PRODIGY GOLD INCORPORATED

Magino Gold Project

MAGINO GOLD PROJECT

Finan Township, Algoma District, Ontario

ENVIRONMENTAL IMPACT STATEMENT

CHAPTER 11: CUMULATIVE EFFECTS

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11.0 CUMULATIVE EFFECTS

11.1 Preamble

On March 9, 2017, the Canadian Environmental Assessment Agency (the "Agency") provided Prodigy Gold Incorporated with the results of a review of the Environmental Impact Statement (EIS) and EIS Summary prepared for the Magino Gold Project. The Agency and federal departments undertook a review of the EIS and considered it in light of the requirements of the Guidelines for the Preparation of an Environmental Impact Statement pursuant to the Canadian Environmental Assessment Act, 2012. This review resulted in a number of additional areas for clarification (AACs).

Prodigy Gold prepared AAC responses and amended the existing EIS. In order to aid the reviewer, please note that chapter 11 was revised in its entirety in order to conform with the requirement outlined in AAC-1.

AAC-1 stated the following requirement to conform:

- "Carry out scoping using the approach described in the Agency's Operational Policy Statement (OPS) entitled Addressing Cumulative Environmental Effects;
- identify and justify the valued components that will constitute the focus of the cumulative effects assessment, and identify and justify spatial and temporal boundaries for each selected VC scoped for inclusion in the cumulative effects assessment;
- Make clear in the cumulative effects analysis stand-alone document (Chapter 11) how consultation with Indigenous groups contributed to the selection of VCs and spatial boundaries."

11.2 Introduction

Following an initial conformity review (CEAA, March 9, 2017) of Prodigy's Environmental Impact Assessment for the Magino Project submitted to CEAA in January 2017, the Agency has requested that Prodigy revise and resubmit Chapter 11 of the EIS which focus on the Cumulative Effects Assessment for the Magino Project.

The following specific deficiencies in the initial document were identified by CEAA:

1) "*All information relevant to the cumulative effects assessment must be presented in a stand-alone document*";
2) "*It is unclear how air, noise, vibration and greenhouse gases from Island Gold Mine were considered in the effects assessment presented in Chapter 7 and associated TSDs*";
3) "*the proponent will identify and assess the project's cumulative effects using the approach described in the Agency's Operational Policy Statement (OPS) entitled Addressing Cumulative Effects Assessment under the Canadian Environmental Assessment Act 2012 and the guide entitled Cumulative Effects Assessment Practitioners' Guide, 1999 (Technical Guidance)*";
4) "*the final choice of VCs and the appropriate boundaries selected to assess the cumulative effects for each VC shall be determined in consultation with Aboriginal Groups*";
5) Identification of Valued Components – "*carry out scoping of VCs using the approach described in the Technical Guidance documents mentioned above: "identify, justify the valued components that will constitute the focus of the cumulative effects assessment, and, justify spatial and temporal boundaries for each selected VC scoped for inclusion in the cumulative effects assessment"*.

11.3 Context for the Cumulative Assessment

11.3.1 Description of Existing Conditions

For the purposes of the Magino Project Environmental Impact Statement (EIS), "existing conditions" are defined as those conditions generally present at the Magino property and the surrounding environment and may reflect on-going and previous activities within the noted study areas. The descriptions of the existing environment focus on those environmental components that may be affected by the Magino Project within the Regional Study Area (RSA), Local Study Area (LSA) and the Project Study Area (PSA). These study areas are defined in Section 11.2.3. The nature and sensitivity of areas is described and geographical areas of particular concern are identified. The existing environment is described using published information and the results of the field investigation and analyses conducted in support of the Magino Project EIS.

The description of the existing conditions considers all activities occurring within the PSA, LSA and RSA. Thus, **emissions and effects of the Island Gold Mine (located 5 km to the East of the Magino property) are incorporated into the baseline information collected for effects assessment of the Magino Project** (response to CEAA comment #2).

