9.0 Community well-being

9.1 Introduction

Community well-being is a valued component because local changes (e.g. noise, visual disturbance) resulting from the project may affect people who live, work, or engage in traditional or recreational activities in the area. Such effects may be manifested as increased stress or annoyance, or a general decrease in their well-being.

This chapter assesses potential changes to community well-being. This is distinguished from human health effects (Chapter 8.0), which are project effects resulting from environmental change, such as change in air or groundwater quality that would have a direct effect on human health.

Local property owners, regional residents and others who visit or frequent the local assessment area derive individual or personal well-being from the values offered by the agricultural setting and rural lifestyle.

This chapter assesses potential effects on community well-being caused by the introduction of the project, including:

- Increase stress and annoyance and/or a decrease in personal well-being caused by:
    - Potential changes to the visual landscape
    - Potential increase in noise
    - Perceived changes in property values
    - Perceived health effects from EMF

9.2 Scope

9.2.1 Significance thresholds

9.2.1.1 Visual landscape

The significance of visual effects depends primarily on the anticipated magnitude of the visual alteration created by the project and the visual sensitivity of the landscape, including the anticipated viewer response to the visual alteration.

The thresholds for assessing the significance of effects on visual quality, defined below, consider the effect of the project within the planning context and intended management vision for the area, as well as the degree of change from current baseline conditions.

A residual effect is considered significant if the following conditions occur:

- The average visual landscape character changes from relatively undisturbed to disturbed (Table 9-1)
- Visual quality is an important planning objective by government authorities

A "relatively undisturbed" visual landscape is one that is either rural/pastoral in character, or rural/pastoral with minimum development (Table 9-1). A disturbed visual landscape exceeds the rural pastoral with distinguishable development class, becoming more semi-urban/industrial in character.

Table 9-1: Landscape character class description

Landscape character class	Description
Rural/Pastoral	The central field of view toward the project has a rural/pastoral character. Built interventions, when assessed from a viewpoint, are (1) not visible or (2) very small in scale, and not easily distinguished from the pre-development conditions.
Rural/Pastoral with minimal development	The central field of view toward the Project has a rural/pastoral character. Built interventions, when assessed from a viewpoint, are (1) difficult to see and (2) low in prominence.
Rural/pastoral with distinguishable development	The central field of view toward the Project has a rural/pastoral character. Built interventions, when assessed from a viewpoint, are (1) easy to see and (2) low to moderate in prominence.
Semi-urban/industrial	The central field of view toward the Project is dominated by a semi-urban or industrial character. Built interventions, when assessed from a viewpoint, are (1) easy to see and (2) high in prominence.
Urban/industrial	The central field of view toward the Project has an urban or industrial character. Built interventions when assessed from a viewpoint, begin to dominate the view as they are (1) very easy to see and (2) very high in prominence.

The Portage la Prairie development plan (Portage la Prairie Planning District 2018) outlines several common general goals related to visual quality. These include the promotion of development that enhances the aesthetic quality and visual cohesion of residential or commercial developments. The plan recognizes that urban parks and

recreation environments have a significant role in defining the character and quality of a community and are experienced by the visual and physical linkages that permit people to interact and move through space.

9.2.1.2 Noise

Health Canada (Health Canada 2017) does not have noise guidelines or enforceable noise thresholds or standards and encourages consultation with provincial and municipal authorities to determine appropriate local standards or regulations for projects. Health Canada does, however, consider the following noise induced endpoints as health effects: noise-induced hearing loss, sleep disturbance, interference with speech comprehension, complaints, and a change in the percentage of the population at a receptor location who become highly annoyed.

Hearing loss impacts are not typically considered in environmental assessments because project-related sound levels rarely reach these high levels at the locations of impacted receptors. However, noise-induced hearing loss may be a concern when project activities such as blasting, pile-driving and jack hammering are expected. When considering impulsive noise, the World Health Organization recommendation is to avoid hearing loss resulting from impulsive noise exposure and that peak sound pressures not exceed 140 decibels for adults and 120 decibels for children (World Health Organization 1999).

Implosive sleeves may be used for fusing the conductors. The implodes create a flash and a loud boom similar to the sound of a 12-guage shotgun blast, about 110 decibels; (CapX2020 2012). As this is below the level for potential hearing loss, this will not be considered further in the assessment.

Manitoba's guidelines for sound pollution specify outdoor environmental sound level objectives for residential, commercial, and industrial areas and include maximum acceptable noise levels for the protection of human health (Manitoba Department of Mines 1977). These guidelines are applied in the assessment of human health to determine whether predicted levels of noise are above the acceptable thresholds, and to determine whether additional mitigation measures may be needed to reduce or control noise levels.

9.2.1.3 Property value

A residual effect on property value or proposed development is considered significant if, unless addressed through compensation, it widely disrupts, restricts or degrades property values or development potential.

9.2.1.4 Electric and magnetic fields (EMF)

Health Canada recognizes the international exposure guidelines for EMF established by the International Commission on Non-Ionizing Radiation Protection, a group recognized by the World Health Organization as the international independent advisory body for non-ionizing radiation protection.

Government and international medical agencies, including Health Canada, the US National Institute of Health, and the National Institute of Environmental Health Sciences have thoroughly reviewed the available scientific information about EMF, but have not recommended regulatory standards.

9.2.2 Spatial boundaries

The spatial boundaries for the environmental assessment consist of the project development area, local and regional assessment areas. Valued component specific details are described below. The following areas are based on guidelines for visual assessment ((Palmer 2016); (Driscoll, et al. 1976); (Sullivan, et al. 2014)). As the potential effects to property values and residential development relate to the presence of the towers and visibility, the assessment areas are treated the same for both.

Project development area: Footprint of the proposed project including the transmission line right-of-way, any additional areas such as borrow pits or marshalling yards and access road allowances.

Local assessment area: The local assessment area corresponds to lands with a potential foreground (0-500 m; Map 9-1) or midground view of the station, a 5 km buffer (Map 9-2). These represents the area where noise and visual impacts are likely to be most pronounced or identifiable.

Regional assessment area: The regional assessment area corresponds to the areas with a potential view of the line, to the maximum extent of visibility, which includes areas within 15 km of the project; (Map 9-3).

9.2.3 Temporal boundaries

The primary temporal boundaries for the assessment are based on the timing and duration of project activities as follows:

- Construction – two years
- Operations and maintenance – for the life of the project, estimated to be a 75-year design life
- Decommissioning – two years

9.3 Existing conditions

9.3.1 Visual landscape

Biophysical characteristics such as topography, vegetation and views of water can create visual interest and draw people's attention. Similarly, the extent and type of landscape disturbances already present can influence the scenic integrity and visual enjoyment of the landscape.

Land use within the local assessment area is primarily agricultural and pastureland with some rural residential development. Agricultural land provides views of open spaces and visually appealing rural landscapes characteristic of open prairie landscapes ((Benson 2008); (Fleischer and Tsur 2000)) and can therefore in fact improve scenic quality.

There are some shelterbelts and small patches of deciduous forest in the area (Figure 9-1). Some other visible land uses include industrial developments, residential developments and utility corridors (Map 9-4). The City of Portage la Prairie falls within the local assessment area as well.

Depending on the degree of human modification, this can reduce the quality and enjoyment of the visual landscape.

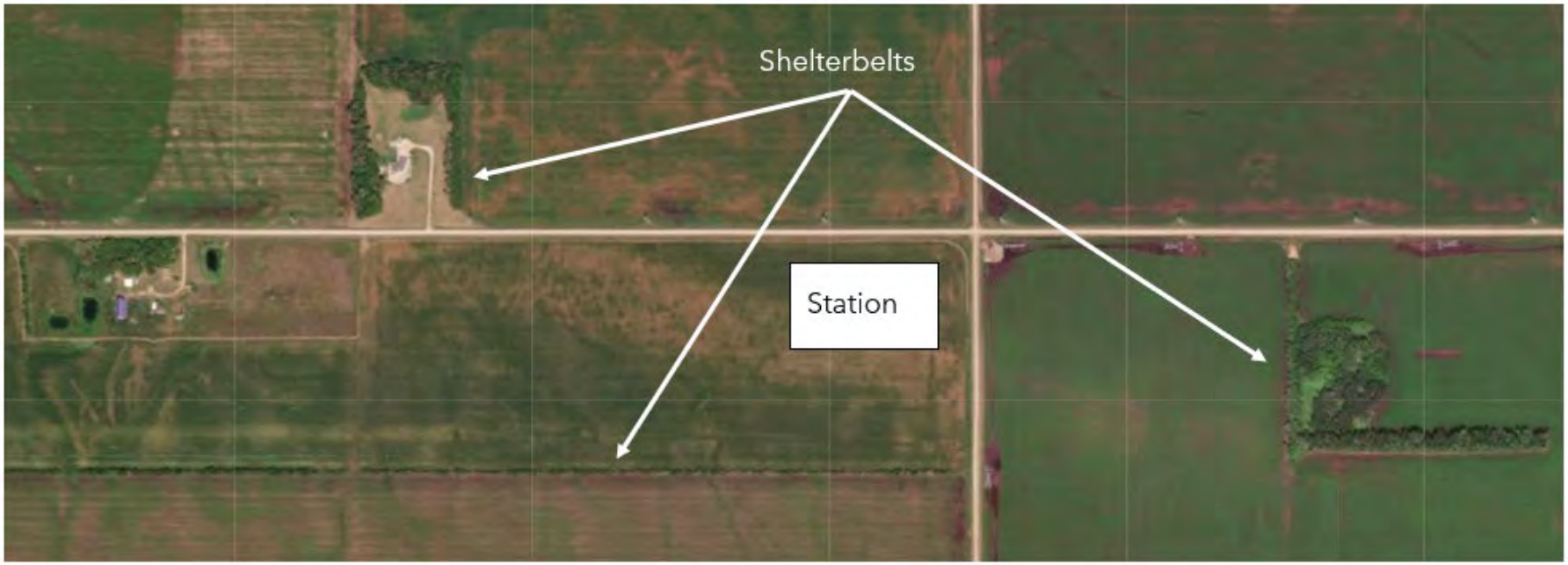


Figure 9-1: Shelterbelts and forested areas around the station

9.3.1.1 Recreation

Portage la Prairie is located in the central plains tourism area (Central Manitoba Tourism 2021) and the provision of recreation and leisure facilities in the area is managed by the Portage Regional Recreation Authority Inc. (Portage Regional Recreation Authority Inc. 2021).

There are no provincial parks within the foreground - local assessment area and no recreation facilities (Map 9-1).

9.3.1.2 Infrastructure

Map 9-4 shows the regional infrastructure. The only major infrastructure within the foreground local assessment area are the transmission and distribution lines. Extending to the midground local assessment area, there is a lot of distinguishable development. There are industrial sites west of Portage la Prairie, the TransCanada highway is 1 mile north, and there are other major developments in the area.

9.3.2 Noise

The project is in an area predominantly used for agricultural purposes and existing noise conditions are not an issue for most of the year. The exception may occur during harvest, which would increase local noise. The TransCanada highway is 1 mile north, which would add to the ambient noise levels in the area.

9.3.3 Property ownership

9.3.3.1 Overview

Land use planning responsibilities in municipal jurisdictions fall under the jurisdiction of the respective municipalities or planning districts. Municipal jurisdictions may adopt development plans and zoning by-laws to guide land use decisions within their boundaries. Municipalities can become members of planning districts to work together with respect to land use planning (i.e., development plans). The RM of Portage la Prairie and the City of Portage la Prairie have formed the Portage la Prairie Planning District. The planning district is established to ensure standardized planning requirements through an updated development plan and zoning by-law encompassing both municipal jurisdictions. This promotes a regional approach to industrial, agricultural, and urban fringe development. Land within the regional assessment area is almost entirely privately owned, with most land either agricultural fields or exurban development (homes, recreation, industrial developments etc.).

9.3.3.2 Commercial and residential development

The local assessment area is largely agricultural. Rural farm residential development is generally widespread and is associated with agricultural operations, including farm accessory buildings. Farming activities are permissible under the development plan.

There are 70 houses and 8 industrial and commercial buildings within the local assessment area (Table 9-2)

Table 9-2: commercial and residential buildings within the local assessment area

Building Type	Count
Commercial Building	6
Industrial Building	2
Occupied House	70
Total	**78**

9.3.4 Electric and magnetic fields

Electric and magnetic fields are produced by both natural and anthropogenic sources. Natural sources of EMF include the Earth's magnetic field, visible light and lightning. Anthropogenic sources include magnets, electrical appliances (e.g., stoves, refrigerators, microwaves), electronic devices (e.g., cellular phones, computers), vehicles, power lines and high-voltage transmission lines.

In a typical home, away from appliances, background levels of magnetic fields range from 1 to 2 mG, whereas background levels of electric fields range from 0.01 to 0.02 kV/m (Exponent 2015b). In proximity to appliances, magnetic fields can be hundreds of times higher and electric fields tens of times higher. The ubiquitous nature of EMF and variability in average background exposure levels make it difficult to quantify EMF levels (Exponent 2015b).

9.4 Effects assessment

9.4.1 Effects pathways

There are four main pathways that can lead to effects to community well-being:

- Potential changes to the visual landscape

    - Presence of the station
    - Security lighting at night
- Potential increase in noise
- Perceived changes in property values
- Perceived health effects from EMF

During engagement for the project (See Chapters 1.0 and 1.0 for details), concerns were raised regarding, health, noise, property values and traffic.

Several studies have linked how power transmission lines have increased levels of stress and annoyance in relation to perceived changes in property values, noise, aesthetic concerns, and health and safety concerns (i.e., the presence of EMF).

Residents living near a transmission line reported experiencing moderately negative effects on their health and safety, property values and aesthetics (Thomas and Evans 1996). McMahan and Meyer (McMahan and Meyer 1995) found the closer individuals live to a transmission line the greater the increase of concerns related to perceived health risks.

Several studies have assessed the link between the exposure of EMF and the perceived health risks thought to be associated with the presence of transmission lines ((Linder 1995), (Morgan, et al. 1985)). While most studies found no definitive health risk, there are often increased levels of stress and anxiety that result from the presence or siting of transmission line development.

As described in Chapter 8.0, several key studies conducted by the World Health Organization (WHO) and the International Agency for Research on Cancer (IARC) confirm there is no link between exposure to EMF fields and adverse human health outcomes. Despite this, there remains a perception that transmission lines pose health risks ((Furby, et al. 1988); (Cain and Nelson 2013); (Keir, Watts and Inwood 2014)).

A study conducted in the Netherlands found that health complaints increased for residents living within 300 m of a new transmission line and there were negative effects on health perceptions for nearby residents even before the line was in operation (Porsius, et al. 2014).

Another study shows regardless of the type of industry, there was a significant association between living in industrialized areas and decreased levels of well being, optimism and use of active coping strategies (Marques and Lima 2011).

9.4.1.1 Potential changes to the visual landscape

The construction of project infrastructure, including station infrastructure, transmission towers and conductor wires, will create or add to human-caused disturbance in the environment.

Based on a review of the literature for visual quality and transmission line visibility (Palmer 2016); (Driscoll, et al. 1976); (Sullivan, et al. 2014) a 500 m buffer was placed around the station (Map 9-1). This was considered the area where the station and transmission towers would be in the foreground view and therefore most intrusive. There is one home within the 500 m buffer. There are no recreational sites, or other public spaces within 500 m of the station.

A 5 km buffer was placed around the station (Map 9-2) representing the area where the station would be in the midground view. Within the 5 km buffer, there is one cultural / historic feature, one recreational site and 70 houses.

<u>The presence of the station</u>

The aesthetic value of the landscape can vary according to its scenic elements and the perception of the landscape by viewers. Landscapes have scenic value, which may be altered by changes brought on by the project and other future developments.

Construction activities include; clearing and grubbing of the station footprint, drilling foundations, installing support structures and towers and other overhead construction, stringing conductors and construction site rehabilitation and decommissioning. These activities are expected to result in disturbance to the existing visual landscape by their presence.

Project components will become more visible to varying and different degrees as construction progresses from site preparation, to overhead construction and stringing conductors. The effects of the project on visual quality recognizes that there will be increasing levels of alteration to viewsheds from the visibility of the station and contrast with the landscape during project construction, but focuses on the final alteration (i.e., during operations and maintenance) when all project components are constructed and operational. Figure 2-4 shows the final station profiles.

<u>Security lighting</u>

The station will have security lighting that stays on all night (Figure 2-3). Artificial lighting, both indoors and outdoors, exposes people to light that can negatively influence the physiological day-night rhythm (Bierbaum, et al. 2019). Stray light

entering bedrooms at night disturbs sleep and contributes to sleepiness and fatigue (Clark 2009).

Light at night is never the only cause of a serious illness, but like many other factors (e.g. stress) it can be a contributor to the development of such an illness (Bierbaum, et al. 2019).

9.4.1.2 Potential increase in noise

The World Health Organization (World Health Organization 2002) defines health as *"a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity*". This implies that noise-induced annoyance may be considered an adverse effect on health (World Health Organization 2011).

Below the exposure threshold of biological damage to the ear, noise can cause potential health impacts, such as sleep disturbance and/or cause long-term high annoyance, an indicator of potential health impacts, depending on the interference of the noise with what someone is trying to do (e.g. sleep, concentrate or communicate) and the expectation of peace and quiet during such activities (e.g. in a quiet rural area or during Indigenous spiritual ceremonies; (Health Canada 2017).

As construction takes place during the day, effects to sleep, and noise guidelines for night, will not be considered in the assessment.

Health Canada (Health Canada 2017) developed guidance for evaluating human health impacts of noise in environmental assessment. The main steps in assessing the potential health impacts of changes in noise associated with a project are the following:

1) Identify people (receptors) who may be affected by the project-related noise
2) Determine the existing (baseline) noise levels at representative receptors, by measurement or estimation
3) Predict project-related changes in noise levels for each phase of the project (construction, operation and decommissioning)
4) Compare predicted noise levels to relevant guidelines and/or standards
5) Identify and discuss the potential human health impacts associated with predicted changes in noise levels
6) Consider mitigation measures, their implementation, and any residual effects, after the measures are implemented
7) Consider community consultation and prepare a complaints-resolution plan
8) Consider the need for monitoring of noise levels.

Identify people (receptors) who may be affected by the project-related noise

Noise levels from construction sites range from 90 decibels at 15 m down to less than 60 decibels at 500 m (Bonneville Power Administration 2012). Based on Health Canada guidelines (Health Canada 2017), no effects are anticipated below 60 decibels. Based on this information a 500 m buffer was drawn around the station (Map 9-1) to determine potential receptors.

There is one occupied home within 500 m of the proposed station and several others just outside of the boundary. There are no recreational sites, or other public spaces within 500 m of the project.

Transportation routes are not included as all construction traffic will follow existing high use highways and municipal roads.

Determine the existing (baseline) noise levels at representative receptors, by measurement or estimation

Health Canada (Health Canada 2017) suggests a conservative approach to estimate a reasonable worst-case scenario and assume baselines of 35 dBA for rural areas and 45 dBA for urban/suburban areas. As the proposed project is in a rural area, an estimated baseline noise level of 35 dba will be used.

Predict project-related changes in noise levels for each phase of the project (construction, operation and decommissioning)

The largest source of noise during construction is the combined operation of machinery (i.e., bulldozers, transportation vehicles, clearing equipment, and cranes) and periodic explosive discharges by implosive sleeves during conductor stringing and line termination. Use of implosive sleeves will be limited to a short duration of time near the end of construction only. Notifications will be provided to area residents to alert them of exploding discharge noise prior to commencing this work. General construction noise will be 89 dBA at 15 m (Table 9-3) and fall to less than 60 dBA at 500 m (Bonneville Power Administration 2012).

Table 9-3: Typical noise emission rates for construction equipment

Type of equipment	Decibels at 15 metres
Implosive sleeve*	110
Road grader	85
Bulldozers	85
Heavy trucks	88
Backhoe	80

Pneumatic tools	85
Crane	85
Combined equipment**	89
Helicopter	80-100

*CAPX2020 (2012)
**Thalheimer (1996) – does not include helicopters or implosive sleeves

The largest source of noise during operation is associated with corona discharges that result in audible noise typically heard as a hissing or crackling sound (Exponent 2015a). Corona discharges are produced at points along the transmission line conductors and are more common during foul-weather events (Exponent 2015a)..

Exponent (Exponent 2015a) modeled the electrical and acoustic environment of the Manitoba-Minnesota Transmission Project (500 kV line). During medium-fair weather conditions, maximum audible noise associated with operation of the transmission lines anywhere along the edge of the right-of-way is expected to be approximately 23 dBA (Exponent 2015a), which is below the typical ambient noise typically experienced in quiet rural locations (30-40 dBA). This is a conservative estimate as the audible noise should be lower for this project due to the lower voltage running through the conductor. During periodic foul weather conditions that may cause corona discharges, maximum audible noise at the edge of the right-of-way is expected to be 48 dBA, dissipating to 45 dBA at a location 30 m from the edge-of-right-of-way (Exponent 2015a).

Compare predicted noise levels to relevant guidelines and/or standards

For construction phases less than one year in duration, Health Canada (Health Canada 2017) has set the guideline of 62 dBA average noise level over a 24-hour period. This guideline is based on a previous study conducted by Health Canada that determined the level at which people start to find construction equipment highly annoying. Health Canada guidance including the percent highly annoyed calculation relies on ISO 1996-1:2003 (International Organization for Standardization 2003).

Health Canada uses 62 decibels when it considers effects related to widespread complaints. When project sound levels are greater than 75 dba, complaints can be expected to include strong appeals to authorities to stop noise.

Identify and discuss the potential human health impacts associated with predicted changes in noise levels

Within 500 m of the construction site, construction noise levels will be above the guideline value of 62 dBA and therefore we can expect some effects. The effects relate to nuisance effects that may cause stress (stress discussed below).

During operation, noise levels will be minimal. During inclement weather, there may be some audible noise, but it is below levels that would be considered a nuisance.

Consider mitigation measures, their implementation, and any residual effects, after the measures are implemented

Mitigation is discussed in Section 9.4.2.

Consider community consultation and prepare a complaints-resolution plan

Manitoba Hydro does extensive engagement for upcoming projects. Details of engagement for this project are covered in Chapters 1.0 and 1.0. Manitoba Hydro will continue to engage interested parties, will maintain the project communication methods in place (project phone line and email) and work to resolve any issues that arise. Manitoba Hydro uses a SharePoint database to record project communications. This allows tracking of any complaints and maintains accountability.

Consider the need for monitoring of noise levels.

The project area includes rural residential and rural areas. The noise created by construction will be periodically above ambient but should not cause a level of nuisance and stress that would justify a monitoring program.

9.4.1.3 Perceived changes in property values

The assessment of change in property values focuses on three effects:

- Change in private property value
- Nuisance effects on residences
- Conflict with land development potential

Private Property Values

The physical presence of the project could affect the value of residential property near the station. 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 project.

The literature is inconclusive on 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, Bottemiller and Cahill 1996); (Jackson and Pitts 2010.); (Headwaters Economics 2012)).

A review of transmission line effects on housing prices found a small, negative effect occurring when rights-of-way abut single-family homes (Bottemiller and Wolverton

2013). 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, Bottemiller and Cahill 1996); (Bottemiller, Cahill and Cowger 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).

Manitoba Hydro conducted a 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 right-of-way. Real estate transactions for developed single-family residential properties within the monitoring area were tracked from January 1, 1992 to December 31, 2013 (Manitoba Hydro 2014). The monitoring area was divided into:

- Adjacent – properties located immediately next to the transmission right-of-way 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 project development area

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

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 regarding sales price (Prairie Research Associates 2015).

Nuisance effects on residents

Potential nuisance effects during project construction include noise disturbance, vibration, dust, damage to property, interference with roads and community infrastructure and nighttime lighting.

Development potential

The development of an electrical station could reduce development potential due to less interest in wanting to buy a lot or build a residence near the station thus lowering the development potential of land nearby. These changes could influence development in localized areas adjacent to the project or potentially affect the location of future developments within the local assessment area.

9.4.1.4 Perceived health effects from EMF

Numerous reviews of research literature on exposure to extremely low frequency EMF and possible adverse health effects have been conducted by national and international scientific and governmental agencies, including Health Canada and the World Health Organization. None of these agencies have concluded that exposure to extremely low frequency EMF is a demonstrated cause of any long-term adverse health effect. Study results are detailed in the EMF health research update report (Exponent 2015b), conducted for the recently constructed Manitoba-Minnesota transmission line.

Regardless of the potential for direct health effects from EMF, perceived health effects could cause additional stress to residents. The effects of stress are discussed below.

9.4.1.5 Stress and annoyance

Visual intrusion, noise, a reduction of property values, or potential health risks of exposure to extremely low frequent electromagnetic fields (ELF-EMF) emitted by power lines can be perceived as a burden (Porsius, et al. 2014). The increased stress has the potential to cause adverse effects.

Stress is thought to contribute to the development of many adverse health conditions including heart disease, stroke, high blood pressure, upper respiratory disease and poor immune response (Scneiderman, Ironson and Siegel 2005).

