the City of Winnipeg for 19 km from Riel Converter Station to the rural municipality (RM) of Springfield.

Sustainable Development Policy

Manitoba Hydro has adopted a sustainable development policy with 13 guiding principles that influence corporate decisions, actions and day-to-day operations to achieve environmentally sound and sustainable economic development (Manitoba Hydro 1993). Manitoba Hydro applies the principles of sustainable development in all aspects of its operations (Chapter 23). Through corporate decisions and actions to provide electrical services, Manitoba Hydro projects must meet the needs of the present without compromising the ability of future generations to meet their needs (Manitoba Hydro 1993).

16.1.1.4 Additional Municipal Guidance

Municipal jurisdictions must adopt development plans and zoning bylaws to guide land and resource use planning decisions within their respective boundaries under *The Planning Act* (C.C.S.M. c. P80). A development plan is a bylaw that outlines the long-term vision and goals of a community to guide development within the planning area of a municipality or planning district. A zoning bylaw is a tool used by the planning authority to implement development plan policies and typically represents what is on the ground. Zoning bylaws are guided by and conform to the development plans. Zoning works by regulating the use of land and location of buildings and structures (Manitoba Municipal Government 2015). Municipal jurisdictions have a variety of development controls in place along the proposed ROW. Land use development controls based on applicable development plans and zoning bylaws are described further in Section 16.4.5.

Manitoba Hydro is cognizant that neither *The Planning Act* (C.C.S.M. c. P80), nor its Regulations, apply to the Crown or Crown agencies. However, it does seek to work cooperatively with the municipalities when planning, designing, constructing and operating and maintaining its Projects to limit the extent of possible interactions with their developments and plans.

16.1.1.5 Manitoba Hydro Corporate Policies and Programs

In addition to the regulatory requirements, Manitoba Hydro has corporate policies and programs to guide its activities, including policies related to municipal zoning and subdivision processes, sustainable development, agricultural biosecurity and landowner compensation. Manitoba Hydro also maintains guidance documents that reflect beneficial management practices as part of its Environmental Protection Program. Applicable guidance documents relate to vegetation management strategies and pesticide application requirements for transmission lines and stations.

16.1.2 Engagement and Key Concerns

As part of Manitoba Hydro's public engagement and First Nation and Metis engagement processes, Manitoba Hydro shared information and documented concerns throughout both processes (see Chapters 3 and 4 for more information). Additional land and resource use information was collected through key person interviews (KPIs) with representatives from resource and recreation groups.

Key issues regarding land and resource use identified through this process and the sections in the EIS where they are addressed are summarized in the following subsections.

16.1.2.1 The First Nation and Metis Engagement Process

Throughout the First Nation and Metis engagement process (FNMEP), Manitoba Hydro received comments about land and resource use. A summary of key feedback received consisted of interests and concerns with respect to traditional land and resource use is provided in Chapter 11 along with the assessment of effects on traditional land and resource use.

First Nation and Metis were provided opportunities to share their knowledge to help inform route selection and the environmental assessment through the FNMEP. First Nations raised specific issues about potential Project effects related to use of unoccupied Crown land and traditional land use activities during the FNMEP and Aboriginal traditional knowledge studies (ATKS) (see Chapter 4 for further discussion). A summary of the feedback received from FNMEP is provided in Chapter 4.

ATKS were prepared by those First Nations who wished to conduct studies for the Project (Chapters 4 and 11). In terms of First Nation harvesting or land use activities, Roseau River Anishinabe First Nation indicated that there are still members who hunt wild game (*e.g.,* moose, deer, fox and beaver), trap for rabbit, wild turkey and muskrat, sport fish, and harvest medicines, berries, nuts and wood. (Roseau River Anishinabe First Nation 2015). Principal concerns from the study related to the protection of the traditional areas identified in the Project area.

The ATKS prepared by Black River First Nation, Long Plain First Nation and Swan Lake First Nation (2015) identified heritage, historical, cultural and sacred values in the Project area related to big game hunting, trapping, plant gathering, and camping (Chapter 11).

Peguis First Nation completed a Land Use and Occupancy Interview Study for the Project. Traditional activities practiced in the PDA by PFN members include cultural and ceremonial activities, camping, fishing, gathering (food and medicinal plants), recreation, visiting lodges, guiding, hunting (big and small game, waterfowl), trapping/snaring, logging and forestry and rice harvesting (Peguis First Nation 2015).

Comments from the Peguis First Nation study related to both construction and operation phases of the Project related to:

- locations for berry picking, medicinal plant harvesting or sites with rare plants
- maintenance of bush and shrubs on Crown lands and lands owned by Manitoba Hydro

The traditional knowledge information received added to the Project's understanding of the existing socio-economic conditions, inform baseline conditions, support the scope of issues assessed and provide input into mitigation practices.

16.1.2.2 Public Engagement

In addition to the feedback received during the First Nations and Metis engagement process, Manitoba Hydro received numerous comments about land and resource use during the three rounds of public engagement process (PEP). Detailed information on the PEP is provided in Chapter 3. Information is also available in the supporting public engagement summary reports and appendices. The following is a summary of feedback received regarding interests and concerns with respect to land and resource use:

- potential damage from proximity of the line to sensitive areas, parks and protected areas
- compatibility with land use plans and potential effects on residential developments, including private subdivisions applications in the RMs of Tache and La Broquerie, due to proximity of the line and perceived reduction in property value
- proximity of the transmission line to cities, towns and villages, rural residential and agro-industrial development, residential buildings and property
- additional transmission lines being located near residences and additional encroachment of Riel Converter Station on private property
- effects on landscape scenic values
- intrusion to neighbourhood residences, thus affecting the serenity of living in the country
- routing too close to schools, stores in the community
- additional noise generated during construction and operations of the Project:
- clearing of forested/woodlot areas adjacent to existing transmission lines, thus decreasing the barrier to noise pollution
- potential effects on recreation opportunities from:

- proximity to recreational use areas (e.g., golf courses) and tourism effects, aesthetic effects (e.g., removal of tree cover)
- overlap of the transmission line ROW on snowmobile trails, particularly if trails need to rerouted, and associated costs
- routing too close to recreational uses, including a camp area and golf course (La Verendrye Golf Course)
- routing next to a public space (Duff Roblin Heritage Provincial Park)
- potential effects on forestry, mining, hunting and trapping activities due to:
- increased ATV and snowmobile access by the New ROW and related effects on hunting in wilderness areas
- effects on forestry resources, research test plots, tree farms and managed woodlots
- disruption of fur-bearing animals
- potential effects on well water quality
- other concerns related to Project routing:
- routing through populated areas instead of Crown lands
- routing too close to the Watson P. Davidson WMA

Where possible, concerns were addressed through the transmission line routing process (see Chapter 5 and Section 2.3 of the Socio-economic and Land Use Technical Data Report). These included avoidance, where possible, and consideration of proximity to the following features:

- First Nation reserves/treaty land entitlement
- campgrounds, picnic areas
- recreational sites (golf courses, skiing areas)
- religious/worship sites (churches)

A number of the concerns heard during engagement that are pertinent to Land and Resource Use were addressed through routing, and the following are examples of such. Alternative route evaluation following Round 2 of the PEP led to the selection of a preliminary preferred route that avoided multi-lot subdivision developments in the RM of Tache. During round 3 of the PEP, Manitoba Hydro learned of the importance of the sand and gravel operation, located at Section 28-9-E, to the RM of Tache. Consequently, the Final Preferred Route was adjusted to avoid bisecting the gravel deposit with the ROW. Two adjustments were made to the Final Preferred Route within the RM of La Broquerie as a result of the Round 3 PEP. The first adjustment, occurring in Section 32-6-8E, re-aligned the route further to the east to reduce potential effects on a municipal golf course. The second adjustment occurred in sections 27/38-4-8E, involving moving the route further west to avoid a private wildlife area.

Concerns and issues raised in relation to the land and resource use also informed the selection of effects addressed in this chapter (Table 16-1).

16.1.2.3 Engagement with Provincial Government

MCWS Forestry, Wildlife, Parks and Natural Areas, the Water Stewardship Division and representatives from MCWS (including from Park System Planning and Ecology) were contacted as part of the engagement process to attended stakeholder workshops and meetings. During Round 1 of the PEP, MCWS provided information on where certain developments are prohibited on Crown land (*i.e.,* protected areas) and expressed preference that the Project limit effects on intact forested areas and wetlands. MCWS also indicated to Manitoba Hydro that there were minimal groundwater concerns due to their understanding of the limited risk of the Project to groundwater resources(Phipps 2014, pers. comm.). During Round 2, ecological reserves were identified as areas of least preference. Concerns were raised about potential drainage-related effects on the proposed Balsam Willow ecological reserve; and Project proximity to the Watson P. Davidson and Spur Woods WMAs and proximity to a proposed protected area east of the Watson P. Davidson WMA. These areas were considered in the alternative route evaluation and alternative routes were developed to avoid them. Manitoba Infrastructure and Transportation (MIT) also indicated during Round 3 that they had no concerns with respect to the Final Preferred Route in relation to the specific issue of provincial quarries.

16.1.2.4 Summary

The overall effect of the route selection process resulted in the reduction of effects on land and resource use. Generally, areas or features avoided, where possible, included multi-lot residential development, recreational land use areas, mineral and aggregate extraction areas of concern, existing and proposed ecological reserves and existing protected areas (*e.g.,* WMAs). A complete list of areas avoided as a result of the PEP and areas of least preference identified for route selection are provided in Chapters 3 and 5, respectively.

16.2 Scope of Assessment

16.2.1 Spatial Boundaries

The following spatial boundaries are used to assess residual and cumulative environmental effects of the Project on Land and Resource Use (see Map 16-1 – Regional Assessment Area and Map 16-2 – Glenboro South Station Regional Assessment Area):

- **Project development area (PDA):** encompasses the Project footprint and is the anticipated area of physical disturbance associated with the construction, operation and maintenance of the Project, including Glenboro South Station and the Dorsey and Riel converter stations.
- **local assessment area (LAA):** includes the PDA and a 1 km buffer on either side of the PDA for the Existing Corridor and New ROW segments and a 1 km buffer around Glenboro South Station and Dorsey and Riel converter stations. The LAA for the transmission line and station components covers an area where effects on land and resource use are likely to be most

prevalent based on the spatial scoping of the following components that relate to land and resource use, wildlife and wildlife habitat (Chapter 9) and noise (Chapter 18).

- **regional assessment area (RAA):** includes the PDA and LAA and the boundaries of all rural municipalities (RMs) traversed by the PDA. From north to south, RMs included are Rosser, Headingley, Macdonald, Ritchot, Springfield, Tache, Ste. Anne, La Broquerie, Stuartburn, Piney and South Cypress (for the Glenboro South Station component only). Effects of other projects and activities occurring within the RAA that have potential to act cumulatively with the Project are assessed based on the RAA.

16.2.2 Temporal Boundaries

The assessment addresses potential effects during Project construction, and operation and maintenance, phases. During construction, the characteristics of the land along the ROW may be altered, affecting some land uses. During construction, land and resource use will also be affected by the presence of work crews and noise associated with operating heavy equipment. The Project will affect some land and resource uses throughout its operation and maintenance phase. For example, commercial forestry, with the exception of tree-farming, cannot occur within the ROW.

Subject to regulatory approval, construction of the Project transmission line (designated D604I) will span from Q3 2017 to Q1 2020; while modifications to Dorsey and Riel converter stations, and Glenboro South Station will span from Q3 2017 and Q4 2019. D604I is anticipated to be in service in 2020 and will have a service life of at least 100 years.

16.2.3 Administrative Boundaries

Consideration was given to the following provincial and municipal administrative boundaries to gather baseline information in the preparation of this EA:

- Rural Municipality (RM) boundaries established by the Province. From north to south the RMs considered include Rosser, Headingley, Macdonald, Ritchot, Springfield, Tache, Ste. Anne, La Broquerie, Stuartburn, Piney and South Cypress (for the Glenboro South Station component only).
- Urban municipal boundaries and community boundaries, including the St. Norbert and South St. Vital neighbourhoods in the City of Winnipeg; the Town of Ste. Anne; and the Village of Glenboro (for the Glenboro South Station component only).
- Provincial planning district boundaries for Cypress, Macdonald-Ritchot and South Interlake.
- Municipal development plan designations and zoning bylaw zones as set out in municipal development plans and zoning bylaws and the Provincial Land Use Policies (Provincial Planning Regulation 81/2011) related to Crown lands.

- Administrative Boundary Plan for Duff Roblin Provincial Heritage Park under the Manitoba Provincial Parks System Plan.
- Crown land encumbrance data designated on a section-township-range basis provided by the provincial Crown Lands and Property Agency.
- Forest Management Units (FMU) 1 and 24 boundaries, provincial park boundaries, ecological reserve boundaries and WMA boundaries established by the province through regulation and by Director Plans of Survey.
- Province of Manitoba Open Trapping Zone Areas – species trapping data are not available for open trapping zones in the province.
- Province of Manitoba Game Hunting Area (GHA) boundaries – data on game hunting are only partially available in GHAs for some species (*e.g.*, white-tailed deer, moose, black bear, wild turkey).
- No regional game bird hunting data were available for Game Bird Hunting Zone (GBHZ) areas within the RAA as the information is only presented on a larger provincial scale (i.e., southern Manitoba).
- Individual outfitter allocation areas in southern Manitoba were not available from MCWS due to privacy and confidentiality issues.

The administrative boundaries identified above affected the availability, quality and organization of baseline land and resource use data used to establish baseline conditions. The extent of data availability and type of data available was factored into the analysis.

16.2.4 Learnings from Past Assessments

Manitoba Hydro's previous experience in transmission line assessments and monitoring programs has shaped the assessment for the land and resource use VC. Documents reviewed for potential effects of energy project developments on land and resource use included: transmission line environmental assessments (*e.g.*, St. Vital Transmission Complex [SVTC], Bipole III Transmission Project [Bipole III]); the Manitoba Clean Environment Commission's (MB CEC) 2007 Report on Public Hearing: Bipole III Transmission Line (2013); construction monitoring reports and access management plans for the Wuskwatim Generating Station and Transmission Projects (Wuskwatim) and Keeyask Infrastructure Project (Keeyask).

From previous transmission line projects, Manitoba Hydro understands the importance of conducting a multi-staged route selection process coupled with public engagement. Building upon the work undertaken for Bipole III, a multi-stage route selection process was undertaken for MMTP, which resulted in the consideration of numerous qualitative and quantitative factors, including land and resource use interests and the selection of a route that offered a balance of considerations.

Previous experience with Bipole III and SVTC has shaped Manitoba Hydro's FNMEP with First Nations and Metis, and Manitoba Hydro's PEP with community interest groups, landowners and various stakeholders. Three rounds of the FNMEP and PEP were undertaken for MMTP to identify potential issues and concerns. Property owners affected by the ROW will be contacted prior to construction to discuss tower placement ("tower spotting") and construction access timing.

In addition to effects avoidance through route selection, previous projects have informed the selection of mitigation measures applied to avoid or reduce effects on land and resource use. Access management was identified as an issue of concern for Bipole III, Wuskwatim and Keeyask. In response, Manitoba Hydro developed access management plans to limit unauthorized backcountry access, educate stakeholders and decommission and rehabilitate access routes created by those projects. Manitoba Hydro will apply the experience gained in implementing access management measures on the Wuswatim and Keeyask Project as appropriate for MMTP, to reduce or avoid access-related issues.

Issues identified under land and resource use from previous environmental assessments were incorporated into the assessment for MMTP. Related issues for land and resource use typically cover a spectrum of concerns. Some will relate specifically to potential Project effects (*e.g.*, loss of productive forestland). Others will reflect perception of potential land use conflicts and related effects on the enjoyment or value of property. Related concerns may vary in relation to such factors as geographic context and property tenure, as well as existing and prospective land and resource use patterns (*e.g.*, rural residential development).

Before finalizing the assessment scope, a review of other large transmission lines and linear developments was undertaken to make sure that the land and resource use elements included in this EIS were both comprehensive and appropriate. This included a review of transmission line and pipeline projects that have undergone environmental assessments in Manitoba and other provinces, including several that have undergone reviews by the National Energy Board (BC Hydro 2007; BC Hydro 2013; NOVA Gas Transmission Ltd. 2013; TransCanada Corporation 2014). From this review, it was concluded that the scope of assessment for the MMTP, which was based both on requirements of the NEB filing manual and on feedback from the public and First Nation and Metis engagement processes, was appropriate.

16.3 Methods

16.3.1 Existing Conditions Methods

Information on existing conditions for land and resource use was obtained through primary and secondary research. Secondary research included a desktop review of statistical sources, previous studies, research findings, other environmental assessments and a review of traditional knowledge, where applicable. Primary data were collected from records of public engagement activities undertaken as part of the PEP and FNMEP for the Project (*i.e.*, open houses, stakeholder meetings), KPIs with identified stakeholders and data requests of government/

stakeholder groups/organizations as required. The following sections present additional information on the sources used to characterize baseline conditions and how the information was interpreted and analyzed.

For more detailed information regarding methods or findings, see the Socio-economic and Land-Use Environment Technical Data Report.

16.3.1.1 Sources of Information

The following sources and types of information were used to characterize the baseline conditions for land and resource use:

- published reports from government agencies related to land and resource use
- previously completed environmental impact assessments and information from past research conducted in the region, including previous project hearing reports and monitoring reports (*e.g.*, Bipole III, Wuskwatim and Keeyask)
- property value literature to review effects of transmission lines on property value, including Manitoba Hydro property value monitoring reporting and PRA (2015, unpublished draft)
- ATKS on First Nation resource use
- public engagement process and First Nation and Metis engagement process
- municipal government development plans and zoning for waste disposal ground information, private subdivision applications, building location data
- publicly available information from government websites (*e.g.*, Manitoba Protected Areas Initiative; MCWS Parks and Natural Areas Branch) on provincial forests, WMAs, wildlife refuges, provincial parks/national parks, provincial Crown lands, private conservation lands, ecological reserves (including proposed areas), protected areas (including proposed areas) and ASIs
- provincial government and municipal government and organization websites (*e.g.,* Trails Manitoba, SnoMAN) and municipal planning and zoning documents and Travel Manitoba website to gather land use and spatial data on high value use areas (*e.g.,* campgrounds and resorts), recreational areas, wildlife viewing, hiking trails, ATV trails and snowmobile trails and shelters
- provincial government websites (*e.g.,* MCWS Forestry Branch; Manitoba Woodlot Association) for information on provincial Crown productive forestland, including annual allowable cut (AAC) and standing timber; forest fire, timber harvest depletion and plantations; timber sales and timber permits; high value forest sites consisting of enhanced silviculture sites, research, monitoring sites, woodlots, tree planting points; and private land forest values. Data on the provincial enhanced forest resource inventory, including data on yield curves by forest strata and land cover classification compiled from MCWS Forestry Branch; wood supply analysis reports; and photo interpretation of private land shelterbelts

- provincial government websites (*e.g.,* Mineral Resources Branch) for land use and spatial data on mineral dispositions, including mineral leases, quarry leases, quarry permits, mining locations and aggregate resources, provincial aggregate inventory reports, including the assignment of development status[1] (*i.e.*, high-medium-low potential for development or "Stop-Caution-Go" categorization with respect to the value of aggregate deposits), municipal planning and zoning documents ((Manitoba Local Government 2011; Manitoba Department of Energy and Mines 1979)
- provincial government websites (*e.g.,* MCWS) for land use and spatial data on surface water and groundwater licences and allocations, purpose/type of use (*i.e.*, industrial, agricultural, domestic, other), groundwater wells, flowing wells, springs and aquifers. Other literature used to gather this information included water management plans, historical MCWS provincial reports and flowing well areas and springs mapping (*i.e.,* artesian groundwater conditions).
- provincial government websites (*e.g.,* MCWS) for data on trapping, hunting, guiding and outfitters locations in southern Manitoba
- Chapter 4 – First Nation and Metis Engagement, Chapter 8 – Fish and Fish Habitat, Chapter 9 – Wildlife and Wildlife Habitat, Chapter 10 – Vegetation and Wetlands, Chapter 11 – Traditional Land and Resource Use, and Chapter 15 – Agriculture.

16.3.1.2 Desktop and GIS Analysis

Baseline data sources and secondary sources available were used to describe land and resource use existing conditions. Land and resource use metrics generated by the route selection process informed the ranking of preferred routes, from the built-environment perspective. Geospatial data were plotted using GIS software to determine the spatial distribution, nature, intensity of overlapping land-uses along alternative routes and the converter and stations. By using GIS overlay mapping, the following interactions of the Project on other land-uses were quantified:

- the number of dwellings and rural residential developments in proximity to the Project in the RAA

[1] The Province of Manitoba Mineral Resources Branch assigns development status (*i.e.*, high-medium-low potential for development or a "Stop-Caution-Go" categorization with respect to the value of the deposit) to aggregate deposits within rural municipalities and updates the status of deposits as further information becomes available. Deposits with a high rating are valuable aggregate deposits and development for other uses is not appropriate. Areas with a medium rating may have quality resources that have not yet been fully defined and caution is to be exercised in considering other uses for these areas. Areas with a low rating have little, if any aggregate value. The intent of the stop development designation is to protect the resource from conflicting surface land uses. The caution development status indicates deposits that are of a lower quality and have not been adequately proven for use. "Go" status implies a deposit that is of no recognized value as an aggregate resource where land uses are not restricted.

- the number of potential interactions or conflict with provincial forests, WMAs, wildlife refuges, provincial parks/national parks, provincial Crown lands, private conservation lands (*e.g.*, Ducks Unlimited), Nature Conservancy of Canada), ecological reserves (including proposed areas), protected area lands (including proposed areas) and ASIs in the RAA
- the number of interactions or conflict with high value use areas (*e.g.,* campgrounds and resorts), recreational areas, canoe routes, hiking trails, ATV trails and snowmobile trails in the RAA
- the number of interactions, conflict with, reduction or loss of productive forestland, high value forest sites, including enhanced silviculture sites, research and monitoring sites and private forestland in the RAA
- the extent of interactions with groundwater quantity in wells, (usage, depth to groundwater) and reduction in groundwater quality due to pesticide/ herbicide application for vegetation management in the LAA
- the number of interactions, conflict or interference with mineral dispositions (*e.g.*, mineral leases, quarry leases, quarry permits, quarry withdrawal areas, mining areas, aggregate resources) in the RAA
- the extent of interaction with provincial open trapping area zones and game hunting areas in the RAA

16.3.1.3 Key Person Interviews

KPIs were conducted with representatives identified from various groups in the environment, recreation and resource group sectors to supplement baseline information (*e.g.,* important features, usage and types of activities). Interview guides were developed to gather information from each of these groups (see Socio-economic and Land Use Technical Data Report [Stantec 2015d]). KPIs undertaken to supplement the description of land-use baseline conditions included the following organizations:

- RiversWest – Red River Corridor Inc.
- Lilac Resort, RV Lodging and Water Park
- SnoMan Inc.
- AtvMB
- Southwood Golf and Country Club
- La Verendrye Golf Club
- Manitoba Lodges and Outfitters Association (MLOA)
- Birch Point Outfitters
- K.C. Outfitting

Personal communications were conducted with representatives of provincial government agencies (*e.g.,* MCWS) to obtain information on surface water and groundwater licenses, surface and groundwater usage, big game and game bird hunting licence types, number of hunters and species harvest data (*e.g.,* wild turkey, white-tailed deer and black bear). In addition, an open house was held at the request of the Trapper's Association.

16.3.1.4 Field Studies

The following field studies were conducted to generate primary information on land and resource use:

- windshield land use surveys to identify private residences and building locations. Information collected was broken down by building type (*i.e.,* occupied house, agricultural building, outbuilding and other buildings [government, commercial, industrial and recreational])
- helicopter survey for forestland values. Information gathered included woodlot and private forestland locations and private shelterbelt locations

Field data collection was based on standard practices for environmental assessment and data requirements for inclusion as part of Manitoba Hydro field data collection protocols as well as post field data reporting (*e.g.*, description of field activities, what data were collected, incidental data).

16.3.1.5 Addressing Uncertainty

In some instances data limitations necessitated that a conservative approach be taken to accommodate uncertainty for the effects assessment. Conservative assumptions were made with respect to effects on groundwater quantity and quality and effects on hunting and trapping to account for data limitations. Furthermore, the assessment was conservative in its approach with respect to the effectiveness of identified mitigation measures by assuming worst-case scenarios.

The following gaps or limitations in the data for existing conditions were identified in the assessment:

- Province of Manitoba Open Trapping Zone Area – record of furbearer harvest is only by individual registered trapline in Registered Trapline Sections; individual species trapping data are not available for open trapping zones in the province.
- Province of Manitoba Game Hunting Area (GHA) boundaries – data on game hunting are only partially available in GHAs for some species (e.g., white-tailed deer, moose, black bear, wild turkey) and was limited in most cases to the number of licenses issued with minimal harvesting data.
- No regional game bird hunting data were available for GBHZ areas – data were limited to that collected on a provincial basis only by Environment Canada, Canadian Wildlife Service.
- Individual outfitter allocation areas in southern Manitoba were not available from MCWS.
- Location, accuracy and completeness of the provincial groundwater well data.

- Contractors that have drilled and installed wells submit the data that are in the provincial groundwater well database. The data cannot be verified for accuracy. Some wells do not have construction or water pumping details; therefore, the summaries of well construction details do not include data for every well in the database. The wells were drilled over a number of decades and at different times of the year. Therefore, the static water level data that are measured when the wells are initially installed is only one point in time. Groundwater levels can vary from seasonal, yearly and long-term variations.
- Many of the groundwater well locations are recorded as a centrepoint within a river lot, quarter section or section of land rather than the exact location of the well. The database user therefore does not know where on the land the well is located, but instead has a more general understanding of well location. This more general understanding of well location is sufficient to describe existing groundwater conditions in the region, but may result in a summary, which includes a higher number of wells within the LAA.
- MCWS, Groundwater Division was contacted to request baseline data for pesticides in the provincial groundwater monitoring wells within the RAA. The provincial groundwater monitoring wells are not sampled for pesticides and have not been historically and therefore do not have baseline pesticide or herbicide water well data available.

16.3.2 Assessment Methods

The overall environmental effects methods are presented in Chapter 7. The specific techniques used to carry out the assessment for land and resource use are presented in this section. They include:

- assessment approach
- potential environmental effects, effect pathways and measureable parameters
- environmental effects description criteria for the VC
- significance thresholds for residual environmental effects

16.3.2.1 Assessment Approach

Potential environmental effects on residential development; designated lands and protected areas, recreational areas; resource use (*e.g.*, timber harvesting, mining and quarrying; surface water and groundwater use; and trapping, guiding and hunting activities) were quantified through geospatial analysis using GIS and analysis of metadata related to land and resource use (*e.g.*, land area or usage). Provincial data and input gathered through stakeholder interviews were used in the assessment of effects.

Land and resource use data were collected based on sources identified in Section 16.3.1.1 and supplemented through public engagement, key person interviews and FNMEP and ATKS. Analysis of these data consisted of overlaying the data with the overall Project RAA, the

evaluation alternative routes, the Final Preferred Route and the station components to determine the number of interaction points and the spatial extent of overlap with land and resource use data. This information was used as part of the baseline, for analysis and subsequent assessment of Project Effects. Project effects related to transmission line development on property values was gathered from a literature review and PRA (2015, unpublished draft).

16.3.2.1.1 Property and Development

The assessment of change in property considers effects on displacement of dwellings, landowner concerns related to nuisance effects (*e.g.,* audible noise), property damage, decrease in property values and visual aesthetics.

GIS ANALYSIS

GIS spatial data analysis were used to determine the number of dwellings and distance from the PDA; residential developments in proximity to the Final Preferred Route; the amount of land within each RM traversed by the ROW; and the number of Crown parcels (encumbrances) located within the ROW.

ANALYSIS OF DEVELOPMENT POTENTIAL

Development plans and zoning bylaws were reviewed to analyze development potential within the RAA (Appendix 16B). Development plan land use designations were summarized in one of four categories: general agricultural (including Crown land); agricultural other than general uses; rural residential, commercial or industrial; and urban or settlement centre (see Map 16-4 – Development Plan Designations [MMM Group Limited 2014a, 2014b]).

Zones identified from the applicable zoning bylaws were grouped on a numerical scale with the low end of the scale (1) representing agricultural zoning and the top end of the scale (18) representing urban zoning as illustrated in Map 16-5 – Zoning Bylaw Zones (MMM Group Limited 2014a; 2014b). Zones lower on the scale generally require larger lot sizes and are more restrictive with respect to single-family dwellings while those on the higher end of the scale represent zones that permit small lot development. In addition, a number of areas did not have zones and generally consisted of community pastures, provincial forests and Crown lands. The consolidated zones were mapped for analysis purposes to inform the development potential of land within the RAA (Jopling 2014, pers. comm.).

The development categories were combined with the zoning categories and reordered on a new number scale (1 to 12) with provincial lands identified separately. The lower categories (1) were generally made up of agricultural lands and the higher end (12) represented urban lands. The blended categories were then reorganized on a five-point scale (1 to 3 with half points in between) developed for routing analysis. An area identified as “1” indicated that the potential for intensification of private development was low. The final categorization was mapped to analyze the development potential of land within the RAA (Jopling 2014, pers. comm.).

Private subdivision applications from the Province of Manitoba were reviewed. These data were analyzed by overlaying the subdivision parcel layer in GIS with a 50 km buffer of the evaluation alternative routes to determine the number of interactions. Since duplicate applications were present in the data, the number of interactions presented referred to the number of applications per each individual parcel of land (*i.e.*, within one section or four quarters).

ASSESSMENT OF TRANSMISSION LINE DEVELOPMENT ON PROPERTY VALUES

A review by Prairie Research Associates (PRA) analysis of transmission line effects on residential property values was undertaken to compliment the literature review completed for the assessment transmission lines on property values (PRA 2015, unpublished draft). The PRA analysis included a literature review and a statistical/econometric analysis of sale value and assessed value data of properties close to three selected exurban/rural residential areas. Methods included:

- literature review of the methods available for studying effects on residential property values; the value of econometric regression studies, which represents a quantitative method for determining the effect of transmission lines on property values, was established
- selection of exurban areas for analysis – three exurban regions outside of Winnipeg were selected, in Selkirk, Oakbank and East St. Paul as each region has a high voltage overhead transmission line running through it or adjacent to
- data extraction and processing – as informed by the literature review, data selected for the econometric analysis consisted of assessed/sales value of property, property characteristics (*e.g.*, square footage, frontage, age of home, garage) and distance between the property and the transmission line; data for processing involved presentation in a structured Excel file format, manual data entry to calculate distance to properties from the centre of the residence to nearby transmission lines using Google Maps and data post-processing to conduct the econometric analysis.
- estimation of effects – application of the econometric/statistical models on the property data to derive a quantitative estimate of transmission line effect on property values; the study tested the null hypothesis that proximity to transmission lines has no effect on property sale price

16.3.2.1.2 Designated Lands, Protected Areas and Recreation

The assessment of change in designated lands, protected areas and recreation considered the physical presence of the line and ROW and overall development and recreational potential for future lands. GIS spatial data analysis was used to determine the interaction with designated lands and potential loss of candidate protected areas, change in area of current land use and the number of areas/sites located in proximity to the Project.

16.3.2.1.3 Forestry

The assessment of change in forested areas considered effects on commercial forestland and high value forest sites using GIS spatial data analysis.

Data on provincial Crown productive forestland were collected and analyzed to assess potential Project effects on the AAC and standing timber. The provincial Forest Resource Inventory (FRI) was updated by MCWS in 2010 for the area that includes the PDA. The update undertaken by MCWS was completed by merging missing ownership codes from previous FRIs (Manitoba Conservation 2007a, b). Stand age was assigned by working group and site class intersected with depletion layers to update forest ages.

The updated FRI was used to quantify productive forestland parameters and to assess potential effects of the PDA on commercial forest area, AAC levels, standing timber, private land forest values. Data on strata yield curves, mean annual increment values and timber sale/timber permit areas were obtained from MCWS to analyze the Project effects on the removal of productive forestland from FMU 1 and 24. Forest fire, timber harvest depletion and plantation GIS files were also obtained from MCWS to analyze Project effects on productive forestland.

Photo interpretation was used to spatially identify shelterbelts and private land forest areas located adjacent to the route that are not captured in the FRI. A helicopter survey was conducted to classify the origin, species composition and height class of the photo interpretation areas. The spatial data obtained were then analyzed using GIS to assess Project effects on the private forestlands and shelterbelts in terms of area affected.

High value forest site data, including data on enhanced silviculture sites, research and monitoring sites and private land forest values, were collected and analyzed in terms of silviculture areas affected and number of sites affected.

The updated FRI was also used in the determination of the FDAV. A FDAV, which is mandatory when productive forestland is removed from the provincial Crown land base, estimates the compensation necessary to offset the removal of productive forestland. Appendix 16 C includes the FDAV, prepared in accordance with MCWS FDAV Guideline (Manitoba Conservation 2002) which was undertaken as part of the effects analysis.

16.3.2.1.4 Groundwater Use

The assessment of change in groundwater use considered the potential effects on groundwater well quantity (levels) and groundwater quality due to aquifer disturbance. MCWS supplied a data set of groundwater use licence locations within the RAA, which included wells and dugouts. The data were mapped by type of water usage and maximum annual allowed capacity of the licensed groundwater supply wells.

MCWS also provided the provincial GWDrill groundwater well database for registered wells that are located within the RAA. The data provided included well identification number, location, status and water use. The well data locations were generally centred in a quarter section of land, section of land or river lot. Well locations were then mapped according to their water use category *(i.e.*,

air conditioning/ geothermal, domestic, industrial, irrigation, livestock, municipal, or unknown/other). Some wells are used for multiple uses and therefore were displayed as multi-use wells. Data for wells were not included on the map or in the summary statistics if their well status was indicated as sealed as this terminology denotes well decommissioning. The data set also included some well construction information where available. Wells located within the LAA were determined using GIS analysis by selecting wells that were contained within a quarter section, section or river lot that intersected with the LAA. The data were then exported to a spreadsheet so that they could be summarized.

An additional data set was received from MCWS that contained information on water pumping data for the GWDrill well locations where available. This data set was joined using GIS and GWDrill using the well's unique identification numbers. The depth to groundwater in this data set displayed in this assessment is the measurement taken by the water well drillers after a well is drilled and installed but prior to the water well pumping test. The depth to groundwater was presented on maps and charts. The wells that have groundwater levels prior to pumping less than 0 metres below ground surface (mbgs) indicate a potential flowing well or artesian location. Additional groundwater information is included in the Groundwater Technical Data Report (Stantec 2015).

16.3.2.1.5 Mining and Aggregates

The assessment of change in mining and aggregates considered the effects from the disruption of mining exploration activities and interference with operations. GIS spatial data analysis was used to determine the interaction with mineral dispositions or sites located in proximity to or crossed by PDA. The assessment of Project effects considered the related change in mining or aggregate resource use from restriction to areas, clearing of the ROW, structure assembly and installation, from the creation of access which can cause disruption effects on operations, and from the presence of line that can result in interference effects.

16.3.2.1.6 Hunting and Trapping

The assessment of change in hunting and trapping considered the effects from disruption to hunting and trapping activities and the potential for damage to equipment. GIS spatial data analysis was undertaken to determine the following: change or disruption to hunting and trapping activities that would restrict land use through the number of hunting lodges and associated outcamps or stations near open trapping and game hunting areas affected by the PDA. The assessment of Project effects considers clearing of the ROW, structure assembly and installation, the creation of access which can cause disruption to harvesting success or lead to increased pressure on resources, and the presence of line which can impair aesthetics.