11.3.2 VCs Identified for the Magino Project Environmental Assessment

VCs refer to those features of the environment that may be affected by the Project and that have been identified to be of concern by Prodigy, government agencies, Aboriginal groups or the public. The value of a component relates to its role in the ecosystem and its scientific, social,

cultural, economic, historical, archaeological or aesthetic importance. Indicators represent more specific items that reflect the key characteristics of the VC that serve as the focus of the assessment.

Prodigy has identified a number of VCs and indicators for the purposes of conducting the effects assessment. They were selected to be:

- representative of the overall environment;
- subject to and appropriately sensitive to the stressors likely to be associated with the Project; and
- Measurable in terms of quantifiable and qualitative parameters of change and effect in the components of the environment for which they have been chosen to represent.

VCs were identified individually for each environmental component with consideration given to:

- The VCs identified in Section 6.2 of the EIS Guidelines as specified by Section 5 of CEAA 2012, as well as species at risk and their critical habitat as per the requirement outlined in Section 79 of the *Species at Risk Act*;
- the topics to be addressed in the Ministry of Natural Resources and Forestry Class EA process;
- Abundance (i.e., representation) in the relevant study areas;
- Ecological importance (i.e., in a context of accepted scientific principles);
- Data availability (i.e., sufficient information must be available to allow an appropriate evaluation of effects);
- Native species (i.e., those that have been well established in the area over a long time period);
- Degree of exposure and sensitivity (i.e., the extent to which a VC may be exposed to "stressors" associated with the Project);
- Human health (i.e., the extent to which human health may be affected);
- Socio-economic importance (i.e., value as a commercial, recreational or subsistence resource; or inherent aesthetic value);
- Conservation status (i.e., the extent to which a VC may be specifically protected by law, designated as rare, threatened, or endangered);
- Traditional and current importance to Aboriginal Peoples (as identified in available Traditional Knowledge studies); and
- Cultural and heritage importance to society.

For the purposes of this effects assessment, some existing environmental features were not identified as VC because they are not present in the study areas or are not likely to be affected by Project works and activities. For example, although parks and protected areas are highly valued features, none are present in the study areas nor are any existing features likely to be affected by the Project. Similarly, there are no cultural heritage features on the Magino property that might be affected. As such, cultural heritage was not identified as a VC.

The VCs and indicators are listed in Table 11-1. They reflect the knowledge acquired on the environment through the secondary source information gathered and scientific studies conducted in the Regional, Local and Project study areas and reported in Chapter 4. They also reflect the direct and indirect input on VCs received to date in the EA process from Aboriginal groups, the public, and government agencies:

- Prodigy and the consulting team considered the questions asked/comments made by Aboriginal groups, the public and government agencies early in the EA process (2012 to early 2014) during meetings, initial engagement activities, and some of the socio-economic discipline interviews. These early activities included discussions of the types of baseline studies that were being done as part of the EA process, amongst other things;
- The TKS/TLUS and other reports identified important areas related to traditional uses/cultural sites or activities, and questions or comments with respect to the potential effects of the Project on Aboriginal interests;
- The proposed list of VCs and indicators was presented as part of the Project update to Mayors & Councils and at public open houses in Dubreuilville, Wawa and White River in 2014 and 2016; and
- Prodigy conducted or made efforts to arrange, Project update presentations/open houses with Aboriginal groups. The updates provided opportunities to discuss those things or issues of importance to the Aboriginal groups.

Table 11-1: Magino Project - List of Valued Components and Indicators

ENVIRONMENTAL COMPONENT	VALUED COMPONENT	INDICATORS
Atmospheric Environment	Air Quality	Particulate Matter
		Nitrogen Dioxide
		Sulphur Dioxide
		Carbon Monoxide
	Noise	Night-time Noise
	Vibration	Air Vibration
		Ground Vibration
	Light	Light Trespass
		Sky glow
	Greenhouse Gases	Annual GHG Emissions
Physical Environment	Terrain and Soils	Terrain and Topography
		Soil Quality
	Groundwater	Groundwater Levels and Quantity
		Groundwater Quality
	Surface Water Hydrology	Surface Water Quantity and Flows
	Surface Water Quality	Surface Water Quality in Receiving Waters
	Stream and Lake Sediments	Sediment Quality
	Visual Resources	Visibility