The stress response diverts energy and resources away from many physiological processes, including both the cardiovascular and immune systems, important to long-term health maintenance (Marmot and Wilkinson 2003). If people feel tense too often or for too long, they become more vulnerable to a wide range of conditions including

infections, diabetes, high blood pressure, heart attack, stroke, depression and aggression (Marmot and Wilkinson 2003).

9.4.2 Mitigation

9.4.2.1 Visual quality

Visual quality considerations were factored into site selection (See Chapter 3.0 for details). Manitoba Hydro will continue to work with a range of interested parties (residents, interested parties, and provincial government agencies as applicable) in development of the proposed station with the goal to reduce any potential visual concerns. Based on concerns raised during the engagement process, Manitoba Hydro has committed to plant trees to reduce visual and noise concerns at two landowner's homes adjacent to the station.

9.4.2.2 Noise

Noise due to implosions has unique characteristics. Therefore, Health Canada (Health Canada 2017) recommends limiting the number of blasts irrespective of other noise levels due to background sources or construction activities. Manitoba Hydro will combine blasts to minimize the overall number of blasts required. A blasting hut may also be used to minimize noise impacts.

General mitigation measures for noise (Health Canada 2017)

- Regularly train workers and contractors to use equipment in ways that minimize noise
- Provide notification to the public ahead of implodes related to conductor stringing with contact information
- Investigate and respond to complaints about noise as quickly as feasible
- Include in tenders, employment contracts, subcontractor agreements and work method statements, clauses that assure the following of local noise by-laws
- Avoid excessive volume of radios and stereos outdoors and the overuse of public address systems where neighbours can be affected
- Keep truck drivers informed of designated vehicle routes, parking locations, acceptable delivery hours and other relevant practices (e.g. minimizing the use of engine brakes and periods of engine idling)

9.4.2.3 Property values and residential development

Station siting considered the occurrence of homes and proximity to homes.

During construction, Manitoba Hydro plans to notify landowners, Indigenous communities and interested parties prior to construction start and will share information about planned construction activities.

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
- Noisy construction activities where noise and vibration may cause disturbance and stress in built-up areas will follow local noise by-laws
- A communication protocol will be developed to notify affected parties of blasting operations and conductor splicing (if required)
- 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

9.4.2.4 Electric and magnetic fields

Although no mitigation is required, Manitoba Hydro continues to undertake the following actions regarding EMF concerns:

- Designing the transmission line to meet international standards and guidelines set forth by the International Commission on Non-Ionizing Radiation Protection. These guidelines have been adopted by Health Canada and the World Health Organization
- Monitoring of worldwide research programs on electric and magnetic fields for its large-scale projects
- Maintaining communications and provision of technical information to interested parties, including the public and agencies responsible for public and occupational health and the environment

9.4.2.5 Stress and annoyance

To mitigate stress and annoyance caused by real and perceived environmental effects, the site selection process considered several factors, including existing land

uses and the presence of existing infrastructure. The following measures will be implemented to mitigate the effects of stress and annoyance:

- Manitoba Hydro has an easement agreement with the private landowners whose land is crossed by the transmission line and where the station is located. The information provided to landowners during this process is expected to alleviate concerns related to project uncertainty
- The final detailed project design will consider standards for setbacks and overhead clearance, including CSA standards such as CAN/CSA-C22.3 No. 1-10 "Overhead Systems" and CAN/CSA 22.3 No. 60826-10 "Design Criteria for Overhead Transmission Lines"
- Manitoba Hydro will continue to share up to date information regarding project activities and timelines and to work to resolve concerns
- Noisy construction activities where noise and vibration may cause disturbance will follow local noise by-laws.
- A communication protocol will be developed to notify affected parties of blasting operations and conductor splicing. Affected parties may include the RCMP, municipalities, landowners and resource users.

9.4.3 Characterizing residual effects

Changes in the visual landscape, increased noise levels during construction, changes in property values and perceived health risks of EMF are likely to be the primary source of stress and annoyance for residents.

The local assessment area consists of agricultural landscapes. There are existing transmission lines in the area and adjacent to the station site, therefore the addition of the station will not alter the average visual landscape character. Only one home is within 500 m of the station, so visual and noise effects are minimal.

Table 6-2 describes the factors used to characterize the interactions between the project and community well-being. Given the application of the above-described mitigation measures the effects of the Project in terms of health are summarized as follows:

- Direction: Adverse
- Magnitude: Small
- Geographic extent: Local
- Duration: Medium-term
- Frequency: Regular
- Reversibility: Reversible

Due to the small number of residents and other public potentially effected, and the well tested mitigation measures, the project should not cause nuisance effects that would alter community well-being. The residual effects for community well-being are not significant.

9.4.4 Follow up and monitoring

Manitoba Hydro's practice is to develop project-specific environmental protection plans where 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.

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 property value proposed development and visual quality will be through construction inspection. Inspection will determine whether the item or activity is in conformance with mitigation requirements.

In terms of effects related to EMF, Manitoba Hydro will continue to monitor studies and make information available to the public.

9.4.5 Cumulative effects

Several of the projects listed in Table 6-3 may interact with this project. Further development alters the landscape and could alter the way of life for those who derive individual or personal well-being from the values offered by the agricultural setting and rural lifestyle. However, as the average visual landscape character is already disturbed, the overall change is minimal.

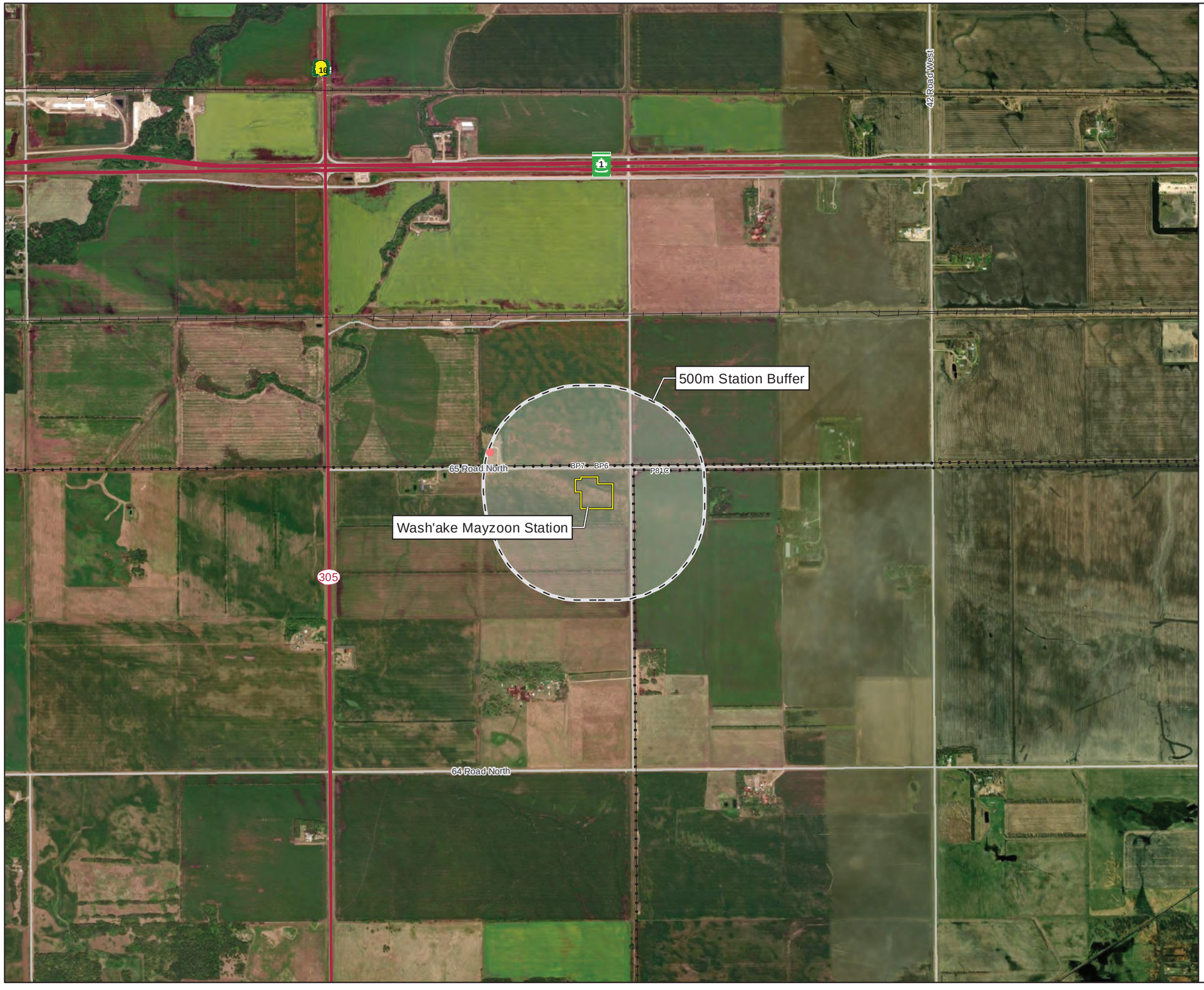
None of the project listed in Table 6-3 will produce EMF, therefore there will be no overlap. Several of them may have overlapping construction periods or continue after construction is complete, extending the length of time construction noise is prevalent in the area. This could increase stress and annoyance. However, all projects listed are greater than 500 m away. The noise and visual intrusion receptors will be different, other than transient receptors.

9.5 Sensitivity to future climate change scenarios

Effects of climate change relate to the anticipated increase in temperature and precipitation. Winter months are projected to experience greater relative changes in precipitation than summer months. The potential effects to community well-being,

visual landscape, noise, property ownership and EMF, will not be altered by future climate change.

The predicted climate change scenarios would not change the significance determinations of the assessment.



Manitoba Hydro

Wash'ake Mayzoon Station

Building Survey
- Occupied House

Project Infrastructure
- Wash'ake Mayzoon Station

Local Assessment Area
- Foreground View

Landbase
- Trans-Canada Highway
- Provincial Trunk Highway
- Provincial Road
- Transmission Line
- Municipal Road
- Rail
- Rural Municipality

Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB
Date Created: August 18, 2021

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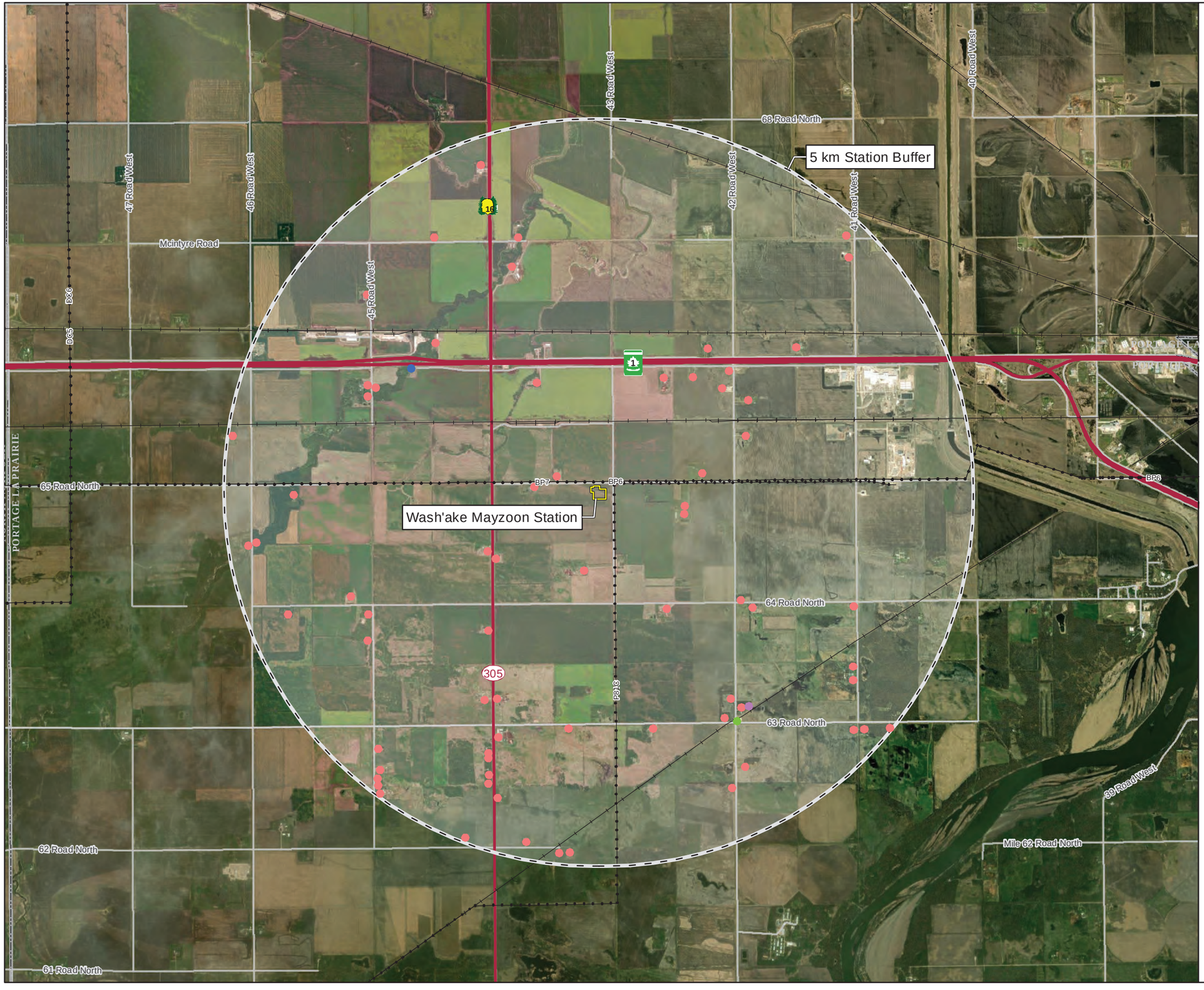
Local Assessment Area Foreground View

Map 9-1



Manitoba Hydro

Wash'ake Mayzoon Station

Building Survey
- Special Features
- Historical/Cultural Resources
- Recreational Bldg/Site
- Occupied House

Project Infrastructure
- Wash'ake Mayzoon Station

Local Assessment Area
- Midground View

Landbase
- Trans-Canada Highway
- Provincial Trunk Highway
- Provincial Road
- Transmission Line
- Municipal Road
- Rail
- Rural Municipality

Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB
Date Created: August 18, 2021

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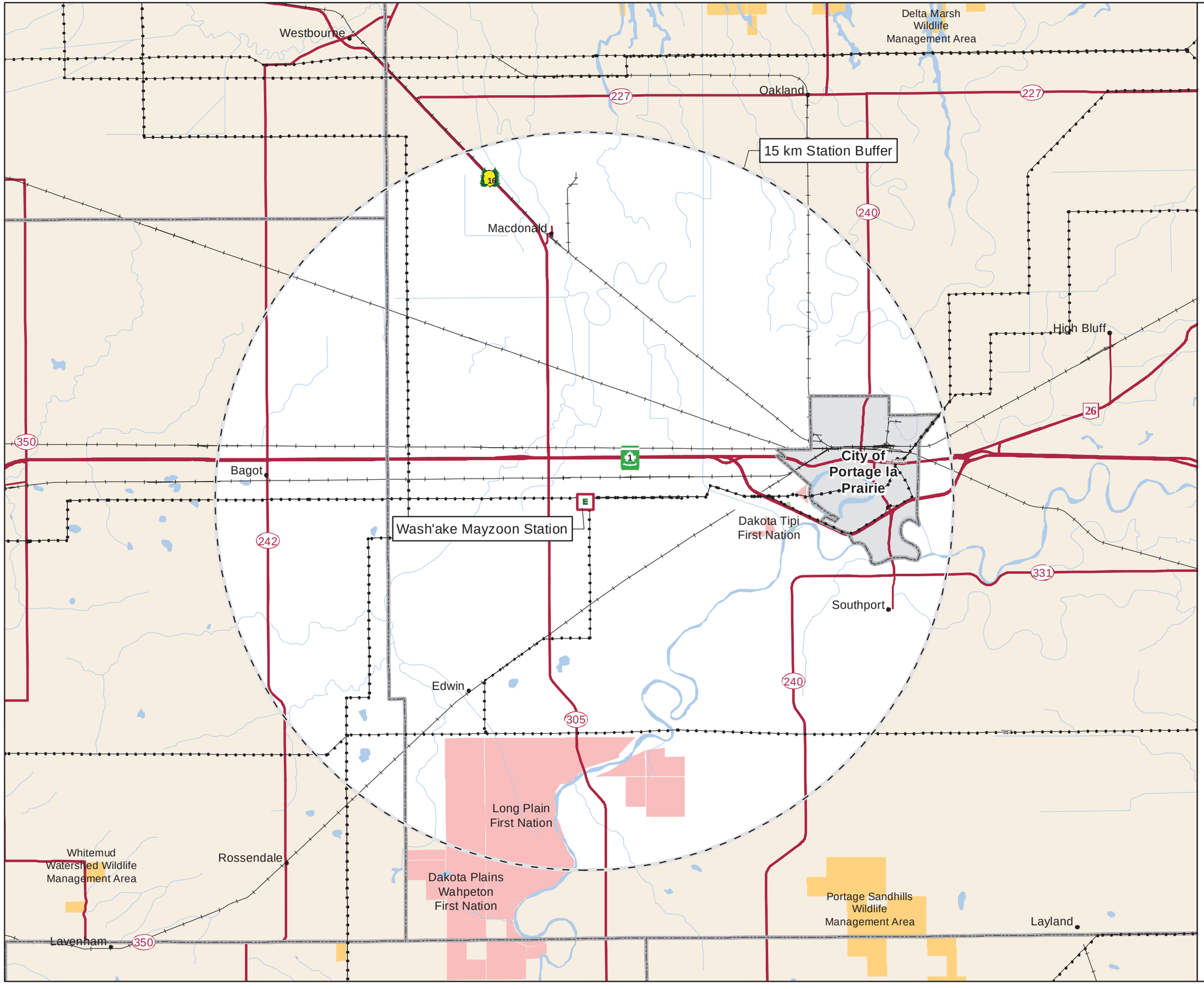
Local Assessment Area Midground View

Map 9-2



Manitoba Hydro

Wash'ake Mayzoon Station

Project Infrastructure

- E — Wash'ake Mayzoon Station

Regional Assessment Area

- Regional Assessment Area - Community Well-Being

Landbase

- Transmission Line
- Railway
- Trans-Canada Highway
- 12 — Provincial Highway
- 300 — Provincial Road
- First Nation
- National/Provincial Park
- Wildlife Management Area
- City of Portage La Prairie

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB
Date Created: August 18, 2021

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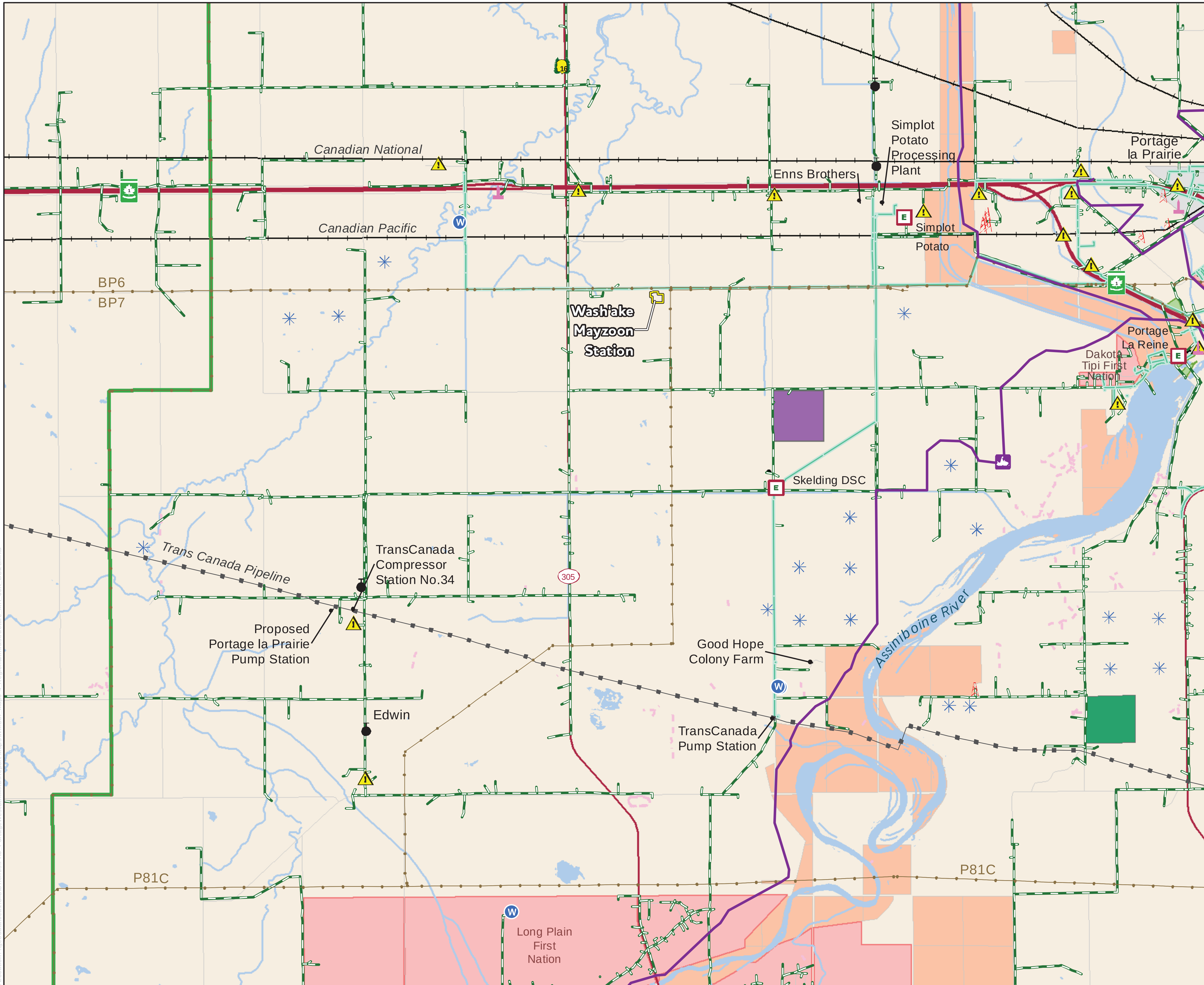
Regional Assessment Area Community Well-Being

Map 9-3



Manitoba Hydro

Wash'ake Mayzoon Station

Project Infrastructure
- Wash'ake Mayzoon Station

Regional Infrastructure
- Electrical Station
- Impacted Site
- Wastewater Treatment Site
- Snowmobile Shelter
- Communication Tower
- Irrigation Pivot
- Pipeline
- Monument
- Trans Canada Highway
- Provincial Highway
- Provincial Road
- Municipal Road
- Trail
- Railway
- Existing Transmission Line
- Distribution Line
- Existing Gas Line
- Trans Canada Pipeline
- Bipole III Transmission Line
- Snowmobile Trail
- Woodlot
- Private Quarry Permit

Landbase
- First Nation
- Crown Land
- Provincial Park
- City/Town

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB
Date Created: August 13, 2021

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0 1 2 Miles
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Regional Infrastructure

Map 9-4

10.0Wildlife

10.1 Introduction

Wildlife and wildlife habitat are a critical part of a functioning ecosystem and play a vital role in ecological and environmental processes.

This chapter assesses potential effects to wildlife including:

- Change in mortality risk
- Change in disturbance/annoyance

10.2 Scope

10.2.1 Significance thresholds

There are no provincial or federal regulations that set thresholds for determining the significance of environmental effects on wildlife and wildlife habitat found within the regional assessment area.

Significance was determined using qualitative and quantitative approaches, through professional judgment and previous experience assessing effects on wildlife and wildlife habitat.

Significant effects on wildlife are those that meet any of the following criteria (based on (Lynch-Stewart 2004)):

- Threaten the long-term persistence or viability of wildlife populations, including any effects that would lead to species extinction, extirpation or up-listing to special concern, threatened or endangered status
- Diminish the potential or prolong threats to species recovery, such as effects that are contrary to or inconsistent with the goals, objectives or activities of federal recovery strategies and action plans
- Diminish the capacity of critical habitat to provide for the recovery and survival of wildlife at risk

10.2.2 Spatial boundaries

The spatial boundaries for the environmental assessment consist of the project development area, local and regional assessment areas. Valued component specific details are described below:

Project development area: Footprint of the proposed project including the station footprint, transmission line right-of-way, any additional areas such as borrow pits or marshalling yards and access road allowances.

Local assessment area: The local assessment area is defined as 1 kilometer around the station and transmission line footprint (Map 10-1). Benitez-lopez et al. (Benitez-lopez, Alkemade and Verweij 2010) reported that most songbirds and waterbirds have lower abundances within 1 km of infrastructure.

It represents the area where indirect or secondary effects of construction and operation and maintenance are likely to be most pronounced or identifiable.

Regional assessment area: The regional assessment area is defined as 15 kilometers around the station and transmission line footprint (Map 10-2). It encompasses the home ranges or dispersal distances of the most wide-ranging species in this assessment, including white-tailed deer (89 km^2 (Fisher, et al. 2013) and red-sided garter snake (18 km dispersal (Gregory and Stewart 1975).