16.3.2.2 Potential Environmental Effects, Effect Pathways and Measurable Parameters

The selection of effects included in the assessment of environmental effects on land and resource use was based on NEB filing requirements (Section 16.1.1), key issues and concerns identified during engagement (Section 16.1.2) and learnings from past assessments (Section 16.2.4). The following issues and concerns related to transmission line development were considered in the assessment:

- displacement of residences, damage to property and decrease in property values and disturbance and nuisance effects from noise and dust
- disturbance to designated lands and protected areas, loss of potentially protected lands
- disruption/intrusion to recreational and tourist sites, facilities and activities
- reduction in productive forestland and timber volume, reduction in plantation areas, loss of research and monitoring sites and loss of private forestland
- change in groundwater quality and quantity
- restriction of areas, operational interference with mining activities
- disturbance and disruption to hunting
- disturbance and disruption to trapping and damage to equipment

The assessment of land and resource use involved consideration of linkages with other socio-economic and environmental components. These consisted of the following EIS sections: fish and fish habitat, wildlife, wildlife habitat and agricultural land use. Effects from change in land and resource use on other environmental and socio-economic components are:

- change in vegetation cover may affect fish habitat (Chapter 8)
- change in surface water quality may affect fish habitat
- change in access may increase harvesting pressure on fish resources
- change in access may increase harvesting pressure on wildlife resources (Chapter 9)
- change in access may lead to increased biosecurity concerns for adjacent agricultural operations (Chapter 15)

Changes in visual quality, which can affect property value and enjoyment of outdoor recreational activities, are addressed in Chapter 17. Changes in air quality and noise, which can affect land use, are considered under the effects on human health risk as pathway component (Chapter 18) related to human health.

The potential environmental effects, effects pathways, measureable parameters used in the assessment of effects on land and resource use and the rationale for their selection, are provided in Table 16-1.

Table 16-1 Potential Environmental Effects, Effect Pathways and Measurable Parameters for Land and Resource Use

Potential Environmental Effect	Effect Pathway	Measurable Parameter(s) and Units of Measurement	Notes or Rationale for Selection of the Measureable Parameter
Change in property (disturbance, nuisance, displacement of residences, reduced property values, development potential)	Clearing of the ROW, structure assembly and installation, creation of access can cause disturbance and nuisance effects on property Presence of the line can impair future residential development and aesthetics	Distance to dwellings (m), number of dwellings and residential development in proximity, change in property value Number of subdivision applications traversed by the ROW	Could result in displacement of dwellings, landowner concerns related to nuisance effects (audible noise, EMF), property damage or decrease in property values and visual aesthetics Loss of/conflict with future development options or changes in current land use
Change in designated lands, protected areas and recreation (proximity)	Clearing of the ROW, structure assembly and installation, creation of access can cause disturbance and disruption effects; presence of line can impair future development/use, aesthetics	Conflict with designated lands and protected areas, First Nation Reserve lands; loss of proposed protected areas (ha), change in area (ha) of current use; number of areas/sites in proximity to Project	Disturbances (proximity, noise, visual intrusion) may affect ecological integrity or other values Disruption/intrusion to recreation and tourism activities, sites/areas
Change in forested areas (effects on commercial forestland and high value forest sites)	Clearing of the ROW, structure assembly and installation can reduce AAC, standing timber and cause disturbance effects on high value forest sites	Area withdrawn from commercial forest production (ha), wood fibre volume (m^3), silviculture areas affected (ha), number of sites affected, woodlot areas affected (ha), shelterbelts/private forestland affected (ha)	Removal of productive forestland from land base (AAC); effect on high value forest sites, woodlots/shelterbelts, plantations, private forest land
Change in groundwater use (effects on quantity and quality)	Geotechnical drilling, structure assembly and installation, flowing wells, application of herbicides for vegetation management	Change in groundwater levels, change in domestic water quality parameters (herbicide concentration)	Reduction in groundwater use

Potential Environmental Effect	Effect Pathway	Measurable Parameter(s) and Units of Measurement	Notes or Rationale for Selection of the Measureable Parameter
Change in mining/ aggregate extraction (disruption to operations, interference effects)	Clearing of the ROW, structure assembly and installation, creation of access can cause disruption effects on operations; presence of line can result in interference effects	Change/restriction of land use; number of sites in proximity	Disruption of mining exploration activities and operations
Change in commercial/recreational hunting and trapping (disruption to harvesting or increase to harvesting, aesthetic effects)	Clearing of the ROW, structure assembly and installation, creation of access can cause disruption to harvesting success or lead to increased pressure on resources; presence of line can impair aesthetics	Change or disruption affecting land use (ha); sensory disturbance affecting harvest	Disruption to trapping and hunting activities, damage to equipment

Figure 16-1 shows how the Project directly and indirectly affects land and resource uses. Direct effects involve a direct cause-effect relationship between the Project and the land-use in question. For example, ROW clearing reduces the amount of forested land and forestry potential in the LAA. Indirect effects involve a pathway through an intermediate (*i.e.*, pathway) component. For example, ROW clearing may change wildlife habitat characteristics in the LAA and potentially affect the quantity of game animals for hunting.

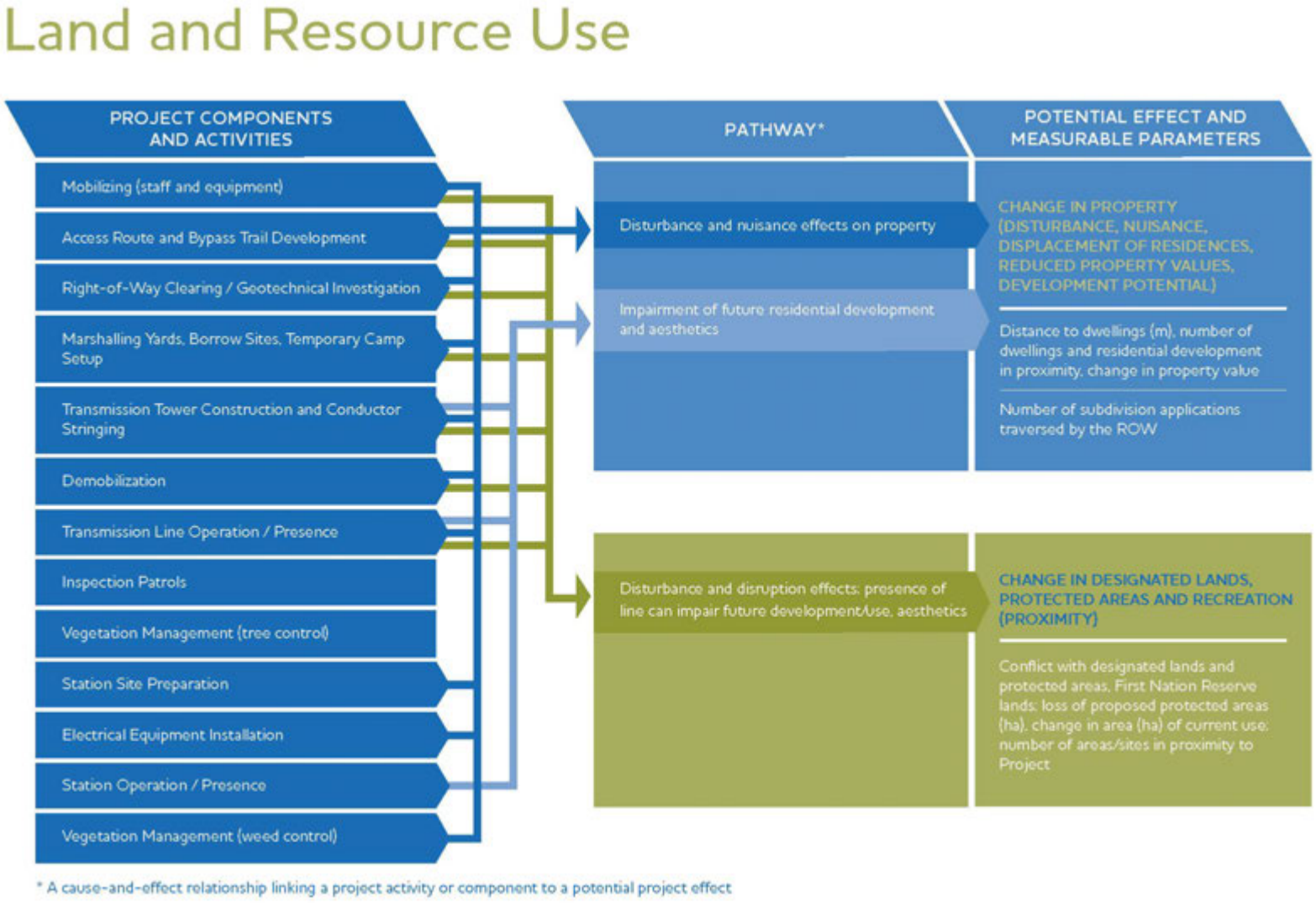

Figure 16-1 Project Pathway Components

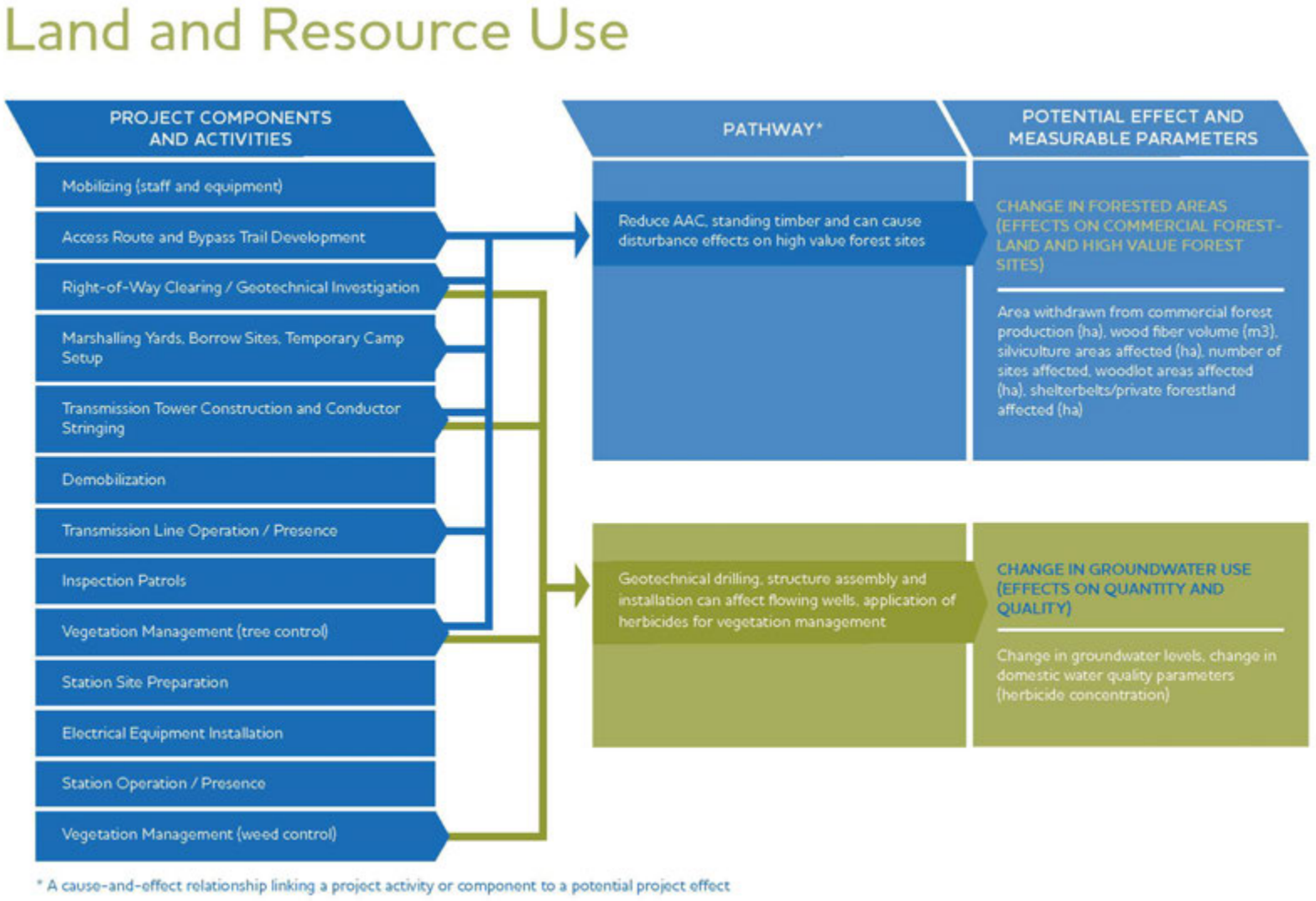

Figure 16-1 Project Pathway Components (continued)

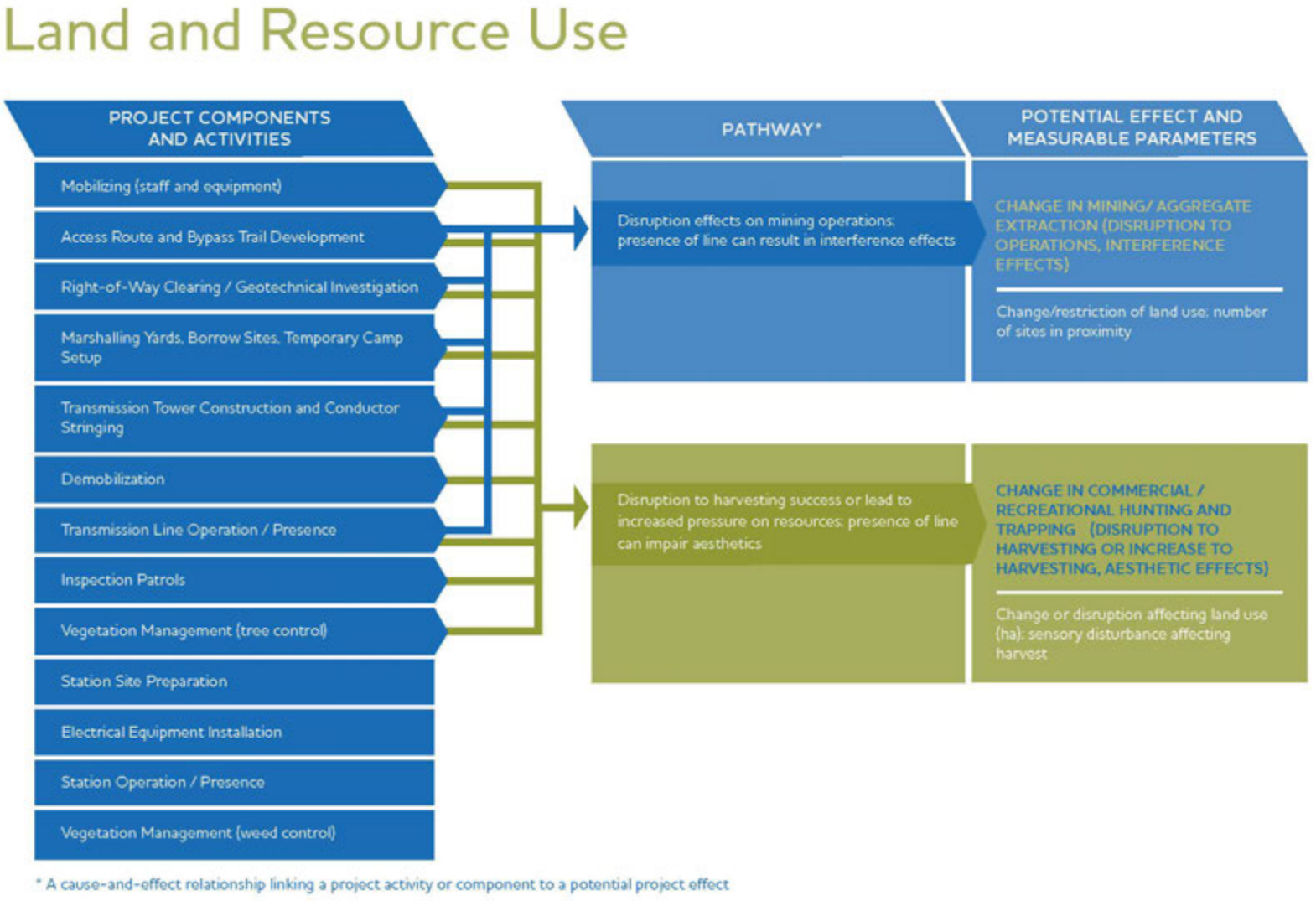

Figure 16-1 Project Pathway Components (continued)

Other environmental VCs can affect and be affected by change in land and resource use. Table 16-2 summarizes the linkages between environmental and socio-economic valued components and land and resource use.

Table 16-2 Linkages between Environmental and Socio-economic Valued Components and Land and Resource Use

Valued Component	Description of Linkage
Fish and fish habitat (Chapter 8)	Potential effects on vegetation cover characteristics and surface water quality from change in land use may affect fish habitat Increased access may increase harvesting pressure on fish resources
Wildlife and wildlife habitat (Chapter 9)	Increased access may increase harvesting pressure on wildlife resources
Agriculture (Chapter 15)	Potential effects on forest resources, including shelterbelts are discussed under Land and Resource Use. Shelterbelts are important features within agricultural landscapes. Increased access along ROW may lead to biosecurity concerns of adjacent agricultural operations
Visual quality (Chapter 17)	Potential effects on visual quality from a change in land use may result in impairment of aesthetics
Human health risk (Chapter 18)	Potential effects on human health from a change in land use may cause more noise or more air polluting activities

16.3.2.3 Residual Environmental Effects Description Criteria

Residual environmental effects are socio-economic effects that remain after the application of mitigation measures. Characterization of residual effects is based on the criteria in Table 16-3. All criteria except context are relevant for both positive and adverse effects. Context is not relevant for positive effects because, regardless of current condition, positive effects will result in improvement of land and resource use conditions.

Table 16-3 Characterization of Residual Environmental Effects on Land and Resource Use

Characterization	Description	Quantitative Measure or Definition of Qualitative Categories
Direction	The trend of the residual effect	**Positive**—an increase in the quality of sites or enhancement of present land uses relative to pre-Project levels **Adverse**—a decrease in the quality of sites or a restriction/degradation of present land uses relative to pre-Project levels **Neutral**—no net change in the quality of sites or present land uses relative to current level
Magnitude	The amount of change in measurable parameters or the VC relative to existing conditions	**Negligible**—no measurable change in land and resource use from baseline conditions **Low**—a small change in land and resource use capacity, but land and resource activities can take place at similar levels as under baseline conditions **Moderate**—a change in land or resource capacity that is greater than low, but land and resource activities can take place at similar levels as under baseline conditions **High**—a measurable change in land and resource use capacity, such that land and resource activities cannot take place at similar levels as under baseline conditions
Geographic Extent	The geographic area in which an environmental, effect occurs	**PDA**—residual effects are restricted to the PDA **LAA**—residual effects extend into the LAA **RAA** – residual effects interact with those of other projects in the RAA
Duration	The period of time required until the effect can no longer be measured or otherwise perceived	**Short-term**—residual effect restricted to construction phase **Medium-term**—residual effect extends to more than the construction phase **Permanent**—residual effect extends for the lifetime of the Project or more
Frequency	Identifies when the residual effect occurs and how often during the Project or in a specific phase	**Single event**—effects occurs once **Multiple irregular event** (no set schedule)—effect occurs multiple times at irregular intervals **Multiple regular event**—effect occurs multiple times at regular intervals **Continuous**—residual effect occurs continuously

Characterization	Description	Quantitative Measure or Definition of Qualitative Categories
Reversibility	Pertains to whether a measurable parameter or the VC can return to its existing condition after the Project activity ceases	**Reversible**—the effect can be reversed after activity completion and reclamation **Irreversible**—the effect cannot be reversed
Socio-economic Context	Existing condition and trends in the area where environmental effects occur	**Low resilience–**land and resource use is unable to accommodate changes in land base or disturbance of environmental conditions **Moderate resilience–**land and resource use is able to accommodate some changes in land base or disturbances of environmental conditions **High resilience–**land and resource use is able to accommodate changes in land base or disturbances to environmental conditions

16.3.2.4 Significance Threshold for Residual Environmental Effects

A residual effect on land and resource use is considered significant if, unless addressed through compensation, it widely disrupts, restricts or degrades present land uses to a point where activities cannot continue at or near baseline levels.

16.4 Existing Conditions for Land and Resource Use

Information for this assessment was gathered through a detailed review of data related to existing conditions a broad range of land and resource uses (Section 16.3), including:

- private property and rural residential development, including land ownership, private property values
- agricultural and industrial developments, including Hutterite colonies
- development and zoning controls
- designated lands, protected areas and recreational areas/sites and tourism activities
- commercial and domestic resource use (forestry, mining/aggregate, groundwater/surface water, trapping, hunting, fishing, gathering)

16.4.1 Overview

Land use in the RAA has been altered from historical tall grass prairie, fen and forestland to agricultural cropland and forestland. Agricultural cropland is the dominant land-use, covering approximately 36% of the RAA (Chapter 15). Contiguous forest cover encompasses large sections of the eastern portions the RAA, including Sandilands Provincial Forest. Cultivation in the eastern portion of the RAA has been hindered by the presence of mineral soils, peatland and upland mixed forests where remnant natural characteristics provide opportunities for forestry, recreation and land conservation. Mining activities in the RAA relate to sand and gravel, quarry extraction and some peat developments.

Landscape in the RAA has been largely influenced by implementation of the section-township-range survey system and to a lesser extent the river lot settlement pattern along the Red, Assiniboine and Seine rivers. The building of roads and railways accompanied the establishment of permanent settlements. Urban areas and settlement centres in and around communities in the capital region surrounding the City of Winnipeg, have witnessed an increase in rural residential and subdivision development over the past decade, particularly in the RMs of Springfield, Tache, Ste. Anne and La Broquerie. Linear infrastructure facilities, including provincial highways and roads, pipeline and other transmission lines (115 kV or greater) are evident across the RAA (Photo 16-1). Recreational areas/sites and activities or use are prevalent across the landscape, including campgrounds, resorts, golf courses, parks, tourist attractions, trails (hiking, biking, horseback riding, all-terrain vehicles, cross-country skiing and snowmobiling), wildlife viewing opportunities and hunting and trapping pursuits.

Photo 16-1 Existing 230 kV transmission lines in the RM of Rosser

16.4.1.1 Socio-economic Context of Land and Resource Uses

Socio-economic context in regards to land and resource use refers to the ability of uses to accommodate change in the land base or disturbance of environmental conditions. The socio-economic context of the land and resource use sub-components addressed under existing conditions is provided below.

Property and Residential Development – land development potential in the RAA ranges from low to low-medium[2], based on a review of applicable municipal development plans and zoning bylaws (see Maps 16-4 – Development Plan Designations and 16-5 – Zoning Bylaw Zones) (Jopling 2014, pers. comm.). There has been increased urban and rural residential development over the last 10 years and a general increase in population within the RAA between 2006 and 2011.

Designated Lands, Protected Areas and Recreation – the provincial trend in establishing new protected areas has been generally stable with some gradual increase in area since 2000. Opportunities for the establishment of additional protected areas in the more populated and settled portion of southern Agro-Manitoba are fewer due to the complexity of land use and private land ownership. Recreational activities occur across the landscape.

Forested Areas – the extent of commercial timber harvesting in southeast Manitoba predominately occurs in the Agassiz and Sandilands provincial forests. There is sufficient AAC in FMU 24 to accommodate current timber utilization within the RAA. High value forest sites (*e.g.*, woodlots, shelterbelts, private forestlands) are principally associated with remaining natural forest cover areas or rural farmstead locations that exist across the landscape.

Groundwater/surface water – groundwater and surface water sources and allocations are widespread within the RAA for domestic, agricultural, industrial or other uses. The resilience of the groundwater resource depends on the location and which sources are being used (*e.g.*, sand/gravel aquifers or the bedrock aquifers).

Water users in the RM of Rosser encompassing the Netley-Grassmere watershed within the East Interlake Conservation District are largely dependent on groundwater sources (see Map 16-11 - Licensed Surface Water and Groundwater Supply). Current water allocations in this watershed were below the sustainable yield of major streams and aquifers (MCWS 2015a).

Water users in the Cooks-Devils Creek watershed within the Cooks Creek Conservation District encompassing the RMs of Springfield, Tache (part) and Ste. Anne (part) are more reliant on groundwater resources (MCWS 2015b). Future growth in licensed water use in the watershed is likely (MCWS2015b).

[2] Areas ranked as “low” have the least development potential (*i.e.,* preferred for transmission line routing), areas ranked as “medium” have moderate development potential, while areas ranked “high” have high development potential where transmission line development should be avoided if possible

Within the La Salle River watershed in the La Salle-Redboine Conservation District, 76% of the surface water available for allocation has been allocated, three-quarters of which is used for irrigation. There are limited potable groundwater resources in the watershed encompassing the RMs of Macdonald and part of Ritchot (La Salle River Watershed Planning Authority 2010; MCWS 2015c).

Residents in the RMs of Ritchot, Springfield, Tache, Ste. Anne, La Broquerie, Stuartburn and Piney encompassing the Seine River watershed within the Seine-Rat River Conservation District are reliant on groundwater. Considerable groundwater development potential is likely available within the underlying Carbonate Aquifer (SRRCD 2012). Groundwater in the eastern portions of the Rat-Marsh River watershed is generally available in sufficient quantities for private, domestic use (SRRCD 2012).

Local groundwater availability, allocation and usage varies in sub-basins of the Assiniboine Delta Aquifer within the Assiniboine Hills Conservation District. In the Assiniboine South sub-basin, which encompasses the Glenboro area in the RM of South Cypress, groundwater is almost fully allocated; however, there is remaining available yield for the aquifer in terms of allocation for the environment and domestic users (AHCD 2013).

Mining/Aggregates – mining activity is limited to sand and gravel and quarry extraction where such deposits exist, primarily in the eastern half of the RAA. Important deposits (of medium quality or potential) occur within the municipalities of Tache and La Broquerie. There are limited existing peat mines within the RAA and further peat development is currently subject to a provincial moratorium covering new peat quarry leases or issuance of licenses for existing peat leases that runs to June 2015 (MCWS 2015d).

Hunting and trapping – resource harvesting for big game, game birds and furbearers occurs throughout the RAA. Hunting opportunities are available in WMAs, provincial forests, some provincial parks, “other” designated Crown lands and some leased Crown lands where there is no prohibition. Hunting on private land is allowed with permission from the owner or lawful occupant (MCWS 2015). Some municipalities have bylaw prohibitions or restrictions on the discharge of firearms or bows, particularly near urban areas (MCWS 2015). Manitoba Conservation has reported on population densities for various species. Densities for black bear are moderate to high, below-average for white-tailed deer and low for moose populations (Chapter 9). Based on past harvesting, the RAA can sustain higher harvesting volumes for black bear. For white-tailed deer, MCWS has recently instituted a “bucks only” harvest restriction to promote a population recovery after multiple difficult winters lowered the provincial white-tailed deer population. (MCWS 2015). Canada Goose and other waterfowl were the most common birds observed during avian field surveys, primarily during spring and fall migration. Ruffed grouse and spruce grouse are common upland game bird species and permanent residents of the RAA (Stantec 2015d).

Trapping of furbearers in Open Trapping Areas is open for various species, subject to trapping seasons and other restrictions. Trappers share Crown land with other resource users (*e.g.,* forest management) (MCWS 2015e). No person, status or non-status, may trap within Beaudry Provincial Heritage Park, areas of provincial parks closed to hunting/trapping, wildlife refuges, most ecological reserves and areas closed to all persons for conservation purposes (MCWS 2015e).

16.4.2 Land Ownership Patterns

Land ownership and patterns of property ownership are described in this section.

Aside from privately owned land within the LAA, portions of the land base in the RMs of Piney and Stuartburn are Crown owned or Crown leased (see Map 16-3 – Land Tenure and Ownership). The total length of the route crossing over Crown and agricultural Crown land is approximately 18 km (8.4%) in the Existing Corridor (*i.e.,* SLTC and RVTC) and 37 km (17.4%) in the New ROW between Vivian and the U.S. border (Table 16-4). The total length of the route along the Existing Corridors involving ROW either under floodway agreement, caveat, easement or owned by Manitoba Hydro is approximately 92 km (43%). The total length of the route encompassing the New ROW segment to the U.S. border is approximately 121 km (57%).

Table 16-4 Final Preferred Route Length in the LAA

Route Segment	Length
Existing Corridor (SLTC, RVTC)	92 km
New ROW	121 km
Total Final Preferred Route	213 km
Final Preferred Route on Agro-Crown & Crown	55 km
Final Preferred Route along Floodway[1]	19 km

NOTE:
[1] distance along Floodway part of Agro-Crown land total; lengths are approximate

Property ownership patterns are influenced by the pattern of historical land use survey, which in the LAA is primarily the Dominion Land Survey (DLS) using the section-township-range system (McKercher and Wolfe 1986; Olsson *et al.* 2010). The exception to this general pattern is in areas where River Long Lot Survey was used along the Red and Assiniboine rivers (MHS 2015). The River Long Lot Survey was established in 1813 and did not conform to the DLS. Lots ranged from 660 to 792 feet wide (201 m to 241 m) by 2 miles (approximately 3.2 km) (MHS 2015). The PDA

for the Project involves paralleling, crossing perpendicularly or crossing diagonally over river lots and outer two-mile river lots[3] in the following areas:

- the entire portion of the RM of Headingley (approximately 13.0 km)
- the St. Norbert area of Winnipeg (crossing diagonally for approximately 4.9 km and paralleling for approximately 1.6 km)
- the South St. Vital area encompassing the Red River Floodway (7.1 km)
- the RM of Ritchot east of PTH 59 and Grande Pointe (2.3 km)

The land survey used (*i.e.,* DLS or River Long Lot Survey) is a consideration in transmission line development. Long river lots are generally avoided by new transmission line development to reduce the number of property owners and farm operations affected. If long river lots are crossed by a new transmission line, routing parallel to the river lot pattern is preferable to crossing in a perpendicular or diagonal fashion to limit interference with agriculture practices (Chapter 15). For the most part, perpendicular or diagonal crossing of river lots by the Project was avoided, although a 4.3 km section of the SLTC segment within the City of Winnipeg crosses river lots either perpendicularly or diagonally.

16.4.2.1 Crown and Public Lands

This section describes the nature of Crown lands and other public lands located within the RAA.

The easement for the Existing Corridor ROW will affect approximately 43 Crown properties and seven municipal owned properties within 1 km of the PDA (*i.e.,* LAA). Crown lands within the RAA for the New ROW include ecological reserves, WMAs and provincial forests.

Crown-owned land encompasses the Red River Floodway through southeast Winnipeg, the RM of Ritchot and the RM of Springfield to Riel Converter Station. Crown lands leased for agricultural purposes prevail in the eastern portions of the RMs of Springfield and Tache, in scattered pockets in the RM of La Broquerie; the northern, southern and eastern sections of the RM of Stuartburn; and in the north-central and southern portions of the RM of Piney. Parcels of municipal-owned land occur within the RMs of Macdonald and Piney.

[3] In the 1870s, Dominion Survey Crews resurveyed the long lots, resulting in terms called Parishes (MHS 2015). Only the first two miles from the river were surveyed with the section survey abutted against the two-mile line. In 1874 the Government of Canada added the “outer two miles” of land to appropriate river lots where possible. The survey was completed in 1877, moving the quarter section survey four miles back from the rivers (Province of Manitoba 2015a; 2015b).

Crown-owned or Crown-leased land and municipal-owned land occurs along the PDA for the New ROW. Crown-owned or Crown-leased parcels include:

- 1 in the RM of Springfield
- 2 in the RM of Tache
- 5 in the RM of Ste. Anne
- 2 in the RM of La Broquerie
- 12 in the RM of Stuartburn (three fall within a provincial forest)
- 19 in the RM of Piney (two fall within a provincial forest)

Municipal-owned lands include:

- 1 in the RM of Macdonald (S ½ NW17-9-1E)
- 2 in the RM of Piney (SW9-2-10E, NE23-1-11E)

Parcels of Crown land that are encumbered within the LAA are located in the RMs of Headingley, Springfield and the City of Winnipeg (*i.e.,* Red River Floodway) along the Existing Corridors, and the RMs of Tache, Ste. Anne, La Broquerie, Stuartburn and Piney along the New ROW. The encumbrances[4] are largely concentrated in the RMs of Ste. Anne, La Broquerie, Stuartburn and Piney (Crown Land and Property Agency 2015). Crown land encumbrance types[5] within the LAA consist of forage leases/agricultural rental (16), wildlife-DUC lands (5), community license of occupation (5), forest research plantation (4), fish and game association license of occupation (2), school land (2) and treaty land entitlement (TLE) notice (2 – part NE5-10-7E, NW4-10-7E). Crown land encumbrances also exist for protected areas, provincial forest, WMAs, quarry leases, and easements for Manitoba Hydro and MTS (Crown Land and Property Agency 2015).

The SLTC consists of land either under floodway agreement, caveat, easement to Manitoba Hydro or owned by Manitoba Hydro. Manitoba Hydro also owns land that encompasses the existing RVTC east of Winnipeg through the RM of Springfield. Manitoba Hydro owns land for the Dorsey and Riel converter stations and Glenboro South Station where station modifications are to occur.

[4] A charge or lien on land other than a mortgage property.

[5] Number of parcels or quarter sections provided based on section-township-range.

16.4.3 Residential Development

The extent of urban and rural residential development, settlement centres and communities, including occupied private dwellings in the RAA are described below:

Urban residential development and other settlement centres occur within the communities of Headingley, Oak Bluff, La Salle, Grande Pointe, La Broquerie, Marchand and in the town of Ste. Anne. Pockets of rural residential development extend out from areas of dense urban residential areas in the RMs of Springfield (Photo 16-2), Ste. Anne, Tache and La Broquerie and to a lesser extent in the RMs of Stuartburn and Piney. In addition, the Oak Bluff West residential subdivision is located immediately adjacent to Oak Bluff and the Project LAA in the RM of Macdonald.

Photo 16-2 Rural residential development in the RM of Springfield

Rural farm residential development is generally widespread throughout the RAA and is associated with agricultural operations, including farm accessory buildings (Photo 16-3).

Private land developments within the RAA are described in terms of active[6] and closed[7] subdivision applications. There were 24 active subdivision applications within 1 km of the Existing Corridor (SLTC and RVTC) and 14 within 1 km of the New ROW south of RVTC to the U.S. border. In addition to active subdivision applications, there were 28 closed subdivision applications within 1 km of the Existing Corridors and 29 within 1 km along the New ROW to the U.S border.

[6] An active subdivision application refers to a file that is under review by Manitoba Hydro's Property Department and other internal departments.

[7] A closed subdivision application refers to a file that has been reviewed by Manitoba Hydro and a response provided to the planning authority outlining Manitoba Hydro's interest or lack thereof. If there are no concerns the file is closed.

Photo 16-3 Rural farm residential development in the RM of Springfield

Due to population increases, most RAA communities experienced growth in the total number of private dwellings and the number of owned dwellings between 2006 and 2011 (Table 16-5). As expected, the large population increases in the RM of La Broquerie and RM of Headingley (42.1% and 17.9%, respectively) corresponded to two of the highest percentage increases in dwellings between 2006 and 2011 (32.2% and 27.7%, respectively). The RM of Springfield had the largest increase in the total number of dwellings (460) followed by the RM of La Broquerie (389) and RM of Tache (386). The exception occurred in the RM of South Cypress and Village of Glenboro, where both had fewer dwellings in 2011 than 2006 (Table 16-5). Average value of owned dwelling information was not available for 2011 but is expected to increase in most of the RM's as following provincial trends between that same period.

