WSR
WEBEQUIE
SUPPLY ROAD

WEBEQUIE SUPPLY ROAD FINAL ENVIRONMENTAL ASSESSMENT REPORT / IMPACT STATEMENT

January 30, 2026

AtkinsRéalis Ref: 661910

SECTION 21:

Cumulative Effects Assessment

WEBEQUIE FIRST NATION

AtkinsRéalis

Contents

Contents (Cont'd)

Contents

In-Text Figures

Contents (Cont'd)

In-Text Tables

Contents (Cont'd)

In-Text Tables (Cont'd)

Contents (Cont'd)

In-Text Tables (Cont'd)

21 Cumulative Effects Assessment

In the context of the Environmental Assessment / Impact Assessment (EA/IA), cumulative effects are the predicted net effects from the Project that overlap temporally and spatially with other past, present and reasonably foreseeable developments (RFDs) or physical activities and may interact cumulatively with the net environmental, health, social or economic effects from other projects or physical activities. Cumulative effects may result if:

- The Project causes direct net adverse effects to a Valued Component (VC), following mitigation with technically and economically feasible measures; and
- The same VC may be affected by other past, present and RFDs and their activities.

This section evaluates predicted net effects of the Project on VCs (as assessed in Sections 6 to 20) in the context of net effects from past, present and RFDs and activities to assess potential cumulative effects.

21.1 Regulatory Requirements

The Project must meet the requirements of the federal *Impact Assessment Act* (IA Act) including the following as related to cumulative effects assessment:

- Under Section 6(1), which include the following as purposes of the IA Act:

  (g) to ensure respect for the rights of the Indigenous Peoples of Canada recognized and affirmed by section 35 of the Constitution Act, 1982, in the course of impact assessments and decision-making under this Act;

  (m) to encourage the assessment of the cumulative effects of physical activities in a region and the assessment of federal policies, plans or programs and the consideration of those assessments in impact assessments;
- Under Section 22(1)(a), which identifies as one of the factors to be considered:

  (ii) any cumulative effects that are likely to result from the designated project in combination with other physical activities that have been or will be carried out.

The cumulative effects assessment was conducted in accordance with the federal regulatory requirements, pursuant to the IA Act, as described in Section 22 of the federal Tailored Impact Statement Guidelines (TISG) for the Project and the provincial regulatory requirements, pursuant to the EA Act, and as set out in Section 8.1 of the provincial Webequie Supply Road Terms of Reference (ToR). The cumulative effect assessment also meets the ToR Notice of Approval conditions. To meet the conditions of the Notice of Approval, reflected in amendments 1.1 to 1.5, the proponent completed the following key tasks and/or activities: offered targeted consultation opportunities to each Indigenous community on cumulative effects; considered other cumulative effect assessments (e.g., Marten Falls Community Access Road; considered information generated from the federal Regional Assessment in the Ring of Fire area, where publicly available; and prepared a Cumulative Effects Assessment Consultation Report (refer to Record of Engagement and Consultation). On the specific requirement to consider other cumulative effects assessments the Project Team has considered the analysis and findings (e.g., species at risk – caribou) in the cumulative effects assessment for the Marten Falls Community Access Road Project as contained in Section 10 of the Draft Environmental Assessment / Impact Statement, dated February 2025. We note at this time the cumulative effects assessment for the NRL and findings from federal Regional Assessment are not available.

21.2 Consideration and Influence of Input Received During Engagement and Consultation Activities

Table 21-1 summarizes comments (and themes of comments) regarding cumulative effects that were received during engagement and consultation activities. The Project Team considered the comments received on the Draft EAR/IS in finalizing the EAR/IS. Details of responses and how the comments have been addressed are provided in the Record of Engagement and Consultation.

Table 21-1: Summary of Inputs Received During Engagement and Consultation

Comment/Theme	How the Comments are Addressed in this EAR/IS	Indigenous Community or Stakeholder
Concerns were raised during the EA Terms of Reference (ToR) phase to include a commitment to prepare a technical work plan for the cumulative effects assessment.	The ToR included a commitment to prepare a work plan for the cumulative effects assessment at the outset of the EA for MECP and IAAC to review. The work plan was provided to the MECP and IAAC for review and guidance and was summarized and presented to the public, Indigenous communities, and others as part of the consultation and engagement activities for the Project.	Ministry of the Environment, Conservation, and Parks (MECP)
The community is well aware that the proposed road system could develop into a utility route that could include any or all of road, rail, fibre-optic and high-capacity electricity transmission. The community recognizes this expansion needs to be considered during planning processes. The community is aware that the Independent Electricity System Operator has already started planning potential transmission into the Ring-of-Fire.	Past, present and future RFDs or activities that may interact with Webequie Supply Road (WSR) were considered as part of the EA/IA process and are presented in **Section 21**. Past, present, and RFDs activities considered in the cumulative effects assessment are listed in **Table 21-2** and included proposed all-season road projects such as the Marten Falls Community Access Road and the Northern Road Link.	Marten Falls First Nation
The community is concerned about conducting the cumulative effects assessment for the Project.	The assessments of cumulative effects of the Project includes the consideration of past, present, and RFDs or activities and their interaction and overlap with predicted net adverse effects for the Project. The findings of the cumulative effects assessment are presented in **Section 21**.	Aroland First Nation
The community is concerned about how cumulative effects will be analyzed taking into context local perspectives, knowledge, and future development goals of Indigenous groups. The community asked if there would be an opportunity to assess cumulative impacts at a regional and strategic level.	**Sections 21.1** and **21.3** describe the regulatory requirements and methodology for the assessment of cumulative effects. The cumulative effects assessment for the Project is intended to meet the requirements in Section 22 of the TISG and EA ToR and followed the guidance document entitled *Assessing Cumulative effects under the Canadian Environmental Assessment Act, 2012, Interim Technical Guidance* (March 2018, Version 2).	Neskantaga First Nation

Comment/Theme	How the Comments are Addressed in this EAR/IS	Indigenous Community or Stakeholder
These groups were concerned about the need for expansion of the cumulative effects section of the Tailored Impact Statement Guidelines to better capture proposed developments in the Ring of Fire area including mineral development and future infrastructure.	See above response. Past, present and RFDs and activities considered in the cumulative effects assessment are listed in **Table 21-2** and include feedback received from Indigenous communities and stakeholders.	Aroland First Nation Attawapiskat First Nation Eabametoong First Nation Fort Albany First Nation Friends of the Attawapiskat River Kasabonika Lake First Nation Ginoogaming First Nation Long Lake #58 First Nation Marten Falls First Nation Members of the public Ministry of Energy, Northern Development and Mines (now Ministry of Energy and Mines) Mushkegowuk Tribal Council Natural Resources Canada Neskantaga First Nation Nibinamik First Nation Noront Resources Wildlife Conservation Society Canada Wildlands League
These groups commented that the Proponent needs to assess the cumulative impacts on the exercise of rights and interests of Indigenous Peoples, as well as effects on valued components due to all project components. This should be clearly described and made clear to Indigenous groups.	See above response. Cumulative effects on the rights and interests of Indigenous Peoples are included in the cumulative effects assessment and are presented in **Section 21.4.12**.	Aroland First Nation Attawapiskat First Nation Eabametoong First Nation Fort Albany First Nation Kasabonika Lake First Nation Long Lake #58 First Nation Neskantaga First Nation Wildlife Conservation Society Canada

21.3 Method for Assessing Cumulative Effects

21.3.1 Assessment Approach

The approach used for conducting the cumulative effects assessment for the Project was informed by the requirements in Section 22 of the federal TISG for the Project (Appendix A-1), in Section 8.1 of the provincial approved ToR (Appendix A-2), and engagement and consultation activities that were completed to-date. As prescribed in the TISG, the proponent is to use the document entitled *Assessing Cumulative Environmental Effects under the Canadian Environmental Assessment Act, 2012, Interim Technical Guidance* (March 2018, Version 2) until the Impact Assessment Agency of Canada releases Technical Guidance under the *Impact Assessment Act* (IA Act) and is referred to as the “Interim Cumulative Effects Assessment Guidance Document”.

The Interim Cumulative Effects Assessment Guidance Document outlines a VC-centred approach to cumulative effects assessment, and provides methodological options, considerations, and documentation outcomes. It notes that each environmental assessment of project tasks should "take into account any cumulative environmental effects that are likely to result from the project in combination with the environmental effects of other physical activities that have been or will be carried out" (Canadian Environmental Assessment [CEA] Agency, 2018).

The steps used to assess cumulative effects included the following:

- Identification and characterization of net effects of the Project for each VC;
- Definition of spatial and temporal boundaries for each VC where potential net adverse effects have been identified for the Project;
- Identification of potential net adverse effects of the Project that may interact, overlap or act in combination with net effects of past, present, RFDs and future activities;
- Identification of the potential cumulative adverse effects;
- Development of additional technically and economically practical mitigation measures, if warranted, and predict likelihood net cumulative effects;
- Evaluation/Characterization of predicted net cumulative adverse effect(s);
- Determination of the significance of the predicted net cumulative adverse effects; and
- Identification of follow-up monitoring, if required.

In accordance with Section 22 of the TISG, the cumulative effects assessment considers the cumulative effects on VCs that may affect Indigenous Peoples and the exercise of their Aboriginal and Treaty Rights, for all potentially affected groups, including those that may experience the effects of increased access to the region by mineral development and other road infrastructure projects. Accordingly, comments and issues of concern from the engagement and consultation with potentially affected Indigenous communities and groups are integrated into the cumulative effects assessment.

The TISG (Section 22) identified the projects or activities that are to be considered in the cumulative effects assessment. This project and activity inclusion list (refer to **Section 21.3.4**) presents known past, present and RFDs and future activities that could overlap spatially and temporally with the net environmental, health, social or economic effects of the Project. **Section 21.4** evaluates the net effects of the Project (as assessed in Section 6 to 20) in the context of net effects from past, present and RFDs or future activities to determine the potential for cumulative effects. Since not all RFDs or activities are likely to proceed, the cumulative effects assessment is considered conservative.

21.3.2 Identification of Valued Components to Carry Forward

The cumulative effects assessment builds on the Project-specific effects assessments presented in Sections 6 to 20. This information is necessary to identify potential net adverse effects on VCs that might act cumulatively with the net adverse effects of other physical activities.

The effects of past and current projects contribute to existing conditions of VCs upon which Project effects are assessed (Sections 6 to 20); therefore, the focus of the cumulative effects assessment is on the combination of net Project effects with the net effects of RFDs or future activities.

The following conditions needed to be met to initiate the assessment of cumulative effects on a VC:

- The Project is predicted to have net adverse effects on a VC;
- The net adverse effects from the Project overlap spatially and/or temporally with net adverse effects of other past, present and RFDs or physical activities on a VC; and
- The net adverse effects from the Project are characterized as having a greater than low magnitude within the VC's Regional Study Area (RSA) and likelihood of occurrence of probable or certain. These criteria have been applied to most VCs, however, there are VC-specific exceptions where feedback from Indigenous communities on potential net adverse effects have influenced the decision to carry forward the VC to the cumulative effects assessment.

Net adverse effects were predicted for VCs in Sections 6 to 20, that met these criteria included:

- Geology, Terrain and Soils;
- Surface Water Resources;
- Groundwater Resources;
- Atmospheric Environment;
- Fish and Fish Habitat;
- Vegetation and Wetlands;
- Wildlife and Wildlife Habitat;
- Species at Risk;
- Social Environment;
- Land and Resource Use; and
- Human Health.

Note that the outcomes of the cumulative effects assessment and their impact on Indigenous Peoples and the exercise of Aboriginal and Treaty Rights (Section 19) is still to be determined. . With respect to Indigenous Peoples and the exercise of Aboriginal and Treaty Rights, the impact of cumulative effects will be undertaken once the severity of potential adverse effects on Indigenous Peoples and Aboriginal and Treaty Rights has been completed in consultation with Indigenous communities, including their feedback from the review of Section 19 of this EAR/IS.

VCs where Project-environment interactions are assessed as having no net effects, positive net effects, negligible to low net effects, and assessed with a likelihood of occurrence as "unlikely" or "possible" are not carried forward to the cumulative effects assessment. These VCs are:

- Cultural Heritage Resources – no net effects;
- Economic Environment – positive net effects; and
- Visual Environment – low net effects.

21.3.3 Identification of Spatial and Temporal Boundaries

21.3.3.1 Spatial Boundaries

The spatial boundaries used in the cumulative effects assessment were determined to be the areas where potential broader adverse effects in the RSA defined for each VC were identified. The spatial boundaries and the rationale for the boundaries for each VC are presented in Sections 6 to 20.

Spatial boundaries for the cumulative effects assessment were designed to include the largest extents for each VC (i.e., RSA) in order to determine whether other projects and physical activities were to be included in the cumulative effects assessment. The following spatial criteria were used for screening projects and activities for the cumulative effects assessment:

- A project or activity was included if it is within the RSA for the VC; and
- A project or activity was excluded if it was outside the RSA for the VC.

21.3.3.2 Temporal Boundaries

Temporal boundaries for the cumulative effects assessment included the construction and operation phases of the Project described in Section 5.2.1.4. The following temporal criteria were used for screening projects and activities for the cumulative effects assessment:

- A project or activity was included if it was reasonably expected or certain to proceed, or in either the provincial EA or federal IA regulatory process.
- A project or activity was included as an existing disturbance if it was known that it will be in development or operation prior to 2023, but was excluded from the list of RFDs or future activities.

21.3.4 Other Projects and Physical Activities Considered

Other projects and/or physical activities to be considered in the cumulative effects assessment are those that have been or likely will be carried out, and that could cause net adverse effects, including induced net effects, to the selected VCs within their respective spatial and temporal boundaries. Furthermore, these net adverse effects would act in combination with the net adverse effects from the Project to result in potential cumulative effects.

The “Interim Cumulative Effects Assessment Guidance Document” noted that “present-day conditions reflect the cumulative effects of many past and existing physical activities”; therefore, existing conditions of VCs described in Sections 6 to 20 were assumed to reflect effects from past and existing physical activities within their respective RSAs. Based on this assumption, the assessment of net effects on VCs in Sections 6 to 20 generally considered the net effects from past and existing projects and associated physical activities. Consequently, the cumulative effects assessment focuses on the combination of the Project-specific net adverse effects with the net adverse effects of ongoing and future projects and physical activities.

With respect to future physical activities that will be carried out, the assessment considers (CEA Agency, 2018):

- Future physical activities that are certain, meaning, the physical activity will proceed, or there is a high probability that the physical activity will proceed. For example, a proponent has received the necessary authorizations or is in the process of obtaining those authorizations.
- Future physical activities that are reasonably foreseeable, meaning the physical activity is expected to proceed. For example, a proponent has publicly disclosed its intention to seek the necessary environmental assessment or other authorizations to proceed.

Climate change is considered in the cumulative effects assessment as a physical process that is expected to change the condition of the VCs from what is observed today irrespective of the changes that may be caused by the Project or other projects and activities in the RSAs.

Section 22 of the TISG identifies the following projects or activities that are to be considered, at a minimum, in the cumulative effects assessment:

- Historical and existing mineral developments, Goldcorp's Musselwhite Mine (now Orla Mining Ltd.'s Musselwhite Mine), DeBeers' Victor Mine and Greenstone Gold's Hardrock Mine (now Equinox Gold Corp.'s Greenstone Mine);
- Other historical infrastructure projects;
- Marten Falls Community Access Road Project and other all-season road projects;
- Power transmission projects;
- Construction of upgrades to the Anaconda and Painter Lake Forestry Access Roads;
- The construction and operation of the Northern Road Link (future road that may link the northern portion of the Marten Falls Community Access Road to the Ring of Fire area);
- Transportation of ore from future development near the project for processing, once past the Webequie Supply Road;
- East-West road;
- Forest management units;
- Mining activities, including those associated with Eagle's Nest, Black Thor, Black Bird, Big Daddy, and Black Label;
- Increased winter road traffic during Operations and Maintenance by future mining proponents;
- Mineral exploration activity in the area; and
- Past projects, including the Ogoki and Long Lac diversions.

Table 21-2 includes information of the past, present, and RFDs or future activities for consideration in the cumulative effects assessment. **Figure 21.1** shows the spatial relationship between the Project and these projects or / and activities.

Past, present, and future RFD's or physical activities are identified based on the TISG, government sources, local knowledge and desktop research. The list of reasonably RFDs or physical activities is based on information available up to November 2024. The identification and selection of specific physical activities was based on a conservative assumption that a potential interaction may exist due to the nature of that activity, the surrounding environment, and the VCs assessed in Sections 6 to 20.

The RSA for each VC was carried forward to be used in the cumulative effects assessment (**Figure 21.1**), which encompasses a conservative spatial extent to capture the potential cumulative effects. Based on the VC-specific RSAs not all RFDs or physical activities in **Table 21-1** will be relevant to each VC; consequently, the cumulative effects assessment for each VC only included those RFDs or physical activities having the temporal and spatial potential to contribute to cumulative effects on that VC.

Table 21-2: Other Projects or Physical Activities Considered

ID No. on Map	Project Name or Physical Activity	Project or Activity Type	Project Description	Approximate Direct Distance to the WSR[1]	Status / Timing	Relevant Project Spatial Boundaries[2]
Past, Present or Ongoing Projects or Physical Activities						
1	DeBeers' Victor Mine	Mining	Victor Mine is a remote fly-in/fly-out mine located in the James Bay Lowlands of Northern Ontario, approximately 90 km west of the coastal community of Attawapiskat First Nation (De Beers Group, 2023). In operation from 2008-2019, Victor was an open-pit mine and Ontario's first diamond mine. The site is now in closure and rehabilitation (De Beers Group, 2023).	160 km east of WSR	Closure phase started in June 2019	▪ Social RSA.
2	Orla Mining Ltd.'s Musselwhite Mine (formerly Goldcorp's Musselwhite Mine)	Mining	Opened in April 1997, the Musselwhite gold mine in northwestern Ontario is a fly-in, fly-out operation on the southern shore of Opapimiskan Lake, about 480 km north of Thunder Bay in northwest Ontario (Natural Resources Canada, 2019). Musselwhite's ore is mined from two main zones below Lake Opapimiskan (Newmont, 2023). An all-weather road connects the mine to the community of Pickle Lake, about 200 km to the south (Natural Resources Canada, 2019). The Musselwhite property is 17,548 hectares, entirely on First Nations land (Natural Resources Canada, 2019).	210 km west of WSR	Currently active mine	▪ Social RSA.
3	Equinox Gold Corp.'s Greenstone Mine (formerly Greenstone Gold's Hardrock Mine)	Mining	Greenstone Gold Mines is advancing on plans to design, construct and operate an open-pit gold mine, processing plant and ancillary facilities, collectively known as the Greenstone Project (Greenstone Gold Mine, 2023a). The property is located approximately 275 km northeast of the city of Thunder Bay, Ontario (Greenstone Gold Mine, 2023a). Greenstone Gold Mines proposes to mine the Hardrock deposit as an open-pit over a Life of Mine of approximately 15 years (Greenstone Gold Mine, 2023a). The Greenstone Project is 85% complete and remains on schedule to pour gold in the first half of 2024 (Greenstone Gold Mine, 2023b). As of October 2025, the Greenstone Project had reached commercial production (Greenstone Gold Mine, 2025).	344 km south of WSR	Opening in 2024	▪ Social RSA.
4	Construction of upgrades to the Anaconda and Painter Lake Forestry Access Roads	All-Season Road	A small section of road (20 km) from Nakina to Aroland First Nation was upgraded to industrial grade in 2021. The next section of road to be completed is an upgrade of the forestry road from Aroland First Nation to Painter Lake. Upgrades to Painter Lake Road are expected to be completed by Aroland First Nation to allow for access to the proposed Marten Falls Community Access Road Project. Aroland First Nation has received an agreement for funding from the Province of Ontario to initiate a planning and design study for the Painter Lake Road improvements as an independent project to the Marten Falls Community Access Road Project.	225 km south of WSR	Unknown	▪ Social RSA.
5	Wataynikaneyap Transmission Project (also known as New Transmission Line to Pickle Lake)	Power Transmission	This project involves the construction, operation and maintenance, and retirement of an overhead 300 km, 230 kilovolt electricity transmission line from Dinowic (east of Dryden) to Pickle Lake in northwestern Ontario. The transmission line was energized in October 2023.	130 km west of WSR	In operation	▪ Social RSA
6	Ogoki Diversion	Hydroelectric	The Long Lac and Ogoki diversions, located in northern Ontario, divert water from a portion of the Hudson Bay watershed into the Lake Superior basin. The Long Lac diversion began in 1939 and the Ogoki diversion began in 1943. These two diversions are often considered as one project because they are both diverting flows from the same watershed. They are operated by Ontario Power Generation (International Lake Superior Board of Control, 2023).	270 km southwest of WSR	In operation	▪ Social RSA.
7	Long Lac Diversion	Hydroelectric		410 km south of WSR	In operation	▪ Social RSA.
8	Rapid Lynx Broadband Project (Phase 1)[3]	Telecommunication	Matawa First Nations proposed the deployment of approximately 810 km of heavily armored fibre-optic cable to be installed 3 feet (approximately 1 m) underground and under water as follows: ▪ Aroland to Marten Falls – 222 km; ▪ Marten Falls to Eabametoong – 162 km; ▪ Eabametoong to Neskantaga – 166 km; ▪ Neskantaga to Webequie – 116 km; and ▪ Webequie to Nibinamik – 144 km. Construction of Phase 1 with brush and clear cutting began in February 2020 (Matawa Rapid Lynx Broadband Project, 2021). Construction of Phase 1 is approximately 58% completed (as of May 2024). Current completion date of Phase 1 is forecasted for March 2026.	Approximately 1 km north of WSR	Under construction	▪ Social RSA; ▪ Species at Risk (Caribou) RSA; ▪ Atmospheric Environment (Air Quality, Noise) RSA, and ▪ Non-Traditional Land and Resource Use RSA.

ID No. on Map	Project Name or Physical Activity	Project or Activity Type	Project Description	Approximate Direct Distance to the WSR[1]	Status / Timing	Relevant Project Spatial Boundaries[2]
9	New Fibre Installation / Upgrade Multiple Towers at various locations in Pikangikum First Nation, Cat Lake First Nation, and Kasabonika First Nations: ▪ Bearskin Lake; ▪ Big Trout Lake; ▪ Cat Lake; ▪ Deer Lake; ▪ Kasabonika Lake; ▪ Kewaywin; ▪ Kingfisher Lake; ▪ Muskrat Dam; ▪ North Spirit Lake; ▪ Pikangikum; ▪ Poplar Hill; ▪ Sachigo Lake; ▪ Sandy Lake; ▪ Slate Falls; ▪ Wapekeka (Angling Lake); ▪ Wawakepewin; ▪ Weagamow; and ▪ Wunnumin Lake.	Telecommunication	*New Fibre Installation* Keewaytinook Okimakanak plans to install approximately 2 km of aerial fibre-optic cable, for internet purposes, to serve residential homes in the Pikangikum First Nation (New Fibre Installation/Upgrade Multiple Towers, 2022). *Upgrade (Multiple) Towers* Keewaytinook Okimakanak is proposing the addition of (3) 0.6 m antennae, in the 5 GHz frequency band, mounted near the top of (2) existing 18 m and 28 m towers which are located at different locations on Cat Lake First Nation and Kasabonika First Nations. The antenna will be installed to improve network access to high-speed internet. In the future, the existing tower may have other antennas and other radiocommunication equipment added or replaced. Innovation, Science and Economic Development Canada determined in January 2023 that the proposed project is not likely to cause significant adverse environmental effects.	Various locations – approximately 70 km to 480 km west from WSR	Likely under construction / In operation*	▪ Social RSA; and ▪ Aboriginal Treaty and Rights and Interest RSA.
10	Forest management units (FMUs)	Forest Management	Ogoki FMU: The closest forest management unit to the Study Area is Ogoki Forest (FMU# 415), bordered by Wabakami Provincial Park to the west, the main branch of the Albany River to the north, and the Lake Nipigon and Kenogami FMU to the south. Geographically, it is approximately 400 km north-east of Thunder Bay, Ontario and is approximately 10,900 km^2 in size. It has been managed as a Crown Management Unit since 2012. Agoke Development LP (ADLP) holds a Forest Resource License on the Ogoki Forest and signed a Forestry Agreement assuming the forest management responsibilities on the forest. There are a number of tourism outfitter establishments within the Ogoki Forest.	Northern edge of Ogoki FMU is approximately 175 km from Webequie	Existing land use	▪ Social RSA.
11	Webequie First Nation – Nursing Station Bulk Fuel Storage Upgrades	Community Infrastructure	Webequie First Nation's Bulk Fuel Storage Upgrades Project is located at the community's nursing station. The existing bulk fuel storage tank needed to be decommissioned and removed. Two (2) new outdoor bulk fuel storage (25,000 L) horizontal double walled tanks would be installed. The new outdoor storage tanks and transfer system are connected to the existing supply and return lines and integrated into the existing indoor day tanks that service the nursing station (Webequie First Nation – Nursing Station Bulk Fuel Storage Upgrades, 2022). Indigenous Services Canada determined in August 2022 that the project is not likely to cause significant adverse environmental effects.	Within Webequie Community	In operation*	▪ Geology, Terrain and Soils RSA; ▪ Surface Water Resources RSA; ▪ Groundwater RSA; ▪ Atmospheric Environment (Air Quality, Noise) RSA; ▪ Fish and Fish Habitat RSA; ▪ Vegetation and Wetlands RSA; ▪ Wildlife and Wildlife Habitat RSA; ▪ Species at Risk RSA; ▪ Social RSA; ▪ Geology, Terrain and Soils RSA; ▪ Human Health RSA; ▪ Visual Environment RSA;

ID No. on Map	Project Name or Physical Activity	Project or Activity Type	Project Description	Approximate Direct Distance to the WSR[1]	Status / Timing	Relevant Project Spatial Boundaries[2]
						▪ Aboriginal and Treaty Rights and Interests RSA; and ▪ Cultural Heritage Resources RSA.
12	Kasabonika Lake New 7 – 12 school	Community Infrastructure	The project is a new school for Grade 7-12 with a floor area of 3,000 square metres. The building will include a gym, stage/cafeteria, music/MPR, library, classrooms, and administration and support spaces. The site will include a multi-purpose athletic field, granular pathways, parking lot and access roads off the main road as well as from the road leading to the dump. Approximately 22,170 square metres of the site area will be seeded with grass mixes (Kasabonika Lake New 7-12 school, 2020). Indigenous Services Canada determined in July 2020 that the project is not likely to cause significant adverse environmental effects.	105 km northwest of WSR	In operation*	▪ Social RSA; and ▪ Species at Risk (Caribou) RSA.
13	Kingfisher Lake First Nation K4-10 School	Community Infrastructure	The project includes the development of a 4.8 ha greenfield site for a new school, located on the north side of Church Road (also known as "Airport Road") approximately 300 m west of the main community townsite. The project includes the construction of a new K4-10 school building (2,446 m2), gravel parking lot (25 stall) and bus loop drop off, outdoor play area and play structure, volleyball court, heated warehouse, and baseball diamond/soccer field. The project includes site development (clearing, grubbing, grading, and landscaping) along with site servicing including power, telecommunications, water, and wastewater services (Kingfisher Lake First Nation K4-10 School, 2021). Indigenous Services Canada determined in July 2021 that the project is not likely to cause adverse environmental effects.	165 km west of WSR	In operations*	▪ Social RSA; and ▪ Species at Risk (Caribou) RSA.
14	Kingfisher Lake First Nation Subdivision Phase 2	Community Infrastructure	The Kingfisher Lake First Nation Subdivision Phase 2 project includes the construction and underground servicing of thirty (30) residential lots for future home construction within the community. The site is located at the west limit of the community, on the south and north sides of Airport Road. The east limit of the site is adjacent to the Phase 1 subdivision, which includes residential lots to support the new school. The scope of the project works for Phase 2 will include site investigations, tree clearing and removal, earthworks and the construction of sanitary sewer and watermain services, roads and culverts, power and communication lines (Kingfisher Lake First Nation Subdivision Phase 2, 2022). Indigenous Services Canada determined in January 2022 that the project is not likely to cause significant adverse environmental effects.	165 km west of WSR	In operations*	▪ Social RSA; and ▪ Species at Risk (Caribou) RSA.
15	Neskantaga First Nation New Construction of an 8-plex teachers' residence	Community Infrastructure	Neskantaga First Nation proposed to construct an 8-plex teacher residence on reserve land near the community school (Neskantaga First Nation New Construction of an 8-plex teachers' residence, 2022). Activities associated with the project include; ▪ Tree clearing; ▪ Grading and site preparation; ▪ Building construction activities; and ▪ Connecting of utilities. Indigenous Services Canada determined in February 2023 that the project is not likely to cause significant adverse environmental effects.	94 km southwest of WSR	Likely under construction / In operation*	▪ Social RSA; and ▪ Species at Risk (Caribou) RSA.
16	Wapekeka First Nation New School Project	Community Infrastructure	The project consists of the construction of a new school, play structure, hockey rink, soccer field, baseball field in Wapekeka First Nation. The school will have a gross floor area of 2,237.5 m^2. At least one fuel tank will be installed for heating purposes. As part of the project a new lift station and fire hydrants will be installed, plus upgrades to the high flow pumping capacity at the water treatment plant. Approximately 1100 metres of watermain and forcemain will be installed to service the new school. To construct the new school building and sports area approximately 4 hectares of bush will need to be cleared. The expected lifespan of the school and sports area is 40 years (Wapekeka First Nation New School Project, 2020). Indigenous Services Canada determined in February 2021 that the proposed project is not likely to cause significant adverse environmental effects.	175 km northwest of WSR	In operation*	▪ Social RSA; ▪ Species at Risk (Caribou) RSA; and ▪ Atmospheric Environment (Greenhouse Gas – GHG) RSA.

ID No. on Map	Project Name or Physical Activity	Project or Activity Type	Project Description	Approximate Direct Distance to the WSR[1]	Status / Timing	Relevant Project Spatial Boundaries[2]
17	Wunnumin H1RCI Compound Construction	Community Infrastructure	The project consists of constructing the necessary infrastructure in Wunnumin Lake First Nation to serve as a base of operations for Hydro One Remotes Communities Inc. ("Remotes"). The project scope includes fencing off an area of approximately 4,688 m^2 next to the airport. The area will then be compacted and graded to allow for drainage with a granular material. The next stage will involve construction a general storage building of 4.9 m x 7.3 m, a lines storage building of 4.9 m x 8.5 m, and a staff house of 8 m x 18 m. The necessary infrastructure on the site includes a drinking water system consisting of a drilled well, pump, treatment and controls, a sewage holding tank, and site electrical works. In addition, the compound will also contain a three-bedroom staff house (modular), a bucket truck storage garage, a lines storage building, a pole bunk storage, and a transformer storage platform (Wunnumin H1RCI Compound Construction, 2019). Indigenous Services Canada determined in December 2019 that the proposed project is not likely to cause significant adverse effects.	130 km west of WSR	In operations*	▪ Social RSA; ▪ Species at Risk (Caribou) RSA; ▪ Surface Water Resources RSA; ▪ Non-traditional Land and Resource Use RSA; and ▪ Aboriginal and Treaty Rights and Interests RSA.
18	Wunnumin Lake First Nation Teacherages Project	Community Infrastructure	The Wunnumin Lake First Nation Teacherage project will include the construction of two new Teacherage Duplexes and renovation of the existing Teacherages. The Duplex Construction includes construction of two 149 m^2 woodframe buildings with PWF crawlspace foundation with wood/electric heat. The units will be located on undeveloped lots; however, the lots have been identified as part of Wunnumin Lake First Nation subdivision design. Servicing will include extension of the hydro lines, water servicing from the Duplexes to the lot line (for connection to existing watermain), appropriately designed and sized septic fields and driveways will connect to an existing road access (Wunnumin Lake First Nation Teacherages Project, 2020). Indigenous Services Canada determined in July 2020 that the proposed project is not likely to cause significant adverse environmental effects.	130 km west of WSR	In operations*	▪ Social RSA; ▪ Species at Risk (Caribou) RSA; and ▪ Aboriginal and Treaty Rights and Interests RSA.
Future Reasonably Foreseeable Developments and Physical Activities That Will Likely Be Carried Out						
19	Black Horse Project and Big Daddy Project	Mining	KWG Resources (now The Canadian Chrome Company Inc.) is an exploration stage company that is participating in the discovery, delineation and development of chromite deposits in the James Bay Lowlands of Northern Ontario, including 1,024 hectares covered by four unpatented mining claims (Fancamp Claims) approximately 280km north of Nakina, Ontario, which contains the Black Horse chromite deposit, named the “Black Horse Project” and 1,241 hectares covered by seven unpatented mining claims (Big Daddy Claims) approximately 280km north of Nakina, Ontario, which contains the Big Daddy chromite deposit, named the “Big Daddy Project” (KWG Resources Inc., 2022). KWG Resources (now The Canadian Chrome Company Inc.) announced in January 2023 that it will conduct a magnetotelluric survey of its Ring of Fire chromite intrusion’s Black Horse Project. The survey will cover both the previously drilled portion of the Black Horse Project and the undrilled potential target area (the “Potential Target Area”) between the Black Horse’s drilled area northward to the south boundary of the Company’s Big Daddy joint venture project with Wyloo Pty Ltd. (formerly Noront Resources Inc.). When data from the survey has been merged with the inferred resources previously reported at the Black Horse project, target areas can be suggested where continuity of the mineralization may be defined by further drilling (KWG Resources Inc., 2023). The development area for the Black Horse and Big Daddy project based on available information, including mine claim and leases, is assumed to be conservatively 2,075.75 ha (20.75 km^2).	Located near eastern terminus of WSR	Potential development	▪ Geology, Terrain, and Soils RSA; ▪ Atmospheric Environment (Air Quality, Noise) RSA; ▪ Surface Water Resources RSA; ▪ Groundwater Resources RSA; ▪ Fish and Fish Habitat RSA; ▪ Vegetation and Wetlands RSA; ▪ Wildlife and Wildlife Habitat RSA; ▪ Species at Risk RSA; ▪ Social RSA; ▪ Non-Traditional Land and Resource Use RSA; ▪ Human Health RSA; ▪ Visual Environment RSA; ▪ Aboriginal and Treaty Rights and Interests RSA; and ▪ Cultural Heritage Resources RSA.

ID No. on Map	Project Name or Physical Activity	Project or Activity Type	Project Description	Approximate Direct Distance to the WSR[1]	Status / Timing	Relevant Project Spatial Boundaries[2]
20	Eagle's Nest Project	Mining	Noront Resources Ltd. proposed the construction, operation, decommissioning and abandonment of an underground nickel-copper-platinum multi-metal mine, an on-site metal mill, and a facility for the extraction of 358,000 cubic metres per annum of groundwater. The proposed mine is located approximately 540 kilometres north of the city of Thunder Bay, Ontario and 240 kilometres west of James Bay in the Ring of Fire mining area (Impact Assessment Agency of Canada, 2024). The Eagle's Nest project is one of the largest undeveloped, high-grade nickel-copper-platinum-palladium deposits in the world and has an expected 11-year mine life, with the potential to extend an additional nine years (CTV News, 2022). In 2013, Noront Resources prepared a draft federal/provincial Environmental Impact Statement/Environmental Assessment Report (EIS/EAR) for their proposed Eagle's Nest Mine in the McFaulds Lake area, including an examination of alternative road routes and types (e.g., winter, East-West all-season road and combined winter/all-season) that would connect the mine to the provincial highway system. The Noront draft EIS/EAR and EA process was not completed. On August 28, 2019, the Impact Assessment Act came into force, replacing the Canadian Environmental Assessment Act, 2012. As a result, the comprehensive study, which was being conducted under the former Canadian Environmental Assessment Act, was terminated per the transitional provisions of the Impact Assessment Act (Impact Assessment Agency of Canada, 2019). In April 2022, the Eagle's Nest Mine was officially sold by Noront Resources to Wyloo Pty Ltd. An updated feasibility study for the Eagle's Nest Mine is currently underway by Wyloo Pty Ltd., including environmental studies and permitting. The development area for the Eagle's Nest Mine Project based on available information, including mine claim and leases, is assumed to be conservatively 1,174.38 ha (11.74 km^2).	Located near eastern terminus of WSR	Currently under planning and regulatory permitting process Potential timeline is for construction to begin in 2027 and production by the end of 2030.	▪ Geology, Terrain, and Soils RSA; ▪ Atmospheric Environment (Air Quality, Noise) RSA; ▪ Surface Water Resources RSA; ▪ Groundwater Resources RSA; ▪ Fish and Fish Habitat RSA; ▪ Vegetation and Wetlands RSA; ▪ Wildlife and Wildlife Habitat RSA; ▪ Species at Risk RSA; ▪ Social RSA; ▪ Non-Traditional Land and Resource Use RSA; ▪ Human Health RSA; ▪ Visual Environment RSA; ▪ Aboriginal and Treaty Rights and Interests RSA; and ▪ Cultural Heritage Resources RSA.
21	Marten Falls Community Access Road Project	All-Season Road	Marten Falls First Nation is proposing the construction and operation, including maintenance, of an all-season multi-use community access road approximately 190 to 230 km in length, connecting the northern end of Painter Lake forestry road to the community of Marten Falls. Marten Falls is located at the junction of the Albany and Ogoki rivers, approximately 170 km northeast of Nakina, Ontario. As proposed, the Marten Falls Community Access Road Project could enable future access to potential mineral development activities in the Ring of Fire area (Impact Assessment Agency of Canada, 2023). The Environmental Assessment/Impact Assessment started October 29, 2021 (Marten Falls First Nation, 2022).	100 km south of WSR	Currently under environmental regulatory process	▪ Species at Risk RSA; ▪ Social RSA;and ▪ Human Health RSA.
22	Northern Road Link Project	All-Season Road	Marten Falls First Nation and Webequie First Nation are proposing to build, operate and maintain an all-season multi-use road and associated infrastructure between the community access road that has been proposed by Marten Falls First Nation and the supply road that has been proposed by Webequie First Nation. The new road would connect to the proposed Ring of Fire mining development area. On March 3, 2023, the Minister of the Environment, Conservation and Parks approved, with an amendment, the Terms of Reference (ToR) for the preparation of an environmental assessment for this project (Northern Road Link, 2023). On October 17, 2024, the Impact Assessment Agency of Canada reposted the Notice of Commencement for the project pursuant to transition provisions included in the *Budget Implementation Act*, 2024 (Northern Road Link, 2024).	Connects to eastern terminus of WSR	Currently under environmental regulatory process	▪ Geology, Terrain, and Soils RSA; ▪ Atmospheric Environment (Air Quality, Noise) RSA; ▪ Fish and Fish Habitat RSA; ▪ Vegetation and Wetlands RSA; ▪ Wildlife and Wildlife Habitat RSA; ▪ Species at Risk RSA; ▪ Social RSA; ▪ Surface Water ESA; ▪ Non-Traditional Land and Resource Use RSA; ▪ Human Health RSA; ▪ Visual Environment RSA; ▪ Aboriginal and Treaty Rights and Interests RSA; and ▪ Cultural Heritage Resources RSA.

ID No. on Map	Project Name or Physical Activity	Project or Activity Type	Project Description	Approximate Direct Distance to the WSR[1]	Status / Timing	Relevant Project Spatial Boundaries[2]
24	East-West Road[4]	All-Season Road	A group of northwestern Ontario communities and businesses, known as East-West Ring of Fire Road Coalition in 2019 requested that the province consider an East-West Road into the Ring of Fire. The coalition at that time was seeking government support for the east-west route, which would extend from Highways 599 and 72 to the Ring of Fire. The group contended this road will benefit a greater number of communities than the government's preferred north-south route – (Northern Road Link (NRL) and Marten Falls Community Access Road (MFCAR) projects) currently under EA/IA process and would bring more economic spinoffs and social benefits. The route for the East-West Road is assumed to be that proposed by Noront Resources in 2015 as part of the Eagle's Nest Mine development and EA. The East-West Road and is not part of the current proposed Eagle's Nest Project by Wyloo Pty Ltd. but remains the preference of the East-West Ring of Fire Road Coalition.	250 km southwest of WSR	Conceptual level proposed development	▪ Species at Risk (Caribou) RSA; ▪ Social RSA; ▪ Surface Water RSA; ▪ Non-Traditional Land and Resource Use RSA; and ▪ Aboriginal and Treaty Rights and Interests RSA.
25	Kashechewan First Nation Road to Site 5 Project	All-Season Road	Having faced decades of flooding-related issues, Kashechewan has proposed relocating their community to higher elevation at 'Site 5'. This project involves clearing and grubbing of vegetation of 32,645 metres of winter road located on and adjacent to Fort Albany No. 67. Subsequent phases of the project include upgrading of the road to an all-season access road (Impact Assessment Agency of Canada, 2020).	320 km east of WSR	Currently under environmental regulatory process	▪ Social RSA.
26	Hydroelectric generation and transmission connection development opportunities in Albany and Attawapiskat Rivers area	Hydroelectric and Power Transmission	In response to Ontario Minister of Energy's request, in 2022, Ontario Power Generation identified hydroelectric potential areas in northern Ontario which include Albany and Attawapiskat Rivers area, to meet demand driven by population and economic growth. The potential hydroelectric developments in Albany and Attawapiskat Rivers area can be an enabler of other economic activities such as the Ring of Fire and other mining sites and could bring about socioeconomic benefits to Indigenous communities and regional economic growth.	Approximately 80 km south of WSR	Potential development	▪ Social RSA.
27	Rapid Lynx Broadband Project (Phase 2)	Telecommunication	Matawa First Nations proposed the deployment of an additional 289 km of fibre and optical equipment connecting Aroland and several other remote First Nations to the communities of Ginoogaming, Long Lake 58 and Constance Lake (Matawa Rapid Lynx Broadband Project, 2022). Schedule for Phase 2 is to be determined.	Two locations are present at 330 km south of WSR while other two locations are present at 110 km west of WSR	Proposed development	▪ Social RSA.
28	Forest management units (FMUs)	Forest Management	**Proposed Neskantaga FMU:** Neskantaga First Nation, in partnership with Mitigokaa Development Corporation, wants to eliminate reliance on diesel-based energy sources and plans to establish a cleaner biomass energy facility for its electricity supply. Operation of the biomass energy facility is estimated to require an annual wood supply of approximately 9,000 m^3, which would require the harvest of approximately 100 hectares per year of forest from public land near the community. Harvest operations are proposed to commence by winter 2021–2022 to supply wood to the proposed biomass energy facility in early 2022. In association with development of the biomass energy facility, Ministry of Natural Resources (MNR) is proposing to designate a FMU for the proposed Neskantaga Forest; identify an available wood supply as part of a Forest Management Plan for the FMU; revise its Forest Management Planning Manual to incorporate special provisions for the Neskantaga Forest MU (including First Nation and Métis Involvement and Consultation – neighbouring communities would be offered opportunities to be involved in the preparation and implementation of the FMP); and exempt forest management activities in the proposed Neskantaga Forest MU from the requirements of O.Reg . 334 of the *Environmental Assessment Act*, relying instead on the requirements/provisions of the Crown *Forest Sustainability Act*. The proposed Neskantaga Forest MU, and the forest management activities that would occur within the proposed management unit, are outside of the area of Ontario to which the forestry exemption in Regulation 334 applies. Therefore, these proposed forest management activities are presently subject to a comprehensive (individual) environmental assessment under the *Environmental Assessment Act*. The MNR proposal would change this, so no assessment under the EA Act would be required ("MNR's policies, regulations and guidelines would maintain environmental protections without the need for a comprehensive environmental assessment").	100 km southwest of WSR	Proposed land use	▪ Species at Risk (Caribou) RSA; and ▪ Social RSA.

ID No. on Map	Project Name or Physical Activity	Project or Activity Type	Project Description	Approximate Direct Distance to the WSR[1]	Status / Timing	Relevant Project Spatial Boundaries[2]
29	Black Thor, Blackbird, and Black Label Mineral deposits	Mineral Exploration Activity	The Black Thor chromite deposit is the largest of its kind yet discovered in North America. The current inferred mineral resources include 69.5 million tonnes grading 31.9% Chromic Oxide (Cr_2O_3) (Canadian Mining Journal, 2011). Cliffs Ferroalloys (Cliffs) proposed to develop the Black Thor chromite mine. The mine is expected to have a lifespan of 30 years or greater and the discovery of additional mineral deposits is expected to extend the lifespan even further (Cliffs Chromite Project, 2021). The mine is located near McFaulds Lake in the Ring of Fire, on the edges of the James Bay Lowlands and within the province's Far North planning area, 150 km west of the De Beers Victor diamond mine (Cliff Chromite Project, 2021). Terms of reference amended: submitted, January 25, 2013. On November 20, 2013, Cliffs announced that it was indefinitely suspending its chromite project in Northern Ontario (Cliffs Chromite Project, 2021). Blackbird chromite deposit was discovered less than 1 km to the south of Eagle's Nest. Black Label is a chromite horizon paralleling to and 150 metres northwest of Black Thor. Noront Resources Ltd. previously owned Blackbird and Black Label mineral deposits. Wyloo Pty Ltd. acquired Noront Resources in April 2022. Based on mine claims and leases, the combined development area for the subject RFDs is assumed to be 2,720.74 ha (27.2 km^2).	Located near eastern terminus of WSR	The Black Thor project was suspended in 2013. Blackbird and Black Label Chromite Projects – status unknown	▪ Geology, Terrain, and Soils RSA; ▪ Atmospheric Environment (Air Quality, Noise) RSA; ▪ Fish and Fish Habitat RSA; ▪ Vegetation and Wetlands RSA; ▪ Wildlife and Wildlife Habitat RSA; ▪ Species at Risk RSA; ▪ Social RSA; ▪ Surface Water RSA; ▪ Non-Traditional Land and Resource Use RSA; ▪ Human Health RSA; ▪ Visual Environment RSA; ▪ Aboriginal and Treaty Rights and Interests RSA; and ▪ Cultural Heritage Resources RSA.
30	Juno Corporation Mining Exploration Activity	Mineral Exploration Activity	On September 8, 2020, Ministry of Energy, Northern Development and Mines (now Ministry of Energy and Mines) issued an exploration permit for Juno Corp. to conduct exploration activities in its mining claims near Webequie First Nation (Juno Corporation Mining Exploration Activity, 2020).	Located 65 km east, northeast of WSR	Potential development	▪ Species at Risk (Caribou) RSA; ▪ Social RSA; and ▪ Aboriginal and Treaty Rights and Interests RSA.
31	Northern Star Eagle Limited and Southern Star Eagle Limited Drilling Program	Mineral Exploration Activity	A drilling program carried out in diamond mining claims on the Northern Star Eagle and Southern Star Eagle Properties in September 2008 recommended further exploration to delineate the mineralization in those mining claims.	Located 45 km northeast of western terminus of WSR	Potential development	▪ Species at Risk (Caribou) RSA; ▪ Social RSA; and ▪ Aboriginal and Treaty Rights and Interests RSA.
32	Development of 10 Lot Residential Subdivision on Eabametoong First Nation	Community Infrastructure	Eabametoong First Nation is proposing the construction of a small subdivision (1200 m^2) consisting of 10 lots for the eventual construction of 10 residential houses (Development of 10 Lot Residential Subdivision on Eabametoong First Action, 2024). Project activities include: ▪ Road Construction; ▪ Lot Development and Servicing; ▪ Water Main Distribution Extension; ▪ Wastewater Collection Extension; and ▪ Hydro Extension.	145 km south of WSR	Proposed development	▪ Species at Risk (Caribou) RSA; and ▪ Social RSA.
33	Kasabonika Lake First Nation Band Representative Facility	Community Infrastructure	The Kasabonika Lake First Nation Band Representative Facility project involves the construction of a new single story Child and Family Service (CFS) building and housing facilities for staff in the community of Kasabonika Lake. The scope of the project works will include tree clearing, lot development, parking lot and laneway construction, connection to community's water and wastewater infrastructure and building construction (Kasabonika Lake First Nation Band Representative Facility, 2023). On May 1, 2024 Indigenous Services Canada issued its notice of determination and determined that the project is not likely to cause significant adverse environmental effects.	104 km northwest of WSR	Likely under construction	▪ Species at Risk (Caribou) RSA; and ▪ Social RSA.

ID No. on Map	Project Name or Physical Activity	Project or Activity Type	Project Description	Approximate Direct Distance to the WSR[1]	Status / Timing	Relevant Project Spatial Boundaries[2]
34	Neskantaga Community Recreation Centre	Community Infrastructure	The project proposes the renovation of the existing arena. There will be an addition to the arena building to house sports and gym equipment to be utilized by community youth, adults, Elders and families. The initial stage of the project will involve design, engineering and planning the arena renovations as well as the 2,400 square foot addition. The aim is to exceed requirements of the highest published accessibility standards and energy efficiency standards. Water and sewer hookup will be required as currently there are no bathroom facilities. The arena renovations will include installation of insulation and completion of walls/ceilings, the construction of change rooms, roof repairs and a connection to the addition. The project will also insulate the exterior shell with v-rib liner (34,400 square feet) (Neskantaga Community Recreation Centre, 2021).	90 km southwest of WSR	Proposed development	▪ Species at Risk (Caribou) RSA; and ▪ Social RSA.
35	Kinonjeoshtegon-CHRT 41-CFS Centre and Associated Building-P048401-2425	Community Infrastructure	The proposed project is located in Kitchenuhmaykoosib Inninuwug First Nation (KIFN), Ontario approximately 580 km north of Thunder Bay, Ontario. The project includes two sites. The proposed project (the Project) is the construction and operation of a new family wellness campus, which will include buildings, access roads and utility connections (water, sewer, power). The Project will provide emergency services, long- and short-term emergency housing, administrative and teaching spaces, healing and ceremonial spaces, storage facilities, and lodging for youth, Elders, families, visitors and staff in KIFN (Kinonjeoshtegon-CHRT 41-CFS centre and Associated Building P048401-2425, 2024).	180 km northwest of WSR	Proposed development	▪ Species at Risk (Caribou) RSA; and ▪ Social RSA.
36	Kitchenuhmaykoosib Inninuwug Wastewater System Upgrades & Expansion	Community Infrastructure	Kitchenuhmaykoosib Inninuwug First Nation proposes to construct and operate a new sewage lagoon on the mainland; expand and upgrade the existing lagoon on Post Island; upgrade the existing lift stations on Post Island; and, construct a wastewater collection system for the mainland, including new lift stations, forcemain, gravity sewer, outflow pipe, sanitary manholes and service connections to the existing housing (Kitchenuhmaykoosib Inninuwug Wastewater System Upgrades & Expansion, 2024).	195 km northwest of WSR	Proposed development	▪ Species at Risk (Caribou) RSA; and ▪ Social RSA.
37 38 39	Transportation of ore from future development near the Project for processing, once past the Webequie Supply Road, potentially involving the following: ▪ Ferrochrome Production Facility (proposed); ▪ Sudbury Smelter (existing); and ▪ Road from Nakina to Ferrochrome Facility and Sudbury Smelter (existing)	Road Traffic	Increased road infrastructure in the region is expected to result in increased traffic to and from the Ring of Fire.	Three locations are present from 530 km to 820 km southeast of WSR	Hypothetical / reasonably predictable increase of activities resulting from infrastructure	▪ Social RSA.
-	Winter Roads – Increased winter road traffic by future mining proponents	Road Traffic	Proposed all-season access to the Ring of Fire may increase exploration and mining expansion efforts in the region, which may also lead to increasing road traffic on winter road system in the area.	--	Hypothetical / reasonably predictable increase of activities resulting from infrastructure	▪ Social RSA; ▪ Species at Risk RSA; ▪ Fish and Fish Habitat RSA; and ▪ Wildlife and Wildlife Habitat (Moose RSA).
-	Climate Change	Human-induced hazard	It is likely that the Project's predicted net effects will interact with climate change.	-	Current trend is projected into foreseeable future	▪ All LSAs/RSAs defined for VCs.

Notes:

[1] Approximate distance (km) from the identified project or physical activity to the closest point of the proposed Webequie Supply Road (WSR).

[2] Definitions and rationale for Project spatial boundaries are provided for each VC in Sections 6 to 20.

[3] Phase 1 of the Rapid Lynx Broadband Project includes the installation of the fibre-optic infrastructure and Phase 2 will connect the services.

[4] The East-West Road is not considered a Reasonably Foreseeable Development/project or activity based on the proposed North-South roads (i.e., MFCAR and NRL) to the Ring of Fire and is excluded from the cumulative effects assessment.

* For the purpose of the EA/IA, it is assumed that projects/activities that were issued a notice of determination by federal authorities indicating that they are not likely to cause significant adverse environmental effects would proceed to construction.

21.3.5 Mitigation and Follow-up Monitoring

Additional mitigation and follow-up monitoring requirements to reduce adverse cumulative effects are presented as appropriate. This includes mitigation to be implemented by the proponent to either reduce or avoid project-related net effects, as well as inferred measures required by other parties to reduce the contribution of effects from RFDs and activities. Information on RFDs and activities, their known or likely net effects, and planned mitigation measures, where available, has been obtained through existing and publicly available information sources, as well as relying on the professional experience of the Project Team.

The cumulative effects assessment considers the nature, location, and timing of these other projects, and their net effects in relation to the Project, as well as environmental protection measures that are known and/or required to be implemented in relation to them, including those required under applicable provincial and federal legislation, regulations and other requirements.

21.3.6 Characterization of Net Cumulative Effects and Determination of Significance

The significance of potential net cumulative effects was determined based on the same VC-specific criteria used for the effects assessment carried out in Sections 6 to 20. The definition of these criteria, which are customized in each VC-specific section are outlined in **Table 21-3**.

The determination of significance was based on the predicted characterization of the net cumulative effects, taking into account the implementation of additional mitigation measures, which could include mitigation measures identified for other ongoing projects, RFDs and future activities.

Table 21-3: Criteria for Characterization of Predicted Net Cumulative Effects on VC

Characterization Criteria	Description	Definition of Qualitative Categories or Quantitative Measure
Direction	Direction relates to the value of the effect in relation to the existing conditions.	**Positive** – Net gain or benefit; effect is desirable. **Neutral** – No change compared with baseline conditions and trends. **Negative** – Net loss or adverse effect; effect is undesirable.
Magnitude	Magnitude is the amount of change in measurable parameters or the VC relative to existing conditions.	**Negligible** – No measurable change. **Low** – (To be defined by VC). **Moderate** – (To be defined by VC). **High** – (To be defined by VC).
Geographic Extent	Geographic extent refers to the spatial area over which a net effect is expected to occur or can be detected within the Project Footprint, Local Study Area and Regional Study Area.	**Project Footprint** – The effect is confined to the Project Footprint or Project Development Area. **Local Study Area** – The effect is confined to the Local Study Area. **Regional Study Area** – The effect extends beyond the Local Study Area boundary but is confined within the Regional Study Area.
Timing	Timing criteria indicate the timing (e.g., dates or seasons) importance of the net effect.	Defined on a VC-specific basis.

Characterization Criteria	Description	Definition of Qualitative Categories or Quantitative Measure
Duration	Duration is the period of time required until the measurable indicators or the VC returns to its existing (baseline) condition, or the net effect can no longer be measured or otherwise perceived.	**Short-term** – Net effect restricted to no more than the duration of the construction phase (approximately 5 years). **Medium-term** – Net effect extends through the Operations Phase of the Project (75-year life cycle). **Long-term** – Net effect extends beyond the Operations Phase (greater than 75 years). **Permanent** – Recovery to baseline conditions unlikely.
Frequency	Frequency refers to the rate of occurrence of an effect over the duration of the Project or in a specific phase.	**Infrequent** – The effect is expected to occur rarely. **Frequent** – The effect is expected to occur intermittently. **Continuous** – The effect is expected to occur continually.
Context	Context considers sensitivity and resilience of the VC to project-related change.	Defined on a VC-specific basis and draws on the existing conditions.
Input from Indigenous Peoples	Views of the Indigenous communities and groups in assigning the criteria to be used and in characterizing the effects.	Varies by VC based on input received from Indigenous communities and groups.
Reversibility	Reversibility describes whether a measurable indicator or the VC can return to its existing condition after the project activity ceases.	**Reversible** – The net effect is likely to be reversed after activity completion and rehabilitation. **Irreversible** – The net effect is unlikely to be reversed.
Likelihood of Occurrence	Likelihood of occurrence is a measure of the likelihood that an activity will result in an effect.	**Unlikely** – The effect is not likely to occur. **Possible** – The effect may occur but is not likely. **Probable** – The effect is likely to occur. **Certain** – The effect will occur.

21.4 Assessment of Cumulative Effects on Valued Components

21.4.1 Geology, Terrain and Soils

21.4.1.1 Past, Present and Ongoing Effects

Following the “Interim Cumulative Effects Assessment Guidance Document,” past, present, and ongoing RFDs and activities are considered to define existing conditions for cumulative effects. As such, the existing conditions outlined in Section 6 for the Geology, Terrain, and Soils VC presently reflect the effects from these projects and activities within the RSA. **Table 21-1** identifies these projects and activities (IDs 1 to 18) and indicates where their effects spatially overlap with the RSA and the Project’s net effects on the VC. Therefore, the cumulative effects assessment for geology, terrain, and soils is focused on integrating the Project’s net adverse effects with those of future RFDs and activities discussed in **Section 21.4.1.2**.

21.4.1.2 Other Ongoing and Reasonably Foreseeable Projects or Activities

A list of the RFDs and activities that were considered for the cumulative effects assessment are presented in **Table 21-1** (ID's 19 to 39). Among the projects and activities detailed in **Table 21-1**, only those found in **Table 21-4** are considered likely to occur within, and potentially impact, the RSA for the Geology, Terrain, and Soils VC. As a result, these projects may contribute to cumulative effects within the RSA.

Table 21-4: Geology, Terrain and Soils – RFDs or Future Activities in the RSA

ID	RFD or Activity	Spatial Overlap of Net Effects	Temporal Overlap of Net Effects	Included in Cumulative Effects Analysis
19	Black Horse Project and Big Daddy Project	Yes	Yes	Yes
20	Eagle's Nest Project	Yes	Yes	Yes
22	Northern Road Link	Yes	Yes	Yes
29	Black Thor, Blackbird, and Black Label Mineral deposits	Yes	Yes	Yes
-	Climate Change	Yes	Yes	Yes

21.4.1.3 Cumulative Effects

Cumulative effects may occur where the net adverse effects of the Project and the net adverse effects of other RFDs or activities interact within the RSA boundary for the VC. The cumulative effects to geology, terrain and soils may occur due to Project and RFDs and activities that overlap spatially and temporally.

Based on the Project footprint analysis, the cumulative effects leading to soil resource loss are estimated at 3.25 km², accounting for potential geological changes and shifts in terrain and topography, which equals 0.25% of the RSA. When other RFDs and activities are considered, the total combined effects on geology, terrain, and soils increases to approximately 50.81 km², representing 3.99% of the RSA.

Table 21-5 summarizes the other RFDs or future physical activities in the RSA that have the potential to contribute to changes to geology, soil quality and quantity (loss of soil resources) and/or alter terrain and topography.

Table 21-5: Geology, Terrain and Soils – Summary of Cumulative Effects

ID	RFD or Activity	Potential Cumulative Effect	Spatial / Temporal Considerations and Effect Pathways	Potential Loss (ha)	Relative Area in the RSA (%)
19	Black Horse Project and Big Daddy Project	Change in geology Change in soil quality and quantity (i.e. loss of soil) Change/alteration of terrain and topography	The Black Horse Project and Big Daddy Project are assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. This may include alteration, or loss of geological features and terrain or topography; and changes to soil quality and	1,181.85	0.92

ID	RFD or Activity	Potential Cumulative Effect	Spatial / Temporal Considerations and Effect Pathways	Potential Loss (ha)	Relative Area in the RSA (%)
			quantity from vegetation clearing and grubbing, earth disturbance and excavation, blasting; emissions, discharges and waste; and spill accidents during construction and/or operation activities.		
20	Eagle's Nest Project	Change in geology Change in soil quality and quantity (i.e. loss of soil) Change/alteration of terrain and topography	The Eagle's Nest Project will temporally and spatial overlap with Project activities. Activities associated with potential future mine development have similar pathways of effects as those arising from the Project. This may include alteration, or loss of geological features and terrain or topography; and changes to soil quality and quantity from vegetation clearing and grubbing, earth disturbance and excavation, blasting; emissions, discharges and waste; and spill accidents during construction and/or operation activities.	3,523.33	2.77
22	Northern Road Link	Change in geology Change in soil quality and quantity (i.e. loss of soil) Change/alteration of terrain and topography	The Northern Road Link will temporally and spatially overlap with Project activities based on current information and proposed development timeline. Activities associated with road development have same pathways of effects as those arising from the Project. This may include alteration, or loss of geological features and terrain or topography; and changes to soil quality and quantity from vegetation clearing and grubbing, earth disturbance and excavation, blasting; emissions, discharges and waste; and spill accidents during construction and/or operation activities.	37.78	0.03
29	Black Thor, Blackbird, and Black Label Mineral deposits	Change in geology Change in soil quality and quantity (i.e. loss of soil) Change/alteration of terrain and topography	The Black Thor, Blackbird, and Black Label Mineral deposits will spatially overlap with project activities; however, the temporal overlap is uncertain based on the current information and status of the development (on hold). Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. This may include alteration, or loss of geological features and terrain or topography; and changes to soil quality and quantity from vegetation clearing and grubbing, earth disturbance and excavation, blasting; emissions, discharges and waste; and spill accidents during construction and/or operation activities.	13.57	0.01

ID	RFD or Activity	Potential Cumulative Effect	Spatial / Temporal Considerations and Effect Pathways	Potential Loss (ha)	Relative Area in the RSA (%)
-	Climate Change	Alteration of topography and terrain Change to soil quality	Acceleration of sediment and erosion due to greater temperature fluctuations or increased frequency of high precipitation events. Greater potential for slope destabilization, altered terrain, terrain instability with predicted changes to permafrost freeze-thaw cycles. Prolonged drought or heavy snow/rainfall events affecting soil stability and quality.	-	-

21.4.1.4 Mitigation for Cumulative Effects

There are multiple Project-related interactions and pathways that result in changes to geology, soil quality and quantity, and/or terrain and topography. These effects are associated with specific construction and operation phases of the Project and particular activities for which mitigation measures have been established and are proven to be effective in minimizing and/or avoiding adverse effects. This is similarly applicable for other RFDs or future activities within the RSA.

With the implementation of the Project's mitigation measures (see Section 6.4) and the assumption that RFDs or activities will be required to have the same or similar standards, it is anticipated that the cumulative effects on changes in soil quality and quantity and/or terrain and topography will not alter soils such that successful rehabilitation with a capability relative to existing conditions would be prevented. Additionally, cumulative effects on geology and terrain are not predicted to alter the function of ecologically or cultural important landforms with implementation of mitigation measures. Therefore, the identified cumulative effects are considered net cumulative effects and are discussed in the following subsection.

21.4.1.5 Characterization of Net Cumulative Effects

The net cumulative effects on geology, terrain and soils, are characterized in **Table 21-6** using the criteria defined in Section 6.5.

For the VC, the net cumulative effects on changes to geology, terrain and soils are predicted to be adverse, low in magnitude, occurring within the RSA, and short to medium-term, with the exception of changes to geology which are permanent. Although the change in soil quality and quantity, and/or terrain and topography will, in some cases occur once or as an irregular event during each project, the effects will be continuous throughout each project and will be reversible.