It encompasses the area where project-specific environmental effects overlap with those of past, present, and reasonably foreseeable future projects and activities. It is used to provide regional context and is therefore generally the area where the project's contribution to cumulative effects is assessed.

10.2.3 Temporal boundaries

The primary temporal boundaries for the assessment are based on the timing and duration of project activities as follows:

- Construction – two years
- Operations and maintenance – for the life of the project, estimated to be a 75-year design life
- Decommissioning – two years

10.3 Existing conditions

10.4 Ecological classification

The project is in the Prairies Ecozone, Lake Manitoba Plains Ecoregion and the Macgregor Ecodistrict. The following ecological classification descriptions have been obtained from Smith et al. (Smith, et al. 1998).

10.4.1 Prairies ecozone

Agriculture influences most native communities of plants and animals. Loss of habitat is the most critical threat to the flora and fauna. The prairies ecozone is home to high numbers of threatened and endangered wildlife species and its native ecosystems are among the most endangered natural habitats in Canada.

10.4.1.1 Lake Manitoba plain ecoregion

The ecoregion is transitional between areas of boreal forest to the north and the aspen parkland of the southwest. It is a mosaic of trembling aspen/oak groves and rough fescue grasslands. Trembling aspen and shrubs occur on moist sites, and bur oak and grass species occupy increasingly drier sites on loamy to clayey, Black Chernozemic soils. Poorly drained, Gleysolic soils support willow and sedge communities.

The region includes habitat for white-tailed deer, coyote, rabbits, ground squirrels, and waterfowl.

10.4.1.2 Macgregor Ecodistrict

As is common in most of the Lake Manitoba Plain Ecoregion, the vegetation in this ecodistrict has also been strongly modified by cultivation, with only minor areas of native vegetation remaining in an unaltered state. The native vegetation consisted of areas of tall prairie grasses, meadow grasses and sedges, interspersed with areas of willow and stands of trembling aspen and balsam poplar with associated shrubs such as snowberry, red-osier dogwood, willow and saskatoon and associated herbs

10.5 Vegetation

Desktop data was analyzed to characterize the existing biophysical information and vegetation in the regional assessment area. The main source is Smith et al. (Smith, et al. 1998).

Map 10-3 shows the land cover in the regional assessment area, displays the various broad land cover types (Manitoba Conservation 2006). Table 10-1 shows the percent of the total area in both the regional and local assessment areas.

More than 80% of the land in the regional assessment area is used for agriculture (90% in the local assessment area), with most of this consisting of cropland (Table 10-1). Ten percent of the regional assessment area and only 6% of the local assessment area consists of forested lands. Range and grassland comprise 16% of the regional assessment area and only 5% of the local assessment area.

This description is consistent with (Smith, et al. 1998) who noted that the vegetation in the MacGregor Ecodistrict has been substantially altered by cultivation and urbanization. The remainder of the ecodistrict was mainly tall-grass prairie with some aspen groves. Most forest cover was, and is, confined to floodplains and levees of streams and rivers, where dense stands of American elm (*Ulmus Americana*), green ash (*Fraxinus pennsylvanica),* Manitoba maple (*Acer negundo*) and basswood (*Tilia americana*) grow. Bur oak (*Quercus macrocarpa*) is present as an additional species on higher sites not prone to flooding.

Table 10-1: Land cover in the regional and local assessment areas

Class Name	Regional assessment area		Local assessment area	
	Area (Hectares)	Percent total	Area (Hectares)	Percent total
Agri - Forage Field	1812	3	0	0
Agricultural Field	46569	65	329	85
Cultural Features	1036	1	0	0
Deciduous Forest	6565	9	21	6
Open Deciduous Forest	489	1	0	0
Range and Grassland	11285	16	18	5
Roads Trails Rail Lines	2949	4	17	4
Sand and Gravel	7	0	0	0
Water Body	809	1	0	0
Wetland - Marsh	133	0	0	0
Wetland - Treed Bog	11	0	0	0
Total	71664	100	385	100

10.6 Wildlife and wildlife habitat

10.6.1 Amphibians and reptiles

Desktop data were analyzed to characterize the existing biophysical information on amphibians and reptiles in the region. Sources included Species at Risk Act Public Registry, COSEWIC List of Canadian Wildlife at Risk, The Manitoba Endangered Species and Ecosystems Act List of Species at Risk, Manitoba Conservation Data Centre Database, the Manitoba Herp Atlas, iNaturalist, and the Amphibians and Reptiles of Manitoba (Preston 1982). Information on species important to Indigenous peoples was received through the Indigenous Engagement Process (Chapter 5). Public engagement documents (Chapter 4) were also reviewed.

The proposed project (project development area) is on private agricultural land in the central Assiniboine River watershed. This watershed supports a variety of amphibians including boreal chorus frog, (*Pseudacris maculate*), leopard frog (*Lithobates pipens*), wood frog (*Lithobates sylvaticus*), spring peeper (*Pseudacris crucifer*), gray tree frog (*Hyla versicolor*) and blue-spotted salamander (*Ambystoma laterale*).

Reptiles found in this region include painted turtle (*Chrysemys picta*), snapping turtle (*Chelydra serpentine*), common garter snake (*Thamnophis sirtalis*), plains garter snake (*Thamnophis radix*) and redbelly snake (*Storeria occipitomaculata)* (Preston 1982).

Amphibians and reptiles are not typically found in intensively developed agricultural areas, and generally prefer natural habitats such wetlands, forests, and grasslands. Other than the ditches adjacent to the municipal roads, there is only marginal habitat for amphibians or reptiles.

10.6.2 Birds

Desktop data was analyzed to characterize the existing biophysical information about birds in the Project area. Sources included Species at Risk Act Public Registry, COSEWIC List of Canadian Wildlife at Risk, The Manitoba Endangered Species and Ecosystems Act List of Species at Risk, Manitoba Conservation Data Centre Database, the Manitoba Breeding Bird Atlas, and the Environment and Climate Change Canada Bird Conservation Regions. Information on bird species important to Indigenous peoples was received through the Indigenous Engagement Process (Chapter 5). Public engagement documents (Chapter 4) were also reviewed.

Bird Studies Canada (Bird Studies Canada 2021) states that the south-central portion of Manitoba supports approximately 200 species of breeding birds, including 88 species with evidence of breeding identified within the two 10 km by 10 km survey squares around the regional assessment area. Some of these species include Canada

goose (*Branta canadensis*), mallard (*Anas platyrhynchos*), blue winged teal (*Anas discors*), mourning dove (*Zenaida macroura*), American robin (*Turdus migratorius*), clay-coloured sparrow (*Spizella pallid*), and the red-tailed hawk (*Buteo jamaicensis)*.

Most bird species in this region typically breed in natural habitats including wetlands, forests, and grasslands. None of these habitats exist within the project development area and comprise only 26% of the regional assessment area and 11% percent of the local assessment area.

10.6.3 Mammals

Desktop data were analyzed to characterize the existing biophysical information about mammals in the region. Sources included Species at Risk Act Public Registry, COSEWIC List of Canadian Wildlife at Risk, Manitoba's The Endangered Species and Ecosystems Act List of Species at Risk, Manitoba Conservation Data Centre Database, and the Manitoba Agriculture and Resource Development wildlife branch website. Information on mammal species important to Indigenous peoples was received through the Indigenous Engagement Process (Chapter 5). Public engagement documents were also reviewed (Chapter 4).

As indicated, the proposed project (project development area) is on private agricultural land in the central Assiniboine River watershed. This watershed is known to support a variety of mammal species including jackrabbit (*Lepus townsendii*), raccoon (*Procyon lotor*), red fox (*Vulpes vulpes*), coyote (*Canis latrans*), white-tailed deer (*Odocoileus virginianus*), muskrat (*Ondatra zibethicu*), beaver (*Castor canadensis*), and mink (*Neovison vison*). No mammal species of conservation concern are known to occur in this regional assessment area.

The mammal species in the regional assessment area are common and widespread in natural habitats including wetlands, forests, and grasslands. None of these habitat types exist within the project development area. As shown in Map 10-1 and Figure 10-1, there are some deciduous forest stands and grasslands within the local assessment area that could provide habitat for wildlife.

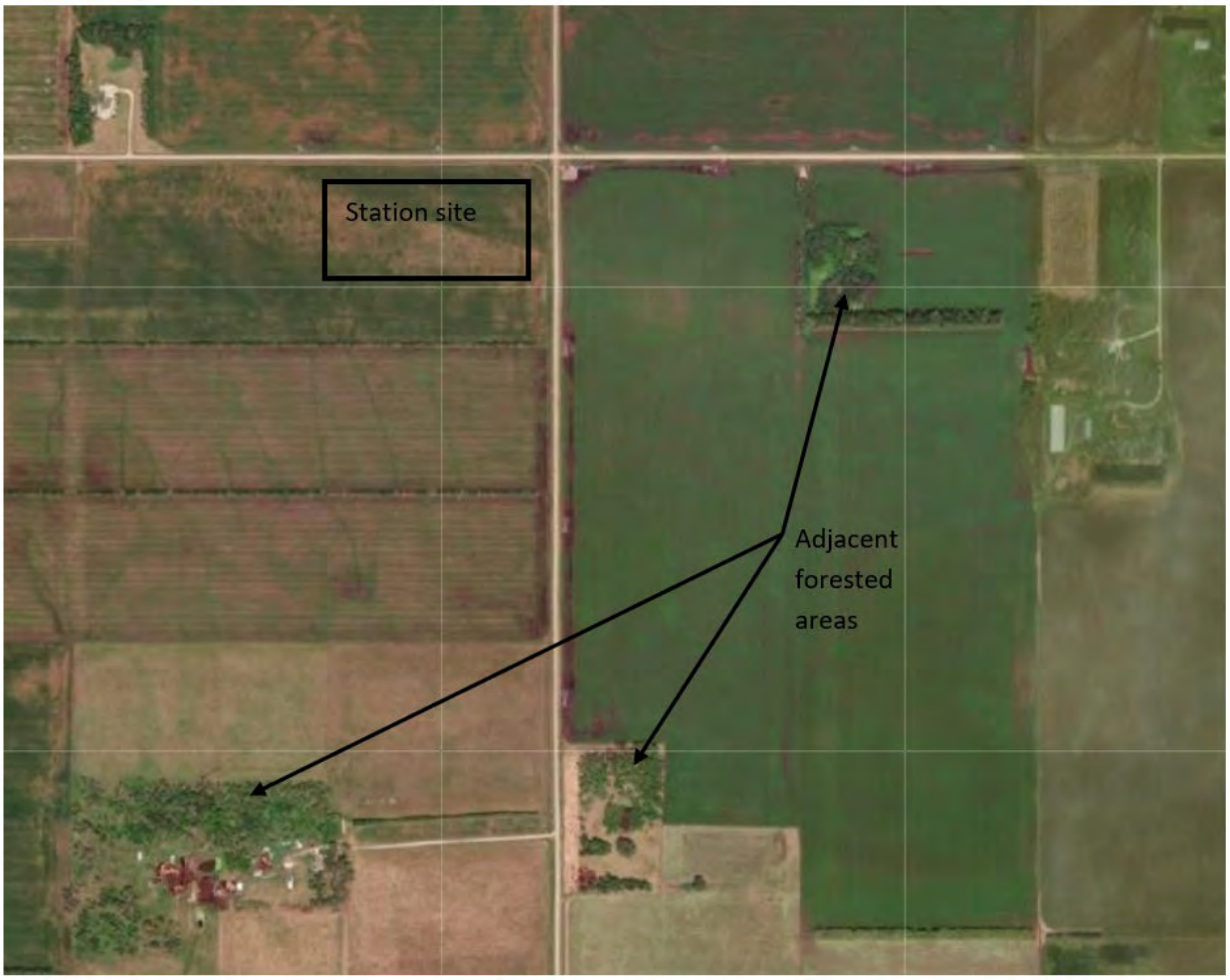


Figure 10-1: Forested areas near the station site

10.6.4 Species of conservation concern

Table 10-2 lists species of conservation concern that may occur in the regional assessment area. To identify species of conservation concern, a variety of databases were examined including the Species at Risk Act Public Registry, COSEWIC List of Canadian Wildlife at Risk, The Manitoba Endangered Species and Ecosystems Act List of Species at Risk, Manitoba Conservation Data Centre Database, and the Manitoba Breeding Bird Atlas. In addition, a specific project area query of the Conservation Data Centre was made on July 8th, 2021 to identify any known occurrence of species of conservation concern (Appendix C).

The species listed in these databases were cross-referenced with Schedule 1 of the *Species at Risk Act* and *The Endangered Species and Ecosystems Act*, to determine the provincially listed rare or sensitive species within the Manitoba plain ecoregion

and regional assessment area. Furthermore, distribution maps and habitat requirements were examined to determine the likelihood of occurrence of federally and/or provincially listed species. There are three bird, two amphibian and two invertebrate species of conservation concern known to occur in the regional assessment area. There are no known vegetation species of conservation concern in the regional assessment area. There are no endangered ecosystems, as defined by *The Endangered Species and Ecosystems Act* (Manitoba) known to occur in the regional assessment area. There is no critical habitat, as defined by the *Species at Risk Act*. The Manitoba Conservation Data Centre query identified a single occurrence on NE-26-011-08W, a monarch (*Danaus plexippus*).

Table 10-2: Species of conservation concern in the regional assessment area

Species	Federal SARA Species Schedule 1 status	Manitoba Endangered Species and Ecosystems Act status	COSEWIC status	Environmental considerations
Western tiger salamander (*Ambystoma mavortium*)	Special concern	Not listed	Special concern	Breed in shallow wetlands
Bobolink (*Dolichonyx oryzivorus*)	Threatened	Not listed	Threatened	Nests in grassland areas, including pastures often near wetlands
Barn Swallow (*Hirundo rustica*)	Threatened	Not listed	Threatened	Aerial insectivore that nests in agricultural buildings and bridges
Northern Leopard Frog (*Lithobates pipens*)	Special concern	Not listed	Special concern	Breed in shallow wetlands
Red-headed Woodpecker (*Melanerpes erythrocephalus*)	Threatened	Threatened	Threatened	Nests in dead or dying deciduous trees, with a preference for open

Table 10-2: Species of conservation concern in the regional assessment area

Species	Federal SARA Species Schedule 1 status	Manitoba Endangered Species and Ecosystems Act status	COSEWIC status	Environmental considerations
				mature woodlands areas.
Chimney Swift *(Chaetura pelagica)*	Threatened	Threatened	Threatened	Aerial insectivore that nests in chimneys and other urban structures
Yellow-banded Bumble Bee (*Bombus terricola*)	Not listed	Not listed	Special concern	Widespread medium-sized bumble bee
Monarch (*Danaus plexippus*)	Special Concern	Not listed	Endangered	Widespread butterfly

10.7 Effects assessment

10.7.1 Effects pathway

Material hauling, machinery operation, station operation and presence and decommissioning all have the potential to interact with wildlife (Table 6-1).

As there will not be any direct loss of wildlife habitat due to the proposed project, two main pathways were considered, that can lead to affects to wildlife, including species of conservation concern:

- Increased mortality risk
- Increase in disturbance/annoyance

10.7.1.1 Increased mortality risk

Construction

Wildlife mortality could increase due to collisions with construction vehicles. These could be mammals, birds, and amphibians, and include species of conservation concern.

Behavioural changes related to increased activity, noise and nighttime illumination from construction may cause an indirect increase in mortality risk due to disturbance to wildlife resulting in behavioural changes and increased chance of predation. Small mammals or birds may move from cover (behavioural change) because of disturbance from noise and vibration, putting them at greater risk of predation and mortality from exposure (Habib, Bayne and Boutin 2007).

Construction activities may also displace wildlife species into areas adjacent to the project that may contain lesser quality habitats depending on a species' habitat requirements and dispersal abilities. This displacement may result in increased energy expenditure potentially reducing an individual's survival and reproduction (Powlesland 2009).

Operation and maintenance

Collisions with transmission lines are among the top causes of human-related bird mortality in Canada (Calvert, et al. 2013). The degree of risk is influenced by several factors relating to transmission line design, location, and mitigation, as well as physical characteristics of the bird (species, size), and flight behaviour (flocking, aerial courtship displays); (Avian Power Line Interaction Committee 2012). Larger-bodied species can have difficulty performing evasive manoeuvres to avoid transmission lines and structures (Bevanger 1998).

The project should not increase bird-wire strikes as the length of line is very short, and not in or adjacent to wetlands or rivers that concentrate large-bodied birds such as geese and ducks.

The physical presence of the transmission line and vegetation management inspection activities may have minor nuisance effects causing altered movements of wildlife near and across the right-of-way during operation.

10.7.1.2 Change in disturbance/annoyance

Indirect effects on habitat are those that reduce the effectiveness of existing or remaining habitat for wildlife. Indirect effects may occur through sensory disturbances (e.g., noise, light) causing temporary displacement of some wildlife from otherwise suitable habitat.

Noise

Mobilizing staff and equipment or the use of heavy machinery can cause noises that could disrupt and displace some wildlife from habitat located within and beyond the project development area. These effects will be more pronounced during sensitive periods (breeding /nesting).

Most of the sensory disturbance (i.e., noise, human presence) associated with construction (i.e., 89 dBA at 15 m) will dissipate within approximately 500 m (Section 9.4.1.2).

Periodic explosive discharges by implosive sleeves during conductor stringing will be louder at 115 dba.

Noise and activity associated with electrical equipment installation at the station may cause some wildlife, such as birds and amphibians to temporarily avoid the area.

Although changes in habitat availability will be most pronounced during construction, operation and maintenance will continue to have an influence on wildlife through periodic disturbance associated with operation and maintenance activities.

The station will not be regularly staffed but periodic inspections will be required. These intermittent activities are not anticipated to have much of an effect on wildlife as noise will be minimal and will be at irregular intervals.

Light

The station will have security lighting as shown in Figure 2-3.

Artificial light disturbs natural movement patterns (habitat fragmentation, barrier effect and displacement), migration and orientation, foraging, predation, communication, and can influence various physiological processes that can impact health and circadian rhythm ((Ogden 1996); (Cabrera-Cruz, Smolinsky and Buler 2018); (Bierbaum, et al. 2019); (Australian Government 2020); (Jägerbrand and Bouroussis 2021).

Documentation of bird aggregation around artificial light at night, as well as observations of bird reactions to strobe lights and lasers, suggests that light may both attract and repel birds (Adams, et al. 2019). Birds can also be disoriented by artificial lights at night (Ogden 1996). Some evidence suggests that artificial night lighting affects the choice of nest site (Longcore and Rich 2004), leading to selection of less optimal sites.

Once a bird is within a lighted zone at night, it may become “trapped” and will not leave the lighted area ((Graber 1968); (Longcore and Rich 2004)). It will often

continue to flap around in the beam of light until they drop to the ground with exhaustion (Avery, Springer and Dailey 1978), and references therein).

Artificial light can also impede the selection of high-quality stopover habitat which is critical to successful migration, and hindrances during migration can decrease fitness (McLaren et al 2018).

Birds that fly at night and are attracted by artificial lights have increased mortality from collision with illuminated towers and high buildings ((Ogden 1996); (Shire, Brown and Winegrad 2000)), and from exhaustion and predation following entrapment into circling around upwardly aimed floodlight beams, illuminated structures and large light-emitting buildings (Clark 2009).

Exposure to artificial light at night may adversely affect bird reproductive and other behaviour ((Pollard 2007); (Walker 2008)). Artificial lighting can also disrupt bird migration by interfering with the night sky patterns used by birds as one of their methods of navigation (Fornasari 2002).

10.7.2 Mitigation

Selection of the station site took a balanced approach to minimize overall project effects. In addition to site selection, standard industry practices and avoidance measures, along with project-specific mitigation as summarized in Chapter 1.0 will be implemented during project construction and operation.

This section highlights the key mitigation measures implemented to limit effects to wildlife, including species of conservation concern.

Mitigation will include, but not be limited to:

- Establishing setbacks and buffers (Appendix D) around migratory bird nests or mammal dens
- Keeping litter and garbage contained
- Flagging off environmentally sensitive areas prior to construction
- Limiting project-related activity outside of the project development area
- Using designated roadways and access roads.
- Cleaning equipment before moving from locations with identified invasive weed infestation
- Performing daily inspections for fuel, oil and fluid leaks on vehicles, equipment and machinery and shutting down and repairing any leaks found
- Hunting and harvesting of wildlife or possession of firearms by project staff will not be permitted while working on project sites

Security lighting mitigation includes:

- Full cut-off lighting
  - No direct light shall be emitted above the horizontal.
- Light spill will be limited to 20lux horizontal (ground level) at 3 meters outside the fence for safety and security purposes.

10.7.3 Characterizing residual effects

Construction noise may temporarily disrupt wildlife behaviour. Security lighting has the potential to alter wildlife behavior as well, including bird migration and nesting. However, due to the limited amount of high-quality habitat in the area and the proximity of the station to industrial development and the City of Portage (lots of noise and light at night), the effects to wildlife should be minimal.

Table 6-2 describes the factors used to characterize the interactions among the project and wildlife.

Given the application of the above-described mitigation measures, the effects of the project in terms of the wildlife and wildlife habitat are summarized as follows:

- Direction: Adverse
- Magnitude: Negligible
- Geographic extent: Local
- Duration: Moderate Term
- Frequency: Infrequent
- Reversibility: Reversible

In conclusion, due to the limited wildlife habitat in the area and the minor nuisance effects and mortality risk, the residual effects for wildlife are not significant.

10.7.4 Follow up and monitoring

Due to limited project interactions and well-established wildlife protections and mitigation measures, wildlife monitoring is not proposed for the project. If significant wildlife habitat damage is observed, remediation efforts will be implemented, and a monitoring plan developed to address concerns. Protections for wildlife habitat will be implemented as part of the environmental protection program.

The environmental protection program is a framework for implementation, management, monitoring and evaluation of protection activities in keeping with environmental effects identified in environmental assessments, regulatory requirements and public expectation. It prescribes measures and practices to avoid

and reduce adverse environmental effects on wildlife habitat (e.g., wildlife reduced risk work windows, setbacks and buffers for sensitive habitat).

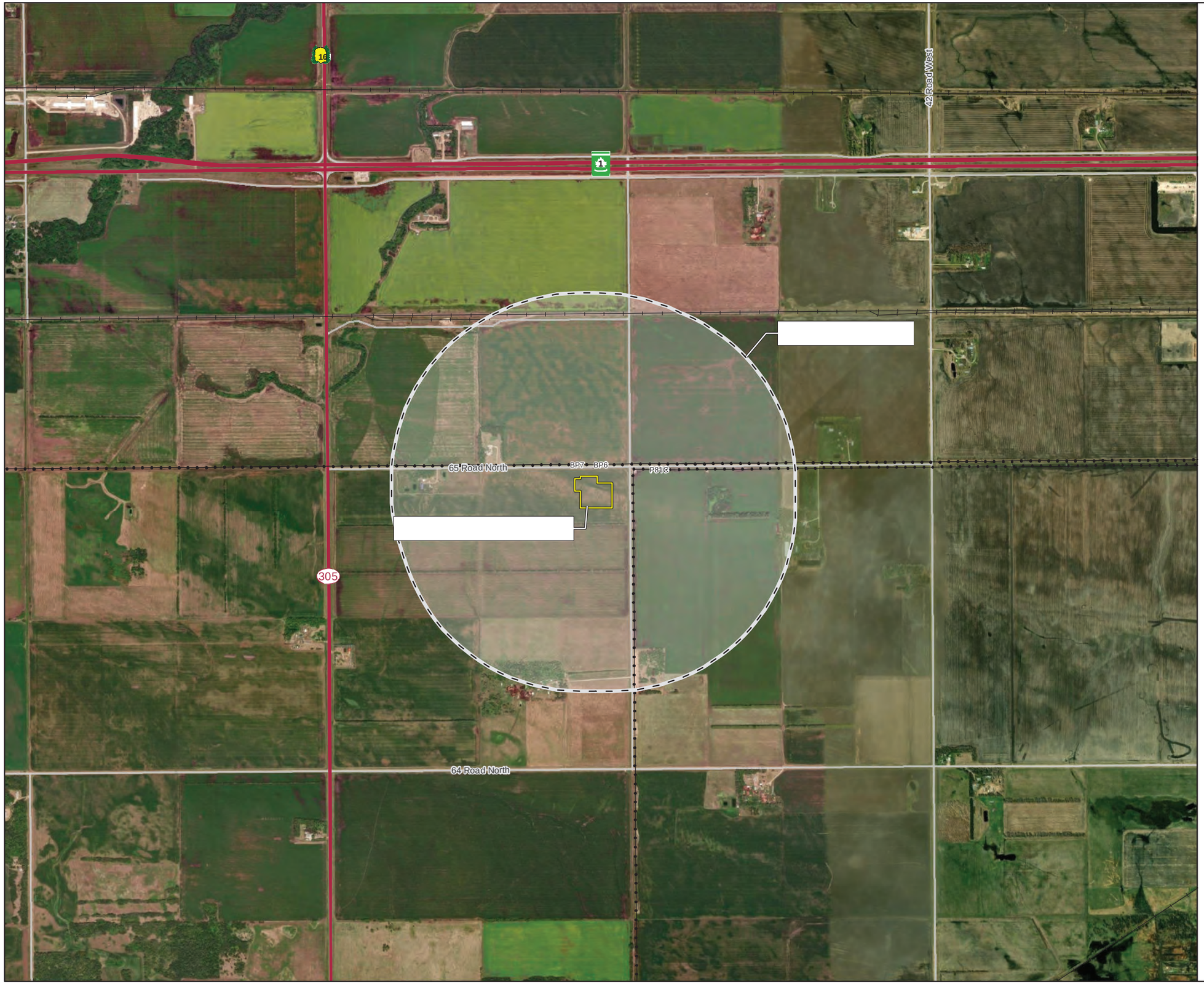
10.7.5 Cumulative effects

Table 6-4 lists the interactions between current and future projects/activities and wildlife. Several of the projects have potential interactions. The main effect of this project is the nuisance effects of noise during construction and security lighting during operations. None of the projects listed are close enough to this project to have overlapping nuisance effects on wildlife.