Table 16-5 Occupied Private Dwellings in the RAA

Municipality	Total Private Dwellings		% Dwelling Change	Total Private Households by Tenure				Average Number of rooms		Average value of owned dwellings ($)	
				2006		2011					
	2006	2011	2006 - 2011	Owned	Rented	Owned	Rented	2006	2011	2006	2011[1]
RM of Headingley	733	936	27.7	685	40	865	0	8.1	8.4	343,217	-
RM of La Broquerie	1,208	1,597	32.2	960	175	1,305	210	7.1	6.9	160,330	-
RM of Macdonald	1,878	2,105	12.1	1,690	125	1,870	175	7.9	7.8	227,274	-
RM of Piney	947	1,112	17.4	660	70	-	-	6.1	-	106,820	-
RM of Ritchot	1,745	1,909	9.4	1,555	150	1,750	105	7.3	7.2	180,575	-
RM of Rosser	472	476	0.8	365	85	405	20	7.1	7.5	228,027	-
RM of South Cypress	247	229	-7.3	205	20	165	0	7.4	7.9	111,962	-
RM of Springfield	4,601	5,061	10.0	4,215	270	4,715	190	7.3	7.4	208,494	-
RM of Ste. Anne	1,644	1,734	5.5	1,375	185	-	-	6.7	-	136,402	-
RM of Stuartburn	720	799	11.0	560	85	-	-	5.9	-	93,513	-
RM of Tache	2,972	3,358	13.0	2,700	205	3,065	220	7.4	7.3	188,461	-
Town of Ste. Anne	501	570	13.8	415	80	475	100	6.8	6.5	133,355	-
Village of Glenboro	316	312	-1.3	230	60	265	50	6.4	6.5	74,830	-
COW CT 6020100.02*	558	600	7.5	525	15	580	0	7.9	8.3	265,386	-
COW CT 6020110.07*	-	2,367	-	-	-	1,975	70	-	7.4	-	-

NOTES:

* Indicates data for Census Tracts within the RAA

[1] Average value of owned dwelling was not provided in the 2011 National House Survey

SOURCE: Statistics Canada 2007a, 2007b, 2007c, 2007d, 2007e, 2007f, 2007g, 2007h, 2007i, 2007j, 2007k, 2007l, 2007m, 2007n, 2013a, 2013b, 2013c, 2013d, 2013e, 2013f, 2013g, 2013h, 2013i, 2013j, 2013k, 2013l

16.4.4 Hutterite Colonies, Agro-Industrial Developments, and Business Parks

Business agricultural developments, agro-industrial developments and industrial developments located within the LAA are described in the following sections.

16.4.4.1 Hutterite Colonies

Three Hutterite colonies are located within the Existing Corridor and New ROW segments (Cedrontech n.d.). The Sturgeon Creek Colony (approx. 160 residents) is located in the RM of Rosser, south of Dorsey Converter Station along the Existing Corridor (SLTC), within the PDA and LAA. The Ridgeland Colony (approx. 106 residents) is located in the RM of Springfield, south of Anola and east of PTH 12. The Pineland Colony (approx. 112 residents) is located in the RM of Piney, south of Piney and east of PTH 89. These colonies have industrial hog, dairy, turkey, chicken and egg production and manufacturing operations.

16.4.4.2 Agro-industrial developments

Agro-industrial developments located within the RAA include the following:

- Richardson Limited maintains a 500-acre research farm and crop development centre, Kelburn Farm, at Howden, Manitoba just south of the city of Winnipeg along the Red River.
- Richardson Limited also operates Agriculture Business Centres in the cities of Winnipeg and Steinbach.
- Viterra operates a canola processing plant in Ste. Agathe, Manitoba and maintains grain-marketing facilities (*i.e.*, terminals) in Rosser, Ste. Agathe and Winnipeg.
- Paterson Grain operates terminals in La Salle and Winnipeg and maintains a crop input centre in Steinbach.
- For Glenboro South Station, Viterra and Co-op maintain operations located south of Village of Glenboro.

16.4.4.3 Industrial Parks

Twelve industrial parks/districts are located within or immediately adjacent to the RAA (Table 16-6). An additional 30 industrial areas/parks/districts are located within the City of Winnipeg. All of these industrial areas are located near major transportation routes, including the Trans-Canada Highway (PTH 1E/W) and transportations links to the United States (PTH 59 and PTH 75).

Table 16-6 Industrial Park/Districts in the RAA

Municipality	Industrial Park/Area	Owner/Developer	Total Area/ Available Acres
City of Winnipeg*	Inkster Industrial Park	City of Winnipeg	180 acres/none
	Murray Industrial Park	City of Winnipeg	600 acres/none
RM of Rosser	Brookside Business Park	CentrePort Canada	150 acres/n/a
	Brookside Industrial Park West		6 acres/6 acres
RM of Headingley	Headingley Business Park	RM of Headingley	32 lots
RM of Macdonald	Oak Bluff Business Park	RM of Macdonald	n/a
	McGillivray Business Park		n/a
RM of Ritchot	Grande Pointe Enterprise Centre	RM of Ritchot	n/a
RM of Springfield	North Transcona Industrial District	RM of Springfield	n/a
	Smart Park Business District (future)		30 lots
City of Steinbach*	Hespeler Industrial Park	City of Steinbach	138 acres/30 acres
	Steinbach Industrial Park		395 acres/93 acres

NOTE:
* Indicates centres with industrial areas adjacent to the RAA
SOURCE: Province of Manitoba 2015a; CentrePort Canada 2012; Partnership of the Manitoba Capital Region 2012

16.4.5 Development and Zoning Controls

Municipal jurisdictions in the RAA have a variety of development controls in place as described in Table 16-7.

Municipal jurisdictions, including planning districts, are required under *The Planning Act* (C.C.S.M. c. P80) to adopt development plans and zoning bylaws to guide land use decisions within their respective boundaries.

Manitoba Hydro is cognizant that neither *The Planning Act* (C.C.S.M. c. P80), nor its Regulations, apply to the Crown or Crown agencies. However, it does seek to work cooperatively with the municipalities when planning, designing, constructing, and operating and maintaining its Projects to limit the extent of possible interactions with their developments and plans.

Table 16-7 Municipal Development Controls in the RAA

Municipality	Development Plan	Zoning Bylaw
City of Winnipeg	Our Winnipeg Plan Bylaw No. 67/2010	City of Winnipeg Zoning Bylaw No. 200/06
RM of Headingley	RM of Headingley Development Plan Bylaw No. 12-2006	RM of Headingley Zoning Bylaw No. 3-2011
RM of La Broquerie	RM of La Broquerie Development Plan Bylaw No. 20-2011	RM of La Broquerie Zoning Bylaw No. 10-2013
RM of Macdonald	Macdonald-Ritchot Planning District Development Plan Bylaw No. 2/10	RM of Macdonald Zoning Bylaw No. 15/95
RM of Piney	RM of Piney Development Plan Bylaw No. 53-09	RM of Piney Zoning Bylaw No. 80/2012
RM of Ritchot	Macdonald-Ritchot Planning District Development Plan Bylaw No. 2/10	RM of Ritchot Zoning Bylaw No. 18-2002
RM of Rosser	South Interlake Planning District Development Plan Bylaw No. 3/10	RM of Rosser Zoning Bylaw No. 4-85
RM of Ste. Anne	RM of Ste. Anne Development Plan Bylaw No. 13-2007	RM of Ste. Anne Zoning Bylaw No. 10-2010
RM of Springfield	RM of Springfield Development Plan Bylaw No. 98-22	RM of Springfield Zoning Bylaw No. 08-01
RM of South Cypress	Cypress Planning District Development Plan Bylaw No. 49-2009	RM of South Cypress Zoning Bylaw No. 1485
RM of Stuartburn	RM of Stuartburn Development Plan Bylaw No. 081-2008	RM of Stuartburn Zoning Bylaw No. 098/2011
RM of Tache	RM of Tache Development Plan Bylaw No. 4-2000	RM of Tache Zoning Bylaw No. 12-2009

Outside of urban centres or settlement areas, most of the land within the RAA, LAA and PDA is designated as “General Agricultural”, “Agricultural Limited” or “Rural Areas” under individual municipal development plans (see Map 16-4 – Development Plan Designations). Areas of Crown land are typically designated as “Natural Resource Area”, “Natural Environment Area”, “Rural Natural Area”, or as designated Crown land (*e.g.*, provincial forests; WMAs) in the development plans. See Appendix 16B for additional information on development and zoning controls within the RAA. There is limited opportunity under these plans for intensified non-agricultural development of lands designated “general agricultural” and other agricultural designations (MMM Group Limited 2014a).

Small pockets of lands with “Rural” designations allow for rural residential, commercial or industrial development. Urban or settlement centre land designations exist in scattered locations across the RAA, including Rosser, Grosse Isle, Headingley, Oak Bluff, La Salle, Grande Pointe,

Prairie Grove, Lorette, Dugald, Anola, Richer, La Broquerie, Marchand, Woodridge, Sundown and Piney (MMM Group Limited 2014a).

Most private land within the RAA is zoned for agriculture and rural uses, such as “A80 – Agriculture Zone”, “AG – Agriculture General”, “AC – Agriculture Conservation”, “AI – Agriculture Intensive”, “AR – Agriculture Restricted”, “AL – Limited Agriculture”, “AML – Agriculture (Moderately Limited) District”, “AG-5 – Rural Agriculture”, “DR – Development Reserve”, “RU – Rural General”, “Rural Mixed”, “Limited Rural Zone” and “Rural Zone 1, 2, 3”. Concentrated pockets of urban zones associated with urban and settlement centres occur in the RMs of Headingley, Macdonald, Ritchot, Springfield, Tache, Ste. Anne, La Broquerie and Piney. Open space zoning for parks and recreation development and open space areas (*e.g.*, sports fields, public reserves, community playgrounds, small road side parks) occurs in the northeastern and southeastern areas of the RMs of Springfield and Tache, as well as the east-central portion of the RM of Ste. Anne (see Map 16-5 – Zoning Bylaw Zones). A number of areas identified did not have zones and corresponded to provincial forests and Crown lands (MMM Group Limited 2014b).

Land use designation for the Dorsey and Riel converter stations include a mixture of agricultural rural area, agricultural preserve area and industrial. Dorsey Converter Station is zoned a mixture of Limited Agriculture (LA) and A80 – Agriculture Zone. Riel Converter Station is zoned Agriculture General (AG). The land use for Glenboro South Station is designated as agricultural area. The station site is zoned AML – Agriculture (moderately limited).

16.4.6 Designated Lands and Protected Areas

Designated lands within the RAA include provincial parks, a provincial forest, existing protected areas and proposed protected areas, ecological reserves, WMAs and ASIs (see Map 16-6 – Designated Lands and Protected Areas). No existing First Nation Reserve land, trust lands or private purchase lands are located within the RAA. There are First Nation treaty land entitlement (TLE) selections within the RAA. Peguis First Nation does have a Notice Area under its TLE Agreement that falls within the RAA. Within this Notice Area, the Province of Manitoba is obligated to notify Peguis First Nation of any proposed dispositions of Crown land.

Under Manitoba’s Protected Areas Initiative (PAI), protected areas prohibit logging, mining (including aggregate extraction), oil, petroleum, natural gas or hydroelectric development. Protected areas with this minimum level of protection remain open for activities such as hunting, trapping or fishing. As part of the PAI land evaluation process, First Nation and Metis communities that may be affected by the establishment of a protected area are consulted, as per the 1998 Memorandum of Understanding signed with Manitoba First Nation organizations on the establishment and management of new protected areas (MCWS 2015f). Manitoba’s protected areas network includes parts of provincial forests, provincial parks, ecological reserves, WMAs and private conservation lands. Manitoba’s protected areas network has grown since 1990 (from 350,000 ha). Currently, over 7 million ha (or approx. 11%) of land in Manitoba is protected. The

trend in establishing new protected areas has, in recent years, been generally stable with some gradual increase since 2000. Opportunities for the establishment of additional protected areas in the more populated and settled portion of southern Agro-Manitoba are fewer due to the complexity of land use and private land ownership (MCWS 2015g).

16.4.6.1 Provincial Parks and Provincial Forests

Designated lands along the Existing Corridor LAA include Beaudry Provincial Park, Duff Roblin Provincial Heritage Park and the St. Norbert Provincial Heritage Park. The Sandilands Provincial Forest is also located in the LAA (see Map 16-6 – Designated Lands and Protected Areas). Provincial parks may include facilities to accommodate hiking, cycling and horseback riding, picnicking and day use, ATV, snowmobile and cross-country ski trails. Established as reserves for timber, provincial forests are used for a variety of activities such as wildlife conservation, outdoor recreation, traditional harvesting and scientific research. Permits are required for resource harvesting within provincial forests.

16.4.6.2 Wildlife Management Areas, Ecological Reserves and Areas of Special Interest

WMAs exist for the benefit of wildlife and for the enjoyment of people. They play an important role in biodiversity conservation and provide for a variety of wildlife-related forms of recreation, including birding and wildlife watching. Hunting and trapping are generally permitted in WMAs, but these activities may be prohibited or restricted in some areas. The use of vehicles, off-road vehicles, watercraft, powerboats, or airboats, may also be restricted in some areas. The Watson P. Davidson and Spur Woods WMAs have both been given permanent protection under the PAI. This protection prohibits logging, mining, hydroelectric development, oil and gas development and other activities that considerably and adversely affect habitat (Roberge 2013, pers. comm.).

Ecological reserves are established to preserve unique and rare natural (biological and geological) features of the province and examples of natural and modified ecosystems. These sites are set aside for ecosystem and biodiversity preservation, research, education and nature study. ASIs are candidate protected areas selected under Manitoba's PAI to represent enduring features found within a natural region that still need to be captured in Manitoba's protected areas network. Proposed protected areas have not yet been given permanent protection status by the province.

Although there are no protected areas in the LAA, there are two candidate protected areas along the Existing Corridor:

- the Assiniboine River Clam Beds proposed protected area
- a Protected Area located at Deacon's Corner north of PTH 1E (SW14-10-4E) in the RM of Springfield

Protected areas within the LAA along the New ROW are the Watson P. Davidson WMA and the Spur Woods WMA. There are 15 candidate protected areas or ASIs in this part of the LAA, including the Balsam Willows candidate protected area in the RM of Ste. Anne.

16.4.7 Recreational Areas/Tourism Activities

A variety of outdoor recreational activities and tourism venues occur throughout the RAA as described below.

Recreational activities and facilities consist of hiking/biking and horseback trails, ATV trails, golf courses, lodges, campgrounds, resorts, parks, recreational angling, boating and canoeing, cross-country ski trails and snowmobile trails and shelters (see Map 16-7 – Recreational Land Use). Recreation and tourism are important to the region's economy as a four-season travel destination and as evidenced by the many opportunities for outdoor recreation, fishing, boating, snowmobiling and tourist attractions. Communities and individual owners of existing and proposed developments, the general public, recreational groups and commercial operators use the recreational land base as a source of primary income or supplementary income, or for recreational pursuit or a way of life.

The flat upland landscape of the Red River Plain in the western half of the RAA has low to moderately low capability for outdoor recreation (CLI 1973). However, intensive and extensive recreational uses are evident across the landscape within the RAA, including the main waterways and areas of topographic and vegetative interest. The Southeast area, corresponding to the eastern half of the RAA, provides varied upland topography, such as within the Sandilands region, offering good opportunities for extensive outdoor recreational activities (*e.g.*, wildlife viewing, hiking). The Red and Assiniboine rivers have moderate capabilities for water-oriented outdoor recreation activities. The Rat River, which occupies a small portion of the area in the southeast, provides moderately low capability for outdoor recreation (*e.g.*, canoeing). Smaller rivers and creeks offer limited and lower quality recreational opportunities (Canada Land Inventory 1973; Ernst 2010).

Southern Manitoba includes several areas of cultural interest, including the long river lot patterns along the Red, Assiniboine and Seine rivers; and distinctive architecture associated with farm buildings and churches of various ethnic groups of interest. Plaques and monuments, such as the Dawson Trail monument at Ste. Anne and the Dominion Lands Survey System monument near Headingley, commemorate the history of the area and the province. Many other historical attractions are associated with larger population centres in the area.

16.4.7.1 Recreation Trails

The southeast region has numerous trails, including established trails, grid roads and old logging and forest access roads used by hikers, bikers, horseback riders and ATV users (Ernst 2010). Named recreational trails located in the LAA along the Existing Corridor and New ROW segments include (Map 16-7 – Recreational Land Use):

- Duff Roblin Parkway, located along the Red River Floodway in the City of Winnipeg (Photo 16-4)
- Winnipeg Trail and Crow Wing Trail – parts of the Trans Canada Trail, located at the Courchaine Bridge near Duff Roblin Provincial Heritage Park and at St. Norbert Provincial Heritage Park in the City of Winnipeg

Photo 16-4 Red River Floodway (looking southeast) in the City of Winnipeg

ATV riding as a sport has grown in popularity. This has led to trail building and a variety of organized activities such as club sponsored rides. There are approximately 1,000 km of trails in the Woodridge area of southeastern Manitoba and southeastern part of the RAA (Hora 2015, pers. comm.). Due to concerns over grass-fire and forest-fire risks, ATV access to the parts of the Sandilands area between Marchand and Stuartburn has been restricted.

16.4.7.2 Campgrounds and Golf Courses

There are camping opportunities within the RAA, including near Glenboro, Ile des Chenes, Richer, Ste. Anne and Steinbach including public campgrounds (*e.g.,* Spruce Woods Provincial Park) and privately owned resorts, campgrounds and parks (Travel Manitoba 2014). Within the LAA, there is one campground resort, the Traveller's RV Resort located along the SLTC within the RM of Springfield north of PTH 100 (Manitoba Association of Campgrounds and Parks 2014).

Southeastern Manitoba has numerous golf courses (SCORE*Golf* 2015). The following are located within the LAA:

- Southwood Golf and Country Club – an 18-hole course adjacent to the Trappist Monastery Ruins in St. Norbert encompassing almost 300 acres; development of adjacent land for an additional 9 holes is planned in the future (Scott 2015, pers. comm.)
- Cottonwood Golf and Country Club – a 27-hole championship golf course in the RM of Ste. Anne just north of PTH 1E
- Oakwood Golf Course and Campground – an 18-hole golf course located in the RM of Ste. Anne south of PTH 1
- La Verendrye Golf Club – an 18-hole golf course located in the community of La Broquerie running in part along the Seine River (Photo 16-5)

Photo 16-5 La Verendrye Golf Course in La Broquerie, MB

16.4.7.3 Boating and Fishing

Two designated canoe routes are located in the LAA, the Red River and the Rat River. Located along the Existing Corridor, the Red River is a designated canoe route and Heritage River under the Canadian Heritage Rivers System (CHRS) Program (CHRS 2011). Boating and fishing occur along the Red River Corridor, stretching from Emerson to Lake Winnipeg. RiversWest maintains an access point along the Red River north of St. Adolphe, MB (Turenne-Maynard 2015, pers. comm.). The Rat River designated canoe route is located in the northeast part of the RM of Stuartburn, southwest of PTH 12 (Berard 1971).

The Project crosses the Assiniboine River and Red River at two separate locations: in the RM of Headingley and in the City of Winnipeg at its southern limit. Both the Assiniboine and Red rivers are navigable and are “Scheduled Waters” under the provisions of the federal NPA. Other large

permanent waterbodies crossed within the RAA that are likely navigable by canoe include reaches of Cooks Creek and the La Salle, Seine and Rat rivers (Chapter 8).

Watercourses in the RAA support a recreational sport fishery. The RAA is located within the Southern Fishing Division of Manitoba's Fishing Divisions (Province of Manitoba 2014a). Waterbodies fished within the RAA include the Assiniboine, La Salle, Rat, Red and Seine rivers and Cooks and Sturgeon creeks. Numerous Master Angler awards have been recorded over the years for various fish species taken from these watercourses (Travel Manitoba 2015).

16.4.7.4 Wildlife Viewing and Private Wildlife Lands

The varied landscape offers diverse wildlife viewing opportunities within the RAA (Ernst 2010), including:

- Beaudry Provincial Park (songbirds, white-tailed deer, raccoons and beaver)
- Pine to Prairie International Birding Trail (Manitoba portion), located west of Piney south of Spur Woods WMA along PR 201 and is located in the LAA for the new transmission line ROW (TCHSCP 2015)
- Spur Woods WMA (old-growth red pine and eastern white cedar stands, breeding and migration area for great gray owl, northern saw-whet owl, boreal owl, white-tailed deer, moose, black bear, snowshoe hare, wolves, coyote, fisher and lynx)
- Watson P. Davidson WMA (major breeding and migration corridor for great gray owls, northern saw-whet owl, boreal owl, migrant bird species, upland game birds, white-tailed deer and occasionally moose)

There are two private wildlife areas within the LAA. The Seven Oaks Fish & Game Association owns a parcel located in the RM of La Broquerie in SW32-5-8E and leases adjacent Crown land in the west half of 29-5-8E. This association has developed the area with walking trails, a clubhouse, warm-up shelters and an open shooting area. The second private wildlife area is also located in the RM of La Broquerie west of the Watson P. Davidson WMA, in sections 27/28-4-8E and is used for hunting and wildlife viewing.

16.4.7.5 Winter Recreation

Winter activities occurring in the RAA include cross-country skiing, snowshoeing and snowmobiling. Cross-country skiing and snowshoeing trails in the RAA and LAA include Beaudry Provincial Park; Crow Wing Trail – part of the Trans Canada Trail; La Salle River; and Sandilands Ski Trails (Ernst 2010).

Groomed snowmobile trails extend across southern Manitoba as part of the SnoFund groomed trail network (Ernst 2010). Several designated snowmobile trails cross the LAA, including trails maintained by the Cross Country Snow Drifters, the Snow Raiders Snowmobile Club Inc. and the South East SnowRiders (SnoMan Inc. 2011; SESR 2012; SRSC 2013; CCSD 2015; Rideout 2015, pers. comm.). Trails are located in the RM of Headingley (south of PTH 1W); south of Oak

Bluff in the RM of Macdonald; at the Red River Floodway in the City of Winnipeg and RM of Ritchot at Grande Pointe; and south of Anola and east to Vivian in the RM of Springfield within the LAA for the Existing Corridor. Snowmobile trails located in the LAA for the new transmission line ROW are located south of Richer and PTH 1E in the RM of Ste. Anne; south of La Broquerie in the RM of La Broquerie; and west of Marchand in the RM of La Broquerie. A snowmobile trail is located just to the west of the Village of Glenboro and Glenboro South Station in the RM of South Cypress.

In addition to the trails listed above, snowmobiling occurs within Beaudry Provincial Park, along the Crow Wing Trail, part of the TransCanada Trail (Existing Corridor), around Steinbach (New ROW segment) and within Spruce Woods Provincial Park north of the Village of Glenboro and Glenboro South Station (Ernst 2010).

16.4.8 Resource Use

Resource use is important to the economy in Manitoba. The Province of Manitoba has a diversified economy based on manufacturing (10% of the provincial gross domestic product [GDP]), agriculture and resource-based industries (9% of the provincial GDP) (Province of Manitoba 2014d). The major primary industries in the province include mining, petroleum, forestry and agriculture. Within the LAA, agriculture and agriculture-related business are a large part of the economy (see Chapter 14 for more information).

This sub-section discusses trapping and hunting; fishing; gathering; mining and aggregates; forestry and surface water and groundwater use.

16.4.8.1 Trapping, Hunting, and Fishing

16.4.8.1.1 Trapping

The transmission line and Dorsey and Riel converter stations are located within Open Trapping Area Zones 1, 3 and 4 (see Map 16-8 – Open Trapping Areas). The Glenboro South Station LAA is located within Open Trapping Area Zone 1. Resource users consider most furbearers to be important (see Wildlife and Wildlife Habitat Technical Data Report [Stantec 2015c]). In southern Manitoba, First Nations and Metis have traditionally trapped for furbearing species, including beaver, lynx, muskrat, mink and fox (Chapter 11; Manitoba Hydro 2015).

Trapping of furbearers in Open Trapping Areas (OTAs) is open for various species, subject to trapping seasons and restrictions on species that can be trapped. An OTA licence can be used in any OTA in Manitoba. Area prohibitions within the RAA include Beaudry Provincial Heritage Park, areas of provincial parks closed to hunting/trapping, wildlife refuges, most ecological reserves and areas closed to all persons (MCWS 2015e). No individual registered traplines are registered within the RAA.

Approximately 7,300 OTA licenses were sold per year between 2011 – 2014. Although licence sales can be tracked by vendor location, it does not accurately reflect where the harvest takes place (Berezanski 2015, pers. comm.).

16.4.8.1.2 Hunting

Hunting opportunities are available on thousands of hectares of provincial forests, some provincial parks, WMAs and other designated Crown lands, including some leased Crown lands within the RAA. Hunting on private land is allowed with permission from the owner or lawful occupant (MCWS 2015). Some municipalities have bylaw prohibitions or restrictions on the discharge of firearms or bows, particularly near urban areas (MCWS 2015).

Game species commonly found in southern Manitoba include whitetail deer, black bear, ruffed grouse, waterfowl, wild turkey, wolf and coyote. White-tailed deer is an important game species to resource users for food, domestic use and recreation (MCWS 2015). In 2014, hunters (29,371 tags sold province-wide) were restricted to harvesting “bucks only” in an effort to increase below-average white-tailed deer populations (MCWS 2015). Black bear is also an important furbearer to resource users First Nation and Metis. First Nations and Metis also hunt large (deer, elk, moose) and small game as well as waterfowl in the Project region (MMF 2013) (Chapter 11; Manitoba Hydro 2015; Black River First Nation, Long Plain First Nation, Swan Lake First Nation 2015; Peguis First Nation 2015; Roseau River Anishinabe First Nation 2015). The following commercial guide-outfitters are known to operate in the RAA:

- Birch Point Outfitters
- Blackjack Outfitters
- East-Man Outfitting
- Headwater Ranch Outfitters
- K.C. Outfitting Guiding Service
- Silver Birch Resort & Outfitting Ltd.
- Whitemouth Lake Outfitters

Guide outfitters tend to cater to non-resident hunters and target black bear, whitetail deer (including bow hunting), upland birds and waterfowl (K.C.’s Outfitting (n.d.); Travel Manitoba 2015).

The density of black bear in southern Manitoba is expected to be moderate to high (Rebizant 2015, pers. comm.). Black bear hunting as a tourism activity is an established economic activity within southern parts of the RAA with two existing outfitters offering black bear outfitting. It is highly regulated by the provincial government (see Wildlife Technical Data Report).

The LAA for the Existing Corridor and New ROW occurs within the following Manitoba Game Hunting Areas (GHAs): 25B, 33, 34A, 35 and 35A (see Map 16-9 – Game Hunting Areas). The LAA for Glenboro South Station is located within GHA 31A.

Hunting licenses sold for big game was collected for the period 2000/2001 to 2010/2011 (Baldwin 2015, pers. comm.; Dettman 2015, pers. comm.). Both resident and foreign resident harvesting occurred within the GHAs in the RAA. White-tailed deer licence type was greatest for resident general deer and resident archery deer hunters in GHAs 35 (peaking at 7,972 in 2008-2009). Estimated foreign-resident white-tailed deer harvest by licence type sold and actual harvest was the greatest in GHA 35 over the period 2011 to 2014. GHAs 25B and 35 were the only areas where moose licenses had been issued from 2000-2007. Six resident moose licenses were issued in GHA 25B and seven moose licenses were issued in GHA 35 between 2000 and 2007.

The number of resident and foreign resident black bear hunters was obtained by GHA as well as the number of black bears harvested for the period 2000/2001 to 2013/2014 (Dettman 2015, pers. comm.; Baldwin 2015, pers. comm.). Estimated resident black bear hunters were the highest in GHA 35 over this period. In GHA 35, the number of resident hunters peaked at 345 in 2001-2002. Estimated foreign resident black bear hunters were also the greatest in GHA 35, peaking at 93 in 2007-2008. Given the number of hunters, the number of black bears harvested by resident and foreign resident licence type were both highest in GHA 35, peaking at 134 in 2004-2005 (resident) and 71 in 2007-2008 (foreign resident).

The Project is located in GBHZ 4, which encompasses the entire portion of southern Manitoba from Saskatchewan to Ontario. Hunting for migratory game birds, like Canada geese and mallard duck and upland game birds such as grouse and partridge is a common activity. Common game bird species hunted in southern Manitoba include ducks, coots, snipes, Canada geese, snow geese, sandhill cranes and wild turkey (Manitoba Conservation 2014). Game bird harvest (wild turkey) was available for four GHAs (31A, 33, 35, 35A) and only for the years 2012 to 2013. The largest wild turkey harvest occurred in 2013 for GHA 33 (43), followed by GHA 31A (38) and GHA 35A (27). This area is also part of the Metis Recognized Harvesting Area, which allows the Metis to harvest on all unoccupied provincial Crown lands, occupied provincial Crown lands (including provincial parks where First Nation members are allowed to harvest), privately owned lands where permission has been given by the owner or occupant, or Indian Reserve lands with Band Council permission (MMF 2013).

16.4.8.1.3 Fishing

The RAA is located within the Southern Fishing Division of Manitoba's Fishing Divisions (Province of Manitoba 2014a). Watercourses within the RAA where recreational fishing occurs include the Assiniboine, Red, La Salle, Seine and Rat rivers and Sturgeon, Edie, Cooks, Fish and Pine creeks.

Many sport fish species are present, including yellow perch, brown bullhead, channel catfish, rainbow trout, brook trout, brown trout, northern pike, walleye, sauger, goldeye, white sucker, freshwater drum, cisco and lake whitefish. First Nation and Metis fisheries occur within the RAA for pike, sturgeon, walleye, whitefish and perch throughout the region (Chapter 11; Manitoba Hydro 2015). Further information on fish species, presence and habitat is provided in Chapter 8.

16.4.8.1.4 Mining/Aggregates

Mining is Manitoba's second leading primary resource sector after agriculture. Aggregate (sand, gravel and crushed stone) is the largest mining sector in Manitoba, based on volume produced and land acreage used (Province of Manitoba 2014c). As a component of land and resource use, mining and aggregate use is important to communities, municipalities and individual owners of existing and proposed developments, because it is a source of primary income or supplementary income. This component of land and resource use is also subject to regulation under provincial legislation (*i.e.*, *The Mines and Minerals Act* (C.C.S.M. c. M162)).

Until the early 1900s, surface and mineral rights came with the purchase of land. Since the early 1900s, surface rights and mineral rights in Canada and in Manitoba have been government-owned. They cannot be purchased, only leased by individuals or companies. As a result, 90% of mineral rights in Canada are government owned. In the 10% of privately owned mineral rights, mineral rights on a property can be sold separately of surface rights (Natural Resources Canada 2015). The regulation of mining activities on publicly owned mineral leases falls under provincial/territorial government jurisdiction.

Mineral areas (see Map 16-10 – Mineral Dispositions) within the Project LAA for the New ROW segment to the U.S. border include:

- 7 quarry leases
- 10 quarry withdrawals
- 29 casual quarry permits
- 24 private quarry permits
- 1 peat mine

Within the LAA along the Riel–Vivian Transmission Corridor, there are:

- 14 mineral areas
- 1 quarry withdrawal
- 13 private quarries (10 of which are concluded)

Within the Existing Corridor PDA, there are:

- 5 mineral areas
- 1 quarry withdrawal
- 1 private quarry
- 3 concluded private quarries

Within the PDA along the New ROW, there are:

- 3 quarry withdrawals
- 7 private quarries (three of which are concluded)

The RM of Tache operates a sand and gravel, quarry operation located in section 28-9-7E . Aggregate resources of varying quantity and quality are present within the RAA and LAA and are concentrated, along with associated sand and gravel pits, in the RMs of Rosser, Springfield, Tache, Ste. Anne, La Broquerie, Stuartburn and Piney. The Province of Manitoba Mineral Resources Branch assigns development status (*i.e.*, high-medium-low potential for development or categorized as "Stop-Caution-Go" with respect to the value of the deposit) to aggregate deposits within rural municipalities and updates the status of deposits as further information becomes available. Municipalities with aggregate deposits that have been assigned a development status are the RMs of Rosser, Springfield, Tache, La Broquerie and Piney.

Within the RAA, peat harvesting and processing operations are located in the Giroux area in the RM of Ste. Anne. An existing peat harvesting plant operated by Premier Horticulture is located adjacent to the Giroux bog (Province of Manitoba 2015b). There are currently two peat moratoriums in place in Manitoba: one on the issuance of new peat quarry leases and another on the issuance of *Environment Act* licences for existing peat leases in Manitoba (MCWS 2015d).

There are no mining activities or aggregate deposits near either Dorsey or Riel converter stations or around Glenboro South Station.

16.4.8.2 Productive Forestland and High Value Forest Sites

Commercial timber harvesting in southeast Manitoba occurs predominately in the Agassiz and Sandilands provincial forests in the southeast portion of the RAA (see Map Series 16-100 – Productive Forestland) (MCWS 2015h; 2015i). With the exception of a few locations north and east of Sundown and at the Piney border crossing (Photo 16-6), the PDA lies outside of the Provincial Forest area. The area intersected by the PDA south of PR 12 is predominately Crown land where commercial timber harvesting occurs to a lesser extent.

MCWS, Forestry and Peatlands Management Branch, maintains a Forest Resource Inventory (FRI) for forest management planning and maintenance of sustainable harvest levels in Manitoba's Commercial Forest Zone (MCWS 2015h). Information includes commercial forest operations through timber sale and timber permit areas, including fuelwood harvesting areas (MCWS 2006).

The LAA occurs within FMUs 1 and 24 of the Aspen Parkland and Pineland Forest Sections; (see Map Series 16-100). Productive forestland for FMU 1 and FMU 24 totalled 171,460 ha (14%) and 585,075 ha (47%), respectively (MCWS 2010; Meng 2014 pers. comm.) and is concentrated in the southeast portion of the RAA (MCWS 2011). In 2010, the ACC for FMU 1 and 24 totalled 305,745 m^3 for both softwoods and hardwoods (MCWS 2010; Liu 2014, pers. comm.). Within the RAA, there were 98 timber sale/timber permits located over approximately 32,500 ha (MCWS 2010).

Photo 16-6 Looking northeast to Sandilands Provincial Forest near Sundown, MB

MCWS conducts reforestation, standing tending activities and silvicultural treatments on high-value forest sites to control growth, composition health and quality of forests (see Map Series 16-200 – High Value Forest Sites). There are 346 plantations covering 5,703 ha located in the RAA, of which two plantations (covering 19.2 ha) occur in the LAA (Porteous 2014, pers. comm.). There are 47 FRI Permanent Sample plots for forest research and monitoring located in the RAA. A Tree Improvement Program is located in the Lonesands area of the Sandilands Provincial Forest (Porteous 2014, pers. comm.).

The Manitoba Forestry Association (MFA) has developed 302 woodlot plans on private land for a total of approximately 19,400 ha in the RAA (Map Series 16-200 – High Value Forest Sites) (MFA 2014). MCWS has also established 40 Trees for Tomorrow plantations on private land within the RAA and LAA. (see Map Series 16-300 – Private Land Forest Areas) (Porteous 2014, pers. comm.). Private landowners have established shelterbelts for aesthetic purposes and for wind and erosion control on agricultural fields, farmsteads and rural residences.

The RAA for the Glenboro South Station project component occurs within FMU 4 of the Aspen Parkland Forest Section. The forest cover is unevenly distributed and concentrated in the Spruce Woods Provincial Forest, located approximately 9 km to the north from Glenboro South Station. The flat lands around Glenboro and the lower slopes of the Tiger Hills are generally devoid of cover with only shelterbelts as windrows and around farmsteads. Minor clumps of trees and native forest cover remain in wet depressions and along streams. Narrow fringe riparian forest stands remain along streams, wetland and lakes. Some fuel wood harvesting opportunities may

exist in the area. The forestry resource in this area is not used for commercial purposes (Manitoba Hydro 2001). However, Manitoba Conservation maintains a Trees for Tomorrow plantation located north of Glenboro and west of PTH 5 south of the Assiniboine River.

16.4.8.3 Groundwater and Surface Water Use

16.4.8.3.1 Major Aquifers and Water Quality

The main bedrock aquifer underlying the Project RAA is the Carbonate Aquifer (Rutulis 1984a, b, 1990). This aquifer is the largest freshwater aquifer in Manitoba and stretches from north of The Pas, Manitoba, southward through the Interlake region and along the east side of the Red and Rat rivers into Minnesota (Grasby and Betcher 2002). The Sandilands area in the southeast portion of the RAA is an important freshwater recharge area because of the relatively high permeability tills that underlie the area. This area is one of the two freshwater recharge areas for the carbonate rock aquifer in Manitoba (Thorleifson et al. 1998, Grasby and Betcher 2002; Ferguson et al. 2003) with the other being in the Interlake region of Manitoba outside of the RAA.

Groundwater quality in southeastern Manitoba is generally acceptable for most purposes, although it becomes more saline closer to the freshwater-saline water boundary (SRGMP 2010). Groundwater tends to be hard (mineralized) in most deep aquifers, although less so in the Winnipeg Formation. Residences relying on well water require household water treatment to deal with hardness. Iron and manganese typically occur at concentrations that stain or cause taste problems. Some local trace metal concentrations can exceed health-based drinking water guidelines (SRGMP 2010). MCWS has provincially maintained water wells located within the RAA.