Table 21-6: Geology, Terrain and Soils – Predicted Net Cumulative Effects Characterization

Predicted Net Cumulative Effect	Characterization Criteria								
	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Context	Reversibility	Likelihood of Occurrence
Change to Geology and Geochemistry	Negative	Low	Project Footprint	Sensitive and Non-Sensitive	Permanent	Continuous	Sensitive	Irreversible	Certain
Alteration of Topography and Terrain	Negative	Low	Project Footprint	Sensitive and Non-Sensitive	Medium-term	Continuous	Sensitive	Reversible	Certain
Change to Soil Quality	Negative	Low	Project Footprint	Sensitive and Non-Sensitive	Short-term	Continuous	Sensitive	Reversible	Certain
Change to Soil Quantity (Loss of Soil Resources)	Negative	Low	Project Footprint	Sensitive and Non-Sensitive	Medium-term	Continuous	Sensitive	Reversible	Certain

21.4.1.6 Determination of Significance

With mitigation, the net cumulative effects on the Geology, Terrian, and Soils VC are expected to be not significant.

21.4.2 Surface Water Resources

21.4.2.1 Past and Ongoing Effects

Following the "Interim Cumulative Effects Assessment Guidance Document," past, present, and ongoing RFDs and activities are considered to define existing conditions for cumulative effects. As such, the existing conditions outlined in Section 7 for the Surface Water Resources VC presently reflect the effects from these projects and activities within the RSA. **Table 21-1** identifies these projects and activities (IDs 1 to 18) and indicates where their effects spatially overlap with the RSA and the Project's net effects on the VC. Therefore, the cumulative effects assessment for surface water resources is focused on integrating the Project's net adverse effects with those of future RFDs and activities discussed in **Section 21.4.2.2**.

21.4.2.2 Other Ongoing and Reasonably Foreseeable Projects or Activities

A list of the RFDs and activities that were considered for the cumulative effects assessment were presented in **Table 21-1** (ID's 19 to 39). Of the projects and activities listed in **Table 21-1**, only those listed in **Table 21-7** were identified as being probable to occur within and have potential net effects on the RSA for the Surface Water Resources VC, therefore, have the potential to result in cumulative effects in the RSA.

Table 21-7: Surface Water Resources – RFDs or Future Activities in the RSA

ID	RFD or Activity	Spatial Overlap of Net Effects	Temporal Overlap of Net Effects	Included in Cumulative Effects Analysis
11	Webequie First Nation – Nursing Station Bulk Fuel Storage Upgrades	Yes	Yes	Yes
19	Black Horse and Big Daddy mining projects	Yes	Yes	Yes
20	Eagle's Nest Project	Yes	Yes	Yes
29	Black Thor, Blackbird, and Black Label Minig Deposits	Yes	Yes	Yes
22	Northern Road Link Project	Yes	Yes	Yes
8	Rapid Lynx Broadband Project (Phase 1)	Yes	Yes	Yes
-	Climate Change	Yes	Yes	Yes

21.4.2.3 Cumulative Effects

Cumulative effects may occur where the net adverse effects of the Project and the net adverse effects of other RFDs or activities interact within the RSA boundary for the VC. The cumulative effects to surface water resources may occur due to Project and RFDs and activities that overlap spatially and temporally.

Based on the Project footprint, cumulative effect on surface water resources are estimated to cover 3.71 km², including possible changes in drainage patterns, water quality, and sediment quality—this accounts for 0.29% of the RSA. When combined with RFDs the total cumulative effect on surface water resources increases to approximately 7.06 km², representing 0.55% of the RSA.

Table 21-8 summarizes the other RFDs or future physical activities in the RSA that have the potential to contribute to changes to surface water quality and quantity.

Table 21-8: Surface Water Resources – Summary of Cumulative Effects

ID	RFD or Activity	Potential Cumulative Effect	Spatial / Temporal Considerations and Effect Pathways	Potential Runoff Area Affected (km^2)	Relative Area in the RSA (%)
11	Webequie First Nation – Nursing Station Bulk Fuel Storage Upgrades	Change in water quality Change in sediment quality	The Webequie First Nation will temporally and spatially overlap with project activities as it's currently in operation. Activities associated with the decommissioning of old fuel storage and the installation of the new fuel storage have similar pathways of effects as those arising from the Project. This may include changes to water quality from discharges and waste; and spill accidents during construction and/or operation activities.	1.69	0.13
19	Black Horse and Big Daddy mining projects	Change in water quality Change in sediment quality Change in water quantity	The Black Horse and Big Daddy mining projects will potentially temporally and spatially overlap with project activities. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. This may include alteration, or loss of water features; and changes to water quality from excavation, blasting; emissions, discharges and waste; and spill accidents during construction and/or operation activities.	0.098	0.008
20	Eagle's Nest Project	Change in water quality Change in sediment quality Change in water quantity	The Eagle's Nest Project will temporally and spatial overlap with Project activities. Activities associated with potential future mine development have similar pathways of effects as those arising from the Project. This may include changes to water quality and quantity from earth disturbance and excavation, blasting; emissions, discharges and waste; and spill accidents during construction and/or operation activities.	0.067	0.005
29	Black Thor, Blackbird, and Black Label Minig Deposits	Change in water quality Change in sediment quality Change in water quantity	The Black Thor, Blackbird, and Black Label Mineral deposits will spatially overlap with project activities; however, the temporal overlap is uncertain based on the current information and status of the development (on hold). Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. This may include alteration, or changes to water quality and quantity from excavation, blasting; emissions, discharges and waste; and spill accidents during construction and/or operation activities.	0.049	0.004

ID	RFD or Activity	Potential Cumulative Effect	Spatial / Temporal Considerations and Effect Pathways	Potential Runoff Area Affected (km^2)	Relative Area in the RSA (%)
22	Northern Road Link Project	Change in water quality Change in sediment quality Change in water quantity	The Northern Road Link will temporally and spatially overlap with Project activities based on current information and proposed development timeline. Activities associated with road development have same pathways of effects as those arising from the Project. This may include changes to water quality and quantity from vegetation clearing and excavation, blasting; emissions, discharges and waste; and spill accidents during construction and/or operation activities.	0.78	0.06
8	Rapid Lynx Broadband Project (Phase 1)	Change in water quantity	The phase 1 of the Rapid Lynx Broadband Project will temporally and spatially overlap with Project activities based on current information and proposed development timeline. Activities associated with road development have same pathways of effects as arising from the Project. This may include changes to water quantity from vegetation clearing and excavation, emissions, discharges and waste; and spill accidents during underwater construction activities.	0.67	0.05
-	Climate Change	Change in water quality Change in sediment quality Change in water quantity	Climate change drivers related to increased precipitation (snowfall, rain, snowmelt) can increase the flood risk on the proposed Project. Changes in flow regime (quantity and timing of peak flows) due to greater temperature fluctuations or temporal shifts in temperature peaks and lows. Freeze-thaw cycles of permafrost may also be affected as a result of temporal shifts in temperature, as well as increased temperature range resulting from shifting weather patterns.	-	-

21.4.2.4 Mitigation for Cumulative Effects

There are multiple Project-related interactions and pathways that result in changes to the VC. These effects are associated with specific construction and operation phases of the Project and particular activities for which mitigation measures have been established and are proven to be effective in minimizing and/or avoiding adverse effects. This is similarly applicable for other RFDs or future activities within the RSA.

With the implementation of the Project's mitigation measures (see Section 7.4) and the assumption that other, future potential projects or activities will be required to have the same or similar standards, it is anticipated that the cumulative effects on surface water quality and quantity- comparable to the existing conditions – would not be compromised. Additionally, the identified cumulative effects are not predicted to alter the function of ecologically or culturally important watercourses with implementation of mitigation measures. Therefore, the identified cumulative effects are considered net cumulative effects and are discussed in the following subsection.

21.4.2.5 Characterization of Net Cumulative Effects

The net cumulative effects on surface water quality and quantity are characterized in **Table 21-9** using the criteria defined in Section 7.5.

The net cumulative effects on surface water quality and quantity are predicted to be adverse, low in magnitude, occurring within the RSA, and short to long-term in duration. Changes in surface water and sediment quality will, in some cases occur once or as an irregular event during each project, the effects will be frequent throughout each project and will be reversible.

Table 21-9: Surface Water Resources – Characterization of Predicted Net Cumulative Effects

Predicted Net Cumulative Effect	Characterization Criteria								
	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Context	Reversibility	Likelihood of Occurrence
Change in water quality	Negative	Low	Project Footprint, LSA, RSA	Sensitive and Non-Sensitive	Short-term	Frequent	High Resilience	Reversible	Possible
Change in water quantity	Negative	Low	Project Footprint, LSA, RSA	Sensitive and Non-Sensitive	Long-term	Frequent	High Resilience	Reversible	Certain
Change in Sediment Quality	Negative	Low	Project Footprint, LSA, RSA	Sensitive and Non-Sensitive	Short-term	Frequent	High Resilience	Reversible	Possible

21.4.2.6 Determination of Significance

With mitigation, the net cumulative effects on the Surface Water VC are expected to be not significant.

21.4.3 Groundwater Resources

21.4.3.1 Past and Ongoing Effects

Following the "Interim Cumulative Effects Assessment Guidance Document," past, present, and ongoing RFDs and activities are considered to define existing conditions for cumulative effects. As such, the existing conditions outlined in Section 8 for the Groundwater Resources VC presently reflect the effects from these projects and activities within the RSA. **Table 21-1** identifies these projects and activities (IDs 1 to 18) and indicates where their effects spatially overlap with the RSA and the Project's net effects on the VC. Therefore, the cumulative effects assessment for groundwater resources is focused on integrating the Project's net adverse effects with those of future RFDs and activities discussed in **Section 21.4.3.2**.

There is an ongoing activity #11 within the Webequie First Nation reserve, which is the Nursing Station Bulk Fuel Storage Upgrades (above ground storage tanks). It is assumed once the upgrades are completed, the fuel tanks will continue operating into the foreseeable future, and under normal operations, the site conditions will remain the same and there will be no spills or releases to the natural environmental with the mitigation measures in place (e.g., containment measures below and around the tanks). In addition, the fuel storage tanks are located approximately 2.3 km from the west terminus of the WSR (Webequie Airport). Spatially, these fuel tanks are outside the RSA of the Groundwater Resources VC for WSR; therefore, this ongoing activity is excluded from the cumulative effects assessment.

21.4.3.2 Other Ongoing and Reasonably Foreseeable Projects or Activities

A list of the RFDs and activities that were considered for the cumulative effects assessment were presented in **Table 21-1**. Of the projects and activities listed in **Table 21-1** (IDs #19 to #39), only those listed in **Table 21-10** were identified as potential contributors to the net effects on the Groundwater Resources VC, therefore, have the potential to result in cumulative effects in the RSA.

Table 21-10: Groundwater Resources – RFDs or Future Activities in the RSA

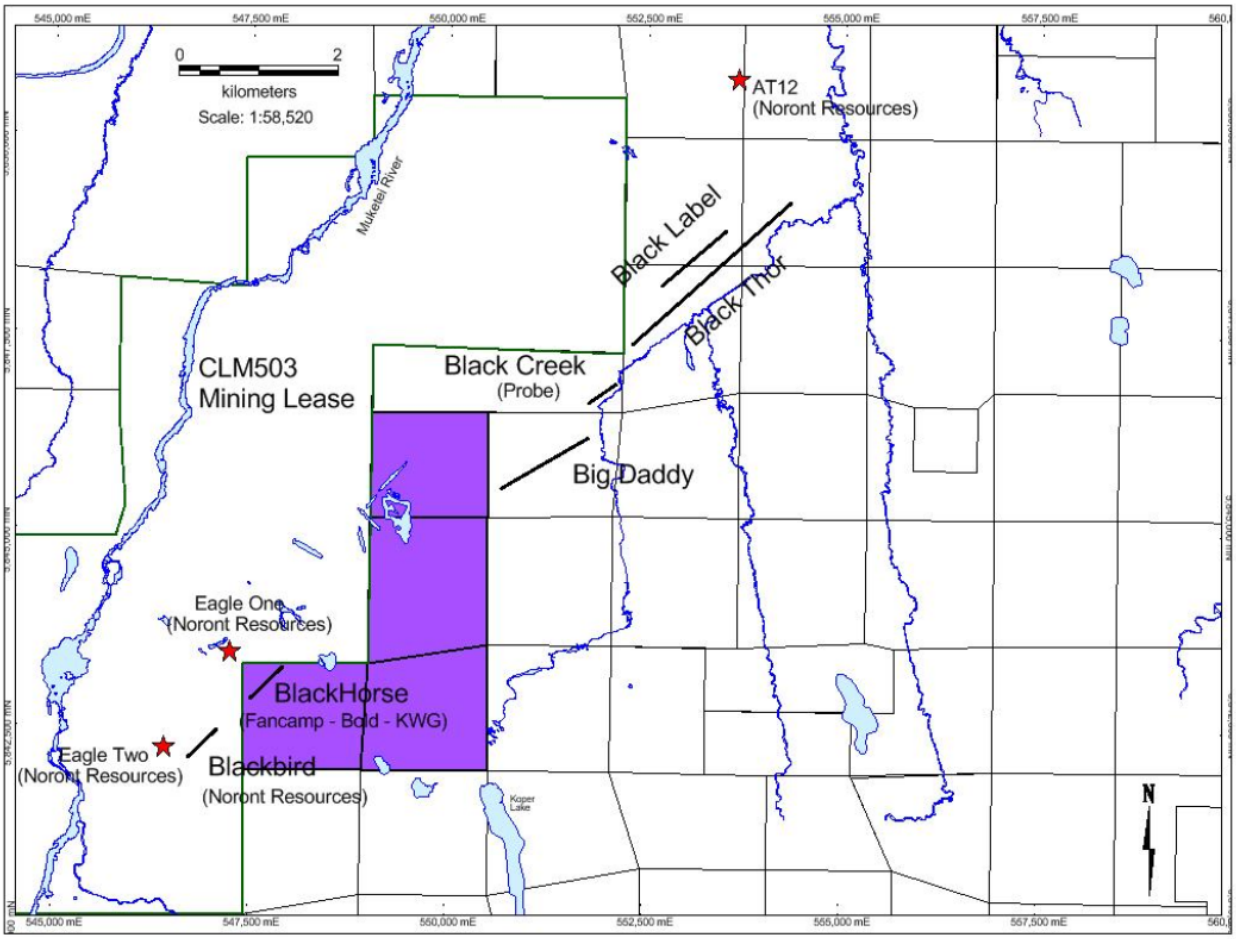
ID	RFD or Activity	Spatial Overlap of Net Effects	Temporal Overlap of Net Effects	Included in Cumulative Effects Analysis
19	Black Horse Project and Big Daddy Project	Limited (Black Horse) No (Big Daddy)	Yes	No
20	Eagle's Nest Project	Yes	Yes	Yes
22	Northern Road Link	Yes	Yes	Yes
29	Black Thor, Blackbird, and Black Label Mineral deposits	No	Yes	No
-	Climate Change	Yes	Yes	Yes

The majority of the RFD projects (claimed areas) under ID #19 (Black Horse and Big Daddy) and all the projects under ID #29 (Black Thor, Blackbird and Black Label) are outside the LSA and RSA of the Groundwater Resources VC. Only a small portion of Black Horse Project may encroach into the LSA and RSA for the WSR. The locations of these RFD projects are generally shown on **Figure 21.1** and **Figure 21.2** below. Considering these projects have limited spatial overlaps with the RSA for the Groundwater Resources VC and potential interact with the WSR. Therefore, the RFD projects (ID #19 and ID #29) are not carried forward for the assessment of the cumulative effects, even though a temporal overlap may occur.

Majority of the Eagle's Nest project (claimed area) and the north end of the Northern Road Link (NRL) project will overlap with the east end of the WSR Project within the LSA and RSA spatially and temporally. Climate change is also anticipated to have an effect on groundwater resources within the LSA and RSA; therefore, climate change and the two RFD projects (IDs #20 and #22) are included in the cumulative effects assessment for the Groundwater Resources VC.

Figure 21.1: Other Past, Present, and Reasonably Foreseeable Future Projects and Physical Activities

Figure 21.2: Locations of RFD Projects (IDs #19, #20 and #29)



(Source: NI43-101 Technical Report – Koper Lake Project Chromite Deposit, KWG 2015**)**

21.4.3.3 Cumulative Effects

Cumulative effects may occur where the net adverse effects of the Project and the net adverse effects of other RFDs or activities interact within the RSA boundary for the VC. The cumulative effects to groundwater quality and quantity may occur due to Project and RFDs and activities that overlap spatially and temporally.

Change to Groundwater Recharge

For the RFDs or physical activities (**Table 21-10**) that have the potential to contribute to changes to groundwater quantity (recharge) within the RSA, the following assumptions are made:

- Out of the estimated 1 km^2 (1,000,000 m^2) disturbed mine development area of the Eagle's Nest project, approximately 30% (0.3 km^2) of the area will become impervious during the development, construction and operation.
- Approximately 500 m of NRL Project (north end) will overlap with Eagle's Nest project. NRL route will be 35 m wide, out of which 26 m width will be impervious and 9 m ditches (including both sides) are pervious during construction and operation. The impervious area was calculated as 13,000 m^2.

Climate change may alter weather patterns such as temporal shifts in rainfall or snowfall, temporal shifts in snow melt, or higher daily temperature maximums, prolonged periods of drought or warmer weather. These factors could affect the permeability of soils and reduce groundwater recharge in the LSA and RSA over time. The cumulative effects leading to a change in groundwater recharge is approximately 36,900m^3, which represents 9% of the total recharge (354,300 + 36,900 = 391,200 m^3) for the combined WSR and Eagle's Nest projects (**Table 21-11** and **Table 21-12** and 1,600 m^3, which represents 0.5 % of the total recharge (354,300 + 1,600 = 355,900 m^3) for the combined WSR and NRL projects.

Table 21-11: Change to Groundwater Recharge – Existing Conditions and Post-Development at Eagle's Nest

Parameter	Unit	Existing Conditions	Post-Development	Change
Pervious Area	Square Metres (m^2)	1,000,000	700,000	-300,000
Impervious Area	Square Metres (m^2)	0	300,000	300,000
Annual Surplus	Millimeters (mm)	189	189	-
Infiltration Factor	-	0.65	0.65	-
Recharge Rate	Millimeters (mm) / year	123	123	-
Recharge Volume	Cubic Metres (m^3) / year	123,000	36,900	-36,900

Table 21-12: Change Groundwater Recharge – Existing Conditions and Post-Development at NRL (North End)

Parameter	Unit	Existing Conditions	Post-Development	Change
Pervious Area	Square Metres (m^2)	17,500	4,500	-13,000
Impervious Area	Square Meters (m^2)	0	13,000	13,000
Annual Surplus	Millimeters (mm)	189	189	-
Infiltration Factor	-	0.65	0.65	-
Recharge Rate	Millimeters (mm) / year	123	123	-
Recharge Volume	Cubic Meters (m^3) / year	123,000	1,600	-1,600

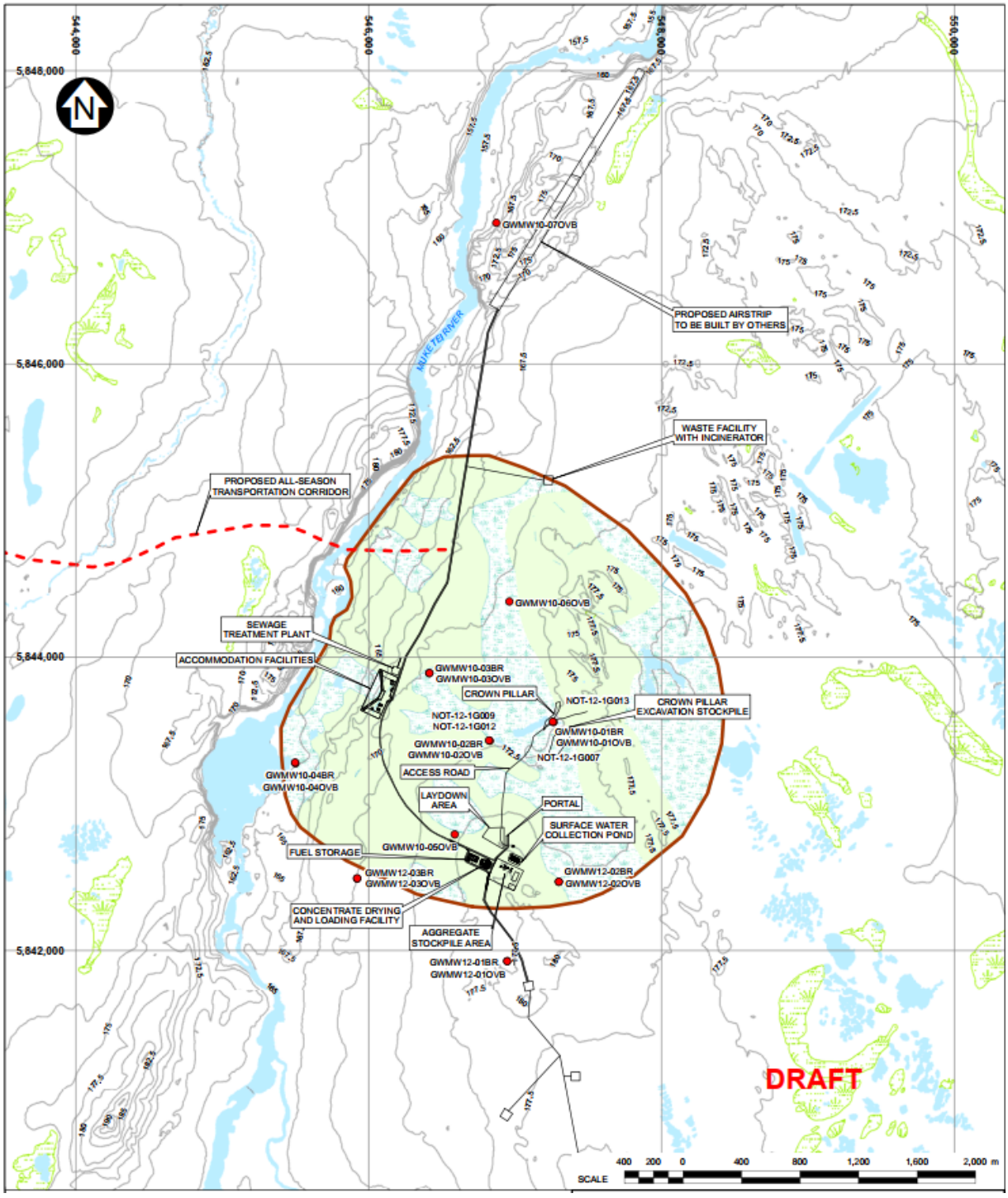
Change to Groundwater Level and Quality

Changes to groundwater levels are mostly related to dewatering during construction and operation of RFDs. Only the Eagle's Nest project is considered for the assessment of the cumulative effects on groundwater levels. No major dewatering activities are anticipated at the north end of the NRL Project, where it overlaps with WSR, based on the information available at this time. The groundwater drawdown zone of influence for the Eagle's Nest project was estimated to be 1.3 km^2 (calculated based on the polygon area of the zone of influence) with the western boundary reaching to the eastern bank of the Muketei River as shown in **Figure 21.3** (Knight Piésold, 2013).

All the tailings and any potential acid generating waste rock will be stored underground as either paste backfill, or cemented paste backfill at the Eagle's Nest. During operations, all water underground will be collected and treated and then used in ore processing. As such, the underground mine will have zero discharge to the natural environment (e.g., ground surface) during operations and therefore no effect on the groundwater or surface water quality in the area is anticipated (Knight Piésold, 2013).

Table 21-13 summarizes other RFDs or physical activities that have the potential to contribute to changes to groundwater levels and quality related to dewatering activities within the RSA.

Figure 21.3: Predicted Groundwater Drawdown Zone of Influence



(**Source:** Knight Piésold, 2013)

Table 21-13: Groundwater Resources (Recharge) – Summary of Cumulative Effects

ID	RFD or Activity	Potential Cumulative Effect	Spatial / Temporal Considerations and Effect Pathways	Estimated Disturbed Impervious Areas due to Development/Construction and Operation (m^2)	Change in Groundwater Recharge (m^3)	Percentage of Change to Total Groundwater Recharge (m^3)
20	Eagle's Nest Project	Change to the groundwater recharge – alteration of recharge due to site development and construction.	Both spatial and temporal overlaps between the WSR and Eagle's Nest projects are anticipated. The development and construction of the mine site will change the natural ground infiltration conditions and cause rainfall to divert or become surface water runoff, thus reducing the recharge.	300,000	36,900	9%
22	Northern Road Link (NRL)	Change to the groundwater recharge – alteration of recharge due to site development and construction.	Both spatial and temporal overlaps between the WSR and NRL (particularly the north end) projects are anticipated. However, the project footprints are not expected to overlap. The road development will change the natural ground infiltration conditions and cause rainfall to divert or become surface water runoff, thus reducing the recharge.	13,000	1,600	0.5%

Note: The total groundwater recharge includes both WSR and Eagle's Nest or WSR and NRL projects.

Table 21-14: Groundwater Resources (Dewatering) – Summary of Cumulative Effects

ID	RFD or Activity	Potential Cumulative Effects	VC-Specific Spatial / Temporal Considerations and Effect Pathways	Groundwater Drawdown Zone of Influence (km^2)	Notes
20	Eagle's Nest Project	Lowering of groundwater levels due to dewatering during construction and operation.	The groundwater drawdown zone of influence is estimated to reach the Muketei River, where it will overlap with the WSR RSA.	1.3	Considered standalone zone of influence. No major dewatering activity (e.g., aggregate pits or quarry sites) is expected at the east end of WSR, except for short-term dewatering activities for the construction of the bridge foundations at the Muketei River crossing.
-	Climate Change	Alteration of groundwater recharge as a result of changing weather patterns attributed to climate change.	Altered precipitation patterns (snowfall, rainfall and snowmelt), and warm weather events disrupt the hydrologic cycle and can lead to increased evapotranspiration during warmer weather (prolonged growing season) thereby reducing infiltration and groundwater recharge over time.	-	-

21.4.3.4 Mitigation for Cumulative Effects

There are multiple Project-related interactions and pathways that result in changes to the VC. These effects are associated with specific construction and operation phases of the Project and particular activities for which mitigation measures have been established and are proven to be effective in minimizing and/or avoiding adverse effects. This is similarly applicable for other RFDs or future activities within the RSA.

With the implementation of the Project's mitigation measures (see Section 8.4) and the assumption that other, future potential projects or activities will be required to have the same or similar standards, it is anticipated that the cumulative effects on changes in groundwater quality and quantity would be prevented to the extent that successful rehabilitation with a capability relative to existing conditions can be achieved. Therefore, the identified cumulative effects are considered net cumulative effects and are discussed in the following subsection.

21.4.3.5 Characterization of Net Cumulative Effects

The net cumulative effects on groundwater quality and quantity are characterized in **Table 21-15** using the criteria defined in Section 8.5.

Table 21-15: Groundwater Resources – Characterization of Predicted Net Cumulative Effects

Predicted Net Cumulative Effect	Characterization Criteria								
	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Context	Reversibility	Likelihood of Occurrence
Change to Groundwater Recharge	Negative	Moderate	Project Footprint	Sensitive	Medium-term	Continuous	Sensitive	Reversible	Probable
Lowering of Groundwater Level	Negative	High	RSA	Sensitive	Medium-term	Continuous	Sensitive	Reversible	Certain

21.4.3.6 Determination of Significance

With mitigation, the net cumulative effects on the Groundwater Resources VC are expected to be not significant.

21.4.4 Atmospheric Environment

21.4.4.1 Past and Ongoing Effects

Following the "Interim Cumulative Effects Assessment Guidance Document," past, present, and ongoing RFDs and activities are considered to define existing conditions for cumulative effects. As such, the existing conditions outlined in Section 9 for the Atmospheric Environment VC presently reflect the effects from these projects and activities within the RSA. **Table 21-1** identifies these projects and activities (IDs 1 to 18) and indicates where their effects spatially overlap with the RSA and the Project's net effects on the VC. Therefore, the cumulative effects assessment for atmospheric environment is focused on integrating the Project's net adverse effects with those of future RFDs and activities discussed in **Section 21.4.3.2**.

21.4.4.2 Other Ongoing and Reasonably Foreseeable Projects or Activities

A list of the RFDs and activities that were considered for the cumulative effects assessment were presented in **Table 21-1** (ID's 19 to 39). Of the projects and activities listed in **Table 21-1**, only those listed in **Table 21-16** were identified as being probable to occur within and have potential net effects on for the Atmospheric Environment VC, therefore, have the potential to result in cumulative effects on air quality and sound levels in the RSA.

Table 21-16: Atmospheric Environment – RFDs or Future Activities in the RSA

ID	RFD or Activity	Spatial Overlap of Net Effects	Temporal Overlap of Net Effects	Included in Cumulative Effects Analysis
19	Black Horse Project and Big Daddy Project	Yes	Yes	Yes
20	Eagle's Nest Project	Yes	Yes	Yes
22	Northern Road Link Project	Yes	Yes	Yes
29	Black Thor, Blackbird, and Black Label Mineral deposits	Yes	Yes	Yes
-	Climate Change	Yes	Yes	Yes

21.4.4.3 Cumulative Effects

Cumulative effects may occur where the net adverse effects of the Project and the net adverse effects other RFDs or activities interact within the RSA boundary for the VC. The cumulative effects on air quality and sound levels may occur due to Project and RFDs and activities that overlap spatially and temporally.

Due to the uncertainty of the RFDs, the assessment of cumulative effects on the VC is largely qualitative. The predicted adverse net effects of the Project on the VC that may act cumulatively with other RFDs include:

- Change in air quality during construction and operation phases; and
- Change in sound levels during construction of the proposed roadway and waterbody crossings.

Table 21-17 summarizes the other RFDs or future physical activities in the RSA that have the potential to contribute to changes to air quality and sound levels.

Table 21-17: Atmospheric Environment – Summary of Cumulative Effects

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Change in the Atmospheric Environment
19	Black Horse Project and Big Daddy Project	▪ Change in air quality; and ▪ Change in sound levels.	The Black Horse Project and Big Daddy Project are assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project, such as use of vehicles, machinery, and equipment for construction and operations. At this point in time, it is not possible to predict types and quantity of equipment and occurrences of activities at the future mine development site.	Construction and operation activities may contribute to regional emissions of TSP, PM_{10}, and $PM_{2.5}$ and NO_2. Cumulative increase in sound levels during construction
20	Eagle's Nest Project	▪ Change in air quality; and ▪ Change in sound levels.	The Eagle's Nest Project is assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project, such as use of vehicles, machinery, and equipment for construction and operations. At this point in time, it is not possible to predict types and quantity of equipment and occurrences of activities at the future mine development site.	Construction and operation activities may contribute to regional emissions of TSP, PM_{10}, and $PM_{2.5}$ and NO_2. Cumulative increase in sound levels during construction
22	Northern Road Link Project	▪ Change in air quality; and ▪ Change in sound levels.	The Northern Road Link will temporally and spatially overlap with Project activities based on current information and proposed development timeline. Activities associated with road development have same pathways of effects as those arising from the Project, such as use of vehicles, machinery, and equipment for construction and operations. At this point in time, it is not possible to predict types and quantity of equipment and occurrences of activities during construction and/or operations of this RFD.	Construction and operation activities may contribute to regional emissions of TSP, PM_{10}, and $PM_{2.5}$ and NO_2. Cumulative increase in sound levels during construction

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Change in the Atmospheric Environment
29	Black Thor, Blackbird, and Black Label Mineral deposits	▪ Change in air quality; and ▪ Change in sound levels.	The Black Thor, Blackbird, and Black Label Mineral deposits will spatially overlap with project activities; however, the temporal overlap is uncertain based on the current information and status of the development (on hold). Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project, such as use of vehicles, machinery, and equipment for construction and operations. At this point in time, it is not possible to predict types and quantity of equipment and occurrences of activities at the future mine development site.	Construction and operation activities may contribute to regional emissions of TSP, PM_{10}, and $PM_{2.5}$ and NO_2. Cumulative increase in sound levels during construction
-	Climate Change	▪ Change in air quality.	The introduction of a new road to the region can temporarily reduce air quality during the construction phase and can contribute to a reduction in air quality during the operations phase from vehicle use. Climate change factors such as higher daily temperatures and prolonged dry conditions can cumulatively interact with project effects on air quality through an increased risk of wildfires. Wildfires reduce air quality via particulate matter and other air pollutants into the atmosphere. Changes in vegetation from a changing climate over time can have a reduced capacity to mitigate dust generated from operations, which contribute to lowered localized air quality.	-

21.4.4.4 Mitigation for Cumulative Effects

There are multiple Project-related interactions and pathways that result in changes to air quality and sound levels; however, they are associated with specific construction and operation phases of the Project and particular activities for which mitigation measures exist and are proven to be effective in minimizing and/or avoiding adverse effects. This is similarly applicable for other RFDs or future activities within the RSA.

With the implementation of the Project's mitigation measures (see Section 9.4 and Table 24-7) and the assumption that other future potential projects or activities will be required to have the same or similar standards, it is anticipated that the cumulative effects on changes- comparable to the existing conditions – in air quality and sound levels would be avoided or reduced. Therefore, the identified cumulative effects are considered net cumulative effects and are discussed in the following subsection.

21.4.4.5 Characterization of Net Cumulative Effects

The net cumulative effects are characterized based on the incremental effects that result from the combination of the standalone net effects of the Project and the RFDs or future activities. Air emissions from a source emitting into the atmosphere will disperse, with the concentration of the air constituents decreasing with increasing distance from the source until eventually the emissions plume will reach a level at which the concentration of the assessed constituent is indistinguishable from ambient background level. Therefore, the potential for air emissions sources to interact cumulatively will decrease with increasing distance between the sources. Similarly, the sound levels attenuate with increasing distance from the emission sources.

Therefore, potential net cumulative effects are predicted to be of low magnitude and short-term in duration. The net cumulative effects on air quality and sound levels are characterized in **Table 21-18** using the criteria defined in Section 9.5.

Table 21-18: Atmospheric Environment – Characterization of Predicted Net Cumulative Effects

Predicted Net Cumulative Effect	Characterization Criteria							
	Direction	Magnitude	Geographic Extent	Duration	Frequency	Context	Reversibility	Likelihood of Occurrence
Increased air contaminant emissions during construction phase	Negative	Low	RSA	Short-term	Infrequent	Moderate resilience	Reversible	Possible
Increased air contaminant emissions during operation phase	Negative	Low	RSA	Short-term	Infrequent	Moderate resilience	Reversible	Possible
Increased sound levels during construction	Negative	Low	LSA	Short-term	Infrequent	Moderate resilience	Reversible	Possible

21.4.4.6 Determination of Significance

The determination of significance of net cumulative effects on the VC is based on the process of significance determination outlined in Section 9.6 for net effects. A predicted net cumulative effect is considered significant if the effect is high in magnitude, local to regional in extent, and long-term to permanent in duration.

As noted in **Table 21-17**, there are no situations of a net cumulative effect on the atmospheric environment that are of high magnitude and long-term or permanent in nature. Consequently, the net cumulative effects on the Atmospheric Environment VC are not significant.

21.4.5 Fish and Fish Habitat

21.4.5.1 Past and Ongoing Effects

Following the "Interim Cumulative Effects Assessment Guidance Document," past, present, and ongoing RFDs and activities are considered to define existing conditions for cumulative effects. As such, the existing conditions outlined in Section 10 for the Fish and Fish Habitat VC presently reflect the effects from these projects and activities within the RSA. **Table 21-1** identifies these projects and activities (IDs 1 to 18) and indicates where their effects spatially overlap with the RSA and the Project's net effects on the VC. Therefore, the cumulative effects assessment for fish and fish habitat is focused on integrating the Project's net adverse effects with those of future RFDs and activities discussed in **Section 21.4.5.2**.

21.4.5.2 Other Ongoing and Reasonably Foreseeable Projects or Activities

A list of the RFDs and activities that were considered for the cumulative effects assessment were presented in **Table 21-2** (ID's 19 to 39). Of the projects and activities listed in **Table 21-2**, only those listed in **Table 21-19** were identified as being probable to occur within and have potential net effects on the RSA for the Fish and Fish Habitat VC, therefore, have the potential to result in cumulative effects in the RSA.

Table 21-19: Fish and Fish Habitat – RFDs or Future Activities in the RSA

ID	RFD or Activity	Spatial Overlap of Net Effects	Temporal Overlap of Net Effects	Included in Cumulative Effects Analysis
19	Black Horse Project and Big Daddy Project	Yes	Yes	Yes
20	Eagle's Nest Project	Yes	Yes	Yes
21	Marten Falls Community Access Road	Yes	Yes	Yes
22	Northern Road Link Project	Yes	Yes	Yes
29	Black Thor, Blackbird, and Black Label Mineral deposits	Yes	Yes	Yes
-	Climate Change	Yes	Yes	Yes

21.4.5.3 Cumulative Effects

Cumulative effects may occur where the net adverse effects of the Project and the net adverse effects of other RFDs or activities interact within the RSA boundary for the VC. The cumulative effects to fish and fish habitat may occur due to Project and RFDs and activities that overlap spatially and temporally.

The predicted net adverse effects of the Project on the Fish and Fish Habitat VC that may act cumulatively with other RFDs include:

- Changes in Fish Access to Habitats (during the Operations Phase); and
- Changes in Public Access to Fish Habitats (during the Operations Phase).

Both of these net adverse effects in terms of the WSR Project are likely to extend into the RSA and have potential adverse effects with respect to fish populations and fish access to habitats. These net effects were characterized as probable to occur and were predicted to have a low to moderate magnitude. Other net effects on the VC are possible, but do not meet the criteria for being carried forward to the cumulative effects assessment. These other effects of negligible and low magnitude are not predicted to meaningfully contribute to cumulative effects in the RSA.

The cumulative effects on fish access to habitats are likely to occur as a result of roadways/obstructions that may affect the ability of fish to access available habitats. Specifically, roads that may utilize culverts or bridges at water crossing may restrict or prevent fish access to habitats during both their construction and operations. In addition, the increase in roadways in the RSA may also increase public access to fish habitats and have a negative effect on the abundance of fish species from increased harvests. During the construction phase, most of these can be avoided by placing fishing prohibitions on construction workers and restricting public access to a water crossing site but may be difficult to limit during the operations phase of the projects. Models suggest that lakes within one kilometre of newly developed roads are most likely to be affected and develop access points to these lakes, generating additional fishing pressure on lakes (Hunt and Lester 2009), These pressures can be significant enough to reduce the abundance of Lake Trout by as much as 77% (Kaufman, Snucins, Gunn, and Selinger. 2009). Due to the remoteness of the projects, it is not expected that a massive influx of new recreational anglers is likely.

Based on satellite imagery and waterbody layers, the RSA (which spans four tertiary watersheds) contains approximately 4,981,788 ha of surface water. This excludes numerous small creeks and watercourses which do not appear on the waterbody layers. Although some watercourses and waterbodies are naturally fishless, it is assumed that all waterbodies have the ability to support fish and fish habitat for the purposes of the cumulative effects assessment. These assumptions are also carried forward to the calculations used for the impact of the Project with other the RFDs. It is assumed that all waterbodies and watercourses within these potentially impacted locations have the ability to support fish and fish habitat.

There is a predicted destruction of approximately 0.06 ha of aquatic habitat that will occur as result of the WSR Project. This loss of fish habitat will primarily be associated with bridge piers, as culverts at crossings will alter but not destroy fish and fish habitat.

For the Northern Road Link Project, approximately 0.17 ha of aquatic fish and fish habitat will be removed. It is also assumed that these same watercourses and waterbodies will also have effects regarding changes in fish access to habitats as well as changes in public access to fish habitats. This assumption of habitat loss is likely higher than required, as design of the individual crossings and final route right-of-way (ROW) for the Northern Road Link Project is not complete. It also assumed that culverts for this project will retain fish and fish habitat at water crossings where no bridges are required. For the other projects in the area detailed below, we have assumed that all watercourses and waterbodies within the footprint of the mine claims and leases associated with these proposed developments will be affected by changes in fish access to habitats as well as changes in public access to fish habitats. This is likely a very conservative estimate as the development footprints are unavailable but are likely considerably smaller than the total claims/leases presented in this assessment.

The cumulative effects to fish and fish habitat is approximately 166.64 ha, which represents 0.0032% of the RSA.

Table 21-20 summarizes the other RFDs or future physical activities in the RSA that have the potential to contribute to changes to fish and fish habitat.

Table 21-20: Fish and Fish Habitat – Summary of Cumulative Effects

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Change in Fish Access to Habitats and Changes in Public Access to Fish Habitats (ha)	Relative Change in the RSA (%)
19	Black Horse Project and Big Daddy Project	▪ Changes in Fish Access to Habitats (During the Operations Phase) ▪ Changes in Public Access to Fish Habitats (during the Operations Phase)	The Black Horse and Big Daddy mining projects will potentially temporally and spatially overlap with project activities. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. This may include loss of fish habitat, alteration and/or disruption of fish habitat, injury/mortality to fish, and changes in fish access to habitats, and changes in public access to fish habitats. from excavation, blasting; emissions, discharges and waste; and spill accidents during construction and/or operation activities.	4.66 (Big Daddy) and 15.28 (Black Horse)	0.0004
20	Eagle's Nest Project	▪ Changes in Fish Access to Habitats (During the Operations Phase) ▪ Changes in Public Access to Fish Habitats (during the Operations Phase)	The Eagle's Nest Project will temporally and spatially overlap with Project activities. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. This may include loss of fish habitat, alteration and/or disruption of fish habitat, injury/mortality to fish, and changes in fish access to habitats, and changes in public access to fish habitats. from excavation, blasting; emissions, discharges and waste; and spill accidents during construction and/or operation activities.	137.14	0.0028
21	Marten Falls Community Access Road	▪ Changes in Fish Access to Habitats (During the Operations Phase) ▪ Changes in Public Access to Fish Habitats (during the Operations Phase)	The Marten Falls Community Access Road will temporally and spatially overlap with Project activities based on current information and proposed development timeline. Activities associated with road development have same pathways of effects as those arising from the Project. This may include loss of fish habitat, alteration and/or disruption of fish habitat, injury/mortality to fish, and changes in fish access to habitats, and changes in public access to fish habitats. from excavation, blasting; emissions, discharges and waste; and spill accidents during construction and/or operation activities.	8.1	0.0002

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Change in Fish Access to Habitats and Changes in Public Access to Fish Habitats (ha)	Relative Change in the RSA (%)
22	Northern Road Link Project	▪ Changes in Fish Access to Habitats (During the Operations Phase) ▪ Changes in Public Access to Fish Habitats (during the Operations Phase)	The Northern Road Link will temporally and spatially overlap with Project activities based on current information and proposed development timeline. Activities associated with road development have the same pathways of effects as those arising from the Project. This may include loss of fish habitat, alteration and/or disruption of fish habitat, injury/mortality to fish, and changes in fish access to habitats, and changes in public access to fish habitats. from excavation, blasting; emissions, discharges and waste; and spill accidents during construction and/or operation activities.	0.17	0.0001*
29	Black Thor, Blackbird, and Black Label Mineral deposits	▪ Changes in Fish Access to Habitats (During the Operations Phase) ▪ Changes in Public Access to Fish Habitats (during the Operations Phase)	The Black Thor, Blackbird, and Black Label Mineral deposits will spatially overlap with project activities; however, the temporal overlap is uncertain based on the current information and status of the development (on hold). Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. This may include loss of fish habitat, alteration and/or disruption of fish habitat, injury/mortality to fish, and changes in fish access to habitats, and changes in public access to fish habitats. from excavation, blasting; emissions, discharges and waste; and spill accidents during construction and/or operation activities.	1.29 (Black Thor and Black Label), Blackbird Included in Eagle's Nest Calculation	0.0001*
-	Climate change	▪ Changes in Fish Access to Habitats (During the Operations Phase)	Climate change factors can interact with the effect of the project on fish access to habitats during operations via the alteration of the hydrological cycle – reduced flows during summer, increased peak flows during snow melt, high rain fall, or a change in ice cover – which can create challenges to fish passage, and in particular during critical lifecycle stages. Higher air temperatures can lead to warmer water temperature, and increased surface water run off and sedimentation from road operations can degrade habitat quality, and reduce accessible fish habitat.	-	-

*Less than 0.0001%

21.4.5.4 Mitigation for Cumulative Effects

There are multiple Project-related interactions and pathways that result in changes to fish and fish habitat; however, they are associated with specific construction and operation phases of the Project and particular activities for which mitigation measures exist and are proven to be effective in minimizing and/or avoiding adverse effects. This is similarly applicable for other RFDs or future activities within the RSA.

With the implementation of the Project's mitigation measures (see Section 10.4) and the assumption that other, future potential projects or activities will be required to have the same or similar standards, it is anticipated that the cumulative effects on fish and fish habitat, and specifically on fish access to habitats; and public access to fish can likely be successfully mitigated, with minimal net effects. Therefore, the identified cumulative effects are considered net cumulative effects and are discussed in the following subsection.

21.4.5.5 Characterization of Net Cumulative Effects

The net cumulative effects on fish and fish habitat are characterized in **Table 21-21** using the criteria defined in Section 10.5.

Net cumulative effects on changes to fish and fish habitat are predicted to be adverse, low in magnitude, occurring within the RSA, and generally long-term. Species are common throughout the RSA so the net cumulative effects to individual populations is unlikely to affect the resiliency of the fisheries as a whole. Frequency for both net cumulative effects will be continuous, albeit intermittent, generally reversible, and probable to occur.

Table 21-21: Fish and Fish Habitat – Characterization of Predicted Net Cumulative Effects

Predicted Net Cumulative Effect	Characterization Criteria								
	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Context	Reversibility	Likelihood of Occurrence
Changes in Fish Access to Habitats	Negative	Low	RSA	Within Spawning	Long-term	Continuous	Resilient	Reversible	Probable
Changes in Public Access to Fish Habitats	Negative	Low	RSA	Within Spawning	Long-term	Continuous	Resilient	Reversible	Probable

21.4.5.1 Determination of Significance

The determination of significance of net cumulative effects on the VC is based on the process of significance determination outlined in Section 10.6 for net effects. A predicted net cumulative effect is considered significant if it is evaluated as adverse, permanent, and of high magnitude, and if it negatively impacts species survival or reproduction at the population level to the extent that the population can no longer sustain itself.

Based on the results in **Table 21-20**, the net cumulative effects on the Fish and Fish Habitat VC are considered not significant.

21.4.6 Vegetation and Wetlands

21.4.6.1 Past and Ongoing Effects

Following the "Interim Cumulative Effects Assessment Guidance Document," past, present, and ongoing RFDs and activities are considered to define existing conditions for cumulative effects. As such, the existing conditions outlined in Section 11 for the Vegetation and Wetlands VC presently reflect the effects from these projects and activities within the RSA. **Table 21-1** identifies these projects and activities (IDs 1 to 18) and indicates where their effects spatially overlap with the RSA and the Project's net effects on the VC. Therefore, the cumulative effects assessment for vegetation and wetlands is focused on integrating the Project's net adverse effects with those of future RFDs and activities discussed in **Section 21.4.6.2**.

21.4.6.2 Other Ongoing and Reasonably Foreseeable Projects or Activities

A list of the RFDs and activities that were considered for the cumulative effects assessment were presented in **Table 21-22** (ID's 19 to 39). Of the projects and activities listed in **Table 21-2**, only those listed in **Table 21-22** were identified as being probable to occur within and have potential net effects on the RSA for the Vegetation and Wetlands VC. These projects and activities have the potential to result in cumulative effects in the RSA.

Table 21-22: Vegetation and Wetlands – RFDs or Future Activities in the RSA

ID	RFD or Activity	Spatial Overlap of Net Effects	Temporal Overlap of Net Effects	Included in Cumulative Effects Analysis
19	Black Horse Project and Big Daddy Project	Yes	Yes	Yes
20	Eagle's Nest Project	Yes	Yes	Yes
22	Northern Road Link Project	Yes	Yes	Yes
29	Black Thor, Blackbird, and Black Label Mineral deposits	Yes	Yes	Yes
-	Climate Change	Yes	Yes	Yes

21.4.6.3 Cumulative Effects

Cumulative effects may occur where the net adverse effects of the Project and net adverse effects of other RFDs or activities interact within the RSA boundary for the VC. The cumulative effects to vegetation and wetlands may occur due to Project and RFDs and activities that overlap spatially and temporally.

Based on the Project footprint, the cumulative effects on vegetation and wetlands may result in an estimated change of 1,011.47 hectares. The total includes 546.57 hectares of direct impacts (permanent vegetation loss within the Project footprint) and 464.9 hectares of indirect impacts (such as changes to surrounding vegetation communities and plant diversity). Combined, these cumulative effects account for about 0.8% of the RSA.

The area of cumulative effect for the NRL Project will depend on which of the alternative routes and ancillary infrastructure alternatives are selected. For the purposes of this Project, the precautionary principle was adopted, and the area of effect was determined based on the greater length of the currently proposed alternatives and an assumed vegetation clearing width of 60 m to accommodate the ROW of the road (Proposed Terms of Reference, Webequie First Nation and Marten Falls First Nation, April 29, 2022). Within the RSA for the Vegetation and Wetlands VC, this area of effect is 37.78 ha.

For other RFDs and activities in the RSA, it was assumed that the area of cumulative effect would correspond either to the footprint of the mine lease (i.e., for the Eagle's Nest project) or the mine claim area (for the Black Horse, Big Daddy, Black Thor and Black Label projects). Climate change may intensify the loss and alteration of wetlands and vegetation by increasing the frequency and severity of droughts, floods, and wildfires, while also altering hydrological regimes that impact wetland water balance and plant community composition. These changes could shift species distributions, reducing the resilience and recovery of disturbed areas, and ultimately compounding the direct and indirect effects of project activities.

The cumulative effects to vegetation and wetlands is approximately 5,768 ha, which represents 4.5% of the RSA.

Table 21-23 summarizes the other RFDs or future physical activities in the RSA that have the potential to contribute to changes to vegetation and wetlands.

Table 21-23: Vegetation and Wetlands – Summary of Cumulative Effects

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Change in Vegetation and Wetlands (ha)	Relative Change in the RSA (%)
19	Black Horse Project and Big Daddy Project	▪ Changes in Vegetation Communities (Assemblages), Species and Diversity ▪ Changes in Wetland Functions ▪ Changes to Species at Risk (SAR) Plants, Plant Species and/or Vegetation Communities of Conservation Concern (SOCC), and/or change in Locally Rare or Underrepresented Vegetation Classes ▪ Changes to Plant Species and/or Vegetation Communities of Traditional Importance to Indigenous Peoples	The Black Horse Project and Big Daddy Project are assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Loss or alteration of vegetation communities (assemblages), species, and diversity in upland, wetland and riparian environments from vegetation removal, grubbing, and/or other activities that cause soil disturbance; ▪ Loss or alteration of geophysical, biophysical and/or socioeconomic functions of wetlands from activities such as vegetation clearing, soil disturbance, the installation of structures, and/or chemical or hazardous spills; ▪ Loss of plant SAR, loss of SOCC, loss or alteration of vegetation communities of Conservation Concern, and/or loss or alteration of locally rare or underrepresented vegetation classes from vegetation clearing, grubbing, and other activities that disturb the soil; and ▪ Loss of plant species, or loss or alteration of vegetation communities of traditional importance to Indigenous Peoples (i.e., for cultural purposes, for medicinal purposes, or as a source of country foods).	1,181.85	0.92
20	Eagle's Nest Project	▪ Change in Vegetation Communities (Assemblages), Species and Diversity ▪ Change in Wetland Functions ▪ Change in SAR Plants, Plant Species and/or Vegetation Communities of Conservation Concern	It is anticipated that the Eagle's Nest project will temporally and spatially overlap with Project activities. Activities associated with mine development have similar pathways of effects to those arising from this Project. These may include: ▪ Loss or alteration of plant species, vegetation communities and diversity in upland, wetland and/or riparian environments; ▪ Loss or alteration of geophysical, biophysical and/or socioeconomic functions of wetlands;	3,523.33	2.77

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Change in Vegetation and Wetlands (ha)	Relative Change in the RSA (%)
		(SOCC), and/or change in Locally Rare or Underrepresented Vegetation Classes ▪ Change in Plant Species and/or Vegetation Communities of Traditional Importance to Indigenous Peoples	▪ Loss of plant SAR, plant SOCC, vegetation communities of Conservation Concern and/or locally rare or underrepresented Species; ▪ Alteration of SOCC vegetation communities and/or alteration of locally rare or underrepresented vegetation classes; and ▪ Loss of Plant Species, or alteration of vegetation communities of traditional importance to Indigenous People, through pathways that include vegetation clearing, grubbing, soil excavation, and the installation of structures.		
22	Northern Road Link Project	▪ Change in Vegetation Communities (Assemblages), Species and Diversity ▪ Change in Wetland Functions ▪ Change in SAR Plants, Plant Species and/or Vegetation Communities of Conservation Concern (SOCC), and/or change in Locally Rare or Underrepresented Vegetation Classes ▪ Change in Plant Species and/or Vegetation Communities of Traditional Importance to Indigenous Peoples	Based on current information and proposed development timelines, it is anticipated that the Northern Road Link (NRL) project will temporally and spatially overlap with Project activities. Activities associated with road development have the same pathways of effects as those arising from the Project. These are: ▪ Loss or alteration of plant species, vegetation communities and diversity in upland, wetland and/or riparian environments; ▪ Loss or alteration of geophysical, biophysical and/or socioeconomic functions of wetlands; ▪ Loss of plant SAR, plant SOCC, vegetation communities of Conservation Concern and/or locally rare or underrepresented Species; ▪ Alteration of SOCC vegetation communities and/or alteration of locally rare or underrepresented vegetation classes; and ▪ Loss of Plant Species, or alteration of vegetation communities of traditional importance to Indigenous People through pathways such as clearing and grubbing, soil grading and excavation, and installation of water crossing structures in the ROW.	37.78	0.03

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Change in Vegetation and Wetlands (ha)	Relative Change in the RSA (%)
29	Black Thor, Blackbird[1], and Black Label Mineral Deposits	▪ Change in Vegetation Communities (Assemblages), Species and Diversity ▪ Change in Wetland Functions ▪ Change in SAR Plants, Plant Species and/or Vegetation Communities of Conservation Concern (SOCC), and/or change in Locally Rare or Underrepresented Vegetation Classes ▪ Change in Plant Species and/or Vegetation Communities of Traditional Importance to Indigenous Peoples	The Black Thor, Blackbird, and Black Label Mineral Deposits will spatially overlap with Project activities; however, the temporal overlap is uncertain based on the current information and status of the development (on hold). Activities associated with mine development have similar pathways of effects to those arising from this Project. These may include: ▪ Loss or alteration of plant species, vegetation communities and diversity in upland, wetland and/or riparian environments; ▪ Loss or alteration of geophysical, biophysical and/or socioeconomic functions of wetlands; ▪ Loss of plant SAR, plant SOCC, vegetation communities of Conservation Concern and/or locally rare or underrepresented Species; ▪ Alteration of SOCC vegetation communities and/or alteration of locally rare or underrepresented vegetation classes; and ▪ Loss of Plant Species, or alteration of vegetation communities of traditional importance to Indigenous People, through pathways that include vegetation clearing, grubbing, soil excavation, and the installation of structures.	13.57	0.01
-	Climate Change	▪ Change in Vegetation Communities (Assemblages), Species and Diversity ▪ Change in Wetland Functions ▪ Change in SAR Plants, Plant Species and/or Vegetation	Climate change may exacerbate the loss and alteration of wetlands and vegetation by: ▪ Increasing the frequency and severity of droughts; ▪ floods, and wildfires; and ▪ Altering hydrological regimes, affecting wetland water balance and plant community composition. ▪ Shifting species distributions, potentially reducing resilience and recovery of disturbed areas.	-	-

[1] The Blackbird mineral deposit falls within the lease area for Eagle's Nest and has been accounted for as part of Project or Activity with the ID of 20 in Table 21-23 (above). As such, the values for potential change and relative change for Project or Activity with the ID of 29 reflect the Black Thor and Black Label Mineral Deposits only.

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Change in Vegetation and Wetlands (ha)	Relative Change in the RSA (%)
		Communities of Conservation Concern (SOCC), and/or change in Locally Rare or Underrepresented Vegetation Classes ▪ Change in Plant Species and/or Vegetation Communities of Traditional Importance to Indigenous Peoples			

21.4.6.4 Mitigation for Cumulative Effects

There are multiple Project-related interactions and pathways that could result in changes to the VC; however, they are associated with specific construction and operation phases of the Project. Project-related interactions and pathways are also related to particular activities for which mitigation measures exist that have proven to be effective in minimizing and/or avoiding adverse effects. This is similarly applicable to other RFDs or future activities within the RSA.

With the implementation of the Project's mitigation measures (see Section 11.4) and the assumption that other RFDs or future activities would adhere to similar mitigation standards, it is anticipated that cumulative effects will not significantly alter vegetation or wetlands, and will allow for successful rehabilitation to establish conditions comparable to their existing capabilities (functions). Additionally, cumulative effects on vegetation and wetlands are not predicted to alter the function of ecologically or culturally important species or vegetation communities with the implementation of mitigation measures, such as ongoing monitoring, adaptive management and collaboration with Indigenous communities to manage cumulative effects. Therefore, the identified cumulative effects are considered net cumulative effects and are discussed in the following subsection

21.4.6.5 Characterization of Net Cumulative Effects

The net cumulative effects on vegetation and wetlands are characterized in **Table 21-24** using the criteria defined in Section 11.5.

Net cumulative effects on vegetation and wetlands are predicted to be negative in direction during construction of the various projects, RFDs and activities. During operations, however, the direction of effect varies with the nature of the proposed activity. The direction is likely neutral for the RFDs or activities where operation (e.g., road maintenance) occurs within the same physical footprint as the Construction Phase but could be negative for RFDs or activities such as mineral exploration and mining, where the areas of disturbance (or footprint) can change over the duration of the project.

For the RSA, the magnitude of change is predicted to be negligible during both construction and operations. Since measurable changes in the availability of species and/or vegetation communities is expected to be less than 10%, it is unlikely there will be an effect on their overall availability.

The timing of activity during construction (whether it be related to road development, mineral exploration or other RFDs and activities) is predicted to have a moderate effect on vegetation species and communities, including wetlands, because the viability of local and regional populations is less likely to be affected if activities are completed outside of the growing season (i.e., winter months). During the operational phase of the projects, the timing of the project activity is more likely to have a low effect on the Vegetation and Wetlands VC.

At the present time, the duration of the effects are anticipated to last between 11 and >75 years, depending on the project, RFD or activity (as identified in **Table 21-24**) with mitigation measures anticipated to permit recovery following the operational phase. It is probable that some early successional plant species could be re-established in the RSA within a few years of reclamation, but mid to late-successional species and vegetation communities, including wetlands, can take decades to reach full functionality. As a result, the duration of cumulative effects for the Vegetation and Wetlands VC is considered long-term.

For the most part, the context of net cumulative effects in the RSA is unknown. Given there is little information available to the Project Team (regarding the footprint of other projects, RFDs and activities, and therefore the composition or structure of associated vegetation communities), the sensitivity of species or vegetation communities to potential activities cannot be accurately determined at this time.

There are not many examples of mitigation and enhancement measures being implemented in environments with expansive interconnected wetland systems, similar to those found in the RSA. Further, the effects of vegetation loss and alteration can be difficult to reverse, with some habitats unlikely to be restored unless the original source of disturbance (e.g., road, mine) was completely removed from the landscape. Peatlands can be particularly difficult to re-establish. As such, net cumulative effects are considered irreversible for wetland vegetation communities and functions, and reversible only for specific species.

Overall, the likelihood of net cumulative effects occurring in the RSA is certain. It will not be possible to avoid loss or alteration of species, vegetation communities (including wetlands) and diversity during the construction phase of any of the proposed projects (RFDs and activities), with the specific footprint of each RFD or activity corresponding to an area of cumulative effect. During the operations phase, net cumulative effects from RFDs that involve road development are unlikely to occur, as maintenance would occur within the footprint disturbed during construction; however, for the remaining RFDs, the likelihood of occurrence is possible as areas of disturbance may change over time.

Table 21-24: Vegetation and Wetlands – Characterization of Predicted Net Cumulative Effects

Predicted Net Cumulative Effect	Characterization Criteria								
	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Context	Reversibility	Likelihood of Occurrence
Loss or Alteration of Vegetation Communities, Species and Diversity (Construction)	Negative	Negligible	RSA	Medium	Long-term	Frequent	Unknown	Irreversible	Certain
Loss or Alteration of Vegetation Communities, Species and Diversity (Operations)	Negative	Negligible	RSA	Low	Medium-term (species) Long-term (diversity and communities)	Infrequent	Unknown	Irreversible	Possible
Loss or Alteration of Wetland Function (Construction)	Negative	Negligible	RSA	Medium	Long-term	Frequent	Moderate (within the footprint of any of the projects, RFDs or activities listed in **Table 21-22**)	Irreversible	Certain
Loss or Alteration of Wetland Function (Operations)	Neutral	Negligible	RSA	Low	Long-term	Unknown	Low	Irreversible	Possible
Loss or Alteration of Plant Species and Vegetation Communities of Conservation Concern (Construction)	Negative	Negligible	RSA	Medium	Long-term	Frequent	Unknown. Although two upland communities are considered rare in the WSR LSA and RSA, an analysis of vegetation communities in the study areas of all projects would be required to determine which species or communities are rare at the landscape scale.	Reversible	Certain

Predicted Net Cumulative Effect	Characterization Criteria								
	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Context	Reversibility	Likelihood of Occurrence
Loss or Alteration of Plant Species and Vegetation Communities of Conservation Concern (Operations)	Negative	Negligible	RSA	Low	Medium-term (species), Long-term (communities and diversity)	Infrequent	Unknown	Reversible	Possible
Loss or Alteration of Plant Species and Vegetation Communities of Traditional Importance to Indigenous Peoples	Negative	Negligible	RSA	Medium	Long-term	Frequent	Unknown. Information about the abundance and composition of species and vegetation communities in some of the other project areas is currently unavailable to AtkinsRéalis; as such, the representation of species of traditional importance are also unknown.	Reversible (Wetland and riparian species) Reversible (Upland species and communities)	Certain
Loss or Alteration of Plant Species and Vegetation Communities of Traditional Importance to Indigenous Peoples	Negative	Negligible	RSA	Low	Medium-term (species), Long-term (communities and diversity)	Infrequent	Unknown	Reversible (Wetland and riparian species) Reversible (Upland species and communities)	Possible

21.4.6.1 Determination of Significance

The determination of significance of net cumulative effects on the VC is based on the process of significance determination outlined in Section 11.6. A predicted net cumulative effect is considered significant if it is evaluated as adverse, permanent, and of high magnitude, and if there is a high magnitude change to biodiversity, ecosystem function to the extent that the ecological community can no longer sustain itself.

Based on the results in **Table 21-25**, the net cumulative effects on the Vegetation and Wetlands VC are considered not significant.

21.4.7 Wildlife and Wildlife Habitat

21.4.7.1 Moose

21.4.7.1.1 Past and Ongoing Effects

Following the "Interim Cumulative Effects Assessment Guidance Document," past, present, and ongoing RFDs and activities are considered to define existing conditions for cumulative effects. As such, the existing conditions outlined in Section 12 for the Moose VC presently reflect the effects from these projects and activities within the RSA. **Table 21-1** identifies these projects and activities (IDs 1 to 18) and indicates where their effects spatially overlap with the RSA and the Project's net effects on the VC. Therefore, the cumulative effects assessment for moose is focused on integrating the Project's net adverse effects with those of future RFDs and activities discussed in **Section 21.4.7.1.2**.

