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# 13.0 CUMULATIVE EFFECTS

## 13.1 Introduction

As indicated in the CEA Agency guidelines for this Project (CEA Agency 2015a) and in the scoping document submitted by ESRA to MCWS (MFESRA 2014), an assessment of cumulative effects is required for the proposed Berens River First Nation to Poplar River First Nation All-Season Road Project. The purpose of this cumulative effects assessment is to identify and assess residual adverse Project effects on VCs that may become significant when they interact with potential effects of regional past, present, and future physical activities in the Regional Assessment Area.

The CEA Agency defines cumulative effects as "*changes to the environment due to the project combined with the existence of other past, present and reasonably foreseeable physical activities*" (CEA Agency 2015a). Further, the Agency notes that cumulative effects may result if:

- Implementation of the project being studied may cause direct residual adverse effects on the Valued Components, taking into account the application of technically and economically feasible mitigation measures; and
- The same Valued Components may be affected by other past, present, or reasonably foreseeable physical activities (CEA Agency 2015a).

Per the CEA Agency's technical guidance (CEA Agency 2014b), the assessment of cumulative effects follows a five-step approach:

**Step 1** – Scoping of the assessment of cumulative effects to determine the VCs to be considered in the analysis and to orient and focus the cumulative effects assessment;

**Step 2** – Analysis of how physical activities of the Project, combined with past, present, and reasonably foreseeable physical activities, may affect selected VCs within the spatial and temporal boundaries of the cumulative effects assessment;

**Step 3** – Identification of technically and economically feasible mitigation measures to eliminate, reduce or control adverse cumulative effects;

**Step 4** – Determining the significance of adverse environmental effects remaining after the application of mitigation measures (i.e., residual effects) that are likely to result from the Project in combination with other physical activities; and

**Step 5** – Development of a Follow-up program to verify the accuracy of the EIA and effectiveness of mitigation measures applied to address both Project-specific environmental effects and cumulative effects.

In accordance with CEA Agency guidance1 on scoping and assessment methods for cumulative effects, this Chapter provides an assessment of the anticipated cumulative effects of the Project.

## 13.2 Scoping

As described above, the scoping step helps to orient and focus the cumulative effects assessment. Scoping for the Project-specific assessment of cumulative effects was undertaken following the assessment of potential environmental effects from the Project and the identification of predicted residual effects on VCs. Specifically, the scoping of the cumulative effects assessment included:

- Identifying Valued Components (VCs) for which adverse residual environmental effects from the Project are expected (**Section 13.2.1**) (Note: In accordance with CEA Agency guidance, VCs that would be affected positively by the Project are omitted from the cumulative effects assessment [CEA Agency 2015a]);
- Determining the spatial and temporal boundaries to capture potential cumulative environmental effects on VCs that may experience residual effects; and
- Identifying the past, present, and future physical activities that are anticipated to contribute to the residual environmental effects of the Project on VCs.

**Appendix 13-1** provides a list of the VCs for which Project residual adverse effects were assessed, summarizes the spatial and temporal level of residual Project effects and indicates which VCs may potentially experience adverse cumulative effects.

The scoping steps are described in **Sections 13.2.1** to **13.2.3**.

### 13.2.1 Valued Components

Per the CEA Agency Guidelines for this Project (CEA Agency 2015a), the cumulative effects assessment includes, but is not limited to, consideration of cumulative effects on the following VCs:

- Fish and fish habitat, including valued fish species;
- Migratory birds;
- Species at Risk; and
- Aboriginal peoples.

These were the same VCs considered during the VC selection process for the focused assessment of potential environmental effects of the Project as previously described in the Environmental Impact Assessment Scope and Approach (**Chapter 6, Section 6.4.1**). If a VC is not expected to experience residual adverse effects of the Project, that VC may be screened-out from further analysis. As well, VCs expected to experience residual adverse effects of the Project may also be screened-out from further analysis when assessed against the VC scoping criteria (CEA Agency 2014b).

[1] Guidance documents included: CEA Agency Guidelines for this Project (CEA Agency 2015a); CEA Agency's Operational Policy Statement entitled Assessing Cumulative Environmental Effects under the *Canadian Environmental Assessment Act, 2012* (CEA Agency 2015b) and the guide entitled Technical Guidance for Assessing Cumulative Environmental Effects under the *Canadian Environmental Assessment Act, 2012* (CEA Agency 2014b).

The cumulative effects assessment focuses on potential adverse cumulative effects on VCs that are expected to experience residual environmental effects caused by the Project (CEA Agency 2015a), regardless of whether those residual environmental effects are predicted to be significant (CEA Agency 2014b). Through the assessment of Project effects on VCs[2] presented in **Chapters 7** to **10**, and including potential effects of the environment on the Project (**Chapter 11**) and potential effects of accidents and malfunctions (**Chapter 12**), residual environmental effects of the Project following the application of mitigation were identified for the VCs. **Appendix 13-1** lists the VCs that are anticipated to experience residual environmental effects from the proposed Project.

To determine if there is the potential for adverse cumulative effects to VCs that would warrant further assessment, scoping criteria were applied (see **Figure 13-1)**. In reference to the criteria outlined in CEAA guidance (CEA Agency 2015b), for a VC to be carried forward for further cumulative effects analysis the VC must be:

- Affected by residual effects of the Project;
- Likely to be adversely affected by other past, present, or future physical activities within the spatial and temporal boundaries defined in **Sections 13.2.2** and **13.2.3** that follow; and
- Warranted by one or more screening criteria such as: potential for significant adverse cumulative effects to the VC; feedback from the APEP; level of uncertainty in predictions of cumulative effects; and/or need for mitigation measures or follow-up[3].