The principal aquifer in the RM of South Cypress and Glenboro area is an extensive sand and gravel aquifer called the Assiniboine Aquifer. Most of the licensed groundwater supply wells are located in the southern third of the RAA in the RM of South Cypress and are for irrigation purposes.

16.4.8.3.2 Groundwater and Surface Water Supply

Groundwater wells are an important source of fresh water for many uses, including domestic, agricultural (livestock and irrigation), air conditioning and geothermal, municipal, industrial, and others. Surface and groundwater resources are managed under an Integrated Watershed Management Planning process in Manitoba. It is a joint partnership between the province and local municipalities to manage land and water resources on a watershed basis over the long term. The Water Stewardship Division of MCWS designates Conservation Districts under the Conservation Districts Program as water planning authorities to undertake integrated watershed management planning in the province (MCWS 2014a). Integrated watershed planning has been undertaken for the following areas:

- La Salle River Watershed (La Salle-Redboine Conservation District) – La Salle River through portion of the RM of Macdonald

- Seine River and Rat-River Marsh watersheds (Seine-Rat River Conservation District) – Seine and Rat rivers through portions of the RMs of Ritchot, Springfield, Tache, Ste. Anne and La Broquerie
- Netley-Grassmere Watershed (East Interlake Conservation District) – Grassmere Drain through a small portion of the RM of Rosser
- Cooks-Devils Creek Watershed (Cooks Creek Conservation District) – Cooks Creek-Devils Creek (Photo 16-7) through portions of the RMs of Springfield, Tache and Ste. Anne (plan under development)

Photo 16-7 Cooks Creek in the RM of Springfield

Long-term plans to manage land, water and related resources on a watershed basis have been prepared or are under development in each of the conservation districts.

Aquifer management plans have been developed in southwestern Manitoba, including the Assiniboine Delta aquifer, to address issues of water supply development, protection and allocation. Similar concerns were apparent in the southeast area of Manitoba (SRGMP 2010). The Southeast Regional Groundwater Management Plan was created partly as a result of the Clean Environment Commission's (CEC) Report on Public Hearing for the Pembina Valley Water Cooperative (PVWC), Supplemental Groundwater Supply System (SRGMP 2010). The CEC report recommended that groundwater development proposals, including the PVWC, not be allowed without management plans being in place. The Southeast Regional Groundwater Management Plan covered a land area east of the Red River to the western edge of Whiteshell Provincial Park and north from the U.S. border to Lake Winnipeg and the Winnipeg River. The groundwater source consists of a confined aquifer in the glaciofluvial sediments underneath the Agassiz Sandilands Uplands. The Sandilands region includes portions of the Rat, Seine, Whitemouth, Roseau and Brokenhead river watersheds. The Sandilands is one of two major sources of recharge to the bedrock aquifers that underlie southern Manitoba (MB CEC 2007).

Groundwater and surface water use requires a licence by the Water Use Licensing Section of MCWS. Generally if water is used in volumes of greater than 25,000 L/day then a water use licence from MCWS allocating a certain volume of water for that individual or corporation's use is required (MCWS 2015j). There are groundwater and surface water licences in the LAA and RAA though no groundwater or surface water is expected to be used by the Project and therefore the Project will not require water use licences.

Most of the licensed groundwater supply wells in the southern half of the RAA, in the RMs of Ste. Anne, La Broquerie, Stuartburn and Piney, are for agricultural purposes. The RM with the highest density of licensed groundwater supply wells is the RM of La Broquerie with mostly agricultural wells (maximum annual volume of 10,000 m^3 to 100,000 m^3) and one industrial well (maximum annual volume of 25 m^3). The northern half of the RAA has a mixture of all groundwater use categories: agricultural, domestic, industrial, irrigation, municipal and other.

Surface water licences in the RAA have been issued principally for irrigation, agricultural and municipal purposes (see Map 16-11 – Licensed Surface Water and Groundwater Supply). Water withdrawals are taken from the La Salle River, Red River, Seine River Diversion, Assiniboine River, an unnamed reservoir and five smaller drain tributaries (Phipps 2014, pers. comm.).

Two surface water licenses and five groundwater licenses occur within the existing transmission line segment of the LAA, while two surface water licenses and six groundwater licenses occur within the New ROW segment of the LAA. There are no surface water sources or record ground water well sources occurring within the PDA.

16.4.8.3.3 Flowing Wells and Springs

Two large fresh water flowing well areas are located in the Project RAA. One area stretches from Hazelridge in the north central part of the RM of Springfield down to the town of Ste. Anne in the RM of Ste. Anne with the LAA traversing it south of Glass and Anola in the RM of Springfield. The second stretches from Giroux in the RM of Ste. Anne south to just south of Marchand in the RM of La Broquerie with the LAA passing through north and south of La Broquerie. Three smaller flowing well areas are located just west of the town of Ste. Anne and around the communities of Ross and Piney (Rutulis 1985). The LAA does not pass through the flowing well area near Ste. Anne or Ross but does pass through the one around Piney. One area of fresh water springs is located in the southeast area of the RAA in the RM of Piney. There are also springs that have been recorded in the northeastern part of the RAA in the RM of Springfield. Lastly, a recorded freshwater spring is located within the Project LAA east of Sundown (see Map 16-12 – Flowing Wells and Springs).

16.4.8.3.4 Groundwater Wells

The highest density of groundwater wells is within the northeastern portion of the RAA (see Map Series 16-400 – Groundwater Wells) in the RMs of Springfield, Tache, Ritchot, Ste. Anne and the northern half of the RM of La Broquerie. The RM of Rosser in the northwestern portion of the

RAA also has a high density of groundwater wells. Smaller localized areas of groundwater wells can be seen in the southern half of the RAA in the RMs of Stuartburn and Piney.

General groundwater wells in the LAA for the Existing Corridor and New ROW are used primarily for domestic purposes (1,320 wells), followed by other (207 wells), agriculture (128 wells), industrial (seven wells) and one municipal well (see Map Series 16-400 – Groundwater Wells and Table 16-8) (Hempel 2015, pers. comm.).

Table 16-8 Groundwater Well Use in the LAA of the Existing Corridor

Rural Municipality	Total Wells	Domestic	Municipal	Agricultural	Industrial	Other
City of Winnipeg	155	102	0	2	1	54
Headingley	35	27	0	3	0	6
La Broquerie	228	198	1	27	2	19
MacDonald	26	18	0	1	2	5
Piney	27	22	0	7	0	3
Ritchot	82	69	0	0	1	14
Rosser	23	17	0	5	1	3
Springfield	324	275	0	21	0	48
Ste. Anne	211	176	0	40	0	37
Stuartburn	39	21	0	9	0	13
Tache	170	165	0	14	0	5
Grand Total	**1320**	**1090**	**1**	**128**	**7**	**207**

NOTES:
Agriculture water use includes irrigation and livestock. Other water use includes geothermal, air conditioning, dewatering, observation, recharge, test wells and other/unknown. Some wells have multiple uses.

The well casing completion depths ranged from 0.9 mbgs to 91.5 mbgs, which shows that there is a range of sand and gravel aquifer use and bedrock aquifer use. Additional well construction details are included in the Groundwater Technical Data Report. Depth to groundwater in the LAA ranged from above ground to 25.5 mbgs (Figure 16-2). A review of the pumping data for groundwater wells, after their installation, showed that locations with recorded groundwater levels aboveground prior to pumping were consistently located in the areas of the flowing well areas (see Map 16-12 – Flowing Wells and Springs and Map 16-13 – Depth to Groundwater in Wells).

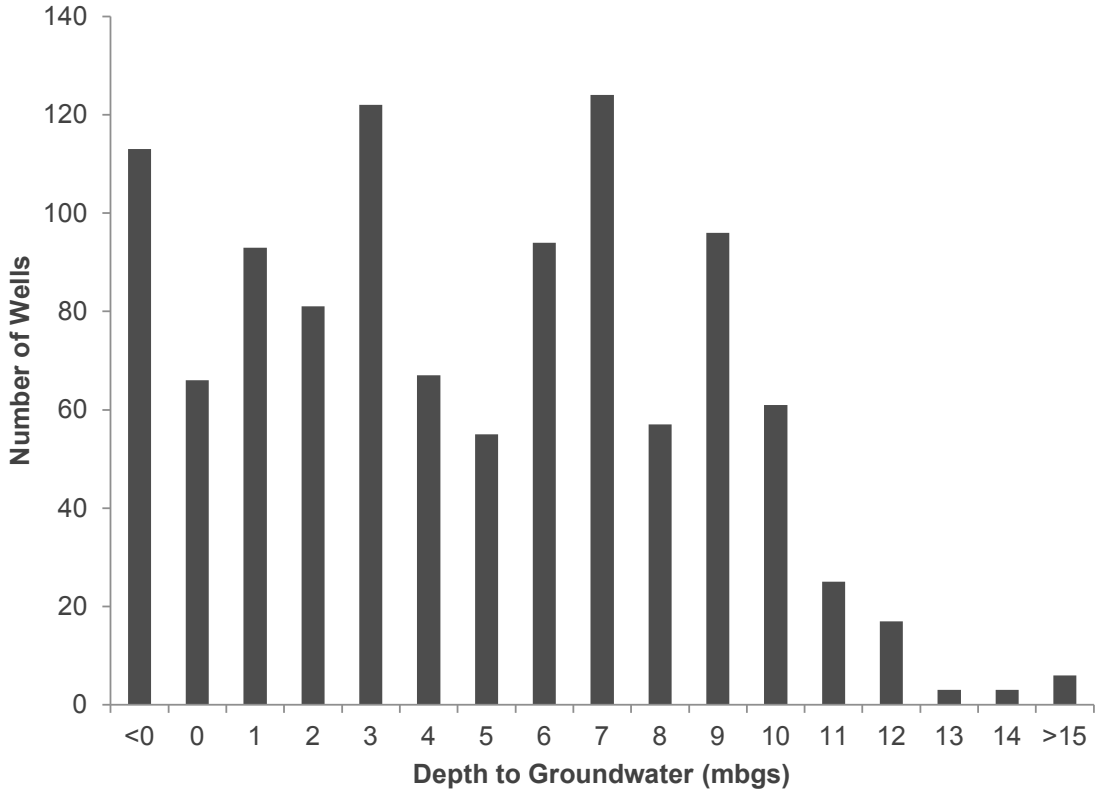

Figure 16-2 Depth to Groundwater in Wells in the LAA

Groundwater well use in the LAAs of Dorsey and Riel converter stations is primarily for domestic and other purposes. Groundwater wells in the vicinity of the Village of Glenboro and Glenboro South Station are used primarily for domestic, industrial and multi-use purposes (Table 16-9) (Hempel 2015, pers. comm.) (see Map 16-14 – Glenboro South Station Groundwater Wells and Map 16-15 – Glenboro South Station Depth to Groundwater in Wells).

Table 16-9 Groundwater Well Uses in the Station LAAs

Station	Total Wells	Domestic	Municipal	Agricultural	Industrial	Other
Dorsey	47	19	2	2	9	17
Riel	35	32	0	2	0	2
Glenboro	3	3	0	3	0	0

NOTES:
Agriculture water use includes irrigation and livestock; Other water use includes geothermal, air conditioning, dewatering, observation, recharge, test wells and other/unknown. Some wells have multiple uses.

16.4.9 Summary of Existing Conditions

The RAA for the Project encompasses a diverse region of a portion of south-central and southeastern Manitoba. Property ownership patterns consist primarily of the section-township-range system interspersed with areas of long lot river land use survey. Privately owned lands and agricultural land use are predominant in southern Manitoba. However, there are substantial portions of the land base that are either Crown owned or Crown leased.

The northwestern part of the LAA is characterized by urban and rural residential land use. Urban residential development and settlement centres include Headingley, Grande Pointe, La Broquerie, Marchand and the town of Ste. Anne. Rural residential developments are located within commuting distance of densely populated urban settlements. Rural farm residential development in the RAA is associated with agricultural Hutterite colonies, agro-industrial developments, industrial parks and crop research and input centres are located within the northern half of the RAA.

Municipal jurisdictions and Planning Districts in the RAA have development controls in place to guide land use decisions. Most of the land located outside of urban centres in the RAA is designated as “General Agricultural”, “Agricultural Limited” or “Rural Areas”. Areas of Crown land are designated as “Natural Resource Areas”, “Natural Environment Area”, “Rural Natural Area” or as designated Crown land (*e.g.*, provincial forests; WMAs).

Crown lands (owned and leased) are more common in the eastern and southeastern parts of the RAA include designated lands such as provincial parks, ecological reserves, WMAs and existing and proposed protected areas. Designated lands include Beaudry Provincial Park, Duff Roblin Provincial Heritage Park, St. Norbert Provincial Heritage Park, Sandilands Provincial Forest, Watson P. Davidson and Spur Woods WMAs.

A variety of outdoor recreational activities and tourism venues occur throughout the RAA, including hiking/biking and horseback trails, ATV trails, golf courses, lodges, campgrounds, resorts, parks, recreational angling, boating and canoeing, cross-country ski trails and snowmobile trails and shelters. Fishing activities are largely confined to the major watercourses located within the RAA. Other land uses interspersed throughout the RAA include private conservation lands. Tourist activities (*e.g.,* canoeing, wildlife viewing) and attractions are principally associated with the more natural landscapes and within urban communities and settlement centres.

Resource development activities occur predominantly in the eastern reaches of the RAA in southern Manitoba, including commercial forestland, high value forest sites (*e.g.*, silviculture enhancements, research and monitoring sites, managed woodlots, shelterbelts and private forestland), quarry and mineral leases, permits and withdrawal areas, aggregate and peat deposits. Groundwater and surface water are used for multiple purposes throughout the RAA. Hunting and outfitting, trapping, fishing and gathering activities can occur throughout the RAA; however, hunting, outfitting and trapping are likely more concentrated in the eastern and

southeastern portion of the RAA. Trapping also continues to be an important traditional activity for both economic and cultural purposes in the region.

16.5 Assessment of Project Environmental Effects on Land and Resource Use

16.5.1 Project Interactions with Land and Resource Use

Table 16-10 identifies physical activities and components of the Project that might interact with Land and Resource Use, for each potential effect.

Table 16-10 Potential Project-Environment Interactions and Effects on Land and Resource Use

Project Components and Physical Activities	Potential Environmental Effects					
	Change in Property	Change in Designated Lands, Protected Areas and Recreation	Change in Forested Areas	Change in Groundwater Use	Change in Mining/ Aggregates	Change in Hunting and Trapping
Transmission Line Construction Activities						
Mobilizing (staff and equipment)	✓	✓	–	–	–	✓
Access Route and Bypass Trail Development	✓	✓	✓	–	✓	✓
Right-of-way Clearing/Geotechnical Investigation	✓	✓	✓	✓	✓	✓
Marshalling Yards, Borrow Sites, Temporary Camp Setup	✓	✓	✓	–	✓	✓
Transmission Tower Construction and Conductor Stringing	✓	✓	✓	✓	✓	✓
Demobilization	✓	✓	–	–	–	✓

Project Components and Physical Activities	Potential Environmental Effects					
	Change in Property	Change in Designated Lands, Protected Areas and Recreation	Change in Forested Areas	Change in Groundwater Use	Change in Mining/ Aggregates	Change in Hunting and Trapping
Transmission Line Operation and Maintenance						
Transmission Line Operation/Presence	✓	✓	✓	–	✓	✓
Inspection Patrols	✓	✓	–	–	–	✓
Vegetation Management (tree control)	–	–	✓	✓	–	✓
Station Construction						
Station Site Preparation	✓	–	–	–	–	–
Electrical Equipment Installation	✓	–	–	–	–	–
Station Operation/Maintenance						
Station Operation/Presence	✓	–	–	–	–	–
Vegetation Management (weed control)	–	–	–	✓	–	–

NOTE:
"✓" = Potential interactions that might cause an effect; "–" = no potential interaction

It is anticipated that the transmission line construction activities will interact with land and resource use. Project construction has the potential to cause disturbance or disruption to residences, create nuisance, damage property or affect property value. The creation of a cleared ROW could increase access to property. Project construction has the potential to conflict with development potential and disturb designated lands and protected areas or result in the loss of potential protected area lands. There is potential to affect productive forestland (through the removal of the AAC) and disturb high valued forest sites or private land forests (woodlots, shelterbelts). Clearing of the ROW, structure assembly and installation, creation of access can cause disruption effects on mining/aggregate operations and the presence of line can result in interference with mining/aggregate operations. Project construction can disrupt or intrude on recreational areas/tourism activities and disturb or disrupt local resource use (hunting and trapping) due to disruption to harvesting success as a result of sensory disturbance or increased pressure on the resource from the creation of new access. Project construction has the potential

to affect groundwater use and quality through the geotechnical investigation and the installation of tower foundations. It is not expected to affect groundwater use with borrow pits since water levels will be recorded during the geotechnical investigation to look for suitable borrow pit sites. At this time it is assumed that a construction camp will not utilize groundwater. Areas of potential concern for groundwater would be avoided.

During operation and maintenance, no groundwater interactions are expected to occur.

The following components or activities are not anticipated to interact with land and resource use:

- Mobilization and demobilization – the movement of personnel and equipment will not affect forestry, groundwater use or mining activities because vehicles will primarily use the existing road network to access marshalling yards and the ROW and will not affect these resources.
- Station modifications – during construction, station modifications at Dorsey and Riel converter stations will not interact with designated lands and protected areas, recreational areas/sites, timber harvesting/ high value forest sites/private forestlands, groundwater usage, mining and aggregates, as they will occur within existing fenced locations associated with station footprints or on existing property. The expansion of Glenboro South Station will occur on Manitoba Hydro owned property that is currently under agricultural use.
- Station operations – station operations will not interact with designated lands and protected areas, recreational areas/sites, timber harvesting and high value forest site and private forestlands, mining and aggregates, because there will be no further disturbance of the ground surface within the PDA (i.e., station footprints).
- Inspection patrols – during operations, inspection patrols will occur infrequently and will not interfere with other land uses occurring on or near the ROW.
- Vegetation management – during operations, vegetation management will not affect land use activities.

16.5.2 Assessment of Change in Property

The assessment of change in property focuses on three effects, the disturbance and nuisance effects on residences (*e.g.,* audible noise); change in property value (*e.g.,* damage to property; decrease in property value; visual aesthetics); and conflict with land development potential.

The transmission line routing process made use of established linear rights-of-way as much as possible in part to avoid or reduce effects on private property. These included locating the proposed transmission line within existing transmission line rights-of-way and paralleling existing transmission lines, floodway channel, railway line, provincial road and municipal road allowances.

Within the municipalities in the RAA, the amount of RM land by percentage and hectare occupied by the PDA is presented in Table 16-11.

Table 16-11 Percent and Total Rural Municipal Area Occupied by PDA in the RAA

Rural Municipalities/City	Rural Municipal Area within PDA (%)	Rural Municipal Area within PDA (ha)
RM of Rosser	0.4	44,225
RM of Headingley	3.0	10,934
RM of Macdonald	0.4	115,981
City of Winnipeg[1]	0.5	47,521
RM of Ritchot	0.1	33,819
RM of Springfield	0.7	108,019
RM of Tache	0.1	58,251
RM of Ste. Anne	0.4	48,042
RM of La Broquerie	0.5	58,071
RM of Stuartburn	0.2	116,708
RM of Piney	0.1	246,233

NOTE:
[1] Includes only two Census Tracts in the City of Winnipeg within the RAA

In most municipalities, the PDA will occupy less than 1.0% of the total municipal area, with the exception of the RM of Headingley, where 3.0% would be occupied. However, in this instance, the PDA would occur entirely within ROW already owned by Manitoba Hydro.

From Dorsey Converter Station to Riel Converter Station and east of Riel–Vivian Transmission Corridor, the PDA will affect (*i.e.,* run parallel to or cross) 31 properties of 17 landowners along an existing ROW. The land within this corridor is comprised of privately owned parcels upon which Manitoba Hydro holds easements, Crown land, parcels owned by the City of Winnipeg and a mixture of wholly owned or partially owned parcels held by Manitoba Hydro. From Vivian south to the U.S. border, the PDA will consist of New ROW and cross 217 properties involving approximately 146 landowners.

In siting the New ROW attempts were made to avoid crossing residences and residential development (including areas designated for future urban and rural residential development). However, one residence is within the PDA, and while large proposed multi-lot subdivisions are generally avoided, some smaller proposed residential developments are crossed by the New ROW through parts of the LAA where extensive subdivision development is prevalent.

The number of dwellings from various distances for the Existing Corridors (*i.e.*, SLTC and RVTC) and within 1 km of the new transmission line ROW to the U.S. border is provided in Table 16-12.

Table 16-12 Number of Dwellings and Distance to PDA

Distance from Edge of ROW	Existing Corridors	New ROW
Within PDA	0	1
Within 100 m	29	11
100 m to 400 m	140	76
400 m to 800 m	440	186
800 m to 1,000 m	565	253
Total	**1,174**	**527**

SOURCE: Manitoba Hydro Buildings Survey and Stantec Orthophoto Merge File

There is one residence located within the PDA for the new transmission line ROW that would require relocation (Table 16-12). Manitoba Hydro has reached an agreement with the property owner.

Within the LAA, there are 42 proposed private subdivision applications, consisting of 36 individual parcels of land. Located adjacent to the LAA is the Oak Bluff West residential subdivision in the RM of Macdonald.

Using zoning and development plans, the development potential of land was ranked based on a low-medium-high scale. Areas ranked as “low” have the least development potential (i.e., preferred for transmission line routing), while areas ranked “high” have high development potential where transmission line development should be avoided if possible.

The development potential for land within the PDA is primarily ranked as low to low-medium. Pockets of medium, medium-high and high development potential land are located in some areas adjacent to the PDA in the LAA, including at Headingley, Oak Bluff, Grande Pointe, Monominto, Ste. Genevieve, Richer and La Broquerie. Of the proposed private subdivisions within the LAA, the Final Preferred Route affects 20 lots or parcels of land where there was a low potential for development and eight lots or parcels of land where there was high potential for development (see Map 16-16 – Land Development Potential).

16.5.2.1 Private Property Values

The literature is inconclusive whether transmission lines affect property values. Some studies show a small, negative effect on property values immediately after construction that diminish over time and distance (Cowger *et. al.* 1996; Jackson and Pitts 2010; Headwaters Economics 2012). In a review of transmission line effects on housing prices, Bottemiller and Wolverton (2013) found a small, negative effect occurring when ROWs abut single-family homes. Effects on property values were more substantive for higher priced homes and negligible for average priced homes.

While transmission line easements were found to have a consistent small negative effect on the value of adjacent affected properties, the statistical significance of this finding has varied (Elliot Grover & Co. Ltd. 2008). Effects on property value varied depending on the location and visibility of transmission towers to properties (Colwell 1990; Cowger *et al.* 1996; Bottemiller *et al.* 2000; Elliot Grover & Co. Ltd. 2008; Chalmers and Voorvart 2009; Jackson and Pitts 2010). Other studies have found no evidence that proximity to, or visibility of, high voltage transmission lines affect property values (Elliot Grover & Co. Ltd. 2008).

Since 2000, Manitoba Hydro has conducted an annual property value-monitoring program in the Birds Hill and Lister Rapids areas in the Rural Municipalities of East and West. St. Paul. The monitoring program was initiated in response to property owner concerns regarding the construction of the Dorsey-St. Vital 230 kV Transmission Line within an existing ROW. Real estate transactions for developed single-family residential properties within the monitoring area were tracked from January 1, 1992 to December 31, 2013 (the latest report date). The monitoring area was divided into:

- adjacent – properties located immediately next to the transmission ROW without any other properties located in between
- nearby – properties located between the adjacent property and the next property line
- other – all other property located within the PDA

The 2014 monitoring report noted that housing prices have fluctuated within range of adjacent, nearby and other properties (Manitoba Hydro 2014a).

The findings of an econometric analysis conducted for Manitoba Hydro by Prairie Research Associates (PRA) on the effect of transmission lines on residential property values were consistent with the existing literature. PRA found mixed evidence that transmission lines affect property values. Evidence that pointed to a negative effect suggests that any effect is small and diminishes rapidly as distance to the transmission line increases. While the analysis indicates a small, negative correlation between transmission line proximity and assessed value, no such negative correlation occurs in regards to sales price (PRA 2015, unpublished draft).

16.5.2.2 Pathways for Change in Property

The assessment of environmental effects on property and residences considers the following:

- disturbance and nuisance effects (e.g., construction noise, dust, audible noise emission, creation of access along the ROW) during Project construction, operation and maintenance
- change in property value during operation and maintenance (e.g., damage to property; decrease in property value; visual aesthetics)
- conflict with development potential of land due to Project construction and presence during operation and maintenance

16.5.2.2.1 Disturbance and Nuisance Effects

TRANSMISSION LINE CONSTRUCTION

Potential effects during transmission line construction include noise disturbance, vibration, dust and damage to property associated with access on the ROW, aesthetics (Chapter 17) and Project-related interference on roads and community infrastructure (Chapter 13).

There is some potential for an interaction or effect from noise and vibration due to construction related activities and from creation of new access along the ROW. Potential receptors sensitive to noise, vibration and dust include residences, schools, hospitals and places of worship. Noise sources within the PDA are anticipated to be typical of construction activities for transmission lines in rural areas and will include some temporary noise disturbances (e.g., movement of equipment, splicing of conductors). Potential effects include disturbance and annoyance to community residents because of heavy equipment operated nearby. For splicing of conductors, Manitoba Hydro uses implosives to join the conductors together. When used, the sound produced constitutes a short very loud bang (see Chapter 18 for assessment of effects related to noise).

TRANSMISSION LINE OPERATION/MAINTENANCE

Project operation and maintenance has the potential to affect residents and property owners through noise generation and visual aesthetic changes (Chapter 17). A transmission line emits audible noise when electrical energy within the conductor interacts with the air surrounding the conductor surface. These reactions depend on ambient conditions such as temperature, humidity and wind speed and direction and are most pronounced in foul-weather conditions, such as rain, fog, and snow (Chapter 18).

STATION CONSTRUCTION

Station modifications are required to facilitate the Project at Dorsey Converter Station, Riel Converter Station and Glenboro South Station. Upgrades at all stations include additional equipment to terminate the new line as well as revisions to existing protection and communication systems to accommodate the new line. Station modifications and equipment additions for Dorsey and Riel converter stations will be on existing Manitoba Hydro owned property. The nearest receptors to both converter station sites are occupied residences located approximately 260 m to the southwest of the proposed expansion site at Dorsey Converter Station and approximately 400 m to the north of the physical footprint of Riel Converter Station, respectively. The fence line at the Dorsey Converter Station will be expanded to the west and the station footprint will be increased by 1.5 ha. The modifications at Riel Converter Station will be contained within the current fenced area of the switchyard portion of the station. Approximately 0.7 ha of land will be required for the expansion of Glenboro South Station, as part of the Project. The expansion is located on Manitoba Hydro owned property.

16.5.2.2.2 Property Value

TRANSMISSION LINE OPERATION AND MAINTENANCE

The physical presence of transmission line infrastructure could affect the value of residential property near the ROW. Factors that can influence property values include change in aesthetics; real or perceived nuisances and health risks; real or perceived change in the use and enjoyment of the property; and distance from the property to the transmission line. Unobserved characteristics of properties or the surrounding environment can also contribute to property value (PRA 2015).

STATION CONSTRUCTION

Modifications to Dorsey and Riel converter stations will occur within existing Manitoba Hydro owned property, and therefore there are no anticipated Project-related effects on property located adjacent to the stations. For the Riel Converter Station site, properties on the east side of PR 207 were purchased by Manitoba Hydro as part of the Riel Sectionalization Project. The closest receptor (*i.e.,* occupied residence) to Riel Converter Station is located approximately 400 m to the north of the station footprint. The nearest occupied residence to the Dorsey Converter Station site expansion is approximately 260 m to the southwest. Stations will continue normal operations. At the Glenboro South Station, Manitoba Hydro owns the 0.7 ha of land required for expansion.

16.5.2.2.3 Development Potential

The development of a cleared ROW for a transmission line could reduce development potential due to fragmentation of lots. The transmission line could also result in less interest in wanting to buy a lot or build a residence near the line, thus lowering the development potential of land or land nearby. These changes could influence development in localized areas adjacent to the Project or potentially affect the location of future developments within the RAA.

16.5.2.3 Mitigation for Change in Property

Transmission line routing considered the occurrence of homes within the ROW, proximity to homes, number of proposed subdivisions potentially affected and the development potential of land. One residence located within the ROW in the RM of Ste. Anne will require relocation. One rural residential subdivision (Oak Bluff West) is located immediately adjacent to the Project LAA in the RM of Macdonald. As well, based on a review of 42 proposed private subdivision applications, the Final Preferred Route affects 20 lots or parcels of land with a low potential for development based on their agricultural designations and zoning and eight lots or parcels of land with a high potential for development.

During construction, Manitoba Hydro will provide residents and property owners information and updates on ongoing and planned construction activities. Manitoba Hydro will compensate owners of residences that will need to be relocated at fair market value and pay transaction costs associated with the relocation. On a case-by-case basis, a voluntary purchase can be considered

for residences where the proximity of the transmission line on New ROW is within 75 m of the residence (*i.e.*, to the nearest part of the line such as the conductor/crossarm) at 100% of all reasonable and related relocation costs. For private land parcels occurring within the PDA that will need to be accessed for ROW purposes, Manitoba Hydro will pay lease payments for easements over private property based on the current land values escalated to 150% of fair market value.

The effect of Project activities can be reduced through scheduling and logistics planning (e.g., use of implosives during daytime hours during the week). Mitigation measures of potential Project effects on property and residential development include the following:

- Construction activities and equipment will be managed to avoid damage and disturbance to adjacent properties, structures and operations.
- Mud, dust and vehicle emissions will be managed in a manner that considers the safe and continuous public activities near construction sites where applicable.
- Noisy construction activities where noise and vibration may cause disturbance and stress in built-up areas will be limited to daylight hours.
- A communication protocol will be developed to notify affected parties of blasting operations and conductor splicing. Affected parties may include Manitoba Conservation and Water Stewardship, RCMP, municipalities, landowners and resource users.
- Implode compression conductor splicing will be limited to the extent possible on weekends and after normal working hours in residential areas.
- Manitoba Hydro will provide the contractor with a stakeholder list with names, organizations and contact information for the purpose of contacting stakeholders as necessary.
- Construction, operation and maintenance personnel will undertake activities in such a way to avoid affecting neighbouring properties, structures or operations. In the unlikely event that a landowner incurs damages, they are subject to compensation through Manitoba Hydro's existing compensation policies.

16.5.2.4 Characterization of Residual Environmental Effects for Change in Property

16.5.2.4.1 Construction Phase

Transmission line routing for the Project considered interactions with residences and residential development, including areas designated for future urban and rural landscape development. The route avoids built-up areas around Oak Bluff, Ste. Anne and Ste. Genevieve, but still intersects with rural residential areas occurring to the south and east of Winnipeg. Through adjustments made during the routing process, the Project will avoid two proposed multi-lot residential subdivisions located in the RM of Ste. Anne, totalling 49 lots. The Final Preferred Route ROW also avoids existing schools, hospitals and churches.

While overlap between the proposed new ROW for the transmission line route and residential communities was reduced through the routing process, it was not possible to avoid all residential areas. Table 16-12 summarizes the distance of residences within the LAA to the ROW. Residences located within 100m of the PDA have the highest potential to be affected by the transmission line due to proximity to the ROW. One residence located within the PDA in the RM of Ste. Anne will need to be relocated. An additional 11 residences are located within 100 m from the PDA located within the RMs of Tache (five), Ste. Anne (five) and La Broquerie (one). Along the existing Riel–Vivian Transmission Corridor, which pre-dates areas of new residential development, there are seven residences located within 100 m from the edge of the ROW.

By adopting mitigation measures, the Project will be constructed to limit possible disturbance and annoyance to residents and interference with residential development. Given the low number of residences located near the proposed transmission line ROW (*i.e.,* 11 residences within 100 m of the PDA for the new ROW), in consideration of mitigation measures, the Project will have a low to moderate nuisance or disturbance effect on residences or other receptors. Nuisance or disturbance will be short term over the construction period as equipment is moved along the ROW. Therefore, nearby residents will not be affected for prolonged periods.

The maximum noise level generated during the construction phase from combined construction equipment is anticipated to be 89 dBA at a distance of 15 m from noise sources; implosive sleeves will generate instantaneous discharges expected to generate 110 dBA during splicing of conductors approximately every five to six towers (assuming approximately 400 m spans) (Stantec 2015b). At 480 m from noise sources within the PDA, construction activities are anticipated to generate 59 dBA (similar to indoor conversation), exclusive of implosives used for tower stringing activities (Stantec 2015b). Occupied residences located within the LAA will, on occasion, experience noise generated by construction activities. Noise levels during the night will remain unchanged from the existing conditions, because construction activities related to the assembly and installation of towers will only occur during the day.

The potential for intensification of private land development within the PDA is primarily low to low-medium based upon the applicable zoning for land use (see Map 16-16 – Land Development Potential). Pockets of medium to high development potential land are located in some areas adjacent to the PDA, including at Headingley, Oak Bluff, Grande Pointe, Monominto, Ste. Genevieve, Richer and La Broquerie. Of the proposed private subdivisions within the LAA, the Final Preferred Route affects 19 lots or parcels of land where there was a low potential for development based on agricultural designation and zoning and eight lots or parcels of land where there was high potential for development. In summary, the Project will have a low to moderate effect overall on land development potential depending on location.

16.5.2.4.2 Operation and Maintenance

Project operation and maintenance has the potential to affect residents and property owners through visual aesthetic changes and noise generation (Chapters 17 and 18). Residual effects are expected to be associated with changes in visual quality on rural residences due to the visibility of the transmission line once it is operational (Chapter 19).

The transmission line will generate audible noise at the edge of the transmission line ROW at all locations (E^{x}ponent 2015). The audible noise generated by the operation of the transmission line along the edge of the ROW (PDA) is predicted to be 23 dBA maximum in fair-weather conditions. In foul weather, these audible noise levels would increase by 25 decibels (dB), which is comparable to the noise level in a living room (45 dBA) (E^{x}ponent 2015). The audible noise associated with the transmission line at the edge of the ROW (PDA) in fair-weather conditions is comparable to a bedroom at night (24 dBA) and quieter than a library (35 dBA). At 30 meters beyond the edge of-ROW AN resulting from transmission line operation is expected to be a maximum of 21 dBA (E^{x}ponent 2015), which is below the typical ambient noise generated at quiet rural locations and is expected to dissipate rapidly. Audible noise effects are predicted to be adverse, of low magnitude and limited to the PDA. The predicted levels are below the applicable standard of 50 dBA (Canadian Standard CAN3-C108.3.1-M84) and Manitoba's Provincial Guidelines for a daytime limit (55 dBA) and nighttime limit (45 dBA). Concerns related to electric and magnetic field (EMF) generation are addressed in Chapter 18. Levels of EMF outside the ROW are anticipated to be below limits recommended by national and international agencies (E^{x}ponent 2015).

Operation and maintenance activities have low potential for affecting property value. Research is inconclusive as to whether the presence or proximity to transmission lines adversely affects real estate values. Effects that have been observed tend to diminish with distance from the transmission line and disappear with time (Section 16.5.2.1). Effects on property value were also varied and depended on the location and visibility of transmission towers to properties, although some studies found no such evidence (Section 16.5.2.1).

The PRA (2015) econometric analysis found mixed results on the effect of transmission lines on property values. Some evidence suggested a negative effect on assessed property values that was small and decreased with distance while other evidence suggested no negative effect on sales prices (PRA 2015).

In consideration of the low number of residences and private land parcels that could be affected, the results of the econometric property analysis and mitigation options, the Project is anticipated to have a low effect on property values. To the extent that any effects occur on property values, they are anticipated to diminish over time and will be spatially limited to the LAA.

16.5.2.5 Summary

With the implementation of mitigation measures, residual effects from the Project on Property are anticipated to be of low to moderate magnitude given the low number of residences located near the proposed ROW. The socio-economic context for the residual effects across the LAA is dependent upon location within the PDA and is of moderate resilience as property use is able to accommodate some change in the land base. Manitoba Hydro acknowledges that the effect of the transmission line on private land and residences is considerable from the perspective of the individual landowner. However, the Project will affect a very small proportion of the developable land within the RAA and will not substantially alter land development patterns overall. Effects will be short to medium term, continuous and occur during the construction and operation and maintenance phases. In addition, the Project effects on property values though mixed will be low, small or non-existent, and if present, are anticipated to decrease with distance from the transmission line and decrease or disappear over time, and will vary depending on the location and visibility of transmission towers to properties.