21.4.7.1.2 Other Ongoing and Reasonably Foreseeable Projects or Activities

A list of the RFDs and activities that were considered for the cumulative effects assessment were presented in **Table 21-1** (ID's 19 to 39). Of the projects and activities listed in **Table 21-2**, only those listed in **Table 21-26** were identified as being probable to occur within and have potential net effects on the RSA for the Moose VC. These projects, RFDs and activities therefore have the potential to result in cumulative effects in the RSA.

Table 21-25: Moose – RFDs or Future Activities in the RSA

ID	Project or Activity	Spatial Overlap of Net Effects	Temporal Overlap of Net Effects	Included in Cumulative Effects Analysis
19	Black Horse Project and Big Daddy Project	Yes	Yes	Yes
20	Eagle's Nest Project	Yes	Yes	Yes
21	Marten Falls Community Access Road Project	Yes	Yes	Yes
22	Northern Road Link Project	Yes	Yes	Yes
24	East-West Road[3]	Yes	Yes	Yes
27	Rapid Lynx Broadband Project (Phase 2)	Yes	Yes	Yes
28	Forest management units (FMUs)	Yes	Yes	Yes

ID	Project or Activity	Spatial Overlap of Net Effects	Temporal Overlap of Net Effects	Included in Cumulative Effects Analysis
29	Black Thor, Blackbird, and Black Label Mineral deposits	Yes	Yes	Yes
30	Juno Corporation Mining Exploration Activity	Yes	Yes	Yes
-	Winter Roads – Increased winter road traffic by future mining proponents	Yes	Yes	Yes
-	Climate Change	Yes	Yes	Yes

21.4.7.1.3 Cumulative Effects

Cumulative effects may occur where the net adverse effects of the Project and the net adverse effects of other RFDs or activities interact within the RSA boundary for the VC. The cumulative effects to VC may occur due to Project and RFDs and activities that overlap spatially and temporally.

Based on the Project Footprint for the WSR Project the cumulative effects on moose and moose habitat are:

- Habitat Loss – Clearance Activities (during the Construction Phase);
- Injury or Death – Increased Access (during the Operations Phase); and
- Injury or Death – Changes to Predator-Prey Dynamics (during the Operations Phase).

As determined in the effects assessment, these three effects (in terms of the WSR Project) are likely to extend into the LSA, have a net adverse effect, are probable or certain to occur, and have a moderate magnitude. Other project effects on moose and moose habitat are possible, but do not meet the criteria of this cumulative effects assessment and are unlikely to contribute significantly to the cumulative effects in the area (refer to Section 12.9).

Habitat Loss – Clearance Activities

The construction of the road has the potential for direct and indirect effects that could cause the loss of moose habitat through physical alteration and removal of suitable habitat.

Moose are considered generalists in their habitat preferences. It eats mostly deciduous leaves and aquatic plants in the growing season, and twigs primarily of coniferous trees in the winter in the eastern boreal (Brassard et al. 1974). Moose are stressed more easily than other ungulates by high temperatures and modify their habitat use in both winter and summer. Use of aquatic habitats and taller forest stands increases with increasing temperatures (Street et al. 2015). Moose also use more densely forested areas in the winter that provide shelter from snow, particularly those near edges with abundant food (Dussault et al., 2005).

Given Ecological Land Classification and RSFs were not available for the Moose RSA, it was conservatively assumed that all treed habitats based on Far North Land Cover (FNLC) were suitable moose habitat. Based on FNLC, the WSR net effects to moose and moose habitat is estimated to be 476.07 ha or 0.01% of the available suitable habitat in the Moose RSA. Using FNLC, 89.3 ha of moose late winter cover (Upland Conifer Forest) is estimated to be removed during construction activities, this represents <0.01% of moose late winter cover in the Moose RSA.

Other RFDs would also result in the removal and alteration of suitable habitats for furbearers. Road projects, including the Northern Road Link Project, the Marten Falls Community Access Road, and the East-West Road would have similar impacts from habitat loss as the WSR Project (within their ROWs). The Rapid Lynx Broadband Project would also have similar impacts as the road projects, but for a shorter timescale as the disturbance would only be during their Construction Phase and openness would not be maintained long-term. For the mining projects, including the Black Horse Project and Big Daddy Project, Eagle's Nest Project, the Juno Corporation Mining and the Black Thor, Blackbird, and Black Label Mineral deposits impacts will depend on details of the mine construction techniques. Given the early stages of these projects, conservatively the entire mine claim was used to encompass the deposit locations and is considered a disturbance. The potential forest harvest near Neskantaga is anticipated to be approximately 100 ha per year. Given moose avoid harvested areas for approximately the first eight years (Mumma et al., 2021) a conservative estimate of avoidance for the first decade was used.

Moose experience stress when temperatures rise, prompting them to seek out shade, water, and thick vegetation for relief. With climate change leading to warmer conditions, less snow, and changes in forest composition, moose may find it increasingly difficult to access ideal habitats. Further habitat loss due to development worsens this challenge, making it even tougher for moose to locate places to stay cool and find food.

The cumulative effects to moose and moose habitat is approximately 344,099.4 ha, which represents 3.17% of the RSA.

Injury or Death – Increased Access

The development of the Project could result in a negative effect on the abundance of moose through increased human access to habitats where moose populations are present. Opening new areas to human development can often result in increased hunting (Courtois and Beaumont, 1999). For moose, the construction of new roads is linked to increased hunting mortality (Timmerman and Gollat, 1982) as most hunting takes place within a few hundred metres of a road (Boer, 1990). Increased browse along the ROW may act as an attractant for moose and correspondingly lead to higher moose harvest (Remple et al., 1997). While temporary access roads will be closed and restored these areas may still be exploited by hunters as linear features take a long time to regenerate and repeated use by trappers or other users may maintain their openness. The potential for harvest is also likely greater during the Operations Phase as it will operate over a long period of time and access will not be controlled unlike the Construction Phase.

The creation of new access roads for RFDs could lead to in increased death and injury of moose. Road RFDs like Northern Road Link Project, the Marten Falls Community Access Road and the East-West Road will have similar effects as they will add to the linear network within the RSA and will be publicly accessible. The Rapid Lynx Project will likely not contribute to increased access as openness will not be maintained beyond the construction Phase. Mining RFDs will also create a network of linear features in addition to the mine footprint themselves. Their impact on furbearers will depend on the configuration of mining roads, how they connect to the road network and which habitats they traverse. Whether these access roads are controlled or allow public access will also determine their impact.

Milder winter conditions can lengthen the duration of accessible roads, which may result in increased hunting activity and associated disturbances. Additionally, diminished snow cover can heighten moose vulnerability to both predators and hunters.

Injury or Death – Changes to Predator-Prey Dynamics

The creation of new and increased use of existing winter access roads for RFDs could lead to in increased death and injury of moose. Linear features are known to facilitate predator movement in the boreal (Dickie et al., 2017; Benoit-Pepin et al., 2024) and creation of new roads connected to human activity is known to spread predators into previously unoccupied areas (Lantham et al. 2011). In northwestern Ontario, wolves are the primary predator of moose (Found et al., 2018)., although black bears will often prey on moose calves. For wolves, roads act as high-speed travel routes that allow them to move large distances across their home ranges (Bojarska et al., 2020) while spending relatively little time on roads, especially on those with high traffic levels. By minimizing the time spent on roads, wolves minimize human encounters (Zimmermann et al., 2014). The use of roads also allows wolves to have higher kill rates of moose (Vander Vennen et al., 2016).

The creation of new and increased use of existing winter access roads for RFDs could lead to in increased death and injury of moose. Road RFDs will have similar effects as they will add to the linear network within the RSA. Selection of roads by wolves has been found to be dependent on the existing road density in northwestern Ontario with increased selection for roads with increasing road density (Newton et al., 2017) which would suggest that the effect of multiple road projects in the RSA would be multiplicative. Mining RFDs will also create a network of linear features in addition to the mine footprint themselves. Their impact on moose will depend on the configuration of mining roads, how they connect to the road network and which habitats they traverse.

Climate change has the potential to influence predator populations, such as wolves and bears, as well as alter their movement patterns. When coupled with rising road density, climate-induced shifts in predator behavior may further elevate predation pressure on moose populations.

Table 21-27 summarizes the other RFDs or future physical activities in the RSA that have the potential to contribute to changes to the Moose VC.

Table 21-26: Moose – Summary of Cumulative Effects

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Habitat Loss (ha)	Relative Change in the RSA (%)
19	Black Horse Project and Big Daddy Project	▪ Habitat loss due to clearance activities (Construction Phase) ▪ Injury or death of moose from increased access (Operations Phase) ▪ Injury or death of moose because of changes to predator-prey dynamics (Operations Phase)	The Black Horse Project and Big Daddy Project are assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Loss or alteration of suitable moose breeding habitat and feeding habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities; ▪ Increased access allows hunters and trappers to enter new areas, leading to increased harvest of moose; and ▪ Injury and death of moose due to increased predator access along roads and other areas of disturbance.	Gen Habitat: 1987.81 Late Winter: 90.07	Gen Habitat: 0.02 Late Winter: <0.01
20	Eagle's Nest Project	▪ Habitat loss due to clearance activities (Construction Phase) ▪ Injury or death of moose from increased access (Operations Phase) ▪ Injury or death of moose because of changes to predator-prey dynamics (Operations Phase)	Based on current information and proposed development timelines, it is anticipated that the Eagle's Nest project will temporally and spatially overlap with Project activities. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Loss or alteration of moose breeding habitat and feeding habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities; ▪ Increased access allows hunters and trappers to enter new areas, leading to increased harvest of moose; and ▪ Injury and death of moose due to increased predator access along roads and other areas of disturbance.	Gen Habitat: 3514.6 Late Winter: 661.17	Gen Habitat: 0.03 Late Winter: 0.01

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Habitat Loss (ha)	Relative Change in the RSA (%)
21	Marten Falls Community Access Road Project	▪ Habitat loss due to clearance activities (Construction Phase) ▪ Injury or death of moose from increased access (Operations Phase) ▪ Injury or death of moose because of changes to predator-prey dynamics (Operations Phase)	Based on current information and proposed development timelines, it is anticipated that the Marten Falls Community Access Road Project will temporally and spatially overlap with Project activities. Activities associated with current and future road development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Loss or alteration of suitable moose breeding habitat and feeding habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities; ▪ Increased access allows hunters and trappers to enter new areas, leading to increased harvest of moose; and ▪ Injury and death of moose due to increased predator access along roads and other areas of disturbance.	Gen Habitat: 1994.98 Late Winter: 429.22	Gen Habitat: 0.02 Late Winter: <0.01
22	Northern Road Link Project	▪ Habitat loss due to clearance activities (Construction Phase) ▪ Injury or death of moose from increased access (Operations Phase) ▪ Injury or death of moose because of changes to predator-prey dynamics (Operations Phase)	Based on current information and proposed development timelines, it is anticipated that the Northern Road Link Project will temporally and spatially overlap with Project activities. Activities associated with current and future road development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Loss or alteration of suitable moose breeding habitat and feeding habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities; ▪ Increased access allows hunters and trappers to enter new areas, leading to increased harvest of moose; and ▪ Injury and death of moose due to increased predator access along roads and other areas of disturbance.	Gen Habitat: 1441.82 Late Winter: 464.79	Gen Habitat: 0.01 Late Winter: <0.01

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Habitat Loss (ha)	Relative Change in the RSA (%)
24	East-West Road[3]	▪ Habitat loss due to clearance activities (Construction Phase) ▪ Injury or death of moose from increased access (Operations Phase) ▪ Injury or death of moose because of changes to predator-prey dynamics (Operations Phase)	Based on current information and proposed development timelines, it is anticipated that the East-West Road project will temporally and spatially overlap with Project activities. Activities associated with current and future road development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Loss or alteration of suitable moose breeding habitat and feeding habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities; ▪ Increased access allows hunters and trappers to enter new areas, leading to increased harvest of moose; and ▪ Injury and death of moose due to increased predator access along roads and other areas of disturbance.	Gen Habitat: 1821.19 Late Winter: 699.01	Gen Habitat: 0.02 Late Winter: 0.01
28	Neskantaga Forest management unit (FMUs)	▪ Habitat loss due to clearance activities (Construction Phase) ▪ Injury or death of moose from increased access (Operations Phase) ▪ Injury or death of moose because of changes to predator-prey dynamics (Operations Phase)	Based on current information and proposed development timelines, it is anticipated that the Neskantaga community-based forest management will temporally and spatially overlap with Project activities. Activities associated with forest harvest have similar pathways of effects as those arising from the Project. These effects may include: ▪ Loss or alteration of suitable moose breeding habitat and feeding habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities; ▪ Increased access allows hunters and trappers to enter new areas, leading to increased harvest of moose; and ▪ Injury and death of moose due to increased predator access along roads and other areas of disturbance.	Gen Habitat: 1000 Late Winter: unknown	Gen Habitat: 0.01

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Habitat Loss (ha)	Relative Change in the RSA (%)
29	Black Thor, Blackbird, and Black Label Mineral deposits	▪ Habitat loss due to clearance activities (Construction Phase) ▪ Injury or death of moose from increased access (Operations Phase) ▪ Injury or death of moose because of changes to predator-prey dynamics (Operations Phase)	The Black Thor, Blackbird and Black Label Mineral deposits are assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Loss or alteration of moose breeding habitat and feeding habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities; ▪ Increased access allows hunters and trappers to enter new areas, leading to increased harvest of moose; and ▪ Injury and death of moose due to increased predator access along roads and other areas of disturbance.	Gen Habitat: 867.32 Late Winter: 28.03	Gen Habitat: 0.01 Late Winter: <0.01
30	Juno Corporation Mining Exploration Activity	▪ Habitat loss due to clearance activities (Construction Phase) ▪ Injury or death of moose from increased access (Operations Phase) ▪ Injury or death of moose because of changes to predator-prey dynamics (Operations Phase)	The Juno Corporation Mining Exploration Activities are assumed to temporally and spatially overlap with Project activities based on the information available Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Loss or alteration of moose breeding habitat and feeding habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities; ▪ Increased access allows hunters and trappers to enter new areas, leading to increased harvest of moose; and ▪ Injury and death of moose due to increased predator access along roads and other areas of disturbance.	Gen Habitat: 328093.44 Late Winter: 9344.89	Gen Habitat: 3.02 Late Winter: 0.09

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Habitat Loss (ha)	Relative Change in the RSA (%)
-	Winter Roads – Increased winter road traffic by future mining proponents	▪ Injury or death of moose because of changes to predator-prey dynamics (Operations Phase)	The Winter Roads – Increased winter road traffic by future mining proponents is assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with current and future winter road maintenance have similar pathways of effects as those arising from the Project. This may include: ▪ Increased access allows hunters and trappers to enter new areas, leading to increased harvest of moose; and ▪ Injury and death of moose due to increased predator access along roads and other areas of disturbance.	N/A	N/A
-	Climate Change	▪ Habitat loss due to clearance activities (Construction Phase) ▪ Injury or death of moose from increased access (Operations Phase) ▪ Injury or death of moose because of changes to predator-prey dynamics (Operations Phase)	Habitat loss from clearance activities reduces the resilience of moose populations to climate-driven habitat changes. As climate change shifts habitat suitability, moose have fewer alternative areas to move to, increasing stress and vulnerability. Extended access seasons due to climate change amplify the mortality risk from hunting and disturbance, especially in areas newly opened by development. Habitat fragmentation, increased road density and altered movement corridors that may be influenced by changing climatic patters could further disadvantage moose in avoiding predators.	-	-

21.4.7.1.4 Mitigation for Cumulative Effects

There are multiple Project-related interactions and pathways that result in changes to moose and moose habitat; however, they are associated with specific Construction and Operation Phases of the Project and particular activities for which mitigation measures exist and are proven to be effective in minimizing and/or avoiding adverse effects. This is similarly applicable to other RFDs or future activities within the RSA.

The combined mitigation measures proposed for the Project to address its net adverse effects on moose and moose habitat are anticipated to be effective in minimizing and/or avoiding those effects. These measures include habitat restoration, access management, and strategies to reduce predator-prey interactions, as outlined in Section 12.4:

When these Project-specific mitigation measures are implemented in conjunction with equivalent mitigation measures applied to other reasonably foreseeable developments (RFDs), the cumulative effects on moose and moose habitat are expected to remain within acceptable limits. This conclusion is based on the assumption that all RFDs will adhere to similar standards for habitat protection, access control, and predator management.

The effectiveness of cumulative mitigation will depend on the implementation across the RFDs within the RSA. With this coordinated approach, cumulative effects on moose and moose habitat can be managed to a level that does not compromise the species' long-term viability in the region. Therefore, the identified cumulative effects are considered net cumulative effects and are discussed in the following subsection.

21.4.7.1.5 Characterization of Net Cumulative Effects

The net cumulative effects on moose and moose habitat are characterized in **Table 21-27** using the criteria defined in Section 12.5.

Habitat Loss – Clearance Activities

Negative effects from habitat loss are certain for moose through site preparation and construction activities as well as terrestrial vegetation changes during road construction and operations. The effect from habitat loss will occur throughout the RSA as the RFDs are spatially located in both the LSA and RSA of the Project. Construction activities, including habitat removal, are expected to occur through the year. The effects may be permanent or long-term depending on the effectiveness of reclamation efforts. As while some areas may re-establish quickly, other areas such as roadbeds or mine footprints may be permanently altered. Context was rated as resilient as moose can use early seral vegetative growth which can provide optimal moose foraging habitat. Effects from RFDs and the Project are expected to be continuous and irreversible in most cases. At the regional scale the magnitude is expected to be low as existing suitable habitats are common in the RSA, comprising 512,409.8 ha,

Injury or Death – Increased Access

Injury and/or death from increased access is certain during the Operations Phase for moose. The effect from increased access will occur throughout the RSA as the RFDs are spatially located in both the LSA and RSA of the Project. The effect would be long-term lasting while the RFDs roads are active with the effect being reversible following the closure of the RFDs. The context is resilient as moose populations are expected to have a small increase in the number of mortalities and may alter behaviour to avoid the road. Harvest will occur during the non-sensitive season. The frequency is infrequent to frequent as harvest levels will be dependant on communities altering their hunting practices. At the regional scale, the magnitude is expected to be moderate as local populations may be measurably affected.

Injury or Death – Changes to Predator-Prey Dynamics

Negative effects on moose survival from improved predator access and success rates is certain during the Operations Phase. The effect from predation will occur throughout the RSA as the RFDs are spatially located in both the LSA and RSA of the Project. Predation would occur throughout the year. The effects will be long-term as any anthropogenic features constructed for RFDs will be used by predators beyond operational lifetimes. Predation events due to increase access are likely to be low in frequency due to shift in moose behaviour and low density. The effect is reversible once anthropogenic features have regenerated following closure of any RFD. The magnitude of the effect is predicted to be moderate, as moose predators are known to have increased success along linear features and the effect will cause a measurable change in moose injury and death.

21.4.7.1.6 Determination of Significance

The determination of significance of net cumulative effects on the Moose VC is based on the process of significance determination outlined in Section 12.8 for net effects. A predicted net cumulative effect is considered significant if it is evaluated as adverse, permanent, and of high magnitude, and if it negatively impacts species survival or reproduction at the population level to the extent that the population can no longer sustain itself.

Based on the results in **Table 21-28**, the net cumulative effects on the Moose VC is considered not significant.

Table 21-27: Moose – Characterization of Predicted Net Cumulative Effects

Predicted Net Cumulative Effect	Characterization Criteria								
	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Context	Reversibility	Likelihood of Occurrence
Habitat Loss – Clearance Activities (construction)	Negative	Low	RSA	All Time Periods	Permanent	Continuous	Resilient	Irreversible	Certain
Injury or Death – Increased Access	Negative	Moderate	RSA	Non-sensitive	Long-term	Frequent	Resilient	Reversible	Certain
Injury/Death – Changes to Predator-Prey Dynamics (operations)	Negative	Moderate	RSA	All Time Periods	Long-term	Infrequent	Resilient	Reversible	Certain

21.4.7.2 Furbearers

21.4.7.2.1 Past and Ongoing Effects

Following the "Interim Cumulative Effects Assessment Guidance Document," past, present, and ongoing RFDs and activities are considered to define existing conditions for cumulative effects. As such, the existing conditions outlined in Section 12 for the Furbearers VC presently reflect the effects from these projects and activities within the RSA. **Table 21-1** identifies these projects and activities (IDs 1 to 18) and indicates where their effects spatially overlap with the RSA and the Project's net effects on the VC. Therefore, the cumulative effects assessment for furbearers is focused on integrating the Project's net adverse effects with those of future RFDs and activities discussed in **Section 21.4.7.1.2.2.**

21.4.7.2.2 Other Ongoing and Reasonably Foreseeable Projects or Activities

A list of the RFDs and activities that were considered for the cumulative effects assessment were presented in **Table 21-2** (ID's 19 to 39). Of the projects and activities listed in **Table 21-1**, only those listed in **Table 21-29** were identified as being probable to occur within and have potential net effects on the RSA for the Furbearers VC, therefore, have the potential to result in cumulative effects in the RSA.

Table 21-28: Furbearers – RFDs or Future Activities in the RSA

ID	RFD or Activity	Spatial Overlap of Net Effects	Temporal Overlap of Net Effects	Included in Cumulative Effects Analysis
19	Black Horse Project and Big Daddy Project	Yes	Yes	Yes
20	Eagle's Nest Project	Yes	Yes	Yes
22	Northern Road Link Project	Yes	Yes	Yes
29	Black Thor, Blackbird, and Black Label Mineral deposits	Yes	Yes	Yes
-	Climate Change	Yes	Yes	Yes

21.4.7.3 Cumulative Effects

Cumulative effects may occur where the net adverse effects of the Project and the net adverse effects of other RFDs or activities interact within the RSA boundary for the VC. The cumulative effects to VC may occur due to Project and RFDs and activities that overlap spatially and temporally.

Based on the Project Footprint for the WSR Project, the cumulative effects on Furbearers (American Marten, North American Beaver) and Furbearer habitat are:

- Habitat Loss – Clearance Activities (during the Construction Phase); and
- Injury or Death – Increased Access (during the Operations Phase).

As determined in the effects assessment, both of these effects (in terms of the WSR Project) are likely to extend into the LSA, have an adverse effect, are probable or certain to occur, and have a moderate magnitude. Other project effects on Furbearers and their habitats are possible, but do not meet the criteria of this cumulative effects assessment and are unlikely to contribute significantly to the cumulative effects in the area (refer to Section 12.9).

Habitat Loss – Clearance Activities

The construction of the road has the potential for direct and indirect effects that could cause the loss of furbearer habitat through physical alteration and removal of suitable habitat. Two species were chosen for the Furbearer VC, American Marten (for the terrestrial furbearers) and North American Beaver (for the aquatic furbearers).

American Marten is a medium-sized terrestrial furbearer whose primary habitat is mature coniferous forest, although it also utilizes other treed vegetation communities, especially those with structure (coarse woody debris and snags). Open habitats like open bogs, fens and recent burns are not used to any great extent. North American beavers inhabit aquatic habitats including rivers, ponds, streams and smaller lakes (Allen, 1983). North American beavers are adaptable to human environments and are not considered sensitive to anthropogenic disturbance like road construction, or linear features (Mumma et al. 2018).

Based on the Project Footprint for the WSR Project, the net effects to American Marten and American Marten habitat is estimated to be 215.63 ha or 0.28% of the available habitat in the RSA. Suitable American Marten habitat is common in the RSA making up 60,400.5 ha or 51.78% of the total area.

Based on the habitat suitability model developed for the project, the WSR net effects to North American Beaver and North American Beaver habitat is estimated to be 9.87 ha or 0.12% of the available high or moderately suitable habitat in the RSA. Suitable North American beaver habitat is common in the RSA making up 8,227.49 ha or 6.13% of the total area.

Other RFDs would also result in the removal and/or alteration of suitable habitats for furbearers. The NRL Project would have similar habitat loss impacts to the WSR Project within their 100 m ROW (with an assumed clearance width of 60 m as per the Proposed Terms of Reference, April 29, 2022)). For the Black Horse Project and Big Daddy Project, Eagle's Nest Project and the Black Thor, Blackbird, and Black Label Mineral deposits impacts will depend on details of the mine construction techniques. Given the early stages of these projects, conservatively the entire mine lease (for the Eagle's Nest Project) or mine claim (Black Horse, Big Daddy, Black Thor and Black Bird) was used to encompass the deposit locations and is considered a disturbance.

American Marten are sensitive to habitat fragmentation. Climate change could lead to reduced coniferous forests and more frequent disturbances, resulting in shrinking habitats for American Marten. Climate-driven changes (e.g., more frequent fires, droughts) can exacerbate the fragmentation caused by clearance, making populations more isolated and vulnerable. Areas cleared for roads might also experience slower regeneration, causing habitat loss to persist over extended periods.

Shifts in precipitation and temperature may impact aquatic environments that support beaver populations. While beavers are generally resilient, climate change can affect the stability of water bodies, potentially reducing the suitability of habitats created or altered by clearance activities.

The cumulative effects to Furbearers and Furbearer habitat is approximately 2,875.6 ha for American Marten. This represents 2.16% of the habitat available for American Marten in the RSA and 261.37 ha for North American Beaver (0.17 % of the RSA).

Injury or Death – Increased Access

The development of the Project could result in a negative effect on the abundance of furbearers through increased human access to habitats where furbearer populations are present. The American Marten is a heavily trapped furbearer; in Canada, it accounts for about 20% of fur sales (Lavoie et al., 2019). American martens are also potentially vulnerable to over trapping due to commercial logging and development in some areas, and this increase in harvest is often associated with better access (Weibe et al. 2012). Historically, North American beavers were the most trapped furbearer in North America and human activity continues to be the most important mortality factor for adults through trapping, hunting and nuisance North American beaver control (Wilson and Ruff 1999; Payne, 1984).

While temporary access roads will be closed and restored, these areas may still be exploited by trappers as linear features take a long time to regenerate and repeated use by trappers or other users may maintain their openness. The potential for harvest is also likely greater during the Operations Phase as it will operate over a long period of time and access will not be controlled unlike the Construction Phase. The issue of problem beavers is also more likely during the Operations Phase.

The creation of new access roads for RFDs could lead to in increased death and injury of furbearers. Road RFDs like Northern Road Link will have similar effects as they will add to the linear network within the RSA and will be publicly accessible. Mining RFDs will also create a network of linear features in addition to the mine footprint themselves. Their impact on furbearers will depend on the configuration of mining roads, how they connect to the road network and which habitats they traverse. Whether these access roads are controlled or allow public access will also determine their impact.

Climate change considerations with respect to increased access could compound stressors for beavers and martens. Increased access raises direct human pressures, while climate change can degrade and destabilize habitats, making recovery from disturbance more difficult for both species. **Table 21-30** summarizes the other RFDs or future physical activities in the RSA that have the potential to contribute to changes to the Furbearers VC.

Table 21-29: Furbearers – Summary of Cumulative Effects

ID	RFD or Activity	Species	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Change in Habitat (ha)	Relative Change in the RSA (%)
19	Black Horse Project and Big Daddy Project	American Marten	▪ Habitat loss due to clearance activities (Construction Phase) ▪ Injury or Death of American Marten from Increased Access (Operations Phase)	The Black Horse Project and Big Daddy Project are assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Loss or alteration of furbearer breeding habitat and feeding habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities; and ▪ Increased access allows hunters and trappers to enter new areas leading to increased harvest of furbearers.	647.84	0.49
		North American Beaver	▪ Habitat loss due to clearance activities (Construction Phase) ▪ Injury or Death of North American beaver from Increased Access (Operations Phase)		41.25	0.03
20	Eagle's Nest Project	American Marten	▪ Habitat loss due to clearance activities (Construction Phase) ▪ Injury or Death of American Marten from Increased Access (Operations Phase)	The Eagle's Nest project is assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Loss or alteration of furbearer breeding habitat and feeding habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities; and ▪ Increased access allows hunters and trappers to enter new areas leading to increased harvest of furbearers.	2,170.3	1.63
		North American Beaver	▪ Habitat loss due to clearance activities (Construction Phase) ▪ Injury or Death of North American beaver from Increased Access (Operations Phase)		216.08	0.16

ID	RFD or Activity	Species	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Change in Habitat (ha)	Relative Change in the RSA (%)
22	Northern Road Link Project	American Marten	▪ Habitat loss due to clearance activities (Construction Phase) ▪ Injury or Death of American Marten from Increased Access (Operations Phase)	The Northern Road Link Project is assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with current and future road development have similar pathways of effects as those arising from the Project. This may include: ▪ Loss or alteration of furbearer breeding habitat and feeding habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities; and ▪ Increased access allows hunters and trappers to enter new areas leading to increased harvest of furbearers.	31.43	0.02
		North American Beaver	▪ Habitat loss due to clearance activities (Construction Phase) ▪ Injury or Death of American Marten from Increased Access (Operations Phase)		0.4	<0.01
29	Black Thor, Blackbird, and Black Label Mineral deposits	American Marten	▪ Habitat loss due to clearance activities (Construction Phase) ▪ Injury or Death of American Marten from Increased Access (Operations Phase)	The Black Thor, Blackbird and Black Label Mineral deposits are assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Loss or alteration of furbearer breeding habitat and feeding habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities; and ▪ Increased access allows hunters and trappers to enter new areas leading to increased harvest of furbearers.	7.96	0.01
		North American Beaver	▪ Habitat loss due to clearance activities (Construction Phase) ▪ Injury or Death of North American beaver from Increased Access (Operations Phase)		3.64	<0.01

ID	RFD or Activity	Species	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Change in Habitat (ha)	Relative Change in the RSA (%)
-	Climate Change	American Marten	▪ Habitat loss due to clearance activities (Construction Phase) ▪ Injury or Death of American Marten from Increased Access (Operations Phase)	Potential changes to climate include shifts in habitat suitability, altered hydrology affecting aquatic habitats, and changes in forest composition and increased fire frequency. These changes may exacerbate the effects of habitat loss and fragmentation, potentially reducing resilience and recovery for both species. For American Marten, sensitivity to human driven changes and habitat fragmentation may be heightened under climate change scenarios. North American Beaver is considered more adaptable, but altered water regimes and vegetation changes could still impact populations.	-	-
		North American Beaver	▪ Habitat loss due to clearance activities (Construction Phase) ▪ Injury or Death of North American beaver from Increased Access (Operations Phase)			

21.4.7.3.1 Mitigation for Cumulative Effects

There are multiple Project-related interactions and pathways that result in changes to furbearer and furbearer habitat; however, they are associated with specific Construction and Operation Phases of the Project and particular activities for which mitigation measures exist that have proven to be effective in minimizing and/or avoiding adverse effects. This is similarly anticipated for other RFDs or future activities within the RSA.

With the implementation of the Project's mitigation measures (see Section 12.4) and the assumption that other, future potential projects or activities will be required to have the same or similar standards, it is anticipated that the cumulative effects will not severely impact furbearer habitat availability. Therefore, the identified cumulative effects are considered net cumulative effects and are discussed in the following subsection.

21.4.7.3.2 Characterization of Net Cumulative Effects

The net cumulative effects on furbearers and furbearer habitat are characterized in **Table 21-30** using the criteria defined in Section 12.5.

Habitat Loss – Clearance Activities

American Marten

Negative effects from habitat loss are certain for American Marten through site preparation and construction activities, as well as terrestrial vegetation changes during road construction and operations. The effect from habitat loss will occur throughout the RSA as RFDs and activities are spatially located in both the LSA and RSA of the Project. Construction activities, including habitat removal, are expected to occur through the year. The effects may be permanent or long-term depending on the effectiveness of reclamation efforts. As while some areas may re-establish quickly other areas such as roadbeds or mine footprints may be permanently altered. Context was rated as moderate as American Marten can be sensitive to anthropogenic changes in habitat. Effects from RFDs and the Project are expected to be continuous and irreversible in most cases. At the regional scale the magnitude is expected to be moderate as existing breeding habitats are limited in the RSA, comprising just 6.7% (8,939 ha) of the RSA.

North American Beaver

Negative effects from habitat loss are certain for American Marten through site preparation and construction activities, as well as aquatic vegetation changes during road construction. The effect from habitat loss will occur throughout the RSA as RFDs and activities are spatially located in both the LSA and RSA of the Project. Construction activities, including habitat removal, are expected to occur through the year. The effects may be permanent or long-term depending on the effectiveness of reclamation efforts. (Although some areas may re-establish quickly other areas such as roadbeds or mine footprints may be permanently altered). The context is low as beaver are adaptable and will modify their habitat to suit their requirements including use of road verges. Effects from RFDs, activities and the Project are expected to be continuous and irreversible in most cases. At the regional scale the magnitude is expected to be low as removal of high to moderately suitable habitat is minor.

Injury or Death – Increased Access

American Marten

Injury and/or death from increased access is certain during the Operations Phase for American Marten. The effect from increased access will occur throughout the RSA as RFDs and activities are spatially located in both the LSA and RSA of the Project. The effect would be long-term lasting while the RFDs roads are active, with the effect being reversible following the closure of the RFDs. The context is moderate as American martens are also potentially vulnerable to over trapping which is often associated with better access. Harvest will occur during the non-sensitive season. The frequency is infrequent to frequent as harvest levels will be dependant on whether traplines get established and if they are used. At the regional scale the magnitude is expected to be moderate as local populations may be measurably affected.

North American Beaver

Injury and/or death from increased access is certain during the Operations Phase for North American beaver. The effect from increased access will occur throughout the RSA as the RFDs are spatially located in both the LSA and RSA of the Project. The effect would be long-term lasting while the RFDs roads are active, with the effect being reversible following the closure of the RFDs. The context is low as beaver populations recover quickly from harvest. Harvest will occur during the non-sensitive season. The frequency is infrequent to frequent as harvest levels will be dependant on whether traplines get established and if they are used. The magnitude of the impact on beavers will be low as beaver populations recover quickly from predation even when predation removes a large percentage of the local population.

21.4.7.3.3 Determination of Significance

The determination of significance of net cumulative effects on the Furbearers VC is based on the process of significance determination outlined in Section 12.8 for net effects. A predicted net cumulative effect is considered significant if it is evaluated as adverse, permanent, and of high magnitude, and if it negatively impacts species survival or reproduction at the population level to the extent that the population can no longer sustain itself.

Based on the results in **Table 21-31** the net cumulative effects on the Furbearers VC is considered not significant.

Table 21-30: Furbearers – Characterization of Predicted Net Cumulative Effects

Predicted Net Cumulative Effect	Characterization Criteria								
	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Context	Reversibility	Likelihood of Occurrence
American Marten									
Habitat Loss – Clearance Activities	Negative	Moderate	RSA	All Time Periods	Permanent	Continuous	Resilient	Irreversible	Certain
Injury or Death – Increased Access	Negative	Moderate	RSA	Non-sensitive	Long-term	Frequent	Moderate	Reversible	Certain
North American Beaver									
Habitat Loss – Clearance Activities	Negative	Low	RSA	All Time Periods	Permanent	Continuous	Resilient	Irreversible	Certain
Injury or Death – Increased Access	Negative	Low	RSA	Non-sensitive	Medium-term	Frequent	Resilient	Reversible	Certain

21.4.7.4 Bats

Due to the identical nature of effects and mitigations on both SAR and non-SAR bats, cumulative effects for all bats are discussed in **Section 21.4.8.3.**

21.4.7.5 Forest Songbirds

21.4.7.5.1 Past and Ongoing Effects

Following the "Interim Cumulative Effects Assessment Guidance Document," past, present, and ongoing RFDs and activities are considered to define existing conditions for cumulative effects. As such, the existing conditions outlined in Section 12 for the Forest Songbirds VC presently reflect the effects from these projects and activities within the RSA. **Table 21-1** identifies these projects and activities (IDs 1 to 18) and indicates where their effects spatially overlap with the RSA and the Project's net effects on the VC. Therefore, the cumulative effects assessment is focused on integrating the Project's net adverse effects with those of future RFDs and activities discussed in the following subsection.

21.4.7.5.2 Other Ongoing and Reasonably Foreseeable Projects or Activities

A list of the RFDs and activities that were considered for the cumulative effects assessment were presented in **Table 21-2** (ID's 19 to 39). Of the projects and activities listed in **Table 21-2**, only those listed in **Table 21-32** were identified as being probable to occur within and have potential net effects on the RSA for the Forest Songbirds VC, therefore, have the potential to result in cumulative effects in the RSA.

Table 21-31: Forest Songbirds – RFDs or Future Activities in the RSA

ID	RFD or Activity	Spatial Overlap of Net Effects	Temporal Overlap of Net Effects	Included in Cumulative Effects Analysis
19	Black Horse Project and Big Daddy Project	Yes	Yes	Yes
20	Eagle's Nest Project	Yes	Yes	Yes
22	Northern Road Link Project	Yes	Yes	Yes
-	Winter Roads – Increased winter road traffic by future mining proponents	Yes	Yes	Yes
-	Climate Change	Yes	Yes	Yes

21.4.7.5.3 Cumulative Effects

Cumulative effects may occur where the net adverse effects of the Project and the net adverse effects of other RFDs or activities interact within the RSA boundary for the VC. The cumulative effects to VC may occur due to Project and RFDs and activities that overlap spatially and temporally.

Based on the Project Footprint for the WSR Project, the cumulative effects to the Forest Songbirds VC are:

- Habitat Loss – Clearance Activities (Construction Phase);
- Habitat Alteration or Degradation – Habitat Structural Change (Construction Phase);
- Habitat Alteration or Degradation – Sensory Disturbances (Construction Phase);
- Alterations in Movement – Sensory Disturbances (Construction Phase); and

- Alterations in Movement – Loss of Connectivity (Construction Phase).

As determined in the effects assessment (Section 12.7), with regard to the WSR Project, net effects are likely to be adverse, are either probable or certain to occur, and have a moderate magnitude. Other project effects on forest songbirds are possible, but do not meet the criteria of this cumulative effects assessment and are unlikely to contribute significantly to the cumulative effects in the area (refer to Section 12.9).

Habitat Loss – Clearance Activities (Construction Phase)

Road construction has the potential to cause direct and indirect effects on the habitat of forest songbirds, including habitat loss (removal of habitat) and physical alteration. Orange-crowned Warblers breed in brushy and open deciduous woodlands, shrub thickets, mixedwoods, and coniferous forest edges where low growth is present (Gilbert et al., 2020). Foraging habitats can be variable, typically reflecting fluctuations in breeding habitat vegetation, but these birds usually forage in dense green foliage and along the bark and outer branches of trees (Gilbert et al., 2020). Tennessee Warblers are associated with open areas that contain grasses, dense shrubs, and scattered clumps of young deciduous trees. In the boreal forests of Ontario, this species has been found in successional stages grading from three-year-old lowland and upland timber harvest areas to mature (60 to 220-year-old) lowland and upland boreal forests (Rimmer and McFarland, 2020). Based on habitat modelling, it was determined that approximately 157.35 ha (0.63%) of high use Orange-crowned Warbler habitat and 233.56 ha (0.82%) of high use Tennessee Warbler habitat would be removed from the RSA.

Other RFDs and activities would also result in the removal and/or alteration of suitable habitat for forest songbirds. For mineral exploration and mining projects, the level of effect will depend on which construction techniques are used. Because of the limited data available to AtkinsRéalis, and the early stage of these projects, it was assumed the entire area of the mine claim (Black Horse Project, Big Daddy Project), or mine lease (Eagle's Nest Project) were considered to be potential areas of disturbance.

Climate change, when combined with vegetation clearing, can further reduce the resilience of remaining suitable habitats. Rising temperatures, shifts in precipitation patterns, and more frequent extreme weather events (such as droughts and storms) can place additional stress on forest ecosystems. This makes it more difficult for ecosystems to recover from disturbances such as construction-related clearing. As a result, cleared areas may regenerate more slowly or fail to return to their original condition if climate conditions have changed significantly, potentially resulting in the permanent loss of high-quality habitat.

The area of cumulative effects on forest songbird breeding habitat is approximately 923 ha, which represents 0.79% of the RSA and 10.33% of forest songbird breeding habitat in the RSA.

Habitat Alteration or Degradation – Habitat Structural Change (Construction Phase)

Vegetation removals, creation of the ROW, and construction of the paved and gravel road surfaces may alter or degrade migratory forest songbird habitat near the Project Footprint, extending into the LSA by generating edge effects that change vegetation height, density, and community composition. Edge effects from construction of the road include abiotic, direct biotic, and indirect biotic effects on the habitat. Forest interior neotropical migrant birds have been found to decrease in relative abundance in the presence of a 16 m wide paved road route (Rich et al. 1994), and even unpaved road routes 8-10 m in width affect the distribution of forest songbirds, resulting in reduced relative abundance (Ortega and Capen, 2002), which may be attributed to alteration or degradation of habitat.

Predicted forest songbird activity was modelled based on future disturbance using presence/absence RSF to predict change in use from clearing the ROW and changing existing habitat features into early seral communities. For both species, the use of the RSA is expected to decrease by small, non-significant amounts.

Other RFDs and activities would also result in structural changes to forest songbird habitat from edge effects. The Northern Road Link Project would have similar habitat alteration or degradation impacts to the WSR Project within the 100 m ROW (with an assumed clearance width of 60 m based on the Proposed Terms of Reference, April 29, 2022). There is also the potential of shifting habitat ranges due to changing climatic conditions, opening opportunities for more southerly forest songbird species to occupy available habitat in place of species known to the LSA and RSA.

For the Black Horse Project, Big Daddy Project and Eagle's Nest Project impacts will depend on details of the mine construction techniques. Given the early stages of these projects, conservatively the entire mine lease (for Eagle's Nest) or mine claim (Black Horse Project, Big Daddy Project) was used to encompass the deposit locations and is considered a disturbance.

Habitat Alteration or Degradation – Sensory Disturbances (Construction Phase)

During construction, activities such as blasting at quarries/pits, earth hauling and vegetation clearing, and the use of construction lighting, may reduce the ability of forest songbirds to use habitat along the ROW and supportive infrastructure due to sensory disturbances. Noise generated by construction equipment (e.g., generators, pumps, and other motors), if occurring during the migratory forest songbird active season (April 1 through September 30), may degrade foraging habitat via reduced foraging efficiency (Ware et al. 2015).

Other RFDs would also result in forest songbird alteration or degradation from sensory disturbances. The Northern Road Link Project would have similar habitat alteration or degradation impacts to the WSR Project within their 100 m ROW (with an assumed clearance width of 60 m). For the Black Horse Project, Big Daddy Project, and Eagle's Nest Project, impacts will depend on details of the mine construction techniques. Given the early stages of these projects, conservatively the entire mine claim or mine lease was used to encompass the deposit locations and is considered a disturbance.

Alterations in Movement – Sensory Disturbances (Construction Phase)

Forest songbird movement is also likely to be altered by sensory disturbances. Noise, lighting and other human actions during construction activities such as blasting, clearing, hauling and grading may create disturbances that could alter movement of Migratory Forest Songbirds as they avoid the ROW and supportive infrastructure areas. For example, traffic noise playback has been found to reduce abundance of forest songbirds (McClure et al., 2013) which may indicate they avoid areas with anthropogenic disturbances.

Other RFDs and activities would also result in sensory disturbances that can alter forest songbird movement. The Northern Road Link Project would have similar sensory disturbance impacts to the WSR Project associated with the 100 m ROW. For the Black Horse Project, Big Daddy Project, and Eagle's Nest Project, impacts will depend on details of the mine construction techniques. Given the early stages of these projects, conservatively the entire mine claim or mine lease was used to encompass the deposit locations and is considered a disturbance.

Alterations in Movement – Loss of Connectivity (Construction Phase)

Forest songbird movement is likely to be altered by construction of the road due to the fragmentation of forest habitat. Forest songbird species considered to be habitat generalists, such as White-throated Sparrow and Dark-eyed Junco, may be less affected but forest gaps 25 to 40 m wide have been demonstrated to reduce the probability of forest bird species of crossing in response to territorial intruders including Swainson's Thrush, Golden-crowned Kinglet and Black-throated Green Warbler (Rail et al., 1997). Gaps in the boreal forest affect forest songbirds variably, impeding movement of some species, such as Yellow-rumped Warbler, while facilitating the movement of others, such as Red-breasted Nuthatch, which may be more disturbance tolerant (Bélisle and St. Clair, 2001).

Other RFDs would also result in habitat fragmentation that can alter forest songbird movement. The Northern Road Link Project would have similar loss of connectivity impacts to the WSR Project within the 100 m wide ROW (assumed vegetation clearance width 60 m). For the Black Horse Project, Big Daddy Project, and Eagle's Nest Project, impacts will depend on details of the mine construction techniques. Given the early stages of these projects, conservatively the entire mine claim or mine lease was used to encompass the deposit locations and is considered a disturbance.

Other RFDs and activities would also result in the creation of new roads and/or increased use of existing winter roads. For projects such as Northern Road Link, there would be similar effects on forest songbirds given the project involves road creation. RFDs and activities involving mineral exploration or mining would also create a network of linear features, in addition to clearing vegetation in order to construct the mine itself. The effect of such projects on forest songbirds will depend on the configuration of the mining roads, how they connect to existing road networks, and which habitats are lost or altered.

Table 21-33 summarizes the other RFDs or future physical activities in the RSA that have the potential to contribute to changes to forest songbirds.

Table 21-32: Forest Songbirds – Summary of Cumulative Effects

ID	RFD or Activity	Species	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Change in Habitat (ha)	Relative Change in the RSA (%)
19	Black Horse Project and Big Daddy Project	Tennessee Warbler	▪ Habitat loss due to clearance activities (Construction Phase) ▪ Habitat alteration and degradation due to changes in vegetation structure (Construction Phase) ▪ Habitat alteration and degradation due to sensory disturbance (Construction Phase) ▪ Alteration in movement from Sensory Disturbance (Construction Phase) ▪ Alteration in movement from changes in connectivity (Construction Phase)	The Black Horse Project and Big Daddy project are assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Loss of forest songbirds breeding habitat and foraging habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities; ▪ Decreased use or avoidance of available habitat due to conversion of habitat or creation of edge effects; ▪ Decreased use or avoidance of available habitat due to sensory disturbance from construction activities; ▪ Changes in movement due to sensory disturbance from construction activities; and ▪ Changes in movement due to loss of connectivity from changes in habitat distribution.	8.88 ha	0.10%
		Orange-crowned Warbler			8.88 ha	0.10%
20	Eagle's Nest Project	Tennessee Warbler	▪ Habitat loss due to clearance activities (Construction Phase) ▪ Habitat alteration and degradation due to changes	It is anticipated that the Eagle's Nest project will temporally and spatially overlap with Project activities. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways	823.5 ha	9.21%
		Orange-crowned Warbler			823.5 ha	9.21%

ID	RFD or Activity	Species	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Change in Habitat (ha)	Relative Change in the RSA (%)
			in vegetation structure (Construction Phase) ▪ Habitat alteration and degradation due to sensory disturbance (Construction Phase) ▪ Alteration in movement from Sensory Disturbance (Construction Phase) ▪ Alteration in movement from changes in connectivity (Construction Phase)	of effects as those arising from the Project. These effects may include: ▪ Loss of forest songbirds breeding habitat and foraging habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities; ▪ Decreased use or avoidance of available habitat due to conversion of habitat or creation of edge effects; ▪ Decreased use or avoidance of available habitat due to sensory disturbance from construction activities; ▪ Changes in movement due to sensory disturbance from construction activities; and ▪ Changes in movement due to loss of connectivity from changes in habitat distribution.		
22	Northern Road Link Project	Tennessee Warbler	▪ Habitat loss due to clearance activities (Construction Phase) ▪ Habitat alteration and degradation due to changes in vegetation structure (Construction Phase) ▪ Habitat alteration and degradation due to sensory disturbance (Construction Phase) ▪ Alteration in movement from Sensory Disturbance (Construction Phase)	Based on current information and proposed development timelines, it is anticipated that the Northern Road Link (NRL) project will temporally and spatially overlap with Project activities. Activities associated with current and future road development have similar pathways of effects as those arising from the Project. This may include: ▪ loss of forest songbirds breeding habitat and foraging habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities;	3.66 ha	0.04%

ID	RFD or Activity	Species	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Change in Habitat (ha)	Relative Change in the RSA (%)
			▪ Alteration in movement from changes in connectivity (Construction Phase)	▪ Decreased use or avoidance of available habitat due to conversion of habitat or creation of edge effects; ▪ Decreased use or avoidance of available habitat due to sensory disturbance from construction activities; ▪ Changes in movement due to sensory disturbance from construction activities and ▪ Changes in movement due to loss of connectivity from changes in habitat distribution.		
		Orange-crowned Warbler			3.66 ha	0.04%
-	Climate Change	Tennessee Warbler Orange-crowned Warbler	▪ Habitat loss due to clearance activities (Construction Phase) ▪ Habitat alteration and degradation due to changes in vegetation structure (Construction Phase) ▪ Habitat alteration and degradation due to sensory disturbance (Construction Phase) ▪ Alteration in movement from Sensory Disturbance (Construction Phase) ▪ Alteration in movement from changes in connectivity (Construction Phase)	Vegetation clearing during construction causes direct habitat loss for forest songbirds. Climate change interacts with this by reducing the resilience and recovery of these habitats, altering their suitability, and compounding fragmentation effects. This poses a increased risk to forest songbird populations, especially those with specialized habitat needs.	-	-

21.4.7.5.4 Mitigation for Cumulative Effects

There are multiple Project-related interactions and pathways that result in changes to forest songbird habitat; however, they are associated with specific Construction and Operation Phases of the Project and particular activities for which mitigation measures exist that have proven to be effective in minimizing and/or avoiding adverse effects. This is similarly applicable for other RFDs or future activities within the RSA.

With the implementation of the Project's mitigation measures (see Section 12.4) and the assumption that other, future potential projects or activities will be required to have the same or similar standards, it is anticipated that the cumulative effects will not severely impact forest songbird habitat and movement in the RSA. Therefore, the identified cumulative effects are considered net cumulative effects and are discussed in the following subsection.

21.4.7.5.5 Characterization of Net Cumulative Effects

The net cumulative effects on forest songbirds are characterized in **Table 21-33** using the criteria defined in Section 12.5.

Net cumulative effects on changes to forest songbirds are predicted to be negative in direction from the construction of the various projects, RFDs and activities. During operations, however, the direction of effect varies with the nature of the proposed activity. The direction is likely neutral for projects, RFDs or activities where operation occurs within the same physical footprint as construction (e.g., road maintenance) but could be negative for projects, RFDs or activities such as mineral exploration and mining, where the areas of disturbance (or footprint) could change over the duration of the project.

21.4.7.5.1 Determination of Significance

The determination of significance of net cumulative effects on the Forest Songbirds VC is based on the process of significance determination outlined in Section 12.7 for net effects. A predicted net cumulative effect is considered significant if it is evaluated as adverse, permanent, and of high magnitude, and if it negatively impacts species survival or reproduction at the population level to the extent that the population can no longer sustain itself.

Based on the results in **Table 21-34**, the net cumulative effects on the Forest Songbirds VC are considered not significant.

.

Table 21-33: Forest Songbirds – Characterization of Predicted Net Cumulative Effects

Predicted Net Cumulative Effect	Characterization Criteria									
	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Context	Reversibility	Likelihood of Occurrence	Significance
Habitat loss due to Clearance Activities	Negative	Low	RSA	All	Permanent	Continuous	Low	Irreversible	Certain	Not Significant
Habitat Alteration or Degradation due to Habitat Structural Change	Negative	Moderate	RSA	All	Permanent	Continuous	Moderate	Irreversible	Possible	Not Significant
Habitat Alteration or Degradation due to Sensory Disturbances	Negative	Moderate	RSA	All	Short-term	Frequent	Moderate	Reversible	Certain	Not Significant
Alteration in Movement due to Sensory Disturbances	Negative	Low	RSA	All	Short-term	Continuous	Moderate	Reversible	Certain	Not Significant
Alteration in Movement due to Loss of Connectivity	Negative	Low	RSA	All	Medium-term	Continuous	Low	Reversible	Possible	Not Significant

21.4.7.6 Wetland Songbirds

21.4.7.6.1 Past and Ongoing Effects

Following the "Interim Cumulative Effects Assessment Guidance Document," past, present, and ongoing RFDs and activities are considered to define existing conditions for cumulative effects. As such, the existing conditions outlined in Section 12 for the Wetland Songbirds VC presently reflect the effects from these projects and activities within the RSA. **Table 21-1** identifies these projects and activities (IDs 1 to 18) and indicates where their effects spatially overlap with the RSA and the Project's net effects on the VC. Therefore, the cumulative effects assessment is focused on integrating the Project's net adverse effects with those of future RFDs and activities discussed in the following subsection.

21.4.7.6.2 Other Ongoing and Reasonably Foreseeable Projects or Activities

A list of the RFDs and activities that were considered for the cumulative effects assessment were presented in **Table 21-2** (ID's 19 to 39). Of the projects, RFDs, and activities listed in **Table 21-2**, only those listed in **Table 21-35** were identified as being probable to occur within and have potential net effects on the RSA for the Wetland Songbirds VC and therefore have the potential to result in net cumulative effects in the RSA.

Table 21-34: Wetland Songbirds – RFDs or Future Activities in the RSA

ID	RFD or Activity	Spatial Overlap of Net Effects	Temporal Overlap of Net Effects	Included in Cumulative Effects Analysis
19	Black Horse Project and Big Daddy Project	Yes	Yes	Yes
20	Eagle's Nest Project	Yes	Yes	Yes
22	Northern Road Link Project	Yes	Yes	Yes
29	Black Thor, Blackbird, and Black Label Mineral deposits	Yes	Yes	Yes
-	Climate Change	Yes	Yes	Yes

21.4.7.6.3 Cumulative Effects

Cumulative effects may occur where the net adverse effects of the Project and the net adverse effects of other RFDs or activities interact within the RSA boundary for the VC. The cumulative effects to VC may occur due to Project and RFDs and activities that overlap spatially and temporally.

Based on the Project Footprint for the WSR Project the cumulative effects to the Wetland Songbirds (Palm Warbler, Alder Flycatcher) VC are:

- Habitat Loss – Clearance Activities (during the Construction Phase);
- Injury or Death – Collisions with Vehicles (during the Operations Phase); and
- Injury or Death – Changes to Predator-Prey Dynamics (during the Operations Phase).

As determined in the effects assessment (Section 12.7), in terms of the WSR Project, these have an adverse effect (negative direction), are either probable (Collisions with Vehicles, Changes to Predator-Prey Dynamics) or certain to occur (Clearance Activities) and have a moderate magnitude. Other project net effects on SAR Wetland Songbirds and SAR Wetland Songbird habitat are possible, but

do not meet the criteria of this cumulative effects assessment (i.e., moderate or high magnitude) and are unlikely to contribute significantly to the cumulative effects in the area (refer to Section 12.9).

Habitat Loss – Clearance Activities (Construction Phase)

Road construction has the potential to cause direct and indirect effects on the habitat of wetland songbirds, including habitat loss (removal of habitat) and physical alteration. Palm Warblers are associated with black spruce bog environments but also use other peatlands with scattered trees and regenerating areas post-burn. Based on an understanding of Palm Warbler habitat preferences, the results of a habitat model were used to estimate the removals of preferred habitat during Project construction (refer to Section 11: Assessment of Effects on Vegetation and Wetlands for information about the modelling process). Predicted construction activities will result in the removal of 60.68 ha of Low Treed Bog, 29.62 ha of Sparse Treed Bog, 43.47 ha of Sparse Treed Fen and 1.38 ha of Organic Poor Fen in the RSA. Overall, suitable Palm Warbler habitat is common throughout the RSA.

Alder Flycatchers are associated with riparian habitats and the edges of ponds, swamps and creeks with alder and birch thickets. Based on an understanding of Alder Flycatcher habitat preferences, the results of habitat modelling were used to estimate the removal of preferred habitat during Project construction. Predicted construction activities will result in the removal of approximately 6.88 ha of riparian and shoreline communities and 1.98 ha of Thicket Swamp in the RSA. Overall, Alder Flycatcher habitat is rare in the RSA.

Other RFDs and activities would also result in the removal and/or alteration of suitable habitat for Wetland Songbirds. For mineral exploration and mining projects, the level of effect will depend on which construction techniques are used. Additionally, habitat loss resulting from clearing activities reduces the ability of wetland ecosystems to withstand the impacts of climate change. As habitats become smaller and more fragmented, their capacity to buffer against climate-driven changes diminishes, leaving songbird populations increasingly susceptible to declines.

Because of the limited data available to AtkinsRéalis, and the early stage of some of these projects, it was assumed the entire area of the mine claim (Black Horse Project, Big Daddy Project, Black Thor and Black Label Mineral deposits), or mine lease (Eagle's Nest Project) were considered to be potential areas of disturbance. The area of cumulative effects on the Wetland Birds VC is approximately 2,000.41 ha, which represents 1.57% of the habitat available for Wetland Birds within the RSA.

Injury or Death – Collisions with Vehicles (Operations Phase)

Movement of vehicles along the WSR during the Operations Phase could result increased injury or death of wetland songbirds, including Palm Warblers and Alder Flycatchers. Avian-vehicle collisions is one of the top three causes of the death of birds in Canada. Wetland songbirds that move and forage at lower heights have been found to be particularly vulnerable to this pathway of effect. As a result, potential collisions between Palm Warblers and vehicles in the RSA are likely to occur since the species forages in low vegetation as well as along the ground. Alder Flycatchers may also collide with vehicles since they typically perch on low branches and shrubs prior to foraging and also will nest within a metre of the ground.

The NRL Project, and other RFDs and activities that involve the creation of new roads could have similar potential effects on Wetland Birds as the WSR Project. Mining RFDs and activities would also involve the creation of new roads and/or increased use of existing access roads. An accurate estimate of the effect of this pathway on wetland songbirds cannot be currently determined given the limited availability of information regarding the potential configuration(s) of mining roads and/or how they may connect to existing road networks.

Injury or Death – Changes to Predator-Prey Dynamics

Creation of the WSR ROW via vegetation clearing activities may improve access for predators of wetland songbirds, increasing the risk of injury or death of species such as the Palm Warbler and Alder Flycatcher. Songbird predators are known to use linear features well beyond their operational lifetime, and species that nest low to the ground, such as Alder Flycatchers, are particularly vulnerable to predation during their nesting season.

Other RFDs and activities would also result in the creation of new roads and/or increased use of existing winter roads. For projects such as Northern Road Link, there would be similar effects on wetland songbirds given the focus on road creation. In addition to clearing vegetation to construct the mine itself, RFDs and activities involving mineral exploration or mining would also create a network of linear features. The effect of such projects on wetland songbirds will depend on the configuration of the mining roads, how they connect to existing road networks and which habitats are lost or altered.

Climate change has the potential to alter wetland hydrology and vegetation, which may result in reduced cover and an increase in edge habitats. These changes can make it easier for predators to move through these environments. Additionally, warmer temperatures and shifting conditions may allow certain predators to thrive and expand their ranges, placing greater pressure on songbird populations. If new roads enable predators to reach wetland habitats more easily, and climate change also affects wetland songbird habitat, the risk of bird predation could increase further than if the new road or changing climate were to happen in isolation.

Table 21-36 summarizes the other RFDs or future physical activities in the RSA that have the potential to contribute to changes to shorebirds and shorebird habitat.

Table 21-35: Wetland Songbirds – Summary of Cumulative Effects

ID	RFD or Activity	Species	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Change in Habitat	Relative Change in the RSA (%)
19	Black Horse Project and Big Daddy Project	Palm Warbler	▪ Habitat loss due to clearance activities (Construction Phase) ▪ Injury or death from vehicle collisions (Operations Phase) ▪ Injury or death from changes to predator-prey dynamics (Operations Phase)	The Black Horse Project and Big Daddy Project are assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Loss of wetland songbird breeding habitat and foraging habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities; ▪ Increased injury or death of wetland songbirds due to collisions with vehicles and equipment on roads or at mine sites; and ▪ Maintenance activities maintain predator access along mine access roads decreases wetland songbird survival.	679.73	0.51
		Alder Flycatcher			26.93	0.02
20	Eagle's Nest Project	Palm Warbler	▪ Habitat loss due to clearance activities (Construction Phase) ▪ Injury or death from vehicle collisions (Operations Phase) ▪ Injury or death from changes to predator-prey dynamics (Operations Phase)	It is anticipated that the Eagle's Nest project will temporally and spatially overlap with Project activities. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Loss of wetland songbird breeding habitat and foraging habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities;	1,050.88	0.79
		Alder Flycatcher			84.82	0.06

ID	RFD or Activity	Species	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Change in Habitat	Relative Change in the RSA (%)
				▪ Increased injury or death of wetland songbirds due to collisions with vehicles and equipment on roads or at mine sites; and ▪ Maintenance activities maintain predator access along mine access roads decreasing wetland songbird survival.		
22	Northern Road Link Project	Palm Warbler	▪ Habitat loss due to clearance activities (Construction Phase) ▪ Injury or death from vehicle collisions (Operations Phase) ▪ Injury or death from changes to predator-prey dynamics (Operations Phase)	Based on current information and proposed development timelines, it is anticipated that the Northern Road Link (NRL) project will temporally and spatially overlap with Project activities. Activities associated with current and future road development have similar pathways of effects as those arising from the Project. This may include: ▪ Loss of wetland songbird breeding habitat and foraging habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities; ▪ Increased injury or death of wetland songbirds due to collisions with vehicles and equipment on roads or at mine sites; and ▪ Maintenance activities maintain predator access along mine access roads decreasing wetland songbird survival.	2.08	<0.01
		Alder Flycatcher			0.17	<0.01

ID	RFD or Activity	Species	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Change in Habitat	Relative Change in the RSA (%)
29	Black Thor, Blackbird, and Black Label Mineral Deposits	Palm Warbler	▪ Habitat loss due to clearance activities (Construction Phase) ▪ Injury or death from vehicle collisions (Operations Phase) ▪ Injury or death from changes to predator-prey dynamics (Operations Phase)	Based on current information and proposed development timelines, it is anticipated that the Black Thor, Blackbird and Black Label Mineral Deposits will temporally and spatially overlap with Project activities. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Loss of wetland songbird breeding habitat and foraging habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities; ▪ Increased injury or death of wetland songbirds due to collisions with vehicles and equipment on roads or at mine sites; and ▪ Maintenance activities maintain predator access along mine access roads decreasing wetland songbird survival predators.	11.37	0.01
		Alder Flycatcher			0.42	<0.01
-	Climate Change	Palm Warbler Alder Flycatcher	▪ Habitat loss due to clearance activities (Construction Phase) ▪ Injury or death from changes to predator-prey dynamics (Operations Phase)	▪ Climate change may amplify the adverse effects of habitat loss and fragmentation, reduce the resilience of wetland ecosystems; ▪ Alter wetland hydrology, potentially reducing habitat suitability for both songbird species; ▪ Change vegetation composition and structure, affecting food availability and nesting sites; and ▪ Increase the frequency and severity of extreme weather events, which may impact breeding success and survival.	-	-

21.4.7.6.4 Mitigation for Cumulative Effects

There are multiple Project-related interactions and pathways that result in changes to Wetland Songbird habitat; however, they are associated with specific Construction and Operation Phases of the Project and particular activities for which mitigation measures exist and have proven to be effective in minimizing and/or avoiding adverse effects. This is similarly applicable to other RFDs or future activities within the RSA.

With the implementation of the Project's mitigation measures (see Section 12.4) and the assumption that other, future potential projects or activities will be required to have the same or similar standards, it is anticipated that the cumulative effects on changes in wetland songbird habitat such that successful rehabilitation with a capability relative to existing conditions would be prevented. Therefore, the identified cumulative effects are considered net cumulative effects and are discussed in the following subsection.

21.4.7.6.5 Characterization of Net Cumulative Effects

The net cumulative effects on wetland songbirds and their habitats are characterized in **Table 21-37** using the criteria defined in Section 12.5.