[2] Refer to **Chapter 6** (Environmental Impact Assessment Scope and Approach), **Appendix 6-1** for a complete list of VCs that were the focus of the assessment of potential environmental effects of the Project.

[3] The answer to this questions would be 'yes' if additional mitigation measures or follow-up beyond what is proposed for this Project is required to reduce the potential for significant adverse cumulative effects within the spatial and temporal boundaries of the cumulative effects assessment.

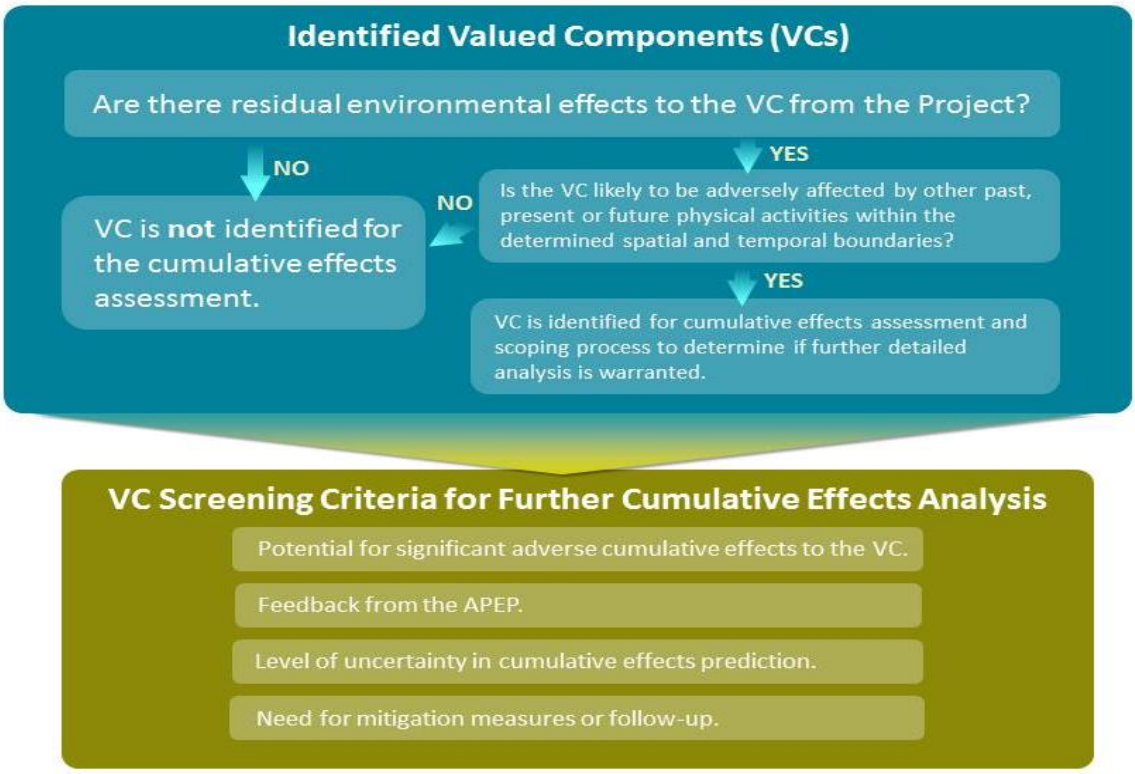



**Figure 13-1: Approach to Scoping and Screening of VCs for further Cumulative Effects Analysis**

VCs that will experience adverse residual Project effects (**Appendix 13-1**) were evaluated using the scoping and screening process illustrated in **Figure 13-1**. Results of the scoping process, including the rationale for screening out or carrying forward VCs for further cumulative effects analysis is presented in **Appendix 13-2**. The following VCs were identified as requiring further cumulative effects analysis:

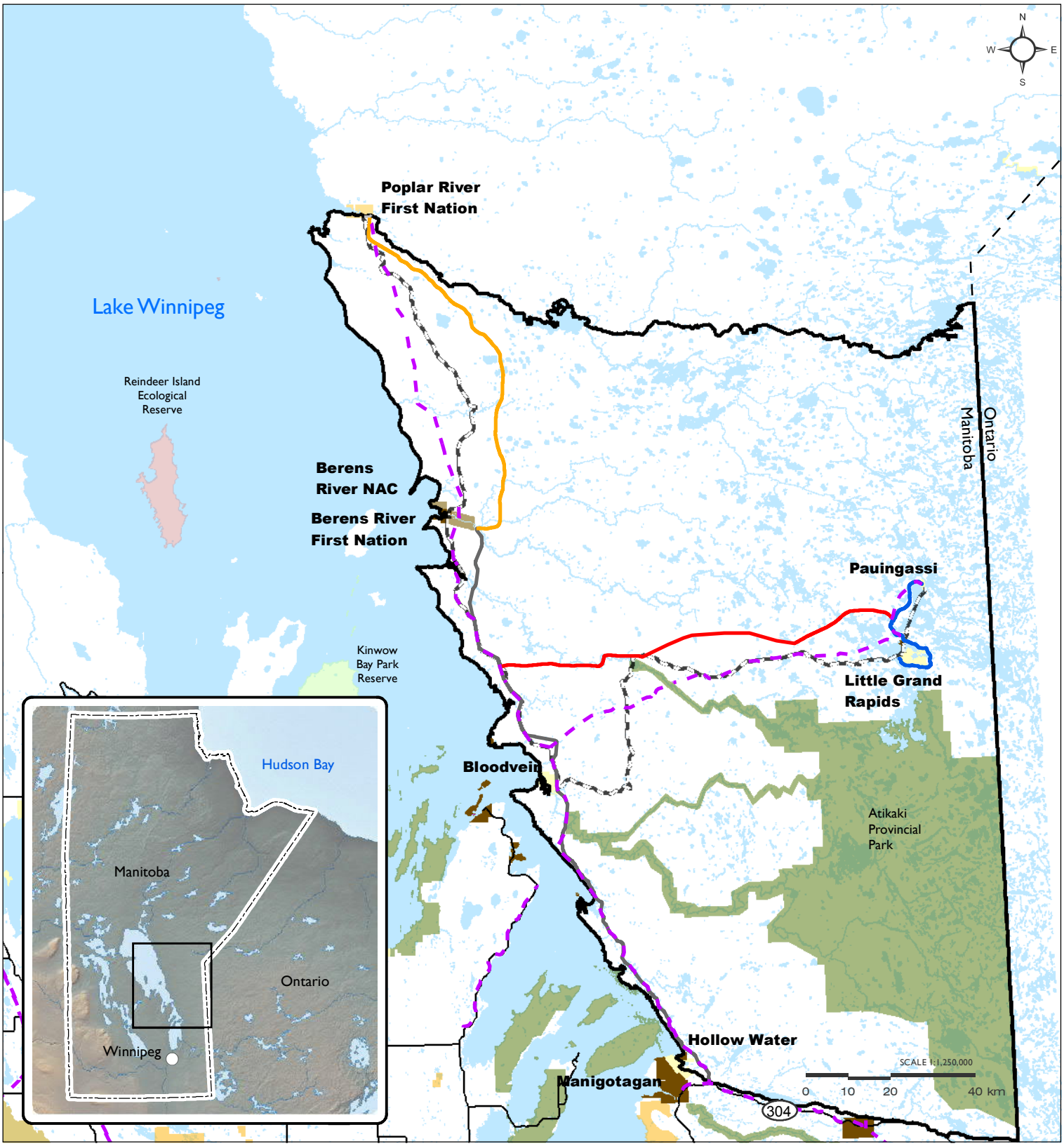
- Air quality;
- Moose; and
- Boreal woodland caribou.

For the VCs listed above, the approach and level of effort applied to assessing cumulative environmental effects is established on a case-by-case basis taking into consideration:

- The characteristics of the Project;
- The risks associated with the potential cumulative environmental effects;
- The state (health, status, or condition) of VCs that may be impacted by the cumulative environmental effects;
- The potential for mitigation and the extent to which mitigation measures may address potential environmental effects; and
- Feedback received through the Aboriginal and Public Engagement Program (CEA Agency 2015b).

### 13.2.2 Spatial and Temporal Boundaries

The planned East Side Large Area Transportation Network of all-season roads discussed in **Chapter 1** (Introduction), **Section 1.2**, that will connect the east side of Lake Winnipeg communities with the existing southern Manitoba road network partially forms the cumulative effects assessment spatial boundaries (**Figure 13-2**). The extent of the planned east side of Lake Winnipeg roads constitutes the largest regional area within which planned physical activities will occur in the foreseeable future. The spatial boundary for the cumulative effects assessment area is also based on a VC-centered spatial boundary approach whereby the area reflects the province's management unit for the Atikaki-Berens woodland caribou population (Manitoba Boreal Woodland Caribou Management Committee 2014). The cumulative effects assessment considered the potential for this woodland caribou population to experience potential adverse cumulative effects and the management unit for this species generally reflects the largest area where cumulative effects of other VCs are anticipated and potentially measurable (**Figure 13-2**). It should be noted that that potential cumulative effects to VCs may extend beyond specific boundary-defined areas such as the cumulative effects assessment area shown in **Figure 13-2**. Equally, potential cumulative effects to VCs may be limited to only a small portion of the cumulative effects area.




Project 4 - All-Season Road Connecting Berens River to Poplar River First Nation

**Figure 13-2**

**Cumulative Effects Spatial Area**

The spatial area for cumulative effects shown in this map reflects a Valued Component-centered spatial boundary approach whereby the area shown reflects the Atikaki-Berens woodland caribou population that may experience potential cumulative effects and is generally the largest area where cumulative effects are anticipated and potentially detectable. The spatial area for cumulative effects also reflects the area encompassing the planned interconnected East Side Large Area Transportation Network of all-season roads

- P4 All-Season Road Alignment
- P1 All-Season Road (South of Berens to PTH 304) - Under Construction
- Future P7 All-Season Road
- Future P7a All-Season Road
- 2013/2014 Manitoba Winter Road
- Transmission Line
- Berens River First Nation Reserve
- Poplar River First Nation Reserve
- Northern Affairs Community
- Provincial Park
- Cumulative Effects Spatial Area

Map Drawing Information:
ESRI Base Layers, Province of Manitoba, CanVec, GeoGratis, Dillon Consulting Limited

Map Created By: ECH
Map Checked By: MG/PS/LD
Map Projection: NAD 1983 UTM Zone 14N

DATE: 4/9/2016

MANITOBA East Side Road AUTHORITY

The temporal boundary for the cumulative effects assessment extends over an approximate 37-year period commencing in 2000, with initial Large Area Transportation Network planning initiatives for the east side of Lake Winnipeg, and concluding in 2037. The year 2037 represents 10 years beyond the completion of the last road project. Considering that construction of the P4 Project is anticipated to be completed in 2024 (Project Description **Chapter 3, Section 3.11**), it is expected that the 37-year period, which includes 10 years post-construction of the P4 Project, is an adequate temporal boundary to assess whether significant adverse cumulative effects may potentially occur for the selected VCs. Baseline information for the VCs being considered in this cumulative effects assessment also exists within this timeframe.