10.7.6 Sensitivity to future climate change scenarios

The predicted climate change scenarios would not change the significance determinations for wildlife, as they are not anticipated to measurably increase the magnitude of the effects of the project on wildlife mortality or disturbance/annoyance to wildlife.

Effects of future climate change scenarios on wildlife will directly relate to the anticipated increase in temperature and associated extreme weather events (e.g., flooding, fires) and may include change in habitat availability resulting from extreme weather events, reduced food availability (e.g., shifts in the seasonal timing of insect emergence, rotting of food caches due to warmer temperatures) and shifts in species ranges.



Manitoba Hydro

Wash'ake Mayzoon Station

Project Infrastructure

- Wash'ake Mayzoon Station

Assessment Area

- Local Assessment Area - Wildlife

Landbase

- Trans-Canada Highway
- Provincial Trunk Highway
- Provincial Road
- Transmission Line
- Municipal Road
- Rail
- Rural Municipality

Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB
Date Created: August 18, 2021

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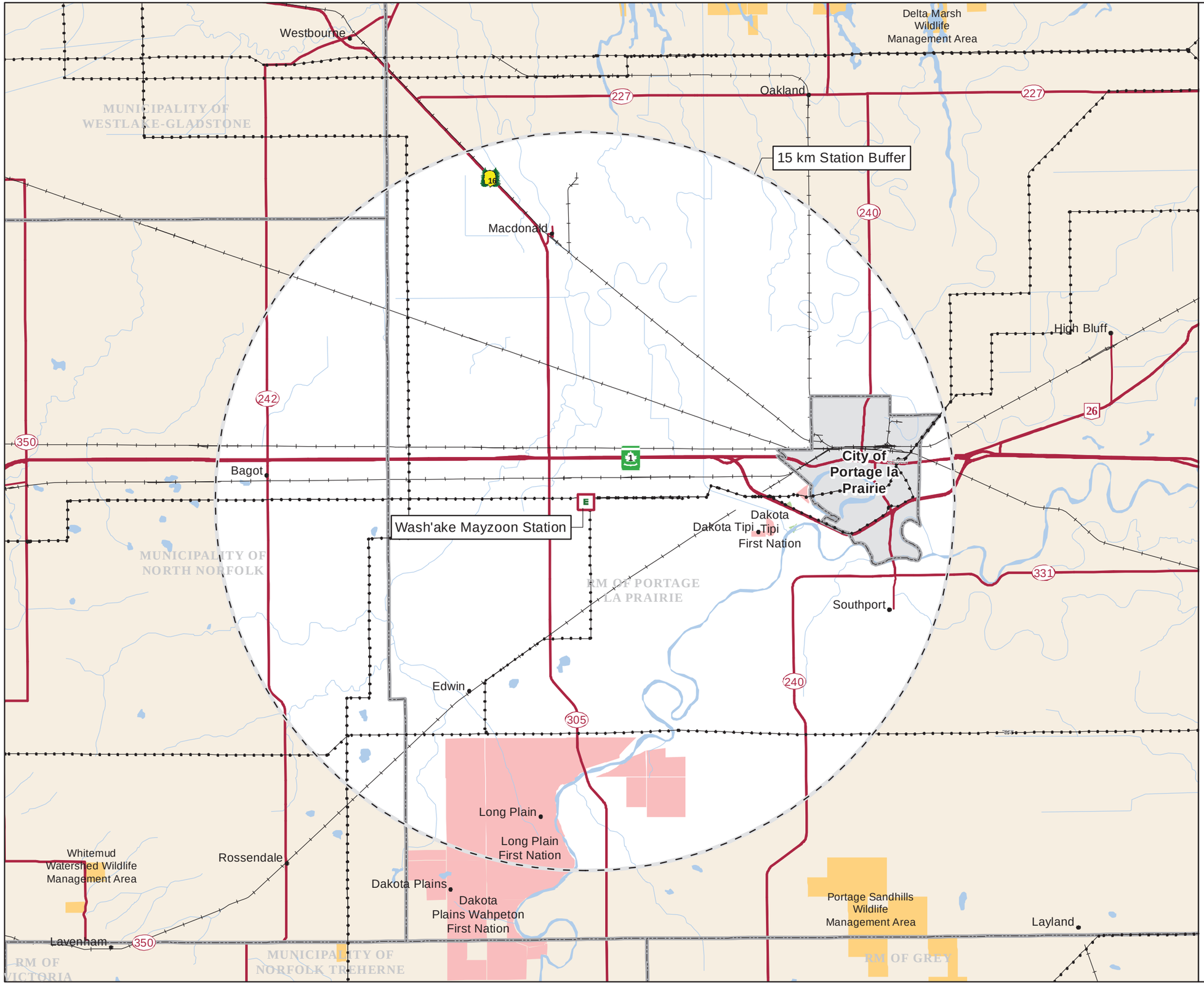
Local Assessment Area Wildlife

Map 10-1



Manitoba Hydro

Wash'ake Mayzoon Station

Project Infrastructure

- Wash'ake Mayzoon Station

Regional Assessment Area

- Regional Assessment Area - Wildlife

Landbase

- Transmission Line
- Railway
- Trans-Canada Highway
- Provincial Highway
- Provincial Road
- First Nation
- National/Provincial Park
- Wildlife Management Area
- City of Portage La Prairie

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB
Date Created: August 18, 2021

N

0 2 4 Miles
0 2 4 Kilometers

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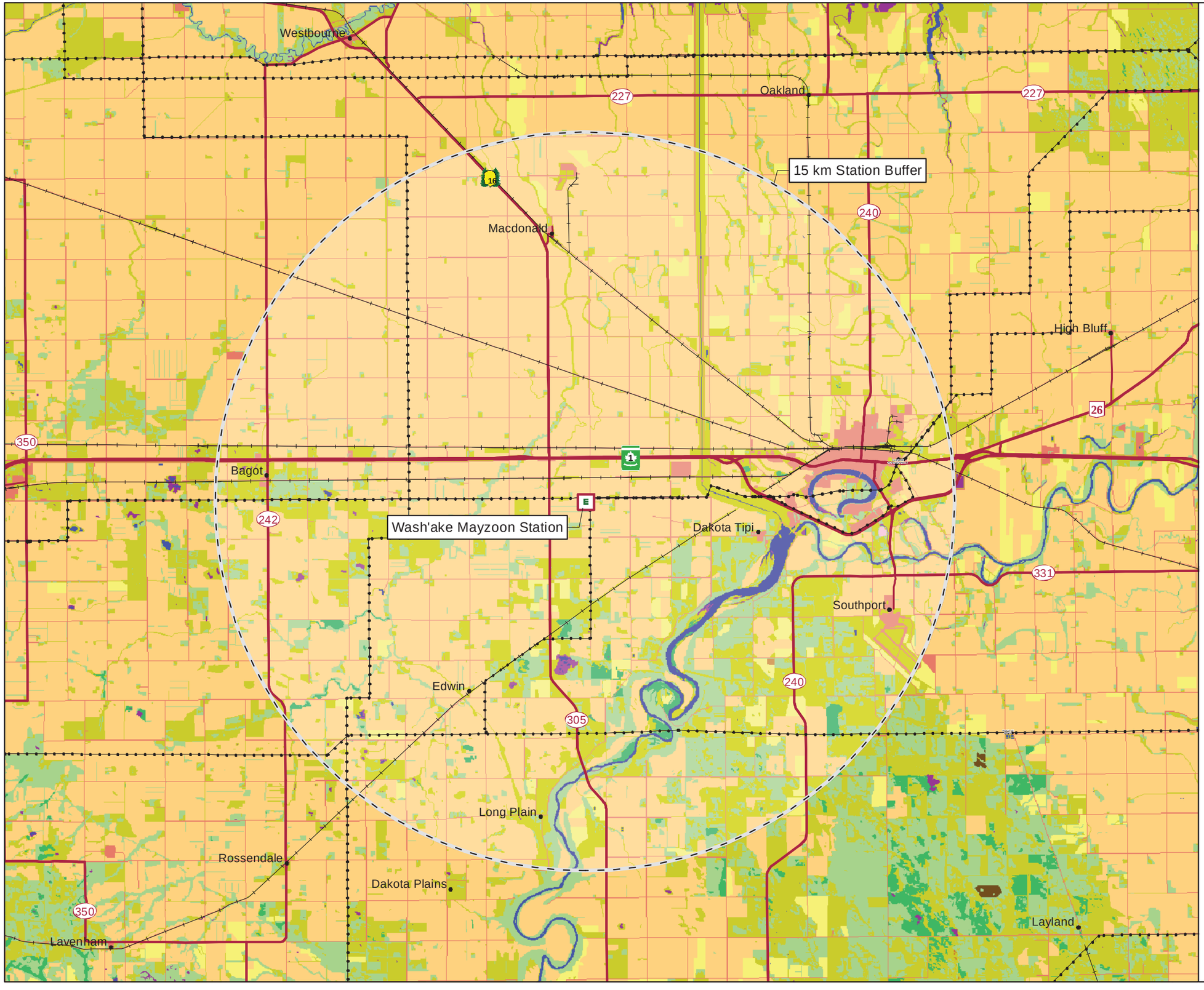
Regional Assessment Area Wildlife

Map 10-2



Manitoba Hydro

Wash'ake Mayzoon Station

Project Infrastructure

- E — Wash'ake Mayzoon Station

Regional Assessment Area

- Regional Assessment Area

Land Cover

- Agricultural Cropland
- Bare Rock, Gravel and Sand
- Coniferous Forest
- Cultural Features
- Decidious Forest
- Forage Crops
- Forest Cutover
- Marsh and Fens
- Mixedwood Forest
- Open Decidious Forest
- Range and Grassland
- Treed and Open Bogs
- Water

Landbase

- Transmission Line
- Railway
- Trans-Canada Highway
- 12 — Provincial Highway
- 300 — Provincial Road

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB
Date Created: August 13, 2021

N

0 2 4 Miles
0 2 4 Kilometers

1:150,000

Land Cover

Map 10-3

11.0Economic opportunities

11.1 Introduction

Economic opportunities are a valued component because of the importance to local and provincial residents, business owners, communities and governments.

Project construction will generate employment opportunities for the local and regional labour force. Direct employment opportunities may include management and supervisory roles, inspection services, equipment operators, health and safety, trades, and semi-skilled and unskilled labour.

Project spending during construction will generate indirect and induced employment opportunities. Indirect employment is generated within industries supplying intermediate components such as raw materials, while induced employment is generated by household spending (e.g., consumer products, restaurants) from wages earned by direct and indirect workers.

Project spending will also generate subcontracting opportunities and the demand for goods and services from local and regional businesses. Such opportunities include the provision of accommodations, parts supply and concrete foundations materials.

Project spending and employment will contribute to the regional, provincial, and national economies. It will also contribute to federal, provincial, and local government revenue through taxation on income and on goods and services procured for the project.

This chapter presents baseline conditions and assesses the potential effects of project activities from construction, operation, and maintenance; it also addresses cumulative effects.

11.2 Scope

11.2.1 Significance thresholds

11.2.1.1 Sustainable Development Policy

The Sustainable Development Act (S270) requires Manitoba Hydro to prepare and adopt a corporate sustainable development code of practice. Manitoba Hydro has adopted a sustainable development policy and 13 guiding principles that influence corporate decisions, actions and day-to-day operations to achieve environmentally sound and sustainable economic development. Manitoba Hydro applies the principles of sustainable development in all aspects of its operations. Through

corporate decisions and actions to provide electrical services, Manitoba Hydro endeavors to meet the needs of the present without compromising the ability of future generations to meet their needs.

In accordance with regulatory guidance, a significance determination will not be made for this valued component as the effects are positive.

11.2.2 Spatial boundaries

The spatial boundaries for the environmental assessment consist of the project development area, local and regional assessment areas. Valued component specific details are described below:

Project development area: Footprint of the proposed project including the station footprint, transmission line right-of-way, any additional areas such as borrow pits or marshalling yards and access road allowances.

Local assessment area: includes the RM of Portage la Prairie. This encompasses the area where employment and economic activities are most prevalent.

Regional assessment area: as above.

11.2.3 Temporal boundaries

The primary temporal boundaries for the assessment are based on the timing and duration of project activities as follows:

- Construction – two years
- Operations and maintenance – for the life of the project, estimated to be a 75-year design life
- Decommissioning – two years

11.3 Existing conditions

11.3.1 Population, employment and economy

According to the 2016 census (Statistics Canada 2021), the City of Portage la Prairie had a population of 13,304, which represents a 2.3% increase over the reported population of 12,996 in 2011. According to Crown-Indigenous Relations and Northern Affairs Canada the total population of Dakota Tipi First Nation is 347 with 180 living on reserve. The Long Plain First Nation population was 3853, with 2,135 on reserve. Dakota Plains Wahpeton First Nation population was 239, with 168 on reserve (Crown-Indigenous Relations Northern Affairs Canada 2021).

The RM and city coordinate planning through the Portage la Prairie Planning District (Portage la Prairie Planning District 2021). This serves to standardize requirements and *"promote a regional approach to industrial, agricultural, and urban fringe development"*.

The RM contains several small communities, such as St. Ambrose, High Bluff, Newton, Oakville, Poplar Point, Skelding and Edwin.

The Portage la Prairie Self-contained Labour Area (SLA) includes:

- Municipality of Portage la Prairie
- City of Portage la Prairie
- Long Plain First Nation
- Dakota Plains First Nation
- Dakota Tipi First Nation

The total population of the area is over 20,000. Figure 11-1 shows the distribution of the workforce in the self-contained labor area (Government of Manitoba 2021).

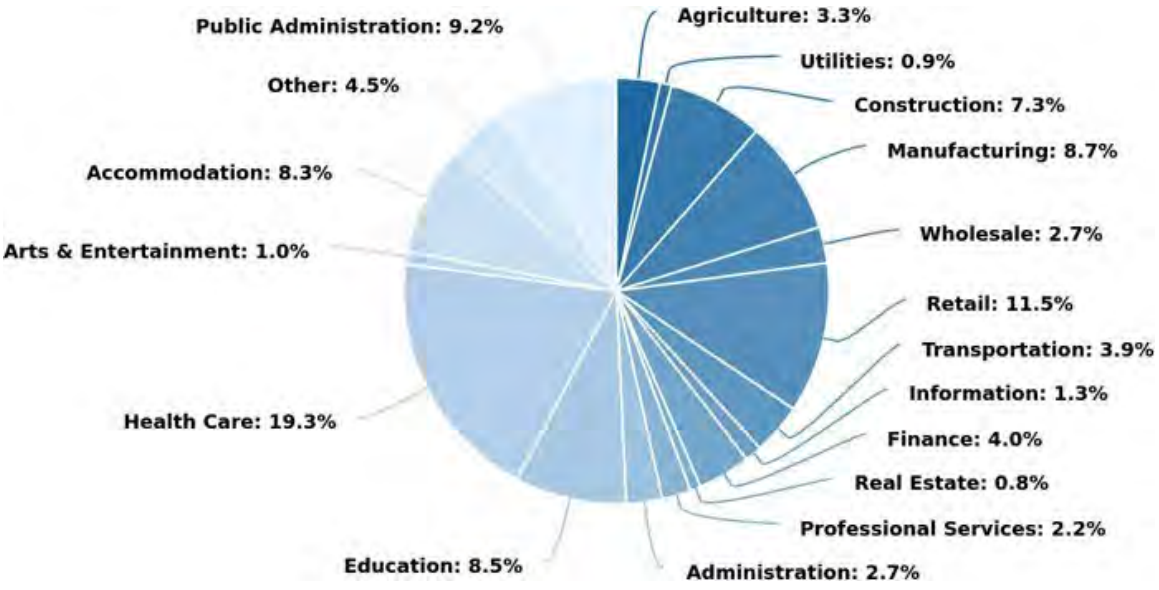


Figure 11-1: Workforce distribution in the Portage la Prairie SLA

11.4 Effects assessment

11.4.1 Effects pathways

During engagement for the project, comments were received relating to the potential for increased growth in the community and the potential to support industrial growth.

Direct Project employment will be generated through the hiring of residents within the local assessment area by either Manitoba Hydro or its contractors. Other direct employment will be generated by providers of equipment used in product construction, while indirect employment will be generated within industries supplying intermediate components. Induced employment is created by the household spending of the direct and indirect workforce.

Project construction will increase demand for goods and services and will generate direct and indirect opportunities for local and regional businesses. Examples of local goods and services provision include the purchase of food (e.g., from grocers and restaurants), fuel and materials. In addition to Project construction contracts, there is potential for sub-contracting opportunities for local and regional businesses.

The Project will generate federal, provincial and local government revenue during construction, operation and maintenance. Revenue includes federal and provincial consumption taxes (e.g., goods and services tax [GST] and provincial sales tax [PST] payable by Manitoba Hydro).

Federal and provincial income taxes will be payable by workers and on taxable income earned by suppliers (direct and indirect) and companies whose earnings are attributed to household spending (i.e., induced income).

Economic opportunities are experienced primarily during construction, with the potential for employment opportunities and presence of the workforce in the regional assessment area. During construction there will be 25 – 45 workers (Table 2-2). Potential project effects on the economy are beneficial rather than adverse.

During the operations and maintenance phase there will be no employment opportunities since the existing Manitoba Hydro workforce will be used for operations and maintenance. Effects on economy during operations will therefore be negligible as no new operation or maintenance jobs will be created.

11.4.2 Mitigation measures

Manitoba Hydro will work with interested Indigenous communities to prepare a list of skilled labor, equipment, services and ancillary supports available for use on the project.

11.4.3 Assessment conclusion

The effects of the Project in terms economic opportunities are summarized as follows:

- Direction: Positive
- Magnitude: Small

- Geographic extent: Regional
- Duration: Medium Term
- Frequency: infrequent
- Reversibility: Reversible

In conclusion, the residual effects are assessed as being minor but positive.

12.0Traditional practices, culture and heritage

12.1 Introduction

As described in the Indigenous Engagement Process (IEP; Chapter 1.0), Manitoba Hydro engaged eight First Nations, the MMF and the PUIPC, see Section 5.3 for a summary of discussion. Manitoba Hydro also supported Indigenous Community and Assessment Coordinator (ICAC) positions and provided opportunities for Long Plain First Nation, Dakota Tipi First Nation and the MMF to share Indigenous Knowledge. This section incorporates the ICAC submissions and feedback from virtual meetings with Manitoba Hydro's understanding of effects. It is clearly indicated when words come directly from the ICAC submissions. The full ICAC studies are included in Appendix A.

Based on experience from past projects, feedback provided in submissions from ICACs, existing literature and interests and concerns identified during virtual meetings with Indigenous communities, Manitoba Hydro identified three valued components that are directly related to matters considered important to rights bearing communities and are of cultural importance. Manitoba Hydro then asked the three ICACs to review this chapter and provide feedback on the valued components and assessment of effects to those valued components. The three valued components related to traditional practices, culture and heritage identified for this project include:

1. Traditional harvesting (e.g. hunting, fishing, trapping, plant gathering)
2. Important sites (e.g. cultural, spiritual, historical, heritage, sacred, identified TLE opportunities)
3. Heritage sites / objects

12.2 Scope

12.2.1 Spatial boundaries

The spatial boundaries for the environmental assessment consist of the project development area, local and regional assessment areas. Valued component specific details are described below:

Project development area: Footprint of the proposed project including the station footprint, transmission line right-of-way, any additional areas such as borrow pits or marshalling yards and access road allowances.

Local assessment area: The local assessment area is defined as 1 kilometre around the station and transmission line footprint (Map 12-1). It represents the area where indirect or secondary effects of construction and operation and maintenance are likely to be most pronounced or identifiable.

Regional assessment area: The regional assessment area is defined as 15 kilometres around the station and transmission line footprint (Map 12-2). It encompasses the area where project-specific environmental effects overlap with those of past, present, and reasonably foreseeable future projects and activities. It is used to provide regional context and is therefore generally the area where the project's contribution to cumulative effects is assessed.

12.2.2 Temporal boundaries

The primary temporal boundaries for the assessment are based on the timing and duration of project activities as follows:

- Construction – two years
- Operations and maintenance – for the life of the project, estimated to be a 75-year design life
- Decommissioning – two years

12.3 Existing conditions

12.3.1 Property ownership

Land use planning responsibilities in municipal jurisdictions falls under the jurisdiction of the respective municipalities or planning districts. Municipal jurisdictions may adopt development plans and zoning by-laws to guide land use decisions within their boundaries. Municipalities can become members of planning districts to work together with respect to land use planning (i.e., development plans). The RM of Portage la Prairie and the City of Portage la Prairie have formed the Portage la Prairie Planning District. The planning district is established to ensure standardized planning requirements through an updated development plan and zoning by-law encompassing both municipal jurisdictions. This promotes a regional approach to industrial, agricultural, and urban fringe development. Lands within the regional assessment area are almost entirely privately owned, with most land either agricultural fields or exurban development (homes, recreation, industrial developments etc.). The RAA encompasses the community of Burnside, formerly known as Rat Creek Settlement, located in 35-11-8 WPM, approximately 14 km west of Portage la Prairie. Scottish settlers establishing farm settlements in the area as early as 1868 and the community became a railway station point along the CPR main line in

1882. The first landowner of Section NE-26-11-8 WPM was Joseph Harris Fawcett who received a land grant in 1881. Sometime prior to 1906, the property transferred ownership to Solomon Beck, an English immigrant and his Ontario-born wife, who lived there with their family until at least the 1920s.

12.3.2 Indigenous land

Map 12-3 shows the Crown lands, Reserve lands and Treaty Land Entitlement areas in the RM of Portage la Prairie. The project is in Treaty One Territory, the traditional territories of the Anishinabe, Cree, and Dakota people, the homeland of the Métis Nation and within the Recognized Métis Harvesting Zone (Manitoba Metis Federation 2021).

In their submission for the Wash'ake Mayzoon EA, the MMF identifies the Recognized Métis Harvesting Zone in Figure 4 that covers the Regional Assessment area for the Project. The MMF adds that: "courts have also recognized that Métis harvesting rights may not be limited to Unoccupied Crown Lands" (Appendix A).

In their ICAC submission, Dakota Tipi First Nation shares that "In order to plan for and build the station in a good way, it is important to understand and acknowledge that the Project site is located in unceded Dakota territory. At the time of contact, Dakota people occupied areas with Canada and the US, the Northwest Territories, Alberta, Saskatchewan, Manitoba, and portions of Ontario. Dakota Tipi First Nation (DTFN) has not signed a Treaty and thus retains, holds and asserts Aboriginal Rights and Title to areas within southern Manitoba. This includes the area surrounding present-day Portage La Prairie, the Yellowquill Trail, and the site of the proposed Project." (Appendix A)

12.3.3 Provincial and federal Crown land

Crown lands are lands vested in the Crown and described under *The Crown Lands Act*. They include lands such as provincial parks, provincial forests, wildlife management areas, community pastures and ecological reserves (Map 12-3).

There are Crown land parcels within the RM of Portage la Prairie. The Assiniboine Diversion is Crown land and Dakota Plains Wahpeton First Nation, Dakota Tipi First Nation and Long Plain First Nation lands exist within the RM of Portage la Prairie.

The station site and local assessment area are not located on any provincial forest, wildlife management area or other provincially protected area, community pasture, Treaty Land Entitlement area or First Nation reserve land. It is located on privately held agricultural land within the RM of Portage la Prairie.

12.4 Effects to traditional practices, culture and heritage

As described in Section 5.2.2, Manitoba Hydro worked closely with several Indigenous communities and organizations to understand traditional practices, culture and heritage within the regional assessment area. A description of past and present use of the area is best described by the community submissions provided in Appendix A. Indigenous people have lived and practiced their culture in the regional assessment for millenia. In the past, cultural activities, hunting, fishing, trapping, and plant gathering for food and medicines were centred around/near the Assiniboine River and its tributaries.

The RAA includes the Yellow Quill Trail, an ancient Indigenous trade route and travelway for people moving northward to Lake Manitoba and the Qu'Appelle Valley in Saskatchewan, and Fort la Reine, a fort built in 1738 A.D. and located close to the Yellow Quill Trail to intercept travellers using the trail. There are no known remains relating to Fort La Reine, but a stone cairn and plaque have been erected to commemorate the site. The RAA is also important to the Métis who were amongst the earliest permanent residents of the Portage area. The Manitoba Act of 1870 provided substantial land grants to the Métis of the Red River Settlement which extended to various parishes along the Assiniboine River including the Parish of Portage la Prairie. The Portage la Prairie area was an important staging ground for the annual buffalo hunts which continued until 1882.