Habitat Loss – Clearance Activities (Construction Phase)

Adverse effects from habitat loss are certain for Wetland Songbirds through site preparation and construction activities as well as terrestrial vegetation changes during road construction. The effect from habitat loss will occur throughout the RSA as the RFDs are spatially located in both the LSA and RSA of the Project. The effects may be permanent or long-term depending on the effectiveness of reclamation efforts. Effects from RFDs, activities and the Project are expected to be continuous and irreversible in most cases. At the regional scale, the magnitude is expected to be low as existing breeding habitats are relatively common in the RSA. However, Wetland Songbirds can be resilient in their habitat choices as many anthropogenically disturbed areas including clearings can be used by these species.

Injury or Death – Collisions with Vehicles (Operational Phase)

Negative effects from collisions with vehicles are certain for Wetland Songbirds during the operational phases of projects, RFDs and activities. The effects of collisions will occur throughout the RSA as RFDs and activities are located spatially throughout the area. The effects are anticipated to be medium-term, ceasing shortly after operation of the project, RFD or other activity. The cumulative effect is considered to be moderate in magnitude and infrequent in occurrence. The effect is reversible once vehicles stop using the roads and anthropogenic features are reclaimed following the closure of projects, RFDs and activities.

Injury or Death – Changes to Predator-Prey Dynamics (Operational Phase)

Negative effects resulting from changes to predator-prey dynamics are certain for Wetland Songbirds during the Operations Phase. The effect of predation could occur throughout the RSA as the RFDs are spatially located in both the LSA and RSA of the Project. Predation would occur throughout Wetland Songbirds active seasons. The effects will be long-term as any anthropogenic features constructed for projects, RFDs or activities will be used by predators beyond their operational lifetimes. Predation events due to increase access are likely to be moderate in frequency as individuals use areas near roadways and access routes. The effect is reversible once anthropogenic features have regenerated following closure of the WSR or any RFD. The magnitude of the effect is predicted to be moderate, as songbird predators are known to have increased success along edges.

Table 21-36: Wetland Songbirds – Characterization of Predicted Net Cumulative Effects

Predicted Net Cumulative Effect	Characterization Criteria								
	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Context	Reversibility	Likelihood of Occurrence
Habitat Loss – Clearance Activities (Construction)	Negative	Moderate	RSA	All Time periods	Permanent to Long-term	Frequent	Resilient	Irreversible	Certain
Injury or Death – Collisions with Vehicles (Operations)	Negative	Moderate	RSA	Throughout the active season	Medium-term	Infrequent	Resilient	Reversible	Probable
Injury or Death – Changes to Predator-Prey Dynamics (Operations)	Negative	Moderate	RSA	Throughout the active season	Long-term	Infrequent	Resilient	Reversible	Probable

21.4.7.6.1 Determination of Significance

The determination of significance of net cumulative effects on the Wetland Songbirds VC is based on the process of significance determination outlined in Section 12.8 for net effects. A predicted net cumulative effect is considered significant if it is evaluated as adverse, permanent, and of high magnitude, and if it negatively impacts species survival or reproduction at the population level to the extent that the population can no longer sustain itself.

Based on the results in **Table 21-38**, the net cumulative effects on the Wetland Songbirds VC is not significant in relation to Habitat Loss (Clearance Activities), Injury and Death (Collisions) or Injury and Death (Changes to Predator-Prey Dynamics).

Table 21-37: Wetland Songbirds – Characterization of Predicted Net Cumulative Effects

Predicted Net Effect	Project Phase	Key Criteria and Scores								
		Magnitude	Geographic Extent	Timing	Duration	Frequency	Context	Reversibility	Likelihood of Occurrence	Significance
Habitat Loss – Clearance Activities	Construction	Moderate	RSA	All Time Periods	Permanent	Frequent	Resilient	Irreversible	Certain	Not Significant
Injury or Death – Collisions with Vehicles	Operations	Moderate	RSA	Sensitive	Medium-term	Infrequent	Resilient	Reversible	Probable	Not Significant
Injury or Death – Changes to Predator-Prey Dynamics	Operations	Moderate	RSA	Sensitive	Long-term	Infrequent	Resilient	Reversible	Probable	Not significant

21.4.7.7 Shorebirds

21.4.7.7.1 Past and Ongoing Effects

Following the "Interim Cumulative Effects Assessment Guidance Document," past, present, and ongoing RFDs and activities are considered to define existing conditions for cumulative effects. As such, the existing conditions outlined in Section 12 for the Shorebirds VC presently reflect the effects from these projects and activities within the RSA. **Table 21-1** identifies these projects and activities (IDs 1 to 18) and indicates where their effects spatially overlap with the RSA and the Project's net effects on the VC. Therefore, the cumulative effects assessment is focused on integrating the Project's net adverse effects with those of future RFDs and activities discussed in the following subsection.

21.4.7.7.2 Other Ongoing and Reasonably Foreseeable Projects or Activities

A list of the RFDs and activities that were considered for the cumulative effects assessment were presented in **Table 21-1** (ID's 19 to 39). Of the projects and activities listed in **Table 21-2**, only those listed in **Table 21-39** were identified as being probable to occur within and have potential net effects on the RSA for the Shorebird VC, and therefore, have the potential to result in cumulative effects in the RSA.

Table 21-38: Shorebirds – RFDs or Future Activities in the RSA

ID	RFD or Activity	Spatial Overlap of Net Effects	Temporal Overlap of Net Effects	Included in Cumulative Effects Analysis
19	Black Horse Project and Big Daddy Project	Yes	Yes	Yes
20	Eagle's Nest Project	Yes	Yes	Yes
22	Northern Road Link Project	Yes	Yes	Yes
29	Black Thor, Blackbird, and Black Label Mineral deposits	Yes	Yes	Yes
-	Climate Change	Yes	Yes	Yes

21.4.7.7.3 Cumulative Effects

Cumulative effects may occur where the net adverse effects of the Project and the net adverse effects of other RFDs or activities interact within the RSA boundary for the VC. The cumulative effects to VC may occur due to Project and RFDs and activities that overlap spatially and temporally.

Based on the Project Footprint for the WSR Project, the cumulative effects to the Shorebirds (Greater Yellowlegs) VC are:

- Habitat Loss – Clearance Activities (Construction Phase); and
- Injury or Death – Changes to Predator-Prey Dynamics.

As determined in the effects assessment (Section 12.7), regarding the WSR Project, net effects are likely to be adverse, are either probable or certain to occur, and have a low magnitude. Although the net effects of clearance activities are focused on the Project Footprint, the geographic extent of changes to predator-prey dynamics extends into the LSA.

Habitat Loss – Clearance Activities

Road construction has the potential to cause direct and indirect effects on the habitat of shorebirds, including habitat loss (removal of habitat) and physical alteration. The Greater Yellowlegs breeds throughout the boreal region in wet bogs with small, wooded islands, muskegs and in coniferous forests with abundant clearings. As such, not all construction activities are expected to result in habitat losses. Based on habitat modelling, it was determined that approximately 80.77 ha (0.23%) of suitable habitat would be removed from the RSA, of which 45.5 ha is high use habitat.

Other RFDs and activities would also result in the removal and/or alteration of suitable habitat for shorebirds. For mineral exploration and mining projects, the level of effect will depend on which construction techniques are used. Climate change may reduce and degrade shorebird breeding and foraging habitats by altering precipitation, water tables, and increasing extreme weather, making habitats less predictable and resilient. Clearing activities when combined with climate-related habitat degradation, can result in greater cumulative losses, e.g., areas cleared for construction may not recover or may recover more slowly under altered climate conditions or remaining habitats may be under increased stress, reducing their capacity to support displaced shorebirds.

Because of the limited data available to AtkinsRéalis, and the early stage of these projects, it was assumed the entire area of the mine claim (Black Horse Project, Big Daddy Project, Black Thor and Black Label Mineral deposits), or mine lease (Eagle's Nest Project) were considered to be potential areas of disturbance. The area of cumulative effects on Shorebirds and Shorebirds breeding habitat is approximately 1,134.34 ha, which represents 0.85% of the habitat available for shorebirds within the RSA.

Injury or Death – Changes to Predator-Prey Dynamics

Creation of the WSR ROW via vegetation clearing activities may improve access for predators of shorebirds, increasing the risk of injury or death of species such as the Greater Yellowlegs. Shorebird predators are known to use linear features well beyond their operational lifetime, and ground-nesting species, such as Greater Yellowlegs, are particularly vulnerable to mammalian predators such as coyote and red fox, which are known to occur in the RSA.

Other RFDs and activities would also result in the creation of new roads and/or increased use of existing winter roads. For projects such as Northern Road Link, there would be similar effects on shorebirds given the goal is road creation. RFDs and activities involving mineral exploration or mining would also create a network of linear features, in addition to clearing vegetation to construct the mine itself.

Climate change can influence predator-prey dynamics by altering the abundance, distribution, and behaviour of predators—such as allowing them to expand their range due to warmer temperatures or causing shifts in prey availability that lead to increased predation on shorebirds. Additionally, climate-related changes to habitat, like drying wetlands and altered vegetation, can concentrate shorebirds into smaller, fragmented areas, making them more vulnerable to predation. Changes in the timing of shorebird breeding and migration can also result in greater overlap with periods of high predator activity, further increasing the risk to shorebird populations.

The effect of such projects and activities on Greater Yellowlegs and other shorebirds will depend on the configuration of the mining roads, how they connect to existing road networks and which habitats are lost or altered.

Table 21-40 summarizes the other RFDs or future physical activities in the RSA that have the potential to contribute to changes to shorebirds and shorebird habitat.

Table 21-39: Shorebirds – Summary of Cumulative Effects

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Change in Wildlife and Wildlife Habitat	Relative Change in the RSA (%)
19	Black Horse Project and Big Daddy Project	▪ Changes to abundance and distribution of Greater Yellowlegs due to habitat loss (clearance activities) ▪ Injury or death of Greater Yellowlegs because of changes to predator-prey dynamics	Based on currently available information, it is anticipated that the Black Horse Project and Big Daddy Project will temporally and spatially overlap with Project activities. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Loss or alteration of breeding and foraging habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities; and ▪ Injury and death due to increased predator access along roads and other areas of disturbance.	473.61 ha	0.36%
20	Eagle's Nest Project	▪ Changes to abundance and distribution of Greater Yellowlegs due to habitat loss (clearance activities) ▪ Injury or death of Greater Yellowlegs because of changes to predator-prey dynamics	Based on current information and proposed development timelines, it is anticipated that the Eagle's Nest project will temporally and spatially overlap with Project activities. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Loss or alteration of breeding and foraging habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities; and ▪ Injury and death due to increased predator access along roads and other areas of disturbance.	653.61 ha	0.49%

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Change in Wildlife and Wildlife Habitat	Relative Change in the RSA (%)
22	Northern Road Link Project	▪ Changes to abundance and distribution of Greater Yellowlegs due to habitat loss (clearance activities) ▪ Injury or death of Greater Yellowlegs because of changes to predator-prey dynamics	Based on current information and proposed development timelines, it is anticipated that the Northern Road Link Project will temporally and spatially overlap with Project activities. Activities associated with current and future road development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Loss or alteration of breeding and foraging habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities; and ▪ Injury and death due to increased predator access along roadway and other areas of disturbance.	2.05 ha	<0.01%
29	Black Thor, Blackbird, and Black Label Mineral deposits	▪ Changes to abundance and distribution of Greater Yellowlegs due to habitat loss (clearance activities) ▪ Injury or death of Greater Yellowlegs because of changes to predator-prey dynamics	Based on currently available information, it is anticipated that the Black Thor, Blackbird and Black Label Mining projects will temporally and spatially overlap with Project activities. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Loss or alteration of breeding and foraging habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities; and ▪ Injury and death due to increased predator access along roads and other areas of disturbance.	3.83 ha	<0.01%
-	Climate Change	▪ Changes to abundance and distribution of Greater Yellowlegs due to habitat loss (clearance activities) ▪ Injury or death of Greater Yellowlegs because of changes to predator-prey dynamics	Climate change may exacerbate habitat loss by altering hydrology, vegetation communities, and increasing the frequency of extreme weather events, which can further degrade breeding and foraging habitats. Shifts in predator populations and behaviors due to changing climate conditions may compound risks to shorebirds.	-	-

21.4.7.7.4 Mitigation for Cumulative Effects

There are multiple Project-related interactions and pathways that result in changes to shorebirds and shorebird habitat; however, they are associated with specific construction and operation phases of the Project and particular activities for which mitigation measures exist that have proven to be effective in minimizing and/or avoiding adverse effects. This is similarly applicable to other RFDs or future activities within the RSA.

With the implementation of the Project's mitigation measures (see Section 12.4.6) and the assumption that other, future potential projects or activities will be required to have the same or similar standards, it is anticipated that the cumulative effects will not severely affect Greater Yellowlegs' breeding and foraging habitat. Additionally, the cumulative effects of changes to predator-prey dynamics are not expected to substantially increase the death or injury of shorebirds provided mitigation measures are appropriately implemented. Therefore, the identified cumulative effects are considered net cumulative effects and are discussed in the following subsection.

21.4.7.7.5 Characterization of Net Cumulative Effects

The net cumulative effects on Shorebirds (Greater Yellowlegs) are characterized in **Table 21-40** using the criteria defined in Section 12.5.

Habitat Loss – Clearance Activities

Negative effects from habitat loss are certain for Greater Yellowlegs during road construction. The effect from habitat loss will occur throughout the RSA as the RFDs are spatially located in both the LSA and RSA of the Project. The effects may be permanent or long-term depending on the effectiveness of reclamation efforts. As while some areas may re-establish quickly, other areas such as roadbeds or mine footprints may be permanently altered. Effects from RFDs, activities and the Project are expected to be continuous and irreversible in most cases. At the regional scale, the magnitude is expected to be low as existing breeding habitats are relatively common in the RSA; however Greater Yellowlegs can be resilient in their habitat choices as many anthropogenically disturbed areas (including clearings) can be used by the species.

Injury or Death – Changes to Predator-Prey Dynamics

Negative effects on Greater Yellowlegs survival from improved predator access is probable during the Operations Phase. The effect from predation will occur throughout the RSA as the RFDs are spatially located in both the LSA and RSA of the Project. Predation would occur throughout the Greater Yellowlegs' active season. The effects may be long-term as any anthropogenic features constructed for RFDs can be used by predators beyond operational lifetimes. Predation events resulting from increased access are likely to be low in frequency as few individuals will be using areas near roadways. The effect is reversible once anthropogenic features have regenerated following closure of the WSR, RFD or activity. The magnitude of the effect is predicted to be moderate, as shorebird predators are known to have increased success along edges.

21.4.7.7.1 Determination of Significance

The determination of significance of net cumulative effects on the Shorebirds VC is based on the process of significance determination outlined in Section 12.8 for net effects. A predicted net cumulative effect is considered significant if it is evaluated as adverse, permanent, and of high magnitude, and if it negatively impacts species survival or reproduction at the population level to the extent that the population can no longer sustain itself.

Based on the results in **Table 21-41** , the net cumulative effects on the Shorebirds VC are considered not significant.

Table 21-40: Shorebirds – Characterization of Predicted Net Cumulative Effects

Predicted Net Cumulative Effect	Characterization Criteria								
	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Context	Reversibility	Likelihood of Occurrence
Habitat loss due to Clearance Activities (Construction)	Negative	Low	RSA	All time periods	Permanent	Continuous	Resilient	Irreversible	Certain
Injury or death as a result of Changes to Predator-Prey Dynamics (Operations)	Negative	Moderate	RSA	All time periods	Long-term	Infrequent	Resilient	Reversible	Probable

21.4.7.8 Waterfowl

21.4.7.8.1 Past and Ongoing Effects

Following the “Interim Cumulative Effects Assessment Guidance Document,” past, present, and ongoing RFDs and activities are considered to define existing conditions for cumulative effects. As such, the existing conditions outlined in Section 12 for the Waterfowl Songbirds VC presently reflect the effects from these projects and activities within the RSA. **Table 21-1** identifies these projects and activities (IDs 1 to 18) and indicates where their effects spatially overlap with the RSA and the Project’s net effects on the VC. Therefore, the cumulative effects assessment is focused on integrating the Project’s net adverse effects with those of future RFDs and activities discussed in the following subsection.

21.4.7.8.2 Other Ongoing and Reasonably Foreseeable Projects or Activities

A list of the RFDs and activities that were considered for the cumulative effects assessment were presented in **Table 21-2** (ID’s 19 to 39). Of the projects and activities listed in **Table 21-2**, only those listed in **Table 21-42** were identified as being probable to occur within and have potential net effects on the RSA for the Waterfowl VC, therefore, have the potential to result in cumulative effects in the RSA.

Table 21-41: Waterfowl – RFDs or Future Activities in the RSA

ID	RFD or Activity	Spatial Overlap of Net Effects	Temporal Overlap of Net Effects	Included in Cumulative Effects Analysis
11	Webequie First Nation – Nursing Station Bulk Fuel Storage Upgrades	Yes	Yes	Yes
19	Black Horse Project and Big Daddy Project	Yes	Yes	Yes
20	Eagle’s Nest Project	Yes	Yes	Yes
22	Northern Road Link Project	Yes	Yes	Yes
29	Black Thor, Blackbird, and Black Label Mineral deposits	Yes	Yes	Yes
-	Climate Change	Yes	Yes	Yes

21.4.7.8.3 Cumulative Effects

Cumulative effects may occur where the net adverse effects of the Project and the net adverse effects of other RFDs or activities interact within the RSA boundary for the VC. The cumulative effects to VC may occur due to Project and RFDs and activities that overlap spatially and temporally.

The cumulative effects of the Project on the Waterfowl VC include:

- Injury or Death – Increased Access.

This effect is likely in terms of the WSR Project are likely to extend into the RSA and have potential adverse effects with respect to waterfowl populations. Canada Goose and Mallard are the most harvested waterfowl species in Canada. The WSR Project, as well as additional projects, RFDs and activities in the area, once operational, will allow for increased access to habitats used by waterfowl. Additionally, climate change can impact wetland, aquatic, and riparian habitats by altering hydrology, vegetation, and food availability, which may reduce the quality or extent of natural areas. As a result, waterfowl may congregate in the remaining suitable habitats, often near new roads or infrastructure created by the

project. Increased human access to these areas raises the risk of hunting and disturbance, potentially leading to higher rates of injury or death among waterfowl.

These factors may in turn increase their exposure hunting pressure as access constraints are often limiting factors for waterfowl harvest. Hunting pressure is expected to be most significant from local communities. Previous estimates illustrate a much larger proportion of First Nations hunters engage in waterfowl hunting and harvest a greater number of birds per hunter (Prevett et al. 1983). Hunting is a key traditional activity and their proximity to the proposed projects suggests First Nations are most likely to utilize this new access. Non-Nations hunting may still occur, but due to the distance from larger communities (such as Thunder Bay), this pressure is not expected to be as high. There are abundant high quality hunting habitats much closer to the large communities, which are much more likely to be exploited. The potential for harvest is also likely greater during the Operations Phase as it will operate over a long period of time and access will not be as easily controlled unlike the Construction Phase.

The effects are likely to occur in aquatic, wetland and riparian habitats where waterfowl spend the majority of their time breeding or foraging. Wherever access to these habitats is more readily available, it is expected that increased hunting may occur.

These effects were characterized as probable to occur and were predicted to have a low to moderate magnitude. Other project effects on Waterfowl VC are possible, but do not meet the criteria for being carried forward to the cumulative effects. These other effects of negligible and low magnitude are not predicted to meaningfully contribute to the cumulative effects in the RSA (refer to Section 12.9).

Table 21-43 summarizes the other RFDs or future physical activities in the RSA that have the potential to contribute to changes to waterfowl and waterfowl habitat.

Table 21-42: Waterfowl – Summary of Cumulative Effects

ID	RFD or Activity	Species	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Change in Habitat (ha)	Relative Change in the RSA (%)
19	Black Horse Project and Big Daddy Project	Canada Goose	▪ Injury or death of Canada Goose from increased access (Operations Phase)	Based on current information and proposed development timelines, it is anticipated that the Black Horse and Big Daddy Project will temporally and spatially overlap with Project activities. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Injury and death due to increased human access to habitats.	2,075.75	1.63%
		Mallard	▪ Injury or death of Mallard from increased access (Operations Phase)	Based on current information and proposed development timelines, it is anticipated that the Black Horse and Bid Daddy Project will temporally and spatially overlap with Project activities. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Injury and death due to increased human access to habitats.	2,075.75	1.63%
20	Eagle's Nest Project	Canada Goose	▪ Injury or death of Canada Goose from increased access (Operations Phase)	Based on current information and proposed development timelines, it is anticipated that the Eagle's Nest Project will temporally and spatially overlap with Project activities. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Injury and death due to increased human access to habitats.	1,174.39	0.92%

ID	RFD or Activity	Species	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Change in Habitat (ha)	Relative Change in the RSA (%)
		Mallard	▪ Injury or death of Mallard from increased access (Operations Phase)	Based on current information and proposed development timelines, it is anticipated that the Eagle's Nest Project will temporally and spatially overlap with Project activities. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Injury and death due to increased human access to habitats.	1,174.39	0.92%
22	Northern Road Link Project	Canada Goose	▪ Injury or death of Canada Goose from increased access (Operations Phase)	Based on current information and proposed development timelines, it is anticipated that the Northern Road Link will temporally and spatially overlap with Project activities. Activities associated with the potential future road development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Injury and death due to increased human access to habitats.	22	0.02%
		Mallard	▪ Injury or death of Mallard from increased access (Operations Phase)	Based on current information and proposed development timelines, it is anticipated that the Northern Road Link will temporally and spatially overlap with Project activities. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Injury and death due to increased human access to habitats.	22	0.02%

ID	RFD or Activity	Species	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Change in Habitat (ha)	Relative Change in the RSA (%)
29	Black Thor, Blackbird, and Black Label Mineral deposits	Canada Goose	▪ Injury or death of Canada Goose from increased access (Operations Phase)	Based on current information and proposed development timelines, it is anticipated that the Black Thor, Blackbird, and Black Label Mineral deposits will temporally and spatially overlap with Project activities. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Injury and death due to increased human access to habitats.	2,720.74	2.13%
		Mallard	▪ Injury or death of Mallard from increased access (Operations Phase)	Based on current information and proposed development timelines, it is anticipated that the Black Thor, Blackbird, and Black Label Mineral deposits will temporally and spatially overlap with Project activities. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Injury and death due to increased human access to habitats.	2,720.74	2.13%
	Climate Change	Canada Goose	▪ Injury or death of Canada Goose from increased access (Operations Phase)	Climate change could interact cumulatively on waterfowl by altering wetland hydrology and habitat suitability, shifting migration patterns and timing which may lead to greater interaction with humans, and impact food availability and breeding success.	-	-
		Mallard	▪ Injury or death of Mallard from increased access (Operations Phase)		-	-

21.4.7.8.4 Mitigation for Cumulative Effects

There are multiple Project-related interactions and pathways that may result in changes to the Waterfowl VC; however, they are associated with specific Construction and Operation Phases of the Project and particular activities for which mitigation measures exist that have proven to be effective in minimizing and/or avoiding adverse effects. This is similarly applicable to other RFDs or future activities within the RSA.

With the implementation of the Project's mitigation measures (see Section 12.4) and the assumption that other, future potential projects or activities will be required to have the same or similar standards, it is anticipated that the cumulative effects on changes in the Waterfowl VC will be limited. Therefore, the identified cumulative effects are considered net cumulative effects and are discussed in the following subsection.

21.4.7.8.5 Characterization of Net Cumulative Effects

The net cumulative effects on waterfowl and waterfowl habitat are characterized in **Table 21-44** using the criteria defined in Section 12.8.

Net cumulative effects on changes the waterfowl are predicted to be adverse, low to moderate in magnitude, occurring within the RSA, long-term, and reversible. The effect is likely to be frequent, occurring in the seasons where both species are present (migrating through the area) and probable in likelihood. Hunters may harvest the species in all time periods that the birds are present. Both species are resilient, and the effect is unlikely to be affected by the activities other than those taken by hunting.

21.4.7.8.1 Determination of Significance

The determination of significance of net cumulative effects on the Waterfowl VC is based on the process of significance determination outlined in Section 13.6 for net effects. A predicted net cumulative effect is considered significant if it is evaluated as adverse, permanent, and of high magnitude, and if it negatively impacts species survival or reproduction at the population level to the extent that the population can no longer sustain itself.

Based on the results in **Table 21-44**, the net cumulative effects on the Waterfowl VC for both Canada Goose and Mallard are considered not significant.

Table 21-43: Waterfowl – Characterization of Predicted Net Cumulative Effects

Predicted Net Cumulative Effect	Characterization Criteria								
	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Context	Reversibility	Likelihood of Occurrence
Canada Goose									
Injury or death as a result of increased access	Negative	Low to Moderate	RSA	All time periods	Long-term	Frequent	Low	Reversible	Probable
Mallard									
Injury or death as a result of increased access	Negative	Low to Moderate	RSA	All time periods	Long-term	Frequent	Low	Reversible	Probable

21.4.7.9 Raptors

21.4.7.9.1 Past and Ongoing Effects

Following the “Interim Cumulative Effects Assessment Guidance Document,” past, present, and ongoing RFDs and activities are considered to define existing conditions for cumulative effects. As such, the existing conditions outlined in Section 12 for the Raptors VC presently reflect the effects from these projects and activities within the RSA. **Table 21-1** identifies these projects and activities (IDs 1 to 18) and indicates where their effects spatially overlap with the RSA and the Project’s net effects on the VC. Therefore, the cumulative effects assessment is focused on integrating the Project’s net adverse effects with those of future RFDs and activities discussed in the following subsection.

21.4.7.9.2 Other Ongoing and Reasonably Foreseeable Projects or Activities

A list of the RFDs and activities that were considered for the cumulative effects assessment were presented in **Table 21-2** (ID’s 19 to 39). Of the projects and activities listed in **Table 21-2**, only those listed in **Table 21-45** were identified as being probable to occur within and have potential net effects on the RSA for the Raptor VC, therefore, have the potential to result in cumulative effects in the RSA.

Table 21-44: Raptors – RFDs or Future Activities in the RSA

ID	Project or Activity	Spatial Overlap of Net Effects	Temporal Overlap of Net Effects	Included in Cumulative Effects Analysis
19	Black Horse Project and Big Daddy Project	Yes	Yes	Yes
20	Eagle’s Nest Project	Yes	Yes	Yes
22	Northern Road Link Project	Yes	Yes	Yes
29	Black Thor, Blackbird, and Black Label Mineral deposits	Yes	Yes	Yes
-	Winter Roads – Increased winter road traffic by future mining proponents	Yes	Yes	Yes
-	Climate Change	Yes	Yes	Yes

21.4.7.9.3 Cumulative Effects

Cumulative effects may occur where the net adverse effects of the Project and the net adverse effects of other RFDs or activities interact within the RSA boundary for the VC. The cumulative effects to VC may occur due to Project and RFDs and activities that overlap spatially and temporally.

Based on the Project Footprint for the WSR Project the cumulative effects on raptors and their habitats are:

- Habitat Loss – Clearance Activities (during the Construction Phase).

As determined in the effects assessment (Section 12.7), the effect from habitat loss (in terms of the WSR Project) is likely to extend into the LSA, have an adverse effect, is certain to occur, and is a moderate magnitude. Other Project effects on raptors and their habitats are possible, but do not meet the criteria of this cumulative effects assessment and are unlikely to contribute significantly to the cumulative effects in the area (refer to Section 12.9).

Habitat Loss

The construction of the road has the potential for direct and indirect effects that could cause the loss of raptor habitat through physical alteration and removal of suitable habitat. Two species were chosen for the Raptor VC, Red-tailed Hawk (for the diurnal raptors) and Great Grey Owl (for the nocturnal raptors). Red-tailed Hawks occupy a wide range of habitats, only avoiding areas with dense forests and large treeless expanses (Preston and Beane 2009). For nesting tall trees are preferred. Deciduous and mixed forest containing large aspen are frequently used but tall conifers are also potential nest sites. Great Grey Owls build their owl nests either using the broken top of snags or re-using stick nests from other species such as hawks, crows and ravens. While commonly associated with conifer forests, the Great Grey Owl will use all forest types where other large birds build stick nests. Given the similar nesting requirements, available nesting habitats were considered the same.

Based on the Project Footprint for the WSR Project, the net effects to raptor breeding habitat are estimated to be removal of 156.61 ha, or 1.75% of the available habitat in the RSA. Preferred raptor breeding habitat is relatively rare in the RSA only making up 8,939 ha or 6.7% of the total area.

In the boreal suitable foraging habitat for Great Grey Owls would include treed bogs, fens burns and roadside clearances (Kirk and Duncan, 1996). Red-tailed Hawks may use similar sites but often in more open environments, however knowledge of Red-tailed Hawk habitat use in boreal wetlands is sparse.

For foraging Red-tailed Hawks were conservatively assumed to use any open habitats with Great Grey Owls also using more treed areas. The net effects to Red-tailed Hawk foraging habitat are estimated to be removal of 74.85 ha or 0.23% of the available foraging habitat in the RSA. For Great Grey Owl the net effects to foraging habitat are estimated to be removal of 215.63 ha or 0.28% of the available foraging habitat in the RSA. Foraging habitat is common for both Red-tailed Hawk and Great Grey Owl with 32,297 ha (24.2%) and 7,6446 ha (57.3%) available respectively.

Other RFDs would also result in the removal and alteration of suitable habitat for raptors. The Northern Road Link Project would have similar habitat loss impacts to the WSR Project within their 100 m ROW. For the Black Horse Project and Big Daddy Project, Eagle's Nest Project and the Black Thor, Blackbird, and Black Label Mineral deposits impacts will depend on details of the mine construction techniques. Climate change can further reduce habitat quality and availability by altering forest composition, increasing the frequency of wildfires, pest outbreaks, and severe weather events. These changes may accelerate the loss of mature trees (needed for Red-tailed Hawk nests) and snags or stick nests (used by Great Grey Owl). Where vegetation is cleared in areas of raptor habitat patches, climate change can hinder natural recovery and regeneration. For example, increased drought or fire frequency may prevent re-establishment of canopy trees or suitable nesting sites, making habitat loss permanent and over a wider extent.

Given the early stages of these projects, conservatively the entire mine lease (Eagle's Nest Project) or mine claim was used to encompass the deposit locations and is considered a disturbance.

The cumulative effects to raptor breeding habitat is an area of approximately 923 ha, which represents 10.33% of the available habitat in the RSA. The cumulative effects to raptor and raptor foraging habitat is an area of approximately 1,156.33 ha for Red-tailed Hawk, which represents 3.58% of available habitat in the RSA and 2,268.89 ha for Great Grey Owl (2.97% of available habitat in the RSA).

Table 21-46 summarizes the other RFDs or future physical activities in the RSA that have the potential to contribute to changes to raptors and raptor habitat.

Table 21-45: Raptors – Summary of Cumulative Effects

ID	RFD or Activity	Species	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Change in Habitat (ha)	Relative Change in the RSA (%)
19	Black Horse Project and Big Daddy Project	Red-tailed Hawk	▪ Changes to abundance and distribution of Red-tailed Hawk	The Black Horse Project and Big Daddy Project are assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. This may include: ▪ Loss or alteration of raptor breeding habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities.	Breeding: 8.88 Foraging: 446.68	Breeding: 0.10 Foraging: 1.38
		Great Gray Owl	▪ Changes to abundance and distribution of Great Grey Owl		Breeding: 8.88 Foraging: 664.21	Breeding: 0.10 Foraging: 0.87
20	Eagle's Nest Project	Red-tailed Hawk	▪ Changes to abundance and distribution of Red-tailed Hawk	The Eagle's Nest project is assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. This may include: ▪ Loss or alteration of raptor breeding habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities.	Breeding: 832.5 Foraging: 629.49	Breeding: 9.21 Foraging: 1.95
		Great Gray Owl	▪ Changes to abundance and distribution of Great Grey Owl		Breeding: 832.5 Foraging: 1,356.64	Breeding: 9.21 Foraging: 1.77

ID	RFD or Activity	Species	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Change in Habitat (ha)	Relative Change in the RSA (%)
22	Northern Road Link Project	Red-tailed Hawk	▪ Changes to abundance and distribution of Red-tailed Hawk	The Northern Road Link Project is assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with current and future road development have similar pathways of effects as those arising from the Project. This may include: ▪ Loss or alteration of raptor breeding habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities.	Breeding: 3.66 Foraging: 1.89	Breeding: 0.04 Foraging: 0.01
		Great Gray Owl	▪ Changes to abundance and distribution of Great Grey Owl		Breeding: 3.66 Foraging: 12.25	Breeding: 0.04 Foraging: 0.03
29	Black Thor, Blackbird, and Black Label Mineral deposits	Red-tailed Hawk	▪ Changes to abundance and distribution of Red-tailed Hawk	The Black Thor, Blackbird, and Black Label Mineral deposits are assumed to spatially overlap with Project activities based on the information available.; however, the temporal overlap is uncertain based on the current information and status of the development (on hold). Activities associated with any future mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. This may include: ▪ Loss or alteration of raptor breeding habitat and foraging habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities.	Breeding: 0 Foraging: 3.41	Breeding: 0 Foraging: 0.01
		Great Gray Owl	▪ Changes to abundance and distribution of Great Grey Owl		Breeding: 0 Foraging: 13.15	Breeding: 0 Foraging: 0.02

ID	RFD or Activity	Species	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Change in Habitat (ha)	Relative Change in the RSA (%)
-	Climate Change	Red-tailed Hawk Great Gray Owl	▪ Changes to abundance and distribution of Red-tailed Hawk ▪ Changes to abundance and distribution of Great Grey Owl	There is potential for synergistic effects of climate change with project-related activities that could compound stressors related to habitat availability and suitability (degradation, direct loss) for foraging and breeding, for both species.	-	-

21.4.7.9.4 Mitigation for Cumulative Effects

There are multiple Project-related interactions and pathways that result in changes to raptor and raptor habitat; however, they are associated with specific Construction and Operation Phases of the Project and particular activities for which mitigation measures exist and are proven to be effective in minimizing and/or avoiding adverse effects. This is similarly applicable to other RFDs or future activities within the RSA. With the implementation of the Project's mitigation measures (see Section 12.4: Mitigation and Enhancement Measures, Assessment of Effects on Raptors) and the assumption that other, future potential projects or activities will be required to have the same or similar standards, it is anticipated that the cumulative effects will not severely impact raptor breeding and foraging habitat availability.

21.4.7.9.5 Characterization of Net Cumulative Effects

Cumulative effects may occur where the Project and other RFDs or activities both cause similar net effects within RSA boundary for the Raptor VC. As discussed in the previous section, net effects to raptor and raptor habitats may occur due to Project and RFDs and activities that overlap spatially and temporally.

The cumulative effects are characterized based on the incremental effects that result from the combination of the standalone net effects of the Project and the RFDs or future activities. The cumulative effects on raptor and raptor habitat from RFDs or future activities, in combination with the environmental effects of the Project, are characterized in **Table 21-46** using the criteria defined in Section 12.5: Characterization of Net Effects, Assessment of Effects on Raptors).

Habitat Loss

Red-tailed Hawk

Negative effects from habitat loss are certain for raptor through site preparation and construction activities as well as terrestrial vegetation changes during road construction and operations. The effect from habitat loss will occur throughout the RSA as the RFDs are spatially located in both the LSA and RSA of the Project. The effects may be permanent or long-term depending on the effectiveness of reclamation efforts. As while some areas may re-establish quickly other areas such as roadbeds or mine footprints may be permanently altered. Even if restoration efforts are successful, given Red-tailed Hawk's requirements for super-canopy trees for breeding, the timeframe for these areas to be used as breeding habitats is likely beyond a century and context was assigned as moderate. Effects from RFDs and the Project are expected to be continuous and irreversible in most cases. At the regional scale the magnitude is expected to be moderate as existing breeding habitats are relatively rare in the RSA. At the regional scale the magnitude is expected to be moderate as existing breeding habitats are limited in the RSA, comprising just 6.7% (8,939 ha) of the RSA.

Great Grey Owl

Negative effects from habitat loss are certain for raptor through site preparation and construction activities as well as terrestrial vegetation changes during road construction and operations. The effect from habitat loss will occur throughout the RSA as the RFDs are spatially located in both the LSA and RSA of the Project. The effects may be permanent or long-term depending on the effectiveness of reclamation efforts. As while some areas may re-establish quickly other areas such as roadbeds or mine footprints may be permanently altered. Even if restoration efforts are successful, given that Great Gray Owl uses other species large stick nests for breeding, the timeframe for these areas to be used as breeding habitats is likely beyond a century, however Great Grey Owls are more flexible using snags and corvid

nests, so context was assigned as resilient. Effects from RFDs and the Project are expected to be continuous and irreversible for habitat removal in most cases. At the regional scale the magnitude is expected to be moderate as existing breeding habitats are relatively rare in the RSA. At the regional scale the magnitude is expected to be moderate as existing breeding habitats are limited in the RSA, comprising just 6.7% (8939 ha) of the RSA.

21.4.7.9.1 Determination of Significance

The determination of significance of net cumulative effects on the Raptors VC is based on the process of significance determination outlined in Section 12.8 for net effects. A predicted net cumulative effect is considered significant if it is evaluated as adverse, permanent, and of high magnitude, and if it negatively impacts species survival or reproduction at the population level to the extent that the population can no longer sustain itself.

Based on the results in **Table 21-47** the net cumulative effects on the Raptors VC is considered significant for Red-tailed Hawk and Great Grey Owl.

Table 21-46: Raptors – Characterization of Predicted Net Cumulative Effects

Predicted Net Cumulative Effect	Characterization Criteria								
	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Context	Reversibility	Likelihood of Occurrence
Red-tailed Hawk									
Habitat Loss due to Clearing Activities	Negative	Moderate	RSA	All Time Periods	Long-term/ Permanent	Continuous	Moderate Due to the need for super-canopy trees	Irreversible	Certain
Great Gray Owl									
Habitat Loss due to Clearing Activities	Negative	Moderate	RSA	All Time Periods	Long-term/ Permanent	Continuous	Resilient	Irreversible	Certain

21.4.7.10 Reptiles and Amphibians

21.4.7.10.1 Past and Ongoing Effects

Following the "Interim Cumulative Effects Assessment Guidance Document," past, present, and ongoing RFDs and activities are considered to define existing conditions for cumulative effects. As such, the existing conditions outlined in Section 12 for the Reptiles and Amphibians VC presently reflect the effects from these projects and activities within the RSA. **Table 21-1** identifies these projects and activities (IDs 1 to 18) and indicates where their effects spatially overlap with the RSA and the Project's net effects on the VC. Therefore, the cumulative effects assessment is focused on integrating the Project's net adverse effects with those of future RFDs and activities discussed in the following subsection.

21.4.7.10.2 Other Ongoing and Reasonably Foreseeable Projects or Activities

A list of the RFDs and activities that were considered for the cumulative effects assessment were presented in **Table 21-1** (ID's 19 to 39). Of the projects and activities listed in **Table 21-2**, only those listed in **Table 21-48** were identified as being probable to occur within the RSA and have potential net effects on the Reptiles and Amphibians VC. These projects, RFDs and activities thus have the potential to result in net cumulative effects in the RSA.

Table 21-47: Reptiles and Amphibians – RFDs or Future Activities in the RSA

ID	Project or Activity	Spatial Overlap of Net Effects	Temporal Overlap of Net Effects	Included in Cumulative Effects Analysis
19	Black Horse Project and Big Daddy Project	Yes	Yes	Yes
20	Eagle's Nest Project	Yes	Yes	Yes
22	Northern Road Link Project	Yes	Yes	Yes
29	Black Thor, Blackbird, and Black Label Mineral deposits	Yes	Yes	Yes
-	Climate Change	Yes	Yes	Yes

21.4.7.10.3 Cumulative Effects

Cumulative effects may occur where the net adverse effects of the Project and the net adverse effects of other RFDs or activities interact within the RSA boundary for the VC. The cumulative effects to VC may occur due to Project and RFDs and activities that overlap spatially and temporally.

Based on the Project Footprint for the WSR Project, the cumulative effects to the Amphibians and Reptiles VC are:

- Habitat Loss – Clearance Activities (Construction Phase);
- Habitat Alteration or Degradation – Habitat Structural Change (Construction Phase);
- Alterations in Movement – Loss of Connectivity (Construction Phase);
- Injury or Death – Incidental Take (Construction Phase); and
- Injury or Death – Collisions with Vehicles (Operations Phase).

As determined in the effects assessment (Section 12.7), regarding the WSR Project, net effects are likely to be adverse, are either probable or certain to occur, and have a moderate magnitude. The geographic extent of these activities is the Project Footprint.

Habitat Loss – Clearance Activities

Road construction has the potential to cause direct and indirect effects on the habitat of amphibians and reptiles, including habitat loss (removal of habitat) from vegetation clearing. Creation of the Project Footprint will remove habitat suitable for reptiles and amphibians to breed, overwinter and thermoregulate. Based on the results of habitat modelling (using Ecological Land Classification, refer to Section 11: Assessment of Effects on Vegetation and Wetlands) and an understanding of the Project Footprint, it is estimated that 380.34 ha of wetland habitat will be removed during the Construction Phase (approximately 0.35% of the RSA). Wetland habitat, particularly peatland habitat, is relatively common, making up 91.82% of the RSA.

RSF modelling was also completed for American toad and three frog species (boreal chorus frog, spring peeper and wood frog), and it was determined that approximately 454.44 ha (0.36%) of high use American toad habitat, 343.83 ha (0.27%) of boreal chorus frog habitat, 585.78 (0.46%) of spring peeper habitat and 636.73 ha (0.50%) of wood frog habitat would be removed from the RSA. Due to the cryptic nature of Eastern garter snake and its low detectability across the RSA, quantification of high use habitat loss was not made; however, given the species is considered a habitat generalist (making use of a variety of terrestrial habitats, much like the American toad) estimates are anticipated to be similar for the two species.

The area of effect for the NRL Project will depend on which of the alternative routes and ancillary infrastructure alternatives are selected. For the purposes of this Project, the precautionary principle was adopted, and the area of effect was determined based on the greater length of the currently proposed alternatives and an assumed clearance width of 60 m (Proposed Terms of Reference, Webequie First Nation and Marten Falls First Nation, April 29, 2022). Within the RSA for Amphibians and Reptiles, this area of effect is approximately 37.78 ha.

For other RFDs and activities in the RSA, it was assumed that the area of effect would correspond either to the footprint of the mine lease (i.e., for the Eagle's Nest project) or the mine claim area (for the Black Horse, Big Daddy, Black Thor and Black Label projects). Climate change is anticipated to modify hydrological regimes, temperature, and precipitation patterns in Northern Ontario, leading to the potential shrinking or drying of wetlands as a result of increased evaporation, altered rainfall, and changes in groundwater recharge. These shifts in seasonal patterns may disrupt amphibian and reptile breeding cycles, reduce overwintering success, and alter the distribution of suitable habitats, further compounding the effects of habitat loss already occurring due to construction and development activities in the region.

The cumulative effects to reptile and amphibian wetland habitat are approximately 4,027.83 ha, which represents 3.75 % of the available habitat in the RSA.

Habitat Alteration or Degradation – Habitat Structural Change (Construction Phase)

Road construction may result in a change in reptile and amphibian habitat structure, such as reduced connectivity (movement routes) between overwintering habitat and breeding habitat, or a reduction in size of overwintering and breeding habitats due to loss of vegetation, changes in vegetation community structure, hydrological changes, and/or construction of the roadbed. RSF based on future disturbance (habitat loss and alteration) effects predicts amphibian utilization will decrease by 3,820.35 ha, or 3.0% of the habitat in the RSA.

Other RFDs would also result in structural changes to reptile and amphibian habitats. The Northern Road Link Project would have similar habitat alteration or degradation impacts as the WSR Project within its ROW. For the Black Horse Project and Big Daddy Project, Eagle's Nest Project and the Black Thor,

Blackbird, and Black Label Mineral deposits impacts will depend on details of the mine construction techniques. Climate change further exacerbates the degradation of remaining habitats, reducing their resilience and ability to support amphibian and reptile populations. For instance, wetland loss due to construction is compounded by drying habitat, which could result in fewer and lower-quality breeding sites. Additionally, fragmented habitats become less capable of buffering species against climate extremes, such as droughts and heat waves, while reduced connectivity from roads and infrastructure impedes the ability of species to migrate to new, suitable habitats as climate conditions change.

Given the early stages of these projects, conservatively the entire mine lease (Eagle's Nest) or mine claim was used to encompass the deposit locations and considered a disturbance.

Alterations in Movement – Loss of Connectivity (Construction Phase)

The movement of amphibians and reptiles is likely to be altered by the road due since the open space and paved and gravel substrates can act as deterrents. Garter snakes are less abundant near roads (Gigeroff and Blouin-Demers, 2023) and have also been found to avoid gravel roads, potentially due to the lower substrate temperature (Shine et al. 2004).

Other RFDs would also result in habitat fragmentation that can alter reptile and amphibian movement. The Northern Road Link Project would have similar loss of connectivity impacts to the WSR Project within the 100 m ROW (60 m of which is assumed to be cleared of vegetation based on the Proposed Terms of Reference, Webequie First Nation and Marten Falls First Nation, April 29, 2022). For the Black Horse Project and Big Daddy Project, Eagle's Nest Project and the Black Thor, Blackbird, and Black Label Mineral deposits impacts will depend on details of the mine construction techniques. Given the early stages of these projects, conservatively the entire mine lease (Eagle's Nest Project) or mine claim was used to encompass the deposit locations and considered a disturbance.

Injury or Death – Incidental Take (Construction Phase)

Vegetation clearing in reptile and amphibian habitat during road construction may result in injury or death to these species groups. Species such as Spring Peepers and Boreal Chorus Frogs are capable of climbing vegetation and may be located up to 1 m above the ground, camouflaged among foliage or in cracks, crevices and knot holes. These two species, as well as recently metamorphosed American Toads and Wood Frogs are very small (2-4 cm in body length) making them inconspicuous in vegetated areas. Overwintering amphibians are very challenging to detect and may be present in wetlands during construction activities such as vegetation clearing.

Other RFDs would also result in incidental take resulting in reptile and amphibian injury or death. The Northern Road Link Project would have similar impacts to the WSR Project within its ROW (in terms of incidental take). For the Black Horse Project and Big Daddy Project, Eagle's Nest Project and the Black Thor, Blackbird, and Black Label Mineral deposits impacts will depend on details of the mine construction techniques. Given the early stages of these projects, conservatively the entire mine lease or mine claim was used to encompass the deposit locations and considered a disturbance.

Injury or Death – Collisions with Vehicles (Operations Phase)

During operations, the predicted maximum vehicles travelling on the road is 500 per day, with most of the travel anticipated to take place during daylight hours. Mortality during the Operations Phase is expected to occur throughout the reptile and amphibian active season, primarily at nighttime during the sensitive spring breeding period for amphibians, during seasonal dispersal or migration, and after periods of heavy

rain (Gunson & Schueler, 2019) and in areas where wetlands occur on both sides of the road (Lagen et al. 2009) in the Project Footprint.

Other RFDs and activities would also result in the creation of new roads and/or increased use of existing winter roads. For projects such as Northern Road Link, there would be similar effects on reptiles and amphibians given the goal is road creation. RFDs and activities involving mineral exploration or mining would also create a network of linear features, in addition to clearing vegetation to construct the mine itself. The effect of such projects on reptiles and amphibians will depend on the configuration of the mining roads, how they connect to existing road networks and which habitats are lost or altered.

Table 21-49 summarizes the other RFDs or future physical activities in the RSA that have the potential to contribute to changes to reptiles and amphibians and their habitats.

Table 21-48: Amphibians and Reptiles – Summary of Cumulative Effects

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Change in Habitat (ha)	Relative Change in the RSA (%)
19	Black Horse Project and Big Daddy Project	▪ Habitat Loss – Clearance Activities (construction) ▪ Alteration or Degradation of Habitat – Habitat Structural Change (construction) ▪ Alterations in Movement – Loss of Connectivity ▪ Injury or Death – Incidental Take (construction) ▪ Injury or Death – Collisions with Vehicles (Operations)	Based on current information and proposed development timelines, it is anticipated that the Black Horse Project and Big Daddy Project will temporally and spatially overlap with Project activities. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Loss of reptile and amphibian breeding, movement, or overwintering habitat from vegetation removal, grubbing, and/or construction activities that permanently remove suitable vegetation communities, ▪ Alteration or degradation of suitable amphibian breeding, movement, or overwintering habitat from habitat size reductions, changes in vegetation community structure, and hydrological changes, ▪ Incidental take resulting in injury or death from activities occurring in reptile and amphibian habitat; and ▪ Injury or death from collisions with vehicles used during the site construction and operation.	1,181.85	0.92
20	Eagle's Nest Project	▪ Habitat Loss – Clearance Activities (construction) ▪ Alteration or Degradation of Habitat – Habitat Structural Change (construction) ▪ Alterations in Movement – Loss of Connectivity ▪ Injury or Death – Incidental Take (construction) ▪ Injury or Death – Collisions with Vehicles (Operations)	Based on current information and proposed development timelines, it is anticipated that the Eagle's Nest Project will temporally and spatially overlap with Project activities. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Loss of reptile and amphibian breeding, movement, or overwintering habitat from vegetation removal, grubbing, and/or construction activities that permanently remove suitable vegetation communities, ▪ Alteration or degradation of suitable amphibian breeding, movement, or overwintering habitat from habitat size reductions, changes in vegetation community structure, and hydrological changes, ▪ Incidental take resulting in injury or death from activities occurring in reptile and amphibian habitat; and ▪ Injury or death from collisions with vehicles used during the site construction and operation.	3,523.33	2.76

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Change in Habitat (ha)	Relative Change in the RSA (%)
22	Northern Road Link Project	▪ Habitat Loss – Clearance Activities (construction) ▪ Alteration or Degradation of Habitat – Habitat Structural Change (construction) ▪ Alterations in Movement – Loss of Connectivity ▪ Injury or Death – Incidental Take (construction) ▪ Injury or Death – Collisions with Vehicles (Operations)	Based on current information and proposed development timelines, it is anticipated that the Northern Road Link Project will temporally and spatially overlap with Project activities. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Loss of reptile and amphibian breeding, movement, or overwintering habitat from vegetation removal, grubbing, and/or construction activities that permanently remove suitable vegetation communities; ▪ Alteration or degradation of suitable amphibian breeding, movement, or overwintering habitat from habitat size reductions, changes in vegetation community structure, and hydrological changes; ▪ Incidental take resulting in injury or death from activities occurring in reptile and amphibian habitat; and ▪ Injury or death from collisions with vehicles used during the site construction and operation.	37.78	0.03
29	Black Thor, Blackbird, and Black Label Mineral deposits	▪ Habitat Loss – Clearance Activities (construction) ▪ Alteration or Degradation of Habitat – Habitat Structural Change (construction) ▪ Alterations in Movement – Loss of Connectivity ▪ Injury or Death – Incidental Take (construction) ▪ Injury or Death – Collisions with Vehicles (Operations)	Based on current information and proposed development timelines, it is anticipated that the Black Thor, Blackbird, and Black Label Mineral deposits will temporally and spatially overlap with Project activities. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Loss of reptile and amphibian breeding, movement, or overwintering habitat from vegetation removal, grubbing, and/or construction activities that permanently remove suitable vegetation communities; ▪ Alteration or degradation of suitable amphibian breeding, movement, or overwintering habitat from habitat size reductions, changes in vegetation community structure, and hydrological changes; ▪ Incidental take resulting in injury or death from activities occurring in reptile and amphibian habitat; and ▪ Injury or death from collisions with vehicles used during the site construction and operation.	13.57	0.01

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Change in Habitat (ha)	Relative Change in the RSA (%)
-	Climate Change	▪ Habitat Loss – Clearance Activities (construction) ▪ Alteration or Degradation of Habitat – Habitat Structural Change (construction) ▪ Alterations in Movement – Loss of Connectivity ▪ Injury or Death – Incidental Take (construction) ▪ Injury or Death – Collisions with Vehicles (Operations)	The combined effect of climate change and project-related activities may amplify adverse impacts, posing a challenge to the success rate of habitat restoration efforts, and reducing the resiliency of amphibians and reptiles at the population level. Climate change can affect existing habitats for the VC through: ▪ Changing hydrological regimes, potentially reducing wetland extent and quality; ▪ Shifting temperature and precipitation patterns, which can affect breeding cycles, overwintering success, and habitat suitability; and ▪ Increasing the frequency and severity of extreme weather events, which may exacerbate habitat loss and fragmentation.	-	-

21.4.7.10.4Mitigation for Cumulative Effects

There are multiple Project-related interactions and pathways that result in changes to amphibian and reptile habitats; however, they are associated with specific Construction and Operation phases of the Project and particular activities for which mitigation measures exist that have proven to be effective in minimizing and/or avoiding adverse effects. This is similarly applicable to other RFDs or future activities within the RSA.

With the implementation of the Project's mitigation measures (see Section 12.4) and the assumption that other, future potential projects or activities will be required to have the same or similar standards, it is anticipated that the cumulative effects will not impact the availability of amphibian and reptile habitat in the RSA. Therefore, the identified cumulative effects are considered net cumulative effects and are discussed in the following subsection.

21.4.7.10.5Characterization of Net Cumulative Effects

The net cumulative effects on amphibian and reptile habitat are characterized in **Table 21-49** using the criteria defined in Section 12.5.

Net cumulative effects on herptiles are predicted to be negative in direction during construction of the various projects, RFDs and activities. During operations, however, the direction of effect varies with the nature of the proposed activity. The direction is likely neutral for projects, RFDs or activities where operation occurs within the same physical footprint as construction (e.g., road maintenance) but could be negative for projects, RFDs or activities such as mineral exploration and mining, where the areas of disturbance (or footprint) could change over the duration of the project.

Habitat Loss – Clearance Activities (Construction Phase)

Adverse effects from clearance activities are certain for amphibians and reptiles during the Construction Phase. The effect will occur throughout the RSA as RFDs and activities are spatially located throughout the landscape. The effects may be permanent or long-term in duration depending on the effectiveness of reclamation efforts. Wetland habitats are known to be more difficult to restore or recreate than upland habitats, and some areas, such as roadbeds or mine footprints may be permanently altered (i.e., effects are irreversible). Vegetation removal will occur during all time periods but will have a greater effect during sensitive time periods for amphibians and reptiles, such as breeding and overwintering. The context was assigned as moderate as was the magnitude.

Habitat Alteration or Degradation – Habitat Structural Change (Construction Phase)

Construction of the road may result in a change to the structure of habitats in which reptiles and amphibians reside. The effect will occur throughout the RSA as RFDs and activities are spatially located throughout the landscape. The effects may be permanent or long-term depending on the effectiveness of reclamation efforts, with a return of late-successional habitats (e.g., swamps) taking more time to return to functionality when compared to habitats in early states of succession. Some habitats will experience permanent structural changes. Changes to vegetation structure will occur during all time periods but will have a greater effect during sensitive time periods for amphibians and reptiles, such as breeding and overwintering. The context was assigned as moderate as was the magnitude.

Alteration in Movement – Loss of Connectivity (Construction Phase)

Adverse effects from loss of connectivity are probable for amphibians and reptiles during the Construction Phase. The effect will occur throughout the RSA as RFDs and activities are spatially located throughout the landscape. The effects may be permanent or long-term in duration depending on the effectiveness of

reclamation efforts. A loss of habitat connectivity may occur during all time periods but would have the greatest effect during active seasons when amphibians and reptiles move or migrate between habitats. The duration is medium-term as reclamation activities are expected to restore habitat connections shortly following the end of operations of various projects, RFDs or activities.

Injury or Death – Incidental take (Construction Phase)

Construction activities are expected to result in incidental take as interactions with species in their habitats can be unavoidable given their diminutive size. Incidental take is adverse in effect and would occur throughout the RSA since projects, RFDs and future activities are spread across the area's geography. The effects of incidental take are thought to be medium-term, ceasing shortly after the project, RFD or activity concludes and access in reduced to the area. The magnitude of effect and context were considered moderate.

Injury or Death – Collisions with Vehicles (Operation Phase)

Adverse effects from collisions with vehicles are probable for amphibians and reptiles during the operational phases of projects, RFDs and activities. The effects of collisions will occur throughout the RSA. The effects are anticipated to be medium-term, ceasing shortly after operation of the project, RFD or other activity. The cumulative effect is considered to be moderate in magnitude and infrequent in occurrence. The effect is reversible once vehicles stop using the roads and anthropogenic features are reclaimed following the closure of projects, RFDs and activities.

21.4.7.10.1 Determination of Significance

The determination of significance of net cumulative effects on the Reptiles and Amphibians VC is based on the process of significance determination outlined in Section 12.8 for net effects A predicted net cumulative effect is considered significant if it is evaluated as adverse, permanent, and of high magnitude, and if it negatively impacts species survival or reproduction at the population level to the extent that the population can no longer sustain itself.

Based on the assessment, the results in **Table 21-50** indicate significant net cumulative effects for the VC from habitat loss (clearance activities) and habitat alteration or degradation/ habitat structural change. The predicted net cumulative effects in relation to alteration in movement (loss of connectivity), injury or death (incidental take, collisions with vehicles) are considered significant.

Table 21-49: Amphibians and Reptiles – Characterization of Predicted Net Cumulative Effects

Predicted Net Cumulative Effect	Characterization Criteria								
	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Context	Reversibility	Likelihood of Occurrence
Habitat Loss – Clearance Activities (construction)	Negative	Moderate	RSA	All time periods	Permanent or Long-term	Continuous	Moderate	Irreversible	Certain
Habitat Alteration or Degradation – Habitat Structural Change (construction)	Negative	Moderate	RSA	All time periods	Long-term	Continuous	Moderate	Irreversible	Certain
Alterations in Movement – Loss of Connectivity (construction)	Negative	Moderate	RSA	All time periods	Medium-term	Continuous	Moderate	Reversible	Probable
Injury or Death – Incidental Take (construction)	Negative	Moderate	RSA	All time periods	Medium-term	Frequent	Low	Reversible	Probable
Injury or Death – Collisions with Vehicles (operations)	Negative	Moderate	RSA	All time periods	Medium-term	Infrequent	Low	Reversible	Probable

21.4.8 Species at Risk

21.4.8.1 Woodland Caribou

21.4.8.1.1 Past and Ongoing Effects

Following the "Interim Cumulative Effects Assessment Guidance Document," past, present, and ongoing RFDs and activities are considered to define existing conditions for cumulative effects. As such, the existing conditions outlined in Section 13 for the Woodland Caribou VC presently reflect the effects from these projects and activities within the RSA. **Table 21-1** identifies these projects and activities (IDs 1 to 18) and indicates where their effects spatially overlap with the RSA and the Project's net effects on the VC. Therefore, the cumulative effects assessment is focused on integrating the Project's net adverse effects with those of future RFDs and activities discussed in the following subsection.

21.4.8.1.2 Other Ongoing and Reasonably Foreseeable Projects or Activities

A list of the RFDs and activities that were considered for the cumulative effects assessment were presented in **Table 21-2** (ID's 19 to 39). Of the projects and activities listed in **Table 21-2**, only those listed in **Table 21-51** were identified as being probable to occur within and have potential net effects on the RSA for the Woodland Caribou VC, therefore, have the potential to result in cumulative effects in the RSA.

Table 21-50: Woodland Caribou – RFDs or Future Activities in the RSA

ID	RFD or Activity	Spatial Overlap of Net Effects	Temporal Overlap of Net Effects	Included in Cumulative Effects Analysis
19	Black Horse Project and Big Daddy Project	Yes	Yes	Yes
20	Eagle's Nest Project	Yes	Yes	Yes
21	Marten Falls Community Access Road Project	Yes	Yes	Yes
22	Northern Road Link Project	Yes	Yes	Yes
28	Forest management units (FMUs)	Yes	Yes	Yes
29	Black Thor, Blackbird, and Black Label Mineral deposits	Yes	Yes	Yes
30	Juno Corporation Mining Exploration Activity	Yes	Yes	Yes
31	Northern Star Eagle Limited and Southern Star Eagle Limited Drilling Program	Yes	Yes	Yes
-	Winter Roads – Increased winter road traffic by future mining proponents	Yes	Yes	Yes
-	Climate Change	Yes	Yes	Yes

21.4.8.1.3 Cumulative Effects

Cumulative effects may occur where the net adverse effects of the Project and the net adverse effects of other RFDs or activities interact within the RSA boundary for the VC. The cumulative effects to VC may occur due to Project and RFDs and activities that overlap spatially and temporally.

Based on the Project Footprint for the WSR Project the cumulative effects to Woodland Caribou and their habitat are:

- Habitat Loss – Clearance Activities (Construction Phase);
- Habitat Alteration or Degradation – Hydrological Changes (Construction Phase);
- Habitat Alteration or Degradation – Sensory Disturbance (Construction and Operation Phases);
- Alterations in Movement – Connectivity (Construction Phase);
- Alterations in Movement – Sensory Disturbance (Construction and Operation Phases); and
- Injury or Death – Changes to Predator-Prey Dynamics (Construction Phase).

As determined in the effects assessment, these six effects (in terms of the WSR Project) are likely to extend into the LSA, have an adverse effect, are probable or certain to occur, and have a moderate magnitude. Other project effects on Woodland Caribou Habitat are possible, but do not meet the criteria of this cumulative effects assessment and are unlikely to contribute significantly to the cumulative effects in the area (refer to Section 13.7).

The cumulative effects to Woodland Caribou Habitat is approximately 513,256 ha, which represents 4.73% of the RSA.

Habitat Loss due to Clearance Activities (Construction Phase)

The construction of the road has the potential for direct and indirect effects that could cause the loss of Woodland Caribou Habitat through physical alteration and removal of suitable habitat, resulting from vegetation clearing activities and disturbance during construction and throughout operations.

Caribou (Boreal population) are generally far-ranging animals that require large, undisturbed areas of old or mature conifer upland forest and lowlands dominated by Jack Pine and/or Black Spruce. Caribou habitat selection at a finer scale is driven by foraging or calving. In Ontario, provincial ministries have produced a General Habitat Description (GHD) for the Forest-dwelling Caribou (2013) that distinguishes three habitat categorizations for this species, which include:

- Category 1: Nursery areas, winter use areas, travel routes;
- Category 2: Seasonal ranges; and
- Category 3: Remaining areas within the range.

Category 1 habitats are high use areas that exhibit repeated, intensive use by caribou and for which fidelity is typically shown over multiple years. Winter use areas are typically landscape features that provide abundant ground lichen for winter forage and exhibit lower average snow depths, which provide easier movement (MNR, 2013). Within the northern portion of the Ontario Shield Ecozone, winter use areas typically consist of open Jack Pine and Black Spruce habitat greater than 40 years old with abundant ground lichen (MNR, 2013). Areas that are continuously used may also offer protection from predators. The forest-dwelling ecotype is relatively sedentary, forming relatively small groups (10-50 animals) during the winter.

Ontario defines Caribou Nursery Areas as “generalized features in which individual or multiple adult female caribou select during late parturition, give birth, and raise their calves during the spring, summer and early fall.” Nursery areas are selected by caribou for refuge and security and can be comprised of lakes and wetland complexes dominated by fens and bogs, particularly those interspersed with upland islands and peninsulas (Carr et al., 2011).