16.5.3 Assessment of Change in Designated Lands, Protected Areas and Recreation

The assessment of change in designated lands, protected areas and recreation focuses on two potential effects: change in designated lands and protected areas and change in recreation. Issues and concerns associated with these effects are Project disturbances (e.g., due to proximity, noise, or visual intrusion, that may affect ecological integrity or other values related to protected areas, proposed protected areas, WMAs; and disruption/intrusion to recreation and tourism activities, sites and areas).

Representatives from MCWS and Park System Planning and Ecology attended the stakeholder workshops and meetings as part of the PEP for the Project. Representatives noted that avoidance of intact forested areas and wetlands should be a routing consideration. No effects on existing protected areas or ecological reserves are anticipated from construction and operation of the transmission line, as these were avoided through transmission line routing.

During transmission line routing, areas of least preference were identified and considered when developing alternative routes. Areas considered for avoidance included existing and proposed ecological reserves, legally protected WMAs, provincial parks and First Nation Reserves and TLE lands. Transmission line routing also considered proximity to campgrounds, picnic areas and recreational sites (*e.g.*, golf courses, skiing areas), lodges, campgrounds, resorts, cottages and recreation sites/trails

Comments received during the PEP related to designated lands, protected areas and recreation, included: proximity of the transmission line to WMAs, protected areas and proposed protected areas; and use of ATVs to access the New ROW and related hunting in wilderness areas. Concerns expressed during the PEP and through KPIs included: proximity of the ROW to Watson P. Davidson WMA, proximity to recreational use areas (*e.g.,* golf courses) and the potential for

related tourism effects, aesthetic effects (*e.g.,* removal of trees) and access issues (*e.g.,* damage from ATVs and snowmobiles) and effects on public space, such as Duff Roblin Heritage Provincial Park.

Concerns were expressed about the transmission line route adversely affecting tourism at the Southwood Golf and Country Club. It was noted that tourists coming to golf would view the line as an eyesore with the removal of natural forest cover along the Existing Corridor that could have an effect on their business (Scott 2015, pers. comm.).

Concerns were noted about increased access along the ROW by removing the natural forest buffer that exists along the existing road allowance adjacent to the La Verendrye golf course. Further concerns were noted that increased access could allow ATVs and snowmobiles easier access to the golf course, which would damage the golf greens and be expensive to repair (Dundas 2015, pers. comm.). Through route adjustments, Manitoba Hydro has moved the Final Preferred Route further east to increase the distance between the golf course and away from the treed road allowance.

The Final Preferred Route runs adjacent to and crosses a recently designated provincial park—Duff Roblin Provincial Heritage Park, located at the Floodway inlet. The route is also adjacent to a parcel of land north of the Assiniboine River in the RM of Headingley that is part of Beaudry Provincial Natural Park. The park parcel is located directly adjacent to the existing SLTC.

Fifteen proposed protected areas are crossed by the Final Preferred Route, two along the SLTC, at the Assiniboine River crossing (Assiniboine River Clam Beds proposed ecological reserve) and west of Deacon's Corner in the RM of Springfield along the Floodway. The remaining proposed protected areas are located along the New ROW segment, in the RMs of Ste. Anne, La Broquerie, Stuartburn and Piney. Of these areas, the Final Preferred Route is adjacent to the Balsam Willows proposed ecological reserve in the RM of Ste. Anne. The Watson P. Davidson WMA is located approximately 4.0 km to the east of the Final Preferred Route in the RM of La Broquerie and immediately adjacent to the new transmission line ROW in the RM of Stuartburn. The Spur Woods WMA is located approximately 690 m to the north of the Final Preferred Route.

The Project crosses the Assiniboine River and Red River at two separate locations: in the RM of Headingley and at the City of Winnipeg south city limit. The Assiniboine and Red rivers are both "Scheduled Water" under the NPA. The Final Preferred Route also crosses the Rat River in the RM of Stuartburn, which is a designated canoe route. The Final Preferred Route crosses the Red River, a designated Canadian Heritage River, in the city of Winnipeg. No recreational concerns were identified during the PEP with crossing of the Red River (Turenne-Maynard 2015, pers. comm.). The watercourses crossed by the Final Preferred Route are fished for recreational purposes.

16.5.3.1 Pathways for Change in Designated Lands, Protected Areas and Recreation

The following Project interactions that can affect designated lands, protected areas and recreation use are discussed in this section:

- Project construction activities, including site preparation (*e.g.*, clearing the ROW), site access to the ROW, the establishment of marshalling yards for the storage of materials and equipment and transmission line construction (*e.g.*, foundations, structure assembly, stringing of conductors) could affect designated lands, protected areas and established recreational activities.
- Potential for adversely affecting established recreational activities and visual aesthetic values (*e.g.*, recreational user's quality of experience due to transmission line operation and visual presence).

16.5.3.1.1 Change in Designated Lands and Protected Areas

TRANSMISSION LINE CONSTRUCTION

Construction (*e.g.,* clearing the ROW, access to ROW and transmission line construction [towers, conductor stringing]) can disturb and interfere with designated lands and protected areas within the PDA due to nuisance disturbance (*e.g.*, noise, dust) and damage to property and visual intrusion (Chapter 17).

Such disturbances can adversely affect the recreational experience of visitors. Businesses reliant on visitor experience for their revenues, such as guide-outfitters, could also be affected (Joro Consultants 2011; Manitoba Hydro 2014b). Positive effects could result from the creation of new access, potentially opening up additional areas for recreating. For example, the new access created by the ROW could lead to an increase in use of areas by ATVs and snowmobiles (Joro Consultants Inc. 2011).

Land clearing for ROW and other Project activities can also lead to loss land available for future protection.

STATION CONSTRUCTION

Modifications (*e.g.,* site preparation, equipment installation) to both the Dorsey and Riel converter stations will occur within existing Manitoba Hydro-owned property. As such, there are no anticipated Project-related effects on designated lands and protected areas. No effects are anticipated with the Glenboro South Station expansion and transmission line realignments.

TRANSMISSION LINE OPERATION AND MAINTENANCE

The application of herbicides as part of ROW maintenance can affect parks and protected areas by affecting vegetation and wildlife.

16.5.3.1.2 Change in Recreation

TRANSMISSION LINE CONSTRUCTION

Transmission line construction can diminish or disturb recreational activities in the LAA. Land clearing for ROW construction may physically interfere with recreational activities temporarily and may temporarily disrupt recreationalists from accessing preferred areas if there is construction occurring near these areas. Nuisance effects (*e.g.,* Project-related noise, dust and reduced visual quality) may affect the experience of recreationalists.

During construction there is potential for increased fishing in waterbodies along the PDA by the Project's workforce. This effect could be compounded by the creation of new access roads or trails associated with the Project.

Navigation

Possible effects mechanisms related to navigation are short-term interference while the transmission line is strung across navigable waters.

The Assiniboine and Red rivers are both scheduled waters[8] under the NPA and are thus protected by the Act's provisions. Navigation on other permanent non-scheduled waterbody crossings where navigation is possible (*e.g.,* by canoe/kayak) is also protected under the Act. This could include such waterbodies as Cooks Creek and the La Salle and Rat rivers. While the international power line crosses two rivers, which are designated navigable under the NPA, Section 58.301 of the *NEB Act* renders power lines as a work that the NPA does not apply to. As such, Manitoba Hydro will be required to comply with the requirements of the *NEB Act* for crossing these two rivers.

STATION CONSTRUCTION

Modifications (*e.g.,* site preparation, equipment installation) to both the Dorsey and Riel converter stations will occur within existing Manitoba Hydro-owned property. There is no potential for Project-related effects on recreational activities. Similarly, there is no potential for Project-related effects from the Glenboro South Station expansion and transmission line realignments.

TRANSMISSION LINE OPERATION AND MAINTENANCE

There is potential for visual quality concerns for recreational venues along the PDA, such as baseball diamonds and golf courses. Key Person Interviews conducted with stakeholders during the PEP indicated concern about ROW clearing and potential property damage due to increased access along the ROW by recreational vehicle users, such as ATVs and snowmobiles operating in the area.

[8] Scheduled waters under the *Navigation Protection Act* refers to those waterways that are listed on the schedule to the Act.

Though the ROW will not be accessible to automobile traffic, it could be used as a recreational trail for ATVs and snowmobiles. Manitoba Hydro does not promote the use of its transmission line ROWs for these purposes due to safety concerns.

STATION OPERATION AND MAINTENANCE

Because modifications to both the Dorsey and Riel converter stations will occur within existing Manitoba Hydro-owned property, there are no anticipated Project-related effects during operation and maintenance. The stations will continue to operate as they currently do. Similarly, there will be no additional interaction with operation and maintenance at the Glenboro South Station and transmission line realignments since there will be no further disturbance of the ground (expanded station footprint and ROW).

16.5.3.2 Mitigation for Change in Designated Lands, Protected Areas and Recreation

Transmission line routing included the consideration of recreation and tourism. No lodges, campgrounds, resorts or cottages are traversed by the Final Preferred Route. Mitigation measures of potential Project effects on designated lands, protected areas, recreational activities and access include the following:

- Clearing and disturbance will be limited to defined rights-of-way and associated access routes.
- Existing access roads, trails or cut lines will be used to the extent possible. Permission to use existing resource roads will be obtained, where applicable.
- Canadian Standard Association stream crossing clearance guidelines will be adhered to for the construction, operation and maintenance of the transmission lines.
- Where applicable, provisions of the *Navigation Protection Act* related to the “Minor Works Order” for classes of work related to Aerial Cables – Power and Telecommunication will be adhered to. Manitoba Hydro will submit the location of transmission line crossings for review to Transport Canada to determine the effects on navigation.

16.5.3.3 Characterization of Residual Environmental Effect for Change in Designated Lands, Protected Areas and Recreation

16.5.3.3.1 Construction Phase

TRANSMISSION LINE

Designated Lands and Protected Areas

The Final Preferred Route crosses parcels of Crown land along the Red River Floodway. These Crown land parcels are under lease for agricultural purposes for cropping and forage. Other Crown lands, including agricultural Crown land and provincial forest parcels, are crossed by the Final Preferred Route and occur in the RMs of Headingley, Ritchot, Springfield, Tache, Ste. Anne, La Broquerie, Stuartburn and Piney.

The Final Preferred Route runs through and adjacent to one newly designated provincial park—Duff Roblin Provincial Heritage Park, located at the Floodway inlet. The PDA encompasses approximately 9.9 ha of the park. Manitoba Hydro maintains an easement across an “Access” land use category established by the Parks and Natural Areas Branch that allows for transmission lines on a ROW through the park. This usage was established under the Red River Floodway Agreement signed between the Province of Manitoba and Manitoba Hydro, October 1985 (see Section 16.1.1.3).

Other provincial parks near the route include a parcel associated with Beaudry Provincial Natural Park located in the RM of Headingley west of the Final Preferred Route. This provincial park parcel is located adjacent to the existing ROW for the SLTC.

No existing protected areas or ecological reserves are traversed by the Project. The Final Preferred Route crosses proposed protected areas and parcels of land (ASIs) as indicated in Section 16.4.6. Approximately 84 ha of these areas are affected by the PDA. No issues were identified by the Protected Areas Initiative or the Provincial Parks and Natural Areas Branch staff regarding candidate protected areas crossed by the FPR

The Final Preferred Route does not cross through or affect any WMAs, although two are located in proximity to the Final Preferred Route. The Watson P. Davidson WMA is located approximately 4.0 km to the east of the Final Preferred Route through the RM of La Broquerie. The southwest corner of this WMA is located immediately adjacent to the new transmission line ROW in the RM of Stuartburn where the Final Preferred Route crosses PTH 12. The Spur Woods WMA is located approximately 690 m to the north of the Final Preferred Route. Both WMAs are protected areas under Manitoba’s Protected Areas Initiative (PAI). No adverse effects on the WMAs are anticipated from the Project because the Final Preferred Route avoids them.

While the Final Preferred Route crosses four conservation districts (East Interlake, La Salle-Redboine, Cooks Creek and Seine-Rat River) it does not directly affect any municipal conservation lands. One private wildlife area located in the RM of La Broquerie (SW32-5-8E) owned by the Seven Oaks Fish & Game Association will be crossed by the Project. The Final Preferred Route will cross through approximately 4.5 km of the Sandilands Provincial Forest, affecting 47 ha of land. Effects related to loss of productive forest land are addressed in Section 16.5.6.

No existing First Nation Reserve land, trust lands, treaty land entitlement, or private purchase lands are crossed or directly affected by the Final Preferred Route. A portion of new and existing ROW located east of Riel Converter Station south of Anola and PTH 15 are located in the Peguis First Nation Notice Area. This means notice must be given to the First Nation with respect to disposition of Crown land. No Crown land is affected by the ROWs in the Notice Area. The Final Preferred Route is adjacent to a recent TLE selection located in part NE5-10-7E within the RM of Springfield.

First Nations still have outstanding entitlement in the province under Manitoba's Treaty Land Entitlement Process, including Long Plain First Nation, Swan Lake First Nation, Roseau River Anishinabe First Nation, Peguis First Nation, Brokenhead Ojibway Nation, and Buffalo Point First Nation. While Peguis First Nation maintains a Notice Area within the RAA there are no other Community Interest Zones in the RAA.

Given the low number of designated lands and protected areas affected by the proposed transmission line ROW, Project disturbance of designated lands and protected areas is predicted to be of low magnitude. No removal of these lands is expected over the construction period.

Recreational Use

The Final Preferred Route crosses several designated snowmobile and active ATV trails. No concerns were raised in relation to the transmission line ROW affecting these trails during the PEP. During the KPIs, Rideout (2015, pers. comm.) identified the potential for a new transmission line to affect existing snowmobile trails (*e.g.*, costs associated with re-routing trails). SnoMan indicated a desire to work cooperatively with Manitoba Hydro to preserve trails and avoid re-routing trails (Rideout 2015, pers. comm.). AtvMB expressed interest in having an agreement with Manitoba Hydro to allow ATV access along the transmission line ROW (Hora 2015, pers. comm.).

Representatives from TransCanada Trail Association, SnoMAN Inc. and AtvMB indicated the beneficial aspects of co-locating their trails with the ROW (AECOM 2014a, 2014b; Rideout 2015, pers. comm.; Hora 2015, pers. comm.).

The Final Preferred Route does not traverse campgrounds, resort areas or cottages.

The Waverley West Complex is a local recreational facility with eight baseball diamonds located south of the existing ROW in St. Norbert. The Project will not directly affect this facility because construction activities and increased access will occur along the existing ROW.

Golf courses located near or adjacent to the Final Preferred Route are the Southwood Golf Course in the City of Winnipeg; Cottonwood Golf Course in the RM of Ste. Anne; and La Verendrye Golf Club in La Broquerie. Given the proximity of the Project to these courses, there is potential for property damage or vandalism to the golf courses from increased access along the adjacent ROW (Dundas 2015, pers. comm.) (Section 16.5.3).

The Project crosses the Assiniboine River in the RM of Headingley and Red River south of the City of Winnipeg limit. The Assiniboine and Red rivers are both "Scheduled Water" under the *Navigation Protection Act* (2014). The NPA protects the public right of navigation in scheduled navigable waters through the regulation of works and obstructions (including transmission lines) that risk interfering with navigation (Section 16.5.3.1.2). No issues related to the navigational use of inland waters by boats or snowmobiles are anticipated.

During the construction phase, the presence of workers and equipment in the LAA will generate noise, dust and a visual presence. This may detract from the recreational experience causing tourists/recreational users to reduce or stop their use of areas near Project work sites during periods of construction activity. In addition, access to some areas will be restricted at certain times by the nature of the work undertaken or for safety reasons (*e.g.*, during use of implosives for conductor stringing).

Recreational activities such as fishing, hunting and trapping may be disturbed during construction but this disruption is expected to be temporary and short term.

With the adoption of mitigation measures, the Project will be constructed to limit possible disturbance and disruption to recreational uses and users. In consideration of mitigation measures, the Project will have a low disturbance effect on recreational areas and activities. Disturbance or disruption will be temporary and short term during the construction period.

STATION CONSTRUCTION

Modifications to both the Dorsey and Riel converter stations will occur within existing Manitoba Hydro-owned property. Therefore, the Project will not affect designated lands, protected areas, recreational areas and activities. Similarly, there is no potential for Project-related effects from the Glenboro South Station expansion and transmission line realignments as the expansion will be retained on Manitoba Hydro Property.

16.5.3.3.2 Operation and Maintenance

Designated Lands and Protected Areas

The Final Preferred Route does not cross any existing Reserve lands or TLE lands. Therefore, no effects are anticipated on these lands from the operation and maintenance of the transmission line. Similarly, no existing protected areas will be affected by transmission line operation and maintenance.

Recreational Use

Project operation and maintenance has the potential to affect recreational users through noise generation, disturbance and changes in visual quality.

With the exception of Duff Roblin Provincial Heritage Park, Project operation and maintenance will not affect protected areas, provincial parks or conservation lands. The ROW will cross part of Duff Roblin Provincial Heritage Park that is subject to a Manitoba Hydro easement and designated “Access” land use category established to accommodate hydro transmission lines. Project operation is not expected to interfere with recreational or educational use of Duff Roblin Provincial Heritage Park. Therefore Project effects on recreation are considered to be of low magnitude, restricted to part of the PDA and will be of medium-term duration.

During Project operation and maintenance, potential interactions with recreational use/activities will be limited, except during vegetation management and from the presence and visibility of the transmission line (Chapter 17). The potential for interaction with recreational use relates to effects on visual quality from the line’s presence and could occur as a result of vegetation management activities (*e.g.*, herbicide use) undertaken within the ROW. Although potentially adverse for some users, some recreational users (*e.g.*, snowmobilers) have expressed a preference to use cleared transmission line ROWs due to ease of access created. The presence of a transmission line near the golf courses may affect the visual quality, affecting the experience of golfers.

The Final Preferred Route, with the exception of the Duff Roblin Heritage Park, avoids recreational parks and sites. Two recreational trails are located along the Final Preferred Route (see Map 16-7 – Recreational Land Use). The Duff Roblin Parkway Trail located along the Floodway is under development. The trail starts at the Duff Roblin Heritage Park located at the Floodway inlet in Winnipeg and will eventually extend north to Lockport. In addition, a trail staging area located at Prairie Grove is crossed by the Final Preferred Route for the SLTC along the east side of PTH 59 at the Floodway crossing. The TransCanada Trail is located at Courchaine Bridge south of the City of Winnipeg Red River Floodway gate. A community garden plot is proposed to be located along the south Floodway berm lands east of the St. Mary’s Road Bridge near the Final Preferred Route. Potential interactions from Project operation and maintenance activities consist of vegetation management along the ROW (*e.g.*, herbicide use for weed control) and the physical presence of the transmission line affecting visual quality (Chapter 17).

The potential effects on sport fishing as a result of operation of the line are similar to that experienced during the construction phase. Increased access can lead to an increase in fish harvest from waterbodies along the transmission line resulting in greater pressure on the resource. The line follows, or is near, existing linear facilities through much of its length and therefore access to water bodies will not be substantially increased. In addition, given the small workforce size involved in the operation and maintenance phase, adverse effects on sport fishing are not anticipated.

STATION OPERATION AND MAINTENANCE

Modifications to both the Dorsey and Riel converter stations will occur within existing Manitoba Hydro-owned property. No interaction will occur with recreational areas/sites, as no further ground disturbance will be required for the Project station modifications within the PDA (*i.e.*, station footprints). Similarly, there is no potential for Project-related effects from the Glenboro South Station expansion and transmission line realignments.

16.5.3.4 Summary

With the implementation of mitigation measures, residual effects from the Project on designated lands, protected areas and recreation are anticipated to be of low magnitude. The socio-economic context for the residual effects across the LAA is dependent upon location within the PDA and is of moderate resilience as designated lands, protected areas and recreation are able to accommodate some change in the land base. The Project is not expected to affect designated lands or affect the establishment of candidate protected areas as there were no sites crossed that were of concern to Protected Areas Initiative staff. There are numerous recreational opportunities available across the landscape and as such the area is likely adaptable to some change in land use. Effects will be short to medium term and continuous, and occur during the construction and operation and maintenance phases.

16.5.4 Assessment of Change in Hunting and Trapping

The assessment of change in hunting and trapping focuses on reduction in trapping and hunting activities (*e.g.*, harvesting success) and potential damage to equipment (*e.g.,* traps) from increased access, that could result from the Project.

Concerns were expressed during the PEP and KPIs about transmission line construction activities, which included effects on:

- wildlife populations – disruption to the bear population, damage to dens (Holme 2015, pers. comm.; Turenne 2015, pers. comm.)
- opening up areas to increased numbers of resident hunters, particularly poachers (Thienpondt 2015, pers. comm.; Turenne 2015, pers. comm.)
- the hunting experience for non-resident hunters and loss of “pristine” wilderness that is considered important by outfitters and hunters (Holme 2015, pers. comm.; Thienpondt 2015, pers. comm.)

Concerns raised about maintenance activities included:

- work occurring simultaneously to outfitters having clients at a bait stand (Holme 2015, pers. comm.)
- increased access to the area that will cause negative consequences on outfitting operations from increased traffic volumes and increased users (Thienpondt 2015, pers. comm.)

16.5.4.1 Pathways for Change in Hunting and Trapping

Potential Project pathways for affecting hunting and trapping include areas lost due to construction of ROWs and marshalling yards, direct disturbance of hunting and trapping activities due to Project-related noise and activity related disturbances and reduction in harvesting success due to sensory disturbance due to increased access and workers in the area affecting the presence of target species. The new ROW may benefit hunters and trappers by increasing access, particularly in areas that were previously remote and difficult to access.

16.5.4.1.1 Change in Hunting and Trapping

TRANSMISSION LINE CONSTRUCTION

Hunting and Trapping

There is potential for hunting and trapping activities to be adversely affected from temporary nuisances (*e.g.,* noise, traffic) and activity-related sensory disturbances during Project clearing and construction that could temporarily displace some wildlife (Stantec 2015c). This could result in a reduction of hunting and trapping success rates through disruption to animals and furbearers. During construction activities, terrestrial furbearers may leave an area because of sensory and habitat disturbance which can result in a temporary decline in trapping productivity (Eagle Vision Resources and Joro Consultants Inc. 2011). However, animals normally return to an area after construction is completed and disturbances have ceased (Joro Consultants Inc. 2011). Trappers will benefit by being able to use the new ROWs for travelling and setting traps thus accessing previously unexploited areas and wildlife (Joro Consultants Inc. 2011). However, the Project could also create undesired access to resources, which could affect the resource or experiences of trappers who use a particular area.

The creation of new access trails for line construction and operation and maintenance can result in an increase in hunter access. An increase in access may be viewed as a benefit to some hunters, while increased access may deter others who prefer more of an undisturbed natural setting. The presence of the ROW may also provide increased hunting opportunities in designated hunting areas, resulting in a benefit to hunting activity. Additional access opportunities could result in negative local effects on some wildlife populations in previously underused areas that may lead to overharvesting in a particular area (Manitoba Hydro 2010; Joro Consultants Inc. 2011). Increased access along the ROW during construction could lead to incidents of vandalism with respect to hunting stations and trapping equipment.

STATION CONSTRUCTION

Modifications (e.g., site preparation; equipment installation) to the Dorsey and Riel converter stations will occur within existing Manitoba Hydro-owned property and will not affect any adjacent resource users. No Project-related effects on hunting and trapping are anticipated for the Glenboro South Station. Similarly, there is no potential for Project-related effects from the Glenboro South Station transmission line realignments.

TRANSMISSION LINE OPERATION AND MAINTENANCE

The presence of the Project ROW can result in undesired access to resources during the operation and maintenance phase potentially resulting in an increase in hunting pressure. However, most of the area traversed by the ROW is already fragmented by various sources of access. The potential for increased access with respect to wildlife focused on two areas traversed, in the Caliento bog and Sundown bog areas (Chapter 9). The existence of the ROW and the resultant potential for increased access could also lead to incidents of vandalism with respect to hunting stations and trapping equipment. Potential effects from Project presence can also affect a resource user's quality of experience on the landscape.

STATION OPERATION AND MAINTENANCE

Because modifications to both the Dorsey and Riel converter stations will occur within existing Manitoba Hydro-owned property, there will be no potential Project-related effects on local hunting and trapping during operation and maintenance outside of these stations. The stations will continue to operate as they currently do. Similarly, operation and maintenance at the Glenboro South Station will not affect these resource use activities.

16.5.4.2 Mitigation for Change in Hunting and Trapping

Mitigation measures of potential Project effects on hunting and trapping include the following:

- Manitoba Hydro will contact lodge operators, outfitters and recreational resource user associations to the extent feasible and practical prior to project start-up.
- Hunting and harvesting of wildlife, or possession of firearms by Project staff will not be permitted while working on project sites.
- Existing access road and trails will be used to the extent possible.
- Clearing and disturbance will be limited to defined rights-of-way and associated access routes.

16.5.4.3 Characterization of Residual Environmental Effect for Change in Hunting and Trapping

16.5.4.3.1 Construction Phase

Project clearing and construction will span eight hunting seasons between 2017 and early 2020 in total; four seasons each for deer, moose, wolf, coyote, grouse, gray partridge, and migratory birds, and eight seasons for black bear and wild turkey (MCWS 2015e).

The Project's construction phase will also span four trapping seasons in Open Trapping Zones 1, 3 and 4 for most furbearer species, excluding river otter (OTA 1) and black bear in all zones (MCWS 2015e).

With respect to the Final Preferred Route, the concern of increased access for hunting and trapping is not anticipated to be an issue in southern Manitoba due to the prevalence of existing access routes. Big game hunting areas crossed by the Final Preferred Route include GHAs 25B, 33, 34A, 35A and 35. The Project crosses a game bird hunting zone, GBHZ 4, which stretches the entire portion of southern Manitoba from Saskatchewan to Ontario. There are no operating lodges located in immediate proximity to the Final Preferred Route. The closest outfitter lodge, operated by K.C. Outfitting, is located north of Sundown, MB, approximately 2 km west of the Final Preferred Route.

Project clearing and construction activities (*e.g.*, ROW clearing, access, tower installation, conductor stringing) may result in temporary sensory disturbance (*e.g.,* construction noise) and nuisance effects (*e.g.,* traffic) displacing big game and reducing the hunting success rates in proximity to the ROW. The creation of undesired access to resources could also affect the experience qualities of hunters using a particular area.

The Project will pass through parts of the LAA that are used by established commercial outfitting operations. No lodges or camps are located within the LAA, but one is located in the RAA. As noted above, one outfitting lodge is located approximately 2 km west of the Final Preferred Route at Sundown, Manitoba. While not located in the LAA, multi-year established bait stations operated by this outfitting lodge are located near the proposed transmission line. Only three of these bait stations are located within 500 m of the ROW and none are closer than 125 m. There may be potential for disturbance of bears during construction activities. This would only occur if clearing or construction occurred in the period when bait stations are active (*i.e.,* April 13 to June 19 and August 17 to October 16 [MCWS 2015]). The effects on outfitting operations during construction in the PDA will be low magnitude, continuous and short term in duration.

The Final Preferred Route crosses the Open Trapping Area Zones 1, 3 and 4 in southern Manitoba. Construction activities may temporarily displace wildlife from areas in proximity to the ROW due to sensory disturbance *(e.g.,* construction noise) and disrupt trapping activity. During the PEP, comment was received from the public related to a concern that construction could disrupt furbearing animals and affect trapping. The Wuskwatim Trappers Monitoring Program conducted for Manitoba Hydro in 2011 was established to compare trapper success in disturbed areas and construction sites close to the Wuskwatim transmission line ROW to undisturbed areas away from the transmission line. Results of the furbearer trapping pilot study revealed that considerably more furbearers were caught closer to the transmission line than in traps set further away. These findings conflicted with literature that suggests furbearers generally avoid sites of disturbance (e.g., presence of transmission line) (Eagle Vision Resources and Joro Consultants Inc. 2011). Furthermore, positive effects can occur for a group when its access to the resource or trapping area is improved. Anticipated effects in any one area are considered to be small based on the overall affected area within the LAA compared to the total area available for open trapping, limited to the PDA and short term in duration.

16.5.4.3.2 Operation and Maintenance

A potential residual effect is the presence of the Project on commercial outfitters and their operations in the LAA (*e.g.*, location of bait stations in the vicinity of the line). Concerns were expressed during the PEP and through KPIs by the MLOA and individual outfitter representatives about the effects of operation and maintenance of the transmission line. The proximity of the transmission line to established bait stations in relation to the presence of transmission structures was identified as having a potential effect on the look and feel of the hunt for non-resident clientele (Holmes 2015, pers. comm.). As described in Chapter 9, avoidance of the FPR by bears is not anticipated during operation and maintenance. Black bears use existing transmission line ROWs (*i.e.,* M602F) in the region, and are known to use other types of linear corridors, such as roads (Jalkotzy et al. 1997) and seismic lines (Tigner et al. 2014) when seeking food. For these reasons, the presence of the FPR is not anticipated to alter bear use of bait stations located near the FPR. It is possible that the outfitter may choose not to use a bait station near the Project ROW based on clientele preference for a “wilderness” experience which would not be enhanced by a view of the transmission line from a bait station.

With the exception of periods where routine maintenance and vegetation management occurs in the PDA, resource harvesting (*e.g.*, hunting, trapping) will be able to continue uninterrupted in or near the Project ROW throughout its operating life. These disturbances will only occur irregularly, but at least on annual basis, if required, over the operation and maintenance life of the Project. They will be low magnitude and medium term in duration as the presence of the transmission line will be continuous over the life of the Project.

16.5.4.4 Summary

With the implementation of mitigation measures, residual effects from the Project on hunting, trapping and outfitting are anticipated to be of low magnitude. Physical project disturbance effects on hunting (*i.e.,* GHAs) and open trapping *(i.e.,* OTAs) represents approximately 0.4% each of the total area for hunting and trapping activities, respectively, in the RAA. The socio-economic context for the residual effects across the LAA is dependent upon location within the PDA and is of moderate resilience as hunting and trapping activities are able to accommodate some change in the land base. The related change in the affected land base represents a small area. As there are numerous opportunities to participate in hunting and trapping activities throughout the RAA, the area is likely more resilient to change. Effects will be short to medium term, regular/ continuous and occur during the construction and operation and maintenance phases.

16.5.5 Assessment of Change in Mining/Aggregates

The assessment of change in mining and aggregates focuses on change in mining/aggregate extraction that could result from the Project. Issues and concerns associated with these effects consisting of: disruption of the resource through area loss and disturbance/interference with resource extraction operations; and an increase in access related to transmission line presence.

Transmission line routing considered and reduced potential effects on mineral interests to the extent possible. However, not all mineral dispositions could be avoided, as presented in Section 16.5.5.3. Additional liaison occurred with the Mineral Resources Branch related to leases and permits crossed by the Final Preferred Route. Representatives of the Mineral Resources Branch indicated that they would review issues associated with mineral interests close to the Final Preferred Route on a case-by-case basis. In addition, they would work with Manitoba Hydro to communicate with holders affected by the preferred route on a path forward. Review also occurred during the PEP with Manitoba Infrastructure and Transportation (MIT) regarding their quarry withdrawal areas. No concerns were expressed on the route by MIT on their provincial quarry withdrawal sites.

The Final Preferred Route was adjusted for the RM of Tache's municipal aggregate and quarry operation in section 28-9-7E by taking advantage of paralleling an existing transmission line ROW.

16.5.5.1 Pathways for Change in Mining/Aggregates

Potential pathways for affecting mining/aggregates operations include area lost due to construction of ROWs and marshalling yards, disturbance and interference with resource extraction activities due to ROW proximity and issues related to increased accessibility along the ROW during operation and maintenance.

16.5.5.1.1 Change in Mining/Aggregates

TRANSMISSION LINE CONSTRUCTION

There is potential for directly affecting mining interests through disruption and disturbance of the resource, and area loss during Project construction.

The Project will disturb or disrupt various mineral extraction operations within the PDA, including quarry leases, casual quarry permits, private quarry permits, quarry withdrawal areas, peat mine and other mining areas (*e.g.*, aggregate deposits) of varying potential economic quality, some of which are associated with existing sand and gravel pits. By prohibiting quarrying from occurring near transmission line towers based on setback distances implemented by Manitoba Hydro[9], the Project could reduce the development potential of mineral areas and aggregate deposits. Project access along the ROW could also affect quarrying operation due to temporary disturbance activities.

[9] Manitoba Hydro maintains the following blasting guidelines:
- within the transmission line ROW – no blasting allowed
- within a 100 m buffer parallel to the ROW – blasting allowed, but blasting mats must be used to control debris
- outside a 100 m buffer parallel to the ROW – no restriction on blasting.

STATION CONSTRUCTION

Modifications (*e.g.,* site preparation, equipment installation) to both the Dorsey and Riel converter stations will occur within existing Manitoba Hydro-owned property and will not affect any adjacent resource users. No Project-related effects are anticipated for the Glenboro South Station. Similarly, there is no potential for Project-related effects from the Glenboro South Station transmission line realignments.

TRANSMISSION LINE OPERATION AND MAINTENANCE

During the operation and maintenance phase, there is potential for interference with current or future planned facility operations and the ability to develop mineral areas (*e.g.,* quarry or aggregate deposits) for future commercial extraction from transmission line presence. Operational limitations for an operator in relation to line proximity could result in a reduction of the amount of material excavated due to protection buffers (*e.g.*, setback distance from transmission towers) implemented by Manitoba Hydro to protect its infrastructure.

Increased access along cleared ROW or other access points could result in increased mineral development activity. However, other factors would contribute to new commercial mineral development, including the nature of the resource itself, market conditions and regulatory controls. An increase in access opportunities is unlikely to affect mineral development.

STATION OPERATION AND MAINTENANCE

Because modifications to both the Dorsey and Riel converter stations will occur within existing Manitoba Hydro-owned property, there will be no potential Project-related effects on mining/aggregate use during operation and maintenance. The stations will continue to operate as they currently do. Similarly, operation and maintenance at the Glenboro South Station will not affect use of this resource.

16.5.5.2 Mitigation for Change in Mining/Aggregates

Mitigation measures of potential Project effects on mining and aggregates include the following:

- Manitoba Hydro will contact local resource users to the extent feasible and practical prior to Project start-up.
- Existing access road, roads, trails or cut lines will be used to the extent possible. Permission to use existing resource roads will be obtained, where applicable.
- Clearing and disturbance will be limited to defined rights-of-way and associated access routes.
- Manitoba Hydro will work with mining/quarry operators to determine if blasting mats or other mitigation measures are required during quarry operations within or adjacent to the ROW.

16.5.5.3 Characterization of Residual Environmental Effect for Change in Mining/Aggregates

16.5.5.3.1 Construction Phase

Project construction has the potential to disturb or interfere with mining activities in the LAA by damaging areas and potentially disrupting current/future operations/ extraction activities. Transmission line routing has considered potential effects on peat and mineral interests.

During the PEP, the Mineral Resources Branch in a stakeholder meeting indicated concerns with the route would be determined on a case-by-case basis and that they would work with Manitoba Hydro and mineral lease holders (Manitoba Hydro 2014, pers. comm.). MIT expressed no concerns during with respect to their quarry withdrawal sites as the areas crossed are considered depleted (DN: check for meeting notes from Round 3 of the PEP). Manitoba Hydro will work to maintain access within the development, where possible, to mineral dispositions (i.e., leases, permits) and quarry mineral withdrawals of interest to MIT.

The Project LAA encompasses seven quarry leases[10], 29 casual quarry permits[11], 24 private quarry permits[12], 10 quarry withdrawal areas (*i.e.,* MIT), and is adjacent to one peat mine consisting of 1,002 ha (approx.). There are 14 mineral areas, a quarry withdrawal and 13 private quarries (10 of which are concluded) within the LAA along the Riel–Vivian Transmission Corridor for a total of 215 ha (approx.).

Within the Existing Corridor PDA, there is one quarry withdrawal, four private quarry permits (three of which are concluded[13]) encompassing 38 ha (approx.). There are three quarry withdrawals and seven private quarry permits (three of which are concluded) within the PDA along the New ROW encompassing 24 ha (approx.).