Dakota Tipi First Nation identifies in their submission that "DTFN continues to exercise rights in the region, including the right to hunt, fish, harvest land- and water-based resources, practice cultivation, build and occupy settlements, build and occupy camps and cabins, and travel to and access resource activity areas. DTFN is in the process of finding and documenting a number of burial sites in the region. There are undoubtedly many more burial and cultural sites yet to be identified." (Appendix A).

The local assessment area is located entirely on agricultural land within the RM of Portage la Prairie, where there is limited cultural activities and traditional harvesting being practiced today. As noted in Dakota Tipi First Nation's submission, "The project site is located on private, cultivated land. This site has already been altered from its natural state and is currently inaccessible to DTFN members." (Appendix A). Dakota Tipi First Nation adds that "While the station covers a reasonably small area, it is important to recognize that this site plays a role in the broader colonial impact and cumulative effects mentioned above." (Appendix A). Cumulative effects are further discussed at the end of this chapter.

In their submission for the Wash'ake Mayzoon Station, the MMF shares that the project is located within the Recognized Métis Harvesting Zones and identified the presence of 80 existing Métis Knowledge features in proximity to areas impacted by the Wash'ake Mayzoon Station. The MMF added that "The presence of these 80 existing features is evidence of the potential for impact to the Métis way of life from transmission enhancements related to the PACE project (both phases 1 & 2) and the BP6 & BP7 project. Today, Métis Constitutionally protected rights to harvest, and any impact on these rights needs to be adequately and appropriately assessed and, if necessary, accommodated and mitigated for." (see Appendix A).

12.4.1 Effects to traditional harvesting

On past projects, including the Brandon-Portage la Prairie transmission line replacement project (BP6/BP7) (Manitoba Hydro 2021), Indigenous communities have expressed that changes in available lands to practice traditional harvesting and access to these lands can have negative impacts to traditional harvesting practices. In the MMF's submission for the Wash'ake Mayzoon Station EA (see Appendix A), it was shared that the project was part of a historic trapping area as well as a broader hunting area (for grouse, waterfowl, turkey and deer) and that 80 Métis Knowledge features exist in the project area, though these were not identified specifically for this project. . In their submission (Appendix A), the MMF expressed the importance of preserving as much contiguous Unoccupied Crown Land as possible to maintain the ability to practice traditional harvesting. The Wash'ake Mayzoon Station will not be located on or take up Unoccupied Crown land.

In their ICAC submission, Dakota Tipi First Nation identifies the project site as "already altered from its natural state and is currently inaccessible to DTFN members" (Appendix A). While no traditional harvesting is being practiced by Dakota Tipi First Nation members at the project site, their submission notes that the regional assessment area is still used for traditional harvesting: "DTFN continues to exercise rights in the region, including the right to hunt, fish, harvest land-and-water-based resources, practice cultivation, build and occupy settlements, build and occupy camps and cabins, and travel to and access resource activity areas." (Appendix A).

12.4.1.1 Mitigation

The primary mitigation measure for reducing adverse effects to traditional harvesting practices was site selection. The site selection methodology considered values from multiple perspectives and community groups. Accordingly, the location of a station is often a balance of those perspectives. The location for this station does not interfere

with any Unoccupied Crown Lands nor do we have current knowledge of traditional harvesting practices taking place directly on the station site.

Manitoba Hydro remains open to any mitigation measures suggested by Indigenous communities to further reduce any adverse effects the project might have on traditional harvesting practices.

12.4.1.2 Characterizing residual effects

Given that the project is located on agricultural land where traditional harvesting practices are limited, the effects of the project on traditional harvesting practices are as follows:

- Direction: Adverse
- Magnitude: Minor
- Geographic extent: Local
- Duration: Short-Term
- Frequency: Intermittent
- Reversibility: Permanent

The unique nature of traditional harvesting practices makes it inappropriate to determine whether any effects are significant or not significant. A full description of effects to harvesting as a result of the project are provided within each ICAC submission (Appendix A). Manitoba Hydro understands the severity of the residual effects to vary between communities but overall, the project has low impacts due to its presence on agricultural lands and avoidance of Unoccupied Crown Lands. Manitoba Hydro will continue to work with communities to mitigate any adverse effects.

12.4.1.3 Follow up and monitoring

The environmental protection program is a framework for implementation, management, monitoring and evaluation of protection activities in keeping with environmental effects identified in environmental assessments, regulatory requirements and public expectations. The environmental protection program prescribes measures and practices to avoid and reduce adverse environmental effects on wildlife habitat (e.g., wildlife reduced risk work windows, setbacks and buffers for sensitive habitat). There are no specific follow up or monitoring measures proposed for this valued component.

12.4.2 Effects to important sites

This valued component includes important sites to Indigenous communities such as sites of cultural, historical and spiritual importance, heritage sites, sacred sites and other sites such as Treaty Land Entitlement opportunities. These include tangible and intangible sites identified by Indigenous communities during the IEP and in the ICAC submissions.

During the IEP for BP6/BP7 (Manitoba Hydro 2021), Long Plain First Nation representatives expressed concerns about projects that may impact their ability to access land for Treaty Land Entitlement selections. Preserving land parcels for current and future use is a high priority for LPFN. LPFN discussed aspects of future development planning initiatives with Manitoba Hydro and highlighted both the economic and land protection value of maintaining properties for future TLE. The location of the station avoids any potential TLE and future development plans.

During the IEP for BP6/BP7 (Manitoba Hydro 2021), Dakota Tipi First Nation identified several sites along the transmission line including burials, mounds and tipi rings, and stressed the need for Manitoba Hydro to be diligent in its pre-construction heritage surveys and monitoring of construction activities. The location of the station avoids these important sites and a Cultural and Heritage Resources Protection Plan (CHRPP) will be followed to monitor for any heritage findings, which is further described in Section 12.4.3 Effects to heritage resources.

In their submission for this project, Dakota Tipi First Nation notes that "DTFN's Community Liaison has visited the proposed station site and reviewed existing research on Dakota history in the region. The area is currently an open field, well away from local waterbodies. There are no cultural artefacts, burials or cultural features currently known to be on the proposed site, and it has not been identified as a significant area to date. However, DTFN has not yet examined the full written record with respect to use of this site. Given the history of the area and the soil disturbance required to install the station's grinding grid, there is potential to disturb cultural artifacts at this site." (Appendix A). After submission by DTFN, artefacts were discovered at the proposed site, which are described in section 12.4.3.

Since May of 2021 unmarked and potential burials have been uncovered near the sites of former Indian Residential Schools across Canada, starting with news of finding 215 remains in Kamloops, B.C. and continuing as more investigations revealed hundreds more unmarked graves at sites across Canada. This information, although not news to ICACs and many community members located in the Project area, brought to light the importance of respecting heritage and archeological values over a Project's life. Dakota Tipi First Nation ICAC Darryl Taylor, has worked with local

archeologists to map out four former Residential schools/day schools in the Portage la Prairie area. Long Plain First Nation representatives indicated during a Project site visit that it was common for children to run away from these schools, and that there was potential for remains to be found throughout the region.

In their submission for this project, the MMF identifies: "the presence of 80 existing Métis Knowledge features in the PACE project area indicates the potential for the Manitoba Métis Community (Manitoba Métis) to have additional specific knowledge to share about alternatives to sites if given the opportunity. We would also like to engage the Métis Citizens for additional project specific information which can be used to inform Manitoba Hydro's full environmental assessment and EAP, construction and future operations of the line." (Appendix A).

12.4.2.1 Mitigation

The primary mitigation measures for reducing adverse effects to important sites is the site selection process and implementing the Culture and Heritage Resources Protection Plan (CHRPP). The location of the station avoids any important site identified by Indigenous communities and avoids areas considered by communities for future development plans and TLE.

In their ICAC submission, Dakota Tipi First Nation suggests four mitigation measures to reduce disturbance to heritage sites, including:

1) "Conduct a full heritage assessment of the site
2) Arrange for a DTFN Liaison to be on-site during heritage work, site clearing and ground disturbance. The Liaison may choose to be on-call in lieu of on-site depending on circumstances
3) Share results of the heritage assessment with DTFN
4) Work with DTFN in decision regarding the handling and treatment of any artifacts found." (Appendix A)

A Heritage Resources Assessment has been conducted for the project and pre-construction archaeological surveys will take place (see section 12.4.3 Effects to Heritage Resources for more detail). Results of the assessment will be shared with communities. Manitoba Hydro will arrange for community members to participate in on-site heritage work and monitoring of construction activities when deemed appropriate by Manitoba Hydro and communities. Manitoba Hydro will follow the CHRPP for handling and treatment of artifacts, which includes provision for notifying communities.

In response to the MMF's statement that "the presence of 80 existing Métis Knowledge features in the PACE project area indicates the potential for the Manitoba

Métis Community (Manitoba Métis) to have additional specific knowledge to share about alternatives to sites if given the opportunity. We would also like to engage the Métis Citizens for additional project specific information which can be used to inform Manitoba Hydro's full environmental assessment and EAP, construction and future operations of the line." (Appendix A), Manitoba Hydro will continue to welcome information from the MMF to inform construction and future operations of BP6/BP7 and the Wash'ake Mayzoon Station as well as to inform the EA for stage 2 of PACE – new transmission line.

It has been shared by Indigenous communities on past projects and for this project that a traditional ceremony should take place on any project that affects the land. In their ICAC submission, Dakota Tipi First Nation suggests that Manitoba Hydro:

1) "Hold a Pipe Ceremony at ground-breaking to respect the land in a traditional way
2) Hold a closing ceremony when construction is complete
3) Ensure DTFN participation in both ceremonies" (Appendix A)

Manitoba Hydro will work with Indigenous communities to organize a traditional ceremony before construction on the project begins and a closing ceremony after completion of the project. All communities engaged on the project will be invited to attend and participate in the ceremonies.

Cultural awareness training will be provided to project staff (contractors and internal MH staff). A Culture and Heritage Workshop will take place on October 7, 2021 where Indigenous communities, the HRB and Manitoba Hydro will meet to share concerns related to important sites, including how to pay respect and be responsive to any finds should they be encountered during site work.

12.4.2.2 Characterizing residual effects

Given that the project is located away from important sites identified by Indigenous communities and future development plans and TLE, the effects of the project on important sites are as follows:

- Direction: Adverse
- Magnitude: Minor
- Geographic extent: Local
- Duration: Short-Term
- Frequency: Intermittent
- Reversibility: Permanent

The unique nature of important sites makes it inappropriate to determine whether any effect is significant or not significant. Therefore, such conclusion will not be made.

Manitoba Hydro anticipates the severity of the residual effects to vary between communities and therefore will continue to work with communities to mitigate any adverse effects.

12.4.2.3 Follow up and monitoring

Manitoba Hydro will continue to be open and responsive to Indigenous communities and consider any important sites in the project area that might be identified in the future.

12.4.3 Effects to heritage resources

12.4.3.1 Existing environment

Heritage resources are protected under Manitoba's Heritage Resources Act (1986) and are managed by the Historic Resources Branch (HRB) under the Department of Sport, Culture and Heritage. A desktop review was undertaken to gain an understanding of the general and specific history of the areas. A screening request for known heritage and cultural sites that have been registered with the province was sent to the HRB for the proposed Project to determine if there are any potential heritage resources that may be affected. A listing of registered sites was provided from the HRB's Site Inventory database for the Rural Municipality (RM) of Portage la Prairie, including the City of Portage la Prairie, to inform the baseline for heritage resources. The listing included:

- Archaeological sites (130),
- Cemetery sites (38),
- Centennial farms (49),
- Plaques (48), municipally designated sites (8), and
- Provincially designated sites (6).

The Canadian Register of Canada's Historic Places was searched for federally designated sites. There are five (5) federal designated sites. A listing of these registered sites that fall within the boundaries of RM of Portage la Prairie and the City of Portage la Prairie is provided at Appendix E.

12.4.3.2 Characterizing residual effects

Potential interactions between the Project and heritage resources that may cause environmental effects are described in this section. Any Project activity that includes surface or sub-surface ground disturbance has the potential for interaction with heritage resources or human remains where they are present.

The temporal boundaries for the assessment of potential effects of the Project on heritage resources includes only the construction phase when there is potential for interaction with heritage resources to be disturbed.

The spatial boundaries for the environmental effects assessment of heritage resources are defined below:

- Local Assessment Area (LAA): The LAA for understanding effects to heritage resources include the property purchased for the proposed station footprint.
- Regional Assessment Area (RAA): The RAA for heritage resources is the area within which the Project's environmental effects may overlap or accumulate with the environmental effects of other projects in proximity to the Project. For heritage resources, the RAA is defined by the boundaries of the RM of Portage la Prairie, including the City of Portage la Prairie.

Direct effects on the heritage resources are only possible during the construction phase. Any effects would be the direct consequence of the disturbance or destruction of heritage site as a result of excavating and earth moving activities. Potential effects of the Project on heritage resources are possible only within the LAA or, more, specifically, within the general area of the Project footprint.

Based on the information compiled from the desktop review, there were no known heritage sites within the LAA. A preliminary archaeological survey undertaken in August 2021 by the Project Archaeologist, Manitoba Hydro staff and representatives from Dakota Tipi First Nation and the Manitoba Métis Federation located surface artifacts within the project footprint. The site consisted of Late Historic period (1870-1930 A.D.) artifacts along with the recovery of a Precontact projectile point. The finds were scattered across a 100-metre area within the project footprint and have been impacted through agricultural processes. The site has been registered with the Manitoba's Historic Resources Branch and notification emails were sent informing the communities of the finds. Continuation of the HRIA survey and testing will occur in fall 2021 once the standing wheat crop has been harvested.

Given that the project is located within a disturbed context, the integrity of the site found during the preliminary HRIA investigation is impacted. With the implementation of the proposed mitigation, the project will not result in a permanent disturbance or destruction of a heritage resource. Therefore, the residual environmental effect of the project on heritage resources during the project are rated not significant. The effects of the project heritage resources are as follows:

- Direction: Adverse

- Magnitude: Minor
- Geographic extent: Site-specific
- Duration: Short-Term
- Frequency: Occurs Once

Reversibility: Permanent

12.4.3.3 Mitigation

Mitigation of potential Project effects on heritage resources includes pre-construction archaeological work at station site. Mitigation measures for the archaeological site found during the preliminary HRIA investigation will include subsurface testing to determine if buried components are present below the plow zone. Additional mitigation measures will be determined based on discussion with the HRB with input from the Indigenous Community Assessment Coordinators. If there are no additional finds as a result of the shovel testing that cannot be mitigated then an application will be made to the HRB for the project to receive heritage clearance.

In addition to the measures developed in the environmental protection plan, a Cultural and Heritage Resources Protection Plan (Appendix B) has been developed to specifically deal with potential effects. It includes the following measures:

- All archaeological finds discovered during site preparation and construction will be left in their original position until the Project Archaeologist is contacted and provides instruction;
- Orientation information will include typical heritage resource materials and reporting procedures;
- The Contractor will report heritage resource materials immediately to the Construction Supervisor who will cease construction activities in the immediate vicinity until the Project Archaeologist is contacted and prescribes instruction; and
- Relevant measures within the Cultural and Heritage Resource Protection Plan will be adhered to during construction and operations phases of the Project.

Table 12-1: Environmental effects analysis for heritage resources

Environmental effect	Mitigation measures	Residual effects	Evaluation
Identification of unknown heritage resources or burials at station site	Pre-construction archaeological work in Project footprint	Disturbance of unknown	Low

	Follow relevant measures outlined in the Cultural and Heritage Resource Protection Plan	resources or burials

No heritage resource sites were initially known within the LAA based on the compiled data. However, an archaeological site was discovered during HRIA investigations. Additional testing and assessment will determine if there are buried subsurface components or if the site is limited to the surface within the disturbed plow zone. The potential for additional unknown archaeological sites being discovered during clearing and construction remains low, especially since the project site has been disturbed through agricultural activities. While there is low potential, there could be potential for deeply buried unknown heritage resources to be discovered during clearing and construction of the proposed station site. Continuing pre-construction archaeological work should reduce the possibility of accidental disturbance to heritage resources or human remains.

12.5 Cumulative effects

The project is in a region of southern Manitoba where the original native ecology has been substantially affected by more than one hundred years of human development. This change has been dominated by conversion of native prairie to agricultural lands, accompanied by urban and rural settlements, public infrastructure, and various other land uses. As a result, there has been a gradual displacement of natural features. Any remaining natural features in the area are highly valued, including the intact aspen-oak forest on Crescent Island and the mature cottonwood forest observed in the vicinity of the Assiniboine River.

Many of the proposed future projects planned in the area (Table 6-3) will be built upon this previously disturbed environment, converting agricultural lands to industrial, utility or transportation infrastructure, as is the case for the Wash'ake Mayzoon Station. Construction related effects on vegetation including clearing, the potential to spread non-native/invasive plants and loss of wetland vegetation are likely to occur on other foreseeable future projects, including the BP6/BP7 project, the Crescent Lake causeway and Manitoba Hydro's planned Portage Area Capacity Enhancement (PACE) 230 kV transmission line project. These projects will contribute to the cumulative effects to important traditional plant species and traditional harvesting in the area.

For the BP6/BP7 project, First Nation representatives in the area have indicated that riparian areas are important for gathering willow, an important traditional plant.

Recognizing the importance of these remaining pockets of intact natural vegetation along the Assiniboine River and Crescent Lake, residual effects related to vegetation loss along these waterways will act cumulatively with riparian habitat loss of these future projects.

In working with ICACs on the project it is understood that cumulative effects to traditional practices, culture and heritage have extended across a broad span of time, and these effects will continue. All future projects have potential to interact with the effects of the Wash'ake Mayzoon Station in that the presence of more infrastructure on the landscape may impact harvesting, important sites, and heritage.

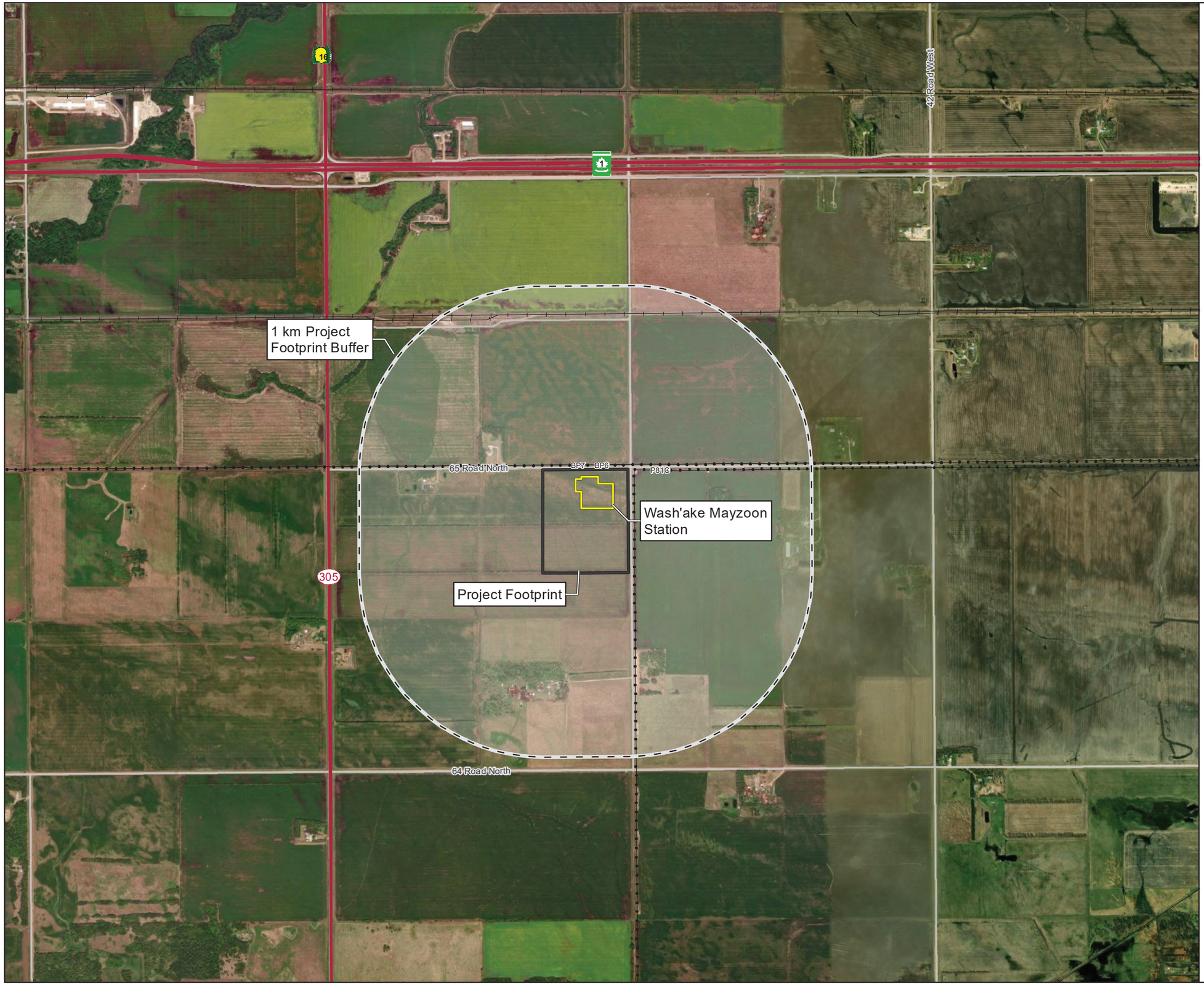
The level of disturbance associated with the Wash'ake Mayzoon Station is minimal in relation to other projects because of the project being on pre-disturbed agricultural land; however, when considered cumulatively with other infrastructure on the landscape, Manitoba Hydro projects in the Portage la Prairie area contribute to the loss of available land to both harvest and access important sites. Manitoba Hydro understands that when working with ICACs on the projects this loss is considered with changes that have occurred since settlement. Adopting pre-disturbance condition as the historical temporal limit, key mitigation to address impacts include hosting ceremonies to pay respect to Mother Earth and supporting Indigenous monitors during construction of transmission projects in the area.

The site selected for the Wash'ake Mayzoon Station and the final route of the BP6/BP7 project are both primarily on pre-disturbed agricultural land. The processes that went into selecting the site for the Station and routing the BP6/BP7 project struck a balance between competing values in the area. Both projects will facilitate the conveyance of clean, renewable energy to an area with growing energy needs, build reliability within the Manitoba transmission system and contribute to Manitoba's economic future.

Manitoba Hydro undertook an approach to Indigenous engagement that was adaptive in that it was structured to understand concerns related to the BP6/BP7 project, then build upon these understandings for the Wash'ake Mayzoon Station and then further build upon these understandings for the upcoming planned PACE transmission line project. Indigenous Coordinators were supported to conduct interviews, assess effects, and propose mitigation measures. Manitoba Hydro intends to work with Coordinators in upcoming future Manitoba Hydro projects, including the planned PACE transmission line, to build upon understandings from this project and the BP6/BP7 project.

- Manitoba Hydro will work with Indigenous Coordinators to apply learnings from the BP6/BP7 project and the Wash'ake Mayzoon Station to the planned PACE transmission line project.

Manitoba Hydro is committed to continue sharing information with landowners, Indigenous communities, the public and to continue working with interested parties through implementation of the Environmental Protection Program.