Category 2, Seasonal Ranges, are large sub-range habitat features that encompass the majority of current caribou distribution during all seasons within the range. Individual caribou use these large features over multiple years to effectively space themselves out from threats that may change annually (e.g. anthropogenic disturbance, predators) and carry out all their life processes (Racey and Arsenault 2007). Caribou tend to select large (>100 km2), interconnected tracts of mature (>40-60 years), conifer dominated (jack pine and/or black spruce), low shrub forest cover composition that are relatively undisturbed and unfragmented and are interspersed with wetlands and lakes within the range.

Category 3 habitat includes the remaining areas within the range, which support caribou indirectly by maintaining the overall refuge function within the range. Category 3 areas generally have the biophysical features and forest composition consistent with seasonal ranges yet are currently young or disturbed (< 40 years old). These areas are generally not currently occupied for long periods of time; however, caribou may travel through them.

Based on the Project Footprint for the WSR Project, the net effects to Woodland Caribou Habitat will include the removal of 232.40 ha (30.6%) of Category 1 Nursery Areas and 98,483 ha (48.5%) of Category 2 Seasonal Ranges in the LSA, which are effectively converted to Category 3 Remaining Areas in the Range, increasing that sub-range habitat by 98,797.34 ha (202.6%) in the RSA. The 232.40 ha of Category 1 High Use Habitat estimated to be removed as a result of construction activities represents 0.05% of the known Category 1 features in the Missisa and Ohziski Caribou Ranges.

Vegetation removals, creation of the ROW and construction of the paved and gravel road surfaces may alter or degrade Caribou habitat near the Project Footprint, extending into the LSA by changing vegetation height, density, and community composition. The ROW will be 35 m wide with a road surface spanning 12 m composed of gravel (eastern half) and asphalt or chip seal treatment (western half). After the implementation of mitigation measures, construction of the road may lead to edge effects, including abiotic, direct biotic, and indirect biotic effects on the habitat, along with the physical habitat structural changes. Overall, the net effect is expected to be negative.

Road operations are unlikely to result in additional loss of caribou habitat, including Category 1 High Use Areas, Category 2 Seasonal Ranges, and Category 3 Remaining Areas in the Range habitat areas, as regular maintenance will involve managing re-growth of vegetation along the ROW within the Project Footprint. There is a very low probability that reclaimed temporary laydown areas and clearings may need to be reused during operations. While the quarries are expected to remain operational following construction, the footprints will not be expanded and as such no additional habitat loss or destruction is anticipated to occur during operations.

Other RFDs would also result in the removal and alteration of Woodland Caribou Habitat. The Northern Road Link Project would have similar habitat loss impacts to the WSR Project within their 100 m ROW (60 m of which is assumed to be cleared of vegetation based on the Preliminary Terms of Reference). For the Black Horse Project and Big Daddy Project, Eagle's Nest Project and the Black Thor, Blackbird, and Black Label Mineral deposits impacts will depend on details of the mine construction techniques.

Climate change could act cumulatively with project-related habitat loss with greater frequency and severity of extreme weather-related events such as wildfires, drought conditions, and pest outbreaks. These could compound reductions in caribou habitat beyond the direct impacts of construction and land alteration. These changes can reduce the availability and quality of Category 1 to 3 habitats but also slow the recovery and regeneration of disturbed areas due to warmer temperatures and shifting precipitation patterns. As a result, the combined effect of ongoing project activities and climate change could result in a decline of suitable caribou habitat at the population level.

Given the early stages of these projects, conservatively the entire mine lease (Eagle's Nest) or mine claim was used to encompass the deposit locations and considered a disturbance.

Habitat Alteration or Degradation due to Hydrological Changes (Construction Phase)

Caribou habitat, including Nursery Areas and Seasonal Ranges, include wetland complexes such as fens and bogs interspersed with peninsulas and upland islands large tracts of undisturbed, mature forest interspersed with wetlands and lakes. Hydrological changes during road construction from activities such as grading, installation of drainage features, and construction of the roadbed could alter soil moisture regime, and shift or alter Nursery Areas and Seasonal Ranges. Changes may occur to both surface and groundwater, causing flooding or drying of vegetation communities.

The effects of roads on hydrology and caribou habitat can occur up to 250 m from the ROW. Caribou habitat, particularly Category 1 Nursery Areas and Category 2 Seasonal Ranges may be altered hydrologically with construction activities such as grading for road installation, resulting in changes to both surface and groundwater water causing flooding or drying of vegetation communities. Based on the groundwater assessment of alteration to groundwater level and flow direction (Section 8.5) these changes are certain to result in a net negative effect in the LSA.

Operation of the road is not anticipated to result in further changes to hydrology than those initiated during the Construction Phase. It is possible that temporary changes to hydrology may occur during the operations, such as accumulation of debris affecting culverts and drainage that results in localized flooding and drying of areas.

Other RFDs and activities would also result in the alteration or degradation of habitat for caribou through hydrological changes. The Northern Road Link Project would have similar habitat impacts to the WSR Project. For the Black Horse Project and Big Daddy Project, Eagle's Nest Project and the Black Thor, Blackbird, and Black Label Mineral deposits, impacts will depend on details of the mine construction techniques.

Effects from climate change could intensify the hydrological and vegetation changes already introduced by the project, with shifting precipitation patterns, altered snowmelt timing, and modified groundwater recharge affecting wetland complexes and moisture regimes in forest ecosystems. These changes could result in the introduction of non-native or early-successional plant species, thereby reducing the availability of preferred caribou forage and reducing suitable cover. Project-related effects, combined with habitat alterations from climatic changes could also elevate physiological stress in caribou, ultimately leading to decreased reproductive success and lower survival rates.

Given the early stages of these projects, conservatively the entire mine lease (Eagle's Nest) or mine claim was used to encompass the deposit locations and considered a disturbance.

Habitat Alteration or Degradation due to Sensory Disturbance (Construction and Operations Phases)

Anthropogenic disturbance in the Missisa Range is prevalent compared to the other Far North ranges and is primarily associated with high levels of mineral exploration activity (MNR, 2014d). At a minimum, the application of a 500 m buffer on anthropogenic disturbance in caribou habitat is recommended by Environment and Climate Change Canada (ECCC), as 500 m represents an estimated zone of influence imparted by human-caused disturbance (ECCC, 2024a; ECCC, 2020; EC, 2011). Within this buffer, approximately 4.68% of existing Category 2 Seasonal Ranges would be altered in the Caribou LSA, and 5.41% of Category 3 habitat; in the Caribou RSA, this reflects an addition of 12,124 ha or 0.12% new anthropogenic disturbance to the area. During construction, activities such as blasting at quarries/pits,

earth hauling and vegetation clearing, and the use of construction lighting, may reduce the ability of caribou to use habitat in the LSA along the ROW and supportive infrastructure due to sensory disturbances.

Sustained or repeated disturbance, such as regular road use by vehicles, can result in the reduction in use of suitable habitat (Sapolsky, 1992; Creel et al., 2002). Several studies have demonstrated that caribou do not use suitable habitat in the vicinity of industrial activities and other human developments (Dyer et al., 2001; Mahoney and Schaefer, 2001; Dyer et al., 2002) indicating sensory disturbances such as noise, light, and scent may contribute to alteration or degradation of habitat. Overall, sensory disturbance effects to caribou habitat in Ontario are poorly understood (ECCC, 2024a) and the caribou disturbance analysis used in the integrated risk assessment for the Missisa and Ohziski Ranges (MNR, 2014d) may underestimate the effects of sensory disturbances on habitat (MNR, 2014a).

During construction, activities such as blasting at quarries or pits, earth hauling, vegetation clearing, and the use of lighting around facilities, may reduce the ability of caribou to use habitat along the ROW and supportive infrastructure due to sensory disturbances. Mitigation measures around timing (hours of work, seasonality) for construction activities are expected to mitigate some of the potential effects but there is a predicted net effect on habitat from noise due to construction activities as well as movement of construction vehicles and equipment. Sensory disturbances have the potential to impact all classes of caribou habitats, particularly Category 1 High Use Areas. Overall, there will be a net negative effect due to sensory disturbance.

It is possible that noise, light, scent, and visual disturbances from vehicles travelling on the road during operations may impact caribou habitat along the ROW and supportive infrastructure.

Other RFDs would also result in alteration and degradation of caribou habitat through sensory disturbances. The Northern Road Link Project would have similar habitat loss impacts to the WSR Project within their 100 m ROW (60 m of which is assumed to be cleared of vegetation). For the Black Horse Project and Big Daddy Project, Eagle's Nest Project and the Black Thor, Blackbird, and Black Label Mineral deposits impacts will depend on details of the mine construction techniques. Given the early stages of these projects, conservatively the entire mine lease (Eagle's Nest) or mine claim was used to encompass the deposit locations and considered a disturbance.

Alterations in Movement due to Loss of Connectivity (*Construction Phase*)

Caribou movement is also likely to be altered by construction of the road due to the fragmentation of forest habitat, resulting in a loss of connectivity. The road route itself will extend approximately 70 km east-west across the Missisa Range, effectively reducing the width of the range by approximately 45% near the middle of the range and potentially causing caribou to move large distances east (into the Ohziski Range) or west around the full extent of the road, which may be sub-optimal habitat. A study tracking 53 GPS-collared Caribou (Boreal population) in the Laurentides Wildlife Reserve (7250 km^2), Quebec, before, during and after a highway expansion project found that 77% of the caribou did not cross the highway during the 6-year study period, and the presence of active construction sites (up to 7 km in length) elicited strong behavioural reactions by caribou (Leblond et al., 2013). The width of routes can influence the barrier effect as well. When the highway in the Laurentides Wildlife Reserve was expanded from 25 m to 90 m, caribou that had once used the highway prior to the expansion modified their home range as the modifications progressed and exhibited stronger avoidance behaviour (Leblond et al., 2013). Barrier effects on Caribou (Boreal population) may be more pronounced due to their sedentary or non-migratory nature making them less inclined to cross disturbance routes (Klein, 1980; Dyer et al., 2002).

Alteration in caribou movement will occur in the Project Footprint due to vegetation clearing initiated during road construction that results in habitat fragmentation and loss of habitat connectivity. These vegetation changes will be maintained during road operations, but no new habitat fragmentation is expected to be generated as a result. Vehicles using the road during operations are expected to produce additional barrier effects resulting in a loss of connectivity across caribou habitat. Temporally, roads may pose as a greatest barrier to caribou during late winter or periods of the year when traffic levels are higher during operations. Dyer et al. (2002) found Caribou (Boreal population) in Alberta crossed actual roads 6 time less frequently in late winter than control roads in their study, and also less frequently compared to other seasons (calving, summer, rut), although road use was higher in the winter than the other seasons. As such, it may actually be the level of traffic that creates the barrier effect, which was the result of a similar study conducted by Smith and Johnson (2023).

Other RFDs would also result in alterations in movement across suitable habitat for caribou. The Northern Road Link Project would have similar connectivity impacts to the WSR Project. For the Black Horse Project and Big Daddy Project, Eagle's Nest Project and the Black Thor, Blackbird, and Black Label Mineral deposits impacts will depend on details of the mine construction techniques. Given the early stages of these projects, conservatively the entire mine lease (Eagle's Nest) or mine claim was used to encompass the deposit locations and considered a disturbance.

Climate change is expected to alter snow depth, ice cover and the distribution of seasonally available resources. These changes could potentially lead caribou to modify their traditional migration and movement routes. A loss of connectivity resulting from the project may constrain their ability to adapt to these environmental changes. Potential geographic shifts in habitat suitability, e.g., northward or to higher elevations, due to climate change, existing roads and linear features could also reduce habitat connectivity by preventing caribou from accessing new suitable areas. This could lead to population isolation. Additionally, the combined effects of fragmented movement corridors and climate-driven shifts in predator distribution and abundance may increase predation risk, an additional pressure on the caribou population.

Alterations in Movement due to Sensory Disturbance (*Construction and Operations Phases*)

Caribou movement is likely to be altered by sensory disturbances generated during the construction phase. Noise, lighting, scent, and other human actions during construction activities such as blasting, clearing, hauling and grading will create disturbances that could alter movement of caribou as they avoid the ROW and supportive infrastructure areas. In Ontario, the impacts of sensory disturbances and their effects on caribou behaviour are not well studied and are therefore a source of uncertainty (ECCC, 2024a). It is generally understood that adult female caribou avoid suitable locations when selecting Nursery Areas due to sensory disturbances from development or recreational activities (Carr et al., 2007; Schaefer and Mahoney, 2007; Vors et al., 2007; Vistnes and Nellmann, 2008), with a potential critical threshold for pregnant cows identified as 10 to 15 km from the disturbance (Carr et al., 2011; MECP, 2020). In disturbed landscapes, Caribou (Boreal population) have been found to increase the size of their home ranges and reduce fidelity to seasonal and annual home ranges, likely to avoid disturbed habitat (Courtois et al., 2007). While Caribou (Boreal population) in Ontario have been found to demonstrate plasticity in-migration, with facultative migration observed in forest-dwelling ecotypes, this plasticity was positively correlated with snow depth and had no relationship with human disturbance (Pereira et al., 2024).

Caribou movement will be affected by road operations due to sensory disturbances noise, light, scent, and visual disturbances from vehicles travelling on the road. While the impacts of sensory disturbances and their effects on caribou behaviour are not well studied in Ontario (ECCC, 2024a), caribou behaviour is known to be altered by sensory disturbances from human developments and recreational activities, such as avoiding suitable Nursery Areas affected by sensory disturbances or increasing home range size to avoid disturbed habitats (Carr et al., 2007; Schaefer and Mahoney, 2007; Vors et al., 2007; Vistnes and Nellmann, 2008; MECP, 2020; Courtois et al., 2007). A potential critical threshold for pregnant cows was identified by Carr et al. (2011) as 10 to 15 km from the disturbance. Sensory disturbances generated by road operations may also elicit anti-predator behaviour in caribou. The risk-disturbance hypothesis suggests displacement of wildlife by roads is because wildlife perceives roads, and associated human activity, as a predation risk (Frid and Dill 2002). Caribou (Boreal population) also move more quickly when near roads with increased traffic density (Leblond et al., 2013).

Other RFDs would also result in caribou habitat alteration or degradation due to sensory disturbance. The Northern Road Link Project would have similar sensory impacts to the WSR Project within their 100 m ROW (60 m of which is assumed to be cleared of vegetation). For the Black Horse Project and Big Daddy Project, Eagle's Nest Project and the Black Thor, Blackbird, and Black Label Mineral deposits impacts will depend on details of the mine construction techniques. Given the early stages of these projects, conservatively the entire mine lease (Eagle's Nest) or mine claim was used to encompass the deposit locations and is considered a disturbance.

Injury or Death due to Changes to Predator-Prey Dynamics (Construction Phase)

The primary cause of caribou (Boreal population) decline in Ontario is widely recognized as habitat disturbance that indirectly results in changes to predator-prey dynamics and increased predation rates (COSEWIC, 2014). Effects on caribou survival from improved predator access and movement rates created during construction is likely. Grey wolf is recognized as the primary predator of caribou (Boreal population) (Ontario Woodland Caribou Recovery Team, 2008). In the context of the collaring study conducted to describe the baseline conditions, nine (9) of twenty-nine (29) collared caribou tracked over four (4) years died, presumed to be a result of wolf predation, with an annual mortality rate of 12.5%. Fryxell et al. (2020) found that caribou mortality from predation was 7% in an unlogged landscape (Pickle Lake) and 14% in a logged landscape (Nakina) in Ontario, with the majority of predation events attributed to Grey Wolf. Grey Wolves and other predators use linear routes to facilitate movement, which also increases hunting efficiency by these species as a result (Dickie et al., 2020, 2022; McKay et al., 2021; Pigeon et al., 2016). In the Nipigon Caribou Range, where there was 41 km of road per 100 km^2 (Thompson et al., 2014) and the minimum caribou abundance was 0.50/100 km^2 (MNR, 2014d), Found et al. (2017) found that caribou made up only 3.1% of Grey Wolf diet. Mortality sites of radio-collared caribou killed by wolves were found to be closer to linear routes than the locations of live animals (James and Stuart-Smith, 2000). Habitat disturbance may also create movement routes and suitable habitat for alternate ungulate prey species (Cumming, 1992), which in turn results in increased wolf numbers (Ballard et al., 2000).

The creation of new and increased use of existing winter access roads for RFDs could lead to in increased death and injury of caribou. Road RFDs will have similar effects as they will add to the linear network within the RSA. Selection of roads by wolves has been found to be dependant on the existing road density in northwestern Ontario with increased selection for roads with increasing road density (Newton et al., 2017) which would suggest that the effect of multiple road projects in the RSA would be multiplicative.

Mining RFDs will also create a network of linear features in addition to the mine footprint themselves. Their impact on caribou will depend on the configuration of mining roads, how they connect to the road network and which habitats they traverse.

Table 21-52 summarizes the other RFDs or future physical activities in the RSA that have the potential to contribute to changes to caribou.

Table 21-51: Woodland Caribou – Summary of Cumulative Effects

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Habitat Loss (ha)	Relative Change in the RSA (%)
19	Black Horse Project and Big Daddy Project	▪ Habitat loss due to clearance activities (Construction Phase) ▪ Habitat alteration or degradation due to hydrological changes (Construction Phase) ▪ Habitat alteration or degradation due to sensory disturbance (Construction and Operation Phases) ▪ Alterations in movement due to loss of connectivity (Construction Phase) ▪ Alterations in Movement due to sensory disturbance (Construction and Operation Phases) ▪ Injury or Death due to Changes to Predator-Prey Dynamics (Construction Phase)	The Black Horse Project and Big Daddy Project are assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Loss or alteration of suitable Caribou seasonal habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities, as well as hydrology changes resulting from construction activities; ▪ Alternation or degradation of suitable Caribou seasonal habitat resulting from sensory disturbance caused by construction and operations activities; ▪ Alternation in movement by Caribou due to loss of habitat connectivity caused by construction as well as disturbance caused by construction and operations activities; and ▪ Injury and death of Caribou due to increased predator access along roads and other areas of disturbance.	Category 1 – Nursery 0 Category 1 – Winter Use Areas 0 Category 2: 2404.75 Category 3: 0	Category 1 – Nursery 0 Category 1 – Winter Use Areas 0 Category 2: 0.022 Category 3: 0
20	Eagle's Nest Project	▪ Habitat loss due to clearance activities (Construction Phase) ▪ Habitat alteration/ degradation due to hydrological changes (Construction Phase) ▪ Habitat alteration/ or degradation due to sensory	The Eagle's Nest Project is assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include:	Category 1 – Nursery 0 Category 1 – Winter Use Areas	Category 1 – Nursery 0 Category 1 – Winter Use Areas

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Habitat Loss (ha)	Relative Change in the RSA (%)
		disturbance (Construction and Operation Phases) ▪ Alterations in movement due to loss of connectivity (Construction Phase) ▪ Alterations in Movement due to sensory disturbance (Construction and Operation Phases) ▪ Injury or Death due to Changes to Predator-Prey Dynamics (Construction Phase)	▪ loss or alteration of suitable Caribou seasonal habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities, as well as hydrology changes resulting from construction activities; ▪ Alternation or degradation of suitable Caribou seasonal habitat resulting from sensory disturbance caused by construction and operations activities; ▪ Alternation in movement by Caribou due to loss of habitat connectivity caused by construction as well as disturbance caused by construction and operations activities; and ▪ Injury and death of Caribou due to increased predator access along roads and other areas of disturbance.	0 Category 2: 4098.04 Category 3: 0	0 Category 2: 0.038 Category 3: 0
21	Marten Falls Community Access Road Project	▪ Habitat loss due to clearance activities (Construction Phase) ▪ Habitat alteration or degradation due to hydrological changes (Construction Phase) ▪ Habitat alteration or degradation due to sensory disturbance (Construction and Operation Phases) ▪ Alterations in movement due to loss of connectivity (Construction Phase) ▪ Alterations in Movement due to sensory disturbance (Construction and Operation Phases)	The Marten Falls Community Access Road Project is assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Loss or alteration of suitable Caribou seasonal habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities, as well as hydrology changes resulting from construction activities; ▪ Alternation or degradation of suitable Caribou seasonal habitat resulting from sensory disturbance caused by construction and operations activities;	Category 1 – Nursery 220.47 Category 1 – Winter Use Areas 518.48 Category 2: 1415.55 Category 3: 455.94	Category 1 – Nursery 0.002 Category 1 – Winter Use Areas 0.005 Category 2: 0.013 Category 3:

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Habitat Loss (ha)	Relative Change in the RSA (%)
		▪ Injury or Death due to Changes to Predator-Prey Dynamics (Construction Phase)	▪ Alternation in movement by Caribou due to loss of habitat connectivity caused by construction as well as disturbance caused by construction and operations activities; and, ▪ Injury and death of Caribou due to increased predator access along roads and other areas of disturbance.		0.004
22	Northern Road Link Project	▪ Habitat loss due to clearance activities (Construction Phase) ▪ Habitat alteration or degradation due to hydrological changes (Construction Phase) ▪ Habitat alteration/ degradation due to sensory disturbance (Construction and Operation Phases) ▪ Alterations in movement due to loss of connectivity (Construction Phase) ▪ Alterations in Movement due to sensory disturbance (Construction and Operation Phases) ▪ Injury or Death due to Changes to Predator-Prey Dynamics (Construction Phase)	The Northern Road Link Project is assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Loss or alteration of suitable Caribou seasonal habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities, as well as hydrology changes resulting from construction activities; ▪ Alternation or degradation of suitable Caribou seasonal habitat resulting from sensory disturbance caused by construction and operations activities; ▪ Alternation in movement by Caribou due to loss of habitat connectivity caused by construction as well as disturbance caused by construction and operations activities; and, ▪ Injury and death of Caribou due to increased predator access along roads and other areas of disturbance.	Category 1 – Nursery 13.74 Category 1 – Winter Use Areas 291.25 Category 2: 570.78 Category 3: 70.95	Category 1 – Nursery 0.0001 Category 1 – Winter Use Areas 0.003 Category 2: 0.004 Category 3: 0.0006

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Habitat Loss (ha)	Relative Change in the RSA (%)
28	Neskantaga Forest management units (FMUs)	▪ Habitat loss due to clearance activities (Construction Phase) ▪ Habitat alteration or degradation due to hydrological changes (Construction Phase) ▪ Habitat alteration or degradation due to sensory disturbance (Construction and Operation Phases) ▪ Alterations in movement due to loss of connectivity (Construction Phase) ▪ Alterations in Movement due to sensory disturbance (Construction and Operation Phases) ▪ Injury or Death due to Changes to Predator-Prey Dynamics (Construction Phase)	The Neskantaga Forest management units are assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Loss or alteration of suitable Caribou seasonal habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities, as well as hydrology changes resulting from construction activities; ▪ Alternation or degradation of suitable Caribou seasonal habitat resulting from sensory disturbance caused by construction and operations activities; ▪ Alternation in movement by Caribou due to loss of habitat connectivity caused by construction as well as disturbance caused by construction and operations activities; and, ▪ Injury and death of Caribou due to increased predator access along roads and other areas of disturbance.	Category 3: 1,500 Estimate based on estimate that 100 hectares per year of forest from public land near the community will be needed for the biomass energy window and a 15-year operational window	Category 3: 0.014
29	Black Thor, Blackbird, and Black Label Mineral deposits	▪ Habitat loss due to clearance activities (Construction Phase) ▪ Habitat alteration or degradation due to hydrological changes (Construction Phase) ▪ Habitat alteration or degradation due to sensory	The Black Thor, Blackbird, and Black Label Mineral deposits are assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include:	Category 1 – Nursery 0 ha Category 1 – Winter Use Areas 0 ha	Category 1 – Nursery 0% Category 1 – Winter Use Areas 0%

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Habitat Loss (ha)	Relative Change in the RSA (%)
		disturbance (Construction and Operation Phases) ▪ Alterations in movement due to loss of connectivity (Construction Phase) ▪ Alterations in Movement due to sensory disturbance (Construction and Operation Phases) ▪ Injury or Death due to Changes to Predator-Prey Dynamics (Construction Phase)	▪ Loss or alteration of suitable Caribou seasonal habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities, as well as hydrology changes resulting from construction activities; ▪ Alternation or degradation of suitable Caribou seasonal habitat resulting from sensory disturbance caused by construction and operations activities; ▪ Alternation in movement by Caribou due to loss of habitat connectivity caused by construction as well as disturbance caused by construction and operations activities; and, ▪ Injury and death of Caribou due to increased predator access along roads and other areas of disturbance.	Category 2: 1,030 ha Category 3: 0 ha	Category 2: 0.009% Category 3: 0%
30	Juno Corporation Mining Exploration Activity	▪ Habitat loss due to clearance activities (Construction Phase) ▪ Habitat alteration or degradation due to hydrological changes (Construction Phase) ▪ Habitat alteration or degradation due to sensory disturbance (Construction and Operation Phases) ▪ Alterations in movement due to loss of connectivity (Construction Phase) ▪ Alterations in Movement due to sensory disturbance (Construction and Operation Phases) ▪ Injury or Death due to Changes to Predator-Prey	The Juno Corporation Mining Exploration is assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include: ▪ loss or alteration of suitable Caribou seasonal habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities, as well as hydrology changes resulting from construction activities; ▪ Alternation or degradation of suitable Caribou seasonal habitat resulting from sensory disturbance caused by construction and operations activities;	Category 1 – Nursery 4,143.0 Category 1 – Winter Use Areas 0 ha Category 2: 484,518.17 ha Category 3: 1,085.25 ha	Category 1 – Nursery 0.038% Category 1 – Winter Use Areas 0% Category 2: 4.462% Category 3: 0.01%

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Habitat Loss (ha)	Relative Change in the RSA (%)
		Dynamics (Construction Phase)	▪ Alternation in movement by Caribou due to loss of habitat connectivity caused by construction as well as disturbance caused by construction and operations activities; and, ▪ Injury and death of Caribou due to increased predator access along roads and other areas of disturbance.		
-	Winter Roads – Increased winter road traffic by future mining proponents	▪ Habitat alteration or degradation due to sensory disturbance (Operation Phase) ▪ Alterations in Movement due to sensory disturbance (Operation Phase) ▪ Injury or Death due to Changes to Predator-Prey Dynamics (Construction Phase)	The Winter Roads – Increased winter road traffic by future mining proponents is assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with current and future winter road maintenance have similar pathways of effects as those arising from the Project. This may include: ▪ Alternation or degradation of suitable Caribou seasonal habitat resulting from sensory disturbance caused by construction and operations activities; and, ▪ Alternation in movement by Caribou due to loss of habitat connectivity caused by construction as well as disturbance caused by construction and operations activities; and Injury and death of Caribou due to increased predator access along roads and other areas of disturbance.	N/A	N/A
-	Climate Change	▪ Habitat alteration or degradation due to sensory disturbance (Operation Phase) ▪ Alterations in Movement due to sensory disturbance (Operation Phase)	The cumulative interaction of the Project with climate change could result in a higher risk of negative population level effects in the RSA. These include: ▪ Increasing the rate and extent of habitat loss and degradation, ▪ Compounded hydrological and vegetation changes, and ▪ Fragmenting movement corridors and reducing connectivity.	-	-

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Habitat Loss (ha)	Relative Change in the RSA (%)
19	Black Horse Project and Big Daddy Project	▪ Habitat loss due to clearance activities (Construction Phase) ▪ Habitat alteration or degradation due to hydrological changes (Construction Phase) ▪ Habitat alteration or degradation due to sensory disturbance (Construction and Operation Phases) ▪ Alterations in movement due to loss of connectivity (Construction Phase) ▪ Alterations in Movement due to sensory disturbance (Construction and Operation Phases) ▪ Injury or Death due to Changes to Predator-Prey Dynamics (Construction Phase)	The Black Horse Project and Big Daddy Project are assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Loss or alteration of suitable Caribou seasonal habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities, as well as hydrology changes resulting from construction activities; ▪ Alternation or degradation of suitable Caribou seasonal habitat resulting from sensory disturbance caused by construction and operations activities; ▪ Alternation in movement by Caribou due to loss of habitat connectivity caused by construction as well as disturbance caused by construction and operations activities; and ▪ Injury and death of Caribou due to increased predator access along roads and other areas of disturbance.	Category 1 – Nursery 0 Category 1 – Winter Use Areas 0 Category 2: 2404.75 Category 3: 0	Category 1 – Nursery 0 Category 1 – Winter Use Areas 0 Category 2: 0.022 Category 3: 0
20	Eagle's Nest Project	▪ Habitat loss due to clearance activities (Construction Phase) ▪ Habitat alteration/ degradation due to hydrological changes (Construction Phase) ▪ Habitat alteration/ or degradation due to sensory	The Eagle's Nest Project is assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include: ▪ loss or alteration of suitable Caribou seasonal habitat from vegetation removal,	Category 1 – Nursery 0 Category 1 – Winter Use Areas 0	Category 1 – Nursery 0 Category 1 – Winter Use Areas 0

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Habitat Loss (ha)	Relative Change in the RSA (%)
		disturbance (Construction and Operation Phases) ▪ Alterations in movement due to loss of connectivity (Construction Phase) ▪ Alterations in Movement due to sensory disturbance (Construction and Operation Phases) ▪ Injury or Death due to Changes to Predator-Prey Dynamics (Construction Phase)	grubbing, and/or other construction activities that permanently remove suitable vegetation communities, as well as hydrology changes resulting from construction activities; ▪ Alternation or degradation of suitable Caribou seasonal habitat resulting from sensory disturbance caused by construction and operations activities; ▪ Alternation in movement by Caribou due to loss of habitat connectivity caused by construction as well as disturbance caused by construction and operations activities; and ▪ Injury and death of Caribou due to increased predator access along roads and other areas of disturbance.	Category 2: 4098.04 Category 3: 0	Category 2: 0.038 Category 3: 0
21	Marten Falls Community Access Road Project	▪ Habitat loss due to clearance activities (Construction Phase) ▪ Habitat alteration or degradation due to hydrological changes (Construction Phase) ▪ Habitat alteration or degradation due to sensory disturbance (Construction and Operation Phases) ▪ Alterations in movement due to loss of connectivity (Construction Phase) ▪ Alterations in Movement due to sensory disturbance (Construction and Operation Phases) ▪ Injury or Death due to Changes to Predator-Prey	The Marten Falls Community Access Road Project is assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Loss or alteration of suitable Caribou seasonal habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities, as well as hydrology changes resulting from construction activities; ▪ Alternation or degradation of suitable Caribou seasonal habitat resulting from sensory disturbance caused by construction and operations activities; ▪ Alternation in movement by Caribou due to loss of habitat connectivity caused by	Category 1 – Nursery 220.47 Category 1 – Winter Use Areas 518.48 Category 2: 1415.55 Category 3: 455.94	Category 1 – Nursery 0.002 Category 1 – Winter Use Areas 0.005 Category 2: 0.013 Category 3: 0.004

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Habitat Loss (ha)	Relative Change in the RSA (%)
		Dynamics (Construction Phase)	construction as well as disturbance caused by construction and operations activities; and, ▪ Injury and death of Caribou due to increased predator access along roads and other areas of disturbance.		
22	Northern Road Link Project	▪ Habitat loss due to clearance activities (Construction Phase) ▪ Habitat alteration or degradation due to hydrological changes (Construction Phase) ▪ Habitat alteration/ degradation due to sensory disturbance (Construction and Operation Phases) ▪ Alterations in movement due to loss of connectivity (Construction Phase) ▪ Alterations in Movement due to sensory disturbance (Construction and Operation Phases) ▪ Injury or Death due to Changes to Predator-Prey Dynamics (Construction Phase)	The Northern Road Link Project is assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Loss or alteration of suitable Caribou seasonal habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities, as well as hydrology changes resulting from construction activities; ▪ Alternation or degradation of suitable Caribou seasonal habitat resulting from sensory disturbance caused by construction and operations activities; ▪ Alternation in movement by Caribou due to loss of habitat connectivity caused by construction as well as disturbance caused by construction and operations activities; and, ▪ Injury and death of Caribou due to increased predator access along roads and other areas of disturbance.	Category 1 – Nursery 13.74 Category 1 – Winter Use Areas 291.25 Category 2: 570.78 Category 3: 70.95	Category 1 – Nursery 0.0001 Category 1 – Winter Use Areas 0.003 Category 2: 0.004 Category 3: 0.0006

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Habitat Loss (ha)	Relative Change in the RSA (%)
28	Neskantaga Forest management units (FMUs)	▪ Habitat loss due to clearance activities (Construction Phase) ▪ Habitat alteration or degradation due to hydrological changes (Construction Phase) ▪ Habitat alteration or degradation due to sensory disturbance (Construction and Operation Phases) ▪ Alterations in movement due to loss of connectivity (Construction Phase) ▪ Alterations in Movement due to sensory disturbance (Construction and Operation Phases) ▪ Injury or Death due to Changes to Predator-Prey Dynamics (Construction Phase)	The Neskantaga Forest management units are assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Loss or alteration of suitable Caribou seasonal habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities, as well as hydrology changes resulting from construction activities; ▪ Alternation or degradation of suitable Caribou seasonal habitat resulting from sensory disturbance caused by construction and operations activities; ▪ Alternation in movement by Caribou due to loss of habitat connectivity caused by construction as well as disturbance caused by construction and operations activities; and, ▪ Injury and death of Caribou due to increased predator access along roads and other areas of disturbance.	Category 3: 1,500 Estimate based on estimate that 100 hectares per year of forest from public land near the community will be needed for the biomass energy window and a 15-year operational window	Category 3: 0.014
29	Black Thor, Blackbird, and Black Label Mineral deposits	▪ Habitat loss due to clearance activities (Construction Phase) ▪ Habitat alteration or degradation due to hydrological changes (Construction Phase) ▪ Habitat alteration or degradation due to sensory	The Black Thor, Blackbird, and Black Label Mineral deposits are assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include:	Category 1 – Nursery 0 ha Category 1 – Winter Use Areas 0 ha	Category 1 – Nursery 0% Category 1 – Winter Use Areas 0%

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Habitat Loss (ha)	Relative Change in the RSA (%)
		disturbance (Construction and Operation Phases) ▪ Alterations in movement due to loss of connectivity (Construction Phase) ▪ Alterations in Movement due to sensory disturbance (Construction and Operation Phases) ▪ Injury or Death due to Changes to Predator-Prey Dynamics (Construction Phase)	▪ Loss or alteration of suitable Caribou seasonal habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities, as well as hydrology changes resulting from construction activities; ▪ Alternation or degradation of suitable Caribou seasonal habitat resulting from sensory disturbance caused by construction and operations activities; ▪ Alternation in movement by Caribou due to loss of habitat connectivity caused by construction as well as disturbance caused by construction and operations activities; and, ▪ Injury and death of Caribou due to increased predator access along roads and other areas of disturbance.	Category 2: 1,030 ha Category 3: 0 ha	Category 2: 0.009% Category 3: 0%
30	Juno Corporation Mining Exploration Activity	▪ Habitat loss due to clearance activities (Construction Phase) ▪ Habitat alteration or degradation due to hydrological changes (Construction Phase) ▪ Habitat alteration or degradation due to sensory disturbance (Construction and Operation Phases) ▪ Alterations in movement due to loss of connectivity (Construction Phase) ▪ Alterations in Movement due to sensory disturbance (Construction and Operation Phases) ▪ Injury or Death due to Changes to Predator-Prey	The Juno Corporation Mining Exploration is assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include: ▪ loss or alteration of suitable Caribou seasonal habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities, as well as hydrology changes resulting from construction activities; ▪ Alternation or degradation of suitable Caribou seasonal habitat resulting from sensory disturbance caused by construction and operations activities;	Category 1 – Nursery 4,143.0 Category 1 – Winter Use Areas 0 ha Category 2: 484,518.17 ha Category 3: 1,085.25 ha	Category 1 – Nursery 0.038% Category 1 – Winter Use Areas 0% Category 2: 4.462% Category 3: 0.01%

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Habitat Loss (ha)	Relative Change in the RSA (%)
		Dynamics (Construction Phase)	▪ Alternation in movement by Caribou due to loss of habitat connectivity caused by construction as well as disturbance caused by construction and operations activities; and, ▪ Injury and death of Caribou due to increased predator access along roads and other areas of disturbance.		
-	Winter Roads – Increased winter road traffic by future mining proponents	▪ Habitat alteration or degradation due to sensory disturbance (Operation Phase) ▪ Alterations in Movement due to sensory disturbance (Operation Phase) ▪ Injury or Death due to Changes to Predator-Prey Dynamics (Construction Phase)	The Winter Roads – Increased winter road traffic by future mining proponents is assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with current and future winter road maintenance have similar pathways of effects as those arising from the Project. This may include: ▪ Alternation or degradation of suitable Caribou seasonal habitat resulting from sensory disturbance caused by construction and operations activities; and, ▪ Alternation in movement by Caribou due to loss of habitat connectivity caused by construction as well as disturbance caused by construction and operations activities; and Injury and death of Caribou due to increased predator access along roads and other areas of disturbance.	N/A	N/A
-	Climate Change	▪ Habitat alteration or degradation due to sensory disturbance (Operation Phase) ▪ Alterations in Movement due to sensory disturbance (Operation Phase)	The cumulative interaction of the Project with climate change could result in a higher risk of negative population level effects in the RSA. These include: ▪ Increasing the rate and extent of habitat loss and degradation, ▪ Compounded hydrological and vegetation changes, and ▪ Fragmenting movement corridors and reducing connectivity.	-	-

21.4.8.1.4 Mitigation for Cumulative Effects

There are multiple Project-related interactions and pathways that result in changes to Woodland Caribou and Woodland Caribou Habitat; however, they are associated with specific construction and operation phases of the Project and particular activities for which mitigation measures exist that have proven to be effective in minimizing and/or avoiding adverse effects. This is similarly applicable to other RFDs or future activities within the RSA.

With the implementation of the Project's mitigation measures (see Section 13.4) and the assumption that other, future potential projects or activities will be required to have the same or similar standards, it is anticipated that the cumulative effects will not impact caribou and caribou habitat in the RSA. Therefore, the identified cumulative effects are considered net cumulative effects and are discussed in the following subsection.

21.4.8.1.5 Characterization of Net Cumulative Effects

The net cumulative effects on Woodland Caribou are characterized in **Table 21-53** using the criteria defined in Section 13.5.

Net cumulative effects on changes to Woodland Caribou are predicted to be adverse, moderate to high in magnitude, occurring within the RSA, and medium to long-term in duration. The effects will be continuous throughout each project. Changes resulting from habitat loss and alteration or degradation will be irreversible, while alterations in movement will be reversible.

21.4.8.1.1 Determination of Significance

The determination of significance of net cumulative effects on the Woodland Caribou VC is based on the process of significance determination outlined in Section 13.6 for net effects. A predicted net cumulative effect is considered significant if it is evaluated as adverse, permanent, and of high magnitude, and if it negatively impacts species survival or reproduction at the population level to the extent that the population can no longer sustain itself.

Based on the results in **Table 21-53**, the net cumulative effects on the Woodland Caribou VC is considered to be significant with respect to characterization criteria such as duration, geographic extent and key concerns from a management perspective and by Indigenous communities.

Table 21-52: Woodland Caribou – Characterization of Predicted Cumulative Effects

Predicted Net Cumulative Effect	Net Cumulative Effects Characterization								
	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Context	Reversibility	Likelihood of Occurrence
Habitat Loss – Clearance Activities (Construction Phase)	Negative	Negligible	RSA	All time periods	Long-term/ Permanent	Continuous	Moderate	Irreversible	Certain
Habitat Alteration or Degradation – Hydrological Changes (Construction Phase)	Negative	Moderate	RSA	All time periods	Long-term/ Permanent	Continuous	Moderate	Irreversible	Certain
Habitat Alteration or Degradation – Sensory Disturbance (Construction and Operation Phases)	Negative	High	RSA	All time periods	Medium-term	Continuous	High	Reversible	Certain
Alterations in Movement – Loss of Connectivity (Construction Phase)	Negative	Moderate	RSA	All time periods	Long-term/ Permanent	Continuous	Moderate	Reversible	Probable
Alterations in Movement – Sensory Disturbance (Construction and Operation Phases)	Negative	High	RSA	All time periods	Short-term	Continuous	High	Irreversible	Certain
Injury or Death – Changes Predator-Prey Dynamics (Construction Phase)	Negative	Moderate	RSA	All time periods	Long-term/ Permanent	Infrequent	High	Reversible	Certain

21.4.8.2 Wolverine

21.4.8.2.1 Past and Ongoing Effects

Following the "Interim Cumulative Effects Assessment Guidance Document," past, present, and ongoing RFDs and activities are considered to define existing conditions for cumulative effects. As such, the existing conditions outlined in Section 13 for the Wolverine VC presently reflect the effects from these projects and activities within the RSA. **Table 21-1** identifies these projects and activities (IDs 1 to 18) and indicates where their effects spatially overlap with the RSA and the Project's net effects on the VC. Therefore, the cumulative effects assessment is focused on integrating the Project's net adverse effects with those of future RFDs and activities discussed in the following subsection.

21.4.8.2.2 Other Ongoing and Reasonably Foreseeable Projects or Activities

A list of the RFDs and activities that were considered for the cumulative effects assessment were presented in **Table 21-2** (ID's 19 to 39). Of the projects and activities listed in **Table 21-2**, only those listed in **Table 21-54** were identified as being probable to occur within and have potential net effects on the RSA for the Wolverine VC, therefore, have the potential to result in cumulative effects in the RSA.

Table 21-53: Wolverine – RFDs or Future Activities in the RSA

ID	RFD or Activity	Spatial Overlap of Net Effects	Temporal Overlap of Net Effects	Included in Cumulative Effects Analysis
19	Black Horse Project and Big Daddy Project	Yes	Yes	Yes
20	Eagle's Nest Project	Yes	Yes	Yes
22	Northern Road Link Project	Yes	Yes	Yes
29	Black Thor, Blackbird, and Black Label Mineral deposits	Yes	Yes	Yes
30	Juno Corporation Mining Exploration Activity	Yes	Yes	Yes
-	Winter Roads – Increased winter road traffic by future mining proponents	Yes	Yes	Yes
-	Climate Change	Yes	Yes	Yes

21.4.8.2.3 Cumulative Effects

Cumulative effects may occur where the net adverse effects of the Project and the net adverse effects of other RFDs or activities interact within the RSA boundary for the VC. The cumulative effects to VC may occur due to Project and RFDs and activities that overlap spatially and temporally.

Based on the Project Footprint for the WSR Project, the cumulative effects to wolverine and their habitat are:

- Habitat Loss – Clearance Activities (Construction Phase);
- Habitat Alteration or Degradation – Hydrological Change (Construction Phase) ;
- Habitat Alteration or Degradation – Sensory Disturbance (Construction and Operation Phases);
- Alterations in Movement – Connectivity (Construction Phase);

- Alterations in Movement – Sensory Disturbance (Construction and Operation Phases); and
- Injury/Death – Increased Access (Operations Phase).

As determined in the effects assessment, these effects (in terms of the WSR Project) are likely to extend into the LSA, have an adverse effect, are probable or certain to occur, and have a moderate magnitude. Other project effects on wolverine habitat are possible, but do not meet the criteria of this cumulative effects assessment and are unlikely to contribute significantly to the cumulative effects in the area.

Habitat Loss – Clearance Activities (Construction Phase)

As described in Section 13.3.4.1, the entire Wolverine LSA and Project Footprint is considered wolverine habitat. No GHD for wolverine is currently available. Based on the extent to which wolverine was detected across the Wolverine LSA during baseline field studies, it was concluded that wolverine home ranges could cover most of the LSA, and thus, the entire LSA could be considered generalized wolverine habitat. This assumption has been carried over to the entire Wolverine RSA.

The construction of the road has the potential for direct and indirect effects that could cause the loss of wolverine habitat through physical alteration and removal of suitable habitat, resulting from vegetation clearing activities and disturbance during construction and throughout operations.

Vegetation removals, creation of the ROW, and construction of the paved and gravel road surfaces may alter or degrade wolverine habitat near the Project Footprint, extending into the LSA by changing vegetation height, density, and community composition. The ROW will be 35 m wide with a road surface spanning 12 m composed of gravel (eastern half) and asphalt or chip seal treatment (western half). After the implementation of mitigation measures, construction of the road may lead to edge effects, including abiotic, direct biotic, and indirect biotic effects on the habitat, along with the physical habitat structural changes. Overall, the net effect is expected to be negative.

Road operations are unlikely to result in additional loss of wolverine habitat, as regular maintenance will involve managing re-growth of vegetation along the ROW within the Project Footprint. There is a very low probability that reclaimed temporary laydown areas and clearings may need to be reused during operations. While the quarries are expected to remain operational following construction, the footprints will not be expanded and as such no additional habitat loss or destruction is anticipated to occur during operations.

Road construction will require the removal of 546.57 ha (0.49%) of wolverine habitat in the RSA, comprised of all ecotypes as wolverine are wide-ranging and may use even low-quality habitat for movement purposes. Overall, the net effect to wolverine is negative due to the loss of suitable denning, movement, and foraging habitats.

Other RFDs would also result in the removal and alteration of Wolverine habitat. The Northern Road Link Project would have similar habitat loss impacts to the WSR Project within their 100 m ROW (60 m of which is assumed to have been cleared of vegetation based on the ToR). For the Black Horse Project and Big Daddy Project, Eagle's Nest Project and the Black Thor, Blackbird, and Black Label Mineral deposits impacts will depend on details of the mine construction techniques. Given the early stages of these projects, conservatively the entire mine lease (for Eagle's Nest) or mine claim was used to encompass the deposit locations and is considered a disturbance.

Climate change could intensify the negative effects of habitat loss from vegetation clearing by making remaining habitats less suitable or more fragmented. For example, drier conditions may reduce wetland areas, compounding the loss from clearing. Vegetation changes may make restored or mitigated areas less effective for wolverine recovery. These changes can degrade habitat quality, shift vegetation communities, and affect the availability of prey species such as beavers.

The cumulative effects to Wolverine is approximately 508,368.29 ha, which represents 16.15 % of the Wolverine RSA.

Habitat Alteration or Degradation – Hydrological Changes (Construction Phase)

Wolverine habitat, particularly foraging and movement habitat, may be altered hydrologically, with construction activities such as grading for road installation resulting in changes to both surface and groundwater water causing flooding or drying of vegetation communities. Hydrological changes are most likely to impact Wolverine through possible local reductions in beaver availability. Beavers comprise an important part of wolverine diet in Ontario (Wolverine Recovery Team, 2013; COSSARO, 2014) and may be negatively affected by drying of wetland areas. As described in Section 11.3.3.3, 91.82% of the project RSA is wetlands, primarily peatlands susceptible to changes in the flow of surface and subsurface water resulting from the bisection of these features by roads.

Based on the assessment of alteration to groundwater level and flow direction (Section 8.5: Assessment of Effects on Groundwater Resources) these changes are certain to result in a net negative effect in the LSA.

Other RFDs would also result in wolverine habitat alteration or degradation due to hydrological changes. The Northern Road Link Project would have similar hydrological impacts to the WSR Project within their 100 m ROW. For the Black Horse Project and Big Daddy Project, Eagle's Nest Project and the Black Thor, Blackbird, and Black Label Mineral deposits impacts will depend on details of the mine construction techniques. Given the early stages of these projects, conservatively the entire mine lease (for Eagle's Nest) or mine claim was used to encompass the deposit locations and considered a disturbance.

Climate change can lead to more variable and extreme precipitation—both droughts and heavy rainfall events which can result in additive drying of wetlands during drought periods, reducing habitat quality and prey availability (beaver). Conversely, and increase flooding during heavy rainfall can potentially lead to further habitat degradation or loss. Warmer winters and earlier spring melts could alter the hydrological regime of peatlands and wetlands, affecting water retention and vegetation communities. Furthermore, changes in snow cover resulting from warmer temperatures could impact wolverine movement and foraging patterns. Snow cover is important for denning and travel.

Overall, there will be a net negative effect due to habitat alteration or degradation due from hydrological changes.

Habitat Alteration or Degradation – Sensory Disturbance (Construction and Operation Phases)

During construction, activities such as blasting at quarries and pits, earth hauling, vegetation clearing, and the use of lighting around facilities may reduce the ability of wolverines to use habitat along the ROW and supportive infrastructure due to sensory disturbances. Mitigation measures around timing (hours of work, seasonality) for construction activities are expected to mitigate some of the potential effects but there is a predicted net effect on habitat from noise due to construction activities as well as movement of construction vehicles and equipment. Sensory disturbances have the potential to impact movement, foraging and denning habitats.

Noise and light from vehicles travelling on the road because of operations will impact wolverine habitat along the ROW and supportive infrastructure. Additionally, the quarries are expected to be used beyond the Construction Phase, which will continue to generate sensory disturbances such as noise and movement of vehicles and equipment. It is expected that the road will mainly be used during daylight hours, minimizing effects on wolverine habitat between dusk and dawn; however, road noise and other sensory disturbances generated during daylight hours has the potential to affect movement, foraging, and denning habitats.

Other RFDs would also result in wolverine habitat alteration or degradation due to sensory disturbance. The Northern Road Link Project would have similar habitat loss impacts to the WSR Project within their 100 m ROW. For the Black Horse Project and Big Daddy Project, Eagle's Nest Project and the Black Thor, Blackbird, and Black Label Mineral deposits impacts will depend on details of the mine construction techniques. Given the early stages of these projects, conservatively the entire mine lease (Eagle's Nest) or mine claim was used to encompass the deposit locations and considered a disturbance.

Overall, there will be a net negative effect due to sensory disturbance.

Alterations in Movement – Sensory Disturbance (Construction and Operation Phases)

Wolverine movement will be altered by sensory disturbances generated from the Construction Phase. Noise, lighting and other human actions during construction activities such as blasting, clearing, hauling and grading will create disturbances that could alter movement of wolverines as they avoid the road the ROW and supportive infrastructure areas. Mitigation measures focused on sensory disturbance including timing windows, noise and light abatement are expected to mitigate some of the potential effects but there is a predicted net negative effect from construction activities on wolverine movement.

After the implementation of mitigation measures, road operations are also expected to result in alterations in wolverine movement. While traffic levels are expected to be low, wolverines are likely to experience a net negative effect due to sensory disturbance from road operation.

Other RFDs would also result in alteration of wolverine movement due to sensory disturbance. The Northern Road Link Project would have similar habitat loss impacts to the WSR Project within their 100 m ROW. For the Black Horse Project and Big Daddy Project, Eagle's Nest Project and the Black Thor, Blackbird, and Black Label Mineral deposits impacts will depend on details of the mine construction techniques. Given the early stages of these projects, conservatively the entire mine lease or mine claim was used to encompass the deposit locations and is considered a disturbance.

Climate change can potentially act cumulatively with the Project on sensory disturbances. For example, warmer temperatures and reduced snow cover can reduce natural sound absorption, making human-originated noises from vehicles, machinery, blasting, etc. become more disruptive to day-to-day movements of wolverine. The combined effect of the Project and climate change could lead to greater avoidance of otherwise suitable habitat, reduced foraging and reproductive success, and increased vulnerability to other risks such as hunting and vehicle-related injury or mortality.

Injury or Death – Increased Access (Operations Phase)

Increased access to wolverine habitat from the Operations Phase may result in increased legal harvest and illegal poaching of wolverine. While the remote nature of the project location may pose a challenge to monitoring for poaching, it is expected that the federal and provincial authorities will continue to enforce laws and regulations relating to wolverines in the RSA; however, the effect cannot be eliminated. Overall, a net negative effect is expected due to increased access.

Other RFDs would also result in alteration of wolverine movement due to sensory disturbance. The Northern Road Link Project would have similar habitat loss impacts to the WSR Project within their 100 m ROW. For the Black Horse Project and Big Daddy Project, Eagle's Nest Project and the Black Thor, Blackbird, and Black Label Mineral deposits impacts will depend on details of the mine construction techniques. Given the early stages of these projects, conservatively the entire mine claim was used to encompass the deposit locations and is considered a disturbance.

Increased mortality from human access, combined with other stressors (habitat loss, climate-driven prey declines), can reduce the resilience of the wolverine population. Warmer winters and shorter periods of snow/ice resulting from climate change effects could make remote areas accessible for longer periods each year. Roads and trails that way have been previously impassable for much of the year may now be open to vehicles and people for extended seasons, with the new road and drier weather. Climate-driven changes (e.g., less freeze-thaw damage, fewer snow blockages) can make roads more reliable and easier to travel, further increasing human access.

Table 21-55 summarizes the other RFDs or future physical activities in the RSA that have the potential to contribute to changes to wolverine.

Table 21-54: Wolverine – Summary of Cumulative Effects

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Habitat Loss (ha)	Relative Change in the RSA (%)
19	Black Horse Project and Big Daddy Project	▪ Habitat loss due to clearance activities (Construction Phase) ▪ Habitat alteration/degradation due to changes in hydrology (Construction Phase) ▪ Habitat alteration/degradation due to sensory disturbance (Construction and Operation Phases) ▪ Alterations in Movement due to sensory disturbance (Construction and Operation Phases) ▪ Injury/Death – Predator-Prey (Construction Phase)	The Black Horse Project and Big Daddy Project are assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Loss or alteration of suitable wolverine habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities, as well as hydrology changes resulting from construction activities; ▪ Alternation or degradation of suitable wolverine seasonal habitat resulting from sensory disturbance caused by construction and operations activities; ▪ Alternation in movement by wolverine due disturbance caused by construction and operations activities; and, ▪ Injury and death of wolverine due to increased predator access along roads and other areas of disturbance.	2,406.51	0.08
20	Eagle's Nest Project	▪ Habitat loss due to clearance activities (Construction Phase) ▪ Habitat alteration/degradation due to changes in hydrology (Construction Phase) ▪ Habitat alteration/degradation due to sensory disturbance (Construction and Operation Phases) ▪ Alterations in Movement due to sensory disturbance (Construction and Operation Phases) ▪ Injury/Death – Predator-Prey (Construction Phase)	The Eagle's Nest Project is assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Loss or alteration of suitable wolverine habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities, as well as hydrology changes resulting from construction activities; ▪ Alternation or degradation of suitable wolverine seasonal habitat resulting from sensory disturbance caused by construction and operations activities;	4,098.04	0.13

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Habitat Loss (ha)	Relative Change in the RSA (%)
			▪ Alternation in movement by wolverine due disturbance caused by construction and operations activities; and, ▪ Injury and death of wolverine due to increased predator access along roads and other areas of disturbance.		
22	Northern Road Link Project	▪ Habitat loss due to clearance activities (Construction Phase) ▪ Habitat alteration/degradation due to changes in hydrology (Construction Phase) ▪ Habitat alteration/degradation due to sensory disturbance (Construction and Operation Phases) ▪ Alterations in Movement due to sensory disturbance (Construction and Operation Phases) ▪ Injury/Death – Predator-Prey (Construction Phase)	The Northern Road Link Project is assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Loss or alteration of suitable wolverine habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities, as well as hydrology changes resulting from construction activities; ▪ Alternation or degradation of suitable wolverine seasonal habitat resulting from sensory disturbance caused by construction and operations activities; ▪ Alternation in movement by wolverine due disturbance caused by construction and operations activities; and, ▪ Injury and death of wolverine due to increased predator access along roads and other areas of disturbance.	620.12	0.02
29	Black Thor, Blackbird, and Black Label Mineral deposits	▪ Habitat loss due to clearance activities (Construction Phase) ▪ Habitat alteration/degradation due to changes in hydrology (Construction Phase) ▪ Habitat alteration/degradation due to sensory disturbance (Construction and Operation Phases) ▪ Alterations in Movement due to sensory disturbance (Construction and Operation Phases)	The Black Thor, Blackbird, and Black Label Mineral deposits are assumed to spatially overlap with Project activities based on the information available.; however, the temporal overlap is uncertain based on the current information and status of the development (on hold). Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Loss or alteration of suitable wolverine habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation	1,031.17	0.03

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Habitat Loss (ha)	Relative Change in the RSA (%)
		▪ Injury/Death – Predator-Prey (Construction Phase)	communities, as well as hydrology changes resulting from construction activities; ▪ Alternation or degradation of suitable wolverine seasonal habitat resulting from sensory disturbance caused by construction and operations activities; ▪ Alternation in movement by wolverine due disturbance caused by construction and operations activities; and, ▪ Injury and death of Wolverine due to increased predator access along roads and other areas of disturbance.		
30	Juno Corporation Mining Exploration Activity	▪ Habitat loss due to clearance activities (Construction Phase) ▪ Habitat alteration/degradation due to changes in hydrology (Construction Phase) ▪ Habitat alteration/degradation due to sensory disturbance (Construction and Operation Phases) ▪ Alterations in Movement due to sensory disturbance (Construction and Operation Phases) ▪ Injury/Death – Predator-Prey (Construction Phase)	The Juno Corporation Mining Exploration Activity is assumed to spatially overlap with Project activities based on the information available; however, the temporal overlap is uncertain based on the current information and status of the development (on hold). Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Loss or alteration of suitable wolverine habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities, as well as hydrology changes resulting from construction activities; ▪ Alternation or degradation of suitable wolverine seasonal habitat resulting from sensory disturbance caused by construction and operations activities; ▪ Alternation in movement by wolverine due disturbance caused by construction and operations activities; and, ▪ Injury and death of wolverine due to increased predator access along roads and other areas of disturbance.	494,880.12	16.15

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Habitat Loss (ha)	Relative Change in the RSA (%)
-	Winter Roads – Increased winter road traffic by future mining proponents	▪ Habitat alteration/degradation due to sensory disturbance (Operation Phase) ▪ Alterations in Movement due to sensory disturbance (Operation Phases) ▪ Injury/Death – Predator-Prey (Operation Phase)	The Winter Roads – Increased winter road traffic by future mining proponents is assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with current and future winter road maintenance have similar pathways of effects as those arising from the Project. This may include: ▪ Alternation or degradation of suitable wolverine seasonal habitat resulting from sensory disturbance caused by construction and operations activities; and, ▪ Injury and death of wolverine due to increased predator access along roads and other areas of disturbance.	N/A	N/A
-	Climate Change	▪ Habitat alteration/degradation due to sensory disturbance (Operation Phase) ▪ Alterations in Movement due to sensory disturbance (Operation Phases) ▪ Injury/Death – Predator-Prey (Operation Phase)	Climate change is an interacting stressor when considering the effects of the project on wolverine populations in the LSA and RSA. Climate change – hydrological changes, higher seasonal temperatures, shifts in weather patterns and precipitation – has the potential to compound habitat loss, degradation, fragmentation, and risks from increased human access, especially when combined with other regional developments. These effects would also have similar implications on prey species, thus affecting food availability of wolverine.	-	-

21.4.8.2.4 Mitigation for Cumulative Effects

There are multiple Project-related interactions and pathways that result in changes to wolverine; however, they are associated with specific construction and operation phases of the Project and particular activities for which mitigation measures exist that have proven to be effective in minimizing and/or avoiding adverse effects. This is similarly applicable to other RFDs or future activities within the RSA.

With the implementation of the Project's mitigation measures (see Section 13.4) and the assumption that other, future potential projects or activities will be required to have the same or similar standards, it is anticipated that the cumulative effects on changes in Species at Risk such that successful rehabilitation with a capability relative to existing conditions would be prevented. Therefore, the identified cumulative effects are considered net cumulative effects and are discussed in the following subsection.

21.4.8.2.5 Characterization of Net Cumulative Effects

The net cumulative effects on wolverine are characterized in **Table 21-56** using the criteria defined in Section 13.5.

Net cumulative effects on changes to wolverine are predicted to be adverse, moderate to high in magnitude, occurring within the RSA, and largely medium to long-term. The effects will be continuous throughout each project. Changes resulting from habitat loss and alteration/degradation will be irreversible, while alterations in movement will be reversible.

21.4.8.2.1 Determination of Significance

The determination of significance of net cumulative effects on the Wolverine VC is based on the process of significance determination outlined in Section 13.6 for net effects. A predicted net cumulative effect is considered significant if it is evaluated as adverse, permanent, and of high magnitude, and if it negatively impacts species survival or reproduction at the population level to the extent that the population can no longer sustain itself.

Based on the results in **Table 21-56**, the net cumulative effects on Wolverine VC is considered to be significant with respect to characterization criteria such as duration, geographic extent and key concerns from a management perspective and by Indigenous communities

Table 21-55: Wolverine – Characterization of Predicted Net Cumulative Effects

Predicted Net Cumulative Effect	Effects Characterization Criteria								
	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Context	Reversibility	Likelihood of Occurrence
Habitat Loss – Clearance Activities (Construction Phase)	Negative	Moderate	RSA	All time periods	Long-term/ Permanent	Continuous	Moderate	Irreversible	Certain
Habitat Alteration or Degradation – Hydrological Changes (Construction Phase) Negative	Negative	Moderate	RSA	All time periods	Long-term/ Permanent	Continuous	Moderate	Irreversible	Certain
Habitat Alteration or Degradation – Sensory Disturbance (Construction and Operation Phases)	Negative	High	RSA	All time periods	Short-term	Continuous	High	Reversible	Certain
Alterations in Movement – Loss of Connectivity (Construction Phase) Negative	Negative	Moderate	RSA	All time periods	Medium-term	Continuous	Moderate	Reversible	Certain
Alterations in Movement – Sensory Disturbance (Construction and Operation Phases)	Negative	High	RSA	All time periods	Medium-term	Continuous	Moderate	Reversible	Certain
Injury or Death – Increased Access (Operations Phase) Negative	Negative	Moderate	RSA	All time periods	Long-term/ Permanent	Infrequent	Moderate	Reversible	Probable

21.4.8.3 Bats

21.4.8.3.1 Past and Ongoing Effects

Following the "Interim Cumulative Effects Assessment Guidance Document," past, present, and ongoing RFDs and activities are considered to define existing conditions for cumulative effects. As such, the existing conditions outlined in Section 13 for the Bats VC presently reflect the effects from these projects and activities within the RSA. **Table 21-1** identifies these projects and activities (IDs 1 to 18) and indicates where their effects spatially overlap with the RSA and the Project's net effects on the VC. Therefore, the cumulative effects assessment is focused on integrating the Project's net adverse effects with those of future RFDs and activities discussed in the following subsection.

21.4.8.3.2 Other Ongoing and Reasonably Foreseeable Projects or Activities

A list of the RFDs and activities that were considered for the cumulative effects assessment were presented in **Table 21-2** (ID's 11 to 29). Of the projects and activities listed in **Table 21-2**, only those listed in **Table 21-57** were identified as being probable to occur within and have potential net effects on the RSA for the bat VC, therefore, have the potential to result in cumulative effects in the RSA.

Table 21-56: Bats – RFDs or Future Activities in the RSA

ID	RFD or Activity	Spatial Overlap of Net Effects	Temporal Overlap of Net Effects	Included in Cumulative Effects Analysis
11	Webequie First Nation – Nursing Station Bulk Fuel Storage Upgrades	Yes	Yes	Yes
19	Black Horse Project and Big Daddy Project	Yes	Yes	Yes
20	Eagle's Nest Project	Yes	Yes	Yes
22	Northern Road Link Project	Yes	Yes	Yes
29	Black Thor, Blackbird, and Black Label Mineral deposits	Yes	Yes	Yes
-	Climate Change	Yes	Yes	Yes

21.4.8.3.3 Cumulative Effects

Cumulative effects may occur where the net adverse effects of the Project and the net adverse effects of other RFDs or activities interact within the RSA boundary for the VC. The cumulative effects to VC may occur due to Project and RFDs and activities that overlap spatially and temporally.

Based on the Project Footprint for the WSR Project the cumulative effects to bats and bat habitat are:

- Habitat Loss – Clearance Activities (Construction Phase);
- Habitat Alteration or Degradation – Habitat Structural Changes (Construction Phase);
- Habitat Alteration or Degradation – Hydrological Changes (Construction Phase);
- Alterations in Movement – Loss of Connectivity (Construction Phase); and
- Alterations in Movement – Sensory Disturbance (Construction Phase).