Some cumulative effects may occur in association with the timing of development phases of a physical activity (e.g., timing of clearing activities). Therefore, physical activity-centred temporal boundaries and overlapping periods for the cumulative effects assessment have also been considered and are presented in **Appendix 13-3**.

### 13.2.3 Physical Activities

The cumulative effects assessment has considered past and existing physical activities, as well as future physical activities that are certain and reasonably foreseeable, in consideration of the spatial and temporal bounds of this cumulative effects assessment. Current baseline conditions represent the cumulative effects from previous and existing land use practices and natural processes that have shaped the biophysical, cultural, and socio-economic components of the area during the period of human settlement. Currently, there are no available, certain and reasonably foreseeable plans by natural resource industries, such as mining and forestry companies, to carry out projects or activities within the spatial or temporal boundaries of this cumulative effects assessment. Regarding commercial forestry, the Forest Management Licence #1 and independent wood supply areas, which formerly overlapped with the cumulative effects assessment area, have been dissolved. Operational infrastructure that once supported this industry (rail line and pulp mill at Pine Falls) have since been decommissioned, which will impede any future revival of large scale forestry activities in this area (**Chapter 10, Section 10.1.5**). Past, present and future physical activities known to occur, that have occurred or will occur within the cumulative effects spatial and temporal boundaries are listed in **Table 13.1** and are described further in **Sections 13.2.3.1** and **13.2.3.2**.

**Appendix 13-4** outlines the VCs that have been identified for further cumulative effects analysis and the past, existing and future physical activities that are anticipated to potentially affect those VCs.

## Table 13.1: Past, Present and Future Physical Activities Considered in the Cumulative Effects Assessment

| Category of Physical Activities | Specific Physical Activity | Description of Physical Activity |
|---|---|---|
| **Past or Present Physical Activities that have been Carried Out** | | |
| Infrastructure development | ESRA's P1 all-season road project from PR 304 to Berens River communities[4]. | Currently under construction (see **Figure 13-2** for location). |
| | Existing infrastructure within and immediately adjacent to First Nation communities within the cumulative effects spatial boundary. | Refer to **Figure 13-2** for locations of First Nation communities and **Chapter 10**, **Sections 10.1.4** and **10.1.5** for a description of existing land use and infrastructure. |
| | Existing winter road use and maintenance. | Refer to **Figure 13-2** for locations of winter roads and **Chapter 2**, **Section 2.1.1** for a description of available travel days. |
| | Past forestry roads. | Forestry roads that occur in the cumulative effects assessment area are no longer used for commercial forestry activities and are largely abandoned. These abandoned roads may be accessed to a limited extent by snowmobile and/or ATV depending on location and connection with other travel routes and degree of natural revegetation that has occurred. Refer **to Chapter 9, Appendix 9-1** for a map illustrating former forestry roads. |
| | Manitoba Hydro transmission lines. | Refer to **Figure 13-2** for location of transmission line. |
| Mining and quarry activities | Mineral dispositions related to mining and quarry activities. | **Appendix 13-6** |
| Hunting | Traditional/subsistence and licenced hunting activities. | Refer to **Chapter 10**, **Section 10.1.6.** |
| Trapping | Licenced trapping of furbearing animals for commercial sale. | Refer to **Chapter 10**, **Section 10.1.6.** |
| Fishing | Traditional/subsistence, sport, and commercial fishing. | Refer to **Chapter 10**, **Section 10.1.6.** |
| **Future Physical Activities that are Certain and Reasonably Foreseeable** | | |
| Infrastructure development | Planned all-season roads east of Lake Winnipeg as part of the Large Area Transportation Network initiative by ESRA. | ▪ Construction, operations and maintenance of the proposed network of all-season gravel roads connecting isolated First Nations reserves and other northern communities with Manitoba's existing southern road network.<br>▪ **Figure 13-2** illustrates the planned ESRA road network.<br>▪ **Table 13.2** provides approximate lengths of planned east side of Lake |

[4] The first 48 km of the P1 all-season road was an existing road that is being rebuilt (i.e., Hollow Water First Nation to Loon Straits).

| Category of Physical Activities | Specific Physical Activity | Description of Physical Activity |
|---|---|---|
| | | Winnipeg roads and anticipated development schedules which are preliminary and subject to change.<br>▪ Cleared limit for road rights-of-way will be 60 m.<br>▪ Roadways will be 10 m wide with two 3.7 m lanes, 1.0 m shoulders and 0.3 m shoulder rounding allowance. |
| | Poplar River First Nation community access road (433 m) linking the proposed Project with the community. | ▪ Construction is expected to begin in 2016 and conclude in 2017. |
| | Poplar River community airport. | ▪ Relocation of existing Poplar River airport to new location on provincial Crown land just northeast of the Poplar River First Nation. |
| Decommissioning of existing winter roads | Decommissioning and rehabilitation, as required, of existing winter roads as they are replaced by the planned all-season roads east of Lake Winnipeg as part of the Large Area Transportation Network initiative by ESRA. | ▪ Existing winter roads will be abandoned as the series of planned all-season roads are sequentially completed.<br>▪ Winter road points of access will be blocked (e.g., with boulders) as required to discourage public access and encourage regeneration of vegetation. |
| Hunting | Traditional/subsistence and licenced hunting activities. | Refer to **Chapter 10**, **Section 10.1.6.** |
| Trapping | Licenced trapping of furbearing animals for commercial sale. | Refer to **Chapter 10**, **Section 10.1.6.** |
| Fishing | Traditional/subsistence, sport and commercial fishing. | Refer to **Chapter 10**, **Section 10.1.6.** |