ENVIRONMENTAL COMPONENT	VALUED COMPONENT	INDICATORS
Biological Environment	Fish and Fish Habitat	Lower Trophic Level Community
		Aboriginal and Sport Fisheries Species
		Forage Fish Species
	Terrestrial Vegetation	Upland Forests
		Rock Barren Vegetation
	Wetlands	Organic /Peat Accumulating Wetlands
		Mineral Wetlands
	Significant Wildlife Habitat	Moose Calving and Feeding Areas
		Amphibian Breeding Areas
		Species of Special Concern Habitat
Biological Environment (continued)	Migratory and Breeding Birds	Passerines
		Marsh Birds
		Waterfowl
		Raptors
	Mammals	Furbearers
		Moose
		Carnivores (e.g., Bear, Wolves)
	Species at Risk (Aquatic and Terrestrial)	Whip-poor-will
		Chimney Swift
		Little Brown Bat
		Northern Long-eared Bat
Social Environment	Population and Demographics	Population Levels and Mobility
		Population Demographics
	Community Vitality	Recreation and Leisure
		Community Facilities and Services
		Health and Social Services
		Adult Education and Training
		Crime and Public Safety
		Individual and Family Well-Being
		Community Character

ENVIRONMENTAL COMPONENT	VALUED COMPONENT	INDICATORS
	Infrastructure and Services	Housing
		Emergency Services (i.e., police, fire, EMS)
		Utilities (i.e., water, waste water, waste management)
		Road Transportation
		Communications
		Energy Supply
Economic Environment	Land Use and Tourism	Land Ownership / Tenure
		Mining
		Forestry
		Commercial Tourism and Recreation
		Commercial Trapping
		Parks and Protected Areas
		Other Land Uses
	Employment and Business Opportunities	Employment (i.e., jobs) and Wage Income
		Labour Supply
		Business Activity
	Government Revenues	Municipal Revenues
		Provincial Revenues
		Federal Revenues
Aboriginal Interests	Aboriginal Employment and Business Opportunities	Aboriginal Employment (i.e., jobs) and Wage Income
		Aboriginal Labour Supply
		Aboriginal Education and Training
		Aboriginal Business Activity (including commercial use of lands and resources)
	Traditional Use of Lands and Resources	Hunting
		Fishing
		Trapping
		Gathering (e.g., berries, medicinal plants)
	Aboriginal Cultural Activities	Archaeological Sites

ENVIRONMENTAL COMPONENT	VALUED COMPONENT	INDICATORS
	and Special Places	Spiritual Sites
		Trails and Camps
		Cultural Activities
Human Health	Public Health	Risks to Human Health
	Worker Safety	Workplace Hazards

11.3.2.1 Spatial Boundaries for the Magino Project Effects Assessment

Spatial boundaries define the geographical extent within which existing environmental conditions are described, and within which potential environmental effects may occur. These spatial boundaries then form the study areas within which the existing conditions of each valued component is assessed.

The EIS Guidelines require that the study areas for each VC encompass the environment and physical works and activities of the Project where effects are expected or likely to occur, and where effects will be studied. The study areas form the spatial boundaries for the assessment.

Three study areas of increasing size were selected for the assessment of existing conditions:

1) ***The Regional Study Area (RSA)*** extends beyond the LSA and PSA, and encompasses the maximum geographical extent (or zone of influence) in which effects from the Project may occur. The RSA represents the largest of the three study areas.
2) ***The Local Study Area (LSA)*** extends beyond the PSA and includes an area around the Project where the effects associated with the Project would be expected to occur. Effects associated with the operation of a mine site are typically experienced by those organisms living in proximity to the site. However, due to the remote nature of the Project, there may also be effects at large distances from the Project. Therefore, the LSA.
3) ***The Project Study Area (PSA)*** corresponds to the area covered by surface mining claims associated with the Project, including the geographic area encompassing all physical works and activities within the site boundary and beyond. This is where footprint effects are expected to occur, i.e., within the 2,261 hectares (ha) of claim blocks lands.