As determined in the net effects assessment, with regards to the WSR Project, effects are likely to be adverse, are either probable or certain to occur, and have moderate magnitude. Other project effects on bats and bat habitat are possible, but do not meet the criteria of this cumulative effects assessment and are unlikely to contribute significantly to the cumulative effects in the area (refer to Section 13.7).

Habitat Loss – Clearance Activities

The construction of the road has the potential for direct and indirect effects that could cause the loss of bat habitat through physical alteration and removal of suitable habitat. In Ontario, bats require several types of habitats throughout the seasons, including roosting habitat; maternity roosting habitat; foraging habitat; swarming sites; and hibernacula. Roosting habitat, including maternity roosts, is typically found on mature deciduous trees, such as under peeling bark, in leaf clusters, or in cracks, cavities and knot holes, and for some species can also include buildings, caves, and rock crevices (Thorne, 2017). Bats forage for insects along habitat edges and riparian routes, as well as over fields and wetlands. Swarming sites can be associated with hibernacula, occurring in the vicinity of entrances or openings to caves, mines, or rock formations that extend below the frost line and provide overwintering habitat for bats (Thorne, 2017; MNR, 2017a).

Based on the Project Footprint for the WSR Project, the net effects to bat maternity roosting habitat from habitat loss are estimated to be the removal of 5.82 ha, or 3.06% of the available habitat in the RSA. Highly suitable deciduous and mixed forest maternity roosting habitat for bats is relatively rare in the RSA, only making up 533.60 ha, or 0.45% of the total area. Net effects to bat foraging habitat from the loss of high use open wetlands, mixed swamps, and riparian routes are estimated to be the removal of 9.08 ha, or 2.08% of the available habitat in the RSA. This habitat assemblage comprises 4,373.91 ha or 3.75% of the RSA.

Other RFDs would also result in the removal and alteration of suitable habitat for bats. The Northern Road Link Project would have similar habitat loss impacts to the WSR Project within their 100 m ROW (with an assumed 60 m width of vegetation clearance). For the Black Horse Project and Big Daddy Project, Eagle's Nest Project and the Black Thor, Blackbird, and Black Label Mineral deposits impacts will depend on details of the mine construction techniques. Given the early stages of these projects, conservatively the entire mine lease (for Eagle's Nest) or mine claim was used to encompass the deposit locations and is considered a disturbance.

Climate change, associated with more wildfires, storms, and droughts, can destroy bat habitats by damaging trees and vegetation used by bats. These impacts may worsen habitat loss from clearance activities, affecting where bats roost, forage, breed, swarm, and hibernate.

The cumulative effects to bat roosting habitat (deciduous and mixedwood forests) is approximately 58.05 ha, which represents 0.05% of the RSA and 10.88% of highly suitable maternity roosting habitat in the RSA. The cumulative effects to bat foraging habitat is approximately 552.75 ha, which represents 0.47% of the RSA and 12.64% of suitable foraging habitat in the RSA.

Habitat Alteration or Degradation – Habitat Structural Change (Construction Phase)

Vegetation removals, creation of the ROW, and construction of the paved and gravel road surfaces has the potential to alter or degrade bat habitat by generating edge effects that change vegetation height, density, and community composition. Edge effects from construction of the road include abiotic, direct biotic, and indirect biotic effects on the habitat. Silver-haired Bat and Big Brown Bat have been found to have decreased activity near roads, with the effect dependent on temperature, suggesting that the construction of roads can degrade habitat for these species (Kitzes and Merenlender, 2014). In Boreal

upland mixed forests, road edge effects on forest plant communities and environmental variables can be measured at the immediate edge, and changes to species composition are also evident (Buss et al., 2024).

Predicted bat activity (SAR and non-SAR) after construction of the road was modelled with a Poisson regression based on anticipated future disturbance effects. This model predicts bat utilization to decrease 30.4% in the Project Footprint, decrease 11.8% in the LSA, and decrease 0.5% in the RSA.

Other RFDs would also result in structural change to bat habitat from edge effects. At habitat edges, climate change can further change the microclimate by greater temperature variability, increased wind exposure leading to drier conditions and changes in habitat structure. These changes can make these habitats less suitable for roosting and foraging. The Northern Road Link Project would have similar habitat alteration or degradation impacts to the WSR Project within their 100 m ROW (60 m wide clearance area). For the Black Horse Project and Big Daddy Project, Eagle's Nest Project and the Black Thor, Blackbird, and Black Label Mineral deposits impacts will depend on details of the mine construction techniques. Given the early stages of these projects, conservatively the entire mine lease or mine claim was used to encompass the deposit locations and is considered a disturbance.

Habitat Alteration and Degradation – Hydrological Changes (Construction Phase)

Hydrological changes during road construction from activities such as grading, installation of drainage features, and construction of the roadbed could alter soil moisture regime, and shift or alter bat wetland and riparian foraging habitat. Changes may occur to both surface and groundwater, causing flooding or drying of vegetation communities. Little Brown Myotis foraging habitat is strongly associated with surface water features (Thorne, 2017). Additionally, many of the insect prey species of Little Brown Myotis and other bats originate from rivers, streams, ponds, and lakes (Clare et al., 2011). As described in Section 11.3.3.3**,** 91.82% of the project RSA is wetlands, primarily peatlands susceptible to changes in the flow of surface and subsurface water resulting from the bisection of these features by roads. The effects of roads on hydrology and bat habitat can occur up to 250 m from the ROW; the habitat alteration assessment uses the same values as those shown in Section 11.3.3.3, with significant effects expected within 20 m, moderate effects within 60 m and minimal effects experienced at 250 m.

Other RFDs and activities would also result in structural change to bat habitat from hydrological changes. Climate change could increase variability in precipitation, leading to more frequent and intense droughts, storms, and flooding events. These changes can disrupt the natural hydrology of wetlands, riparian zones, and peatlands—key foraging habitats for bats like Little Brown Myotis. The Northern Road Link Project would have similar habitat alteration or degradation impacts to the WSR Project within their 100 m ROW. For the Black Horse Project and Big Daddy Project, Eagle's Nest Project and the Black Thor, Blackbird, and Black Label Mineral deposits impacts will depend on details of the mine construction techniques. Given the early stages of these projects, conservatively the entire mine claim was used to encompass the deposit locations and is considered a disturbance.

Alterations in Movement – Loss of Connectivity (Construction Phase)

Bat movement is likely to be altered by construction of the road due to the fragmentation of forest habitat. It is acknowledged that forest fragmentation has been found to positively affect the abundance Little Brown Myotis and Eastern Red Bat potentially due to increased access to both foraging and roosting sites (Ethier and Fahrig, 2011); however, this has not been studied in the context of boreal forest or roads, nor for all species such as those present in the RSA. Additionally, the Ethier & Fahrig (2011) study was conducted in 2009 prior to the discovery of White-nose Syndrome in Ontario in 2010 (MNR, 2015b) and may not be reflective of present populations and their behaviours. Climate change could increase the

frequency and severity of wildfires, storms, pest outbreaks, and droughts. These events can create new habitat edges and isolated patches, compounding fragmentation resulting from the Project. Other RFDs would also result in habitat fragmentation that can alter bat movement. The Northern Road Link Project would have similar loss of connectivity impacts to the WSR Project within their 100 m ROW. For the Black Horse Project and Big Daddy Project, Eagle's Nest Project and the Black Thor, Blackbird, and Black Label Mineral deposits impacts will depend on details of the mine construction techniques. Given the early stages of these projects, conservatively the entire mine lease or mine claim was used to encompass the deposit locations and is considered a disturbance.

Alterations in Movement – Sensory Disturbance (Construction Phase)

Bat movement is also likely to be altered by sensory disturbances during the construction phase. Noise, lighting and other human actions during construction activities such as blasting, clearing, hauling and grading will create disturbances that could alter movement of bats as they avoid the ROW and supportive infrastructure areas. Construction lighting used during the bat active season may result in woodland-adapted bats avoiding these areas, as they have been found to avoid both high-pressure sodium and white LED lights (Stone et al. 2009, 2012; Altringham and Kerth, 2016).

Other RFDs would also result in sensory disturbances that can alter bat movement. The Northern Road Link Project would have similar sensory disturbance impacts to the WSR Project within their 60 m ROW. For the Black Horse Project and Big Daddy Project, Eagle's Nest Project and the Black Thor, Blackbird, and Black Label Mineral deposits impacts will depend on details of the mine construction techniques. Climate change can alter bat activity patterns (e.g., timing of emergence, foraging duration) as bats respond to changing temperatures and prey availability. These behavioral shifts may make bats more vulnerable to sensory disturbance if their active periods increasingly overlap with construction (longer frost-free/snow free periods, drier conditions favouring longer construction). Given the early stages of these projects, conservatively the entire mine claim was used to encompass the deposit locations and is considered a disturbance.

Table 21-58 summarizes the other RFDs or future physical activities in the RSA that have the potential to contribute to changes to bats and bat habitat.

Table 21-57: Bats – Summary of Cumulative Effects

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Change in Habitat (ha)	Relative Change in the RSA (%)
19	Black Horse Project and Big Daddy Project	▪ Habitat loss due to clearance activities ▪ Habitat alteration or degradation due to habitat structural change ▪ Habitat alteration or degradation due to hydrological changes ▪ Alterations in movement due to loss of connectivity ▪ Alterations in movement due to sensory disturbance	The Black Horse Project and Big Daddy Project are assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. This may include: ▪ Loss or alteration of bat roosting habitat and foraging habitat from vegetation removal, grubbing, and/or other activities during exploration, mine construction, or operations that permanently remove suitable vegetation communities. ▪ Alteration or degradation of suitable bat habitat from edge effects generated by vegetation removals and activities during exploration, mine construction, or operations, including abiotic, direct biotic, and indirect biotic effects. ▪ Alteration or degradation of bat foraging habitat from hydrological changes resulting from mine exploration, construction or operations ▪ Alteration in bat movement from loss of habitat connectivity where vegetation removals during exploration or construction result in gaps or cause habitat fragmentation. ▪ Alteration in bat movement from sensory disturbances generated by mining exploration, construction or operations	Roosting Habitat: 0 Foraging Habitat: 256.84	0 5.87
20	Eagle's Nest Project	▪ Habitat loss due to clearance activities ▪ Habitat alteration or degradation due to habitat structural change ▪ Habitat alteration or degradation due to hydrological changes ▪ Alterations in movement due to loss of connectivity	The Eagle's Nest project is assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. This may include: ▪ Loss or alteration of bat roosting habitat and foraging habitat from vegetation removal, grubbing, and/or other activities during exploration, mine construction, or operations that permanently remove suitable vegetation communities. ▪ Alteration or degradation of suitable bat habitat from edge effects generated by vegetation removals and activities during exploration, mine construction, or operations, including abiotic, direct biotic, and indirect biotic effects.	Roosting Habitat: 52.23 Foraging Habitat: 285.14	9.79 6.52

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Change in Habitat (ha)	Relative Change in the RSA (%)
		▪ Alterations in movement due to sensory disturbance	▪ Alteration or degradation of bat foraging habitat from hydrological changes resulting from mine exploration, construction or operations ▪ Alteration in bat movement from loss of habitat connectivity where vegetation removals during exploration or construction result in gaps or cause habitat fragmentation. ▪ Alteration in bat movement from sensory disturbances generated by mining exploration, construction or operations		
22	Northern Road Link Project	▪ Habitat loss due to clearance activities ▪ Habitat alteration or degradation due to habitat structural change ▪ Habitat alteration or degradation due to hydrological changes ▪ Alterations in movement due to loss of connectivity ▪ Alterations in movement due to sensory disturbance	The Northern Road Link Project is assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with current and future road development have similar pathways of effects as those arising from the Project. This may include: ▪ Loss or alteration of bat roosting habitat and foraging habitat from vegetation removal, grubbing, and/or other activities during road construction that permanently remove suitable vegetation communities. ▪ Alteration or degradation of suitable bat habitat from edge effects generated by vegetation removals and activities during road construction, including abiotic, direct biotic, and indirect biotic effects. ▪ Alteration or degradation of bat foraging habitat from hydrological changes resulting from road construction or operations ▪ Alteration in bat movement from loss of habitat connectivity where vegetation removals during road construction result in gaps or cause habitat fragmentation. ▪ Alteration in bat movement from sensory disturbances generated by road construction.	Roosting Habitat: 0 Foraging Habitat: 1.27	0 0.03
29	Black Thor, Blackbird, and Black Label Mineral deposits	▪ Habitat loss due to clearance activities ▪ Habitat alteration or degradation due to habitat structural change	The Black Thor, Blackbird, and Black Label Mineral deposits are assumed to spatially overlap with Project activities based on the information available.; however, the temporal overlap is uncertain based on the current information and status of the development (on hold).	Roosting Habitat: 0 Foraging Habitat: 0.42	0 0.01

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Change in Habitat (ha)	Relative Change in the RSA (%)
		▪ Habitat alteration or degradation due to hydrological changes ▪ Alterations in movement due to loss of connectivity ▪ Alterations in movement due to sensory disturbance	Activities associated with any future mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. This may include: ▪ Loss or alteration of bat roosting habitat and foraging habitat from vegetation removal, grubbing, and/or other activities during exploration, mine construction, or operations that permanently remove suitable vegetation communities. ▪ Alteration or degradation of suitable bat habitat from edge effects generated by vegetation removals and activities during exploration, mine construction, or operations, including abiotic, direct biotic, and indirect biotic effects. ▪ Alteration or degradation of bat foraging habitat from hydrological changes resulting from mine exploration, construction or operations ▪ Alteration in bat movement from loss of habitat connectivity where vegetation removals during exploration or construction result in gaps or cause habitat fragmentation. ▪ Alteration in bat movement from sensory disturbances generated by mining exploration, construction or operations.		
	Climate Change	▪ Habitat loss due to clearance activities ▪ Habitat alteration or degradation due to habitat structural change ▪ Habitat alteration or degradation due to hydrological changes ▪ Alterations in movement due to loss of connectivity ▪ Alterations in movement due to sensory disturbance	Climate change (higher temperatures, intense storms, changing precipitation) interacts cumulatively with project effects on the Bat VCs potentially by exacerbating habitat loss, degradation, hydrological changes, fragmentation, and sensory disturbance: - Shifts in the composition, structure, and distribution of forest and wetland habitats. Loss or reduction of mature deciduous and mixedwood forests that provide critical roosting and maternity sites. - Changes in tree species, density, and health, which can reduce the availability of suitable roosts - Changing hydrology – wetland and riparian habitats, reduction in prey availability, which are important for bat foraging. - Greater edge effects, reduced connectivity can limit bat movement between roosting and foraging sites	-	-

21.4.8.3.4 Mitigation for Cumulative Effects

There are multiple Project-related interactions and pathways that result in changes to bats and bat habitat; however, they are associated with specific construction and operation phases of the Project and particular activities for which mitigation measures exist that have proven to be effective in minimizing and/or avoiding adverse effects. This is similarly applicable to other RFDs or future activities within the RSA.

With the implementation of the Project's mitigation measures (see Section 13.4) and the assumption that other, future potential projects or activities will be required to have the same or similar standards, it is anticipated that the cumulative effects will not severely impact bat habitat and movement in the RSA. Therefore, the identified cumulative effects are considered net cumulative effects and are discussed in the following subsection.

21.4.8.3.5 Characterization of Net Cumulative Effects

The net cumulative effects on bats and bat habitat are characterized in **Table 21-59** using the criteria defined in Section 13.5.

Net cumulative effects on changes to bats and bat habitat are predicted to be negative in direction from the construction of the various projects, RFDs and activities. During operations, however, the direction of effect varies with the nature of the proposed activity. The direction is likely neutral for projects, RFDs or activities where operation occurs within the same physical footprint as construction (e.g., road maintenance) but could be negative for projects, RFDs or activities such as mineral exploration and mining, where the areas of disturbance (or footprint) could change over the duration of the projects.

Bat roosting and foraging habitat loss and alteration or degradation of habitat is expected due to site preparation and construction activities, such as vegetation clearing and quarry creation. Construction of the Project Footprint will directly and permanently remove habitat suitable for bats to roost and forage, including maternity roosting habitat for the duration of operations. Construction of the road will also fragment habitat resulting in loss of connectivity and generate sensory disturbances, both of which will likely alter bat movement.

21.4.8.3.6 Determination of Significance

The determination of significance of net cumulative effects on the Bats VC is based on the process of significance determination outlined in Section 13.6 for net effects. A predicted net cumulative effect is considered significant if it is evaluated as adverse, permanent, and of high magnitude, and if it negatively impacts species survival or reproduction at the population level to the extent that the population can no longer sustain itself.

Based on the results in **Table 21-59,** the net cumulative effects on the Bats VC is considered to be significant. This determination is based on net cumulative effects characterization criteria such as duration and geographic extent, as well as key concerns from a management perspective and by Indigenous communities

Table 21-58: Bats – Characterization of Predicted Net Cumulative Effects

Predicted Net Cumulative Effect	Characterization Criteria									
	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Context	Reversibility	Likelihood of Occurrence	Significance
Habitat Loss due to Clearance Activities	Negative	Moderate	RSA	All Time Periods	Permanent	Continuous	Moderate	Irreversible	Certain	Significant
Habitat Alteration or Degradation due to Habitat Structural Change	Negative	Moderate	RSA	All Time Periods	Medium-term	Continuous	Moderate	Reversible	Certain	Not Significant
Habitat Alteration or Degradation due to Hydrological Changes	Negative	Moderate	RSA	All Time Periods	Permanent	Continuous	Moderate	Irreversible	Certain	Significant
Alterations in Movement due to Loss of Connectivity	Negative	Low	RSA	All Time Periods	Medium-term	Continuous	Low	Reversible	Probable	Not Significant
Alterations in Movement due to Sensory Disturbance	Negative	Low	RSA	All Time Periods	Short-term	Frequent	Low	Reversible	Certain	Not Significant

21.4.8.4 Forest Songbirds At Risk

21.4.8.4.1 Past and Ongoing Effects

Following the "Interim Cumulative Effects Assessment Guidance Document," past, present, and ongoing RFDs and activities are considered to define existing conditions for cumulative effects. As such, the existing conditions outlined in Section 13 for the Forest Songbirds at Risk VC presently reflect the effects from these projects and activities within the RSA. **Table 21-1** identifies these projects and activities (IDs 1 to 18) and indicates where their effects spatially overlap with the RSA and the Project's net effects on the VC. Therefore, the cumulative effects assessment is focused on integrating the Project's net adverse effects with those of future RFDs and activities discussed in the following subsection.

21.4.8.4.2 Other Ongoing and Reasonably Foreseeable Projects or Activities

A list of the RFDs and activities that were considered for the cumulative effects assessment were presented in **Table 21-1** (ID's 19 to 39). Of the projects and activities listed in **Table 21-2**, only those listed in **Table 21-60** were identified as being probable to occur within and have potential net effects on the RSA for the SAR forest songbirds VC, therefore, have the potential to result in cumulative effects in the RSA.

Table 21-59: Forest Songbirds at Risk – RFDs or Future Activities in the RSA

ID	RFD or Activity	Spatial Overlap of Net Effects	Temporal Overlap of Net Effects	Included in Cumulative Effects Analysis
19	Black Horse Project and Big Daddy Project	Yes	Yes	Yes
20	Eagle's Nest Project	Yes	Yes	Yes
22	Northern Road Link Project	Yes	Yes	Yes
29	Black Thor, Blackbird, and Black Label Mineral deposits	Yes	Yes	Yes
-	Winter Roads – Increased winter road traffic by future mining proponents	Yes	Yes	Yes
-	Climate Change	Yes	Yes	Yes

21.4.8.4.3 Cumulative Effects

Cumulative effects may occur where the net adverse effects of the Project and the net adverse effects of other RFDs or activities interact within the RSA boundary for the VC. The cumulative effects to VC may occur due to Project and RFDs and activities that overlap spatially and temporally.

Based on the Project Footprint for the WSR Project the cumulative effects on SAR Forest Songbirds (Evening Grosbeak) and SAR Forest Songbirds habitat are:

- Habitat Loss – Clearance Activities (during the Construction Phase); and
- Injury or Death – Changes to Predator-Prey Dynamics.

As determined in the effects assessment, both of these effects (in terms of the WSR Project) are likely to extend into the LSA, have an adverse effect, are probable or certain to occur, and have a moderate magnitude. Other project effects on SAR Forest Songbirds and SAR Forest Songbirds habitat are possible, but do not meet the criteria of this cumulative effects assessment and are unlikely to contribute significantly to the cumulative effects in the area (refer to Section 13.7).

Habitat Loss due to Clearance Activities

The construction of the road has the potential for direct and indirect effects that could cause the loss of Evening Grosbeak habitat through physical alteration and removal of suitable habitat. Evening Grosbeak distribution is closely associated with old, mixed wood forests with high percentages of Fir (Abies sp.), White Spruce (Picea glauca), or Trembling aspen (Populus tremuloides) as well as conifer forests. Ontario Breeding Bird Atlas data indicate that the Project occurs along the northernmost extent of Evening Grosbeak range in Ontario (Birds Canada, 2024).

Based on the Project Footprint for the WSR Project the net effects to Evening Grosbeak and Evening Grosbeak breeding habitat are estimated to be 155.01 ha, or 1.77% of the available habitat in the RSA. Suitable Evening Grosbeak breeding habitat is relatively uncommon in the RSA making up 8,749.4 ha or 6.56% of the total area.

Other RFDs would also result in the removal and alteration of suitable habitat for Evening Grosbeak. The Northern Road Link Project would have similar habitat loss impacts to the WSR Project within their 100 m ROW (60 m of which is assumed to be cleared of vegetation). For the Black Horse Project and Big Daddy Project, Eagle's Nest Project and the Black Thor, Blackbird, and Black Label Mineral deposits impacts will depend on details of the mine construction techniques. Given the early stages of these projects, conservatively the entire mine lease or mine claim was used to encompass the deposit locations and is considered a disturbance.

Climate change, specifically warmer temperatures and altered precipitation patterns can shift forest composition, reduce the availability of preferred tree species, and alter the structure of breeding habitats for Evening Grosbeak. When combined with habitat loss from clearance activities, these factors could result in a greater reduction of suitable habitat for the species.

The cumulative effects to Evening Grosbeak is approximately 801.65 ha, which represents 0.6% of the RSA, or 9.16% of the available habitat for Evening Grosbeak in the RSA.

Injury or Death due to Changes to Predator-Prey Dynamics

The creation of new and increased use of existing winter access roads for RFDs could lead to in increased death and injury of Evening Grosbeak. Linear features are known to facilitate predator movement in the boreal (Dickie et al., 2017; Benoit-Pepin et al., 2024) and creation of new roads connected to human activity is known to spread predators into previously unoccupied areas (Lantham et al. 2011). Forest songbird predators are known to have increased success along edges including species associated with evening grosbeak.

Climate change, as an RFD, can boost predator survival through milder winters, resulting in increased predator populations. This raises predation risks for Evening Grosbeaks and other songbirds due to more predators or new species in breeding areas. Earlier springs may align predator activity with nesting, while shifts in food supply can lead predators to target songbird eggs and young.

The creation of new and increased use of existing winter access roads for RFDs could lead to in increased death and injury of Evening Grosbeak. Road RFDs will have similar effects as they will add to the linear network within the RSA. Mining RFDs will also create a network of linear features in addition to the mine footprint themselves. Their impact on Evening Grosbeak will depend on the configuration of mining roads, how they connect to the road network and which habitats they traverse.

Table 21-61 summarizes the other RFDs or future physical activities in the RSA that have the potential to contribute to changes to SAR Forest Songbirds and their habitat.

Table 21-60: Forest Songbirds at Risk – Summary of Cumulative Effects

ID	RFD or Activity	Species	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Change in Habitat (ha)	Relative Change in the RSA (%)
19	Black Horse Project and Big Daddy Project	Evening Grosbeak	▪ Changes to abundance and distribution of Evening Grosbeak from habitat loss (Construction Phase) ▪ Injury or death of Evening Grosbeak from changes to predator-prey dynamics (Operations Phase)	The Black Horse Project and Big Daddy Project are assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Loss or alteration of Evening Grosbeak breeding habitat and foraging habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities. ▪ Maintenance activities that maintain predator access along mine access roads decreasing Evening Grosbeak survival.	8.88	<0.01
20	Eagle's Nest Project	Evening Grosbeak	▪ Changes to abundance and distribution of Evening Grosbeak from habitat loss (Construction Phase) ▪ Injury or death of Evening Grosbeak from changes to predator-prey dynamics (Operations Phase)	The Eagle's Nest project is assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Loss or alteration of Evening Grosbeak breeding habitat and foraging habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities. ▪ Maintenance activities maintain predator access along mine access roads decreasing Evening Grosbeak survival.	789.11	0.59

ID	RFD or Activity	Species	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Change in Habitat (ha)	Relative Change in the RSA (%)
22	Northern Road Link Project	Evening Grosbeak	▪ Changes to abundance and distribution of Evening Grosbeak from habitat loss (Construction Phase) ▪ Injury or death of Evening Grosbeak from changes to predator-prey dynamics (Operations Phase)	The Northern Road Link Project is assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with current and future road development have similar pathways of effects as those arising from the Project. This may include: ▪ Loss or alteration of Evening Grosbeak breeding habitat and foraging habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities. ▪ Maintenance activities maintain predator access along roadway and access roads decreasing Evening Grosbeak survival.	3.66	<0.01
29	Black Thor, Blackbird, and Black Label Mineral deposits	Evening Grosbeak	▪ Changes to abundance and distribution of Evening Grosbeak from habitat loss (Construction Phase) ▪ Injury or death of Evening Grosbeak from changes to predator-prey dynamics (Operations Phase)	The Black Thor, Blackbird and Black Label Mineral deposits are assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Loss or alteration of Evening Grosbeak breeding habitat and foraging habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities. ▪ Maintenance activities maintain predator access along mine access roads decreasing Evening Grosbeak survival.	0	0

ID	RFD or Activity	Species	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Change in Habitat (ha)	Relative Change in the RSA (%)
-	Winter Roads – Increased winter road traffic by future mining proponents	Evening Grosbeak	▪ Injury or death of Evening Grosbeak from changes to predator-prey dynamics (Operations Phase)	The Winter Roads – Increased winter road traffic by future mining proponents is assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with current and future winter road maintenance have similar pathways of effects as those arising from the Project. This may include: ▪ Maintenance activities maintain predator access along roadway and access roads decreasing Evening Grosbeak survival.	N/A	N/A
-	Climate Change	Evening Grosbeak	▪ Changes to abundance and distribution of Evening Grosbeak from habitat loss (Construction Phase) ▪ Injury or death of Evening Grosbeak from changes to predator-prey dynamics (Operations Phase)	Climate change can affect forest composition, altering preferred tree species, and change breeding habitats which is added stressor with vegetation clearance. Changes in climate may affect predator populations or behaviors, potentially increasing predation pressure on songbirds.	-	-

21.4.8.4.4 Mitigation for Cumulative Effects

There are multiple Project-related interactions and pathways that result in changes to Evening Grosbeak and Evening Grosbeak habitat; however, they are associated with specific construction and operation phases of the Project and particular activities for which mitigation measures exist and are proven to be effective in minimizing and/or avoiding adverse effects. This is similarly applicable to other RFDs or future activities within the RSA.

With the implementation of the Project's mitigation measures (see Section 13.4) and the assumption that other, future potential projects or activities will be required to have the same or similar standards, it is anticipated that the cumulative effects will not severely impact Evening Grosbeak breeding and foraging habitat availability. Additionally, the cumulative effects of changes to predator-prey dynamics are not expected to significantly increase Evening Grosbeak deaths or injuries with the implementation of mitigation measures. Therefore, the identified cumulative effects are considered net cumulative effects and are discussed in the following subsection.

21.4.8.4.5 Characterization of Net Cumulative Effects

The net cumulative effects on Evening Grosbeak are characterized in **Table 21-62** using the criteria defined in Section 13.5.

Habitat Loss – Clearance Activities (Construction Phase)

Negative effects from habitat loss are certain for Evening Grosbeak through site preparation and construction activities as well as terrestrial vegetation changes during road construction. The effect from habitat loss will occur throughout the RSA as the RFDs are spatially located in both the LSA and RSA of the Project. The effects may be permanent or long-term depending on the effectiveness of reclamation efforts. As while some areas may re-establish quickly other areas such as roadbeds or mine footprints may be permanently altered. Effects from RFDs and the Project are expected to be continuous and irreversible in most cases. At the regional scale, the magnitude is expected to be moderate as existing breeding habitats are relatively uncommon in the RSA and a relatively large percentage is being removed. However, Evening Grosbeak can be resilient in their habitat choices as many anthropogenically disturbed areas including clearings can be used by Evening Grosbeak.

Injury or Death – Changes to Predator-Prey Dynamics (Operations Phase)

Negative effects on Evening Grosbeak survival from improved predator access and success rates is certain during the Operations Phase. The effect from predation will occur throughout the RSA as the RFDs are spatially located in both the LSA and RSA of the Project. Predation would occur throughout the Evening Grosbeak active season. The effects will be long-term as any anthropogenic features constructed for RFDs will be used by predators beyond operational lifetimes. Predation events due to increase access are likely to be low in frequency due to the cryptic nature of the Evening Grosbeak and few individuals will be using areas near roadways. The effect is reversible once anthropogenic features have regenerated following closure of the WSR or any RFD. The magnitude of the effect is predicted to be Low in the regional scale.

Table 21-61: Forest Songbirds at Risk – Characterization of Predicted Net Cumulative Effects

Predicted Net Cumulative Effect	Characterization Criteria								
	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Context	Reversibility	Likelihood of Occurrence
Evening Grosbeak									
Habitat Loss – Clearance Activities (construction)	Negative	Moderate	RSA	Sensitive	Permanent or Long-term	Continuous	Resilient	Irreversible	Certain
Injury or Death – Changes to Predator-Prey Dynamics (operations)	Negative	Low	RSA	Sensitive	Long-term	Infrequent	Moderate	Reversible	Certain

21.4.8.4.6 Determination of Significance

The determination of significance of net cumulative effects on the SAR Forest Songbirds VC is based on the process of significance determination outlined in Section 13.6 for net effects. A predicted net cumulative effect is considered significant if it is evaluated as adverse, permanent, and of high magnitude, and if it negatively impacts species survival or reproduction at the population level to the extent that the population can no longer sustain itself.

Based on the results in **Table 21-63,** the net cumulative effects on the SAR Forest Songbirds VC is considered to be not significant).

21.4.8.5 Wetland Songbirds At Risk

21.4.8.5.1 Past and Ongoing Effects

Following the "Interim Cumulative Effects Assessment Guidance Document," past, present, and ongoing RFDs and activities are considered to define existing conditions for cumulative effects. As such, the existing conditions outlined in Section 13 for the Wetland Songbirds at Risk VC presently reflect the effects from these projects and activities within the RSA. **Table 21-1** identifies these projects and activities (IDs 1 to 18) and indicates where their effects spatially overlap with the RSA and the Project's net effects on the VC. Therefore, the cumulative effects assessment is focused on integrating the Project's net adverse effects with those of future RFDs and activities discussed in the following subsection

21.4.8.5.2 Other Ongoing and Reasonably Foreseeable Projects or Activities

A list of the RFDs and activities that were considered for the cumulative effects assessment were presented in **Table 21-2** (ID's 19 to 39). Of the projects and activities listed in **Table 21-2**, only those listed in **Table 21-63** were identified as being probable to occur within and have potential net effects on the RSA for the SAR Wetland Songbirds VC and therefore have the potential to result in net cumulative effects in the RSA.

Table 21-62: Wetland Songbirds at Risk – RFDs or Future Activities in the RSA

ID	RFD or Activity	Spatial Overlap of Net Effects	Temporal Overlap of Net Effects	Included in Cumulative Effects Analysis
19	Black Horse Project and Big Daddy Project	Yes	Yes	Yes
20	Eagle's Nest Project	Yes	Yes	Yes
22	Northern Road Link Project	Yes	Yes	Yes
29	Black Thor, Blackbird, and Black Label Mineral deposits	Yes	Yes	Yes
-	Climate Change	Yes	Yes	Yes

21.4.8.5.3 Cumulative Effects

Cumulative effects may occur where the net adverse effects of the Project and the net adverse effects of other RFDs or activities interact within the RSA boundary for the VC. The cumulative effects to VC may occur due to Project and RFDs and activities that overlap spatially and temporally.

Based on the Project Footprint, the cumulative effects to SAR Wetland Songbirds (Olive-sided Flycatcher, Rusty Blackbird) and their habitats are:

- Habitat Loss – Clearance Activities (during the Construction Phase);
- Injury or Death – Collisions with Vehicles (during the Operations Phase); and
- Injury or Death – Changes to Predator-Prey Dynamics (during the Operations Phase).

As determined in the effects assessment, in terms of the WSR Project, these have an adverse effect (negative direction), are either probable or certain to occur, and have a moderate magnitude. Other project effects on SAR Wetland Songbirds and SAR Wetland Songbird habitat are possible, but do not meet the criteria of this cumulative effects assessment and are unlikely to contribute significantly to the cumulative effects in the area (refer to Section 13.7).

Habitat Loss – Clearance Activities

The construction of the road has the potential for direct and indirect effects that would result in the loss of habitat for SAR Wetland Songbirds. Not all construction activities are expected to result in habitat losses for all wetland songbirds. For example, Olive-sided Flycatcher are known to use open areas that contain tall trees or snags for perching, including human-made openings. Nevertheless, based on an understanding of Olive-sided Flycatcher habitat preferences, the results of habitat modelling indicated that Project construction activities would result in the removal of the following amounts of breeding habitat in the RSA: 201.02 ha of coniferous swamp, 90.36 ha of bog, 81.11 ha of coniferous forest, 44.85 ha of fen, and 6.88 ha of riparian or shoreline communities. Overall, Olive-sided Flycatcher habitat is common throughout the RSA, with 64.58% of the study area consisting of the vegetation communities it inhabits.

Rusty blackbirds inhabit forested wetlands in the boreal forest and taiga terrestrial ecozones during the breeding season. In the boreal ecozones, the species prefers wet ecosites such as bogs, fens, and ponds. It will also make sure of forested riparian areas. Based on an understanding of Rusty Blackbird habitat preferences and the results of habitat modelling, the estimated levels of habitat loss for the species within the RSA are: 6.55 ha of along shrubby riparian areas and shorelines, 44.85 ha within fen communities, 90.31 ha in treed bogs and 201.02 ha of habitat in coniferous swamp communities. Overall, Rusty Blackbird habitat is common throughout the RSA, with 60.77% of the study area consisting of the vegetation communities it inhabits.

Other RFDs and activities would also result in the removal and/or alteration of suitable habitat for Olive-sided Flycatchers and Rusty Blackbirds. The NRL Project would have similar habitat loss impacts within their 60 m ROW to those of the WSR Project. For the Black Horse, Big Daddy, and Eagle's Nest projects and the Black Thor, Blackbird, and Black Label Mineral deposits impacts will depend on details of the mine construction techniques. Given the early stages of these projects, conservatively the entire lease area was used to determine the area of effect (area of disturbance) for the Eagle's Nest Project and Black Label Footprint (as the latter's mineral deposit is found on the Eagle's Nest lease area). For the remaining RFDs and activities, the mine claim area that encompassed the deposit locations was considered the area of disturbance.

Climate change alters precipitation, increases droughts, and changes snowmelt, making wetlands more vulnerable. Less water or more evaporation shrinks wetlands and dries out bogs and fens. Habitat clearance fragments wetlands and reduces their ability to cope with climate impacts, leading to further degradation.

The cumulative effects to Olive-sided Flycatcher is approximately 3,016.4 ha, which represents 2.26% of suitable habitat the RSA. The cumulative effects to Rusty Blackbirds and their habitats is approximately 3,427.8 ha, which represents 2.57% of the RSA, leaving suitable habitat readily available for both species (62.32% of the study area will remain suitable for Olive-sided Flycatcher and for 58.2% of the study area for Rusty Blackbird).

Injury or Death – Collisions with Vehicles (Operations)

Movement of vehicles along the WSR during the Operations Phase could result increased injury or death of SAR wetland songbirds, such as Olive-sided Flycatchers and Rusty Blackbirds. Bird-vehicle collisions is one of the top three causes of avian death in Canada. Wetland songbirds that move and fly from low shrub to low shrub have been found to be particularly vulnerable to this pathway of effect. As a result, potential collisions between Rusty Blackbirds and vehicles in the RSA are more likely to occur since the species forages in shallow water and perches in low vegetation.

The NRL Project, and other RFDs and activities that involve the creation of new roads would have similar potential effects on SAR Wetland Birds as the WSR Project. Mining RFDs and activities will also involve the creation of new roads and/or increased use of existing access roads. Given the limited availability of information regarding the potential configuration of mining roads and how they may connect to existing road networks, an accurate area of effect for this pathway cannot be determined at this time.

Injury or Death – Changes to Predator-Prey Dynamics (Operations)

Linear features are known to facilitate predator movement in the boreal ecozone (Dickie et al., 2017; Benoit-Pepin et al., 2024). The creation of new roads connected to areas of human activity has been shown to allow predators to spread into habitats they previously did not occupy (Lantham et al. 2011). The creation of new roads and/or the increased use of existing winter access roads could lead to in increased death and injury of Olive-sided Flycatchers and Rusty Blackbirds.

Road RFDs and activities, such as the NRL Project, would have similar effects to the WSR Project as they will add to the linear network within the RSA. Mining RFDs will also create a network of linear features in addition to the mine footprints themselves. Their impact on SAR Wetland Birds will depend on the configuration of mining roads, how they connect to the road network and which habitats they traverse.

The Project and associated vegetation clearance activities create greater access for predators. With climate change, predators could become more numerous or active, increasing mortality risk to songbirds. Faced with climate-related challenges (e.g., drying wetlands), songbirds may alter their nesting or feeding habits (potentially choosing more open areas) which exposes them to predation. Warmer winters allow predators to remain active for longer periods, increasing the time songbirds are at predation risk. Furthermore, habitat loss and the decline of dense vegetation due to both clearing activities and climate change leave songbirds more vulnerable to predation by reducing their protective cover.

Table 21-64 summarizes the other RFDs or future physical activities in the cumulative effects assessment that have the potential to contribute to changes to SAR Wetland Birds and their habitats.

Table 21-63: Wetland Songbirds at Risk – Summary of Cumulative Effects

ID	RFD or Activity	Species	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Change in Habitat (ha)	Relative Change in the RSA (%)
19	Black Horse Project and Big Daddy Project	Olive-sided Flycatcher	▪ Changes to abundance and distribution of Olive-sided Flycatcher from habitat loss (Construction Phase) ▪ Injury or death of Olive-sided Flycatcher from changes to predator-prey dynamics (Operations Phase)	The Black Horse Project and Big Daddy Project are assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Loss or alteration of Olive-sided Flycatcher breeding habitat and foraging habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities; and ▪ Maintenance activities that maintain predator access along mine access roads decreasing the likelihood of Olive-sided Flycatcher survival.	515	0.39
		Rusty Blackbird	▪ Changes to abundance and distribution of Rusty Blackbird from habitat loss (Construction Phase) ▪ Injury or death of Rusty Blackbirds from collisions with vehicles (Operations Phase). ▪ Injury or death of Rusty Blackbird from changes to predator-prey dynamics (Operations Phase)	The Black Horse Project and Big Daddy Project are assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Loss or alteration of Rusty Blackbird breeding habitat and foraging habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities;	997.82	0.75

ID	RFD or Activity	Species	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Change in Habitat (ha)	Relative Change in the RSA (%)
				▪ Decreased survival and fitness of Rusty Blackbird resulting from vehicles moving along the RFDs during their operational phases; and ▪ Maintenance activities maintain predator access along mine access roads thereby decreasing Rusty Blackbird survival.		
20	Eagle's Nest Project	Olive-sided Flycatcher	▪ Changes to abundance and distribution of Olive-sided Flycatcher from habitat loss (Construction Phase) ▪ Injury or death of Olive-sided Flycatcher from changes to predator-prey dynamics (Operations Phase)	The Eagle's Nest Project is assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Loss or alteration of Olive-sided Flycatcher breeding habitat and foraging habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities; and ▪ Maintenance activities maintain predator access along mine access roads decreasing Olive-sided Flycatcher survival.	2,428.35	1.82
		Rusty Blackbird	▪ Changes to abundance and distribution of Rusty Blackbird from habitat loss (Construction Phase) ▪ Injury or death of Rusty Blackbirds from collisions with vehicles (Operations Phase). ▪ Injury or death of Rusty Blackbird from changes	The Eagle's Nest Project is assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include:	2,350.2	1.76

ID	RFD or Activity	Species	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Change in Habitat (ha)	Relative Change in the RSA (%)
			to predator-prey dynamics (Operations Phase)	▪ Loss or alteration of Rusty Blackbird breeding habitat and foraging habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities; ▪ Maintenance activities involve vehicles travelling along roads resulting in injury or death of Rusty Blackbirds during operational phases; and ▪ Maintenance activities maintain predator access along mine access roads decreasing Rusty Blackbird survival.		
22	Northern Road Link Project	Olive-sided Flycatcher	▪ Changes to abundance and distribution of Olive-sided Flycatcher from habitat loss (Construction Phase) ▪ Injury or death of Olive-sided Flycatcher from changes to predator-prey dynamics (Operations Phase)	The Northern Road Link Project is assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with current and future road development have similar pathways of effects as those arising from the Project. This may include: ▪ Loss or alteration of Evening Grosbeak breeding habitat and foraging habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities; and ▪ Maintenance activities maintain predator access along roadway and access roads decreasing Evening Grosbeak survival.	35.86	0.03
		Rusty Blackbird	▪ Changes to abundance and distribution of Rusty Blackbird from habitat loss (Construction Phase) ▪ Injury or death of Rusty Blackbirds from collisions	The Northern Road Link Project is assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with current and future road development have similar pathways of	33.27	0.02

ID	RFD or Activity	Species	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Change in Habitat (ha)	Relative Change in the RSA (%)
			with vehicles (Operations Phase). ▪ Injury or death of Rusty Blackbird from changes to predator-prey dynamics (Operations Phase)	effects as those arising from the Project. This may include: ▪ Loss or alteration of Rusty Blackbird breeding habitat and foraging habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities; ▪ Maintenance activities involve vehicles travelling along roads resulting in injury or death of Rusty Blackbirds during operational phases; and ▪ Maintenance activities maintain predator access along roadway and access roads decreasing Rusty Blackbird survival.		
29	Black Thor, Blackbird, and Black Label Mineral deposits	Olive-sided Flycatcher	Changes to abundance and distribution of Olive-sided Flycatcher from habitat loss (Construction Phase) Injury or death of Olive-sided Flycatcher from changes to predator-prey dynamics (Operations Phase)	The Black Thor, Blackbird and Black Label Mineral deposits are assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Loss or alteration of Olive-sided Flycatcher breeding habitat and foraging habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities; and ▪ Maintenance activities maintain predator access along mine access roads decreasing Olive-sided Flycatcher survival	5.62	<0.01

ID	RFD or Activity	Species	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Change in Habitat (ha)	Relative Change in the RSA (%)
		Rusty Blackbird	▪ Changes to abundance and distribution of Rusty Blackbird from habitat loss (Construction Phase) ▪ Injury or death of Rusty Blackbirds from collisions with vehicles (Operations Phase) ▪ Injury or death of Rusty Blackbird from changes to predator-prey dynamics (Operations Phase)	The Black Thor, Blackbird and Black Label Mineral deposits are assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Loss or alteration of Rusty Blackbird breeding habitat and foraging habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities; ▪ Injury or death of Rusty Blackbirds from vehicles travelling along roads during the RFD's operational phase; and ▪ Maintenance activities maintain predator access along mine access roads decreasing Rusty Blackbird survival.	13.57	0.01
-	Climate Change	Olive-sided Flycatcher	Changes to abundance and distribution of Olive-sided Flycatcher from habitat loss (Construction Phase): ▪ Injury or death of Olive-sided Flycatcher from changes to predator-prey dynamics (Operations Phase)	Climate change can disrupt wetland hydrology through altered precipitation, increased droughts and floods, and shifts in snowmelt. In turn, water availability and wetland extent are impacted. Vegetation removal and new roads fragment these habitats and diminish their buffering capacity. Combined, these changes intensify wetland degradation and loss associated with the Project. Climate change can shift predator populations (e.g., expanding range expansions, increased abundance) and behaviors.	-	-

ID	RFD or Activity	Species	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Change in Habitat (ha)	Relative Change in the RSA (%)
		Rusty Blackbird	▪ Changes to abundance and distribution of Rusty Blackbird from habitat loss (Construction Phase) ▪ Injury or death of Rusty Blackbirds from collisions with vehicles (Operations Phase). Injury or death of Rusty Blackbird from changes to predator-prey dynamics (Operations Phase)			

21.4.8.5.4 Mitigation for Cumulative Effects

There are multiple Project-related interactions and pathways that result in changes to SAR wetland songbird habitat; however, they are associated with specific construction and operation phases of the Project and particular activities for which mitigation measures exist and are proven to be effective in minimizing and/or avoiding adverse effects. This is similarly applicable to other RFDs or future activities within the RSA.

With the implementation of the Project's mitigation measures (see Section 13.4) and the assumption that other, future potential projects or activities will be required to have the same or similar standards, it is anticipated that the cumulative effects on changes in SAR wetland songbird habitat such that successful rehabilitation with a capability relative to existing conditions would be prevented. Therefore, the identified cumulative effects are considered net cumulative effects and are discussed in the following subsection.

21.4.8.5.5 Characterization of Net Cumulative Effects

The net cumulative effects on SAR Wetland Songbirds and their habitats are characterized in **Table 21-65** using the criteria defined in Section 13.5.

Habitat Loss – Clearance Activities (Construction Phase)

Adverse effects from habitat loss are certain for SAR Wetland Birds through site preparation and construction activities as well as terrestrial vegetation changes during road construction. The effect from habitat loss will occur throughout the RSA as the RFDs are spatially located in both the LSA and RSA of the Project. The effects may be permanent or long-term depending on the effectiveness of reclamation efforts. Effects from RFDs, activities and the Project are expected to be continuous and irreversible in most cases. At the regional scale, the magnitude is expected to be low as existing breeding habitats are relatively common in the RSA. However, SAR Wetland Songbirds can be resilient in their habitat choices as many anthropogenically disturbed areas including clearings can be used by these species.

Injury or Death – Collisions with Vehicles (Operational Phase)

Negative effects from collisions with vehicles are certain for SAR Wetland Birds during the operational phases of projects, RFDs and activities. The effects of collisions will occur throughout the RSA as RFDs and activities are located spatially throughout the area. The effects are anticipated to be medium-term, ceasing shortly after project operations. The cumulative effect is considered to be moderate in magnitude and infrequent in occurrence. The effect is reversible once vehicles stop using the roads and anthropogenic features are reclaimed following the closure of projects, RFDs and activities.

Injury or Death – Changes to Predator -Prey Dynamics (Operational Phase)

Negative effects resulting from changes to predator-prey dynamics are certain for SAR Wetland Birds during the Operations Phase. The effect of predation could throughout the RSA as the RFDs are spatially located in both the LSA and RSA of the Project. Predation would occur throughout SAR Wetland Birds active seasons. The effects will be long-term as any anthropogenic features constructed for projects, RFDs or activities will be used by predators beyond their operational lifetimes. Predation events due to increase access are likely to be moderate in frequency as individuals use areas near roadways and access routes. The effect is reversible once anthropogenic features have regenerated following closure of the WSR or any RFD. The magnitude of the effect is predicted to be Moderate, as songbird predators are known to have increased success along edges.

Table 21-64: Wetland Songbirds at Risk – Characterization of Predicted Net Cumulative Effects

Predicted Net Cumulative Effect	Characterization Criteria								
	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Context	Reversibility	Likelihood of Occurrence
Olive-sided Flycatcher									
Habitat Loss – Clearance Activities (construction)	Negative	Moderate	RSA	All time periods	Permanent (roads), Long-term (other)	Frequent	Resilient	Irreversible	Certain
Injury or Death – Collisions with Vehicles (operations)	Negative	Moderate	RSA	All time periods	Medium-term	Infrequent	Resilient	Reversible	Probable
Injury or Death – Changes to Predator-Prey Dynamics (operations)	Negative	Moderate	RSA	All time periods	Long-term	Infrequent	Resilient	Reversible	Probable
Rusty Blackbird									
Habitat Loss – Clearance Activities (construction)	Negative	Low	RSA	All time periods	Permanent (roads), Long-term (other)	Frequent	Resilient	Irreversible	Certain
Injury or Death – Collisions with Vehicles (operations)	Negative	Moderate	RSA	All time periods	Medium-term	Infrequent	Resilient	Reversible	Probable
Injury or Death – Changes to Predator-Prey Dynamics (operations)	Negative	Moderate	RSA	All time periods	Long-term	Infrequent	Resilient	Reversible	Probable

21.4.8.5.6 Determination of Significance

The determination of significance of net cumulative effects on the Wetland Songbirds VC is based on the process of significance determination outlined in Section 13.6 for net effects. A predicted net cumulative effect is considered significant if it is evaluated as adverse, permanent, and of high magnitude, and if it negatively impacts species survival or reproduction at the population level to the extent that the population can no longer sustain itself.

Based on the results in **Table 21-66**, the net cumulative effects on the Wetland Songbirds VC is not significant.

Table 21-65: Wetland Songbirds at Risk – Characterization of Predicted Net Cumulative Effects

Predicted Cumulative Net Effect	Project Phase	Characterization Criteria								
		Magnitude	Geographic Extent	Timing	Duration	Frequency	Context	Reversibility	Likelihood of Occurrence	Significance
Habitat Loss – Clearance Activities	Construction	Moderate	RSA	All time periods	Permanent (roads), Long-term (other)	Frequent	Resilient	Irreversible	Certain	Not Significant
Injury or Death – Collisions with Vehicles	Operations	Moderate	RSA	Active Season (Sensitive)	Medium-term	Infrequent	Resilient	Reversible	Probable	Not Significant
Injury or Death – Changes to Predator-Prey Dynamics	Operations	Moderate	RSA	Active Season (Sensitive)	Long-term	Infrequent	Resilient	Reversible	Probable	Not Significant

21.4.8.6 Shorebirds At Risk

21.4.8.6.1 Past and Ongoing Effects

Following the "Interim Cumulative Effects Assessment Guidance Document," past, present, and ongoing RFDs and activities are considered to define existing conditions for cumulative effects. As such, the existing conditions outlined in Section 13 for the Shorebirds at Risk VC presently reflect the effects from these projects and activities within the RSA. **Table 21-1** identifies these projects and activities (IDs 1 to 18) and indicates where their effects spatially overlap with the RSA and the Project's net effects on the VC. Therefore, the cumulative effects assessment is focused on integrating the Project's net adverse effects with those of future RFDs and activities discussed in the following subsection.

21.4.8.6.2 Other Ongoing and Reasonably Foreseeable Projects or Activities

A list of the RFDs and activities that were considered for the cumulative effects assessment were presented in **Table 21-1** (ID's 19 to 39). Of the projects and activities listed in **Table 21-2**, only those listed in **Table 21-67** were identified as being probable to occur within and have potential net effects on the RSA for the Lesser Yellowlegs VC, therefore, have the potential to result in cumulative effects in the RSA.

Table 21-66: Shorebirds at Risk (Lesser Yellowlegs) – RFDs or Future Activities in the RSA

ID	RFD or Activity	Spatial Overlap of Net Effects	Temporal Overlap of Net Effects	Included in Cumulative Effects Analysis
19	Black Horse Project and Big Daddy Project	Yes	Yes	Yes
20	Eagle's Nest Project	Yes	Yes	Yes
22	Northern Road Link Project	Yes	Yes	Yes
29	Black Thor, Blackbird, and Black Label Mineral deposits	Yes	Yes	Yes
-	Winter Roads – Increased winter road traffic by future mining proponents	Yes	Yes	No
-	Climate Change	Yes	Yes	Yes

21.4.8.6.3 Cumulative Effects

Cumulative effects may occur where the net adverse effects of the Project and the net adverse effects of other RFDs or activities interact within the RSA boundary for the VC. The cumulative effects to VC may occur due to Project and RFDs and activities that overlap spatially and temporally.

Based on the Project Footprint for the WSR Project the cumulative effects on Lesser Yellowlegs and Lesser Yellowlegs habitat are:

- Habitat Loss – Clearance Activities (during the Construction Phase); and
- Injury or Death – Changes to Predator-Prey Dynamics.

As determined in the effects assessment, both effects (in terms of the WSR Project) are likely to extend into the LSA, have an adverse effect, are probable or certain to occur, and have a moderate magnitude. Other project effects on Lesser Yellowlegs and Lesser Yellowlegs habitat are possible, but do not meet

the criteria of this cumulative effects assessment and are unlikely to contribute significantly to the cumulative effects in the area (refer to Section 13.7).

Habitat Loss due to Clearance Activities

The construction of the road has the potential for direct and indirect effects that could cause the loss of Lesser Yellowlegs habitat through physical alteration and removal of suitable habitat. Not all construction activities are expected to be habitat losses; Lesser Yellowlegs can be found breeding on disturbed habitats like cleared areas from forestry and energy developments (MECP, 2024).

Lesser Yellowlegs in the eastern Canadian boreal nest primarily in drier areas surrounded by open wetlands, specifically large open fens with open waterbodies (COSEWIC, 2020). They also nest in raised open areas like regenerating burns that retain their wetland features (Cadman et al. 2007).

Based on the Project Footprint for the WSR Project the net effects to Lesser Yellowlegs and Lesser Yellowlegs breeding habitat are estimated to be 80.77 ha, or 0.23% of the available habitat in the RSA. Preferred Lesser Yellowlegs breeding habitat is common in the RSA making up 35233.6 ha or 26.42% of the total area.

Other RFDs would also result in the removal and alteration of suitable habitat for Lesser Yellowlegs. The Northern Road Link Project would have similar habitat loss impacts to the WSR Project within their 60 m wide vegetation clearances along the ROW. For the Black Horse Project and Big Daddy Project, Eagle's Nest Project and the Black Thor, Blackbird, and Black Label Mineral deposits impacts will depend on details of the mine construction techniques. Given the early stages of these projects, conservatively the entire mine lease or mine claim was used to encompass the deposit locations and considered a disturbance.

Drier conditions and reduced precipitation from climate change may impact wetland hydrology, worsening habitat loss from vegetation clearing and hindering habitat restoration. These combined effects can result in greater, more permanent habitat loss, posing a cumulative threat to Lesser Yellowlegs populations in the region.

The cumulative effects to Lesser Yellowlegs is approximately 1,134.34 ha, which represents 0.85% of the RSA, with suitable habitat remaining in 25.57% of the total area.

Injury or Death due to Changes to Predator-Prey Dynamics

The creation of new roads and the increased use of existing access roads for the Project could lead to in increased death and injury of Lesser Yellowlegs. Linear features are known to facilitate predator movement in the boreal (Dickie et al., 2017; Benoit-Pepin et al., 2024) and creation of new roads connected to human activity is known to spread predators into previously unoccupied areas (Lantham et al. 2011). Ground-nesting shorebirds, like Lesser Yellowlegs, are particularly vulnerable to mammal predators like red fox (Vulpes vulpes) and coyote which are known to spread via human infrastructure such as roads (MECP, 2024).

Warmer temperatures and milder winters can lead to increased survival and expansion of predator populations. For example, red fox and coyote may expand their range northward or become more abundant. Earlier springs or delayed winters can extend the active season for both predators and Lesser Yellowlegs, increasing the window of risk.

Road RFDs, such as the NRL Project, will have similar effects to the WSR Project as they will add to the linear network within the RSA and lead to increased injury and/or death of Lesser Yellowlegs. Mining RFDs will also create a network of linear features in addition to the mine footprint themselves. Their impact on Lesser Yellowlegs will depend on the configuration of mining roads, how they connect to the road network and which habitats they traverse.

Table 21-68 summarizes the other RFDs or future physical activities in the RSA that have the potential to contribute to changes to Lesser Yellowlegs and Lesser Yellowlegs habitat.

Table 21-67: Shorebirds at Risk (Lesser Yellowlegs) – Summary of Cumulative Effects

ID	RFD or Activity	Potential Cumulative Effects	VC-Specific Spatial / Temporal Considerations and Effect Pathways	Potential Change in Habitat (ha)	Relative Change in the RSA (%)
19	Black Horse Project and Big Daddy Project	▪ Changes to abundance and distribution of Lesser Yellowlegs from habitat loss (Construction Phase) ▪ Injury or death of Lesser Yellowlegs from changes to predator-prey dynamics (Operations Phase)	The Black Horse Project and Big Daddy Project are assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Loss or alteration of Lesser Yellowlegs breeding habitat and foraging habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities; and ▪ Maintenance activities maintain predator access along mine access roads decreasing Lesser Yellowlegs survival.	473.61	0.36
20	Eagle's Nest Project	▪ Changes to abundance and distribution of Lesser Yellowlegs from habitat loss (Construction Phase) ▪ Injury or death of Lesser Yellowlegs from changes to predator-prey dynamics (Operations Phase)	The Eagle's Nest Project is assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Loss or alteration of Lesser Yellowlegs breeding habitat and foraging habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities; and ▪ Maintenance activities maintain predator access along mine access roads decreasing Lesser Yellowlegs survival	653.61	0.49
22	Northern Road Link Project	▪ Changes to abundance and distribution of Lesser Yellowlegs from habitat loss (Construction Phase) ▪ Injury or death of Lesser Yellowlegs from changes to predator-prey dynamics (Operations Phase)	The Northern Road Link Project is assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with current and future road development have similar pathways of effects as those arising from the Project. This may include: ▪ Loss or alteration of Lesser Yellowlegs breeding habitat and foraging habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities; and ▪ Maintenance activities maintain predator access along roadway and access roads decreasing Lesser Yellowlegs survival.	2.05	<0.01

ID	RFD or Activity	Potential Cumulative Effects	VC-Specific Spatial / Temporal Considerations and Effect Pathways	Potential Change in Habitat (ha)	Relative Change in the RSA (%)
29	Black Thor, Blackbird, and Black Label Mineral deposits	▪ Changes to abundance and distribution of Lesser Yellowlegs from habitat loss (Construction Phase) ▪ Injury or death of Lesser Yellowlegs from changes to predator-prey dynamics (Operations Phase)	The Black Thor, Blackbird and Black Label Mineral deposits are assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. These effects may include: ▪ Loss or alteration of Lesser Yellowlegs breeding habitat and foraging habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities; and ▪ Maintenance activities maintain predator access along mine access roads decreasing Lesser Yellowlegs survival	3.83	<0.01
-	Climate Change	▪ Changes to abundance and distribution of Lesser Yellowlegs from habitat loss (Construction Phase) ▪ Injury or death of Lesser Yellowlegs from changes to predator-prey dynamics (Operations Phase)	Climate change acts cumulatively primarily by amplifying habitat loss and predation risks for the species: ▪ Alteration of wetland hydrology and vegetation, affecting breeding and foraging habitat availability and quality; ▪ Changes in predator populations and distribution, potentially increasing risk of predation; and ▪ Shifts in timing of migration and breeding, which may interact with construction and operational project phases. The cumulative effect of climate change, when combined with habitat loss and increased predation from project activities, may add stress on Lesser Yellowlegs populations, particularly if site restoration is slow or unsuccessful.	-	-

21.4.8.6.4 Mitigation for Cumulative Effects

There are multiple Project-related interactions and pathways that result in changes to Lesser Yellowlegs and Lesser Yellowlegs habitat; however, they are associated with specific construction and operation phases of the Project and particular activities for which mitigation measures exist that have proven to be effective in minimizing and/or avoiding adverse effects. This is similarly applicable to other RFDs or future activities within the RSA.

With the implementation of the Project's mitigation measures (see Section 13.4) and the assumption that other, future potential projects or activities will be required to have the same or similar standards, it is anticipated that the cumulative effects will not severely impact Lesser Yellowlegs breeding and foraging habitat availability. Additionally, the cumulative effects of changes to predator-prey dynamics are not expected to significantly increase Lesser Yellowlegs deaths or injuries with the implementation of mitigation measures. Therefore, the identified cumulative effects are considered net cumulative effects and are discussed in the following subsection.

21.4.8.6.5 Characterization of Net Cumulative Effects

The net cumulative effects on Lesser Yellowlegs are characterized in **Table 21-69** using the criteria defined in Section 13.5.

Habitat Loss due to Clearance Activities

Negative effects from habitat loss are certain for Lesser Yellowlegs through site preparation and construction activities as well as terrestrial vegetation changes during road construction. The effect from habitat loss will occur throughout the RSA as the RFDs are spatially located in both the LSA and RSA of the Project. The effects may be permanent or long-term depending on the effectiveness of reclamation efforts. As while some areas may re-establish quickly other areas such as roadbeds or mine footprints may be permanently altered. Effects from RFDs and the Project are expected to be continuous and irreversible in most cases. At the regional scale the magnitude is expected to be low as existing breeding habitats are relatively common in the RSA. However, Lesser Yellowlegs can be resilient in their habitat choices as many anthropogenically disturbed areas including clearings can be used by Lesser Yellowlegs.

Injury or Death due to Changes to Predator-Prey Dynamics

Negative effects on Lesser Yellowlegs survival from improved predator access and success rates is certain during the Operations Phase. The effect from predation will occur throughout the RSA as the RFDs are spatially located in both the LSA and RSA of the Project. Predation would occur throughout the Lesser Yellowlegs active season. The effects will be long-term as any anthropogenic features constructed for RFDs will be used by predators beyond operational lifetimes. Predation events due to increase access are likely to be low in frequency due to the cryptic nature of the Lesser Yellowlegs and few individuals will be using areas near roadways. The effect is reversible once anthropogenic features have regenerated following closure of the WSR or any RFD. The magnitude of the effect is predicted to be Moderate, as shorebird predators are known to have increased success along edges.

Table 21-68: Shorebirds at Risk (Lesser Yellowlegs) – Characterization of Predicted Net Cumulative Effects

Predicted Net Cumulative Effect	Characterization Criteria								
	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Context	Reversibility	Likelihood of Occurrence
Habitat Loss – Clearance Activities (construction)	Negative	Low	RSA	All Time Periods	Permanent	Continuous	Resilient	Irreversible	Certain
Injury/Death – Changes to Predator-Prey Dynamics (operations)	Negative	Moderate	RSA	All Time Periods	Long-term	Infrequent	Resilient	Reversible	Certain

21.4.8.6.6 Determination of Significance

The determination of significance of net cumulative effects on the Lesser Yellowlegs VC is based on the process of significance determination outlined in Section 13.6 for net effects. A predicted net cumulative effect is considered significant if it is evaluated as adverse, permanent, and of high magnitude, and if it negatively impacts species survival or reproduction at the population level to the extent that the population can no longer sustain itself.

Based on the results in **Table 21-69** and **Table 21-70**, net cumulative effects on the Lesser Yellowlegs VC are not considered significant.