#### *13.2.3.1 Past and Present Physical Activities*

**Table 13.1** lists the past and present physical activities that are anticipated to potentially contribute to cumulative effects on VCs carried forward for assessment. The remote nature of the cumulative effects assessment area defined in **Section 13.2.2** has resulted in the limitation of past and present physical activities to:

- Current construction of ESRA's P1 all-season road project between PR 304 and Berens River First Nation (**Figure 13-2**);
- Existing infrastructure on and immediately adjacent to First Nation communities;
- Existing winter road use and maintenance (**Figure 13-2**);
- Past forestry roads (**Chapter 9, Appendix 9-1**);
- Mineral dispositions (mining claims, quarries; **Appendix 13-6**);
- Manitoba Hydro transmission lines (**Figure 13-2**); and
- Traditional land and resource use including hunting, fishing, and trapping.

Additional information on physical activities in the regional area, including land and resource use is provided in **Chapter 10** (Socio-economic and Cultural Environment).

#### *13.2.3.2 Future Physical Activities*

**Table 13.1** above lists the future physical activities that are certain and reasonably foreseeable, and that are anticipated to potentially contribute to cumulative effects on VCs carried forward for assessment. Future physical activities with potential to contribute to cumulative environmental effects include:

- The planned all-season roads east of Lake Winnipeg as part of the Large Area Transportation Network initiative by ESRA (**Chapter 1**, **Figure 1-4**);
- The future Poplar River First Nation community access road (433 m) linking the proposed Project with the community (**Chapter 1**, **Figure 1-3**);
- The future relocation of the Poplar River community airport;
- The planned future decommissioning of the existing seasonal winter roads between east side of Lake Winnipeg First Nation communities (**Figure 13-2**) by the planned all-season roads; and
- Continued traditional resource use activities, including fishing, hunting, and trapping.

**Table 13.2** lists the future planned ESRA all-season roads within the cumulative effects assessment area, including anticipated start and completion dates.

### Table 13.2: Other ESRA All-Season Road Projects and Schedule

| All-Season Road Projects | Length (km) | Start | Completion |
|---|---|---|---|
| PR 304 to Berens River First Nation (P1) | 156 | 2012 (under construction) | ~2020 |
| Pauingassi to Little Grand Rapids First Nation (P7A) | 36.4 | 2016 | ~2020 |
| P1 to Little Grand Rapids First Nation and Pauingassi First Nation (P7) | 131 | 2020 | ~2027 |

Start dates are dependent upon a number of factors such as community feedback and environmental approvals. Construction periods for each road segment will be approximately 6 to 10 years depending upon a number of factors including length of road, number of watercourse crossings, and construction challenges (e.g., terrain, weather). Maintenance of winter roads will be ongoing throughout the construction of the ESRA all-season road network.

Although discussions with east side of Lake Winnipeg communities have occurred regarding potential future Manitoba Hydro transmission line development, no certain, and reasonably foreseeable Manitoba Hydro physical activities are currently planned within the spatial boundaries of this cumulative effects assessment.

## 13.3 Analysis of Potential Cumulative Effects

**Sections 13.3.1** to **13.3.4** provide the cumulative effects assessment for each VC carried forward for further analysis, and for the effects of those past, present, and future physical activities that have been identified in **Table 13.1** as having the potential to combine with the Project effects on those VCs. Each section describes assumptions and uncertainties inherent in the assessment of cumulative effects.

*A cumulative effect would be considered significant after application of mitigation measures if the overall magnitude of the cumulative adverse effect is considered to be high within, or potentially beyond, the cumulative effects assessment temporal and spatial boundaries.*

The rationale explaining why some VCs are carried forward for further cumulative effects analysis, while others are not, is explained in the scoping methodology outlined in **Section 13.2** and as provided in **Appendix 13.2**. For example, the 'Fish Habitat' VC is not carried forward for further, detailed cumulative effects analysis because under the *Fisheries Act*, Fisheries and Oceans Canada requires fish habitat offsetting (i.e., compensation) for this Project and other present and future physical activities that result in "serious harm" (i.e., permanent alteration to, or destruction of) fish habitat. Therefore, potential for cumulative effects to fish habitat will be prevented. Also, prior to fish habitat offsetting measures, the potential for significant adverse effect to fish habitat (and associated effects to fish and harvest fish) is considered low due to the minimal amount of fish habitat that will be permanently altered or destroyed (maximum of 206.5 $m^2$ of instream habitat and 180 m of riparian zone habitat).

A cumulative adverse effect would be considered significant after application of mitigation measures (discussed in **Section 13.4**) if the overall magnitude of the cumulative effect is considered to be high within, or potentially beyond, the temporal and spatial boundaries of the assessment (**Section 13.2.2**).

For the VCs carried forward for cumulative effects assessment, **Table 13.3** describes the specific criteria by which the magnitude of adverse cumulative effects are categorized within the spatial and temporal boundaries of the cumulative impact assessment for each VC.