The municipal aggregate resource areas (*i.e.*, five in Tache, two in La Broquerie and one in Stuartburn) along the PDA are of moderate potential/quality or are unproven, except for three deposits in the RM of Tache, which are of high potential. The route crosses four sand and gravel pits in the RM of Tache. Discussions with the RM of Tache during the PEP and transmission line routing resulted in a modification to the Final Preferred Route that addressed municipal concerns (i.e., by paralleling an existing transmission line in the area where the deposits are located in Section 28-9-E) by reducing the interaction with the municipal deposits of importance. Deposits

[10] Quarry lease refers to a 10-year lease granted by the Crown with the exclusive rights to excavate quarry minerals (the *Mines and Minerals Act*).

[11] Casual quarry permit refers to annual permits issued for the production of a specified quantity of Crown quarry mineral (the *Mines and Minerals Act*).

[12] Private quarry permit refers to private aggregate or quarry operations.

[13] Refers to status of permit or quarry operations.

that are of medium potential may have quality resources and caution is to be exercised in considering other uses for these areas. High potential deposits are valuable resources and should not be developed for other uses. The one peat mine in the area was avoided by the PDA along the Final Preferred Route.

Mining activities and dispositions in the RAA correspond to an area totalling approximately 23,676 ha. The Project overlap (PDA) represents approximately 0.3% of the total area of actual or potential mining activities in the RAA.

The extent to which the Project could affect existing operations relates to direct effects on mining interests through disruption and disturbance to the resource and area loss during Project construction and potential for interference with current or future planned operations and the ability to develop mineral areas for future commercial extraction from transmission line presence (Manitoba Hydro 2011). Given the low number of mineral dispositions and aggregate deposits affected by the Final Preferred Route, the effect is anticipated to be low in magnitude for the PDA. The area affected by the clearing of the ROW and construction activities will be continuous for the period of construction and short term in duration. The creation of the ROW and any access trails may in fact have a beneficial effect for some related activities, such as mineral exploration, by providing additional access into some areas. Access to the mining areas/aggregate deposits by those not associated with Project construction will be limited.

16.5.5.3.2 Operation and Maintenance

Except at tower locations and subject to clearance or set-back restrictions, mining resource use activities will be able to occur adjacent or near the PDA throughout Project operation. Project-related changes in access would likewise be maintained throughout the Project life.

16.5.5.4 Summary

With the implementation of mitigation measures, residual effects from the Project on mining/ aggregate extraction are anticipated to be of low magnitude. Project disturbance effects on mining/aggregate extraction represents a small area (approx. 0.3%) of the total area for mining activities within the RAA. The socio-economic context for the residual effects across the LAA is dependent upon location within the PDA and is of moderate resilience as mining/aggregate extraction is able to accommodate some change in the land base. The disturbance on, or interference with, mining/aggregate extraction will have only a small effect on potential extraction activities. The area related to affected sites represents a small area overall. Effects will be short to medium term, regular/ continuous and occur during the construction and operation and maintenance phases (*e.g.*, transmission line presence).

16.5.6 Assessment of Change in Forested Areas

The assessment of change in forest areas focuses on two potential effects: effects on commercial forests and effects on high value forest sites. Issues and concerns associated with these effects includes the removal of productive forestland from the land base (*i.e.,* reduction in potential AAC); and reduction in areas of high value forest sites *(e.g.,* woodlots, shelterbelts, plantations, private forestland).

The Final Preferred Route avoids known timber sale and timber permit areas. As well, enhanced silviculture sites, research and monitoring sites were avoided by the route and will not be affected.

16.5.6.1 Pathways for Change in Forested Areas

The assessment of environmental effects on productive forestland and high value forest sites is based on the potential loss and removal of timber volumes, reduction in forested areas due to ROW clearing during Project construction. Vegetation management conducted during operation and maintenance is considered in terms of preventing the regrowth of merchantable forests.

16.5.6.1.1 Change in Productive Forestland and High Value Forest Sites

TRANSMISSION LINE CONSTRUCTION

Productive Forestland

The clearing and construction phase of the transmission line will remove productive forestland within the PDA through the removal of timber volumes currently growing on productive forestlands. Site access to the ROW also has the potential for affecting productive forestland and high value forest sites.

The reduction in productive forestland from the commercial forest area will affect the determination of sustainable harvest levels. When MCWS updates the FRI for a major land withdrawal or large area depletion resulting from a natural disaster, the AAC is recalculated. The FRI for FMU 24 was last updated in 2010 by MCWS. When the AAC is recalculated the loss of productive forestland resulting from the construction of the transmission line will form a portion of the resulting reduction in sustainable harvest levels.

High Value Forest Sites

The clearing and construction phase of the Project will affect woodlot plan areas, private land shelterbelts and private natural forestland within the PDA through the reduction of the areas of these high value forest sites. A reduction in woodlot plan areas will affect the various uses and values for which they are managed, such as timber harvesting, non-timber forest products, wildlife, recreation or aesthetics.

Shelterbelts established on agricultural fields are predominantly for wind and erosion control while shelterbelts around farmsteads and rural residences are for environmental and aesthetic purposes. Most affected shelterbelts are bisected at right angles by the Project. Despite the removal of those portions of the shelterbelts within the ROW, their overall function of wind and erosion control will be maintained. Private natural forestland areas within the PDA will be affected for the duration of the Project. Similar to woodlot plan areas, private land forest areas may be managed for economic, environmental and social values.

STATION CONSTRUCTION

Modifications to both the Dorsey and Riel converter stations will occur within existing Manitoba Hydro-owned property and will not affect any adjacent resource users. No Project-related effects are anticipated for the Glenboro South Station. Similarly, there is no potential for Project-related effects from the Glenboro South Station transmission line realignments.

TRANSMISSION LINE OPERATION AND MAINTENANCE

Previously forested sections within the PDA will remain cleared and unavailable for commercial forestry throughout Project operation. The Project may increase wildlife viewing opportunities in woodlot plan areas and private land forest areas through increased line of sight and increase the proportion of forest edge, which will favour some wildlife species and increase foraging opportunities within the PDA (Chapter 9). However, the linear opening in the forest cover and the presence of the transmission towers and line may reduce the aesthetic value of woodlots and private land forest area (Chapter 17).

STATION OPERATION AND MAINTENANCE

Because modifications to both the Dorsey and Riel converter stations will occur within existing Manitoba Hydro-owned property, there will be no potential Project-related effects on resource use during operation and maintenance. The stations will continue to operate as they currently do. Similarly, operation and maintenance at the Glenboro South Station will not affect resource use.

16.5.6.2 Mitigation for Change in Forested Areas

Mitigation measures of potential Project effects on productive forestland and high value forest sites include the following:

- Existing access roads, trails or cut lines will be used to the extent possible. Permission to use existing resource roads will be obtained, where applicable.
- All elm (*Ulmus americana*) wood will be burnt, chipped immediately or disposed of at approved municipal disposal sites to prevent the spread of Dutch Elm Disease (Manitoba Government 2013)
- Locations of tree improvement sites, private managed woodlots and shelterbelts will be identified in the Construction Environmental Protection Plan (CEnvPP) for the line to limit damage from construction activities (*e.g.*, errant construction equipment).

- Farmsteads and rural residences with shelterbelts established for aesthetic and environmental values affected by Project activities will be compensated by Manitoba Hydro
- Manitoba Hydro will re-establish shelterbelts outside of the ROW where possible in such areas affected.
- Clearing and disturbance will be limited to defined rights-of-way and associated access routes.

FOREST DAMAGE APPRAISAL AND VALUATION

Manitoba Conservation's FDAV policy identifies the parameters for the calculation of financial compensation, due to the Crown, for the removal of timber and the effect on high value silvicultural investments on productive Crown forestlands (Manitoba Conservation 2002). As with past projects, MB Conservation Forestry and Peatlands Management Branch, assesses a Timber Damage Appraisal Assessment for the merchantable timber found within the project area. This appraisal takes into account the area of disturbance and its associated cost to re-establish that timber; the timber volumes and associated dues, the forest renewal charge and fire protection charges and is a one-time charge.

The FDAV policy was applied to the PDA area to quantify the effect on Crown forest resources. The damage appraisal calculations and estimates of compensation payable to MCWS are provided in Appendix 16C and summarized in Table 16-13.

Table 16-13 Crown Land Forest Damage Appraisal and Valuation Summary

Softwood (m)	Hardwood (m)	Crown Charges	Softwood ($)	Hardwood ($)	Total ($)
9,816.70	4,959.07	Crown Dues	--	--	$ 25,857.60
		Forest Protection Charges	--	--	$ 2,511.88
		Forest Renewal Charge[1]	$ 38,244.22	$ 2,479.53	$ 40,723.75
			Total All		**$ 69,093.24[2]**

SOURCE: Maskwa Ecological Consulting Inc. 2015

[1] Forest Renewal Charge for Tamarack charged at Hardwood rate (Doig 2014, pers. comm.)
Crown Dues - $1.75 m^3; Forest Renewal Charge - softwood $5.75 m^3, hardwood $0.50 m^3; Forest Protection Charge - $0.17/$m^3$. Considers volume from all age classes using the MCWS conventional standard, tree length volume tables.

[2] This evaluation is an estimate only, and recalculations may be required by MCWS after ROW clearing to make sure timber dues and the PDA are accurately reflected in the results.

16.5.6.3 Characterization of Residual Environmental Effect for Change in Forested Areas

16.5.6.3.1 Construction Phase

Project construction has the potential to disturb or interfere with resource use activities (*e.g.*, forestry) within the LAA. Effects can include loss to productive areas and damage to areas and sites.

The Final Preferred Route avoids known timber sale and timber permit areas, enhanced silviculture sites and research and monitoring sites. As such, there are no anticipated effects resulting from the construction or operation and maintenance phases of the Project on these types of forested areas.

PRODUCTIVE FORESTLAND

Project construction affects 515 ha of productive forestland in FMU 1 and 24. The loss of productive forestland represents approximately 12,313 m^3 of softwood and 21,752 m^3 of hardwood and affects both productive forestland and high value forest sites. In addition to the productive forestland evaluated in the PDA, some additional clearing may be required for access development, borrow/deposition areas or bypass routes necessitated by terrain features encountered during ROW clearing. The locations of these areas are currently unknown; however, they will be very localized and small in area.

Commercial Forest Area

The construction phase affects 219 ha of commercial forest area in FMU 1 and 24. The Project will result in a decline of 0.04% and 0.03% of commercial forest area in FMU 1 and 24, respectively, which accounts for a decline of 0.03% to the total commercial forest area. Because the Project will affect only 0.03% of commercial forest area within FMU 1 and 24, its effects on the commercial forest are considered low magnitude and restricted to the PDA. The loss of commercial forest area is a single event that will endure throughout the life of the Project due to ROW maintenance. This loss of commercial forest area (*i.e.,* standing timber) will only have a small effect on productive forestland, for which compensation is provided as a mitigation.

Annual Allowable Cut

Manitoba Conservation and Water Stewardship only recalculate the AAC following major land withdrawals or large area depletions. Due to the very small size of the commercial forest withdrawal, MCWS will probably not recalculate the AAC until the next FRI is undertaken or the current FRI needs to be updated. The FRI for FMU 24 was last updated in 2010 by MCWS. The Project will result in the reclassification of commercial forest area that represents a reduction of the AAC harvest level of 224.4 m^3/ha/year, in FMU 1 and 24. This represents a reduction of 0.32% and 0.05% of the AAC in FMU 1 and 24, respectively, which represents a 0.07% reduction of the total AAC.

Given that the Project will only result in a 0.07% reduction in the total AAC, the effect on the AAC is considered to be of low magnitude in the PDA. The reduction in AAC will be a single event and as the ROW will remain clear, will endure for the duration of the Project. The reduction of AAC levels will only have a small effect on productive forestland, as compensation is provided for mitigation.

HIGH VALUE FOREST SITES

The high value forest sites assessed consist of enhanced silviculture sites, research and monitoring sites and private forestland values of woodlot plans, shelterbelts and private land natural forest areas.

Enhanced Silviculture Sites and Research and Monitoring Sites

The construction of the Project does not affect any enhanced silviculture sites, or research and monitoring sites as none are located within the PDA.

Woodlot Plans

Right-of-way clearing will reduce five woodlot plan areas by 28.6 ha total. As this represents a decline of 0.15% of the 19,359.9 ha of the 302 woodlot plan areas, within the RAA, the effect on woodlot plan areas will be of low magnitude in the PDA. The reduction in woodlot plan areas will be a single event and will endure for the life of the Project. The change in value and quality of affected woodlots represents a small area and is of moderate resilience. Some woodlot management practices can continue through operation and maintenance.

Shelterbelts

Project construction affects 18.4 ha within 79 identified private land shelterbelts. The identification and delineation of shelterbelts was only conducted adjacent to the Alternative, Preferred and Final Preferred Route segments, resulting in the identification of only a small subset of the shelterbelts within the LAA. The Project effect percentage, on shelterbelts, was not calculated because it would not represent the effect on all shelterbelts within the RAA or LAA and would represent an overestimate of the Project effect on shelterbelts. Most of the affected shelterbelts are maintained for wind and erosion control on agricultural fields and are bisected at right angles by the Final Preferred Route. The effect on shelterbelts at the RAA level will be small but may be more prominent at the individual landowner level. The decline in shelterbelt area is of moderate magnitude in the LAA. The Project will result in a decline of 18.4 ha of shelterbelts identified within the LAA for the Final Preferred Route. The reduction in shelterbelt area will be a single event and, as the ROW will remain clear, will endure for the duration of the Project. The removal of shelterbelts is small and limited to the PDA.

Private Land Natural Forest Areas

As classified in the FRI, the construction phase affects 295.7 ha of the 110,099.8 ha of private and municipally owned productive forestland in the RAA. The Project will result in a decline of 0.27% of FRI classified, private and municipal productive forestland within the RAA. As the

Project will only result in the decline of 0.27% of the private and municipal productive forestland, the effect will be of low magnitude in the PDA. The decline in private and municipal productive forestland occurs as a single event at the time of construction. The loss is small and the overall land use of the remaining forested areas would be maintained.

16.5.6.3.2 Operation and Maintenance

Project operation and maintenance activities are not expected to affect commercial forestry use as the trees will have been removed from the ROW. As the ROW clearing will be maintained throughout the life of the Project forestry uses will be negligible.

16.5.6.4 Summary

With the implementation of mitigation measures, including compensation, residual effects from the Project are anticipated to be of low to moderate magnitude. Loss of commercial forest area (0.03%) within FMU 1 and 24 and the reduction in the AAC (0.07%) are both small in relation to the total commercial forest area and total available AAC. The reduction in woodlot plan areas represents only 0.15% of the total woodlot plan areas. Reduction of private and municipal productive forestland corresponds to only 0.27% of the total private and municipal productive forestland affected. In addition, the Project will result in a decline in shelterbelts (18.4 ha) of the total shelterbelts identified. The socio-economic context for the residual effects across the LAA is dependent upon location within the PDA and is of moderate resilience because forested areas are able to accommodate some change in the land base.

The loss of commercial forest area and reduction of AAC levels will only have a small effect on productive forestland. The reduction in area related to the change in value and quality of affected woodlots represents a small area. The removal of shelterbelts is also small but may be of higher importance at the individual landowner level. The loss of private and municipal productive forestland is small and the overall land use functionality of the remaining forested areas is maintained. Effects will be permanent due to area or site loss, limited to a single event and occur during the construction and operation and maintenance phases.

16.5.7 Assessment of Change in Groundwater Use

The assessment of change in groundwater use focuses on change in quantity and quality that may arise from interaction with the Project. Issues and concerns associated with this effect include changes in groundwater levels and quality in wells.

16.5.7.1 Pathways for Change in Groundwater Use

In general, groundwater use, quality and quantity will not be affected under normal conditions of construction and operation of the Project. Potential pathways for affecting groundwater use includes reduction in groundwater quantity (levels) in wells from unintended discharge from

aquifers due to the installation of tower foundations and geotechnical drilling and the reduction in groundwater quality in wells due to pesticide/ herbicide application for vegetation management.

16.5.7.1.1 Change in Groundwater Use

TRANSMISSION LINE CONSTRUCTION

The installation of transmission tower foundations range in depth with the deepest foundations potentially being installed 9 m down. Installation of tower foundations and geotechnical drilling have the potential to disturb groundwater quantity through the unintended discharge of aquifers in artesian areas of flowing wells and springs (see Map 16-12 – Flowing Wells and Springs) which has the potential for a drop in the aquifer level. In the unlikely event of a substantial drop in groundwater levels, local groundwater users could be affected. The transmission line construction does not traverse areas of saline flowing well conditions and therefore the release of saline groundwater through unintended discharge of aquifers in artesian conditions is not anticipated. Accidents and malfunctions related to spills into groundwater are discussed in Chapter 21.

STATION CONSTRUCTION

Modifications to both the Dorsey and Riel converter stations will occur within existing Manitoba Hydro-owned property and no Project-related effects on adjacent groundwater resource users are anticipated. No Project-related effects on groundwater use are anticipated for the Glenboro South Station. Similarly, there is no potential for Project-related effects from the Glenboro South Station transmission line realignments. There are no flowing well conditions in the LAA for any of the station modifications.

TRANSMISSION LINE OPERATION AND MAINTENANCE

Manitoba Hydro will apply herbicides along the transmission line for vegetation management. Groundwater quality could be affected by the leaching of applied herbicides. Under normal conditions, these chemicals will degrade within the vadose zone (*i.e.,* unsaturated zone above the water table) (Phipps 2015, pers. comm.; Groundwater Technical Data Report). Furthermore, Manitoba Hydro has a vegetation management program that guides the locations and methodology for appropriate herbicide use. Human health risk in relation to herbicide use is addressed in Chapter 18. Accidents and malfunctions related to spills into groundwater are discussed in Chapter 21.

STATION OPERATION AND MAINTENANCE

Manitoba Hydro will apply herbicides at the station sites for vegetation management (weed control). In the event of improper application, the potential exists for herbicide entry into shallow aquifers resulting in an indirect effect (groundwater contamination) and exceedances of the stipulated regulatory guidelines for drinking water (Health Canada 2014). Under normal conditions, most of these chemicals should degrade within the vadose zone. The aquifers that the wells are accessing are deeper than herbicides are expected to be located (Phipps 2015, pers. comm.; Groundwater Technical Data Report). Furthermore, Manitoba Hydro has a vegetation

management program that guides the locations and methodology for appropriate herbicide use as discussed in Chapter 2. Accidents and malfunctions are discussed in Chapter 21.

16.5.7.2 Mitigation for Change in Groundwater Use

Mitigation measures of potential Project effects on groundwater use include the following:

- A qualified drilling contractor with appropriate experience will be present for work in areas underlain by artesian aquifers.
- Monitoring of groundwater levels in drill holes will be conducted during drilling and foundation installation.
- Drill holes will be sealed as soon as possible in the case of a groundwater level rise.
- Precautions will be taken where there is potential for mixing surface and groundwater to prevent interconnection of these waters.
- Emergency response plans will be in place for sealing/grouting and pumping out drill holes in artesian well areas.
- Follow-up inspections of installed foundations will be conducted to monitor for excess water leakage.
- If herbicides are required to control vegetation growth, all applicable permits will be obtained and provincial regulations adhered to for pesticide use.

16.5.7.3 Characterization of Residual Environmental Effect for Change in Groundwater Use

CONSTRUCTION PHASE

Project construction has the potential to disturb groundwater quantity within the LAA. Effects can include reduction in groundwater quantity in wells due to unintended discharge from the installation of tower foundations and geotechnical drilling. With the implementation of the standard mitigation measures described above, there will be no residual effects on groundwater during the construction phase of the Project as groundwater will not be released to the surface.

The SLTC portion of the Existing Corridor will be located alongside the Red River Floodway and then continues through the Riel–Vivian Transmission Corridor. MMTP tower foundations will be designed and installed such that they will not interact with groundwater levels or flow regimes of underlying features. Cast-in-place piles will seal the soil to foundation interface preventing potential groundwater seepage.

OPERATION AND MAINTENANCE

Project operation and maintenance could affect groundwater quality within the LAA. Effects could include a reduction in groundwater quality from herbicide use. Under normal conditions, most of these chemicals should degrade within the vadose zone. The aquifers that the wells are

accessing are deeper than herbicides are expected to be located. With the implementation of the standard mitigation measures described above, there will be no residual effects on groundwater during Project operation and maintenance.

16.5.7.4 Summary

With the implementation of mitigation measures, residual effects from the Project are anticipated to be negligible in magnitude. No residual effects with respect to construction and operation and maintenance are expected.

16.5.8 Summary of Environmental Effects on Land and Resource Use

A summary of residual environmental effects on land and resource use is provided below in Table 16-14.

Table 16-14 Summary of Residual Environmental Effects on Land and Resource Use

Project Phase	Residual Environmental Effects Characterization						
	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Socio-economic Context
Change in property							
Construction	A	L-M	PDA	ST	C	R	MR
Operation and Maintenance	A	L	LAA	MT	C	R	MR
Change in designated lands, protected areas and recreation							
Construction	A	L	PDA	ST	C	R	MR
Operation and Maintenance	A	L	PDA	MT	C	R	MR
Change in forested areas							
*Productive forestland**							
Construction	A	L	PDA	P	S	R	MR
Operation and Maintenance	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Note: *consists of commercial forest areas and AAC

Project Phase	Residual Environmental Effects Characterization						
	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Socio-economic Context
*High value forest sites**							
Construction	A	L-M*	PDA	P	S	R	MR
Operation and Maintenance	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Note: *Low magnitude for woodlot plans, private land forest areas; Moderate magnitude for shelterbelts; summary excludes enhanced silviculture sites and research and monitoring sites as both have a neutral effect, of negligible magnitude, with high resiliency							
Change in groundwater use							
Construction	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Operation and Maintenance	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Change in mining/aggregates							
Construction	A	L	PDA	ST	C	R	MR
Operation and Maintenance	A	L	PDA	MT	R/C	R	MR
Change in hunting and trapping							
Construction	A	L	PDA	ST	C	R	MR
Operation and Maintenance	A	L	PDA	MT	R/C	R	MR

KEY

See Table 16-3 for detailed definitions

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

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

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

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

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

Reversibility: *R: Reversible: I: Irreversible*

Socio-Economic Context: *LR: Low resilience, MR: Moderate resilience, HR: High resilience*

N/A Not applicable

16.6 Assessment of Cumulative Environmental Effects on Land and Resource Use

The Project residual effects described in Section 16.5 likely to interact cumulatively with residual environmental effects of other physical activities are identified in this section and the resulting cumulative environmental effects are assessed. This is followed by an analysis of the Project contribution to residual cumulative effects. Reasonably foreseeable future physical activities considered in the cumulative effects assessment are illustrated in Chapter 7 – Assessment Methods. For the locations of existing and known future physical activities see Map Series 7-200 – Past and Present Physical Activities and Resource Use and Map Series 7-300 – Reasonably Foreseeable Future Physical Activites.

16.6.1 Identification of Project Residual Effects Likely to Interact Cumulatively

Since the 1800s, southern Manitoba has undergone substantive agricultural development. Today the area contains a broad range of agricultural land uses, industrial and residential development. As transmission lines already traverse the RAA, the Project increases transmission line interaction with land and resource use.

Projects and activities that overlap spatially and temporally with the MMTP can result in cumulative effects, both positive and negative, on land and resource use. The effects for linear developments in regards to land and resource use will be greater during construction than operation, although some effects will persist throughout operation and maintenance phase (*i.e.*, from ROW clearing, presence of the line). Those projects whose construction period overlaps temporally with MMTP are included in Table 16-15. Where residual environmental effects from the Project are likely to act cumulatively with those from other projects and physical activities, a cumulative effects assessment is undertaken to determine their significance.

Besides MMTP, three major transmission lines to be built by Manitoba Hydro will traverse the Project RAA: Bipole III, SVTC (construction planned for 2016–2018 and 2017–2018, respectively) and Dorsey-Portage South 230 kV (construction planned 2018-2019). Bipole III will traverse the RMs of Macdonald, Ritchot, Tache, Ste. Anne and Springfield. Bipole III will cross MMTP as it exits the SLTC/Riel Converter Station. The SVTC, will traverse the RMs of Macdonald, Ritchot, South St. Boniface in the city of Winnipeg and Tache. The SVTC will cross the Project (D604I) after it exits St. Vital Station and traverses the City of Winnipeg, crossing the Floodway east of PTH 59. The Dorsey-Portage South 230 kV Transmission Project will emanate from Dorsey Converter Station and traverse west through the RM of Rosser before turning south and continue through the RMs of St. Francois-Xavier and Cartier to the Portage area outside the RAA.

The Richer South Station to Spruce Station Transmission Project (construction planned for 2017) is proposed to provide power to TransCanada Pipeline's (TCPL) proposed Energy East Project. The transmission project will include a transmission line originating from Richer South Station and ending at a proposed pipeline pump station located east of the TCPL existing pipeline ROW and the Dorsey-Forbes (D602F) 500 kV transmission line. This project's start point, Richer South Station, is located near MMTP in the RM of Ste. Anne.

The Energy East Pipeline Project (construction planned for 2017-2022) will include compressor station additions at select locations along the mainline. TCPL's route traverses the RMs of Macdonald, Ritchot, Tache and Ste. Anne. An addition to the compressor station at Ile des Chenes in the RM of Ritchot will be required for the Project, involving a new footprint of approximately 9 ha. This component is located south of MMTP Final Preferred Route in the RM of Ritchot.

The South End Water Pollution Control Centre (SEWPCC) Upgrade Project is part of the City of Winnipeg's long-term plan to progressively improve its wastewater management systems over a 20-year period. The SEWPCC Project (construction planned for 2016) will involve a single major upgrade with the addition of Biological Nutrient Removal and expansion of the secondary treatment process at the existing facility. The facility is located in south Winnipeg, north of the Perimeter Highway in the South St. Vital neighbourhood.

The proposed Northwest Winnipeg Gas Pipeline Project (construction planned for 2016) will involve the extension of an existing natural gas pipeline from northwest Winnipeg to Stonewall and then east to connect to an existing pipeline near the community of Selkirk, MB. In addition, there is potential for additional natural gas pipeline upgrade projects within the RAA. This project is located east and northeast of Dorsey Converter Station in the RM of Rosser.

The Manitoba Highway Renewal Program includes three projects within the RAA: the St. Norbert Bypass Project, the Headingley Bypass Project and the Oakbank Corridor. The St. Norbert Bypass Project (to be constructed in the next five years) will connect PTH 75 south of St. Norbert to Kenaston Boulevard at PTH 100 (south Perimeter) in the city of Winnipeg. The Headingley Bypass Project (within the next 30 years) will involve a new highway connection as an alternative to PTH 1W through the RM of Headingley and connect to CentrePort Canada Way at its interchange with the Perimeter Highway (PTH 101). The Oakbank Corridor (within the next 30 years) will be a new highway connecting PTH 101 to PR 206, with a new bridge required across the Red River Floodway. These highway projects are located in proximity to MMTP in the RM of Headingley (north of the Trans-Canada Highway), south Winnipeg (west of the Red River) and in the RM of Springfield (north of PTH 15).

Plans for residential development in the RAA include additional housing in the Oak Bluff area (Oak Bluff West) southwest of the city of Winnipeg and east of the SLTC, and in Sage Creek within the City of Winnipeg north of the south Perimeter Highway in the South St. Boniface area of the city and north of the SLTC (Qualico Communities 2015). In addition to these developments, there are numerous other existing residential subdivisions across the land base, as well as several active (or pending) residential subdivision applications across the RAA in proximity to the

Project, particularly in the RMs of Headingley, Macdonald, Ritchot, Springfield, Tache, Ste. Anne and La Broquerie.

Chapter 7 – Assessment Methods presents the Project and physical activities inclusion list, which identifies other projects and physical activities that might act cumulatively with the Project. Where residual environmental effects from the Project act cumulatively with those from other projects and physical activities (Table 16-15), a cumulative effects assessment is undertaken to determine their significance.

Table 16-15 Potential Cumulative Environmental Effects on Land and Resource Use

Other Projects and Physical Activities with Potential for Cumulative Environmental Effects	Potential Cumulative Environmental Effects				
	Change in property	Change in Designated Lands, Protected Areas and recreation	Change in forested areas (AAC / high value sites)	Change in mining/ aggregates	Change in hunting and trapping
Past and Present Physical Activities and Resource Use					
Agriculture (Conversion, Livestock Operations, Cropping and Land Drainage)	✓	✓	–	✓	✓
Residential Developments	✓	–	✓	✓	–
Existing Linear Developments (Riel-Forbes 500 kV, Glenboro-Rugby-Harvey 230 kV, Riel Sectionalization)	✓	✓	✓	✓	✓
Other Resource Activities (Forestry, Mining, Hunting, Trapping, Fishing)	–	✓	✓	✓	✓
Recreational Activities	–	✓	✓	–	✓
Future Projects and Physical Activities					
Bipole III Transmission Project	✓	✓	✓	✓	✓
St. Vital Transmission Complex	✓	✓	✓	–	✓
Dorsey-Portage South 230 kV Transmission Project	✓	–	–	–	✓
Northwest Winnipeg Natural Gas Pipeline Project	–	–	✓	–	–
Richer South Station to Spruce Station Transmission Project	✓	–	✓	✓	✓
Energy East Pipeline Project	–	–	–	–	–
Southend Water Pollution Control	–	–	–	–	–

Other Projects and Physical Activities with Potential for Cumulative Environmental Effects	Potential Cumulative Environmental Effects				
	Change in property	Change in Designated Lands, Protected Areas and recreation	Change in forested areas (AAC / high value sites)	Change in mining/ aggregates	Change in hunting and trapping
Centre Upgrade Project					
St. Norbert Bypass	✓	–	✓	–	✓
Headingley Bypass	✓	–	✓	–	✓
Oakbank Corridor	–	–	–	–	–
Residential Development	✓	–	–	–	✓
Natural Gas Upgrade Projects	–	–	✓	–	–
MIT Capital Projects (Highway Renewal)	✓	–	✓	–	✓
Piney-Pinecreek Border Airport Expansion	–	–	–	–	–

NOTES:

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

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

16.6.2 Cumulative Effects Assessment for Cumulative Change in Property

16.6.2.1 Cumulative Effect Pathways for Cumulative Change in Property

Future projects in the RAA (Table 16-15) have the potential to interact cumulatively with the Project if their plans include the development of facilities in areas of existing residences, residential development, including effects on property value. Cumulative effects arising from future activities have similar effects pathways as effects arising from the Project, including disturbance and nuisance effects on residences, residential development (*i.e.*, proximity) and change in property (*i.e.*, presence).

The nature and extent of cumulative effects will likely differ depending on the project. For example, pipelines have little visible infrastructure and thus could be expected to have less effects on land and resource values related to visual quality than transmission lines. Highway

infrastructure development can cause both positive and negative effects. While construction may result in similar nuisance related effects as those identified during the Project, when operational, highway improvements may improve the accessibility of some areas, and thus facilitate property development.

16.6.2.2 Mitigation for Cumulative Effects for Cumulative Change in Property

Implementation of the mitigation measures described in Section 16.5.2.3 will reduce the Project's effects on residences and property. Other proponents may adopt similar mitigation measures to mitigate their own project effects.

16.6.2.3 Residual Cumulative Effects

A substantial proportion of the RAA (approximately 46%) has already been disturbed due to predominant agricultural land use and industrial and residential development.

Future projects proposed within the RAA that spatially and temporally overlap with the Project (Table 16-15) can contribute to cumulative nuisance effects. In areas of overlap, cumulative nuisance effects may extend for a longer duration or be of higher magnitude than in the Project case alone. Cumulative effects will be less pronounced where the Project and future projects share an existing ROW (*e.g.*, SVTC and Bipole III) because some of the nuisance-related activities, such as noise associated with land-clearing, will only happen once.

While the construction periods of projects identified in Table 16-15 overlap with the Project, there is low likelihood that synergistic cumulative effects will occur because linear development (pipelines and transmission lines) construction activity generally occupies a particular area only for a relatively short period of time. However, there is a moderate potential for non-synergistic cumulative effects occurring over a broader area.

There are residential areas where multiple new transmission lines are going to be constructed or are proposed (*e.g.*, within the Manitoba Hydro South Loop Transmission Corridor in the vicinity of Rosser in the RM of Rosser, through South Headingley in the RM of Headingley, west of Oak Bluff West in the RM of Macdonald, along the Riel-Vivian Transmission Corridor in the RM of Springfield and along the New ROW segment in the RM of Ste. Anne).

The development of a cleared ROW for transmission lines could reduce development potential due to fragmentation of lots. Multiple transmission lines could also result in less interest in wanting to buy a lot or build a residence near the lines, thus lowering the development potential of land or land nearby. These changes could influence development in localized areas adjacent to the Projects or potentially affect the location of future developments within the RAA.

Future projects that overlap spatially and temporarily with the Project can contribute to cumulative effect on land development potential. The cumulative effects in these areas may extend for a longer period or be of greater magnitude than with just the Project alone due to multiple transmission line presence. However, the projects will affect a very small proportion of the

developable land within the RAA and will not substantially alter overall land development patterns.

Potential effects associated with a change in property (*e.g.*, property value) are primarily related to the operation and maintenance phase from the presence of infrastructure. Based on literature review, Manitoba Hydro's ongoing monitoring of property sales along an existing transmission line ROW and the PRA study (2015, unpublished draft), effects on property value are anticipated to be low magnitude as a result of the Project in combination with other projects. Cumulative effects on property value are not anticipated for the Energy East pipeline project, because that project will not, generally, result in visible above-ground infrastructure.

A summary of the characterization of the cumulative effects on change in property/development potential, including the cumulative environmental effects with the Project and the Project contribution to cumulative effects, is presented in Table 16-16. With the addition of Project effects and those of other projects, cumulative effects from the development of the required footprints for these infrastructure projects would be over the medium term and low-moderate in magnitude. The Project's contribution to cumulative environmental effects is not anticipated to result in a change that widely disrupts continued residential land and property use or potential development overall within the RAA.

16.6.3 Cumulative Effects Assessment for Cumulative Change in Designated Lands, Protected Areas and Recreation

16.6.3.1 Cumulative Effect Pathways for Cumulative Change in Designated Lands, Protected Areas and Recreation

Future projects in the RAA (Table 16-15) have the potential to interact cumulatively with the Project where their plans include the development of facilities in or adjacent to designated lands, protected areas and recreational areas. Cumulative effects arising from future activities have similar effects mechanisms as effects arising from the Project, including disturbance/conflict with designated lands and protected areas (including proposed protected areas) and disturbance with recreational opportunities, activities and access.

The nature and extent of cumulative effects will likely differ depending on the project. For example, pipelines have little aboveground infrastructure and are thus less visible, and have narrower ROW requirements, and therefore could be expected to have less effects on designated lands, protected areas and recreation than transmission lines. Highway infrastructure development can cause both positive and negative effects. While construction may result in similar disturbance related effects as those identified during the Project, when operational, highway improvements may improve the accessibility of some areas, and could facilitate recreational use and development.

16.6.3.2 Mitigation for Cumulative Effects for Cumulative Change in Designated Lands, Protected Areas and Recreation

Implementation of the mitigation measures described in Section 16.5.3.2 will reduce the effects on designated lands, protected areas and recreation. Other proponents may adopt mitigation measures to mitigate their own project effects.

16.6.3.3 Residual Cumulative Effects

Portions of the land in the RAA have already been disturbed due to predominant agricultural land use and industrial and residential development.

Approximately 236,765 ha of the RAA is occupied by Crown land, agro-Crown lands, provincial parks and provincial forests. There is potential for designated lands and protected areas to be affected if the effects of the Project act cumulatively with those of other projects that overlap spatially within the RAA. Within the RAA, the disturbance of designated lands and protected areas from the PDA will result in conflicts with 752 ha, or approximately 0.3% of the area of these sites in the RAA.

There is potential for the effects of the Project to act cumulatively with the effects of other projects. The future projects proposed within the RAA (Table 16-15) have the potential to cause disruption and disturbance effects during the Project construction. While the construction periods of other identified projects overlap with the Project, the spatial disruption is additive as opposed to being synergistic. As the likelihood of two projects being built near each other at the same time is limited, there is limited potential for disturbance-related synergistic effects.