Table 21-69: Shorebirds at Risk – Characterization of Predicted Net Cumulative Effects

Predicted Net Cumulative Effect	Project Phase	Key Criteria and Scores								
		Magnitude	Geographic Extent	Timing	Duration	Frequency	Context	Reversibility	Likelihood of Occurrence	Significance
Habitat Loss – Clearance Activities	Construction	Low	RSA	All Time Periods	Permanent	Continuous	Resilient	Irreversible	Certain	Not Significant
Injury or Death – Changes to Predator-Prey Dynamics	Operations	Moderate	RSA	All Time Periods	Long-term	Infrequent	Resilient	Reversible	Certain	Not Significant

21.4.8.7 Common Nighthawk

21.4.8.7.1 Past and Ongoing Effects

Following the "Interim Cumulative Effects Assessment Guidance Document," past, present, and ongoing RFDs and activities are considered to define existing conditions for cumulative effects. As such, the existing conditions outlined in Section 13 for the Common Nighthawk VC presently reflect the effects from these projects and activities within the RSA. **Table 21-1** identifies these projects and activities (IDs 1 to 18) and indicates where their effects spatially overlap with the RSA and the Project's net effects on the VC. Therefore, the cumulative effects assessment is focused on integrating the Project's net adverse effects with those of future RFDs and activities discussed in the following subsection.

21.4.8.7.2 Other Ongoing and Reasonably Foreseeable Projects or Activities

A list of the RFDs and activities that were considered for the cumulative effects assessment were presented in **Table 21-1** (ID's 19 to 39). Of the RFDs and activities listed in **Table 21-2**, only those listed in **Table 21-71** were identified as being probable to occur within the RSA and have potential net effects on the RSA for the Common Nighthawk VC. These RFDs and activities therefore have the potential to result in net cumulative effects in the RSA.

Table 21-70: Common Nighthawk – RFDs or Future Activities in the RSA

ID	RFD or Activity	Spatial Overlap of Net Effects	Temporal Overlap of Net Effects	Included in Cumulative Effects Analysis
19	Black Horse Project and Big Daddy Project	Yes	Yes	Yes, for all effects
20	Eagle's Nest Project	Yes	Yes	Yes, for all effects
22	Northern Road Link Project	Yes	Yes	Yes, for all effects
29	Black Thor, Blackbird, and Black Label Mineral deposits	Yes	Yes	Yes, for all effects
-	Climate Change	Yes	Yes	Yes, for all effects

21.4.8.7.3 Cumulative Effects

Cumulative effects may occur where the net adverse effects of the Project and the net adverse effects of other RFDs or activities interact within the RSA boundary for the VC. The cumulative effects to VC may occur due to Project and RFDs and activities that overlap spatially and temporally.

Based on the Project Footprint for the WSR Project, the cumulative effects to the Common Nighthawk VC are:

- Habitat Loss – Clearance Activities (during the Construction Phase); and
- Injury or Death – Collisions with Vehicles (during the Operations Phase).

As determined in the assessment, both of these net effects (in terms of the WSR Project) are likely to extend into the LSA, have an adverse effect, are probable or certain to occur, and have a moderate magnitude. Other project effects on Common Nighthawk and Common Nighthawk Habitat are possible, but do not meet the criteria of this cumulative effects assessment and are unlikely to contribute significantly to the cumulative effects in the area (refer to Section 13.7).

Habitat Loss

The construction of the road has the potential for direct and indirect effects that could cause the loss of Common Nighthawk habitat through physical alteration and removal of suitable habitat. Not all construction activities are expected to be habitat losses; Common Nighthawk use disturbed areas like gravel roads, road verges, gravel pits, laydowns and pipelines (Brigham et al. 2011). Temporary clearings will provide additional Common Nighthawk habitat, at least in the short-term, and creation of the quarries will likely add habitat in the long-term.

In terms of habitat loss, breeding and foraging habitat can be described separately for Common Nighthawk. In the boreal, Common Nighthawks are often disturbance specialists using post-burn habitats as well as rocky outcrops, dry bogs and pine forests for breeding (COSEWIC, 2018). In terms of foraging habitat, Common Nighthawks are more generalists, congregating in areas where large numbers of aerial insects are available such as riparian areas and large wetlands (Brigham et al. 2011).

Based on the Project Footprint for the WSR Project the net effects to Common Nighthawk and Common Nighthawk breeding habitat are estimated to be 9.61 ha, or 3.6% of the available habitat in the RSA. Preferred Common Nighthawk breeding habitat is rare in the RSA only making up 270.1 ha or 0.2% of the total area. For foraging Common Nighthawks will use any open habitats including riparian, shrublands, open and semi-open peatlands. The net effects to Common Nighthawk and Common Nighthawk foraging habitat are estimated to be 91.62 ha or 0.28% of the available foraging habitat in the RSA.

Other RFDs would also result in the removal and alteration of suitable habitat for Common Nighthawk. The Northern Road Link Project would have similar habitat loss impacts to the WSR Project within their 100 m ROW (assumed 60 m wide zone of cleared vegetation). For the Black Horse Project and Big Daddy Project, Eagle's Nest Project and the Black Thor, Blackbird, and Black Label Mineral deposits impacts will depend on details of the mine construction techniques. Given the early stages of these projects, conservatively the entire mine lease or mine claim was used to encompass the deposit locations and is considered a disturbance.

Changes in climate such as increased frequency of extreme weather, altered hydrological regimes and increased daily temperatures, combined with habitat loss attributed to the Project, has the potential to affect the resilience of Common Nighthawk populations. The effects of climate change may result in changes in vegetation communities, abundance of insect populations which have an effect on conditions related to breeding success and foraging.

The cumulative effects to Common Nighthawk breeding habitat is approximately 124.25 ha, which represents 0.09% of the RSA, or 46% currently available to the species The cumulative effects to Common Nighthawk foraging habitat is approximately 1,388.83 ha, which represents 1.04% of the RSA.

Table 21-72 summarizes the other RFDs or future physical activities in the RSA that have the potential to contribute to changes to the Common Nighthawk VC.

Table 21-71: Common Nighthawk – Summary of Cumulative Effects

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Habitat Loss (ha)	Relative Change in the RSA (%)
19	Black Horse Project and Big Daddy Project	▪ Changes to abundance and distribution of Common Nighthawk from habitat loss (Construction Phase) ▪ Injury or Death of Common Nighthawk from vehicle collisions (Operations Phase)	The Black Horse Project and Big Daddy Project are assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. This may include: ▪ Loss or alteration of Common Nighthawk breeding habitat and foraging habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities; and ▪ Increased injury or death of Common Nighthawks due to collisions with vehicles and equipment on roads or at mine sites.	Breeding: 0 Foraging: 473.61	Breeding: 0 Foraging: 0.36
20	Eagle's Nest Project	▪ Changes to abundance and distribution of Common Nighthawk ▪ Changes to survival of Common Nighthawk Common	The Eagle's Nest project is assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. This may include: ▪ Loss or alteration of Common Nighthawk breeding habitat and foraging habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities; and ▪ Increased injury or death of Common Nighthawks due to collisions with vehicles and equipment on roads or at mine sites.	Breeding: 124.25 Foraging: 907.86	Breeding: 0.09 Foraging: 0.68
22	Northern Road Link Project	▪ Changes to abundance and distribution of Common Nighthawk ▪ Changes to survival of Common Nighthawk	The Northern Road Link Project is assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with current and future road development have similar pathways of effects as those arising from the Project. This may include: ▪ Loss or alteration of Common Nighthawk breeding habitat and foraging habitat from vegetation removal, grubbing, and/or other	Breeding: 0 Foraging: 2.29	Breeding: 0 Foraging: <0.01

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Habitat Loss (ha)	Relative Change in the RSA (%)
			construction activities that permanently remove suitable vegetation communities; and ▪ Increased injury or death of Common Nighthawks due to collisions with vehicles and equipment on roads or at construction sites.		
29	Black Thor, Blackbird, and Black Label Mineral deposits	▪ Changes to abundance and distribution of Common Nighthawk ▪ Changes to survival of Common Nighthawk	The Black Thor, Blackbird, and Black Label Mineral deposits are assumed to spatially overlap with Project activities based on the information available.; however, the temporal overlap is uncertain based on the current information and status of the development (on hold). Activities associated with any future mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. This may include: ▪ Loss or alteration of Common Nighthawk breeding habitat and foraging habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities; and ▪ Increased injury or death of Common Nighthawks due to collisions with vehicles and equipment on roads or at mine sites.	Breeding: 0 Foraging: 3.83	Breeding: 0 Foraging: <0.01
-	Climate Change	▪ Changes to abundance and distribution of Common Nighthawk ▪ Changes to survival of Common Nighthawk	Changes in climate may exacerbate the loss and fragmentation of suitable habitats attributed to the Project and other RFDs. Adverse climate trends (e.g., increased frequency of extreme weather, altered food availability) may reduce the resilience of species populations already stressed by habitat loss and increased mortality risks	-	-

21.4.8.7.4 Mitigation for Cumulative Effects

There are multiple Project-related interactions and pathways that result in changes to Common Nighthawk and Common Nighthawk habitat; however, they are associated with specific construction and operation phases of the Project and particular activities for which mitigation measures exist and are proven to be effective in minimizing and/or avoiding adverse effects. This is similarly applicable to other RFDs or future activities within the RSA.

With the implementation of the Project's mitigation measures (see Section 13.4) and the assumption that other, future potential projects or activities will be required to have the same or similar standards, it is anticipated that the cumulative effects will not severely impact Common Nighthawk breeding and foraging habitat availability. Additionally, cumulative effects of increased road traffic are not expected to significantly increase Common Nighthawk deaths or injuries with the implementation of mitigation measures. Therefore, the identified cumulative effects are considered net cumulative effects and are discussed in the following subsection.

21.4.8.7.5 Characterization of Net Cumulative Effects

The net cumulative effects on Common Nighthawk are characterized in **Table 21-73** using the criteria defined in Section 13.5.

Habitat Loss – Clearance Activities

Negative effects from habitat loss are certain for Common Nighthawk through site preparation and construction activities as well as terrestrial vegetation changes during road construction and operations. The effect from habitat loss will occur throughout the RSA as the RFDs are spatially located in both the LSA and RSA of the Project. The effects may be permanent or long-term depending on the effectiveness of reclamation efforts. As while some areas may re-establish quickly other areas such as roadbeds or mine footprints may be permanently altered. Effects from RFDs and the Project are expected to be continuous and irreversible in most cases. At the regional scale the magnitude is expected to be moderate as existing breeding habitats are relatively rare in the RSA. However Common Nighthawks can be resilient in their habitat choices as many anthropogenically disturbed areas including clearings and quarries can be used by Common Nighthawk.

Injury or Death – Collisions with Vehicles

Negative effects on mortality from collisions during the operational phase is certain and occurring throughout Common Nighthawk active season where the road intersects breeding, roosting and foraging habitats. These effects will occur throughout the RSA as the RFDs are spatially located in both the LSA and RSA of the Project. The context is moderate as Common Nighthawks are known to be sensitive to collisions to due their roosting and foraging behaviours. If other RFDs pave their roads like the Project, the effect may be reduced. The effect would be long-term lasting as long as the RFDs roads are active with the effect being reversible following the closure of the RFDs. At the regional scale collisions are still expected to occur infrequently but have a moderate magnitude as local populations may be measurably affected.

Table 21-72: Common Nighthawk – Characterization of Predicted Net Cumulative Effects

Predicted Net Cumulative Effect	Characterization Criteria								
	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Context	Reversibility	Likelihood of Occurrence
Habitat Loss due to Clearance Activities	Negative	Moderate	RSA	All Time Periods	Long-term or Permanent	Continuous	Resilient due to ability to use many disturbed habitats	Irreversible	Certain
Injury or Death due to Collisions with Vehicles	Negative	Moderate	RSA	During Common Nighthawk active season	Long-term	Infrequent	Moderate due to use of roads by male Common Nighthawks	Reversible	Certain

21.4.8.7.6 Determination of Significance

The determination of significance of net cumulative effects on the Common Nighthawk VC is based on the process of significance determination outlined in Section 13.6 for net effects. A predicted net cumulative effect is considered significant if it is evaluated as adverse, permanent, and of high magnitude, and if it negatively impacts species survival or reproduction at the population level to the extent that the population can no longer sustain itself.

Based on the results in **Table 21-74** the net cumulative effects on the Common Nighthawk VC are considered significant for Habitat Loss due to Clearance Activities, and not significant for Injury or Death due to Collisions with Vehicles.

Table 21-73: Common Nighthawk – Characterization of the Predicted Net Cumulative Effects

Predicted Net Effect	Project Phase	Characterization Criteria								
		Magnitude	Geographic Extent	Timing	Duration	Frequency	Context	Reversibility	Likelihood of Occurrence	Significance
Habitat Loss – Clearance Activities	Construction	Moderate	RSA	All Time Periods	Long-term to Permanent	Continuous	Resilient due to ability to use many disturbed habitats	Irreversible	Certain	Significant
Injury or Death – Collisions with Vehicles	Operations	Moderate	RSA	During Common Nighthawk active season	Long-term	Infrequent	Moderate due to use of roads by male Common Nighthawks	Reversible	Certain	Not Significant

21.4.8.8 Bald Eagle

21.4.8.8.1 Past and Ongoing Effects

Following the "Interim Cumulative Effects Assessment Guidance Document," past, present, and ongoing RFDs and activities are considered to define existing conditions for cumulative effects. As such, the existing conditions outlined in Section 13 for the Bald Eagle VC presently reflect the effects from these projects and activities within the RSA. **Table 21-1** identifies these projects and activities (IDs 1 to 18) and indicates where their effects spatially overlap with the RSA and the Project's net effects on the VC. Therefore, the cumulative effects assessment is focused on integrating the Project's net adverse effects with those of future RFDs and activities discussed in the following subsection.

21.4.8.8.2 Other Ongoing and Reasonably Foreseeable Projects or Activities

A list of the RFDs and activities that were considered for the cumulative effects assessment were presented in **Table 21-1** (ID's 19 to 39). Of the projects and activities listed in **Table 21-2**, only those listed in **Table 21-75** were identified as being probable to occur within and have potential net effects on the RSA for the Bald Eagle VC, therefore, have the potential to result in cumulative effects in the RSA.

Table 21-74: Bald Eagle – RFDs or Future Activities in the RSA

ID	RFD or Activity	Spatial Overlap of Net Effects	Temporal Overlap of Net Effects	Included in Cumulative Effects Analysis
19	Black Horse Project and Big Daddy Project	Yes	Yes	Yes
20	Eagle's Nest Project	Yes	Yes	Yes
22	Northern Road Link Project	Yes	Yes	Yes
29	Black Thor, Blackbird, and Black Label Mineral deposits	Yes	Yes	Yes
-	Winter Roads – Increased winter road traffic by future mining proponents	Yes	Yes	No
-	Climate Change	Yes	Yes	Yes

21.4.8.8.3 Cumulative Effects

Cumulative effects may occur where the net adverse effects of the Project and the net adverse effects of other RFDs or activities interact within the RSA boundary for the VC. The cumulative effects to VC may occur due to Project and RFDs and activities that overlap spatially and temporally.

Based on the Project Footprint for the WSR Project the cumulative effects on Bald Eagle and Bald Eagle habitat are:

- Habitat Loss – Clearance Activities (during the Construction Phase).

As determined in the effects assessment, the effect from habitat loss (in terms of the WSR Project) is likely to extend into the LSA, have an adverse effect, is certain to occur, and is a moderate magnitude. Other project effects on Bald Eagle and Bald Eagle habitat are possible, but do not meet the criteria of this cumulative effects assessment and are unlikely to contribute significantly to the cumulative effects in the area (refer to Section13.7).

Habitat Loss

The construction of the road has the potential for direct and indirect effects that could cause the loss of Bald Eagle habitat through physical alteration and removal of suitable habitat. Bald Eagles breed in forested areas adjacent to large bodies of water or large rivers; the nest tree is typically one of the largest in the habitat that has limbs capable of supporting a nest. In northwestern Ontario, nests are typically between 6 and 200 m from the water's edge, averaging 23 to 65 m from the shoreline (Hackl, 1994; Jones, 1995). For foraging, preferred foraging habitats are rivers, lakes and estuaries. Large bodies of water are preferred over small streams and ponds, but all open aquatic habitats were considered Bald Eagle habitat for the purpose of the Cumulative Effects Assessment.

Based on the Project Footprint for the WSR Project, the net effects to Bald Eagle and Bald Eagle breeding habitat are estimated to be 166.23 ha, or 1.8% of the available habitat in the RSA. Preferred Bald Eagle breeding habitat is relatively rare in the RSA only making up 8,939 ha or 6.9% of the total area. For foraging Bald Eagles were conservatively assumed to use any open water habitats. The net effects to Bald Eagle and Bald Eagle foraging habitat is estimated to be 1.92 ha or 0.01% of the available foraging habitat in the RSA. Preferred Bald Eagle foraging habitat is relatively common in the RSA at 16,685 ha or 12.5% of the total area.

Other RFDs would also result in the removal and alteration of suitable habitat for Bald Eagle. The Northern Road Link Project would have similar habitat loss impacts to the WSR Project within their 100 m ROW (with an assumed 60 m wide clearance area). For the Black Horse Project and Big Daddy Project, Eagle's Nest Project and the Black Thor, Blackbird, and Black Label Mineral deposits impacts will depend on details of the mine construction techniques. Given the early stages of these projects, conservatively the entire mine lease or mine claim was used to encompass the deposit locations and is considered a disturbance.

Climate change could act cumulatively with the Project by compounding habitat loss and altering forest composition and structure that are suitable for Bald Eagle breeding. Warmer temperatures can alter forest composition which would affect the growth and survival trees needed for Bald Eagle nesting. Changes in the freeze-thaw cycles may impact the stability of nest trees and the timing of Bald Eagle breeding.

Extreme weather linked to climate change can lower nest success and juvenile survival. Changes in rainfall and snowmelt shift water levels and impact foraging habitats. Warmer waters and altered hydrology affect fish and aquatic food webs, limiting foraging. Frequent droughts or floods may further reduce fish availability, a key food source for Bald Eagles.

The cumulative effects to Bald Eagle breeding habitat is approximately 836.03 ha (0.63% of the RSA), leaving 90.6% of the existing breeding habitat in the RSA intact. The cumulative effects to Bald Eagle foraging habitat is approximately 148.74 ha, which represents 0.11% of the RSA, meaning 99.1% of suitable foraging habitat in the RSA will remain unaffected.

Table 21-76 summarizes the other RFDs or future physical activities in the RSA that have the potential to contribute to changes to Bald Eagle and Bald Eagle habitat.

Table 21-75: Bald Eagle – Summary of Cumulative Effects

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Habitat Loss (ha)	Relative Change in the RSA (%)
19	Black Horse Project and Big Daddy Project	▪ Changes to abundance and distribution of Bald Eagle from habitat loss (Construction Phase)	The Black Horse Project and Big Daddy Project are assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. This may include: ▪ Loss or alteration of Bald Eagle breeding habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities.	Breeding: 8.88 Foraging: 10.58	Breeding: 0.01 Foraging: 0.01
20	Eagle's Nest Project	▪ Changes to abundance and distribution of Bald Eagle from habitat loss (Construction Phase)	The Eagle's Nest project is assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. This may include: ▪ Loss or alteration of Bald Eagle breeding habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities.	Breeding: 823.5 Foraging: 137.93	Breeding: 0.62 Foraging: 0.10
22	Northern Road Link Project	▪ Changes to abundance and distribution of Bald Eagle from habitat loss (Construction Phase)	The Northern Road Link Project is assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with current and future road development have similar pathways of effects as those arising from the Project. This may include: ▪ Loss or alteration of Bald Eagle breeding habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities.	Breeding: 3.66 Foraging: 0.24	Breeding: <0.01 Foraging: <0.01
29	Black Thor, Blackbird, and Black Label Mineral deposits	▪ Changes to abundance and distribution of Bald Eagle from habitat loss (Construction Phase)	The Black Thor, Blackbird, and Black Label Mineral deposits are assumed to spatially overlap with Project activities based on the information available.; however, the temporal overlap is uncertain based on the current information and status of the development (on hold). Activities associated with any future mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. This may include: ▪ Loss or alteration of Bald Eagle breeding habitat and foraging habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities.	Breeding: 0	Breeding: 0

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Habitat Loss (ha)	Relative Change in the RSA (%)
-	Climate Change	▪ Changes to abundance and distribution of Bald Eagle from habitat loss (Construction Phase)	Climate change acts cumulatively with direct habitat loss from WSR by altering forest and aquatic ecosystems, increasing the frequency of extreme events, and reducing the resilience and recovery of Bald Eagle habitats. These factors can lead to long-term declines in habitat quality and availability, affecting Bald Eagle abundance and distribution	-	-

21.4.8.8.4 Mitigation for Cumulative Effects

There are multiple Project-related interactions and pathways that result in changes to Bald Eagle and Bald Eagle habitat; however, they are associated with specific construction and operation phases of the Project and particular activities for which mitigation measures exist and are proven to be effective in minimizing and/or avoiding adverse effects. This is similarly applicable to other RFDs or future activities within the RSA.

With the implementation of the Project's mitigation measures (see Section 13.4) and the assumption that other, future potential projects or activities will be required to have the same or similar standards, it is anticipated that the cumulative effects will not severely impact Bald Eagle breeding and foraging habitat availability. Therefore, the identified cumulative effects are considered net cumulative effects and are discussed in the following subsection.

21.4.8.8.5 Characterization of Net Cumulative Effects

The net cumulative effects on Bald Eagle are characterized in **Table 21-77** using the criteria defined in Section 13.5.

Habitat Loss

Negative effects from habitat loss are certain for Bald Eagle through site preparation and construction activities as well as terrestrial vegetation changes during road construction and operations. The effect from habitat loss will occur throughout the RSA as the RFDs are spatially located in both the LSA and RSA of the Project. The effects may be permanent or long-term depending on the effectiveness of reclamation efforts. As while some areas may re-establish quickly other areas such as roadbeds or mine footprints may be permanently altered. Even if restoration efforts are successful, given Bald Eagle's requirements for super-canopy trees for breeding, the timeframe for these areas to be used as breeding habitats is likely beyond a century and context was assigned as moderate. Effects from RFDs and the Project are expected to be continuous and irreversible in most cases. At the regional scale the magnitude is expected to be moderate as existing breeding habitats are relatively rare in the RSA. At the regional scale the magnitude is expected to be moderate as existing breeding habitats are limited in the RSA, comprising just 6.7% (8,939 ha) of the RSA.

21.4.8.8.6 Determination of Significance

The determination of significance of net cumulative effects on the Bald Eagle VC is based on the process of significance determination outlined in Section 13.6 for net effects. A predicted net cumulative effect is considered significant if it is evaluated as adverse, permanent, and of high magnitude, and if it negatively impacts species survival or reproduction at the population level to the extent that the population can no longer sustain itself.

Based on the results in **Table 21-77** the net cumulative effect on Bald Eagle breeding habitat is considered significant.

Table 21-76: Bald Eagle – Characterization of Predicted Net Cumulative Effects

Predicted Net Cumulative Effect	Characterization Criteria								
	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Context	Reversibility	Likelihood of Occurrence
Habitat Loss due to Clearance Activities	Negative	Moderate	RSA	All Time Periods	Long-term/ Permanent	Continuous	Moderate Due to the need for super-canopy trees	Irreversible	Certain

21.4.8.9 Short-eared Owl

21.4.8.9.1 Past and Ongoing Effects

Following the "Interim Cumulative Effects Assessment Guidance Document," past, present, and ongoing RFDs and activities are considered to define existing conditions for cumulative effects. As such, the existing conditions outlined in Section 13 for the Short-eared Owl VC presently reflect the effects from these projects and activities within the RSA. **Table 21-1** identifies these projects and activities (IDs 1 to 18) and indicates where their effects spatially overlap with the RSA and the Project's net effects on the VC. Therefore, the cumulative effects assessment is focused on integrating the Project's net adverse effects with those of future RFDs and activities discussed in the following subsection.

21.4.8.9.2 Other Ongoing and Reasonably Foreseeable Projects or Activities

A list of the RFDs and activities that were considered for the cumulative effects assessment were presented in **Table 21-2** (ID's 19 to 39). Of the projects and activities listed in **Table 21-2**, only those listed in **Table 21-78** were identified as being probable to occur within and have potential net effects on the RSA for the Short-eared Owl VC. As such, these projects have the potential to result in net cumulative effects in the RSA.

Table 21-77: Short-eared Owl – RFDs or Future Activities in the RSA

ID	RFD or Activity	Spatial Overlap of Net Effects	Temporal Overlap of Net Effects	Included in Cumulative Effects Analysis
19	Black Horse Project and Big Daddy Project	Yes	Yes	Yes
20	Eagle's Nest Project	Yes	Yes	Yes
22	Northern Road Link Project	Yes	Yes	Yes
29	Black Thor, Blackbird, and Black Label Mineral deposits	Yes	Yes	Yes
-	Winter Roads – Increased winter road traffic by future mining proponents	Yes	Yes	No
-	Climate Change	Yes	Yes	Yes

21.4.8.9.3 Cumulative Effects

Cumulative effects may occur where the net adverse effects of the Project and the net adverse effects of other RFDs or activities interact within the RSA boundary for the VC. The cumulative effects to VC may occur due to Project and RFDs and activities that overlap spatially and temporally.

Based on the Project Footprint for the WSR Project the cumulative effects on Short-eared Owl and Short-eared Owl habitat are estimated to be:

- Habitat Loss – Clearance Activities (during the Construction Phase); and
- Injury or Death – Collisions with Vehicles.

As determined in the effects assessment, the effect from habitat loss (in terms of the WSR Project) is likely to extend into the LSA, have an adverse effect, is certain to occur, and is a moderate magnitude. Other project effects on Short-eared Owl and Short-eared Owl habitat are possible, but do not meet the criteria of this cumulative effects assessment and are unlikely to contribute significantly to the cumulative effects in the area (refer to Section 13.7).

Habitat Loss – Clearance Activities

The construction of the road has the potential for direct and indirect effects that could cause the loss of Short-eared Owl habitat through physical alteration and removal of suitable habitat. Not all construction activities are expected to be habitat losses; Short-eared Owl may use disturbed areas like clearings, laydowns and pipelines. Temporary clearings will provide additional Short-eared Owl habitat, at least in the short-term. Short-eared Owls favour open habitats for nesting and hunting including fens, bogs and burns, and as such the limiting habitat feature would be nesting locations on dry ground near taller vegetation. Additionally, conifers adjacent to open areas are used during the winter for roosting adjacent to open areas (COSEWIC, 2021).

Based on the Project Footprint for the WSR Project, the net effects to Short-eared Owl and Short-eared Owl breeding habitat are estimated to be 166.23 ha, or 1.8% of the available habitat in the RSA. Preferred Short-eared Owl breeding habitat is relatively rare in the RSA only making up 8,939 ha or 6.9% of the total area. For foraging Short-eared Owls were conservatively assumed to use any open water habitats. The net effects to Short-eared Owl and Short-eared Owl foraging habitat is estimated to be 1.92 ha or 0.01% of the available foraging habitat in the RSA. Preferred Short-eared Owl foraging habitat is relatively common in the RSA at 16,685 ha or 12.5% of the total area.

Other RFDs would also result in the removal and alteration of suitable habitat for Short-eared Owl. The Northern Road Link Project would have similar habitat loss impacts to the WSR Project within their 100 m ROW. For the Black Horse Project and Big Daddy Project, Eagle's Nest Project and the Black Thor, Blackbird, and Black Label Mineral deposits impacts will depend on details of the mine construction techniques. Given the early stages of these projects, conservatively the entire mine claim was used to encompass the deposit locations and is considered a disturbance.

Vegetation clearing is a direct pathway through which the Project and RFDs contribute to habitat loss and degradation for Short-eared Owl. Climate change acts as an additional stressor through changes in temperature and precipitation patterns. These changes can alter vegetation communities, hydrology, and the availability of habitats (such as fens, bogs, and burns) that are preferred for behaviours such as nesting and hunting.

The cumulative effects to Short-eared Owl breeding and foraging habitat is approximately 527.73 ha, which represents 0.4% of the available habitat within the RSA.

Injury or Death – Collisions with Vehicles

Movement of construction equipment and vehicles within WSR Project Footprint could result in increased death and injury of Short-eared Owl. During Construction vehicles will be travelling between camps and construction locations; these trips could occur at all hours and encounters with birds would not be unexpected. During operations most traffic is anticipated during the day. Collisions can be of particular importance for Short-eared Owls as they often fly low across roads while hunting (Fajardo et al. 1994). In Ontario between 1970-2018, 80% of Short-eared Owls admitted to the Owl Foundation for treatment had injuries either confirmed or likely sustained from collision with a vehicle (COSEWIC, 2021). Traffic speed is of particular importance with higher speeds resulting in increased deaths for owls (Gagné et al., 2015) and collision are expected to be higher during the Operations Phase.

The creation of new and increased use of existing winter access roads for RFDs could lead to in increased death and injury of Short-eared Owl. On mining RFDs collisions may be more likely to occur during construction than operations due to the higher number of vehicles being required and the anticipation that construction vehicles will be travelling between camps and construction locations during all hours. However, this will depend on the configuration of mining roads, how they connect to the road network and which habitats they traverse, as well as how movement of material and personnel at the mines are organized.

Climate change may indirectly increase mortality risks by influencing owl behavior such as changes in migration timing, foraging patterns, or by altering prey availability. This may drive owls into riskier areas or make them crossroads more often. Extreme weather events associated with climate change may also increase stress and susceptibility to injury

Table 21-79 summarizes the other RFDs or future physical activities in the RSA that have the potential to contribute to changes to Short-eared Owl and Short-eared Owl habitat.

Table 21-78: Short-eared Owl – Summary of Cumulative Effects

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Habitat Loss (ha)	Relative Change in the RSA (%)
19	Black Horse Project and Big Daddy Project	▪ Changes to abundance and distribution of Short-eared Owl from habitat loss (Construction Phase)	The Black Horse Project and Big Daddy Project are assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. This may include: ▪ Loss or alteration of Short-eared Owl breeding habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities; and ▪ Increased injury or death of Short-eared Owl due to collisions with vehicles and equipment on roads or at mine sites.	Breeding: 256.84	Breeding: 0.19
20	Eagle's Nest Project	▪ Changes to abundance and distribution of Short-eared Owl from habitat loss (Construction Phase)	The Eagle's Nest project is assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. This may include: ▪ Loss or alteration of Short-eared Owl breeding habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities; and ▪ Increased injury or death of Short-eared Owl due to collisions with vehicles and equipment on roads or at mine sites.	Breeding: 269.03	Breeding: 0.20
22	Northern Road Link Project	▪ Changes to abundance and distribution of Short-eared Owl from habitat loss (Construction Phase)	The Northern Road Link Project is assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with current and future road development have similar pathways of effects as those arising from the Project. This may include: ▪ Loss or alteration of Short-eared Owl breeding habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities; and ▪ Increased injury or death due to collisions with vehicles and equipment on roads or at construction sites.	Breeding: 1.03	Breeding: <0.01

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Habitat Loss (ha)	Relative Change in the RSA (%)
29	Black Thor, Blackbird, and Black Label Mineral deposits	▪ Changes to abundance and distribution of Short-eared Owl from habitat loss (Construction Phase)	The Black Thor, Blackbird, and Black Label Mineral deposits are assumed to spatially overlap with Project activities based on the information available.; however, the temporal overlap is uncertain based on the current information and status of the development (on hold). Activities associated with any future mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. This may include: ▪ Loss or alteration of Short-eared Owl breeding habitat and foraging habitat from vegetation removal, grubbing, and/or other construction activities that permanently remove suitable vegetation communities; and ▪ Increased injury or death of Short-eared Owl due to collisions with vehicles and equipment on roads or at mine sites.	Breeding: 0.42	Breeding: <0.01
-	Climate Change	▪ Changes to abundance and distribution of Short-eared Owl from habitat loss (Construction Phase) ▪ Increased risk of mortality or injury from vehicular collision	Climate change can further exacerbate habitat loss and degradation by altering vegetation communities, hydrology, and the availability of habitat (fens, bogs, burns) that Short-eared Owls prefer for nesting and hunting. Climate change may indirectly increase mortality risks by influencing owl behavior (e.g., changes in migration timing, foraging patterns) or by altering prey availability, which could drive owls to riskier habitats or crossroads more frequently. Extreme weather events associated with climate change may also increase stress and susceptibility to injury.	-	-

21.4.8.9.4 Mitigation for Cumulative Effects

There are multiple Project-related interactions and pathways that result in changes to Short-eared Owl and Short-eared Owl habitat; however, they are associated with specific Construction and Operation Phases of the Project and particular activities for which mitigation measures exist and are proven to be effective in minimizing and/or avoiding adverse effects. This is similarly applicable to other RFDs or future activities within the RSA.

With the implementation of the Project's mitigation measures (see Section 13.4) and the assumption that other, future potential projects or activities will be required to have the same or similar standards, it is anticipated that the cumulative effects will not impact Short-eared Owl breeding and foraging habitat availability. Therefore, the identified cumulative effects are considered net cumulative effects and are discussed in the following subsection.

21.4.8.9.5 Characterization of Net Cumulative Effects

The net cumulative effects on Short-eared Owl are characterized in **Table 21-80** using the criteria defined in Section 13.5.

Habitat Loss – Clearance Activities

Negative effects from habitat loss are certain for Short-eared Owl through site preparation and construction activities as well as terrestrial vegetation changes during road construction and operations. The effect from habitat loss will occur throughout the RSA as the RFDs are spatially located in both the LSA and RSA of the Project. The effects may be permanent or long-term depending on the effectiveness of reclamation efforts. As while some areas may re-establish quickly other areas such as roadbeds or mine footprints may be permanently altered. Effects from RFDs and the Project are expected to be continuous and irreversible in most cases. At the regional scale the magnitude is expected to be low as existing breeding habitats are relatively common in the RSA. However Short-eared Owls can be resilient in their habitat choices as many anthropogenically disturbed areas including clearings and reclaimed areas can be used by Short-eared Owl.

Injury or Death – Collisions with Vehicles

Negative effects on mortality from collisions during the operational phase is certain and occurring throughout Short-eared Owl active season where the road intersects breeding, roosting and foraging habitats. These effects will occur throughout the RSA as the RFDs are spatially located in both the LSA and RSA of the Project. The context is moderate as Short-eared Owls are low flying behaviour makes Short-eared Owls vulnerable to collisions. If other RFDs control road access, the effect may be reduced. The effect would be long-term lasting as long as the RFDs roads are active with the effect being reversible following the closure of the RFDs. At the regional scale collisions are still expected to occur infrequently but have a low magnitude as local populations may be measurably affected.

21.4.8.9.6 Determination of Significance

The determination of significance of net cumulative effects on the Short-eared Owl VC is based on the process of significance determination outlined in Section 13.6 for net effects. A predicted net cumulative effect is considered significant if it is evaluated as adverse, permanent, and of high magnitude, and if it negatively impacts species survival or reproduction at the population level to the extent that the population can no longer sustain itself.

Based on the results in **Table 21-80**, the net cumulative effects on the Short-eared Owl VC are considered not significant.

Table 21-79: Short-eared Owl – Characterization of Predicted Net Cumulative Effects

Predicted Net Cumulative Effect	Characterization Criteria								
	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Context	Reversibility	Likelihood of Occurrence
Habitat Loss due to Clearing Activities	Negative	Low	RSA	All Time Periods	Long-term/ Permanent	Continuous	Resilient due to ability to use many disturbed habitats	Irreversible	Certain
Injury or Death due to Collisions	Negative	Low	RSA	During Short-eared Owl active season	Long-term	Infrequent	Moderate due to low flying behaviour around roads	Reversible	Certain

21.4.8.10 Lake Sturgeon

21.4.8.10.1 Past and Ongoing Effects

Following the “Interim Cumulative Effects Assessment Guidance Document,” past, present, and ongoing RFDs and activities are considered to define existing conditions for cumulative effects. As such, the existing conditions outlined in Section 13 for the Lake Sturgeon VC presently reflect the effects from these projects and activities within the RSA. **Table 21-1** identifies these projects and activities (IDs 1 to 18) and indicates where their effects spatially overlap with the RSA and the Project’s net effects on the VC. Therefore, the cumulative effects assessment is focused on integrating the Project’s net adverse effects with those of future RFDs and activities discussed in the following subsection.

21.4.8.10.2 Other Ongoing and Reasonably Foreseeable Projects or Activities

A list of the RFDs and activities that were considered for the cumulative effects assessment were presented in **Table 21-2** (ID’s 19 to 39). Of the projects and activities listed in **Table 21-2**, only those listed in **Table 21-81** were identified as being probable to occur within and have potential net effects on the RSA for the Lake Sturgeon VC, therefore, have the potential to result in cumulative effects in the RSA.

Table 21-80: Lake Sturgeon – RFDs or Future Activities in the RSA

ID	RFD or Activity	Spatial Overlap of Net Effects	Temporal Overlap of Net Effects	Included in Cumulative Effects Analysis
19	Black Horse Project and Big Daddy Project	Yes	Yes	Yes
20	Eagle’s Nest Project	Yes	Yes	Yes
21	Marten Falls Community Access Road	Yes	Yes	Yes
22	Northern Road Link Project	Yes	Yes	Yes
29	Black Thor, Blackbird, and Black Label Mineral deposits	Yes	Yes	Yes
-	Climate Change	Yes	Yes	Yes

21.4.8.10.3 Cumulative Effects

Cumulative effects may occur where the net adverse effects of the Project and the net adverse effects of other RFDs or activities interact within the RSA boundary for the VC. The cumulative effects to VC may occur due to Project and RFDs and activities that overlap spatially and temporally.

Based on the Project Footprint for the WSR Project the cumulative effects to Lake Sturgeon are estimated to be:

- Changes in Fish Access to Habitats (during the Operations Phase); and
- Changes in Public Access to Fish Habitats (during the Operations Phase).

Both of these effects (in terms of the WSR Project) are likely to extend into the RSA, have an adverse effect, are probable to occur, and may have a low to moderate magnitude. Other project effects on Lake Sturgeon are possible, but do not meet the criteria of this cumulative effects assessment and are unlikely to contribute significantly to the cumulative effects in the area (refer Section 13.7).

These net effects are likely to originate from additional roadways and obstructions that may affect Lake Sturgeon access to habitats. Specifically, roads or embankments that may utilize culverts or bridges may limit changes in Lake Sturgeon access to habitats during both construction and operations. In addition, the increase in roadways may also increase public access to Lake Sturgeon habitats. During the construction phase, most of these can be avoided but may be difficult to limit during the operations phase of the projects. Models suggest that lakes within one kilometre of newly developed roads are most likely to be affected and develop access points to these lakes, generating additional fishing pressure on lakes (Hunt and Lester 2009). There is a catch-and-release fishery in some lakes in Ontario (Briggs et al, 2020), but these are generally located in Southern Ontario (Lake St. Clair) and unlikely to be exploited in this part of the province. Due to the remoteness of the projects, it is not expected that a massive influx of new recreational anglers is likely. It is expected that these pressures will be relatively low in magnitude and generally limited to larger waterbodies with sizeable fish stocks. Lake Sturgeon are generally not targeted as a recreational species as they cannot be legally kept (by non-Indigenous fishers), so the increase in recreational fishing is likely to be low.

Based on satellite imagery and waterbody layers, the RSA (which spans four tertiary watersheds) contains approximately 4,981,788 ha of surface water. This excludes numerous small creeks and watercourses which do not appear on the waterbody layers. Although some watercourses and waterbodies are naturally fishless, we have assumed that all waterbodies have the ability to support Lake Sturgeon for the purposes of cumulative effects assessment. These assumptions are also carried forward to the calculations used for the impacts of other projects. It is assumed that all waterbodies and watercourses within these potentially impacted locations have the ability to support fish and fish habitat (and as such, Lake Sturgeon as well).

There is an expected destruction of 0.06 hectares (ha) of aquatic habitat lost for the WSR Project. This loss of Lake Sturgeon habitat will primarily be associated with bridge piers, as culverts will retain fish and fish habitat under crossing where no bridge is required.

For the Northern Road Link Project, approximately 0.17 hectares of aquatic Lake Sturgeon habitat will be lost. Additional watercourses are also affected and altered but those are unlikely to contain Lake Sturgeon as they are generally limited to larger lakes and rivers (like the Attawapiskat) not identified on the waterbody layer may be affected by the project. This assumption of habitat loss is likely higher than required, as design of the individual crossings is not complete. However, it is also assumed that culverts will retain fish and fish habitat under crossing where no bridges are required.

For MFCAR, approximately 0.7 hectares of aquatic habitat are expected to be lost, although the aquatic habitat lost is not expected to support Lake Sturgeon. However, approximately 1.6 ha of Lake Sturgeon habitat are expected to be altered for bridge and culvert and may present changes in fish access to habitats as well as public access to fish habitats. For the other projects in the area detailed below, we have assumed that all watercourses and waterbodies within the footprint of the claims and leases associated with these developments will be affected by changes in fish access to habitats as well as changes in public access to fish habitats. This is likely a very conservative estimate as the development footprints are unavailable but are likely considerably smaller than the total claims/leases. We have also assumed that all watercourses would be capable of supporting Lake Sturgeon, which is also a conservative estimate.

As a contributor to cumulative effects for the Project, climate change is can affect Lake Sturgeon and its habitat primarily through changes in habitat accessibility and public access. Climate change can alter hydrological regimes, water temperatures, and flow patterns, potentially affecting the ability of Lake Sturgeon to access suitable habitats during critical life stages (e.g., spawning, feeding, migration). Climate change may influence accessibility (e.g., through changes in ice cover, water levels, or

infrastructure vulnerability), which can interact with increased public access resulting from the Project and other RFDs. The increased frequency of floods, droughts, and storms as a result of climate change can physically alter habitats, disrupt sturgeon populations, and interact with project-related disturbances (e.g., construction, road crossings).

The cumulative effects to Lake Sturgeon is approximately 160.14 hectares, which represents 0.0032% of the available habitat in the RSA.

Table 21-82 summarizes the other RFDs or future physical activities in the RSA that have the potential to contribute to changes to Lake Sturgeon.

Table 21-81: Lake Sturgeon – Summary of Cumulative Effects

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Change in Habitat (ha)	Relative Change in the RSA (%)
19	Black Horse Project and Big Daddy Project	▪ Changes in Fish Access to Habitats (During the Operations Phase); and ▪ Changes in Public Access to Fish Habitats (during the Operations Phase),	The Black Horse and Big Daddy mining projects will potentially temporally and spatially overlap with project activities. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. This may include: ▪ Loss of Lake Sturgeon habitat, alteration and/or disruption of fish habitat, injury/mortality to fish, and changes in fish access to habitats, and changes in public access to fish habitats. from excavation, blasting; emissions, discharges and waste; and spill accidents during construction and/or operation activities.	4.66 (Big Daddy) and 15.28 (Black Horse)	0.0004
20	Eagle's Nest Project	▪ Changes in Fish Access to Habitats (During the Operations Phase); and ▪ Changes in Public Access to Fish Habitats (during the Operations Phase),	The Eagle's Nest Project will temporally and spatial overlap with Project activities. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. This may include: ▪ Loss of Lake Sturgeon habitat, alteration and/or disruption of fish habitat, injury/mortality to fish, and changes in fish access to habitats, and changes in public access to fish habitats. from excavation, blasting; emissions, discharges and waste; and spill accidents during construction and/or operation activities.	137.14	0.0028
21	Marten Falls Community Access Road	▪ Changes in Fish Access to Habitats (During the Operations Phase); and ▪ Changes in Public Access to Fish Habitats (during the Operations Phase),	The Marten Falls Community Access Road will temporally and spatially overlap with Project activities based on current information and proposed development timeline. Activities associated with road development have same pathways of effects as those arising from the Project. This may include:	1.6	0.0001*

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Change in Habitat (ha)	Relative Change in the RSA (%)
			▪ Loss of Lake Sturgeon habitat, alteration and/or disruption of fish habitat, injury/mortality to fish, and changes in fish access to habitats, and changes in public access to fish habitats. from excavation, blasting; emissions, discharges and waste; and spill accidents during construction and/or operation activities.		
22	Northern Road Link Project	▪ Changes in Fish Access to Habitats (During the Operations Phase); and ▪ Changes in Public Access to Fish Habitats (during the Operations Phase),	The Northern Road Link will temporally and spatially overlap with Project activities based on current information and proposed development timeline. Activities associated with road development have same pathways of effects as those arising from the Project. This may include: ▪ Loss of Lake Sturgeon habitat, alteration and/or disruption of fish habitat, injury/mortality to fish, and changes in fish access to habitats, and changes in public access to fish habitats. from excavation, blasting; emissions, discharges and waste; and spill accidents during construction and/or operation activities.	0.17	0.0001*
29	Black Thor, Blackbird, and Black Label Mineral deposits	▪ Changes in Fish Access to Habitats (During the Operations Phase); and ▪ Changes in Public Access to Fish Habitats (during the Operations Phase),	The Black Thor, Blackbird, and Black Label Mineral deposits will spatially overlap with project activities; however, the temporal overlap is uncertain based on the current information and status of the development (on hold). Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. This may include: ▪ Loss of Lake Sturgeon habitat, alteration and/or disruption of fish habitat, injury/mortality to fish, and changes in fish access to habitats, and changes in public access to fish habitats. from excavation, blasting; emissions, discharges and waste; and spill accidents during construction and/or operation activities.	1.29 (Black Thor and Black Label), Blackbird Included in Eagle's Nest Calculation	0.0001*

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Change in Habitat (ha)	Relative Change in the RSA (%)
-	Climate Change	▪ Changes in Fish Access to Habitats (During the Operations Phase); and ▪ Changes in Public Access to Fish Habitats (during the Operations Phase),	Habitat loss from infrastructure may be compounded by climate-driven changes in water quality or quantity, further reducing available or suitable habitat for Lake Sturgeon. Climate change may influence accessibility (e.g., through changes in ice cover, water levels, or infrastructure vulnerability), which can interact with increased public access resulting from new roads and developments.	-	-

*Less than 0.0001%

21.4.8.10.4Mitigation for Cumulative Effects

There are multiple Project-related interactions and pathways that result in changes to Lake Sturgeon habitat; however, they are associated with specific construction and operation phases of the Project and particular activities for which mitigation measures exist that have proven to be effective in minimizing and/or avoiding adverse effects. This is similarly applicable to other RFDs or future activities within the RSA.

With the implementation of the Project's mitigation measures (see Section 13.4) and the assumption that other, future potential projects or activities will be required to have the same or similar standards, it is anticipated that the cumulative effects on changes in Lake Sturgeon habitat such that successful rehabilitation with a capability relative to existing conditions would be prevented. Therefore, the identified cumulative effects are considered net cumulative effects and are discussed in the following subsection.

21.4.8.10.5Characterization of Net Cumulative Effects

The net cumulative effects a on Lake Sturgeon are characterized in **Table 21-83** using the criteria defined in Section 13.5.

Net cumulative effects on changes to Lake Sturgeon are predicted to be adverse, low in magnitude, occurring within the RSA, and generally long-term. Species are common throughout the study area so impacts to individual populations is unlikely to affect the resiliency of the fisheries as a whole. Frequency for both effects will be continuous, albeit intermittent, generally reversible, and probable to occur.

21.4.8.10.6Determination of Significance

The determination of significance of net cumulative effects on the Sturgeon VC is based on the process of significance determination outlined in Section 13.6 for net effects. A predicted net cumulative effect is considered significant if it is evaluated as adverse, permanent, and of high magnitude, and if it negatively impacts species survival or reproduction at the population level to the extent that the population can no longer sustain itself.

Based on the results in **Table 21-83**, the net cumulative effects on the Sturgeon VC are considered not significant.

Table 21-82: Lake Sturgeon – Characterization of Predicted Net Cumulative Effects

Predicted Net Cumulative Effect	Characterization Criteria								
	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Context	Reversibility	Likelihood of Occurrence
Changes in Fish Access to Habitats	Negative	Low	RSA	Sensitive	Long-term	Continuous	Resilient	Reversible	Possible
Changes in Public Access to Fish Habitats	Negative	Low	RSA	Sensitive	Long-term	Continuous	Resilient	Reversible	Possible

21.4.9 Social Environment

21.4.9.1 Past and Ongoing Effects

Following the "Interim Cumulative Effects Assessment Guidance Document," past, present, and ongoing RFDs and activities are considered to define existing conditions for cumulative effects. As such, the existing conditions outlined in Section 14 for the Social Environment VC presently reflect the effects from these projects and activities within the RSA. **Table 21-1** identifies these projects and activities (IDs 1 to 18) and indicates where their effects spatially overlap with the RSA and the Project's net effects on the VC. Therefore, the cumulative effects assessment is focused on integrating the Project's net adverse effects with those of future RFDs and activities discussed in the following subsection.

21.4.9.2 Other Ongoing and Reasonably Foreseeable Projects or Activities

A list of the RFDs and activities that were considered for the cumulative effects assessment were presented in **Table 21-1** (ID's 19 to 39). Of the projects and activities listed in **Table 21-1**, only those shown in **Table 21-84** were identified as potential contributors to the net effects on the RSA for the Social Environment VC, therefore, have the potential to result in cumulative effects in the RSA.

Table 21-83: Social Environment - RFDs or Future Activities in the RSA

ID	Project or Activity	Spatial Overlap of Net Effects	Temporal Overlap of Net Effects	Included in Cumulative Effects Analysis
1	DeBeers' Victor Mine	No	Yes	No
2	Orla Mining Ltd.'s Musselwhite Mine (formerly Goldcorp's Musselwhite Mine)	No	Yes	No
3	Equinox Gold Corp.'s Greenstone Mine (formerly Greenstone Gold's Hardrock Mine)	No	Yes	No
4	Construction of upgrades to the Anaconda and Painter Lake Forestry Access Roads	No	Yes	No

ID	Project or Activity	Spatial Overlap of Net Effects	Temporal Overlap of Net Effects	Included in Cumulative Effects Analysis
5	Wataynikaneyap Transmission Project (also known as New Transmission Line to Pickle Lake)	No	Yes	No
6	Ogoki Diversion	No	Yes	No
7	Long Lac Diversion	No	Yes	No
8	Rapid Lynx Broadband Project (Phase 1)	Yes	Yes	Yes
9	New Fibre Installation / Upgrade Multiple Towers at various locations in Pikangikum First Nation, Cat Lake First Nation, and Kasabonika First Nations: ▪ Bearskin Lake ▪ Big Trout Lake ▪ Cat Lake ▪ Deer Lake ▪ Kasabonika Lake ▪ Kewaywin ▪ Kingfisher Lake ▪ Muskrat Dam ▪ North Spirit Lake ▪ Pikangikum ▪ Poplar Hill ▪ Sachigo Lake ▪ Sandy Lake ▪ Slate Falls ▪ Wapekeka (Angling Lake) ▪ Wawakepewin ▪ Weagamow ▪ Wunnumin Lake	No	Yes	No
10	Forest management units (FMUs)	No	Yes	No
11	Webequie First Nation – Nursing Station Bulk Fuel Storage Upgrades	Yes	Yes	Yes
12	Kasabonika Lake New 7 – 12 school	No	Yes	No
13	Kingfisher Lake First Nation K4-10 School	No	Yes	No
14	Kingfisher Lake First Nation Subdivision Phase 2	No	Yes	No
15	Neskantaga First Nation New Construction of an 8-plex teachers' residence	No	Yes	No
16	Wapekeka First Nation New School Project	No	Yes	No
17	Wunnumin H1RCI Compound Construction	No	Yes	No
18	Wunnumin Lake First Nation Teacherages Project	No	Yes	No
19	Black Horse Project and Big Daddy Project	Yes	Yes	Yes

ID	Project or Activity	Spatial Overlap of Net Effects	Temporal Overlap of Net Effects	Included in Cumulative Effects Analysis
20	Eagle's Nest Project	Yes	Yes	Yes
21	Marten Falls Community Access Road Project	Yes	Yes	Yes
22	Northern Road Link Project	Yes	Yes	Yes
25	Kashechewan First Nation Road to Site 5 Project	No	Yes	No
26	Hydroelectric generation and transmission connection development opportunities in Albany and Attawapiskat Rivers area	No	Yes	No
27	Rapid Lynx Broadband Project (Phase 2)	Yes	Yes	Yes
28	Forest management units (FMUs)	No	Yes	No
29	Black Thor, Blackbird, and Black Label Mineral deposits	Yes	Yes	Yes
30	Juno Corporation Mining Exploration Activity	Yes	Yes	Yes
31	Northern Star Eagle Limited and Southern Star Eagle Limited Drilling Program	Yes	Yes	Yes
32	Development of 10 Lot Residential Subdivision on Eabametoong First Nation	No	Yes	No
33	Kasabonika Lake First Nation Band Representative Facility	No	Yes	No
34	Neskantaga Community Recreation Centre	No	Yes	No
35	Kinonjeoshtegon-CHRT 41-CFS Centre and Associated Building-P048401-2425	No	Yes	No
36	Kitchenuhmaykoosib Inninuwug Wastewater System Upgrades & Expansion	No	Yes	No
37 38 39	Transportation of ore from future development near the Project for processing, once past the Webequie Supply Road, potentially involving the following: ▪ Ferrochrome Production Facility (proposed) ▪ Sudbury Smelter (existing) ▪ Road from Nakina to Ferrochrome Facility and Sudbury Smelter (existing)	Yes	Yes	Yes
-	Winter Roads - Increased winter road traffic by future mining proponents	Yes	Yes	Yes
-	Climate Change	Yes	Yes	Yes

21.4.9.3 Cumulative Effects

Cumulative effects may occur where the Project and other RFDs or activities interact within the RSA boundary of the VC. The cumulative effects to the Social Environment may occur due to Project and RFDs and activities that overlap spatially and temporally.

The RFDs included in the cumulative effects analysis for the Social Environment are as follows:

- Rapid Lynx Broadband Project (Phase 1);
- Eagle's Nest Project;
- Black Horse Project and Big Daddy Project;
- Marten Falls Community Access Road (MFCAR) Project;
- Northern Road Link (NRL) Project;
- Black Thor, Blackbird, and Black Label Mineral deposits;
- Juno Corporation Mining Exploration Activity;
- Northern Star Eagle Limited and Southern Star Eagle Limited Drilling Program;
- Transportation of ore from future development near the Project for processing, once past the Webequie Supply Road, potentially involving the following:
  - Ferrochrome Production Facility (proposed);
  - Sudbury Smelter (existing);
  - Road from Nakina to Ferrochrome Facility and Sudbury Smelter (existing); and
- Winter Roads – Increased winter road traffic by future mining proponents.

The MFCAR and NRL projects, and mining and related activities in the Ring of Fire development area in the future will drive change through increasing connectivity of the communities of Webequie First Nation and Marten Falls First Nation with the provincial highway network, changing access to traditional territories, and creating new economic opportunities for community members. While the Project aims to generate positive economic outcomes, it is crucial to consider the potential adverse social shifts that may arise, particularly for the Webequie First Nation community.

The cumulative effects on the Project on the Social Environment considered in this section include:

- Community cohesion;
- Community safety; and
- Traffic safety.

The Project is anticipated to affect Webequie First Nation's community cohesion, community safety and traffic safety. As noted in Section 14, following the implementation of proposed mitigation and enhancement measures described in the Community Readiness Plan (CRP) and the characterization of net effects in Section 14.5, the net adverse effects of the Project on community cohesion, community safety and traffic safety were characterized as moderate in magnitude and the adverse effects were determined to be significant.

The presence of non-local workers during construction can pose safety risks for vulnerable populations, particularly Indigenous women, girls, youth, and Elders (InterGroup, 2025). These risks include gender-based and family violence, which can arise from interactions in both the workplace and the community. The interactions with non-local workers can affect community cohesion, leading to social tensions and reduced youth participation in cultural activities. Indigenous women and girls may be

especially vulnerable due to disrupted cultural structures and the compounding effects of colonialism. During the operation phase, safety concerns may also emerge due to increased transportation activity. This includes risks associated with impaired or unlicensed driving, hitchhiking, and the lack of route lighting.

The construction and operation of the all-season roads, including WSR, NRL and MFCAR will enable previously isolated communities, such as Marten Falls First Nation, to have year-round access to the provincial highway network, which may bring about substantial change with both positive and negative effects.

The completion of the all-season roads, WSR, NRL and MFCAR projects, will enable the development of mining operations in the Ring of Fire region, Eagle's Nest Mine and the Big Daddy and Black Horse projects located near the eastern terminus of the WSR and northern terminus of the NRL.

The timing of the mining operations is not known; however, they will occur after the WSR, NRL and MFCAR projects are constructed. This will open up Webequie First Nation and other communities in the LSA and RSA to potential employment and economic development opportunities over a longer time horizon, as well as the presence of workforce camps during this time. These changes could have both positive and adverse effects on communities in the LSA, as well as the RSA. Vulnerable groups within communities, such as Indigenous women and girls, youth, Elders, and 2SLGBTQQIA+ individuals, may experience effects in different ways depending on access to benefits of these projects, as well as mitigation of adverse effects (InterGroup, 2025).

The potential cumulative effects of the WSR, MFCAR, NRL, Eagle's Nest Mine, and Big Daddy and Black Horse projects near Webequie First Nation and Marten Falls First Nation warrant a coordinated approach to mitigation and monitoring. These developments could have compounding effects on vulnerable community members, including Indigenous women and girls, 2SLGBTQQIA+ individuals, youth, and Elders (InterGroup, 2025).

Climate change could act cumulatively with the Project to tangibly affect community cohesion, safety, and traffic safety. Its impacts are ongoing, interact with other stressors, and could be intensified for vulnerable groups:

Extreme climate events such as wildfires, severe flooding, and other extreme weather could interact cumulatively with Project effects on social cohesion by fragmenting and displacing communities in cases when evacuation orders are in place. This situation increases social tension and compounds vulnerabilities in the community subpopulations. These impacts on social cohesion can become long-term and difficult to reverse, when both climate change and Project development pressures are present without mitigations and social planning.

Similarly, during severe weather, risks to community safety are amplified. For example, flooding or wildfires can threaten homes and public spaces, while extreme cold or heat can endanger vulnerable populations (such as Elders, youth, and those with health conditions). The presence of non-local workers and increased population movement (from Project activities) can further strain local emergency services and community safety resources during these periods

Climate change can increase stresses from Project activities (in-migration, changes in land use) by disrupting traditional activities, increasing competition for natural resources related to traditional land use, and heightening anxiety about future stability. For example, shifts in wildlife populations, vegetation, and water resources as a result of climate change (refer to Section 21.4.5 to 21.4.8) can disrupt hunting, fishing, and gathering, affecting food security and cultural practices.

The Project is expected to increased traffic and stressors to local infrastructure. Climate change increases the likelihood of damage to WSR (e.g., roads washed out by floods, bridges weakened by thawing permafrost), making communities more vulnerable to isolation and safety risks in the absence of mitigations. Climate change can make travel more hazardous (e.g., unpredictable road conditions, extreme weather), while the Projects will increase traffic volume and introduce new drivers unfamiliar with local conditions. The combined effect is a higher risk of accidents and injuries.

Based on the Project Footprint and activities for the WSR Project, the predicted adverse net effects to the Social Environment were characterized as moderate in magnitude and the adverse effects were determined to be significant for community cohesion, community safety, and traffic safety. The cumulative effects to the Social Environment are predicted to have ongoing adverse effects on community cohesion, community safety, and traffic safety, as described above.

Table 21-85 summarizes the other RFDs or future physical activities in the RSA that have the potential to contribute to changes to the Social Environment.

Table 21-84: Social Environment – Summary of Cumulative Effects

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Change	Relative Change in the RSA (%)
8	Rapid Lynx Broadband Project (Phase 1)	▪ Traffic Safety	The Rapid Lynx Broadband Project (Phase 1) is assumed to temporally and spatially overlap with Project activities based on the information available. The Project is assumed to be captured by existing conditions.	▪ Reduced community cohesion ▪ Reduced feeling of personal safety ▪ Increased risk of traffic accidents ▪ Increased non-local population ▪ Increased traffic in community	Low
19	Black Horse Project and Big Daddy Project	▪ Community Cohesion ▪ Community Safety ▪ Traffic Safety	The Black Horse Project and Big Daddy Project are assumed to temporally and spatially overlap with Project activities based on the information available. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. This may include in-migration of temporary workers, reduced community cohesion, reduced feeling of personal safety, increased non-local population, increased risk of for community well-being and quality of life, and increased risk of traffic accidents.	▪ Reduced community cohesion ▪ Reduced feeling of personal safety ▪ Increased risk of traffic accidents ▪ Increased non-local population ▪ Increased traffic in community	Moderate

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Change	Relative Change in the RSA (%)
20	Eagle's Nest Project	▪ Community Cohesion ▪ Community Safety ▪ Traffic Safety	The Eagle's Nest Project will temporally and spatial overlap with Project activities. Activities associated with any ongoing mineral exploration or potential future mine development have similar pathways of effects as those arising from the Project. This may include in-migration of temporary workers, reduced community cohesion, reduced feeling of personal safety, increased non-local population, increased risk of for community well-being and quality of life, and increased risk of traffic accidents.	▪ Reduced community cohesion ▪ Reduced feeling of personal safety ▪ Increased risk of traffic accidents ▪ Increased non-local population ▪ Increased traffic in community	Moderate
21	Marten Falls Community Access Road Project	▪ Community Cohesion ▪ Community Safety ▪ Traffic Safety	The Marten Falls Community Access Road Project will temporally and spatially overlap with Project activities based on current information and proposed development timeline. Activities associated with road development have same pathways of effects as those arising from the Project. This may include in-migration of temporary workers, reduced community cohesion, reduced feeling of personal	▪ Reduced community cohesion ▪ Reduced feeling of personal safety ▪ Increased risk of traffic accidents ▪ Increased non-local population ▪ Increased traffic in community	Moderate

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Change	Relative Change in the RSA (%)
			safety, increased non-local population, increased risk of for community well-being and quality of life, and increased risk of traffic accidents.		
22	Northern Road Link Project	▪ Community Cohesion ▪ Community Safety ▪ Traffic Safety	The Northern Road Link will temporally and spatially overlap with Project activities based on current information and proposed development timeline. Activities associated with road development have same pathways of effects as those arising from the Project. This may include in-migration of temporary workers, reduced community cohesion, reduced feeling of personal safety, increased non-local population, increased risk of for community well-being and quality of life, and increased risk of traffic accidents.	▪ Reduced community cohesion ▪ Reduced feeling of personal safety ▪ Increased risk of traffic accidents ▪ Increased non-local population ▪ Increased traffic in community	Moderate
29	Black Thor, Blackbird, and Black Label Mineral deposits	▪ Traffic Safety	The Black Thor, Blackbird, and Black Label Mineral deposits are assumed to temporally and spatially overlap with Project activities based on the information available. The activities are assumed to be captured by existing conditions.	▪ Increased risk of traffic accidents ▪ Increased traffic in community	Low

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Change	Relative Change in the RSA (%)
30	Juno Corporation Mining Exploration Activity	▪ Traffic Safety	The Juno Corporation Mining Exploration is assumed to temporally and spatially overlap with Project activities based on the information available. The activities are assumed to be captured by existing conditions.	▪ Increased risk of traffic accidents ▪ Increased traffic in community	Low
37 38 39	Transportation of ore from future development near the Project for processing, once past the Webequie Supply Road, potentially involving the following: ▪ Ferrochrome Production Facility (proposed) ▪ Sudbury Smelter (existing) ▪ Road from Nakina to Ferrochrome Facility and Sudbury Smelter (existing)	▪ Community Cohesion ▪ Community Safety ▪ Traffic Safety	The transportation of ore from future development near the Project for processing will spatially overlap with project activities; however, the temporal overlap is uncertain based on the current information and status of the development. Activities associated with any potential future mine material transportation have similar pathways of effects as those arising from the Project. This may include in-migration of temporary workers, reduced community cohesion, reduced feeling of personal safety, increased non-local population, increased risk of for community well-being and quality of life, and increased risk of traffic accidents.	▪ Reduced community cohesion ▪ Reduced feeling of personal safety ▪ Increased risk of traffic accidents ▪ Increased non-local population ▪ Increased traffic in community	Moderate

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Change	Relative Change in the RSA (%)
-	Winter Roads – Increased winter road traffic by future mining proponents	▪ Traffic Safety	Increased winter road traffic for future mining proponents will spatially overlap with project activities; however, the temporal overlap is uncertain based on the current information and status of the development. The activities are assumed to be captured by existing conditions.	▪ Increased risk of traffic accidents ▪ Increased traffic in community	Low
-	Climate Change	▪ Community Cohesion ▪ Community Safety ▪ Traffic Safety	Severe weather events (such as storms, flooding, and unpredictable freeze-thaw cycles) can damage or render roads and infrastructure impassable. For remote communities, this can mean isolation from essential services, supplies, and emergency response. Severe weather can disrupt traditional activities and gatherings, which are important for maintaining social cohesion in remote communities. When combined with project effects such as altered land use or increased non-local presence, these disruptions can lead to social tension and reduced participation in cultural practices. Climate change can make travel more hazardous	-	-

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Change	Relative Change in the RSA (%)
			(e.g., unpredictable road conditions, extreme weather), while projects increase traffic volume and introduce new drivers unfamiliar with local conditions. The combined effect is a higher risk of accidents and injuries		

21.4.9.4 Mitigation for Cumulative Effects

Mitigation and enhancement measures for the Project are described Section 14 for the Social Environment. There are potential cumulative effects with other RFDs near the Project including the risk of compounding effects on vulnerable groups including Indigenous women and girls, 2SLGBTQQIA+ individuals, youth, and Elders, in particular in the Webequie First Nation and Marten Falls Fist Nation. Webequie First Nation and proponents of the RFDs should consider broader strategies that anticipate long-term pressures and enhance local services for Webequie First Nation and Marten Falls First Nation. The coordinated application of mitigation and enhancement measures across various projects, along with continuous monitoring, can "significantly help in limiting cumulative adverse net effects" (InterGroup, 2025).