Manitoba Hydro

Wash'ake Mayzoon Station

Project Infrastructure

- Wash'ake Mayzoon Station
- Project Footprint

Assessment Area

- Local Assessment Area
  Traditional Harvesting and Important Sites

Landbase

- Trans-Canada Highway
- Provincial Trunk Highway
- Provincial Road
- Transmission Line
- Municipal Road
- Rail
- Rural Municipality

*Metis harvesting area covers the entire map

Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB
Date Created: August 18, 2021

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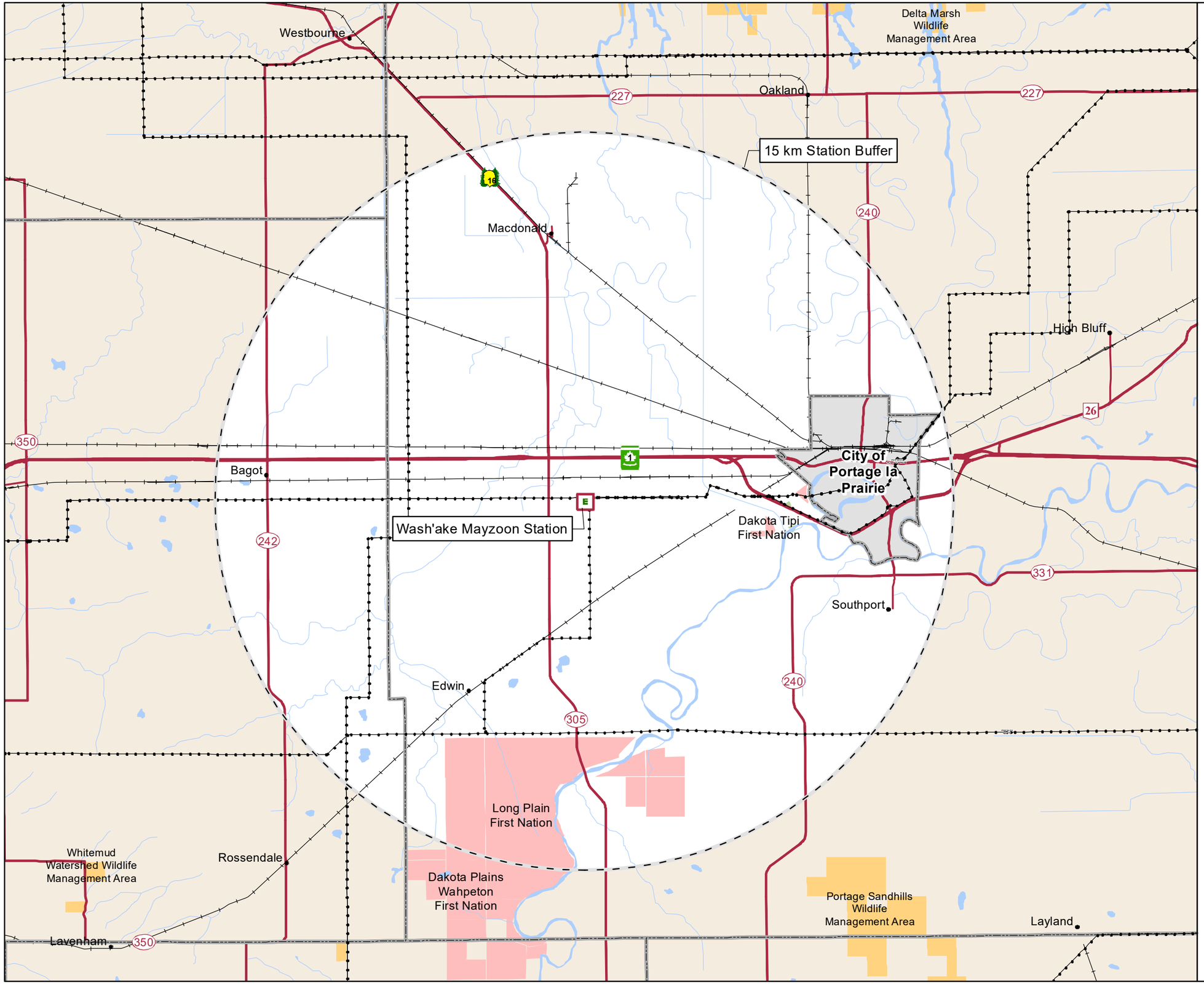
0 1,000 2,000 Feet

1:20,000

Local Assessment Area Traditional Harvesting and Important Sites

Map 12-1



Manitoba Hydro

Wash'ake Mayzoon Station

Project Infrastructure

- E — Wash'ake Mayzoon Station

Regional Assessment

- Regional Assessment Area - Traditional Harvesting and Important Sites

Landbase

- Transmission Line
- Railway
- Trans-Canada Highway
- Provincial Highway
- Provincial Road
- First Nation
- National/Provincial Park
- Wildlife Management Area
- City of Portage La Prairie

*Metis harvesting area covers the entire map

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB
Date Created: August 18, 2021

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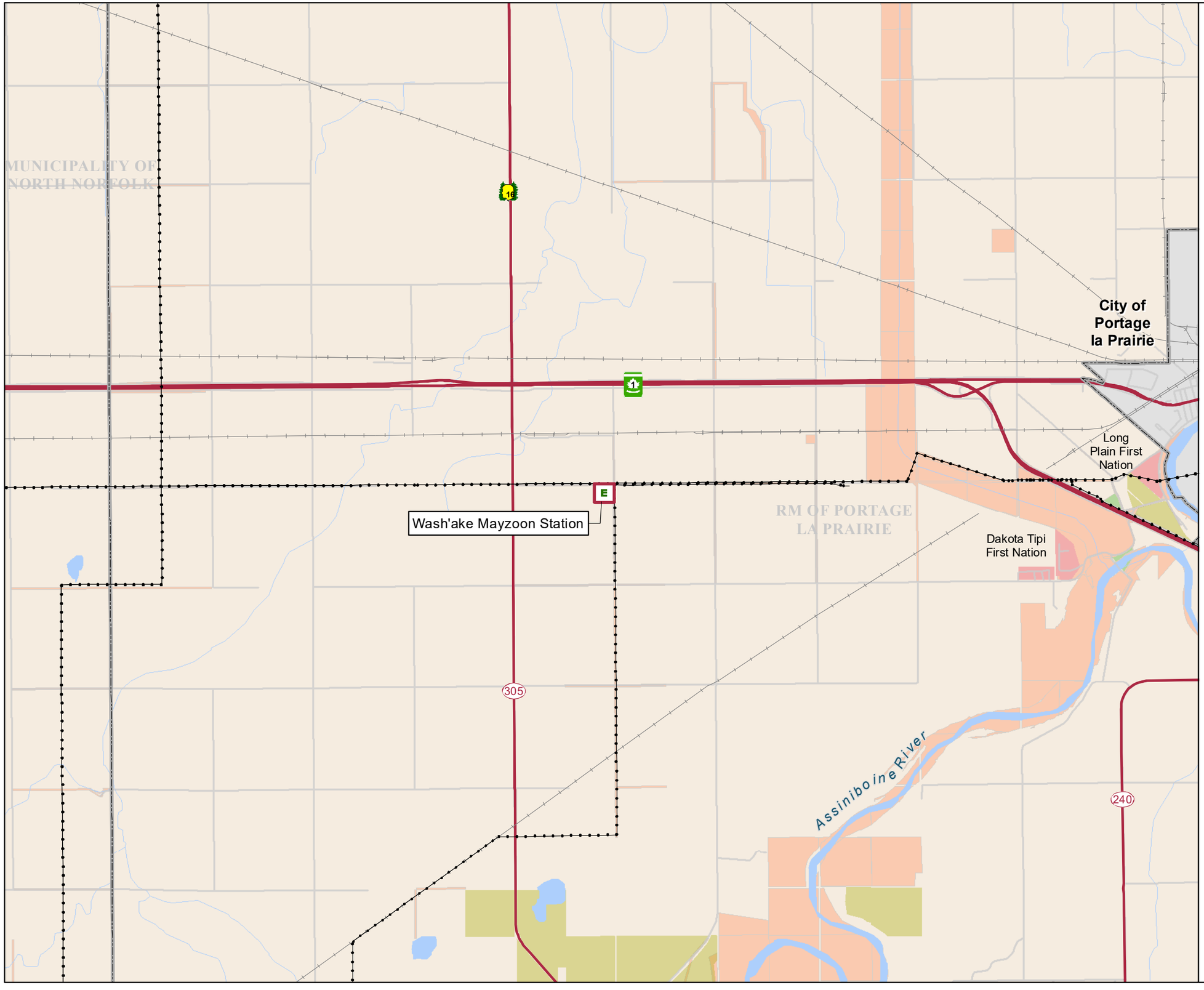
Regional Assessment Area Traditional Harvesting and Important Sites

Map 12-2



Manitoba Hydro

Wash'ake Mayzoon Station

Project Infrastructure

- Wash'ake Mayzoon Station

Landbase

- Transmission Line
- Railway
- Trans-Canada Highway
- Provincial Highway
- Provincial Road
- Municipal Road
- First Nation
- Crown Land
- Treaty Land Entitlement
- National/Provincial Park
- Wildlife Management Area
- City of Portage La Prairie
- Rural Municipality

*Metis harvesting area covers the entire map

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB
Date Created: August 13, 2021

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Designated Lands

Map 12-3

13.0Greenhouse gases and climate change

13.1 Climate

Climate plays an important role in multiple aspects of the project. For example, design loads are influenced by ice accumulation and wind, construction planning may use seasonal temperature patterns to favour frozen ground conditions, and conductor clearances are influenced by ambient temperature and wind conditions.

Furthermore, the impact of extreme climate events, such as the wet snow event in October 2019 that resulted in damage to the adjacent BP6/BP7 transmission line (Manitoba Hydro 2021), can result in substantial outages and financial consequences.

At a high level, this section characterizes historic climate conditions and presents projections of how climate in the area may change in the future. The information provided will become foundational for subsequent assessments of climate change impacts and resilience for transmission projects in the Portage la Prairie area.

13.1.1 Historic climate

The project is in the MacGregor Ecodistrict of the Lake Manitoba Plain Ecoregion, which is part of the broader Prairies Ecozone. The climate is generally characterized as subhumid, with mean annual precipitation that varies considerably year-to-year (often falling in the form of local summer storms), high evaporation, short, warm summers and long, cold winters (Smith, et al. 1998).

There are nine meteorological stations operated by Environment and Climate Change Canada (ECCC) used for the assessment. Seven are in the Portage area and one at the Richardson International Airport in Winnipeg and one in Brandon are also included. These two are to complement records at Portage la Prairie and extrapolate to southern Manitoba.

Some stations have a long temporal coverage (back to 1886) but many have missing and poor-quality data that limit the suitability of these records for long term climate studies.

13.1.2 Climate normals

Monthly Climate Normals (Environment and Climate Change Canada 2021) are illustrated in Figure 13-1 for temperature, precipitation and wind speed. Also shown are period-of-record extremes at each station, which may extend beyond the 1981-2010 period.

Portage la Prairie is located roughly midway between Winnipeg and Brandon and because of their proximity, normal climatic conditions from Winnipeg and Brandon are indicative of general conditions at Portage la Prairie. This is illustrated in Figure 13-1 for precipitation, which shows similar patterns at all three stations. One notable difference in the precipitation plots is the extreme (period-of-record) daily precipitation in which Portage la Prairie CDA's 137mm event (August 16, 1985; (Environment and Climate Change Canada 2021)) exceeds extreme daily records at Winnipeg Richardson Int'l A and Brandon A. This difference shows the highly variable nature of precipitation compared to temperature.

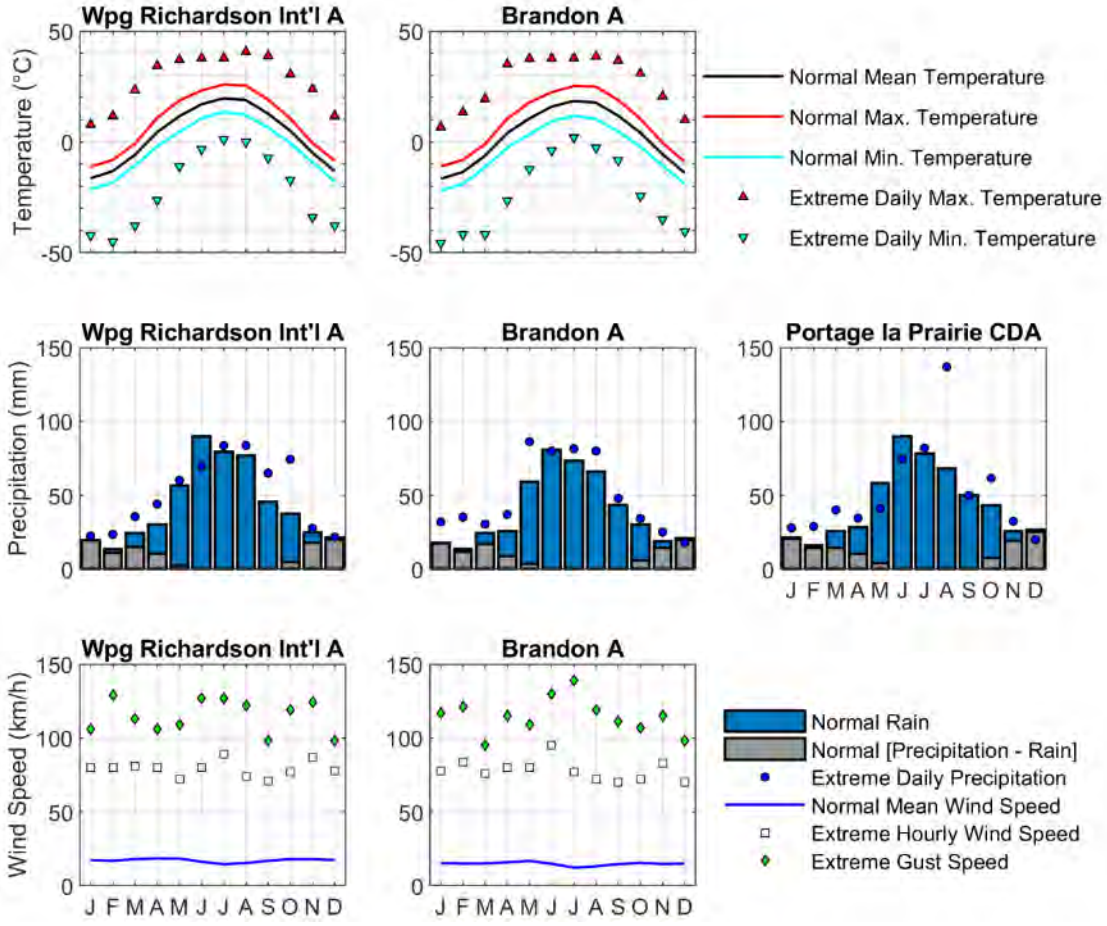

Figure 13-1: 1981-2010 Monthly Climate Normals at Winnipeg, Brandon and Portage la Prairie[3].

[3]Also shown (points) are period-of-record, sub-monthly, extremes for select variables. Data retrieved from ECCC (2021).

13.1.3 Trends

Adjusted and Homogenized Canadian Climate Data (AHCCD) from ECCC are developed specifically for purposes of trend analysis (Vincent, Hartwell and Wang 2020); (Mekis and Vincent 2011); (Wan, Wang and Swail 2010). AHCCD includes minimum temperature (Tmin), mean temperature (Tmean), maximum temperature (Tmax), rain (total of daily rainfall), snow (total of daily snowfall), precipitation (total of daily precipitation), and wind speed (mean of hourly wind speed). Seasonal and annual time series from AHCCD at select locations in the project area are plotted in Figure 13-2.

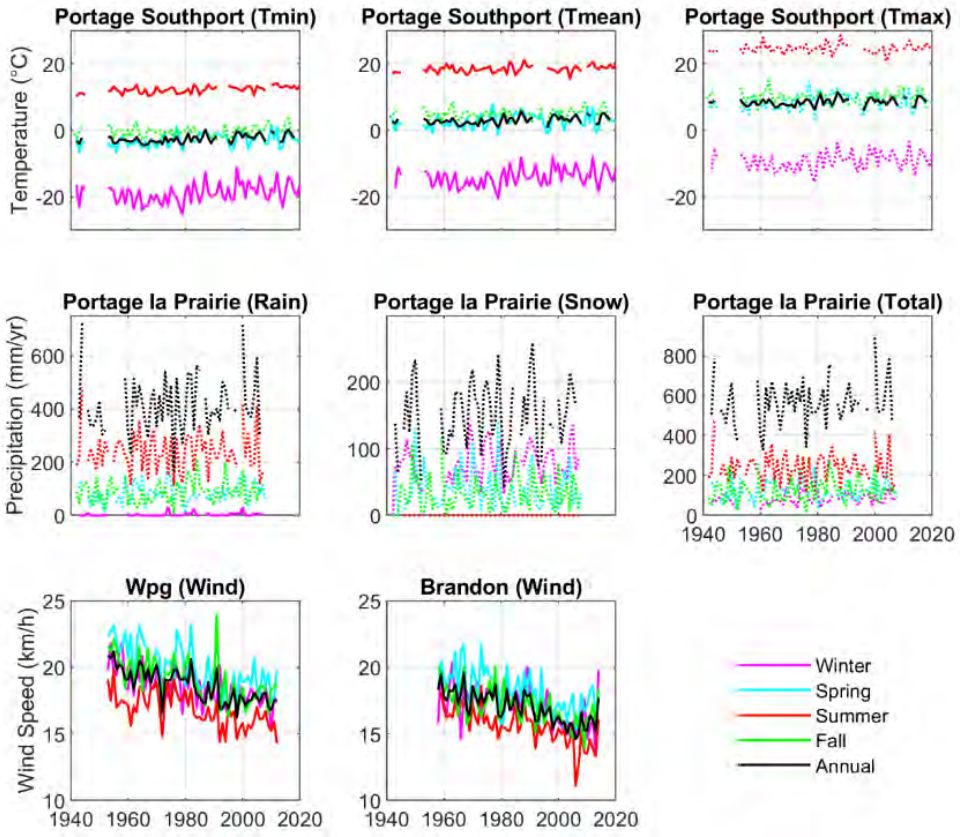

Figure 13-2: Time series of seasonal and annual temperature, precipitation and wind speed[4].

[4]Solid lines indicate statistically significant trends and dotted lines indicate time series where no statistically significant trend was detected. Data shown are from the entire period available within ECCC's Adjusted and Homogenized Canadian Climate Data (AHCCD) for select stations of interest.

Statistically significant trends are shown in Figure 13-2 as solid lines (dotted lines are not statistically significant). Trends of note include:

- Annual temperatures increased by
  - 0.031°C/yr for Tmin
  - 0.026°C/yr for Tmean
  - 0.019°C/yr for Tmax
- In winter
  - minimum temperatures increased by 0.044°C/yr
  - mean temperatures increased by 0.035°C/yr,
- In spring
  - minimum temperatures increased by 0.035°C/yr
  - mean temperatures increased by 0.029°C/yr
- In summer
  - minimum temperatures increased by 0.025°C/yr
  - mean temperatures increased by 0.016°C/yr
- The only significant precipitation trend was for increasing winter rain (0.02mm/yr), which is likely in response to warmer winter temperatures resulting in more precipitation falling as rain instead of snow.
- Annually, wind speeds decreased by 0.055km/h/yr in Winnipeg and 0.056km/h/yr at Brandon. Seasonally, the largest trend occurred in summer at Brandon by 0.057km/h/yr and in spring at Winnipeg 0.071km/h/yr.

It is important to recognize that trend analysis can be sensitive to the start and end dates. For the purposes of this assessment, trends are analyzed for their entire period of record available. Historic trends provide an indication of how the climate has changed in the past but may not be an accurate representation of continued longer-term changes in the climatic system (e.g., through extrapolation of trends).

13.1.4 Future climate

Global climate models driven by future greenhouse gas emission scenarios (van Vuuren, et al. 2011) are used to project how Earth's climate may evolve in the future. Forty simulations from eighteen global climate models and two greenhouse gas emission scenarios provided the basis for this assessment.

The text below characterizes projections specific to the Portage la Prairie area. Based on the design life of the project, projections are presented for the 2050s (2040-2069) and 2080s (2070-2099) future horizons relative to the reference 1981-2010 period. Projected changes (deltas; Δ) indicate how the overall long-term climate may differ from the reference period, so information presented in this section can be complementary to historic climate normal presented in Section 13.1.1.

Table 13-1: Projected change for the 2050s future horizon (2040-2069)*

	Tmin (°C)	Tmean (°C)	Tmax (°C)	Precipitation (mm)	Evaporation (mm)	Runoff (mm)	Wind Speed (km/h)
Annual	2.97	2.83	2.60	3.00	3.7	-0.12	-0.12
Winter	4.34	3.73	3.18	2.65	1.81	2.36	-0.06
Spring	2.73	2.43	2.31	6.73	5.75	-2.95	-0.14
Summer	2.55	2.67	2.55	-1.11	2.66	0.2	-0.33
Fall	2.66	2.69	2.72	2.67	2.91	0	-0.17

↑ ↓ Strong agreement

↑ ↓ Moderate agreement

↑ ↓ Weak agreement

↑ ↓ Negligible agreement

*Relative to 1981-2010. Cell colours reflect agreement on the direction of change. Dark green / brown indicates strong agreement that an increase / decrease will occur, medium green / brown indicates moderate agreement that an increase / decrease will occur, light green / brown indicates weak agreement that an increase / decrease will occur, and grey denotes projections where the ensemble agreement is less than 60% on the direction of future change.

Table 13-2: Projected change for the 2080s future horizon (2070-2099)

	Tmin (°C)	Tmean (°C)	Tmax (°C)	Precipitation (mm)	Evaporation (mm)	Runoff (mm)	Wind Speed (km/h)
Annual	4.04	3.83	3.72	4.56	4.76	-0.34	-0.13
Winter	6.11	5.19	4.53	4.11	2.56	3.1	-0.04
Spring	3.85	3.57	3.45	9.72	9.79	-3.92	-0.11
Summer	3.45	3.52	3.69	0.45	4.29	0.2	-0.54
Fall	3.63	3.63	3.59	3.88	4.4	0.07	-0.19

↑ ↓ Strong agreement

↑ ↓ Moderate agreement

↑ ↓ Weak agreement

↑ ↓ Negligible agreement

The model projects average temperatures will increase by 2.83°C in the 2050s and 3.83°C in the 2080s (Table 13-1; Table 13-2). Both future time horizons (Table 13-1; Table 13-2) show strong agreement that temperature will increase into the future in all seasons. Winter is projected to experience the greatest temperature increase.

There is strong agreement that annual and winter precipitation will increase for both future time horizons. Increasing spring and fall precipitation is also projected, although with less agreement. Summer precipitation shows very small changes and is associated with notable uncertainty regarding the direction of change.

As expected, increasing temperature results in increasing evaporation, which may result in dryer summers. Some runoff projections show increasing winter runoff coincident with decreasing spring runoff, which may suggest changes in runoff timing. Increased temperatures result in earlier snowmelt in winter months, leaving less snow to melt in spring. Global climate models suggest that mean wind speed is not expected to drastically change in the future.

13.2 Greenhouse gas emissions

The following section documents the predicted construction and operation and maintenance greenhouse gas emissions ('GHG emissions') for the project, including construction activity GHG emissions (including supply-chain GHG emissions), land-use change GHG emissions resulting from permanent disturbances, and maintenance GHG emissions during operation. A full technical report is provided in Appendix F.

Total aggregated GHG emissions are anticipated to be 5.9 kilotonnes ("kt") of carbon dioxide equivalent ("CO_2e") for the project. While aggregated GHG emissions are presented to the nearest tonne ("t") in Table 13-3, this is only done to help facilitate comparison between activities; it is not intended to imply that this level of accuracy was achieved in the assessment of GHG emissions.

Table 13-3: Summary of GHG emissions

Activity	kt CO_2e	% of total
Construction: Material Supply Chain	2.454	41.5%
Construction: On-Site Energy	0.817	13.8%
Construction: Worker Transport	0.144	2.4%

Station Maintenance	2.325	39.3%
Station Land Use Change	0.169	2.9%
Total	**5.909**	

13.2.1 Construction-activity GHG emissions

GHG emissions will result from the construction of the project, including GHG emissions embedded in the materials ("supply-chain GHG emission") used to construct the station. These supply-chain GHG emissions have been estimated to provide a useful point of comparison with direct on-site construction GHG emissions which are predicted to represent only 13.8% of overall station related GHG emissions.

Construction related activities for have been broken down into three major activities:

1. Manufacture of construction components/materials (supply-chain)
2. Transportation of construction components/materials (supply-chain)
3. Construction of the station (on-site energy and worker transport)

Most construction GHG emissions are supply-chain GHG emissions embedded in the manufacturing of station components/materials. Material related GHG emissions include estimates for electrical apparatus (e.g., transformers, disconnects, circuit breakers etc.), the control building (including major internal equipment), above-ground conductors, the below-grade grounding system, foundations (for the control building and electrical apparatus), yard cover, electrical apparatus supports, take-off structures (e.g., gantry towers), and fencing.

Conservative estimates have been made during the calculation of GHG emissions throughout. For example, most metal components will likely be manufactured internationally, but not all. For this assessment, India was selected as the presumed source location because India is one of the furthest locations in which to estimate transport GHG emissions, resulting in a conservative estimate of GHG emissions (a higher estimate); but, the actual source location of most station components are unknown at this time. A detailed list of assumptions is provided in the technical report.

GHG emissions related to the construction of the station, and the transportation of workers, are based on workforce estimates for each stage of construction (Table 2-2) and high level assumptions of vehicle requirements. Machinery operation may include excavators, loaders, dozers, graders, backhoes, cranes (e.g., 20 tonne, 50 tonne), semi-trailers, dump trucks, tracked vehicles, pick-up trucks, drill rigs, bucket

trucks, telehandlers, tensioners, pullers, person lifts, all-terrain and support vehicles as well as generators, compressors and other small construction equipment.

GHG emissions resulting from on-site energy use during construction are estimated to be 0.8 kt. For comparison, this is about 3% of the annual GHG emissions from Manitoba Hydro's existing fleet (25 kt of CO_2ein 2019; (Manitoba Hydro 2020a)).

13.2.2 Land use change GHG emissions

The use of construction vehicles during station construction will result in direct GHG emissions ("construction-activity GHG emissions"). In addition to this GHG emissions impact, station construction will also permanently alter the carbon content of areas of the station where land is covered by foundations and/or compacted granular fill and granite isolation stone.

For estimating land use change impacts, this assessment followed similar methods to those used for the life cycle assessment of the Manitoba-Minnesota Transmission Project (Jeyakumar and Kilpatrick 2015). From a carbon content perspective, the entire area within the station's fence-line is assumed to have all above ground carbon content (e.g., crops) permanently removed.