### Table 13.3: Criteria for Magnitude of Adverse Cumulative Effects for VCs

| VC | Magnitude of Adverse Cumulative Effect | | |
|---|---|---|---|
| | Low | Moderate | High |
| Air Quality (GHGs) | Cumulative contributions of greenhouse gases to the global atmosphere are minor and do not result in a detectable increase in greenhouse gas accumulations within the global atmosphere. | Cumulative contributions of greenhouse gases to the global atmosphere result in a measurable increase in greenhouse gas accumulations within the global atmosphere, with the potential to have a minor to moderate overall influence to climate change. | Cumulative contributions of greenhouse gases to the global atmosphere result in a measurable increase in greenhouse gas accumulations within the global atmosphere, with the potential to have a substantial overall influence to climate change. |
| Moose | Cumulative effects are not likely to have a definable, detectable, or measurable potential effect above baseline (i.e., potential effect is within a normal range of variation). | Cumulative effects are anticipated to have a measurable potential effect that can be detected with a well-designed monitoring program; but is only marginally beyond a threshold of acceptable change. | Cumulative effects are anticipated to be easily observed, measured, and described (i.e., readily detectable without a monitoring program) and are well beyond a threshold of acceptable change. |
| Boreal Woodland Caribou | Cumulative effects are not likely to have a definable, detectable, or measurable potential effect above baseline (i.e., potential effect is within a normal range of variation) and habitat change does not exceed the sustainable threshold of 65% undisturbed (35% disturbed) habitat identified by Environment Canada (2012). | Cumulative effects are anticipated to have a measurable potential effect that can be detected with a well-designed monitoring program; but habitat change is only marginally beyond the sustainable threshold of 65% undisturbed (35% disturbed) habitat identified by Environment Canada (2012). | Cumulative effects are anticipated to be easily observed, measured, and described (i.e., readily detectable without a monitoring program), and habitat change is well beyond the sustainable threshold of 65% undisturbed (35% disturbed) habitat identified by Environment Canada (2012). |

### 13.3.1 Air Quality: Greenhouse Gases

A cumulative effects assessment (**Appendix 13-5**) for greenhouse gas was completed to estimate the total direct and indirect greenhouse gas emissions attributable to the Project and other physical activities (Project Scenario) compared with the greenhouse gas emissions (direct and indirect) of the current Baseline Scenario (i.e., without the Project and other physical activities). In addition to the proposed P4 Project, physical activities considered in the cumulative greenhouse gas assessment included the future ESRA all-season roads (P7 and P7a) and the completed P1 all-season road currently under construction (**Figure 13-2**). These road projects represent the physical activities that would contribute to greenhouse gas emissions.

The Baseline Scenario cumulative effects assessment for greenhouse gas resulted in total annual emissions estimates of 17,580 and 21,432 tonnes CO2e during the hypothetical periods of time when the construction phases and operations and maintenance phases, respectively, of the four all-season road projects (P4, P1, P7 and P7a) would have been occurring at the same time (i.e., worst-case). The Projects Scenario was estimated to emit a total of approximately 29,123 and 15,301 tonnes CO2e

annually for the same periods. While a temporary increase in greenhouse gas emissions is predicted during the construction phase of the Projects, the net cumulative change in greenhouse gas emissions due to the combined Projects was estimated to be a reduction of approximately 6,128 tonnes CO2e annually. Details of the greenhouse gas cumulative effects assessment, including assumptions, are provided in **Appendix 13-5**.

In summary, under the worst case scenario of all planned all-season roads in the cumulative effects assessment area being under construction at the same time, the Project is estimated to contribute to a temporary increase of the provincial construction-based greenhouse gas emissions by approximately 12%. Once the all-season roads are operational, an estimated reduction of approximately 0.1% of the Province's total GHG emissions attributed to road transportation will be realized[5]. Given that there would be a temporary overall increase in greenhouse gas emissions during the construction phase of the all-season roads, but an overall decrease in greenhouse gas emissions during the operational years of the all-season roads, the change in greenhouse gas emissions would not result in a detectable increase in greenhouse gas accumulations within the global atmosphere and therefore would not influence climate change.

### 13.3.2 Moose

A cumulative effects assessment for moose has been completed and is presented in **Appendix 9-1** of the Terrestrial Environment **Chapter 9**. In summary, moose densities in the cumulative effects assessment area are inherently low and the area will remain relatively remote, even with the presence of the future all-season roads. Existing patterns of resource use are likely to shift with the establishment of future all-season roads however, these changes will occur over a long period of time while construction is underway. Based on results of Traditional Knowledge studies, and in consideration of the remoteness of the cumulative effects assessment area, resource use in the region is not expected to increase dramatically. Rather, there could be a shift in resource use closer to the future all-season roads and away from major waterways that are traditionally used to access moose hunting areas. There are no other major developments planned in the cumulative effects assessment area, such as forestry or mining operations, that will result in additional roads for resource development purposes that would provide access, cause disturbance or change habitats. Studies referenced and discussed in the Wildlife Technical Report (Joro Consultants 2015a in **Chapter 9**, **Appendix 9-1**) indicate that moose densities are not necessarily linked to disturbance, but more so to habitat productivity and climate conditions more suitable for the species. The Wildlife Technical Report (Joro Consultants 2015a) indicates that although more northern areas in Manitoba have fewer disturbances (less development) than southern areas, moose populations are generally denser in southern areas of Manitoba which are generally more developed/disturbed. Local effects on moose may result from increased hunting pressure near the future roads and along rivers and creeks that are intersected by the all-season roads, but activities are not expected to have an effect on regional moose populations.