It is anticipated that there will be some cumulative overlap from the Project with other projects (*e.g.*, SVTC and Richer South Station to Spruce Station transmission projects). The resultant disturbance is limited to an area encompassing Duff Roblin Provincial Heritage Park and along the Red River Floodway for a distance of 24 km (in Winnipeg and RMs of Ritchot and Springfield). In addition, there is some spatial overlap with a few proposed protected areas, including: Assiniboine River Clam Beds candidate protected area in the RM of Headingley and proposed protected area parcels and Earl's Block ASI in the RM of Ste. Anne. There is limited potential in the RAA overall for cumulative effects on recreation.

A summary of the characterization of the cumulative effects on change in designated lands, protected areas and recreation, including the cumulative environmental effects with the Project and the Project contribution to cumulative effects, is presented in Table 16-16. The cumulative effects from the development of the required footprints for the cumulative infrastructure projects would therefore be of low-moderate in magnitude and medium term.

The Project's contribution to cumulative environmental effects is not anticipated to result in a change that widely disrupts continued land use. Similarly, the Project's cumulative effects contribution is not expected to degrade present land use activities within the RAA that are not mitigated.

16.6.4 Cumulative Effects Assessment for Cumulative Change in Hunting and Trapping

16.6.4.1 Cumulative Effect Pathways for Cumulative Change in Hunting and Trapping

Future projects in the RAA (Table 16-15) have the potential to interact cumulatively with the Project if their plans include the development of facilities in hunting and trapping areas. Cumulative effects arising from future activities have similar effects mechanisms as effects arising from the Project, including disturbance or interference effects on hunting and trapping due to noise disturbance, damage to areas and sites, visual aesthetics, as well as change in access and loss of wildlife habitat. Projects that can affect hunting and trapping include linear developments that involve land clearing, developments that may increase or reroute traffic and developments that may result in direct mortality to wildlife (*e.g.*, from bird collisions). Some current and future projects do not occur in areas that are currently used for hunting or trapping. In particular, projects near developed areas will likely not affect hunting and trapping as these activities often occur further away from developments. Other developments may occur in areas that are previously disturbed and which provide little or no wildlife habitat.

16.6.4.2 Mitigation for Cumulative Effects for Cumulative Change in Hunting and Trapping

Implementation of the mitigation measures described in Section 16.5.4.2 will reduce the effects on hunting and trapping. As well, mitigation designed to reduce the effects on wildlife will also benefit hunting and trapping (Chapter 9). Other proponents may adopt mitigation measures to mitigate their own project effects or may be required to provide compensation as appropriate.

16.6.4.3 Residual Cumulative Effects

The Open Trapping Area (OTA) Zones encompass the entire RAA, totalling an area of approximately 846,993 ha. Of this total, the Project intersects approximately 3,079 ha, or 0.4% of the open trapping zone area. Five game hunting areas, excluding GHA 38 (Winnipeg), encompass the entire RAA, totalling an area of approximately 846,984 ha. The PDA also intersects approximately 3,079 ha, or 0.4% of the game hunting areas used for guide outfitting in the RAA.

The future projects proposed within the RAA (Table 16-15) have the potential to cause disruption and disturbance effects during the construction phase. While the construction periods of other identified projects overlap with the Project, there is low likelihood of synergistic cumulative effects occurring. The spatial disruption is more additive as opposed to being synergistic given that the likelihood of two projects being built near each other at the same time is limited, thereby resulting in limited potential for disturbance-related synergistic effects.

It is anticipated that there could be some cumulative overlap with the addition of Project effects and those of other projects (*i.e.*, Bipole III, SVTC, Dorsey-Portage South 230 kV and Richer South Station to Spruce Station transmission projects, St. Norbert and Headingley Bypasses). There is minimal spatial overlap between the projects and GHAs 25B, 33 and 35A in the RMs of Rosser, Ritchot, Springfield and Ste. Anne. Similarly, there is limited spatial overlap between the Projects and OTA 3 (RM of Rosser), OTA 1 (south Winnipeg and RM of Ritchot) and OTA 4 (RM of Ste. Anne.

A summary of the characterization of the cumulative effects on change in hunting and trapping areas, including the cumulative environmental effects with the Project and the Project contribution to cumulative effects, is presented in Table 16-16. With the addition of Project effects and those of other projects, cumulative effects from the development of the required footprints for these infrastructure projects would be medium term and low in magnitude. The Project's contribution to cumulative environmental effects is not anticipated to measurably result in a change that widely disrupts continued land use, or reduces the quality of sites or degrades present land use activities within the RAA that is not mitigated.

16.6.5 Cumulative Effects Assessment for Cumulative Change in Mining/Aggregates

16.6.5.1 Cumulative Effect Pathways for Cumulative Change in Mining/Aggregates

Future projects in the RAA (Table 16-15) have the potential to interact cumulatively with the Project if their plans include the development of facilities in mining areas. Cumulative effects arising from future activities have similar effects mechanisms as effects arising from the Project, including disturbance or interference effects on mining activities, damage to areas and sites, as well as access. Projects that can affect mining and aggregates include linear developments that involve land clearing. Some current and future projects occur in areas that are currently not used for mining or aggregate extraction. In particular, projects near developed areas will likely not affect mining and aggregate extraction as these activities often occur further away from developments. Other developments may occur in areas that are previously disturbed and which provide little or no mineral/aggregate value.

16.6.5.2 Mitigation for Cumulative Effects for Cumulative Change in Mining/Aggregates

Implementation of the mitigation measures described in Section 16.5.5.2 will reduce the effects on mining resources. Other proponents may adopt mitigation measures to mitigate their own project effects or may be required to provide compensation as appropriate.

16.6.5.3 Residual Cumulative Effects

Portions of the land in the RAA have already been disturbed due to predominant agricultural land use and industrial and residential development. The Project does not substantially overlap with mining activities. Mining activities in the RAA correspond to an area totalling approximately 50,007 ha. The Project overlap (97 ha) represents 0.2% of the total area of mining activities in the RAA.

The future projects proposed within the RAA (Table 16-15) have the potential to cause disruption and disturbance effects during the construction phase. While the construction periods of other identified projects overlap with the Project, there is low likelihood of synergistic cumulative effects occurring. The spatial disruption is more additive as opposed to being synergistic given that the likelihood of two projects being built near each other at the same time is limited, thereby resulting in limited potential for disturbance or interference-related synergistic effects.

It is anticipated that there could be some cumulative overlap with the addition of Project effects and those of other projects (*i.e.*, Bipole III and Richer South Station to Spruce Station transmission projects). There is minimal spatial overlap between the projects and mineral dispositions (*i.e.,* private quarry permit, quarry withdrawals, aggregate deposits) in the RM of Springfield (with Bipole III) and in the RM of Ste. Anne (with Richer South Station to Spruce Station).

A summary of the characterization of the cumulative effects on change in mining activities, including the cumulative environmental effects with the Project and the Project contribution to cumulative effects, is presented in Table 16-16. With the addition of Project effects and those of other projects, cumulative effects from the development of the required footprints for these infrastructure projects would be medium term and low in magnitude. The Project's contribution to cumulative environmental effects is not anticipated to result in a change that widely disrupts continued land use, or reduces the quality of sites or degrades present land use activities within the RAA that is not mitigated.

16.6.6 Cumulative Effects Assessment for Cumulative Change in Forested Areas

16.6.6.1 Cumulative Effect Pathways for Cumulative Change in Forested Areas

Land clearing will result in some productive forestlands being removed from the available land base of FMU 1 and FMU 24 for the duration of the Project. However, this effect is limited to the PDA. The Project will reduce the productive forest within FMU 1 and FMU 24 by only 0.03%. Manitoba Hydro will reimburse the Crown through the application of the FDAV Guideline (Manitoba Conservation 2002) to mitigate the Project effect on Crown timber and silvicultural investments. Upon decommissioning of the Project, the PDA area can be returned to the original

status, ownership and reincorporated into the available land base for the determination of the AAC.

Future projects in the RAA (Table 16-15) have the potential to interact cumulatively with the Project to the extent that they will be located in high value forest sites. Cumulative effects arising from future activities could have similar effects mechanisms as those associated with the Project, which could affect high value forest sites (*i.e.*, woodlots, shelterbelts, private forestland) through disruption effects (*e.g.*, loss of areas). Some current and future projects do not occur in areas that are currently used for forestry or there are no high value forest sites. In particular, projects near developed areas will likely not affect forestry values as these activities often occur further away from developments. Other developments may occur in areas that are previously disturbed and which provide little or no forestry value or there are no sites of concern.

16.6.6.2 Mitigation for Cumulative Effects for Cumulative Change in Forested Areas

Implementation of the mitigation measures described in Section 16.5.6.2 will reduce the effects on high value forest sites. Other proponents will be required to compensate for the loss of productive Crown forest land under the FDAV policy and may adopt other mitigation measures to mitigate their own project effects.

16.6.6.3 Residual Cumulative Effects

Portions of the land in the RAA have already been disturbed due to predominant agricultural land use and industrial and residential development.

As was discussed in Section 16.4.8.2, the Project overlaps with high value forest sites consisting of woodlot plans, shelterbelts and private land natural forest areas.

Approximately 129,459 ha of the RAA is occupied by woodlot plans and private productive forestlands (excluding shelterbelts). It is anticipated that the effects of the Project on these high value forest sites could act cumulatively with the effects of other projects in the RAA. Within the RAA, the disturbance of woodlots, shelterbelts and private land forest areas from the Project (PDA) will result in conflicts with 325 ha, or approximately 0.2% of the area of these sites in the RAA.

The future projects proposed within the RAA (Table 16-15) have the potential to remove productive forestland from the land base (*i.e.,* reduction in potential AAC) and reduce areas of high value forest sites *(e.g.,* woodlots, shelterbelts, plantations, private forestland) during the construction phase. While the construction periods of other identified projects overlap with the Project, there is low likelihood of synergistic cumulative effects occurring. The spatial disruption is more additive as opposed to being synergistic given that the likelihood of two projects being built near each other at the same time is limited. As such, there is limited potential for disruption-related synergistic effects.

It is anticipated that there could be some cumulative overlap with the addition of Project effects and those of other projects (*i.e.*, Bipole III, SVTC and Richer South Station to Spruce Station transmission projects). There is no additional spatial overlap between the projects and Sandilands Provincial Forest and timber allocation areas (*i.e.,* timber sales) while there is minimal overlap with high value forest sites (*i.e.,* woodlots and shelterbelts) and limited to a few sites in the RMs of Ritchot and Springfield. Any potential for cumulative effects would be related to amount forested areas affected or removed by development. Given the renewable nature of the resource, activities would have limited additive interaction. The potential for cumulative interactions is limited as most of the future projects would largely avoid high value forest sites altogether.

A summary of the characterization of the cumulative effects on change in productive forestland and high value forest sites, including the cumulative environmental effects with the Project and the Project contribution to cumulative effects, is presented in Table 16-16. The effects on high value forest sites are limited and can be mitigated through negotiation of appropriate compensation or re-establishment of forest values (i.e., shelterbelts) in such areas where possible. With the addition of Project effects and those of other projects, cumulative effects from the development of the required footprints for these infrastructure projects on productive forestland and high value forest sites would be low in magnitude. The Project's contribution to cumulative environmental effects is not anticipated to measurably result in a change that widely disrupts continued land use or degrades the quality of sites or present land use activities within the RAA that is not mitigated.

16.6.7 Summary of Cumulative Effects

Table 16-16 summarizes cumulative environmental effects on land and resource use.

While the Project will have a cumulative environmental effect, with the implementation of mitigation measures, cumulative effects are anticipated to be of low to moderate magnitude. Cumulative effects will occur in a medium resilience socio-economic context and are anticipated to occur throughout the RAA. Cumulative effects will be medium term to permanent, occurring on a continuous basis or as a single event.

Table 16-16 Summary of Cumulative Environmental Effects on Land and Resource Use

Cumulative Effect	Residual Cumulative Environmental Effects Characterization						
	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Socio-economic Context
Cumulative Effect on Residences and Property							
Cumulative environmental effect with the Project	A	L/M	RAA	MT	C	R	MR
Contribution from the Project to the overall cumulative environmental effect	The Project will result in a conflict or disruption to residences and property for the medium term. These effects will be limited to the PDA in extent.						
Cumulative Effect on Designated Lands, Protected Areas and Recreation							
Cumulative environmental effect with the Project	A	L/M	RAA	MT	C	R	MR
Contribution from the Project to the cumulative environmental effect	The Project will result in a conflict or disruption to designated lands, protected areas and recreation areas for the medium term. These effects will be limited to the PDA in extent.						
Cumulative Effect on Forested Areas							
Productive Forestland							
Cumulative environmental effect with the Project	A	L	RAA	P	S	R	MR
Contribution from the Project to the cumulative environmental effect	The Project will result in loss of productive forestland for life of the Project. These effects will be limited to the PDA in extent.						
High Value Forest Sites							
Cumulative environmental effect with the Project	A	L	RAA	P	S	R	MR
Contribution from the Project to the cumulative environmental effect	The Project will result in conflict or disruption to high value forest sites (*i.e.*, woodlots, shelterbelts, private forestland) throughout the life of the Project. These effects will be limited to the PDA in extent.						

Cumulative Effect	Residual Cumulative Environmental Effects Characterization						
	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Socio-economic Context
Cumulative Effect on Mining/Aggregates							
Cumulative environmental effect with the Project	A	L	RAA	MT	C	R	MR
Contribution from the Project to the cumulative environmental effect	The Project will result in a conflict or disruption to mining activities for the medium-term. These effects will be limited to the PDA in extent.						
Cumulative Effect on Hunting and Trapping							
Cumulative environmental effect with the Project	A	L	RAA	MT	C	R	MR
Contribution from the Project to the cumulative environmental effect	The Project will result in a conflict or disruption to hunting and trapping areas for the medium term. These effects will be limited to the PDA in extent.						

KEY

See Table 16-3 for detailed definitions.

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

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

Geographic Extent: PDA: ROW; LAA: Local; RAA: Regional

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

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

Reversibility: R: Reversible; I: Irreversible

Socio-Economic Context: LR: Low resilience, MR: Moderate resilience, HR: High resilience

N/A Not applicable

The Project's contribution to cumulative environmental effects are a result of conflict or disruption to residences and property, designated lands, protected areas and recreation, mining/aggregates and hunting and trapping for the medium term. In addition, the Project's contribution to these effects will result in the loss of productive forestland and conflict or disruption to high value forest sites throughout the life of the Project. These cumulative environmental effects will be limited to the PDA in extent. The Project's contribution to the cumulative environmental effects is not expected to:

- change or disrupt continued residential land and property use
- change or disrupt designated land, protected areas and recreation land use within the RAA, or degrade present land use activities
- change or disrupt forestry activities or the quality of forestry sites in the RAA

- degrade the quality of mining/aggregate extraction activities in the RAA
- disrupt hunting and trapping activities in the RAA through the reduction or degradation of hunting and trapping sites

16.7 Determination of Significance

16.7.1 Significance of Environmental Effects from the Project

With the application of mitigation measures, residual effects of the Project on land and resource use, due to change in private property and rural residential development, designated lands and protected areas and resource use (forestry, groundwater, mining/aggregates, hunting and trapping) are anticipated to be not significant. With consideration of other land use and environmental factors , Manitoba Hydro considered effects on private property and residential development through transmission line routing. With the application of mitigation measures identified in Section 16.5.2.3, the Project will not restrict or degrade rural residential development to a point where it cannot continue at current levels. The Project will not affect any federally or provincially protected lands. It will cross Duff Roblin Heritage Provincial Park through part of the park designated as “access” to allow for a transmission line ROW and will not otherwise affect the functioning of this park. Project effects on resource use, including forestry, mining, recreation, hunting and trapping, have been considered and reduced through transmission line routing and with the application of mitigation measures are of low to moderate magnitude . The Project will not disrupt, restrict, or degrade any of these land uses to a point where they cannot continue at or near baseline levels.

16.7.2 Significance of Cumulative Environmental Effects

The existing land base in the RAA has been partially modified through agricultural conversion and industrial and residential development that has occurred over the past two hundred years. Approximately 67% of the RAA is disturbed from resource use activities (*i.e.,* agriculture [cropland, hayland, pasture, cleared, abandoned], forestry [woodlots, private land forest areas], mining [sand and gravel pits, peat, quarry mining areas, aggregate deposits]) with approximately 28% of the RAA comprised of Crown lands, including agricultural Crown lands, provincial park and provincial forest land.

The cumulative effects from disruption, disturbance of land and resource base and the reduction or loss of resources are not anticipated to occur at levels that restrict land and resource activities such that existing activities cannot continue within the RAA at current levels. The Project PDA is predicted to account for minimal contribution to the cumulative effects case (approximately 3,080 ha or 0.4% of the RAA). None of the land and resources uses assessed are at a threshold

where cumulative effects will be significant in terms of a disruption that widely disturbs present land uses to a point where they cannot continue at or near baseline levels. As such, the Project contribution to cumulative effects is considered not significant. With the addition of Project effects and those of other projects, cumulative effects from the development of the required footprints for these infrastructure projects would be long term.

16.7.3 Project Contribution to Cumulative Environmental Effects

The Project's contribution to cumulative effects will make a small contribution to the cumulative effects case. It is anticipated that much of the Project's contribution to the identified cumulative effect will be of low to moderate magnitude, long term, principally related to the presence of the transmission line and is of moderate resiliency (*i.e.,* can accommodate some change in the quality of sites or current levels of activity). Therefore, the Project's contribution to cumulative effects is not anticipated to appreciably affect the land base available for land and resource use activities in the RAA.

16.7.4 Sensitivity of Prediction to Future Climate Change

Based on the climate change scenarios presented in the Hydroclimatic Study for the Project (Manitoba Hydro 2015b), temperature and precipitation are expected to increase in the future. Predicted monthly mean temperatures are generally projected to increase by 1.5°C (2020), 2.9°C (2050) and 4.1°C (2080). Predicted total precipitation amounts are projected to increase by 3.5% in 2020, 4.2% in 2050 and 6.7% in 2080. On a monthly basis, greater changes in precipitation are expected in the winter months than summer months. In terms of climate extremes, projected changes indicate warmer and fewer cold days and nights, warmer and more frequent hot days and nights, increased frequency of warm spells/heat waves and increased frequency of heavy precipitation events (*i.e.,* total rainfall).

Concerns in urban centres associated with climate change relate to extreme weather events, flooding, drought, heat stress, disease and changes in green space. Urban centres are more able to undertake climate adaptation. Rural communities are more sensitive to climate change given their dependence on natural resource sectors (*i.e.,* agricultural communities, recreation/tourism communities). Communities that depend on these industries could face challenges. The agricultural industry has progressed further than other sectors in its adaptation efforts related to crop types and varieties grown (Sauchon and Kulshreshtha 2008).

Annual mean temperatures within the MMTP study region are projected to increase with time (Manitoba Hydro 2015b). Generally, warmer temperatures along with longer growing seasons and higher carbon dioxide (CO_2) concentrations could result in enhanced forest growth in the RAA as long as water and nutrients are not limiting factors. The longer growing seasons and

enhancement could be offset, however, by increases in the frequency and intensity of forest fires, insect outbreaks and extreme weather events. Forest ecosystems affected by warmer temperatures are expected to gradually push the forest's ideal habitat northward, although there are some limiting factors, including soil conditions, seed dispersal and habitat fragmentation (Natural Resources Canada 2004). Precipitation is projected to increase on average within the MMTP study region (Manitoba Hydro 2015b). Although winter precipitation is projected to increase on average, warmer temperatures may lead to less snow accumulation, which could result in lower spring melts and lower spring flood peaks (Manitoba Hydro 2015b). Flooding driven by heavy rainfall could increase into the future for some regions for central North America. In addition, earlier spring peak flows are likely in snowmelt-fed rivers; however the projected magnitude of change is uncertain (Manitoba Hydro 2015b). The Project is not expected to affect the ability of individuals to participate in forest management (*i.e.,* woodlots), preclude further forestry development, or contribute to flooding or reduction in water supply.

Increased temperatures could lead to greater tourism visitation in recreation areas. Opportunities for nature-based recreation activities could increase due to the extension of the summer tourism season to include more favourable shoulder seasons (*i.e.,* spring and autumn). Species of interest could similarly be affected by warmer temperatures through changes in habitat. As a result, species that have been viewed or hunted may no longer inhabit certain protected areas. This change could be offset by an increase habitat for deer (and potentially moose). Warmer temperatures could also affect waterfowl hunting due to the loss of waterfowl habitat. Lower precipitation in the summer months could lower lake and stream levels and thus reduce opportunities for water-based recreation (*i.e.,* swimming, fishing, boating, canoe-tripping). Winter activities could be affected by less snow cover and shorter seasons, which could affect the timing of, and opportunities for, snowmobiling, cross-country skiing and snowshoeing (Sauchon and Kulshreshtha 2008). However, it is unlikely that the Project is going to preclude these future recreational activities.

The predicted climate change scenarios would not change the significance determinations for land and resource use, because they are not expected to measurably increase the magnitude of effects of the Project on land and resource use activities.

16.8 Prediction Confidence

There is a moderate to high degree of confidence in the predicted effects of construction, operation and maintenance of the Project on land and resource use. The prediction confidence is based on information collected as part of desktop-based data compilation, GIS data analyses and understanding of Project activities and locations. Through a process of extensive public engagement and FNMEP undertaken for the Project (*i.e.,* open houses, stakeholder meetings, KPIs), there is good understanding of the issues and concerns related to land and resource use which have been addressed. While some of the desktop data were limited in terms of availability (*e.g.,* lack of groundwater quality data on pesticides/herbicides) or scale (*e.g.,* big game and game bird hunting areas and open trapping area data to support harvest evaluation),

environmental effects mechanisms are well-understood. Manitoba Hydro's considerable past experience with the construction, operation and maintenance of other similar transmission lines in the province is also well-understood. Many of the effects analyzed were supported through quantification. The mitigation measures identified in Section 16.5 are standard practice and have been implemented on previously completed transmission projects. Finally, the significance conclusion is based upon a well-founded understanding of the land and resource use context within the Project RAA.

The prediction confidence with respect to cumulative effects is moderate given the lack of spatial context available for the assessment of cumulative effects.

16.9 Follow-up and Monitoring

Manitoba Hydro's practice is to develop project-specific environmental protection plans where the mitigation measures are stipulated for construction, operation and maintenance activities. These measures are regularly reviewed for their effectiveness as part of a process of adaptive management in project monitoring and follow-up.

Land and resource use activities within the RAA are the subject of ongoing planning, management, regulatory enforcement and monitoring by the federal, provincial and municipal governments. This includes monitoring and the collection of information on, for example, municipal land use, hunting and angling activity and development for the purpose of licensing, enforcement and resource management. Manitoba Hydro has provided and will continue to provide Project information to relevant agencies and organizations as required and requested.

Potential follow-up related to land and resource use may involve flagging environmentally sensitive sites (*e.g.*, residences, high value forest sites). Sensitive sites for land and resource are identified in the Socio-economic and Land Use Technical Report (Stantec 2015d).

Manitoba Hydro worked with an outfitter as part of a black bear bait site monitoring program conducted over the spring and fall 2014 black bear hunting seasons to gain a better understanding of how many bears frequent current bait sites in the area adjacent and away from the Project ROW. Potential monitoring may involve the continuation of a black bear bait site monitoring program to determine if black bear activity at bait sites changes with MMTP development throughout the clearing and construction and post Project phase.

16.10 Summary

The following summarizes key issues, routing mitigation, potential effects pathways and conclusions with respect to the assessment and mitigation measures, significance and cumulative effects related to land and resource use for the Project.

Key Issues and Routing Considerations

Key issues and concerns associated with land and resource use identified during the engagement process included Project effects on the following:

- proximity to rural residential development and agro-industrial development
- proximity to residences and farmsteads and other sensitive receptors (e.g., schools, churches)
- potential for reduction in property values due to transmission line development
- proximity to designated lands and protected areas
- disruption/disturbance to, recreational areas, resource use areas and activities (*i.e.*, forestry, groundwater use, mining, hunting and trapping)

Transmission line routing for the Project (*i.e.,* alternative route evaluation and preferred route selection) together with Rounds 1, 2 and 3 of the PEP and the FNMEP played an important role in reducing and avoiding potential effects for the Final Preferred Route. Key design and routing adjustments included avoidance of multi-lot subdivision developments; realignment to take advantage of existing transmission ROW to avoid an important municipal sand and gravel operation; and adjustments to reduce potential effects on a municipal recreation site and a private WMAs.

Potential Effects and Mitigation

The potential effects of the Project on land and resource use were identified and assessed, focusing on activities associated with property, specifically residential development and development potential, designated lands, protected areas and recreation, productive forest areas and high value forest sites, mining and aggregate extraction, recreation and tourism, hunting, trapping and fishing activities. The assessment of environmental effects on land and resource use considered the following:

- potential to affect residences and property owners through disturbance and nuisance effects (*e.g.*, construction noise, dust, audible noise emission) and property access during Project construction, operation and maintenance
- potential to affect property value due to Project construction and presence during operation and maintenance
- conflict with development potential of land due to Project construction and presence during operation and maintenance
- potential to adversely affect designated lands, protected areas and established recreational activities
- potential to adversely affect established recreational activities and visual aesthetic values (*i.e.*, recreational user's quality of experience due to transmission line operation and visual presence)

- potential to directly affect productive forestland and high value forest sites (*i.e.*, loss, removal of timber volumes, reduction in areas) during Project clearing and construction. Construction and maintenance activities (*i.e.*, establishment of marshalling yards, access to the ROW) may also affect productive forestland and high value forest sites.
- potential to adversely affect groundwater quantity (levels) due to aquifer disturbance during construction (*i.e.*, installation of tower foundations, geotechnical drilling) and groundwater quality (*i.e.*, herbicide application during operation and maintenance)
- potential to directly affect mining interests and dispositions from area loss through disruption of the resource and disturbance/interference with resource operations during Project construction (*i.e.*, site preparation, access to the ROW, the establishment of marshalling yards, transmission line construction)
- other potential effects on mining/aggregates related to proximity and interference with facility operation and future development and an increase in access associated with transmission line presence during operation and maintenance
- potential to adversely affect hunting and trapping as a result of temporary noise and activity-related disturbances (*i.e.*, sensory disturbance affecting fur-bearer presence and success of harvesting) during Project construction (*i.e.*, site preparation, access to the ROW, the establishment of marshalling yards, transmission line construction) and from the physical presence of the transmission line
- Project effects on land and resource use have been reduced/prevented through Project design (*e.g.*, routing) and through the implementation of project-specific mitigation measures (*e.g.*, access management, compensation, notification regarding construction, operation and maintenance activities).

With the implementation of mitigation measures, residual effects from the Project on land and resource use are anticipated to be of low to moderate magnitude. The socio-economic context against which residual effects have been assessed is one of medium resilience, where land and resource use is able to accommodate some changes in the land base or disturbances of environmental conditions. Effects will be short to medium term to permanent, regular/continuous and will occur during both the construction and operation and maintenance phases (*i.e.*, transmission line presence).

Significance of Project Effects

Residual effects of the Project on land and resource use, due to change in private property and rural residential development, designated lands, protected areas and resource use, are not significant. The Project has been routed with consideration of private property and rural residential development and with the application of mitigation measures identified in Section 16.5.2.3 the Project will not restrict or degrade rural residential development to a point where it cannot continue at current levels. The Project will comply with provincial government land use planning and will not affect any federally or provincially protected lands. The Project will cross Duff Roblin Heritage Provincial Park through part of the park designated as “access” to

allow for a transmission line ROW and will not otherwise affect the functioning of this park. Project effects on resource use, including forestry, mining, recreation, hunting and trapping, have been considered and reduced or avoided where possible through transmission line routing and through the application of mitigation measures, generally are of low to moderate magnitude and will not affect the sustainability of any of these activities within the LAA. The predicted climate change scenarios would not change the significance determinations for land and resource use, as they are not expected to measurably increase the magnitude of effects of the Project on land and resource use activities.

Significance of Cumulative Effects

Future projects in the RAA (Table 16-15) have the potential to interact cumulatively with the Project if their plans include the development of facilities in areas of existing residences, residential development, including effects on property value; in designated lands, protected areas and recreational areas; in mining areas; and in hunting and trapping areas.

Cumulative effects arising from future activities have similar effects pathways as those associated with the Project, including:

- disturbance and nuisance effects on residences, residential development (*i.e.*, proximity) and change in property (*i.e.*, presence)
- disturbance/conflict with designated lands and protected areas (including proposed protected areas) and disturbance with recreational opportunities, activities and access
- removal of productive forestlands from the available land base within the PDA for the duration of the Project and the provision of compensation to the Crown through application of the FDAV Guideline to mitigate Project effects on Crown timber and silvicultural investments
- potential effects on high value forest sites (*i.e.*, woodlots, shelterbelts, private forestland) through disruption effects (*e.g.*, loss of areas) and disturbance effects (*i.e.*, noise, dust)
- disturbance or interference effects on mining activities, and damage to areas, sites and access
- disturbance or interference effects on hunting and trapping, including noise disturbance and damage to areas and sites, visual aesthetics, and access

The existing land base in the RAA has been partially modified through agricultural conversion and industrial and residential development that has occurred over the past two hundred years. The cumulative effects on disruption, disturbance of land and resource base and the reduction or loss of resources are not anticipated to occur at levels that restrict land and resource activities such that existing activities cannot continue within the RAA at current levels. With the addition of Project effects and those of other projects, cumulative effects from the development of the required footprints for these infrastructure projects would be medium term/permanent.

Cumulative Effects Contribution

The Project is predicted to account for 0.9% of the 7,373 ha of additional disturbance in the cumulative effects case. None of the land and resource uses assessed are at a threshold where cumulative effects will likely be significant, so Project contribution to cumulative effects are considered not significant. The Project will make a small contribution to the cumulative effects case.

It is anticipated that much of the Project's contribution to the identified cumulative effect will be of low to moderate magnitude, medium term to permanent, principally related to the presence of the transmission line and is of moderate resiliency (i.e., can accommodate some change in the quality of sites or current levels of activity). Therefore, the Project's contribution to cumulative effects is not anticipated to affect the land base available for land and resource use activities in the RAA.

16.11 References

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Appendix 16A
Floodway Memorandum Agreement

Red River Floodway Agreement

MEMORANDUM OF AGREEMENT made this day of , 19 .

BETWEEN:

HER MAJESTY THE QUEEN, in Right of the Province of Manitoba, represented herein by the Minister of Natural Resources

(hereinafter called the "Grantor"),

OF THE FIRST PART,

- and -

THE MANITOBA HYDRO-ELECTRIC BOARD

(hereinafter called "Manitoba Hydro"),

OF THE SECOND PART.

WHEREAS the Grantor has constructed a diversion channel for the Red River from a point at or near St. Norbert, in the Province of Manitoba, around Greater Winnipeg to St. Andrew's Locks, near Lockport in the said Province, which diversion channel is known as the Red River Floodway and is hereinafter called the "Floodway".

AND WHEREAS the primary use of the Floodway is as a diversion channel;

AND WHEREAS the Floodway is also used for transportation, recreation and agricultural purposes;

AND WHEREAS Manitoba Hydro desires a right-of-way over, across, upon, under and through certain portions of the Floodway described as follows:

Parcel One: All those portions of the South-West Quarter of Section 27, and of the North-Half of Section 28, in Township 11 and Range 4, East of the Principal Meridian, in Manitoba, taken for Water Control Works as shewn on a Plan deposited in the Winnipeg Land Titles Office as number 7270 contained within the limits bordered blue on a Special Plot registered in the said Office as number 13,001. Excepting out of the North-West Quarter of said Section 28, all mines, minerals, mineral oils, petroleum, gas, coal, gravel and valuable stone in, upon or under the said land and the right to enter and remove the same.

Parcel Two: All those portions of the West-Half of Section 27, and of the North-Half of Section 28 and of the South-East Quarter of Section 33, in the said Township and Range, taken for Water Control Work as shewn on plans deposited in the said office as numbers 7406 and 10,283, contained within the limits bordered blue on said Special Plot number 13,001. Excepting out of the North-East Quarter of said Section 28 and of the South-East Quarter of said Section 33 all mines, minerals, mineral oils, petroleum, gas, coal. gravel and valuable stone in, upon, or under the land contained within the limits of the Canadian National Railway Spur Track as shewn on a Plan filed in the said Office as number 2128 and the right to enter and remove the same and excepting out of all that portion of the North-West Quarter of said Section 27, which lies to the North of a line drawn from a point in the Western limit of said North-West Quarter of Section 27 distant Southerly thereon 524 feet from the Northern limit of said Quarter Section to a point in the Eastern limit of said Quarter Section distant Southerly thereon 924 feet from the said Northern limit, all reservations regarding mines, minerals and other matters more fully set forth in an instrument registered in the said Office as number 680169.

Parcel Three: All those portions of the closed Government Road Allowance South of and adjacent to the Southern limits of Sections 27 and 28 in said Township and Range and its straight productions between said Sections taken for Water Control Work as shewn on a Plan deposited in the said Office as number 10,283, contained within the limits bordered blue on said Special Plot number 13001.

Parcel Four: All that portion of the Closed Government Road Allowance East of and adjacent to the Eastern limit of the East-half of said Section 28 taken for Water Control Work as shewn on said plan number 10,283 contained within the limits bordered blue on said Special Plot number 13,001.

Parcel Five: All that portion of the Closed Government Road Allowance North of and adjacent to the Northern limit of the North-East Quarter of said Section 28, taken for Water Control Work as shewn on said Plan number 10,283 contained within the limits bordered blue on said Special Plot number 13,001.

Parcel Six: All those portions of the South-West Quarter of Section 14, and of the East-Half of Section 15, and all of Section 22, in the said Township and Range, taken for Water Control Work as shewn on plans deposited in the said Office as numbers 7406 and 10,283, contained within the limits bordered blue on said Special Plot number 13,001.

Parcel Seven: All those portions of the Closed Government Road Allowance South of and adjacent to the Southern limit of said Sections 14 and 15 and its straight production between said Sections 14 and 15 taken for Water Control Work as shewn on said Plan number 10,283, contained within the limits bordered blue on said Special Plan number 13,001.

Parcel Eight: All that portion of the Closed Government Road Allowance East of and adjacent to the East half of said Section 15, taken for Water Control Work as shewn on said Plan number 10,283, contained within the limits bordered blue on said Special Plan number 13,001.

Parcel Nine: All that portion of the closed Government Road Allowance North of and adjacent to the Northern limit of said Section 15 taken for Water Control Work as shewn on said Plan number 10,283, contained within the limits bordered blue on said Special Plot number 13,001.

Parcel Ten: All those portions of Section 2, and of the North-East Quarter of Section 10, and of the West half of Section 11, in the said Township and Range, taken for Water Control Work as shewn on a Plan deposited in the said Office as number 7386, contained within the limits bordered blue on a Special Plan registered in the said Office as number 13,000.

Parcel Eleven: All that portion of the closed Government Road Allowance North of and adjacent to said Section 2, taken for Water Control Work as shewn on a Plan registered in the said Office as number 10,204, contained within the limits bordered blue on said Special Plot number 13,000.

Parcel Twelve: All that portion of the Closed Government Road Allowance, West of and adjacent to the West half of said Section 11, taken for Water Control Work as shewn on said plan number 10,204, contained within the limits bordered blue on said Special Plot number 13,000.

Parcel Thirteen: All that portion of the North half of Section 26, which lies North of the Northern limit shown bordered blue on a Plan of Survey of Right-of-Way for Power Transmission Line registered in the said Office as number 7753, and all of Section 35, in Township 10 and Range 4, East of the Principal Meridian in Manitoba, taken for Water Control Work as shewn on a Plan deposited in the said Office as number 7386, contained within the limits bordered blue on said special plot number 13,000.

Parcel Fourteen: All that portion of the Closed Government Road Allowance North of and adjacent to the Northern limit of said Section 26, contained within the limits bordered blue on said Special Plot number 13,000.

Parcel Fifteen: All those portions of the South-half of Section 26 and of the West-half of Section 23, in Township 10 and Range 4, East of the Principal Meridian in Manitoba, taken for Water Control Work as shown on a Plan deposited in the Winnipeg Land Titles Office as number 7386, contained within the limits bordered blue on said special plot number 13,000.