For the purposes of this assessment we have assumed 3 ha of farmland will be permanently covered. Land use change GHG emissions as a result of the construction are estimated to be 0.169 kt of CO_2e. Table 13-4 summarizes the key inputs assumed for that estimate.

Table 13-4: Right-of-way land use change summary

Land use change component	Value	Unit
Area affected (ha)	3	ha
Above ground carbon content - original state	15.33	tonne C/ha
Above ground carbon content - modified state	0.0	tonne C/ha
Permanent carbon change	15.33	tonne C/ha
GHG emissions released (per ha)	56.22	tonne CO_2e/ha
GHG Emissions Released	**0.169**	**kt CO_2e**

13.2.3 Operation and maintenance GHG emissions

Operation and maintenance emissions, due to the use of vehicles, at the station are expected to minimal. However, 136 kg of carbon tetrafluoride ("CF_4") and 227 kg of sulphur hexafluoride ("SF_6") are expected to be incorporated into circuit breakers added to the station. These are potent greenhouse gases with global warming potentials of 7,390 tonnes of CO_2e/tonne of CF_4 and of 22,800 tonnes of CO_2e/tonne of SF_6. Based on these emission equivalency factors, and the total amount of CF_4 and SF_6 associated with the project, there is a total potential of 6,181 tonnes of CO_2e related to these installed gases. New breakers are expected to have an average release rate of <1%/year, which translates to be 0 to 62 tonnes of CO_2e per year. This assessment assumed a release rate of 0.5% over 75 years, which would result in 2.3 kt of CO_2e. This is a conservative assumption that increased construction related emissions by over 60% (compared with an estimate that excluded these potential emissions). It is probable that a much lower level of CF_4 and SF_6 is unintentionally released throughout the life of the station.

13.3 Summary

Aggregated construction related emissions for the Wash'ake Mayzoon Station are 5.9 kt of CO2e. The two most significant categories of construction related emissions are the supply-chain emissions embedded in the materials of Wash'ake Mayzoon Station components and maintenance emissions related to the unintentional release of sulphur hexafluoride ("SF6") and carbon tetrafluoride ("CF4") gases throughout the presumed 75-year life of the station; however, it is probable that a much lower level of CF4 and SF6 would be released.

14.0Effects of the environment on the project

14.1 Overview

Effects of the environment on the project refer to the forces of nature that could affect the project physically or hamper the ability to carry out activities in their normal, planned manner. Typically, potential effects of the environment on any project are a function of project or infrastructure design and the risks of natural hazards and influences of nature. These effects may result from physical conditions, landforms and general site characteristics that may act on the project such that project components, schedule and/or costs could be substantively and adversely changed.

While environmental forces (e.g., severe weather, climate change) have the potential to adversely affect the project, good engineering design considers and accounts for these effects and the associated loadings or stresses on the project that may be caused by these environmental forces. The methodologies used for mitigating potential effects of the environment on the project are inherent in the planning, engineering design, construction, and planned operation of a well-designed project expected to be in service for several decades or longer.

The potential effects of the environment on the project is focused on the following effects:

- Delays in construction and/or operation and maintenance
- Damage to infrastructure
- Reduced visibility impacting public health and safety

14.2 Effects analysis

The assessment of the effects of the environment on the project considers potential changes to the project that may be caused by the environment. The project will be designed, constructed, and operated in compliance with various codes, standards, beneficial practices, acts, and regulations that govern the required structural integrity, safety, reliability, and environmental and operating performance of the project to minimize the potential for adverse effects of the environment on the project.

There are no environmental factors that are expected to interact substantially with the construction of the project. While some weather-related delays are possible, they are not likely to adversely affect the project construction, schedule, or cost.

During operation and maintenance, the transmission line or station components be subject to severe weather events. Manitoba Hydro designs its infrastructure to withstand extreme weather; however, it is not possible to design for all eventualities.

Severe weather that has negatively affected the Manitoba Hydro system in the past includes tornados, ice storms and floods. There is potential for any of these to occur in the regional assessment area. Mitigation measures include, applying engineering practices and scheduling of activities to account for possible weather disruptions.

Over the next 100 years, Manitoba will likely experience warmer temperatures, a greater frequency of storm events, increasing storm intensity and an increase in annual precipitation. Potential effects of climate change on operation and maintenance of the project would be related to increases in the frequency of severe weather events, changes in temperature and changes in precipitation. It is expected that increases in extreme weather events would potentially affect operation and maintenance of the project by increasing unexpected maintenance due to storm damage. Changes in temperature could affect the freeze/thaw cycle, which will result in decreased foundation stability and potentially increased maintenance.

Mitigation measures include applying engineering practices and scheduling of activities to account for possible weather disruptions. Based on the above, the residual effects of the environment on the project during all phases of the project assessed as minor, with a moderate level of confidence because of the uncertainty in the potential changes to local, regional, and global climate that could occur over the life of the project.

14.3 Assessment conclusions

The most likely effect of the environment on the project is a short-term disruption in service and the economic costs of repair. The project will be designed to meet applicable CSA standards. Design will be subject to two general design standards and the structural design loads will be based on a 150-year return period. Despite these measures, it is likely that extreme weather events can still result in outages and the requirement for repair of lines, conductors or towers. While this can result in socio-economic effects and potential public safety hazards, potential effects on the biophysical environment would be limited and associated mainly with an increased risk of an accidental release of hydrocarbons in the event of a flood or fire.

The project is being designed, and will be constructed and operated with regard for health, safety, and environmental protection to minimize potential environmental effects that could result during the normal course of construction, operation and

maintenance as well as those that could result from forces of nature that could affect the project physically or hamper the ability to carry out activities in their normal, planned manner.

The careful planning and design of the project will minimize the potential for damage from extreme weather events. The effects of an individual event could have significant effects on a localized extent. However, the potential for these events to occur, given the measures that will be undertaken to prevent their occurrence, is low.

In the very unlikely and improbable event that damage to the line were to occur, it would be of a short duration, low frequency, or limited geographic extent such that major residual adverse environmental effects will not likely occur.

Overall, given the nature of the project, proposed mitigation, the potential residual environmental effects, extreme weather events on all valued components during all phases of the project, are assessed as not significant.

15.0Accidents and malfunctions

15.1 Overview

In the context of environmental assessment, a malfunction is a failure of a piece of equipment, a device, or a system to operate as intended and an accident is an unexpected and unintended interaction of a project component or activity with environmental, health-related, social, or economic conditions (Impact Assessment Agency 2021).

These could occur as a result of abnormal operating conditions, wear and tear, human error, equipment failure, or other possible causes. Many accidents or malfunctions are preventable and can be readily addressed or prevented by good planning, design, equipment selection, hazards analysis and corrective action, emergency response planning, and mitigation.

In this section, potential accidents and malfunctions that could result in significant adverse environmental effects are described, discussed, and assessed. The focus is on credible accidents that have a reasonable probability of occurrence, and where the resulting residual environmental effects could be major without careful management.

It is noted that accidents and malfunctions are evaluated individually, in isolation of each other, as the probability of a series of accidental events occurring in combination with each other is very minimal. These possible events, on their own, generally have a very low probability of occurrence and thus their environmental effects are of low likelihood. They have an even lower probability or likelihood of occurring together – thus their combination is not considered credible, nor of any measurable likelihood of occurrence.

Accident and malfunction event scenarios have been conservatively selected that represent higher consequence events that would also address the consequences of less likely or lower consequence scenarios.

The accidents, malfunctions, and unplanned events that have been selected based on experience and professional judgment are as follows:

- Worker accident
- Fire
- Power outages
- Tower / structure collapse (weather, sabotage or force majeure)
- Spill of hazardous materials

- Collisions
- Discovery of a heritage site / object

Table 15-1 presents the potential interactions between the valued components and potential accidents or malfunctions. Project and cumulative effects of the accident or malfunction event on each valued component with a potential interaction are described, and the significance of the effect is determined using the same thresholds as those for the project environmental effects. Any event that results in human mortality is considered significant. The potential for, and consequence of, accidents and malfunctions were assessed considering historical risk information from Manitoba Hydro's experience and for other similar projects.

Table 15-1: Project-accident / malfunction interactions

Accident /malfunction	Valued components						
	Agriculture	Human health	Community well-being	Wildlife	Economic opportunities	Traditional practices, culture and heritage	Greenhouse gases
Worker accident		X	X				
Fire	X	X	X	X		X	X
Power outages			X		X		
Tower collapse (weather, sabotage or force majeure)		X		X			
Spill of hazardous materials	X	X		X		X	X
Collisions		X	X				
Discovery of a heritage site / object						X	

15.2 Effects assessment

15.2.1 Worker accident

A worker accident has the potential to interact with human health and safety as it may result in harm, injury, or death to workers. All workers will be properly trained in practices to prevent workplace accidents including Workplace Hazardous Materials Information System (WHMIS), first aid, and other applicable training programs. These procedures are designed to prevent serious injury to staff and the general public as well as to minimize the occurrence of unplanned events and minimize any potential damage to the environment.

Interactions between a worker accident and communities will be mitigated by compliance with health and safety legislation, safety by design, and implementation of environmental management measures aimed at protecting human health. Safety risks to workers will be reduced by complying with the requirements of various governing standards including the federal *Canada Labor Code*, the federal *Transportation of Dangerous Goods Act*, the *Manitoba Workplace Health and Safety Act* and all associated regulations. Adherence to public safety codes and regulations will help the project to be carried out in a safe manner to protect workers and the public.

With the application of, and compliance with, these acts, regulations, and standards, including the application of safety and security measures that are known to effectively mitigate the potential environmental effects, the potential environmental effects of a worker accident on communities during construction and operation and maintenance of the project are considered not significant.

15.2.2 Fire

Potential effects caused by a fire include:

- Smoke emissions (GHG / climate)
- Safety risks to workers and the public (human health)
- Loss or damage to property or resources (community well-being)
- Direct crop loss (agriculture)
- Contamination with sediment-laden water used in extinguishing the fire (groundwater (human health), wildlife, agriculture)
- Damage to infrastructure or heritage sites / objects (heritage sites / objects, traditional practices and culture)

A fire may arise from heavy equipment or from natural causes such as a lightning strike.

Manitoba Hydro will ensure that personnel are trained in the use of fire-extinguishing equipment. In the unlikely event of a fire, local emergency response will be able to reduce the severity and extent of damage.

A large fire could create particulate matter levels greater than the ambient air quality standard over distances of several kilometers or damage vegetation or infrastructure in the area, but such situations would be of short duration, infrequent, and are not expected to occur because of planned mitigation and prevention measures. The potential residual environmental effects of a fire are therefore considered not significant.

15.2.3 Hazardous materials spill

Hazardous materials could be released into the air, soils, surface water or groundwater as a result of an accidental spill during construction or operation and maintenance activities.

In general, hazardous materials spills have the potential to:

- Contaminate surface and groundwater (human health, traditional practices and culture, wildlife)
- Contaminate soil (agriculture, traditional practices and culture, wildlife)
- Increase harmful emissions (GHG / climate)

Spills are usually highly localized and easily cleaned up by on-site crews using standard equipment. The oil containment infrastructure for the station will limit potential effects during operation.

Implementation of a detailed spill response plan and a well-designed construction environmental protection plan will result in minimal potential effects through accidental releases. The contractor will be required to provide environmental training, as well as training in spill prevention and response, to construction personnel. Prior to the commencement of construction activities, Manitoba Hydro will ensure that spill response equipment is readily available. All spills will be contained, cleaned, and reported to applicable authorities as follows:

- Contaminated material or potentially hazardous material will be contained
- Proper safety precautions (e.g., protective clothing and footwear) will be taken
- The contractor will follow their spill response policy and will ensure that the provinces spill reporting line is notified for reportable spills

- Contaminated wastes, such as used cleaning cloths, absorbents, and pads, will be stored in proper waste containers
- Waste material will be disposed of at approved disposal facilities

Construction equipment will be cleaned and maintained in good working condition, with visual inspections of equipment performed on a regular basis. Petroleum products such as gasoline, diesel fuel, and oil will be properly labeled in accordance with the appropriate legislation and regulations. Refueling, oiling, and maintenance of equipment, as well as storage of hazardous materials, will be conducted in a designated and contained area(s). Servicing of equipment (e.g., oil changes and hydraulic repairs) will be completed off-site when possible. Vehicles will be equipped with spill containment and cleanup materials.

Personnel handling fuels and hazardous wastes will have WHMIS training and will be qualified to handle these materials in accordance with the manufacturer's instructions and applicable regulations. Hazardous waste and storage area(s) will be clearly marked and secured. Industrial waste will be reused or recycled on a priority basis. Where reuse or recycling opportunities are not available, industrial waste will be collected and disposed of at an approved facility. Garbage receptacles for solid non-hazardous wastes will be available. These wastes will be collected on a regular basis or as they are generated and will be disposed of at approved locations. With these mitigation measures and emergency response procedures implemented, and because of the low likelihood of such events, the potential residual environmental effects of a hazardous material spill on groundwater resources, aquatic environment, and terrestrial environment during construction and operation and maintenance of the project are considered not significant.

15.2.4 Vehicle accidents

A vehicle accident arising from project-related activities could cause injury or death to workers or the public (human health; note that the potential for a fire or hazardous material spill, which could be associated with a vehicle accident or other means has been addressed above).

The potential for a vehicle accident exists during construction and operation and maintenance phase of the project. Worker traffic and truck traffic to and from the site, and the operation of heavy equipment on-site during construction have the potential to result in a vehicle accident during construction. Project-related vehicles will observe all traffic rules and provincial and federal highway regulations. Trucking activity will observe speed limits and weight restrictions. Because the project will comply with all applicable traffic rules and regulations, the nominal increase in traffic

volumes as a result of the project along with safety precautions, the potential residual environmental effects of a vehicle accident are considered not significant.

15.2.5 Tower collapse

While considered unlikely given the applied design standards, it is possible for a transmission tower or station structure to collapse during construction and operation as a result of extreme weather, mechanical failure, or intentional or unintentional human interaction.

Tower collapse has the potential to:

- Cause injury or death (human health)
- Cause fires (effects and mitigation discussed above)
- Damage other infrastructure, heritage / cultural sites, crops, either directly due to tower collapse or as a result of emergency repair activities (agriculture, community well-being, traditional practices and culture)
- Impede access / movement (traditional practices and culture, wildlife)

The risk of tower failure will be reduced through the application of sound engineering practice in the design of the towers and transmission lines for extreme loadings, the use of qualified construction contractors, and regular maintenance.

Engineering design will adhere to industry standards and reflect Manitoba Hydro's experience with similar projects. Design will follow the Canadian Standards Association (CSA) C22.3 No. 1-10 "Overhead Systems" standard. The reliability-based design method will be used for designing the structural components following the CAN/CSA-C22.3 No. 60826-10 "Design Criteria of Overhead Transmission Lines" standard.

In addition, consequences are managed through mitigation. Line maintenance crews will address damage to personal property, vegetation or soils. Soil contamination issues will be addressed following spill response planning.

The effects of a tower collapse would be localized and short term. The viability of wildlife populations or the capacity of critical habitat for wildlife species of conservation concern would not be jeopardized. Disruption of infrastructure or agriculture is short term and minimal. Given the localized extent of the effects on wildlife habitat, effects on land use activities are not expected to extend beyond the actual collapsed structures. The likelihood of injury to or death of, humans or wildlife is low given the limited area affected by a tower collapse and the rarity of such an occurrence. As a result, while the magnitude of the effect of tower collapse on the

affected valued component could be moderate to high, given the low likelihood and array of mitigation measures the effect is assessed as being not significant.

15.2.6 Discovery of a heritage site / object

Cultural or heritage sites / objects may be discovered during activities involving ground disturbance such as construction related excavation. It is unlikely that a heritage sites / objects will be discovered during operation.

The discovery of a heritage site / object has the potential to affect heritage sites / objects and traditional practices and culture.

Heritage potential is determined during the environmental assessment. If areas of high potential are found, a preconstruction archaeological survey may be conducted.

Mitigation for the protection of heritage sites / objects is outlined in the cultural and heritage resources protection plan (Appendix B).

The CHRPP will provide clear instructions if Manitoba Hydro, its contractors and/or consultants, discover or disturb a cultural or heritage sites / objects and will determine the ongoing protection measures for the resources through processes outlined in this document.

If a heritage site / object is discovered, project work will cease in the area of the discovery and the project archaeologist will be contacted. Work in the area will continue only if approval is received from the archaeologist or the Historic Resources Branch.

With the low probability of encountering heritage sites / objects during project-related activities, and in consideration of the nature of the project and planned mitigation, the potential residual effects are considered not significant.

15.3 Assessment conclusion

The project is being designed, and will be constructed and operated with regard for health, safety, and environmental protection to minimize potential environmental effects that could result during the normal course of construction, operation and maintenance as well as those that could result from accidents and malfunctions.

The careful planning of the project and the implementation of proven and effective mitigation will minimize the potential for accidents and malfunctions. The effects of an individual accident or unplanned event could have significant effects on a localized extent. However, the potential for these events to occur, given the measures that will be undertaken to prevent their occurrence, is low. In the very unlikely and

improbable event that an accidents or malfunctions were to occur, it would be of a short duration, low frequency, or limited geographic extent such that major residual adverse environmental effects will not likely occur.

Overall, given the nature of the project, credible accidents and malfunctions considered, proposed mitigation, the potential residual environmental effects of all project-related accidents and malfunctions on all valued components during all phases of the Project, are assessed as not significant.

16.0Environmental protection program

16.1 Introduction

Manitoba Hydro will implement the mitigation measures, monitoring and other follow-up actions identified during the assessment (summarized in Appendix G) through an Environmental Protection Program (EPP). The EPP provides the framework for implementing, managing, monitoring and evaluating environmental protection measures consistent with regulatory requirements, corporate commitments, beneficial practices and public expectations. Environmental protection, management and monitoring plans will be prepared and implemented under the EPP to address environmental protection requirements in a responsible manner.

The purpose of this chapter is to outline how Manitoba Hydro will implement, manage and report on environmental protection measures, monitoring and other follow-up actions as well as regulatory requirements and other commitments identified in this environmental assessment report.

Manitoba Hydro developed the environmental protection program in accordance with its environmental policy.

Manitoba Hydro's Corporate Environmental Management Policy states the corporation is committed to protecting the environment by:

- ensuring that work performed by its employees and contractors meets environmental, regulatory, contractual, and voluntary commitments
- recognizing the needs and views of its interested parties and ensuring that relevant information is communicated
- continuously assessing its environmental risks to ensure they are managed effectively
- reviewing its environmental objectives regularly, seeking opportunities to improve its environmental performance
- considering the life cycle impacts of its products and services
- ensuring that its employees and contractors receive relevant environmental training, and
- fostering an environment of continual improvement

16.2 Environmental management

An environmental management system is a framework for developing and applying its environmental policy and includes articulation of organizational structure,

responsibilities, practices, processes and resources at all levels of the corporation. The environmental management system includes commitments to comply with legislation, licenses, permits and guidelines, conduct inspections and monitoring, and review the results for adherence to requirements.

16.3 Adaptive management

Adaptive management is a planned systematic process employed with the goal of continually improving environmental management practices by learning from their outcomes. The environmental protection program for the project has established the principles of adaptive management allowing for flexibility in the mitigation of adverse environmental effects that may result from the project. Manitoba Hydro will use the information gathered during follow up and monitoring activities to verify the accuracy of the environmental assessment effects predictions and the effectiveness of implemented mitigation measures.

Manitoba Hydro designed the EPP to be adaptive and responsive throughout the project lifecycle by evaluating program documents, processes, procedures and mitigation measures through inspection, monitoring and communication programs and conducting reviews to facilitate updates to the program.

Within the EPP, adaptive management will take place in two primary areas:

- At the management level, involving changes with the program structure itself
- At the implementation level, involving individual mitigation measures as management and implementation teams evaluate the onsite effectiveness of mitigation strategies or the program.

Scheduled update meetings between departments, annual reviews of the program and its effectiveness will take place to foster the process.

16.4 Experience from previous projects

Manitoba Hydro has extensive experience in the development of environmental protection, monitoring and follow-up plans for all sizes of projects in many different environments, from small electrical stations, to transmission lines that span over half of Manitoba.

The development of the EPP has allowed the standardization and consistent approach to environmental protection, monitoring and follow-up. The EPP improves through the experiences from past and current projects (e.g., monitoring and inspection results, documentation format changes).

16.5 Indigenous engagement

As a component of the Indigenous engagement process, Manitoba Hydro offered the ICACs the opportunity to review the IEP and traditional practice, culture and heritage chapters of the environmental assessment. Feedback shared by Indigenous communities during the IEP helped inform the environmental assessment report and EPP.

The knowledge that was shared through the IEP assisted Manitoba Hydro with:

- Developing a greater understanding of the project development area
- Identifying key concerns in the project development area
- Identifying potential project effects
- Planning and designing the project
- Developing potential mitigation measures

Manitoba Hydro recognizes the unique relationship that Indigenous communities and organizations have with their areas of land use and appreciates sharing of information about their history and culture, and perspective on the project.

16.6 Environmental protection program

16.6.1 Overview

Manitoba Hydro's Environmental Protection Program (EPP) provides the framework for the delivery, management and monitoring of environmental and socio-economic protection measures that satisfy corporate policies and commitments, regulatory requirements, environmental protection guidelines and beneficial practices, and input during the public engagement process and Indigenous engagement process. The EPP:

- Describes how Manitoba Hydro is organized
- Functions to deliver timely, effective, comprehensive solutions and mitigation measures to address potential environmental effects
- Defines roles and responsibilities for Manitoba Hydro employees and contractors
- Outlines management, communication and reporting structures.

The EPP includes the what, where and how aspects of protecting the environment during the pre-construction, construction, operation and decommissioning of the project. Figure 16-1 illustrates the components of the EPP. The following sections describe each component in further detail.

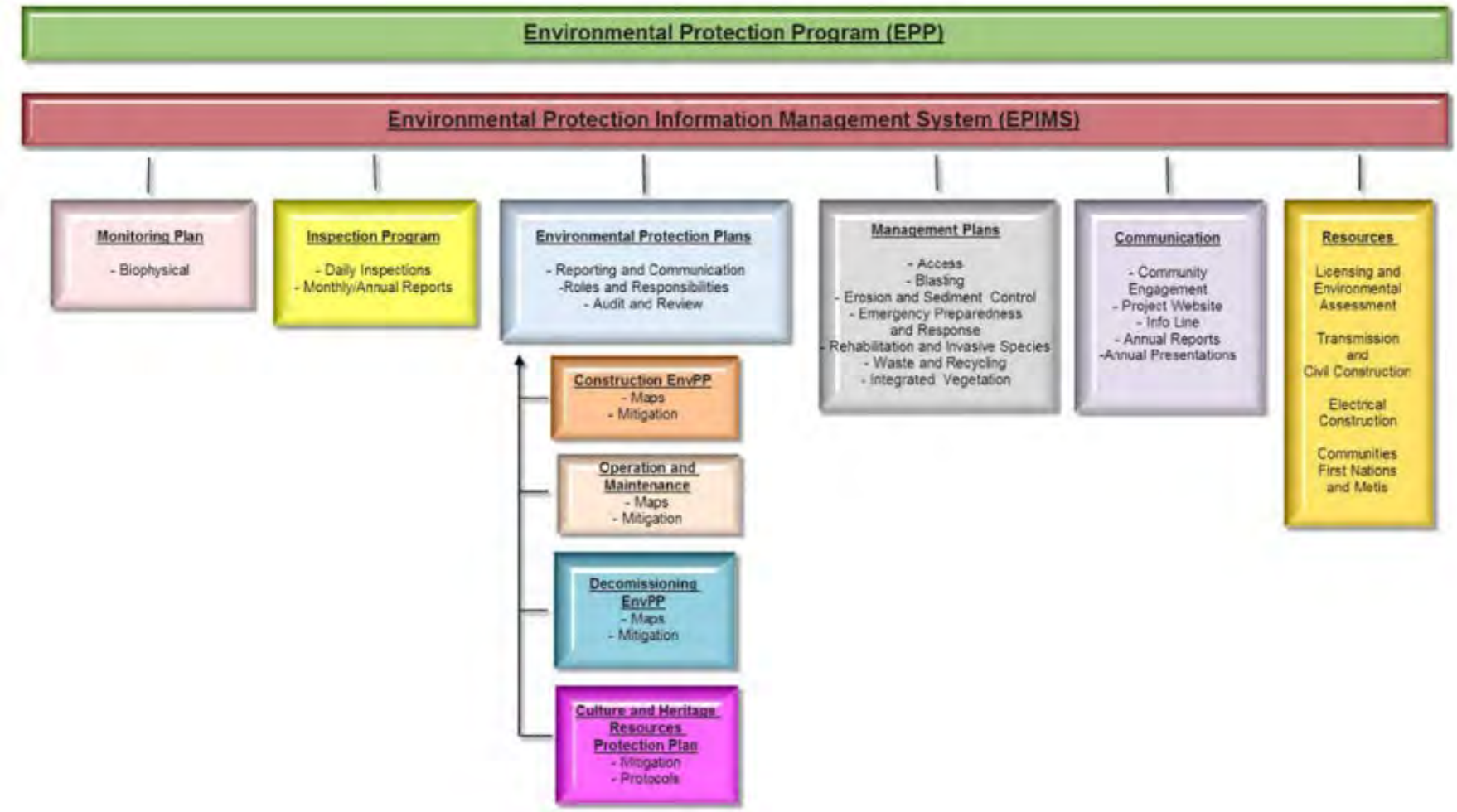

Figure 16-1: Environmental protection program components

16.6.2 Organization

The organizational structure of the EPP includes senior Manitoba Hydro management, project management and implementation teams that work together to provide timely and effective implementation of environmental protection measures identified in environmental protection plans (Figure 16-2). Manitoba Hydro senior management is responsible for the overall EPP, including resourcing, management and performance, and is accountable for regulatory compliance, policy adherence and interested party satisfaction.