[5] The 1% reduction is based on Province's most recent total GHG emissions estimate of 5.13 Mt CO2e due to road transportation in 2008.

Due to the anticipated low traffic volumes on the future all-season roads relative to the provincial highway system, moose-vehicle collisions are expected to have a negligible influence on the cumulative effects to the moose population within the cumulative effects assessment area. The Wildlife Technical Report (Joro Consultants 2015a in **Chapter 9, Appendix 9-1**) indicates that only one known moose-vehicle collision has occurred along the open section of the P1 all-season road since monitoring began in 2011 (i.e., Rice River Road segment which is an existing forestry road between the Manigotagan and Bloodvein rivers) suggesting the risk of a collision is low.

### 13.3.3 Boreal Woodland Caribou

A cumulative effects assessment for the boreal woodland caribou (Atikaki-Berens management unit) has been completed based on available data for the cumulative effects assessment area (Joro Consultants 2015a in **Chapter 9, Appendix 9-1**). The intent of the caribou cumulative effects assessment was to determine total habitat disturbance within the management unit relative to the sustainable threshold of 65% undisturbed (35% disturbed) habitat identified by Environment Canada (2012). Disturbance was broken into two major components consistent with those described by Environment Canada (2012) and included natural disturbance (primarily fire less than 40 years old) and anthropogenic disturbance including linear features such as winter roads, transmission lines, as well as other footprint disturbance such as forestry and quarry development.

The road layer used for this cumulative effects assessment consisted of the National Road Network Roads (federal data), access roads (Class 2 [year-round secondary gravel roads, graded, and ditched], Class 3a [summer access high ground road, graded, and graveled when required]) community roads, highways, and park roads. The winter road within the P1 project area was removed from the cumulative effects assessment and replaced with the P1 all-season road which is currently under construction. The winter road connecting Berens River and Poplar River was removed in the 2020 cumulative effects assessment considering the winter road will be decommissioned and replaced by the P4 all-season road within the timeline for this cumulative effects assessment.

Natural disturbance area was calculated from fire data derived from the Land Cover Classification of Canada - East Side (LCCES) fire data to include the updated 1928-2013 fire layer with the time period of 1975-2013 for the 40 year cumulative effects assessment timeframe.

Anthropogenic disturbance was assessed using all linear developments including transmission lines and winter roads. These features were buffered by 500 m on either side of the feature based on the Environment Canada (2012) approach. Using the LCCES data, areas of harvested forests within the previous 40 years were identified and an area of disturbance was calculated for each range. Drill holes, obtained from Innovation, Energy, and Mines: Mineral Resources Division, were assigned a buffer with a radius of 250 m for the Atikaki-Berens management unit. Table 18 and maps 1-3 in **Appendix 9-1** of **Chapter 9** illustrate the disturbance factors and extent of disturbance of the Atikaki-Berens management unit based on available data.

**Table 13.4** provides the total percentage of cumulative habitat disturbance for the Atikaki-Berens management unit in 1960, 1980, 2015, 2020, and 2025. In all cases, except for 1960, the disturbance threshold within the Atikaki-Berens management unit is below the 35% disturbance threshold identified by Environment Canada (2012) and in all cases, fire is the largest contributor of disturbance.

### Table 13.4: Total Percentage of Cumulative Habitat Disturbance over Time for the Atikaki-Berens Boreal Woodland Caribou Management Unit

| Year | Total Percentage of Habitat Disturbance | Above or Below the Environment Canada (2012) Caribou Habitat Disturbance Threshold of 35%? | All-Season Roads Included in the Habitat Disturbance Calculation |
|---|---|---|---|
| 1960 | 48.1% | Above | None (note that forest fire was a substantial influence on habitat disturbance). |
| 1980 | 33.4% | Below | None. |
| 2015 | 34.7% | Below | P1 and P4 all-season roads. |
| 2020 | 34.3% | Below | P1, P4 and P7A all-season roads |
| 2025 | 34.6% | Below | P1, P4, P7A and P7 all-season roads. |

Based on these analyses, the overall loss of habitat due to the P4 all-season road footprint is a small contributor to the overall effect with fire being the greatest contributor to disturbance. Analysis of caribou collar data indicates that animals are currently residing in proximity to the winter road and moving across both the winter road and transmission line corridor. The winter road currently runs though high quality caribou habitat and given caribou have coexisted with the operational activities associated with the existing winter road, caribou have likely become accustomed to the winter road right-of-way and traffic.

## 13.4 Mitigation

Mitigation of adverse cumulative effects of greenhouse gas accumulation is expected to occur over time with the continued development of more fuel-efficient vehicles and the gradual shift from hydrocarbon-based fuels to renewable fuel system technologies. Current projections include a decline in energy consumption by passenger vehicles of 0.6 per cent per year based on factors such as new passenger vehicle emission standards from 2017-2025, which are expected to improve vehicle fuel efficiency (National Energy Board 2013). The greenhouse gas cumulative effects assessment (**Appendix 13-5**) recommends adherence to applicable best management practices to minimize greenhouse gas emissions, corresponding with ESRA's commitment to the application of construction and operations and maintenance best management practices (**Chapter 5**). Additionally, the decommissioning of winter roads as all-season roads are completed will also contribute to the reduction of greenhouse gas emissions within the cumulative effects assessment area (**Appendix 13-5**).