The CRP for the Project offers a key framework for supporting this type of coordinated, long-term planning (Appendix N of the EAR/IS) and addressing potential adverse cumulative effects. The CRP outlines priorities and strategies that are not only specific to the WSR but are also applicable to other foreseeable developments in the area. Additional recommendations for mitigation and enhancement take into consideration the Truth and Reconciliation Commission of Canada's Calls to Action and National Inquiry into Missing and Murdered Indigenous Women and Girls Calls to Justice, including calls to action on health, justice, culture, and human security (TRCC, 2015; NIMMIWG, 2019b).

With the implementation of the Project's mitigation and enhancement measures outlined here and in Section 14.4, and the assumption that other RFDs will be required to have the same or similar standards, it is anticipated that the cumulative effects on changes to the Social Environment will be appreciably reduced and minimized. Therefore, the identified cumulative effects are considered net cumulative effects and are discussed in the following subsection

21.4.9.5 Characterization of Net Cumulative Effects

The net cumulative effects on the Social Environment are characterized in **Table 21-86** using the criteria defined in Section 14.5.

Net cumulative effects on changes to the Social Environment are predicted to be adverse, moderate in magnitude, occurring within the RSA, and long-term in duration. It is estimated that changes in Social Environment will require mitigations to be progressively developed and adapted over a long-term period. The effects will be frequent throughout each project's development; and these changes will be reversible for change in community safety but would be irreversible for change in community cohesion and change to traffic safety.

Table 21-85: Social Environment – Characterization of Predicted Net Cumulative Effects

Predicted Net Cumulative Effect	Characterization Criteria								
	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Context	Reversibility	Likelihood of Occurrence
Change in community cohesion	Negative	Moderate	Project Footprint, LSA, RSA	Time sensitive	Medium-term	Frequent	Low Resilience	Irreversible	Possible
Change in community safety	Negative	Moderate	Project Footprint, LSA, RSA	Not time sensitive	Medium-term	Frequent	Low Resilience	Reversible	Possible
Change in traffic safety	Negative	Moderate	Project Footprint, LSA, RSA	Not time sensitive	Medium-term	Frequent	Low Resilience	Irreversible	Certain

21.4.9.6 Determination of Significance

The determination of significance of net cumulative effects on the Social Environment VC is based on the process outlined in Section 14.6 for net effects. A predicted net cumulative effect is considered significant if the effect is assessed as moderate to high in magnitude, medium- to long-term in duration, as well as being identified as a key concern by Indigenous communities, and / or where additional management may be needed.

Based on the results in **Table 21-86**, the net cumulative effects to the Social Environment VC are considered significant.

21.4.10 Non-Traditional Land and Resource Use

21.4.10.1 Past and Ongoing Effects

Following the "Interim Cumulative Effects Assessment Guidance Document," past, present, and ongoing RFDs and activities are considered to define existing conditions for cumulative effects. As such, the existing conditions outlined in Section 17 for the Human Health VC presently reflect the effects from these projects and activities within the RSA. **Table 21-1** identifies these projects and activities (IDs 1 to 18) and indicates where their effects spatially overlap with the RSA and the Project's net effects on the VC. Therefore, the cumulative effects assessment is focused on integrating the Project's net adverse effects with those of future RFDs and activities discussed in the following subsection.

21.4.10.2 Other Ongoing and Reasonably Foreseeable Projects or Activities

A list of the RFDs and activities that were considered for the cumulative effects assessment were presented in **Table 21-1** (ID's 19 to 39). Of the projects and activities listed in **Table 21-1**, only those listed in **Table 21-87** were identified as being probable to occur within and have potential net effects on the RSA for the Non-Traditional Land and Resource Use VC, therefore, have the potential to result in cumulative effects in the RSA.

Table 21-86: Non-Traditional Land and Resource Use – RFDs or Future Activities in the RSA

ID	RFD or Activity	Spatial Overlap of Net Effects	Temporal Overlap of Net Effects	Included in Cumulative Effects Analysis
8	Rapid Lynx Broadband Project (Phase 1)[1]	Yes	Yes	Yes
19	Black Horse Project and Big Daddy Project	Yes	No[2]	Yes
20	Eagle's Nest Project	Yes	No[2]	Yes
21	Marten Falls Community Access Road project	Yes	No[2]	Yes
22	Northern Road Link Project	Yes	No[2]	Yes
29	Black Thor, Blackbird, and Black Label Mineral deposits	Yes	No[2]	Yes
-	Climate Change	Yes	Yes	Yes

Notes:

[1] Phase 1 of the Rapid Lynx Broadband Project includes installation of the fibre-optic infrastructure and Phase 2 will connect the service.

[2] These RFD projects and activities are reasonably foreseeable in the future, although their timing cannot be specified.

21.4.10.2.1 Cumulative Effects

Cumulative effects may occur where the net adverse effects of the Project and net adverse effects of the other RFDs or activities interact within the RSA boundary for the VC. The cumulative effects to the Land and Resource Use may occur due to Project and RFD's and activities that overlap spatially and temporally.

Based on the Project net effects to Non-Traditional Land and Resource Use presented in Section 16 there is a potential for change to transportation use in the RSA with respect to increased traffic volumes on existing roads, which includes winter roads and the provincial highway network. There are two winter roads within the Non-Traditional Land and Resource Use RSA that Webequie First Nation and other Indigenous community members use, as described in Section 16 (refer to Figure 16.19). These winter roads are located approximately 200 km west and south of the RFDs. The Rapid Lynx Broadband Project (Phase 1) is located south-west of the Project and Webequie First Nation reserve, and partially follows the ROW of the Webequie winter road to Nibinamik First Nation.

Over half of the Rapid Lynx Broadband Project (Phase 1) has been installed including the portion along the Webequie winter road. However, there may be a segment to complete for the installation to Webequie First Nation. There is low probability that the construction of Rapid Lynx Broadband Project (Phase 1) will temporally overlap with the Project, however Phase 2 of the Rapid Lynx Broadband Project to connect the service is unknown. Use of the winter road may have a negligible effect of increasing traffic by both Projects during Phase 2 of the Rapid Lynx Broadband Project. Once installed, the use of the Webequie winter road to Nibinamik will be low during operations for maintenance and repair activities. Therefore, the cumulative effects to transportation use of winter roads are predicted to be low in the RSA.

Climate change can reduce the operational period and reliability of winter roads due to warmer temperatures and unpredictable freeze-thaw cycles. As winter roads may become less dependable, traffic that would have used these routes would likely shift to WSR, increasing the overall traffic volume.

In context to the above, however, overall changes to transportation use and associated increase in traffic volumes will occur in the RSA based on in future proposed developments that include the NRL Project, the WSR, and the MFCAR project. This change to transportation use and associated increased traffic volume would be amplified when considering other RFDs (i.e., mining developments) that will use the future road network of the WSR, NRL and MFCAR as it may connect to the provincial highway network.

Consequently, the cumulative effects of increased traffic volumes in the RSA from RFDs and activities are predicted to be high in magnitude to the existing conditions (no all-season roads) and with consideration of the WSR. Traffic may increase or fluctuate on the NRL and MFCAR, if road or access restrictions are not in place. Extending beyond the RSA, traffic volumes from the RFDs and activities are predicted to have a negligible impact on the traffic volumes of nearby provincial highways (e.g., Highway 643, Highway 584 and Highway 17) and local municipal roads. RFDs would utilize the NRL and MFCAR as it offers a reliable all-season north-south connection to the provincial highway network which would reduce the use of the Webequie winter roads.

The potential relative changes to transportation use in the RSA from the RFDs may consequently increase traffic volumes beyond the projection for the Webequie Supply Road in the RSA (of 500 vehicles on an average annual daily basis). Based on RFDs and activities in the RSA, and information available, traffic volumes are estimated to increase by approximately 1,250 vehicles to a conservative high of 2,250 vehicles on an average annual daily, primarily occurring along the NRL Project (north-south transportation route with MFCAR) and to a much lesser extent WSR.

Overall, the cumulative effects on increased traffic on the Webequie winter road is predicted to be low. The cumulative effects on increased traffic with the establishment and operations of the RFDs in **Table 21-88** is predicted to be moderate, specifically, due to the use of the NRL and MFCAR.

Table 21-87: Non-Traditional Land and Resource Use – Summary of Cumulative Effects

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Change	Relative Change in the RSA
8	Rapid Lynx Broadband Project	Change in transportation use – increase in traffic volumes	Increased transportation use and associated traffic volumes on Webequie winter road are predicted during Phases 1 and 2 of the Rapid Lynx Broadband Project. Transportation of materials, equipment, and workers will comprise additional traffic to complete the installation of fibre-optics and also for the connection servicing. No information is available on the Phase 1 installation, connections and maintenance activities.	Increase in transportation use, but traffic volumes are unknown	Relative change is considered low.
19	Black Horse Project and Big Daddy Project	Change in transportation use – increase in traffic volumes	Increased transportation use and associated traffic volumes for roads in the RSA are predicted during construction of mine projects to transport equipment and materials. During operations, mine products will be transported by heavy trucks along the assumed NRL, in addition to traffic associated with the movement of equipment, materials and workers to the mine sites. The Black Horse Project and Big Daddy Project are at a conceptual/feasibility level of design and therefore no information is available on traffic volumes at this time. As there will be spatial overlap with other RFD's, traffic volumes are expected to occur along the NRL road in the RSA and then the MFCAR to access the provincial highway network. There are potential health and safety concerns with traffic volumes on future proposed roads in the RSA (NRL and WSR), including those identified by Indigenous communities such as pedestrian safety and dust.	Increase in transportation use, but traffic volumes are unknown	Relative change is considered moderate.
20	Eagle's Nest Project	Change in transportation use – increase in traffic volumes	The Eagle's Nest Mine project will change transportation use by increasing traffic volumes on roads within the RSA during construction of the mine to transport workers, equipment and materials. During the mine's operation, products will be transported along the assumed NRL and MFCAR, in addition to traffic associated with the movement of equipment, materials and workers to the mine site. Projected traffic volumes associated with the operation of the mine are estimated to be approximately 500 to 600 light and heavy vehicles on an average annual	Addition of approximately 500 vehicles per day on average	100% change relative to the projected traffic volumes for the WSR (less than 500 on average daily basis)

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Change	Relative Change in the RSA
			daily basis, which will spatially overlap with traffic volumes from other RFD's in the RSA. There are potential health and safety concerns with traffic volumes on future proposed roads in the RSA (NRL and WSR), including those identified by Indigenous communities such as pedestrian safety and dust.		
22	Northern Road Link Project	Change in transportation use – increase in traffic volumes	The NRL Project is a proposed transportation route and when operational will generate additional traffic volume in the RSA as it will facilitate the movement of equipment, materials and workers to mineral exploration activities and proposed mine developments in the Ring of Fire area. Projected traffic volumes associated with the operation of the NRL are estimated to be approximately 750 light and heavy vehicles on an average annual daily basis. The timing as to when construction of the NRL will occur is uncertain, and therefore it is assumed for the assessment of effects, the changes to transportation use and increase of traffic volumes may occur along MFCAR project, and will be outside of the Non-Traditional Land and Resource VC RSA. Similar to other RFD's, there are potential health and safety concerns with traffic volumes on the NRL and WSR in the RSA, including those identified by Indigenous communities such as pedestrian safety and dust.	Addition of 750 vehicles per day on average	150% change relative to the projected traffic volumes for the WSR (less than 500 on average daily basis)
29	Black Thor, Blackbird, and Black Label Mineral deposits	Change in transportation use – increase in traffic volumes	Similar to RFD # 19, transportation use and associated traffic volumes for roads in the RSA are predicted during construction of the mine to transport equipment and materials. During operations, mine products will be transported by heavy trucks along the assumed NRL for the movement of equipment, materials and workers to the mine site. Black Thor, Blackbird, and Black Label Mineral deposits as RFDs are at a conceptual/feasibility level of development, and therefore, no information is available on traffic volumes at this time. As there will be spatial overlap with other RFD's, traffic volumes are expected to	Increase in transportation use, but traffic volumes are unknown	Relative change is considered moderate.

ID	RFD or Activity	Potential Cumulative Effects	Spatial / Temporal Considerations and Effect Pathways	Potential Change	Relative Change in the RSA
			occur along the NRL road in the RSA and then the MFCAR to access the provincial highway network. There are potential health and safety concerns with traffic volumes on future proposed roads in the RSA (NRL and WSR), including those identified by Indigenous communities such as pedestrian safety and dust.		
-	Climate Change	Change in transportation use – increase in traffic volumes	Climate change could reduce the operational period and reliability of existing winter roads due to warmer temperatures and unpredictable freeze-thaw cycles. This leads to increased reliance on WSR once it is operational.	-	-

21.4.10.3 Mitigation for Cumulative Effects

There are multiple Project-related interactions and pathways that result in changes to Non-Traditional Land and Resource Use; however, they are associated with specific construction and operation phases of the Project and particular activities for which mitigation measures exist and are effective in minimizing and/or avoiding adverse effects. Key mitigation measures are the establishment of a technical working group to coordinate transportation activities through the RSA and potential for road access restrictions. The timing for the construction and operation of RFD's is unknown and may consider the use of the Webequie winter road which may temporally overlap with the Project. However, coordination of transportation use may be effective to relieve traffic-related concerns, such as during the ramp-up period of the winter road season, but not reduce overall increase in traffic.

Some First Nations in the RSA have established benefit agreements with the RFDs in mining developments that may include economic or financial returns to the communities. These agreements may include the use of the WSR, NRL and MFCAR, based on the assumption that mining impacts can include the transportation or logistics requirements to move raw materials off-site. The successful mitigation for fluctuations in traffic volumes can be realized with the establishment of impact benefit agreements between RFDs in mining with nearby First Nations communities and territories. Overall, the changes to traffic volumes in the RSA are predicted to be mitigated. Therefore, the identified cumulative effects are considered net cumulative effects and are discussed in the following subsection.

21.4.10.4 Characterization of Net Cumulative Effects

The net cumulative effects on Non-Traditional Land and Resource Use are characterized in **Table 21-89** using the criteria defined in Section 16.5.

In summary for the future scenario, which includes the establishment of the transportation network of NRL, MFCAR and WSR, the net cumulative effects on changes to Non-Traditional Land and Resource Use are predicted to be:

- Direction: Negative. The Project and RFDs will increase traffic volumes;
- Magnitude: Moderate. The increase in traffic will be a detectable change from existing conditions (no all-season roads) which may also fluctuate as travel patterns shift in response to other RFD activities and potential road access restrictions;
- Geographic Extent: RSA. Traffic on future proposed and reasonably foreseeable road networks will be within the RSA. There will be negligible effects on traffic volumes for the future proposed road network on existing provincial highway networks outside of the RSA;
- Timing: Time Sensitive. The increase in traffic is associated with the development and operations of RFD's;
- Duration: Medium-term. Traffic will increase and potentially fluctuate over the duration of the Project's operation phase (75-year life cycle);
- Frequency: Continuous. Traffic will take place on a continual basis through the year as the proposed future roads will be all-season;
- Context: Moderate resilience, due to the use of mitigation measures which may minimize the access for increased traffic;
- Input from Indigenous Peoples: Input Received and Ongoing. Engagement and consultation has occurred with First Nations in the LSA and RSA throughout the EA/IA process for the Project. Input received to-date has formed the basis for the assessment of effects on the Non-Traditional Land and

Resource Use VC, and ongoing and future input will be incorporated into the future revisions of the report;

- Reversibility: Reversible upon completion and rehabilitation of the RFD projects; and
- Likelihood of occurrence: Possible. The increase in traffic will create changes in context of existing conditions (no all-season roads).

Table 21-88: Non-Traditional Land and Resource Use – Characterization of Predicted Net Cumulative Effects

Predicted Net Cumulative Effect	Characterization Criteria								
	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Context	Reversibility	Likelihood of Occurrence
Change in traffic volume on existing roads (including winter roads and provincial highways)	Negative	Moderate	RSA	Time Sensitive	Medium-term	Continuous	Moderate Resilience	Reversible	Possible

21.4.10.5 Determination of Significance

The determination of significance of net cumulative effects on the VC is based on the process of significance determination outlined in Section 16.6 for net effects. A predicted net cumulative effect is considered significant if the effect is assessed as moderate to high in magnitude, medium- to long-term in duration, as well as being identified as a key concern by Indigenous communities, and / or where additional management may be needed.

Based on the results in **Table 21-89**, the net cumulative effects on the Non-Traditional Land and Resource Use VC are considered not significant.

21.4.11 Human Health

21.4.11.1 Past and Ongoing Effects

Following the "Interim Cumulative Effects Assessment Guidance Document," past, present, and ongoing RFDs and activities are considered to define existing conditions for cumulative effects. As such, the existing conditions outlined in Section 17 for the Human Health VC presently reflect the effects from these projects and activities within the RSA. **Table 21-1** identifies these projects and activities (IDs 1 to 18) and indicates where their effects spatially overlap with the RSA and the Project's net effects on the VC. Therefore, the cumulative effects assessment is focused on integrating the Project's net adverse effects with those of future RFDs and activities discussed in the following subsection.

21.4.11.2 Other Ongoing and Reasonably Foreseeable Projects or Activities

A list of the RFDs and activities that were considered for the cumulative effects assessment were presented in **Table 21-1** (ID's 19 to 39). Of the projects and activities listed in **Table 21-1**, only those listed in **Table 21-90** were identified as being probable to occur within and have potential net effects on the RSA for the Human Health VC, therefore, have the potential to result in cumulative effects in the RSA.

Table 21-89: Human Health – RFDs or Future Activities in the RSA

ID	RFD or Activity	Spatial Overlap of Net Effects	Temporal Overlap of Net Effects	Included in Cumulative Effects Analysis
3	Greenstone Gold's Hardrock Mine	No	Yes	Yes
4	Construction of upgrades to the Anaconda and Painter Lake Forestry Access Roads	No	Yes	Yes
10	Forest Management Units (FMUs) – Ogoki	No	Yes	Yes
20	Eagle's Nest Project	Yes	Yes	Yes
21	Marten Falls Community Access Road Project	No	Yes	Yes
22	Northern Road Link Project	No	Yes	Yes
-	Climate Change	Yes	Yes	Yes

21.4.11.3 Cumulative Effects

Cumulative effects may occur where the net adverse effects of the Project and the net adverse effects of other RFDs or activities interact within the RSA boundary for the VC. The cumulative effects to human health may occur due to Project and RFDs and activities that overlap spatially and temporally.

A description of potential cumulative effects on the Human Health VC is provided in **Table 21-91** and is organized by determinants of health.

Table 21-90: Human Health – Summary of Cumulative Effects

Determinant of Health	Potential Cumulative Effect	Likelihood	Magnitude	Retained for CEA? (Y/N)
Structural / Level 3 Determinants of Health – Structural or systemic factors that impact health and well-being				
Colonization and Trauma from Residential Schools	Construction Indirect: It is possible that despite implementation of mitigation and enhancement measures there may still be some small and temporary net effects due to limitation of traditional land activities and predicted increases in mental health issues due to increased substance use during both construction and operation.	Possible	Low	No
Racism and Social Exclusion	Construction Indirect: The community may still be exposed to racism and discrimination from outside workers despite mitigation measures, increasing risk to their safety and security with potential for some adverse net health impacts.	Probable	Moderate	Yes
Worker Accommodations (i.e., worker/ construction camps)	Construction Indirect: Individuals who are not members of Webequie First Nation may gain entry into the community, which may have lingering safety and security impacts in Webequie First Nation, particularly to specific subgroups, including women, girls and individuals who identify as 2SLGBTQQIA+. Substance use may exacerbate violent activity, including sexual violence. Therefore, designating a camp as 'dry' does not necessarily mitigate this issue and there may be limited negative net effects.	Possible/ Probable	Low	Yes
Intermediate / Level 2 Determinants of Health – Community factors that impact health and well-being				
Air Quality (including GHG emissions)	Construction Direct: Even with the application of mitigation measures, exceedances of Ontario Ambient Air Quality Criteria for total suspended particulates, PM10, and PM2.5 and Canadian Ambient Air Quality Standards for NO2 remain a possibility at some culturally sensitive areas. This indicates that there may be potential for adverse net health effects.	Certain	Moderate to High	No *

Determinant of Health	Potential Cumulative Effect	Likelihood	Magnitude	Retained for CEA? (Y/N)
Air Quality (including GHG emissions)	Operation Direct: There may be limited potential for adverse net health effects due to the operation of the Webequie Supply Road alone.	Certain	Moderate to High	No *
Noise Levels and Vibration	Construction Direct: Adverse and temporary net effects to health during construction may occur. Individuals who are more sensitive to noise may be more vulnerable – the effect is considered to be low to moderate.	Probable	Low to Moderate	No *
Surface Water Quality (including Quantity and sediment quality)	Construction Direct: Changes in surface water quantity and surface water quality, and changes in sediment quality may occur. Adverse net effects to health are anticipated in the construction and operations phases, if there are sufficient impacts to surface water quantity and quality that impact community practices and use of the water – the effect is considered to be low.	Certain	Low	No *
Food Security (including quality and availability of Country Foods)	Construction Indirect: There may be a temporary loss of traditional food security in the community due to construction activities and their impact to wildlife and harvesting practices. As a result, there may be some temporary adverse net effects to health and well-being.	Probable	Low	Yes
Safety of women and girls	Construction Direct: There is potential for adverse net effects to health. Specifically, there is a risk to the safety and security of Indigenous women and girls, and safety concerns related to increased amount of alcohol and illicit substances entering the community illegally.	Probable	Moderate	Yes
Safety of women and girls	Operation Indirect: There is a risk to the safety and security of women and girls.	Probable	Moderate	Yes
Traffic Volume and Safety	Operation Direct: There are possible safety and security risks due to accidents and injuries because of speeding or driving under the influence during the operations phase. However, these magnitude, likelihood and significance of these adverse effects are hard to predict.	Certain	Low	No
Access to Transportation Services	Construction Indirect: Small adverse net health effects during the construction phase may occur if community members experience long delays in accessing services and goods because air travel and the winter road, when available, is too busy.	Possible	Low	No

Determinant of Health	Potential Cumulative Effect	Likelihood	Magnitude	Retained for CEA? (Y/N)
Proximal / Level 1 Determinants of Health: Individual factors that impact health and well-being				
Mental wellness	Construction Indirect: – Despite mitigation / enhancement measures, historic deficiencies in mental health services in Webequie prevents them from having the capacity to support any mental wellness challenges arising from the Project – the presence of construction camp workers may still pose safety and security risk and impact the mental health and wellness of community members, particularly women, girls, and those who identify as 2SLGBTQQIA +.	Possible	Low	No
Mental wellness	Operation Indirect: Despite previously recommended inspection areas, it can be anticipated that drugs and alcohol will make its way into the community due to the increased accessibility, resulting in adverse net effects to mental wellness.	Possible	Low	No
Substance Use	Construction Direct: It can be anticipated that drugs and alcohol will make its way into the camps illegally and thereby the community, due to increased accessibility, increasing use of illegal substances. In turn, this will have adverse net effects on the health of workers and those in the community.	Probable	Moderate	Yes
Substance Use	Operation Indirect: Similar to construction phase, it can be anticipated that drugs and alcohol will make its way into the community illegally despite previously recommended inspection areas, due to the increased accessibility. This has potential for adverse net effects to health.	Probable	Low	Yes

Note: * Cumulative effects of air quality and noise levels are discussed in **Section 21.4.4**; while **Section 21.4.11.3.5** addresses how climate change may affect human health through incremental changes in air and water quality.

21.4.11.3.1 Racism and Social Exclusion

Construction Phase

It is assumed that the construction schedules of the Webequie Supply Road and the Marten Falls Community Access Road will overlap and require large mobilization efforts of equipment, personnel, and supplies to staging areas and worker accommodations camps. As the Anaconda and Painter Lake Access Road upgrade will likely be complete by the time construction of the three Ring of Fire project roads, traffic will be routed through the Anaconda and Painter Lake Access Roads and the winter road network to access staging areas and worker accommodation camps.

During transport of materials, it is possible that members of Webequie First Nation will have increased encounters with outside workers and there may be an increased likelihood for them to experience anti-Indigenous discrimination and racism during these interactions, and especially for those members of

Webequie First Nation who participate in employment opportunities on these projects. Systemic racism and hurtful stereotyping of Indigenous Peoples during these interactions may lead to an increase health issues such as mental wellness issues, substance misuse, and social isolation.

If members of Webequie First Nation choose to participate in construction jobs related to the Webequie Supply Road, Marten Falls Community Access Road, or the Northern Road Link, or resource industry jobs with Eagle's Nest Mine, Greenstone Gold Mine, or Ogoki Forest Management, it may be necessary for them to seek accommodation in worker camps. These camps may house other workers who may be non-Indigenous, or who are Indigenous but from other communities. As it may not be possible to fully enforce planned policies to reduce harassment and bullying, members of Webequie First Nation may experience external racism and / or lateral violence. Members of Webequie First Nation may experience feelings of marginalism, which could trigger or worsen existing social and economic inequalities and lead to negative mental wellness and physical health outcomes.

It is possible that the construction of the Ring of Fire Road projects could lead to social division within Webequie First Nation, and between First Nation communities in the Regional Study Area. Differences in opinion of the Project(s) within and between communities could lead to reduced social cohesion and exclusion which could have negative mental wellness outcomes such as isolation, loss of traditional knowledge transfer between those with differing opinions on the road projects and future of the community, loss of cultural identity as the projects progress, increased tensions over land rights within the communities, and feeling of loss related to loss of traditional lands used for cultural practices and traditions. Lateral violence, and loss of cultural connectivity may be associated with negative physical health and mental wellness outcomes.

21.4.11.3.2Worker Accommodations (i.e., worker/construction camps)

Construction Phase

While constructing the Webequie Supply Road, Marten Falls Community Access Road, Northern Road Link, and Eagle's Nest Mine there will likely be the presence of accommodation camps to house workers participating in construction-related positions with each Project. Many of the workers being accommodated will be non-Indigenous or will not be members of Webequie First Nation. Therefore, members of Webequie First Nation who choose to stay in worker accommodation camps while participating in construction-related employment will be exposed to large numbers of non-Indigenous colleagues. It is possible that members of Webequie First Nation will have experiences of racism and discrimination due to their Indigenous identity and associated systemic negative stereotypes, which may lead to violence, harassment, or feelings of social isolation. These experiences may lead to negative physical and mental wellness outcomes for members of Webequie First Nation, and other Indigenous Peoples from the Regional Study Area participating in construction-related employment and living in the construction camps.

Worker accommodation camps are often male-dominated, and there is increased risk of gender based-violence. Women and people who identify as 2SLGBTQQIA+ may be at increased risk of sexual harassment, assault, sex trafficking, and exploitation in these settings. Indigenous women and girls and 2SLGBTQQIA+ individuals are already at an increased risk of experiencing violence, which could be further exacerbated in male-dominated isolated work camps, particularly if additional confounding factors such as alcohol and illicit substance misuse, social and cultural isolation, sexual coercion, and marginalization are introduced despite mitigation measures and efforts to make camps "dry". Violent and exploitive situations against women, girls and 2SLGBTQQIA+ individuals will lead to negative physical

and mental outcomes, and may also increase substance use, social isolation, rates of sexually transmitted diseases, and physical injuries.

In addition to the those working and living in the worker accommodation camps, it may be possible that non-Indigenous and Indigenous outsiders living in the construction camps may gain access into the Webequie First Nation community despite mitigation measures to limit access as they may not be fully enforceable, particularly over long construction timelines. Outsiders entering the community may introduce increased access to illicit drugs and / or alcohol, increased threats for safety (particularly for women, girls, and 2SLGBTQQIA+ individuals), and increased opportunities for racially charged interactions between Indigenous and non-Indigenous People resulting from systemic stereotypes. Negative interactions between community members and workers who manage to gain access into the community, despite mitigation measures discussed in Section 6.1.5.4, could lead to increased need for mental and physical health services. With little capacity available in Webequie First Nation for an increase in need, there may be shortfalls in providing adequate mental and physical health resources to community members which would in turn lead to negative health outcomes, particularly for those with pre-existing, chronic, or worsening conditions, the elderly, and those with substance dependency issues.

It is not anticipated that during the construction phase it will be possible for members of Webequie First Nation to access the Ring of Fire region using the proposed roads. Therefore, cumulative effects of the Eagle's Nest Mine worker accommodation camps were not considered to be as pressing as the effects of the three Ring of Fire Road Projects in this assessment. Further, as provincial highway network access will not be available until the Project is completed, cumulative effects of Greenstone Gold Mine, and Ogoki Forest Management Plans worker accommodations were not considered as likely to occur in this assessment.

21.4.11.3.3Food Security (including quality and availability of traditional foods)

Construction Phase

During the construction phase, it will not be possible for Webequie First Nation to access the provincial highway network using the Webequie Supply Road, Northern Road Link, Marten Falls Community Access Road, nor the Anaconda and Painter Lake Forestry access road. Further, Webequie First Nation will not have access to the Ring of Fire mining development, inclusive of Eagle's Nest Mine. However, members of Webequie First Nation are concerned that the construction of the Webequie Supply Road, Marten Falls Community Access Road, and the Northern Road Link may interfere with the productivity of their traplines, and their ability to harvest traditional food sources due to physical interference and noise disruption, as discussed in Section 6.2.8. A disruption in the traplines due to construction activities could lead to additional food insecurity and a decrease in food sovereignty. A disruption in habitat (for fish, plants, or animals), changes in mating behaviours, and changes in general animal behaviours may also decrease the availability of traditional foods in the community. The community struggles to gather enough traditional food currently due to the high costs associated with using and maintaining equipment, as well as a lack of knowledge and experience among the youth to access the land and harvest traditional foods. Additional burdens placed on hunting and gathering by the construction operations of the Ring of Fire Road Projects may further reduce food security and food sovereignty for Webequie First Nation and possibly other Indigenous communities affected by construction-related activities. The recommended preferred route for Webequie Supply Road aims to reduce the number of traplines intersecting the road, and is further east from significant hunting areas, runs east of areas used for traditional activities, reduces intersection with moose mating areas, and minimizes effects to waterbodies as discussed in Section 4.4.

During the construction phase, members of Webequie First Nation may leave the community for various lengths of time to participate in construction employment opportunities with the Esnagami Road Bypass Upgrade, Northern Road Link, Webequie Supply Road, or the Marten Falls Community Access Road.

Community members may also leave at this time to participate in mining and forestry activities with the Ogoki Forest Management Plans, or the Greenstone Gold Mine. Inevitably, this means that adults and Elders with knowledge of traditional hunting and gathering practices may leave the community and will be unavailable to pass on traditional food acquisition knowledge to future generations. The ongoing effect of their absence, particularly during key harvesting intervals, could have long-term repercussions to mental and health outcomes in the community as youths' ability to carry forward traditional knowledge and practices to future generations may be impeded.

During the construction phase, members of Webequie First Nation, and other nearby Indigenous communities may participate in road construction, mining and forestry employment opportunities with the aforementioned opportunities. During employment, Indigenous employees will receive a source of income previously unavailable for community members. Increased income within Webequie First Nation, and other nearby Indigenous communities, will improve purchasing power for market food items. Although those who are able to seek employment will benefit with improved mental wellness and physical health outcomes from increased access to healthy food options, those unable to access these employment opportunities (i.e., Elders, youth, and those with chronic health conditions) may continue to be unable to afford expensive healthy market food items.

21.4.11.3.4Safety of Women and Girls

Construction Phase

The Webequie Supply Road is expected to be built following the completion of the Anaconda and Painter Lake Forestry Access Road upgrades. However, both the Marten Falls Community Access Road and the Northern Road Link will be incomplete at the time of construction of the Webequie Supply Road, and it is unlikely that Anaconda and Painter Lake Roads will be used to transport equipment specifically for the Webequie Supply Road. It is probable that winter roads and air transport will be used to transport the necessary equipment and personnel for the construction of the Northern Road Link, the Webequie Supply Road and the Marten Falls Community Access Road. Due to this, it is likely that the volume of traffic on the winter roads will increase during the construction phase, causing an increase in the exposure of the Webequie First Nation community to outsiders passing through the area, and could in turn increase the exposure of women and girls to undesirable people and situations of potential violence. Other First Nation communities, including Marten Falls First Nation, Aroland First Nation, Eabametoong First Nation, Neskantaga First Nation and Nibinamik First Nation are also expected to experience this increase in traffic and the subsequent exposure to a potential threat to community safety and security, particularly for women and girls.

During the construction phase of the Webequie Supply Road it is expected to result in the influx of construction-related equipment and construction workers to the area. It is expected that the influx of equipment and personnel will increase traffic and associated accidents, increase opportunities for employment, and increase potential for negative interactions with non-Indigenous constructions workers and with Indigenous construction workers from other reserves. Together, these negative interactions could affect the safety of community members of Webequie First Nation, particularly women, girls, and those who identify as 2SLGBTQQIA+.

During the construction phase of the Webequie Supply Road, and the Northern Road Link, there will be temporary construction camps used to accommodate construction workers near Webequie First Nation.

It is likely that these camps will accommodate Indigenous construction workers from other First Nation communities, as well as non-Indigenous construction workers. Despite mitigation measures, the presence of these outside construction workers, may create lingering feelings of reduced safety for women and girls due to the risk of sexual violence and sex trafficking against Indigenous women, girls, and members of the 2SLGBTQQIA+ community. In addition to physical health risks, there are mental health effects of living in fear of personal safety.

There are three pathways that women, girls and members of the 2SLGBTQQIA+ community are expected to interact with Project construction workers, or workers of other operations occurring in the area.

The first pathway for interaction is through contact of outside construction workers with community members within Webequie First Nation. Although Webequie First Nation does have plans to implement restrictions for construction worker entry into the community, due to potential enforcement challenges, it may not be possible to have total compliance with the restriction policy and construction workers may enter the community and create an environment of concern for safety.

The second pathway of exposure that is expected to occur is through participation of women and members of the 2SLGBTQQIA+ community in employment opportunities. This would increase the exposure of vulnerable persons to construction workers, in turn influencing risk to personal safety, or deterring vulnerable populations from seeking employment with the Project. Furthermore, it is expected that although these construction camps may be considered “dry”, it may not be possible to obtain full compliance with a “dry” policy, and therefore there could be the presence and use of alcohol and/or illicit substances in the community which can compound the risk to personal safety for women, girls and members of the 2SLGBTQQIA+ community (See Substance Use) as substance use is linked to increased violence and sexual assault.

The third pathway of exposure is expected to occur during the transportation of materials and equipment for construction of the Webequie Supply Road and the Northern Road Link using the winter roads. It is also possible, though less likely, that exposure to workers from future Ogoki Forest Management and/or Greenstone Gold Mine could occur in a similar manner. It is possible that interactions between workers (who can be predominantly men) and women, girls, and members of the 2SLGBTQQIA+ community could occur throughout the winter road network. There are additional concerns for the safety of all community members during these interactions, as members of the community may face violence or racism due to anti-Indigenous rhetoric, and systemic exposure to racism which is more common for Indigenous Peoples than non-Indigenous People.

It is possible that there will be interactions between Webequie First Nation community members and Eagle’s Nest Mine workers during the later phases of construction of the Webequie Supply Road, though an overlap in timelines is not guaranteed. If interactions were to occur, unsafe interactions would be considered possible.

Operations Phase

The Webequie Supply Road alone does not provide access to the provincial highway network; however, with the expected simultaneous completion of the Marten Falls Community Access Road and the Northern Road Link, Webequie First Nation will be connected to the provincial highway network during the operations phase of the Webequie Supply Road. It is anticipated that equipment, supplies, and personnel will be regularly using all three roads as the primary means of transport to the Ring of Fire region. The increased traffic will create more opportunities for accidents, more opportunities for interactions with mine workers and / or persons with nefarious intent, and more opportunities to have illicit

substances and / or alcohol brought to the community. Members of Webequie First Nation will also have access to the road for travel, further increasing the interactions mentioned previously.

Therefore, there are concerns to the safety of women, girls, and 2SLGBTQQIA+ individuals through these interactions with regular use of the completed Ring of Fire roads. With an increase in traffic to and from the Webequie First Nation community during the operations phase, there is an increased risk of sex trafficking and assault against women, girls, and members of the 2SLGBTQQIA+ community. These populations are already at an increased rate of likelihood for experiencing violent situations, and therefore with more access to the Webequie First Nations community through the three Ring of Fire roads the concern for personal safety is increased, despite restrictions against outsiders in the community. This threat also applies to Marten Falls First Nation and Aroland First Nation, who are also expected to see increased traffic through their communities as goods and personnel use the road to access the Ring of Fire mining development.

The participation of women and members of the 2SLGBTQQIA+ community in employment opportunities with developments such as Eagle's Nest Mine, Greenstone Mine, and other accessible future employment operations will increase the exposure of this community to outsiders through worker accommodations and interactions in the workplace. As some workplaces have instances of discrimination and harassment despite efforts to address these issues, it is likely that women and members of the 2SLGBTQQIA+ community will encounter increased rates of racism, discrimination, and harassment while seeking and participating in employment opportunities. Increased exposure to racism, discrimination, and harassment in the workplace will have negative physical health and mental wellness outcomes on women, girls and 2SLGBTQQIA+ individuals.

21.4.11.3.5Substance Use

Construction Phase

During the construction phase, it is likely that there will be increased traffic to the community, particularly during the transportation of equipment and personnel to work sites. As the Webequie Supply Road (or any other Ring of Fire Road Projects) will not be completed at this time, traffic will be higher on the winter roads and via air. It is expected that the Marten Falls Community Access Road and the Northern Road Link will be being built concurrent to the Webequie Supply Road, meaning a compounding of traffic on different winter roads and via air due to the need for transportation of equipment and personnel needed to build all three roads. Due to the anticipated increase in traffic, there may be more opportunities for increased availability of illicit drugs and / or alcohol as they are transported into or near the community by construction personnel and sub-contractors. An increase in the availability of these substances may also lead to an increase in substance misuse, which is associated with several negative physical health and mental wellness outcomes as discussed in under substance use.

It is anticipated that for construction purposes, there will be worker accommodations situated near the Webequie First Nations community. Although it is planned that outsiders and construction workers will not be allowed to enter the community, there may not be full compliance and enforcement of this policy, leading outsiders and construction workers to have access to the community despite mitigation measures. It is not possible to predict the level of which outsiders will gain access to the community.

When entering the community, these outsiders and construction workers may bring with them illicit drugs and / or alcohol which will make access to these substances easier, and lead to the negative health outcomes associated with substance misuse (as discussed in Section Substance Use). Further, members of Webequie First Nation may seek employment opportunities with the Ring of Fire Road Projects, leading to time spent in worker accommodations. While in the accommodations, members of Webequie

First Nation may have increased access to illicit drugs and / or alcohol, despite efforts to make these camps “dry”. With concerns already over substance use among community members, increased access to illicit substances and / or alcohol could exacerbate existing mental wellness challenges, such as lack of supports, which could further strain health resources in Webequie First Nation.

With increased access to illicit substances and / or alcohol within the community, those with pre-existing substance misuse issues, or those considered at risk of developing substance misuse issues (i.e., older adults, those with chronic pain, youth, and those with pre-existing mental wellness challenges), may be at increased risk of becoming further entrenched, or developing a problem with the use of illicit substances and / or alcohol. With limited mental and physical health service capacity within the community, an increase in demand of these services, due to an increase in substance and / or alcohol misuse, would be hard to accommodate and could lead to a decline in the quality and availability of health services in the community, resulting in poorer health outcomes overall. Further, an increase in the availability and misuse of illicit substances, coupled with the loss of individuals in the community to new employment opportunities, could trigger a cycle of cultural erosion. Over time, this could lead to negative and exacerbated physical health and mental wellness outcomes such as increased family and domestic violence, loss of cultural identity, and disconnection from the community.

Operation Phase

Once completed, the three Ring of Fire roads will provide Webequie First Nation with access to the provincial highway network via the Webequie Supply Road, the Northern Road Link, the Marten Falls Community Access Road, and the Anaconda and Painter Lake Forestry access roads. Access to the provincial highway network will provide new opportunities for members of Webequie First Nation to access health and mental wellness services for substance misuse and addiction, as well as a connection to the outside world that is not as expensive as air travel, which together will have tremendous positive health benefits.

However, access to the provincial highway network will also allow community members increased access to illicit substances and alcohol. In addition, the connection to the provincial highway network will allow drug traffickers access to the community that was previously unavailable. Additionally, it is expected that the construction of Eagle’s Nest Mine will occur during the operations phase of the Ring of Fire Road Projects, which will further increase traffic and interactions with outside workers as construction, equipment, and personnel are brought in for mine construction. The result of these pathways is an increase in the availability and movement of illicit drugs and / or alcohol into Webequie First Nation, which may have negative health impacts in the community.

21.4.11.3.6Climate Change

Climate change acts cumulatively with the Project by amplifying existing vulnerabilities and introducing new pathways of risk to human health. Its effects interact with those of the Project potentially impacting human health in relation to air and water quality, food security, mental wellness, safety, and access to services:

Climate change has the potential to intensify air quality challenges by increasing the frequency and severity of wildfires, modifying atmospheric conditions, and influencing pollutant dispersion patterns. The Project may also contribute to air quality concerns, including emissions of particulate matter and nitrogen dioxide (NO_2). When these project-related impacts are considered alongside the effects of climate change, an elevated risk of negative respiratory health outcomes is possible, particularly among sensitive populations.

Climate change can alter precipitation patterns, increase the risk of droughts or floods, and affect surface water quality and quantity. These changes, combined with Project-related disturbances (e.g., construction impacts on water bodies), may further threaten traditional food sources and water safety, compounding risks to food security and community health.

Climate change can strain health systems through increased use due to e.g., vector-borne diseases, heat stress, acute injury from extreme weather. The Project may alter access routes and increase demand for health services. Together, these factors can challenge the community's capacity to respond to health needs, particularly for vulnerable groups.

21.4.11.4 Mitigation for Cumulative Effects

Mitigation and enhancement measures for the Project are described Section 17 for the Human Health VC. There are potential cumulative net effects with other RFDs near the Project including the risk of compounding effects on vulnerable groups including Indigenous women and girls, 2SLGBTQQIA+ individuals, youth, and Elders, in particular in the Webequie First Nation and Marten Falls Fist Nation. Webequie First Nation and proponents of the RFDs should consider broader strategies that anticipate long-term pressures for Webequie First Nation and Marten Falls First Nation.

The following outlines recommended mitigation measures to address the cumulative effects on human health associated with the Project. Recognizing the unique challenges faced by the communities within the LSA and RSA, these proposed mitigation and enhancement measures are designed to promote community safety, well-being, and resilience throughout Project phases.

21.4.11.4.1 Racism and Social Exclusion

- Webequie First Nation, Marten Falls First Nation, Aroland First Nation, and Ring of Fire road project operators should consider working together to ensure that external workers are regularly educated about Indigenous culture, inform workers of and actively work to break down pre-existing racial stereotypes, and build a strong sense of community and belonging within the worker accommodations camps. A zero-tolerance policy for racially charged language or violence should be considered as part of the employment contract.
- Webequie First Nation, Marten Falls First Nation, Aroland First Nation and other interested First Nation Community leaders are encouraged to work together to build and maintain strong inter-community relationships, work within their respective communities to communicate Project updates as the Project(s) progress. Exploring the need for a formal complaint system to report and resolve instances of discrimination and violence, may help to prevent the negative health effect of social isolation and racism.

21.4.11.4.2 Worker Accommodations (i.e., worker/construction camps)

- Webequie First Nation, Marten Falls First Nation, and Aroland First Nation should consider working with Project construction contractor to ensure adequate education, training, and enforcement of Indigenous-led anti-racism and anti-harassment policies in the workplace, and in the construction camps as extensions of the workplace. Implementation of mandatory semi-annual training programs focused on the safety of Indigenous women, girls and 2SLGBTQQIA+ individuals (covering issues like sexual harassment and sex trafficking) for all Project employees (AtkinsRéalis, 2024i; 2024k) should be required at all worker accommodation camps.

- Zero-tolerance policies for racism, race-based violence and sexual harassment should be explored alongside Indigenous-led mechanisms for reporting and investigating incidents. Avenues of enforcement should be considered, including termination clauses for offenses in employee contracts.
- Webequie First Nation and Marten Falls First Nation, should consider working with Ring of Fire road project construction contractor to develop methods to enforce proposed community-entry restrictions among those living in worker accommodations. This will help to prevent negative interactions between community members and construction workers living in nearby accommodation camps and limit negative mental health impacts.
- Webequie First Nation, and Marten Falls First Nation should work with Project construction contractor to establish checkpoints to restrict the flow of illicit substances being smuggled into Webequie First Nation by workers accommodated in construction camps, or into the construction camps themselves, which are mandated to be “dry” facilities.

21.4.11.4.3Food Security (including quality and availability of traditional foods)

- Webequie First Nation should consider working within the community (leaders and community members) to identify key times for land users to be in the community for traditional knowledge transfer, and to harvest traditional foods for their families and the community to preserve traditional knowledge and ensure traditional foods are available for consumption within the community. These time periods can be communicated to the contractors of the different Projects within the area where members of the First Nations may be employed, so these members can have time off during these key times for traditional food harvesting and cultural community events. This may include options such as accommodations during scheduling and having the option to take additional time off. Community members may also wish to discuss community timing and frequency of hunting/gathering trips, purchasing and maintaining community equipment to increase affordability of going out on the land for those who remain in the community, etc.
- Webequie First Nation should continue to work with the Webequie Supply Road construction contractor to ensure traditional hunting, gathering, and fishing grounds receive minimal impact from physical disturbance and noise during the construction phase.
- Additionally, throughout construction, noise should be limited to certain hours, and construction should be considerate of identified key hunting and fish harvesting areas.

21.4.11.4.4Safety of Women and Girls

Webequie First Nation should consider working with both Marten Falls First Nation and Eagle’s Nest Mine officials (once the mine is being constructed/operational) to ensure appropriate mitigation and enhancement measures are taken during the operations phase of the Ring of Fire Road Projects to further protect the safety of women, girls, and members of the 2SLGBTQQIA+ community. Mitigation measures should be developed that promote pathways to safety of women, girls, and 2SLGBTQQIA+ individuals (Ministry of Children, Community and Social Services, 2021b). These include:

- Webequie First Nation should consider working with Marten Falls First Nation, Aroland First Nation, and the operator of Eagle’s Nest Mine to ensure respectful and inclusive workplace dynamics are encouraged, particularly for women and members of the 2SLGBTQQIA+ community. Mandatory training should be provided to all employees to increase awareness of Indigenous culture and history and policies to limit the instances of harassment and discrimination in all workplaces and extensions of the workplace, as well as transit to and from the workplace should be implemented within the employment contract of all workers.

- Webequie First Nation should consider working with the operator/owner of Eagle's Nest Mine to consider strategies within the employment contract to enforce that construction workers for the mine who are not from Webequie First Nation should not be allowed into the community.
- Webequie First Nation should consider working with the operator/owner of Eagle's Nest Mine to consider strategies within the employment contract to enforce that worker accommodations, associated with the mine development, are 'dry', to ensure interactions between workers, particularly with women and 2SLGBTQQIA+ individuals occur without the confounding influence of illicit substances and / or alcohol, which can increase the likelihood of violent interactions and poses an increased risk to personal safety and security.
- Webequie First Nation should consider working with Eagle's Nest Mine operator/owner to develop a plan to monitor, report, and handle complaints of discrimination, harassment, violence or threats to personal safety, particularly for women, girls, and 2SLGBTQQIA+ individuals due to road construction or operation. Further, access to relevant and timely health care services for those who need to access care as a result of experiences related to the Ring of Fire Road Projects should be considered in this plan as follow-up measure in the plan.
- Webequie First Nation should consider working with Marten Falls First Nation, Aroland First Nation, and the operator of Eagle's Nest Mine to provide security checkpoints along the Ring of Fire roads entry and exit points to discourage the entry of illicit substances and alcohol into 'dry' worker accommodations during the construction and operations phases, and to address potential safety concerns that arise for all members of the community, but particularly the safety and security of women, girls, and members of the 2SLGBTQQIA+ community.

21.4.11.4.5Substance Use

- Webequie First Nation should consider working with the federal and provincial governments to increase the availability of mental and physical wellness services within the community for those struggling with substance and / or alcohol misuse issues and relieve pressure on existing services that is expected to increase due to the Ring of Fire Road Projects. This increase in support to address substance misuse and addiction should be provided to Webequie First Nation before construction of the Webequie Supply Road project starts. This is a key mitigation measure.
- It is advised that Webequie First Nation work with Marten Falls First Nation and Eagle's Nest Mine operator/owner to devise checkpoints along the Ring of Fire Road Projects to help to ensure illicit substances and / or alcohol are not being trafficked along the road network to prevent increased availability of these substances in previously remote communities.
- Webequie First Nation should work with the project proponent for construction (i.e., the Government of Ontario) to require that the contractors responsible for worker accommodation camps and road construction ensure the "dry" status of worker accommodations is enforced through training and employment contract obligations.
- Webequie First Nation is encouraged to work with Marten Falls First Nation, Aroland First Nation, other nearby Indigenous communities, and operators of Eagle's Nest Mine to promote and provide culturally relevant experiences, workplace training, and traditional knowledge transfer to youth to maintain a strong sense of cultural identity within communities and regionally.
- Webequie First Nation should work with Eagle's Nest Mine operators and Ring of Fire road project operators to ensure there is adequate access to mental wellness and addiction services for members of the workforce to access while in the employment of the Project(s).
- Webequie First Nation, Marten Falls First Nation, Aroland First Nation, and other interested First Nation parties should work together to build capacity for traditional healing and culturally appropriate mental wellness and addiction services for members of their respective communities during the

construction and operation phases. It is a strong recommendation of this IA that federal and provincial governments recognize the need for additional health care, mental health and addiction support services in these communities and provide additional support before starting construction on the projects. This will help communities better prepare and make them more resilient to change that will be brought on by these projects.

21.4.11.4.6Climate Change

Mitigation measures to address potential effects of climate change on human health should be developed collaboratively within the Indigenous communities, integrating traditional knowledge and local priorities and in partnership with provincial and federal government. Ongoing monitoring and adaptive management are essential as climate risks increase. These can include:

- **Increase resilience of the community-based health system:** expand local health and emergency response capacity to address climate-related risks such as heat stress, respiratory illnesses caused by wildfire smoke, and vector-borne diseases. Include training health workers to recognize and respond to climate-related health impacts, as well as implement adaptive measures that enable the community to effectively manage emerging health challenges associated with a changing climate.
- M**onitor and manage air and water quality**: implement real-time air quality monitoring systems, particularly during wildfire season, and proactively provide public health advisories to keep community members informed. Safeguarding water sources from climate-related contamination, such as those caused by flooding or drought, should be accomplished through infrastructure improvements and consistent water quality testing for drinking water safety.
- F**ood security and traditional practices:** promote climate-resilient agricultural techniques and foster the continuation of traditional food harvesting methods. Establish community programs for food storage and distribution to help buffer against shortages that may arise due to climate change. This could provide reliable access for local residents to nutritious food, even in challenging conditions.
- **Infrastructure adaptation:** upgrading housing, community buildings, and health facilities to withstand the impacts of extreme weather events, such as adding insulation, creating cooling centres, and installing flood protection measures. Ensure that transportation routes remain accessible during climate events, so that residents can continue to reach necessary health and emergency services without disruption.
- **Community education and engagement:** Provide clear information about the health risks associated with climate change and practical personal safety measures, such as guidance on heat protection and precautions during wildfire smoke events. Engage with local communities in climate adaptation planning, incorporate traditional knowledge and practices into local strategies.
- **Emergency preparedness:** Develop and regularly update emergency response plans tailored to climate-related events, including wildfires, floods, and heatwaves; and also those events that lead to widespread and prolonged power outages. Conducting community drills will foster readiness, and prioritize the safety and needs of vulnerable populations, such as elders, individuals with chronic illnesses, and children, in all response plans.

21.4.11.5 Characterization of Net Cumulative Effects

While mitigation measures—such as anti-racism initiatives, improved safety protocols, controlled substance access, and expanded health services—are expected to reduce cumulative effects, these impacts will not be fully eliminated. Net cumulative effects on the Human Health Valued Component (VC) are still anticipated.

Vulnerable populations—including Indigenous women, girls, 2SLGBTQQIA+ individuals, youth, and those with pre-existing health conditions—are likely to remain at increased risk due to the Project's development. This highlights the need for ongoing adaptive management to consistently monitor and evaluate how well mitigation strategies are working. Consequently, the net cumulative effects on human health are considered moderate in magnitude, adverse in nature, long-term, and extending to the RSA.

21.4.11.6 Determination of Significance

The significance of net cumulative effects on the Human Health VC is determined in accordance with the methodology described in Section 17.6 for assessing net effects. A net cumulative effect is considered significant when it meets specific criteria and raises management concerns, including:

- Health context: Increased pressure on existing health conditions;
- Magnitude: Moderate to high levels of impact; and
- Duration: Effects persisting over the medium to long term.

Given the characterization of net cumulative effects discussed previously, the net cumulative effects on the Human Health VC are expected to be significant. A Follow up and Monitoring Program to address the net cumulative effects is described in Section 17.10 of the EAR/IS and Appendix Q – Health Impact Assessment.

21.5 Indigenous Peoples and Impacts to the Exercise of Aboriginal and Treaty Rights

The assessment of cumulative effects on Indigenous Peoples and Impacts to the Exercise of Aboriginal and Treaty Rights is still to be determined and the assessment has not been fully completed due to limited input from communities on their interpretation or expressed impacts to their rights. An evaluation of cumulative effects will be undertaken once the severity of potential adverse effects on Indigenous Peoples and Impacts to the Exercise of Aboriginal and Treaty Rights has been completed. The methodology for assessing severity of impact is described in Section 19.6, with specific criteria provided in Tables 19-17 and 19-18. In ROW with the IAAC Guidance, the Project Team is committed to conducting the cumulative effects assessment collaboratively and iteratively with Indigenous communities and groups, where appropriate and feasible.

21.6 References

Avaanz. (2025). Ring of Fire Workforce Estimates. Memorandum from Avaanz to AtkinsRéalis. May 14, 2025.

Canadian Environmental Assessment Agency (CEA Agency). 2018. Assessing Cumulative effects under the Canadian Environmental Assessment Act, 2012, Interim Technical Guidance (March 2018, Version 2). Available at https://www.canada.ca/en/impact-assessment-agency/services/policy-guidance/assessing-cumulative-environmental-effects-ceaa2012.html

Canadian Mining Journal. 2011. Date retrieved October 2, 2023. Available at: https://www.canadianminingjournal.com/news/chromite-cliffs-releases-black-thor-details-for-discussion/

Cliffs Chromite Project. 2021. Date retrieved October 2, 2023. Available at: https://www.ontario.ca/page/cliffs-chromite-project

CTV News. 2022. Date retrieved October 2, 2023. Available at: https://northernontario.ctvnews.ca/landmark-agreement-signed-over-ring-of-fire-1.6184408

De Beers Group. 2023. Date retrieved September 29, 2023. Available at: https://canada.debeersgroup.com/operations/mining/victor-mine

Greenstone Gold Mine. 2023a. Date retrieved September 29, 2023. Available at: https://www.greenstonegoldmines.com/greenstone

Greenstone Gold Mine. 2023b. Date retrieved September 29, 2023. Available at: https://www.greenstonegoldmines.com/project-development

Greenstone Gold Mine. 2025. Date retrieved November 21, 2025. Available at: https://www.greenstonegoldmines.com/greenstone

Impact Assessment Agency of Canada (IAAC). 2019a. Date retrieved October 2, 2023. Available at: https://www.iaac-aeic.gc.ca/050/evaluations/proj/63925

Impact Assessment Agency of Canada (IAAC). 2019b. Canadian Impact Assessment Registry. Date retrieved November 27, 2024. Available at: https://iaac-aeic.gc.ca/050/evaluations/proj/81040

Impact Assessment Agency of Canada (IAAC). 2023. Date retrieved October 2, 2023. Available at: https://www.iaac-aeic.gc.ca/050/evaluations/proj/80184

Impact Assessment Agency of Canada (IAAC). 2024. Canadian Impact Assessment Registry. https://www.iaac-aeic.gc.ca/050/evaluations/proj/80183

International Lake Superior Board of Control. 2023. Date retrieved October 2, 2023. Available at: https://www.ijc.org/en/lsbc/watershed/great-lakes-diversions#:~:text=The%20Long%20Lac%20and%20Ogoki%20diversions%2C%20located%20in,are%20both%20diverting%20flows%20from%20the%20same%20watershed.

Juno Corporation Mining Exploration Activity, 2020. Date retrieved November 26, 2024. Available at: https://ero.ontario.ca/notice/019-1316

KWG Resources Inc. (now The Canadian Chrome Company Inc.). 2022. Date retrieved October 2, 2023. Available at: https://kwgresources.com/

KWG Resources Inc. (now The Canadian Chrome Company Inc.). 2023. Magnetotelluric Survey Begun For New Black Horse Chromite 43-101. Date retrieved November 19, 2024. Available at: https://kwgresources.com/magnetotelluric-survey-begun-for-new-black-horse-chromite-43-101/

Kasabonika Lake First Nation Band Representative Facility, 2023. Date retrieved November 26, 2024. Available at: https://www.iaac-aeic.gc.ca/050/evaluations/proj/85909

Kasabonika Lake New 7-12 school, 2020, 2024. Date retrieved November 26, 2024. Available at: https://www.iaac-aeic.gc.ca/050/evaluations/proj/80628

Kingfisher Lake First Nation Subdivision Phase 2, 2022. Date retrieved November 27, 2022. Available at: https://www.iaac-aeic.gc.ca/050/evaluations/proj/84025

Kinonjeoshtegon-Chrt 41-CFS center and Associated Building P048401-2425,2024. Date retrieved November 29, 2024. Available at: https://www.iaac-aeic.gc.ca/050/evaluations/proj/88491

Kitchenhmaykoosib Inninuewug Wastewater System Upgrades & Expansion, 2024. Date retrieved November 28, 2024. https://www.iaac-aeic.gc.ca/050/evaluations/proj/88716

Marten Falls First Nation. 2022. Date retrieved October 2, 2023. Available at: https://www.martenfallsaccessroad.ca/wp-content/uploads/2022/03/2022-03-09-MFFN-CAR-March-2022-MFFN-CAR-March-2022-Update-Meeting.pdf#:~:text=Congratulations%20on%20reaching%20a%20new%20milestone%20and%20all,2021%20The%20Environmental%20Assessment%20started%20October%2029%2C%202021

Management Units and Forest Management Plan Renewal Schedules. Data retrieved: November 28, 2024. Available at: https://www.ontario.ca/page/management-units-and-forest-management-plan-renewal-schedules#section-1

Matawa Rapid Lynx Broadband Project. 2021. Available at: https://www.rapidlynx.ca/

Matawa Rapid Lynx Broadband Project. 2022. Matawa First Nations Management receives funding for phase two of Rapid Lynx broadband deployment. Available at: https://www.link2build.ca/news/articles/2022/june/matawa-first-nations-management-receives-funding-for-phase-two-of-rapid-lynx-broadband-deployment/

Natural Resources Canada. 2019. Date retrieved: September 21, 2023. https://natural-resources.canada.ca/science-data/science-research/earth-sciences/earth-sciences-resources/earth-sciences-federal-programs/musselwhite-mine-ontario/8818

Newmont. 2023. Date retrieved September 21, 2023. Available at: https://www.newmont.com/operations-and-projects/global-presence/north-america/musselwhite-canada/default.aspx

New Fibre Installation/Upgrade Multiple Towers, 2022. Date retrieved November 27, 2024. Available at: https://www.iaac-aeic.gc.ca/050/evaluations/proj/84118

New Fibre Installation, 2024. Date retrieved November 27, 2024. Available at: https://www.iaac-aeic.gc.ca/050/evaluations/proj/87378

Northern Road Link. 2023. Date retrieved October 2, 2023. Available at: https://www.ontario.ca/page/northern-road-link-project

Neskantaga First Nation New Construction of an 8-plex teachers' residence, 2022. Data retrieved November 27, 2024. Available at: https://www.iaac-aeic.gc.ca/050/evaluations/proj/84196

Neskantaga Community Recreation Centre, 2021. Data retrieved November 27, 2024. Available at: https://www.iaac-aeic.gc.ca/050/evaluations/proj/82816

Northern Road Link Project, 2024. Data retrieved November 26, 2024. Available at: https://www.iaac-aeic.gc.ca/050/evaluations/proj/84331

Ontario Ministry of the Environment, Conservation and Parks (MECP). 2023. Environmental Assessment Projects. https://www.ontario.ca/page/environmental-assessment-projects-category

Regional Assessment in the Ring of Fire Area, 2020. Data retrieved November 27, 2024. Available at: https://www.iaac-aeic.gc.ca/050/evaluations/proj/80468

Victor Diamond Mine Extension Project, 2013. Data retrieved November 28, 2024. Available at: https://www.iaac-aeic.gc.ca/050/evaluations/proj/80043

Webequie First Nation – Nursing Station Bulk Fuel Storage Upgrades, 2022. Data retrieved November 28, 2024. Available at: https://www.iaac-aeic.gc.ca/050/evaluations/proj/83841

Wapekeka First Nation New School Project, 2020. Data retrieved November 28, 2024. Available at: https://www.iaac-aeic.gc.ca/050/evaluations/proj/80759

Wunnumin H1RCI Compound Construction, 2019. Data retrieved November 27, 2024. Available at: https://www.iaac-aeic.gc.ca/050/evaluations/proj/80308

Wunnumin Lake First Nation Teacherages Project, 2020. Data retrieved November 28, 2024. Available at: https://www.iaac-aeic.gc.ca/050/evaluations/proj/80809

AtkinsRéalis

AtkinsRéalis
191 The West Mall
Toronto, ON M9C 5L6
Canada
416.252.5315

atkinsrealis.com