The environmental protection management team is composed of senior Manitoba Hydro staff and is responsible for the management of environmental protection plans, including compliance with regulatory and other requirements, quality assurance and control, consultation with regulators, and related public and Indigenous engagement activities. Environmental consultants and advisors support the management team.

The environmental protection implementation team is composed of Manitoba Hydro operational field and office staff and is responsible for the day-to-day implementation of environmental protection plans, including monitoring, inspecting and reporting. The implementation team works closely with other Manitoba Hydro staff as required.

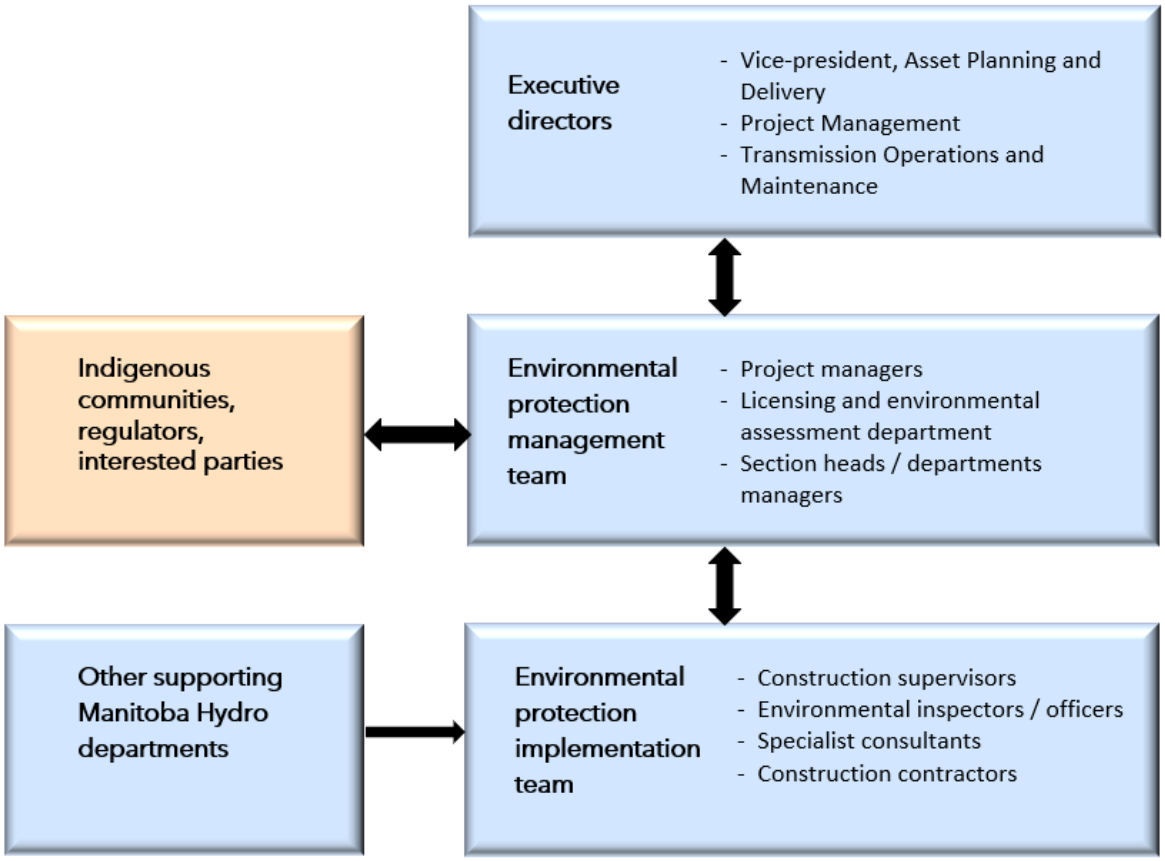

Figure 16-2: Environmental protection organizational structure

16.6.3 Resources

Manitoba Hydro commits resources early in the planning cycle to provide effective environmental assessment, mitigation and monitoring. Teams of engineers and environmental professionals develop preventative or avoidance mitigation measures that include design and routing alternatives. In addition, there are resource allocations for the delivery and implementation of environmental protection measures to meet corporate policy and government regulatory requirements.

Manitoba Hydro is committed to staffing the environmental protection program with environmental inspectors and providing required support, including training, financial resources and equipment.

16.6.4 Roles and responsibilities

Figure 16-3 illustrates the typical organizational lines of reporting and communications. The roles and responsibilities for delivery of the project and implementation of environmental protection measures are as follows:

- The construction supervisor has overall responsibility for the implementation of the environmental protection plans and reports to a section head or department manager.
- The Licensing and Environmental Assessment Department oversees the development of environmental protection documents and associated inspection and monitoring programs, including ongoing public and Indigenous engagement activities.
- The construction contractor is responsible for ensuring work adheres to the environmental protection plans and reports to the construction supervisor.
- Environmental inspectors / officers have the primary responsibility to confirm that environmental protection measures and specifications are implemented per the environmental protection plans as well as provide information and advice to the construction supervisor.
- Manitoba Hydro field safety, health and emergency response officers are responsible for the development and execution of the safety program and occupational health and safety practices at the various construction sites.

Other Manitoba Hydro employees, including engineers and technicians, provide information and advice to the construction supervisor.

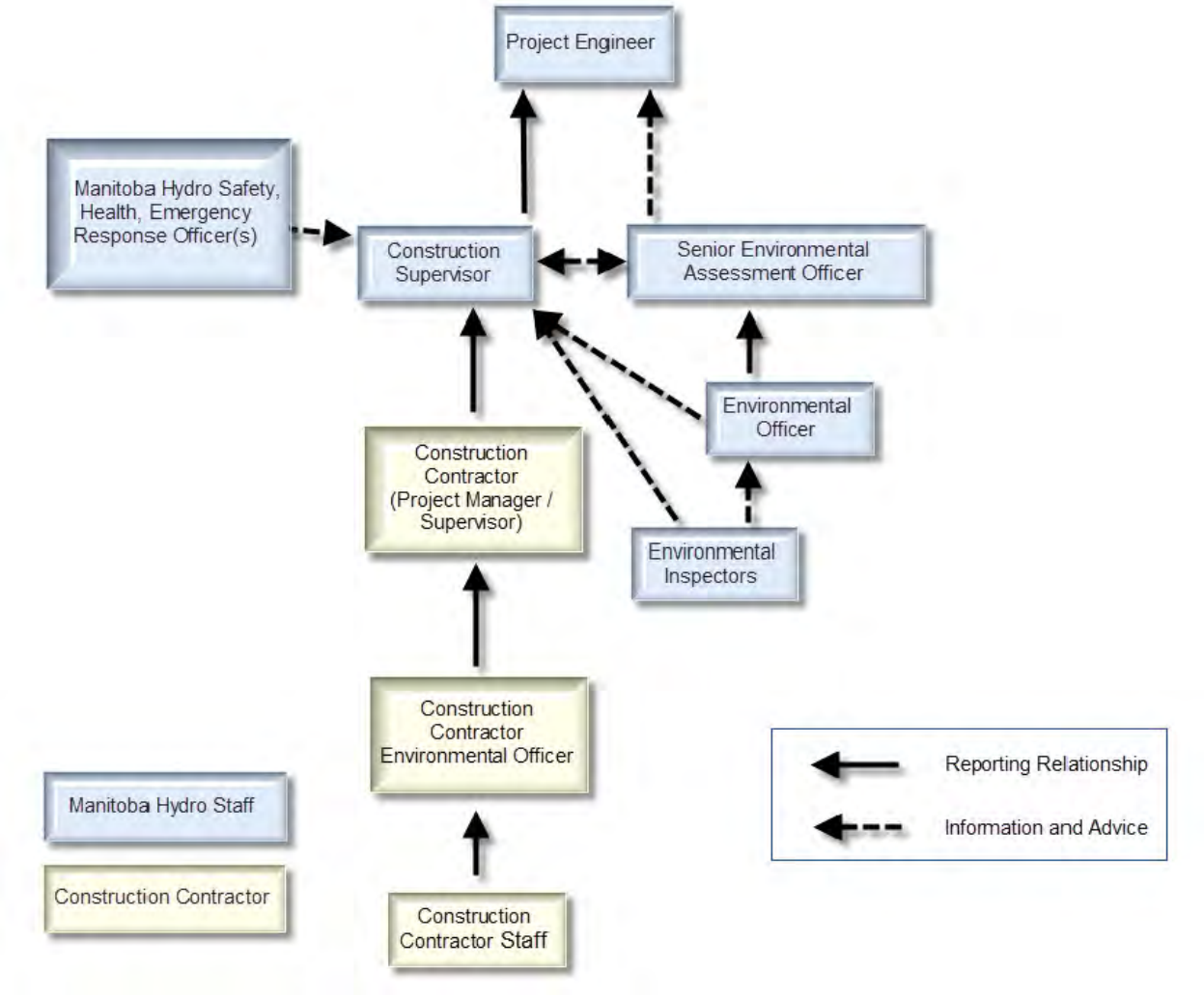

Figure 16-3: Typical organizational lines of reporting and communications

16.6.5 Communication and reporting

Manitoba Hydro personnel will maintain ongoing communications with Manitoba Conservation and Climate, other provincial and federal departments, and Indigenous communities and organizations regarding implementation of the environmental protection plan. The construction supervisor and environmental inspectors will maintain ongoing communications with the contractor and contract staff through daily tailboard meetings and weekly or otherwise scheduled construction meetings at the worksite. Inspection reports as well as incident, monitoring and other reports will be prepared and available on site for the regulators, contractors and Manitoba Hydro staff.

Manitoba Hydro will provide Indigenous communities and organization, landowners, interested parties and the public with ongoing opportunities to review and comment on the project. Manitoba Hydro developed a dedicated project webpage to facilitate communication with Indigenous communities and organizations, landowners, interested parties and the public. The environmental protection management team will record and review formal enquiries or complaints for response or action. Manitoba Hydro will also engage Indigenous communities in monitoring of the Project whether it be through field tours offered to community members during construction of the Project or through Indigenous monitoring positions.

16.6.6 Environmental protection plans

Environmental protection plans document environmental protection measures to provide for compliance with regulatory and other requirements, and to achieve environmental protection goals consistent with corporate environmental policies. Manitoba Hydro designed the environmental protection plans as user-friendly reference documents that provide project managers, construction supervisors and contractors with detailed lists of environmental protection measures and other requirements implemented in the design, construction and operation phases of a project.

Manitoba Hydro organized the environmental protection measures by construction component and activity, and environmental component and issue to assist project personnel in implementing measures for work sites and activities.

Manitoba Hydro will develop the environmental protection plans described in the following sections.

16.6.6.1 Construction

The construction environmental protection plan (CEnvPP) will be prepared prior to construction. It is a key element in implementing effective environmental protection and limiting the potential adverse environmental effects identified in the environmental assessment report. It also outlines actions to identify unforeseen environmental effects and implement adaptive management strategies to address them. An important component of an environmental protection plan is review and updating. This allows environmental protection measures to remain current, continually improving environmental performance.

A CEnvPP is composed of general and specific environmental protection measures that cover all aspects of the work and the environment. General environmental protection measures for the project include mitigation measures and follow-up

actions identified in the environmental assessment report, including design mitigation, provincial and federal regulatory requirements, beneficial practice guidelines, Manitoba Hydro environmental policies and commitments, and input during public and Indigenous engagement.

The CEnvPP lists the general environmental protection measures for major components and activities associated with the project. Environmental protection measures are provided for environmentally sensitive sites (ESS) identified during public and Indigenous engagement and assessment activities. Environmentally sensitive sites are locations, features, areas, activities or facilities along or immediately adjacent to the transmission line corridor or other project components that are ecologically, socially, economically or culturally important and sensitive to disturbance by the project and, as a result, require site-specific mitigation measures.

The CEnvPP will contain orthophoto map sheets that provide Manitoba Hydro project managers, construction supervisors, employees, contractors and contract employees with detailed site-specific environmental protection information that can be implemented, managed, evaluated and reported on in the field.

16.6.6.2 Operation and maintenance

The Operations and Maintenance Environmental Protection Plan will be prepared after completion of construction. The plan will contain ongoing operation monitoring requirements. It applies to project components from in-service to the end of their operational life.

16.6.6.3 Decommissioning

A decommissioning environmental protection plan will be prepared at the end of the project's operational life and will contain decommissioning methods, waste and recycling management, and mitigation measures to address environmental effects and legislation that is in effect at that time.

16.6.6.4 Cultural and heritage sites / objects

The fact that cultural and heritage sites / objects have intrinsic value to Manitobans is understood by Manitoba Hydro and addressed through a separate protection plan. The culture and heritage resource protection plan (Appendix B) outlines protection measures in the event of the discovery of previously unrecorded cultural and heritage sites / objects during construction and describes the ongoing monitoring of known cultural and heritage sites / objects for disturbance.

Through Indigenous engagement and previous projects, Manitoba Hydro understands and acknowledges the importance of cultural and heritage sites / objects to Indigenous communities. Manitoba Hydro has developed mechanisms such as notification of discovery and involvement in site investigations, which are further explained in the culture and heritage resource protection plan.

Results from the heritage resources monitoring program will be discussed through Indigenous engagement on an as required basis during construction, as well as through a heritage resources impact assessment to the Manitoba Historic Resources Branch per the terms of the Heritage Resources Act (1986) and heritage permit.

16.6.6.5 Management plans

Management involves the organization of activities and resources to resolve or respond to environmental problems, issues or concerns. Management plans provide reasoned courses of action to achieve pre-defined goals or objectives. Management plans will be prepared to address important management issues, regulatory requirements and corporate commitments identified in the environmental assessment report. The management plans will describe the management actions, roles and responsibilities, evaluation mechanisms, updating requirements and reporting schedules. The following management plans will be prepared prior to the start of construction of the project:

- Biosecurity
- Blasting
- Emergency preparedness and response
- Rehabilitation and weed management
- Waste and recycling

Environmental inspectors / officers will conduct regular inspections during construction to ensure adherence to the plans. The following sections describe each plan.

16.6.6.6 Biosecurity

Prior to the start of construction Manitoba Hydro will prepare a biosecurity management plan for the project to provide guidance to Manitoba Hydro staff and contractors in order to prevent the introduction and spread of weeds and other pests, including invasive species, in agricultural land and livestock operations through project pre-construction and construction activities.

16.6.6.7 Blasting

Prior to the use of explosives, the contractor will prepare blasting plans to manage the storage and use of explosives at construction sites in accordance with environmental protection measures, provincial and federal legislation and guidelines, and corporate policies for explosives.

16.6.6.8 Emergency preparedness and response

Prior to the start of construction, each contractor will prepare an emergency preparedness and response plan to prepare for and respond to emergencies at construction sites in accordance with provincial legislation and guidelines, and corporate policies and procedures for the protection of human health and the environment. The plan will include the following:

- Spills or releases of hazardous substances, including petroleum products
- Accidents involving hazardous substances
- Medical emergencies
- Explosions and fire
- Measures prescribed for
  - Provision of emergency response planning
  - Responsibilities
  - Training
  - Exercises
  - Procedures
  - Containment
  - Clean-up equipment and materials

16.6.6.9 Rehabilitation and weed management

Prior to the start of construction, Manitoba Hydro will prepare a rehabilitation and weed management plan in accordance with environmental protection measures and provincial guidelines for rehabilitation.

The plan will prescribe measures for:

- Washing equipment and vehicles prior to entering construction sites
- Controlling vegetation at construction sites
- Restoring and re-vegetating disturbed sites

16.6.6.10 Waste and recycling

Prior to the start of construction, Manitoba Hydro or the contractor will develop a waste and recycling management plan to manage waste at construction locations in accordance with provincial legislation and guidelines, and corporate policies and procedures for the protection of human health and the environment.

The plan will include measures for:

- Waste reduction
- Recycling and reusing initiatives
- Storage of kitchen wastes
- Recycling and disposal of construction wastes
- Disposal of wastes at licenced facilities

16.7 Follow-up and monitoring

Follow-up and monitoring are conducted to verify the accuracy of the environmental assessment of a project, assess the effectiveness of measures taken to mitigate adverse effects and determine compliance with regulatory requirements. Manitoba Hydro implements the follow-up and monitoring activity using two programs called inspection and monitoring, which are discussed further in the sections below.

16.7.1 Indigenous engagement

Manitoba Hydro will offer Indigenous communities and organizations environmental protection program meetings to review and discuss the findings of the environmental assessment and engagement and how the information shared will inform the EPP.

Manitoba Hydro will also engage Indigenous communities in monitoring of the project whether it be through field tours offered to community members during construction of the project or other means. Manitoba Hydro will further discuss with Indigenous communities to determine the preferred and most meaningful option for monitoring.

16.7.2 Inspection program

Inspection is the organized examination or evaluation involving observations, measurements and sometimes tests for a construction project or activity. The results of an inspection are compared to specified requirements, drawings and standards for determining whether the item or activity is in conformance with these requirements. Environmental inspection is an essential and key function in environmental protection and implementation of mitigation measures.

Manitoba Hydro has established a comprehensive integrated environmental inspection program to comply with regulatory approvals and meet corporate environmental objectives. The program includes environmental inspectors onsite during construction activities. Manitoba Hydro's approach to environmental inspection includes:

- Compliance with regulatory approvals
- Adherence to environmental protection plans
- Onsite environmental inspectors
- Training and education
- Regular monitoring and inspection during construction
- Interaction with contractors (e.g., pre-construction meeting, daily discussion)
- Regular review of inspection and monitoring information
- Quick response to incidents or changing conditions
- Monthly summary reports
- Regular reporting to regulators
- Notification of regulators of emergency or contingency situations

Environmental inspectors / officers will:

- Visit active work sites to inspect for compliance with licence, permit or other approval terms and conditions, and adherence to environmental protection plan general and specific mitigation measures
- Report all instances of non-compliance to the construction supervisor, contractor and applicable regulatory authority
- Report incidents such as accidents, malfunctions, spills, fires, explosions and environmental damage to the construction supervisor and applicable regulatory authority
- Provide inspection reports electronically to the environmental protection information management system for review and viewing by applicable Project staff

Incidents will be dealt with immediately and followed up in subsequent daily inspection reports.

16.7.3 Monitoring program

Due to the small scope of the project and minimal natural habitat, an environmental monitoring plan has not been prepared for this project. However, should inspection discover unknown effects, one may be prepared and implemented.

Should it be required, monitoring will be carried out by Manitoba Hydro and may be contracted to environmental consultants that possess the necessary expertise, equipment and analytical facilities.

16.7.4 Environmental protection information management system

An environmental protection information management system (EPIMS) is the internal central repository of environmental protection information, including:

- Environmental protection documents
- Reference information such as regulations and guidelines
- Inspection reports
- Monitoring field data and reports

The environmental inspection program will employ modern electronic recording, reporting and communication systems using field computers, geographic positioning systems and digital cameras. Field computers will have project and other reference information needed for effective implementation of environmental protection measures, including regulations, guidelines, licences, permits, engineering drawings, specifications, maps, reports and data.

EPIMS is a tool that helps Manitoba Hydro monitor and report on environmental protection implementation, regulatory compliance and incident reporting. EPIMS will be the mechanism to provide reporting and tracking of environmental protection performance, and the foundation of an auditable EPP.

16.8 Pre-construction activities

Manitoba Hydro will undertake several activities prior to commencing construction of the project to set the direction for environmental protection and compliance with legislated requirements. Manitoba Hydro will endeavour to meet with interested Indigenous communities and organizations during the finalization of the construction environmental protection plan to discuss, address and mitigate concerns, to the extent possible, with cultural and environmentally sensitive sites.

Manitoba Hydro will obtain licenses, permits, authorizations and other approvals, including property agreements, right-of-way easements and releases, prior to commencement of construction of each project component. Additional terms and conditions of these approvals will be incorporated into the construction environmental protection plan. Additional approval requirements to be obtained by the contractors will be identified and communicated to the successful bidders.

The Licensing and Environmental Assessment Department will typically participate in the tender / direct negotiated contract development process to support the inclusion of environmental requirements as contract specifications. Bidders are required to list and defend their environmental record and must have an environmental policy, including a commitment to environmental protection.

Meetings will be held with the contractors to review the environmental protection requirements, establish roles and responsibilities, management, monitoring and other plans, inspection and reporting requirements, and other submittals. Prior to the start of construction, contractor employees will be trained and/or oriented on environmental protection requirements.

16.9 Work stoppage

The duty to stop work rests with everyone encountering situations where the environment, including biophysical, socio-economic and heritage sites / objects, are threatened by an activity or occurrence that has not been previously identified, assessed and mitigated. Work stoppage is also to occur in the event of an environmental accident, extreme weather event or exposed human remains. Individuals discovering such situations are to inform their supervisor who will report the matter to the construction supervisor or environmental inspector / officer immediately. The contractor is also required to stop work voluntarily where construction activities are adversely affecting the environment or where mitigation measures are not effective in controlling environmental effects. Remedial action plans or other environmental protection measures will be developed and implemented immediately after discussion and prior to resumption of work if previously halted. Work is not to resume until the situation has been assessed and responded to and Manitoba Hydro approves the resumption of work. Stop work orders will be documented, reported to regulatory authorities (if applicable) and reviewed at construction meetings.

16.10 Review and updating

16.10.1 Incident reviews

CEnvPP will be subject to review in the event of an incident, including environmental accidents, fires and explosions, reportable releases of hazardous substances and non-compliance situations.

16.10.2 Auditing

Auditing is a systematic approach to defining environmental risk and/or determining the conformance of an operation with respect to prescribed criteria. An environmental audit typically involves a methodical examination of evidence that may include interviews, site visits, sampling, testing, analysis, and verification of practices and procedures. Environmental protection plans for the project will be subject to internal and external audits. The audit results will help to evaluate the effectiveness of environmental protection measures, to learn from inspection and monitoring programs, and to improve project planning and environmental assessment performance.

16.10.3 List of revisions

A list of revisions will be maintained at the beginning of each environmental protection plan that identifies the nature of the revision, section revised and dates.

16.11 Summary

This chapter outlined the environmental protection program where environmental protection commitments, mitigation measures and follow-up actions identified in this environmental assessment report will be implemented, managed, reported and evaluated. The purpose, organization, responsibilities, management, communication and other aspects of the environmental protection program were described. Environmental protection plans are described as they relate to the construction, operation and decommissioning stages in the project planning cycle and environmental assessment and licensing process. Implementation of follow-up actions, including inspection, management and auditing are discussed. Environmental management and monitoring plans are also identified.

17.0Conclusion

The environmental assessment for this project examined potential effects on biophysical and socioeconomic components. Biophysical components assessed include climate, groundwater and air quality, terrain and soils, and wildlife.

Socioeconomic components assessed include human health; community well-being; agriculture; and traditional practices, culture and heritage.

The primary mechanism to mitigate potential effects involved the site selection process (Chapter 3.0), which considered both biophysical and socioeconomic factors.

Mitigation measures were developed to address effects that were not avoided by site selection. Effects to the natural environment in the project region consist mainly of agricultural land and there are few areas of natural habitat that would be affected by the project. Natural terrestrial habitat is limited. There are several wildlife species of conservation concern that may occur in the region, but few natural areas near the project where they could occur.

The main effect of the project on wildlife will be the presence of the station and the security lighting that can affect adjacent wildlife habitat and alter behaviours, which could affect wildlife.

The project is expected to result in positive economic benefits to the region, through the presence of the workforce, but also indirectly, through facilitating development of industry. There will be a slight increase in traffic associated with the workforce, but the volume will be low and outside of traditionally heavy traffic periods.

The proposed station and transmission line tap are on agricultural land so there will be effects associated with direct loss of agricultural land as well as the inconvenience, nuisance and increased production costs associated with operating farming equipment and crop production. Manitoba Hydro has developed a compensation policy for landowners that grant an easement for a transmission line right-of-way and for incidental and or physical damages to property during construction.

Changes in groundwater and air quality have the potential to affect human health. Due to the localized nature of the project and standard mitigation, the potential effects to human health will be minor.

Noise during construction and the presence of the station can alter the landscape character of the area which can affect the well-being of people on the area.

The environmental assessment includes an evaluation of potential cumulative effects and effects of the environment on the project, as well as an analysis of potential

accidents, malfunctions and unplanned events. It also includes a description of the environmental protection program developed for the project, including the various roles, communication protocols, and commitments to monitor project activities and manage potential effects.

Based on the site selection process, and the measures developed to mitigate and manage any potential adverse effects, the conclusion of environmental assessment was that the residual effects are not significant.

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