For physical activities that involve the permanent alteration or destruction of fish habitat potentially resulting in serious harm to fish that are part of or support a commercial, recreational, or Aboriginal fishery, habitat offsetting (compensation) may be required in an authorization under the federal *Fisheries Act*. Therefore, adverse cumulative effects to the habitat of fish and harvested fish species is expected to be mitigated through habitat offsetting plans, as required. There are no plans to incorporate boat ramps, docks or other structures or modifications to the all-season roads to facilitate access to fish-bearing watercourses. Therefore, convenient fishing opportunities at fish-bearing water crossings along the all-season road routes will be limited by the design of the all-season roads. The decommissioning of the winter roads system as the new all-season roads are completed will reduce potential damage to the habitat of fish and harvested fish species where winter roads cross watercourses. Manitoba Conservation and Water Stewardship is responsible for the management and enforcement of fishing and control of invasive aquatic species in the province.

Adverse cumulative effects on caribou and moose are expected to be primarily mitigated through government conservation initiatives such as the designation of wildlife refuge areas under *The Wildlife Act* on either side of the all-season roads proposed and currently under construction east of Lake Winnipeg within the spatial area of this cumulative effects assessment. These cooperative management initiatives are evolving and are currently under discussion. On-going monitoring and enforcement of hunting limits by MCWS will also contribute to the overall management strategy for moose in the cumulative effects assessment area. The potential long-term habitat protection resulting from the proposed establishment of a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site (WHS) called Pimachiowin Aki will also provide guidance in the development of conservation strategies and limitations on development. The limitations on the degree of anthropogenic disturbance allotted within this designation area is an important factor of consideration for potential future cumulative effects on moose, caribou, and other wildlife populations within the cumulative effects assessment area. Mitigation inherent in the design of the ESRA all-season roads expected to minimize potential vehicle collisions with moose and caribou includes incorporating appropriate sight lines into the all-season road right-of-way designs, posting speed limits, and installing wildlife crossing signage as recommended by MCWS.

## 13.5 Significance Conclusions

Based on the cumulative effects assessment criteria explained in **Section 13.3**, the analyses and descriptions of expected cumulative effects (**Sections 13.3.1** to **13.3.4**) and the mitigation measures outlined in **Section 13.4** applied for each of the four VCs assessed, significant adverse cumulative effects to moose, caribou and air quality (i.e., greenhouse gas emissions) are not expected to be significant. This conclusion and rationale is summarized in **Table 13.5** for each VC and is based on the criteria that adverse cumulative effects are not considered significant if the magnitude of those effects are assessed as being low or moderate in magnitude.

### Table 13.5: Cumulative Environmental Effects Significance Conclusions for Air Quality, Moose and Caribou

| VC | Cumulative Effects Analysis | Magnitude of Adverse Cumulative Effect* | Cumulative Effect Significance Conclusion |
|---|---|---|---|
| Air Quality (GHGs) | Although a temporary overall cumulative increase in greenhouse gas emissions would occur during the construction phase of the planned all-season roads, greenhouse gas emissions produced by vehicles using the all-season roads during the operations and maintenance phase are expected to offset emissions from the continued use of other modes of travel (e.g., air travel) if the all-season roads were not constructed. The result is expected to be an overall decrease in greenhouse gas emissions within the cumulative effects assessment area during the all-season road operational years resulting in no significant influence to global atmospheric greenhouse gases and no significant influence on climate change. | Low | Not Significant |
| Moose | Overall moose habitat loss and fragmentation due to past, present and future physical activities would be negligible in relation to the abundance of undisturbed moose habitat within the cumulative effects assessment area. From the perspective of moose habitat loss, the cumulative effect of the Project would be of low magnitude and low extent and therefore not be considered to be significant. In terms of adverse cumulative effects to moose populations within the cumulative effects assessment area, with the application of government conservation initiatives and on-going monitoring and enforcement of hunting limits by Manitoba Conservation and Water Stewardship, a decline in the moose population is not anticipated. | Low | Not Significant |
| Boreal Woodland Caribou | Overall caribou habitat loss and fragmentation due to past, present and future physical activities would be negligible in relation to the abundance of undisturbed habitat within the cumulative effects assessment area. Therefore, the cumulative effect of the Project in terms of the potential caribou habitat loss would not be considered to be significant based on the low magnitude and low extent of the cumulative habitat losses. With the application of government conservation initiatives and on-going monitoring and enforcement of Species at Risk protection by Manitoba Conservation and Water Stewardship, significant decline in the caribou population within the cumulative effects assessment area, specifically the Atikaki-Berens caribou management unit, is not anticipated. | Low | Not Significant |

*See definitions of Magnitude of Adverse Cumulative Effect in Table 3.3

## 13.6 Follow-up

Considering no significant adverse cumulative environmental effects are anticipated from past, present and reasonably foreseeable future physical activities, it is not expected that additional follow-up studies will be required other than follow-up studies proposed in **Chapter 14** to verify the accuracy of the environmental assessment of this Project and to determine the effectiveness of mitigation measures incorporated into the design, construction and operations and maintenance phases of the Project. Each

proposed successive east side of Lake Winnipeg all-season road project will have commitments to mitigation measures and follow-up studies which will be revised and adapted, as required. Pre-construction and follow-up studies associated with each proposed all-season road project, such as moose and caribou monitoring, provide for the monitoring of potential cumulative effects of the series of east side of Lake Winnipeg roads. If unexpected adverse cumulative effects were identified in the future, then additional measures can be discussed with Manitoba Conservation and Water Stewardship.