Parcel Sixteen: All that portion of the closed Government Road Allowance, North of and adjacent to the Northern limit of said Section 23, contained within the limits bordered blue on said special plot number 13,000.

Parcel Seventeen: All those portions of the West-half of Section 14, in Township 10 and Range 4, East of the Principal Meridian in Manitoba, taken for Water Control Work, as the same is shewn on a plan deposited in the said office as number 7386, contained within the limits bordered blue on said special plot number 13,000.

Parcel Eighteen: All those portions of the North-West Quarter 11 and of the South-West Quarter of Section 14, in said Township and Range, taken for Water Control Work, as the same is shewn on a Plan deposited in the said office as number 9298, contained within the limits bordered blue on special plot number 13,000, excepting thereout: - All mines and minerals.

Parcel Nineteen: All those portions of the closed Government Road Allowances which lie North of, and South of and adjacent to the Northern and Southern Limits of said Section 14, taken for Water Control Work, as shewn on said plan number 9298, contained within the limits bordered blue on said special plot number 13,000. Excepting thereout - All mines and minerals

Parcel Twenty: All those portions of the North-West Quarter of Section 11 and of the East-half of Section 10, in the said Township and Range, taken for Water Control Works as the same is shown bordered blue on a plan deposited in the said office as number 7565, contained within the limits bordered blue of a special plot registered in the said office as number 12,989.

Parcel Twenty-One: All that portion of the Closed Government Road Allowance which lies East of and adjacent to the North-East Quarter of said Section 10, contained within the limits bordered blue on said Special Plot number 12,989.

Parcel Twenty-Two: All those portions of the South-West Quarter of Section 10, and of the North-half and the South-West Quarter of Section 4, and of the East-half and the South-West Quarter of Section 5, in said Township and Range taken for Water Control Works as the same is shewn colored blue on plan deposited in the said office as number 7565 and 10,174, contained within the limits of said Special Plot number 12,989.

Parcel Twenty-Three: All those portions of the closed Government Road Allowance which lies West of and adjacent to said Section 10, and North of and West of and adjacent to said Section 4, in said Township and Range, shewn within the limits bordered blue on said Plan number 10,174, contained within the limits of said Special Plot number 12,989.

Parcel Twenty-Four: All that portion of the North-West Quarter of Section 32 in Township 9 and Range 4, East of the Principal Meridian in Manitoba, taken for Water Control Work as the same is shown bordered blue on plans deposited in the said office as numbers 7565 and 10,174, contained within the limits bordered blue on said Special Plot number 12,989.

Parcel Twenty-Five: All that portion of the closed Government Road Allowance West of and adjacent to said North-West Quarter of Section 32, taken for Water Control Work as shown bordered blue on said Plan number 10,174, contained within the limits bordered blue on said Special Plot number 12,989.

Parcel Twenty-Six: All that portion of Fractional Section 9 in Township 10 and Range 4, East of the Principal Meridian in Manitoba, taken for the Dawson Road as shewn on plans registered in the said Office as numbers 2436 and 3270, now closed, taken for Water Control Work as shewn on Plans deposited in the said Office as numbers 7565 and 10,174, contained within the limits bordered blue on said special Plot number 12,989.

Parcel Twenty-Seven: Lots 1, 2, 8 and 9, which lots are shewn on a plan of part of said Fractional Section 9, registered in the said Office as number 2436, taken for Water Control Work as shewn on said plans 7565 and 10,174, contained within the limit bordered blue on said Special Plot number 12,989.

Parcel Twenty-Eight: All those portions of Sections 31 and of the North-West Quarter of Section 32 in Township 9 and Range 4, East of the Principal Meridian in Manitoba, taken for Water Control Works as shewn bordered blue on a Plan deposited in the said Office as number 7565, now closed and shewn as Parcels 1, 2, 3 and 4 and bordered green on a plan deposited in the said Office as number 10,174. Excepting out of said Parcels 1 and 2, all that portion required for a Public Road as shewn on a Plan registered in the said Office as number 12,828.

Parcel Twenty-Nine: All those portions of Sections 4 and 5 in Township 10 and Range 4, East of the Principal Meridian in Manitoba, taken for Water Control Works as the same is shewn bordered blue on a plan deposited in the said Office as number 7565, now closed and shewn as Parcels 5, 6, 7, 8, 9 and 10 and bordered green on a Plan deposited in the said Office as number 10,174.

Parcel Thirty: All those portions of the South-half and the North-East Quarter of Section 10, and of the North-West Quarter of Section 11, in Township 10 and Range 4, East of the Principal Meridian in Manitoba, taken for Water Control Works as the same is shewn bordered blue on a Plan deposited in the said Office as number 7565, now closed and shewn as Parcels 11, 12 and 13 and bordered green on a Plan deposited in the said Office as number 10,174.

Parcel Thirty-One: All those portions of Sections 11 and 14, and of the Government Road Allowance lying between said Sections, in Township 11 and Range 4, East of the Principal Meridian in Manitoba, taken for Water Control Works as the same is shewn bordered blue and plan deposited in the said office as number 7386, now closed and shewn as Parcel 1 and outlined in green on a plan deposited in the said office as number 10,204.

Parcel Thirty-Two: All that portion of the South-half of Section 14 in Township 10 and Range 4, East of the Principal Meridian in Manitoba, taken for Water Control Works as shewn bordered blue and plan deposited in the said Office as number 7386, now closed, and shewn as Parcel 4 and bordered green on a plan deposited in the said Office as number 10,204.

Parcel Thirty-Three: All those portions of Section 31 in Township 9 and Range 4, East of the Principal Meridian in Manitoba, taken for Water Control Works and Public Road as shewn on Plans registered in the Winnipeg Land Titles Office as numbers 7565 and 10,174 respectively, contained within the limits bordered blue on a Special Plot registered in the said Office as number 12,989.

Parcel Thirty-Four: All those portions of the Fractional Section 36, in Township 9 and Range 3, East of the Principal Meridian in Manitoba, taken for Water Control Works and Public Road as the same are shewn on plans deposited in the Winnipeg Land Titles Office as numbers 7565 and 10,174 respectively, contained within the limits bordered blue on said Special Plot number 12,989.

Excepting thereout: All mines and minerals contained within the limits of the abandoned Right-of-Way of the Canadian Pacific Railway as shewn on a plan filed in the said Office, Provencher Division as number 12.

Parcel Thirty-Five: All that portion of the closed Government Road Allowance which lies to the East of and adjacent to said Fractional section 36, taken for Water Control Works and Public Road as shown on said Plan number 10,174 contained within the limits bordered blue on said Special Plot number 12,989. Excepting thereout: All mines and minerals, contained within the limits bordered yellow on a Plan filed in the said Office as number 10,092.

Parcel Thirty-Six: All those portions of Lots 171 to 175, both inclusive, in the Outer Two Miles of the Parish of Saint Norbert, in Manitoba, according to a plan of same registered in the Winnipeg Land Titles Office as number 3910, taken for Water Control Work as the same is shewn on a Plan deposited in the said Office as number 7560, contained within the limits bordered blue on a Special Plot registered in the said Office as number 12,965.

Parcel Thirty-Seven: All that portion of the Government Road Allowance (Four Mile Road) which lies to the East of and adjacent to Lots 171 and 172, in the Outer Two Miles of said Parish, taken for Water Control Work as shewn on a plan deposited in the said Office as number 10,104, contained within the limits bordered blue on said Special Plot number 12,965.

Parcel Thirty-Eight: All those portions of Lots 171 and 172 O.T.M. taken for Saint Anne's Road as the same is shewn on a Plan filed in the said Office as number 472, now closed, contained within the limits bordered blue on said Special Plot number 12,965.

Parcel Thirty-Nine: All those portions of River Lots 174 to 177, both inclusive, of the Parish of Saint Norbert, in Manitoba, according to a Plan of same registered in the Winnipeg Land Titles Office as number 3941, including the Main Highway as the same is shewn on a plan filed in the said Office as number 606, now closed, which lies to the East of the Eastern limit of the land taken for a Public Road as the same is shewn on a plan deposited in the said Office as number 9009, taken for Water Control Work as shewn on a plan deposited in the said Office as number 7560, contained within the limits bordered blue on said Special Plot number 12,965.

Parcel Forty: All that portion of the Government Road Allowance (Two Mile Road) East of and adjacent to said River Lots 174 and 175, contained within the limits bordered blue on said Special Plot number 12,965.

Parcel Forty-One: All those portions of River Lots 174 to 176, both inclusive, of the Parish of Saint Norbert, in Manitoba, according to a plan of same registered in the Winnipeg Land Titles Office as number 3941, including Saint Mary's Road as the same is shewn on a plan registered in the said Office as number 3941, now closed, taken for Water Control Work and Public Road as the same is shewn bordered blue and pink respectively on plans deposited in the said Office as numbers 7560 and 10,104, which lie to the West of the Western limit of the land taken for a Public Road as the same is shewn on a plan deposited in the said Office as number 9009, contained within the limits bordered blue and pink respectively on a Special Plot registered in the said Office as number 12,965.

Parcel Forty-Two: All that portion of the South half of River Lot 75, of the Parish of Saint Norbert, in Manitoba, according to said Plan number 3941, taken for Water Control Work and Public Road as the same is shewn on said Plan number 10,104 contained within the limit bordered blue and pink respectively on said Special Plot number 12,965.

(hereinafter referred to as "the land");

AND WHEREAS the Grantor has agreed to grant to Manitoba Hydro an easement or right-of-way for the construction and use of certain transmission lines and related facilities within the boundaries of the Floodway.

NOW THEREFORE THIS AGREEMENT WITNESSETH that in consideration of the sum of---------ONE---------Dollar ($1.00)

now paid by Manitoba Hydro to the Grantor the receipt of which is hereby acknowledged, the parties hereto covenant and agree as follows:

1. The Grantor hereby grants to Manitoba Hydro, its successors and assigns, the right, license and easement to enter upon and use all that portion of the land coloured red on drawings hereto annexed bearing nos. P.E.-4644-C, P.E.-4657-C and P.E.-6819-C (hereinafter called the "right-of-way") and to excavate, construct, place, operate, inspect, maintain, repair, alter, add to and remove, on, under, across, along, over, through or from the right-of-way overhead and/or underground electric power transmission and/or distribution lines and related plant, equipment and facilities, (hereinafter referred to as "the works").

2. Manitoba Hydro agrees to obtain prior approval in writing of the Director of the Water Resources Branch of the Department of ~~Natural Resources~~ before undertaking any construction, reconstruction, or maintenance of the works or any additions or changes thereto on the right-of-way, other than emergency repairs and ordinary maintenance.

3. The Grantor hereby grants to Manitoba Hydro the right of free and unimpeded ingress and egress to and from the right-of-way over and upon property adjoining the right-of-way which are now or may hereafter be owned by the Grantor insofar as ingress and egress cannot conveniently be had from the right-of-way; provided however that the Grantor shall not be under any obligation to maintain routes of ingress or egress, and the same

shall be had at the sole and entire cost, risk and expense of Manitoba Hydro.

4. The Grantor hereby grants to Manitoba Hydro the right to cut and trim trees and brush on and on either side of the right-of-way which, in the opinion of Manitoba Hydro interfere with or are likely to interfere with the works.

5. Manitoba Hydro shall exercise the rights, licenses and easements hereby granted with due care and attention and in a careful and workmanlike manner so as to cause a minimum of inconvenience, injury or damage to the Grantor, and in the event of any injury or damage, Manitoba Hydro shall forthwith make good the same.

6. (1) The Grantor shall not, without first giving not less than 90 days notice in writing, delivered to or mailed to Manitoba Hydro, excavate, drill, place, install, erect or permit to be excavated, drilled, placed, installed, or erected on, over or under the right-of-way any pit, well, foundation, pavement, material, fence, structure or thing which will extend more than 12 feet above the ground level or within 2 feet of underground cable, but otherwise the Grantor shall have the right fully to use and enjoy the right-of-way, subject always to and so as not to interfere with the rights, licenses and easements hereby granted.

6. (2) All notices to be given hereunder to Manitoba Hydro shall be given in writing addressed to The Property Manager,

Manitoba Hydro, P.O. Box 815, Winnipeg, Manitoba and to the Grantor, 1577 Dublin Avenue, Winnipeg, Manitoba R3E 3J5, or such other address as the Grantor and Manitoba Hydro may from time to time appoint in writing.

7. The Grantor hereby agrees that the rights, licenses, and easements hereby granted shall be exercisable forthwith and at any and all times hereafter by Manitoba Hydro and by its servants, agents and employees, in any manner, free and without charge.

8. Manitoba Hydro performing and observing the covenants and agreements on its part to be performed and observed shall and may hold and enjoy the rights, licenses, and easements hereby granted without hindrance, molestation or interruption on the part of the Grantor or of any person claiming by, through, under or in trust for, the Grantor.

9. Notwithstanding anything herein contained or implied, Manitoba Hydro agrees that the rights, licenses and easements granted to it by the Grantor in this Agreement, are subject to the right of the Grantor, without concurrence of Manitoba Hydro, for its employees, contractors and agents, including vehicles, machinery and equipment, at all times and from time to time, to enter upon the land,

(i) for the purpose of reconstructing, improving, relocating, inspecting, maintaining and operating the Floodway; provided, however, the

Grantor shall give reasonable advance notice to Manitoba Hydro before undertaking any major construction;

(ii) and may at any time in its absolute discretion direct, channel or divert the flow of water across the land.

10. (i) In the event that the works, in the sole opinion of the Grantor, interfere with the operation, improvement, reconstruction or relocation of the Floodway or of any part or parts thereof, or are otherwise required for the purposes of the Grantor, Manitoba Hydro agrees that it will remove or relocate the works, forthwith upon the request of the Grantor, upon such terms and conditions, including costs, as may be agreed upon by the Grantor and Manitoba Hydro.

(ii) In the event that Manitoba Hydro and the Grantor fail to agree on the terms, conditions and costs as provided in Subsection (i) the matter may be referred by either party to the Lieutenant Governor in Council for final determination.

11. It is understood and agreed that any and all loss of or damage to property, real or personal, or any injury to persons, including injuries resulting in death, and including workers' compensation or other statutory assessments or awards, in any

way arising directly or indirectly out of or as a result of the works or the exercise of rights granted hereby shall be at the sole risk and expense of the party responsible in law therefore, and each party hereby agrees to indemnify and save harmless the other from any and all such loss, damage or injury to persons or property, including any third party claims in respect thereof and attributable to it, it being the intent that each party shall be responsible for its own acts.

12. It is understood and agreed that the works shall be and shall remain the property of Manitoba Hydro notwithstanding that they may be or become affixed to the land, and that should for any reason whatever the said works or any part or parts thereof be abandoned, Manitoba Hydro agrees to remove the same at its sole risk and expense, restoring the lands to the satisfaction of the Grantor, and this Agreement shall thereupon terminate with respect to the portion of the land.

13. To the intent that the burden of all rights, licenses, easements, grants, covenants and agreements contained in this Agreement may run with said land, the Grantor covenants and agrees with Manitoba Hydro that the rights, licenses and easements hereby granted shall enure to the benefit of Manitoba Hydro, its successors and assigns, and shall be binding upon the Grantor, and on the successors in title of the Grantor, the owners or occupiers for the time being of said land or any part thereof.

IN WITNESS WHEREOF the parties hereto have executed these presents on the day and year first above written.

WITNESS:

HER MAJESTY THE QUEEN, in Right of the Province of Manitoba

Minister of Natural Resources

THE MANITOBA HYDRO-ELECTRIC BOARD

Roslyn L. Roth
Assistant Corporate Secretary

Manitoba Hydro
Approved
Property
RER
Legal

Appendix 16B
Land Use Development Controls

Land Use Development Controls

LAND USE AND DEVELOPMENT CONTROLS IN THE LAA

City of Winnipeg

Land use in the City of Winnipeg is subject to the development planning document *OurWinnipeg By-Law No. 67/2010* and the *Complete Communities Direction Strategy Secondary Plan No. 68/2010*. "Rural/Agricultural" land use is traversed by the SLTC and is the only City of Winnipeg land use which occurs in the RAA (City of Winnipeg 2011).

Land use zoning is subject to the City of Winnipeg Zoning By-Law No. 200-2006 (City of Winnipeg, 2007). The north-west portion includes zoning districts dominated by "Agricultural". Other districts in vicinity of Pembina Highway, Perimeter Highway and the La Salle River include: "Rural Residential 5", "Residential Single-Family/Manufacturing", "Parks and Recreation 2 (Community)", "Residential Two-Family", "Parks and Recreation 1 (Neighbourhood), "Commercial Corridor", "Parks and Recreation 3 (Regional)", "Residential Single-Family/Educational and Institutional", "Residential Single-Family/Low Density" and "Commercial Community". The north-east portion includes zoning districts for "Agricultural", "Rural Residential 2", "Rural Residential 5" and "Commercial Community" in vicinity of St. Mary's Road, Jean Louis Road and Forbes Road. The south-west portion includes the zoning district "Agricultural" in vicinity of Waverly Street and the La Salle River. The south-east portion includes the zoning district "Agricultural" in vicinity of St. Mary's Road (City of Winnipeg 2007).

RM of Headingley

Land use in the RM of Headingley is subject to the Rural Municipality of Headingley Development Plan By-Law No.12-2006. Land use adjacent to the Assiniboine River is largely categorized as "Neighbourhood", with "General Business" and "Institutional" scattered at the fringes of neighbourhoods. "General Agricultural" is the dominant land use category within the RM north and south of the Assiniboine River. An isolated pocket of "General Industrial" is located in the south east corner of the RM (Landmark Planning and Design Inc. 2006).

Land use zoning is subject to the Rural Municipality of Headingley Zoning By-Law No. 3-2011. Zoning in the west portion includes several zoning districts with "Residential" distributed along the Assiniboine River and "Development Reserves" at the outer edges of "Residential" areas. The majority of zoning districts in the west includes "Rural" with pockets of "Industrial" and "Commercial". The south-loop transmission corridor passes in a north-south direction in the west portion of the RM through zoning sub-districts including "Rural General", "Institutional", "Development Reserve" and "Rural Residential" (Landmark Planning and Design Inc. 2011).

RM of La Broquerie

Land use in the RM of La Broquerie is subject to the Rural Municipality of La Broquerie Development Plan By-Law No. 20-2011. Land use categories have been organized near the community of Marchand at the east side of the rural municipality and the Local Urban District (LUD) of La Broquerie at the north side of the RM Land use categories at Marchand include “Principle Policy Area” within the core community and “Agriculture 2 Area” along the outer periphery. Land use categories surrounding the LUD of La Broquerie include “Principle Policy Area” within the core community, “Agriculture 2 Area” along the outer periphery and scattered portions of “Rural Residential Area”. The majority of the rural municipality has been designated as “Agriculture 1 Area” in the development plan (The Rural Municipality of La Broquerie 2011).

Land use zoning is subject to the rural municipality’s Zoning By-law No. 10-2013. Zoning categories have been placed around the LUD of La Broquerie in the north and includes “Residential”, “Development Reserve”, “Highway Commercial”, “Main Street Commercial/ Residential”, “General Industrial” and “Open Space” in the core community and “Rural Area 2”, “Rural Commercial Industrial” and “Rural Residential” along the LUDs periphery. Land use zoning around the community of Marchand includes “General Development” and “Rural Area 2”. The majority of the RM has been designed as “Rural Area 1” in the zoning by-law (The Rural Municipality of La Broquerie 2013).

RM of Tache

Land use in the RM of Tache is subject to the Rural Municipality of Tache Development Plan By-Law No. 4-2000. Most of the land in the rural municipality is designated “General Agricultural Area”. Land in the northwest portion of the rural municipality has been designated as “Limited Agricultural Area” or “Rural Residential Area”, with pockets of “Residential Area” and “Open Space and Recreational” along the Seine River in vicinity of the LUD of Lorette. Land designated in the east portion of the rural municipality includes “Limited Agricultural Area”, “Natural Environment Area”, “Natural Resource Area”, ”Rural Residential” and “Settlement Centre” at the communities of Ste. Genevieve and Ross . Land designated in the south portion of the rural municipality includes scattered portions of “Rural Residential Area”. Land designated in the LUD of Lorette and LUD of Landmark includes “Residential Area”, “Commercial Area”, “Industrial Area” and “Open Space & Recreational Area” (The Rural Municipality of Tache 2000).

Land use zoning is subject to the Rural Municipality of Tache Zoning By-Law No. 12-2009. Land in the LUD of Lorette and LUD of Landmark has been designated as “Residential Limited Zone”, “Residential General Zone”, “Mobile Home Park Zone”, “Commercial Zone”, “Industrial Zone” and “Open Space Recreational Zone”. “Settlement Centre Zone” designations have been given to lands in the communities of Dufresne, Linden, Ste. Genevieve and Ross (The Rural Municipality of Tache 2009).

RM of Springfield

Land use in the Rural Municipality of Springfield is subject to the Rural Municipality of Springfield Development Plan By-Law No. 98-22. The majority of lands in the rural municipality have been designated “Agricultural Preserve Area”. Lands in the north west portion of the RM include “Aggregate”, “Commercial”, “Hamlet”, “Industrial”, “Institutional”, “Open Space”, “Recreation”, “Residential”, “Rural & Agricultural Area”, “Rural Residential” and “Ecological Areas”. Lands in the north east portion of the RM include “Aggregate”, “Rural & Agricultural Area” and “Rural Residential”. Lands in the south west portion of the rural municipality include “Aggregate”, “Commercial”, “Hamlet”, “Industrial”, “Institutional”, “Open Space”, “Recreation”, “Residential”, “Rural & Agricultural Area” and “Rural Residential”. Lands in the south east portion of the rural municipality include “Aggregate”, “Commercial”, “Hamlet”, “Industrial”, “Institutional”, “Open Space”, “Residential”, “Rural & Agricultural Area”, “Rural Residential” and “Ecological Areas” (The Rural Municipality of Springfield 2013).

Land use zoning is subject to the Rural Municipality of Springfield Zoning By-Law No. 08-01. Most of land use in the rural municipality has been designated “Agricultural General Zoning District”. Lands designated in the north east portion of the rural municipality have been zoned “Agricultural Restricted Zoning District”, “Rural Residential Zoning District”, “Commercial Recreational Zoning District” and “Industrial Extractive Zoning District” along the periphery of Birds Hill Provincial Park. Lands in the east portion of the rural municipality included scattered designations including “Agricultural General Zoning District (site specific)”, “Rural Residential Zoning District”, “Sensitive and Natural Resource Zoning District”, “Industrial Extractive Zoning District”, “Industrial Extractive Holding Zoning District”, “Development Reserve Zoning District”. Lands in the south west portion of the rural municipality are confined between the Floodway and City of Winnipeg limits, where designations included “Agricultural Restricted Zoning District”, “Commercial Highway Zoning District”, “Rural Residential Zoning District”, “Hamlet Area Zoning District”, “Commercial Central Zoning District” and “Commercial Recreation Zoning District” (Landmark Planning and Design Inc. 2010).

Macdonald-Ritchot Planning District

Land use in the rural municipality of Macdonald and rural municipality of Ritchot is subject to the Macdonald-Ritchot Planning District Development Plan By-Law No. 2/10. Most of land use in the rural municipalities has been designated “Green/Agricultural”. Planning policies have been designated in the communities of Starbuck, Oak Bluff, Sanford, La Salle, St. Adolphe, Ile des Chenes, Ste. Agathe, Domain, Brunkild and Grande Point. Land use planning policies include “Urban Centre”, “Urban Centre Hold”, “Environmental”, “Green/Agricultural”, “Enterprise Centre” and “Rural Centre”. Livestock management areas (Restricted, Limited and Mutual Separation) have been applied to lands within, or in vicinity of these communities (Lombard North Group 2011).

Land use zoning in the rural municipality of Macdonald is subject to the Rural Municipality of Macdonald Zoning By-Law No. 15/95. Most of lands in the rural municipality is designated “Agricultural General Zone”. Lands around the periphery of Starbuck, Oak Bluff, Sanford, La Salle, Brunkild and Domain are zoned “Agricultural Restricted Zone”. Land use zoning in the community of Starbuck includes designations for “Residential General Zone”, “Industrial General Zone”, “Open Space Zone”, “Institutional

Zone", "Residential General Zone", "Commercial General Zone", "Industrial Agriculture Zone" and "Residential Rural Zone" (at the outer periphery). Land use zoning in the community of Oak Bluff includes designations for "Industrial General Zone", "Commercial General Zone", "Open Space Zone", "Residential General Zone", "Commercial Highway Zone" and "Institutional Zone". Land use zoning in the community of La Salle includes designations for "Residential General Zone", "Open Space Zone", "Residential General Zone", "Commercial General Zone" and "Residential Suburban Zone". Land use zoning in the community of Sanford includes designations for "Residential General Zone", "Residential General Zone", "Open Space Zone", "Institutional Zone", "Industrial General Zone" and "Residential Rural Zone" (at the outer periphery). Land use zoning in the communities of Brunkild and Domain includes a designation for "General Development Zone" (The Rural Municipality of Macdonald 1995).

Land use zoning in the rural municipality of Ritchot is subject to the Rural Municipality of Ritchot Zoning By-Law No. 18-2002. The majority of lands in the rural municipality are designated as "Agricultural General" and "Agricultural Restricted". Land use zones have been provided for the communities of Ste. Agathe, St. Adolphe, Ile des Chenes and Grande Pointe. Lands in these communities have been designated "Agricultural Restricted", "Commercial Agricultural", "Commercial Highway", "Industrial General", "Residential Rural", "Residential Mobile Home", "Commercial General" and "Open Space" (The Rural Municipality of Ritchot 2002).

RM of Piney

Land use in the rural municipality of Piney is subject to the Rural Municipality of Piney Development Plan By-Law No. 53-09. The majority of land use in the rural municipality has been designated "Rural Area 3". "Settlement Centre" designations have been provided to the communities of Middlebro, Sprague, South Junction, Vassar, Piney and Woodridge. "Limited Rural Area", "Rural Area 1", "Rural Area 2" and "Rural Area 3" designations occur in areas adjacent to Provincial Forests throughout all areas of the rural municipality (The Rural Municipality of Piney 2009).

Land use zoning in the rural municipality of Piney is subject to the Rural Municipality of Piney Zoning By-Law No. 80/2012. The majority of lands in the rural municipality are designated as "Rural Zone 3". "General Development Zone" designations have been provided to the communities of Middlebro, Sprague, South Junction, Vassar, Piney and Woodridge. "Limited Rural Zone", "Rural Zone 1", "Rural Zone 2" and "Rural Zone 3". A "Rural Seasonal Residential Zone" land use designation exists adjacent to PTH 308, west of the Northwest Angle Provincial Forest (The Rural Municipality of Piney 2012).

South Interlake Planning District

Land use in the rural municipality of Rockwood and rural municipality of Rosser is subject to The South Interlake Planning District Development Plan By-Law No. 3/10. The majority of land use in the planning district has been designated “Agricultural Rural Area”. A land use designation for “CentrePort Canada Area” is included for the lands in the south east corner of the rural municipality of Rosser and bounded by PTH101. “Rural Settlement Centre” land use designations are provided for the communities of Marquette, Meadows, Grosse Isle and Rosser (The South Interlake Planning District 2010).

Land use zoning in the rural municipality of Rosser is subject to The Rural Municipality of Rosser Zoning By-Law No. 4-85. The majority of lands in the rural municipality are designated as “Agricultural Zone”. The south east portion of the rural municipality includes lands designated for “Agricultural Limited”, “Open Space Zone”, “Highway Commercial Zone” and “Airport Industrial Zone”. “General Development Zone” land use has been designated for the communities of Meadows, Gross Isle and Rosser. “Agricultural Limited” lands are designated for areas at the periphery of these communities. Land use zoning in the south east portion of the RM is also subject to the Rural Municipality of Rosser CentrePort Zoning By-Law No. 10-14. The By-Law provides designations for lands within PTH101 required for the CentrePort Canada Way project. Designations for land use found within CentrePort include “Industrial Centre Zone”, “Industrial General Zone”, “Industrial Heavy Zone” and “Open Space Zone” (The Rural Municipality of Rosser 1985).

RM of Ste. Anne

Land use in the rural municipality of Ste. Anne is subject to The Rural Municipality of Ste. Anne Development Plan By-Law No. 13-2007. The majority of land use in the rural municipality has been designated “Rural Agriculture Area”. Lands east and west of the town of Ste. Anne, south of Giroux, north of Richer and La Coulee are designated “Rural Mixed Use Area”. Lands north east and south of Richer are designated “Rural Natural Area”. “Settlement Centre” designations have been provided for the communities of Giroux, Richer, La Coulee and Greenland. Smaller portions of land in the north east and south east areas of the rural municipality are designated “Rural Residential Area” (The Rural Municipality of Ste. Anne 2010).

Land use zoning in the rural municipality of Ste. Anne is subject to The Rural Municipality of Ste. Anne Zoning By-Law No. 10-2010. The majority of lands in the rural municipality are designated as “Agriculture Zone”. Non-agriculture land use designations occur primarily in the eastern portion of the rural municipality, surrounding the communities of Ste. Anne, La Coulee, Richer and south of Giroux, including designations for “Rural Mixed Use Zone”, “Natural Environment Zone”, “Rural Residential Zone”, “Rural Residential 5 Zone”, “Residential Mobile Home Zone”, “Commercial Recreational Zone”, “Highway Commercial Zone”. The communities of Giroux, Greenland and La Coulee are designated as a “General Development Zone” (Manitoba Intergovernmental Affairs Community Planning Services 2007).

RM of Stuartburn

Land use in the rural municipality of Stuartburn is subject to The Rural Municipality of Stuartburn Development Plan By-Law No. 081-2008. Most of the land in the rural municipality has been designated “Agriculture 1 Area”. Areas of land in the north east, north-west and south have been designated “Limited Development Area”. “Restricted Rural Area” designations have been given to the periphery at the communities of Stuartburn, Gardenton, Vita and Sundown. “Settlement Centre” designations have been provided for these the core lands within these communities (The Rural Municipality of Stuartburn 2008).

Land use zoning in the rural municipality of Stuartburn is subject to The Rural Municipality of Stuartburn Zoning By-Law No. (x). Most of the lands in the rural municipality are designated as “Agriculture Zone”. Areas of land in the north east, northwest and south have been designated “Limited Development Zone”. “Restricted Rural Zone” designations have been given to the periphery at the communities of Stuartburn, Gardenton, Vita and Sundown. “General Development Zone” designations have been provided for these the core lands within these communities (The Rural Municipality of Stuartburn 2011).

RM of South Cypress

Land use in the rural municipality of South Cypress is subject to the Cypress Planning District Development Plan By-Law No. 49-2009. Most of the land use in the rural municipality has been designated “Agricultural Area”. “General Development Area” land uses have been provided for Treesbank and Stockton in the south. A “Rural Highway Commercial Area” and “Industrial Area” are designated in lands in the south west. Lands in the Village of Glenboro have been designated “Urban-Agricultural Limited Area”, “Residential Area”, “Open Space Area”, “Urban Highway Commercial Area”, “Downtown Commercial Area” and “Industrial Area”. Lands at the outer periphery of Glenboro are designated “Rural-Agricultural Area”, “Industrial Area” and “Rural-Agricultural Moderately Limited Area” (The Cypress Planning District 2009).

Land in the rural municipality of South Cypress is subject to the Rural Municipality of South Cypress Zoning By-Law No. 1485. Most of land in the rural municipality is designated as “Agricultural (General) District”. Lands at the outer periphery of Glenboro in the south are designated “Industrial District”, “Agricultural (Moderately Limited) District” and “Agricultural (Limited) District”. “General Development District” lands are designated for Treesbank and Stockton. A “Rural Highway Commercial District” is designated for a portion of lands at the junction of PTH 2 and PTH 18. An “Industrial District” is designated for a portion of lands located in the south west adjacent to PTH 2 (The Rural Municipality of South Cypress 2010).

Appendix 16C
Forest Damage Appraisal Valuation

Forest Damage Appraisal and Valuation

The Forestry and Peatland Management Branch applies the Forest Damage Appraisal and Valuation Guideline (Manitoba Conservation 2002) whenever productive forestland is removed or destroyed outside of permitted forest management activities. It is a compensatory form of mitigation that the Province levies on the project proponent. It accounts for the volume of timber affected at the time of clearing, determined by multiplying the affected yield strata area, by density and age class, by the applicable volume per hectare (ha). It also accounts for the investments in forest management such as enhanced silvicultural activities, forest protection, and research and monitoring sites, if applicable.

The Forest Damage Appraisal and Valuation (FDAV) has been conducted on the Crown Land portion of the proposed PDA. Additional productive forestland may be cleared for access development, borrow/deposition areas or bypass routes necessitated by terrain features encountered during right-of-way clearing.

MCWS has developed strata yield tables for various utilization standards and indicated that the commercial standard, tree length yields should be used for the assessment (Meng pers. comm. 2014). The crown dues to be used in the FDAV assessment were provided by Manitoba Conservation and Water Stewardship (MCWS) (Doig pers. comm. 2014). High value sites such as plantations, research/monitoring sites and tree improvement program sites were avoided in the site selection process; therefore, only the potential loss of timber was valued in the FDAV determination. The Forest Damage Appraisal and Valuation calculations for productive crown forestlands that are proposed to be cleared within the PDA are provided in the following overview table.

The Forest Damage Appraisal and Valuation determination for the PDA is summarized in Chapter 16 of the EA, Section 16.5.4.2. It should be noted that this assessment is an estimate only and that recalculations may be required by MCWS after right-of-way clearing is completed to ensure timber dues and the PDA are accurately reflected in the results.

Appendix 16C: Forest Damage Appraisal and Valuation Calculations – Final Preferred Route Summary								
	Total Soft Volume (m3)	Total Hard Volume (m3)	Total Volume (m3)	Crown Dues ($1.75 m3)	Forest Renewal Charge[1]		Forest Protection ($0.17 m3)	Total Timber Value
					Softwood ($5.75 m3)	Hardwood ($0.50 m3)		
Preferred Route – Sub-Total FMU 1	754.98	2,884.28	3,639.26	$6,368.70	$4,332.24	$1,442.14	$618.67	$12,761.76
Deletions from the Preferred Route – Sub-Total FMU 1	150.23	1,222.84	1,373.07	$2,402.87	$863.82	$611.42	$233.42	$4,111.52
Additions to the Final Preferred Route – Sub-Total FMU 1	109.17	1,008.78	1,117.95	$1,956.41	$627.73	$504.39	$190.05	$3,278.58
Final Preferred Route – Sub-Total FMU 1	**713.92**	**2,670.22**	**3,384.14**	**$5,922.24**	**$4,096.15**	**$1,335.11**	**$575.30**	**$11,928.82**
Preferred Route – Sub-Total FMU 24	10,408.65	3,055.81	13,464.46	$23,562.80	$40,978.42	$1,527.90	$2,288.96	$68,358.09
Deletions from the Preferred Route – Sub-Total FMU 24	6,235.47	1,996.90	8,232.37	$14,406.65	$22,254.96	$998.45	$1,399.50	$39,059.56
Additions to the Final Preferred Route – Sub-Total FMU 24	4,929.60	1,229.95	6,159.54	$10,779.20	$15,424.61	$614.97	$1,047.12	$27,865.91
Final Preferred Route – Sub-Total FMU 24	**9,102.78**	**2,288.86**	**11,391.63**	**$19,935.35**	**$34,148.07**	**$1,144.42**	**$1,936.58**	**$57,164.44**
Preferred Route – Total All	11,163.63	5,940.09	17,103.72	$29,931.51	$45,310.66	$2,970.04	$2,907.63	$81,119.84
Deletions from the Preferred Route – Total All	6,385.70	3,219.74	9,605.44	$16,809.52	$23,118.78	$1,609.87	$1,632.92	$43,171.08
Additions to the Final Preferred Route – Total All	5,038.77	2,238.72	7,277.49	$12,735.61	$16,052.34	$1,119.36	$1,237.17	$31,144.48
Final Preferred Route – Total All	**9,816.7**	**4,959.07**	**14,775.77**	**$25,857.60**	**$38,244.22**	**$2,479.53**	**$2,511.88**	**$69,093.24**

Source: Maskwa Ecological Consulting Inc. 2015.