The size of the RSA, LSA and PSA varies in accordance with the VC under consideration. Chapter 4 of the Magino Project EIS provides definitions for the RSA, LSA and PSA used to identify and describe potential effects for each VC.

11.3.2.2 Temporal Boundaries for the Magino Project

The Magino Project phases and durations are defined in Chapter 6 of the EIS. The relationship between Project phases/duration and the temporal boundaries for cumulative effects assessment is presented in Table 11-2.

Table 11-2: Temporal Boundaries for the Magino Project

Project Phase	Duration
Site Preparation	Up to 1 year
Construction	2 years
Operation - Mining	10 years
Operation - Milling	15 years
Closure	3 years
Post Closure	4 to 50 years until closure objectives are achieved.

11.4 Cumulative Effects Assessment

11.4.1 Types of Cumulative Effects

The types of cumulative effects are generally categorized as follows:

- Additive – which is the sum of two or more physical activities;
- Synergistic - occurs as a result of the interaction between two or more effects, when the resultant combination is greater or different than the simple addition of the effects;
- Compensatory - effects from two or more physical activities that "offset" each other; and
- Masking – where the effects of one project might mask the effects of another in the field.

Due to the remoteness and the low human population density of the Algoma District, the types of activities that have occurred or will occurred within the RSA or LSA are mainly:

1) Resource based industries consisting of mining exploration, mining production, logging and forestry operations;
2) Development of utility corridor (power transmission, pipelines) and transportation route (highway, secondary roads, forestry roads, railway);
3) Tourism and recreational based activities; and,
4) Fishing, hunting and trapping by residents.

Given this type of activities, and the geographic separation between the sites where these activities have or are likely to occur, only additive and synergetic cumulative effects are likely to occur.

11.4.2 Cumulative Effects Assessment Methodology

The cumulative effects assessment is based on *CEAA, Technical guidance for Assessing Cumulative Environmental Effects under the Canadian Environmental Assessment Act, 2012* [(1)]. This methodology consists of the following Steps:

- Step 1: Scoping
  - Identify VCs carried forward for the cumulative effects assessment
  - Determining spatial and temporal boundaries
  - Examining physical activities that have been carried out
  - Examining physical activities that will be carried out.
- Step 2: Analysis
  - Description of methodologies to predict cumulative effects
  - Source of data / information to support analysis
  - Scientific data supporting the cumulative effects assessment
  - Community knowledge and Aboriginal knowledge available to the proponent that can inform the cumulative effects assessment
- Step 3: Mitigation
  - Identify technically and economically feasible measures that would mitigate any significant adverse cumulative environmental effects.
- Step 4 Significance

    - Consider the significance of any cumulative environmental effects that are likely to result from a designated project in combination with other physical activities, taking into account the implementation of mitigation measures.
- Step 5: Follow-up
    - Follow-up programs should address project-specific environmental effects and cumulative environmental effects.

11.4.3 SCOPING of VCs for Cumulative Effects Assessment

> *"As the first step in a cumulative effects assessment, scoping serves to orient and focus subsequent steps. Its overall outcome is a list of VCs that should be carried forward into the Step 2 analysis, as well as a rationale for VCs considered in scoping that are not carried forward. Scoping documents the scientific evidence and advice, as well as feedback from the public and Aboriginal groups used to determine if further assessment is warranted"[(1)].*

11.4.3.1 Criteria for Determining Whether VC should be carried forward to Step 2

Screening of the Magino VCs to determine which VCs should be carried forward for cumulative effects assessment is based on the following considerations:

1) Guidance provided by the Magino EIS Guidelines and CEAA Operational Policy for cumulative effects assessment;
2) Aboriginal consultations for VCs of Aboriginal Interest;
3) Community consultations for socio-economic VCs;
4) Possible pathways for cause of cumulative effects; and,
5) Other practical considerations.

In addition to the above, specific criteria well also used for determining which of the Magino Project VC should be carried forward to Step 2 of the cumulative effects assessment. These criteria are presented in Table 11-4.

11.4.3.1.1 Guidelines for the Preparation of an Environmental Impact Statement for the Magino Gold Project (November 2013) and CEAA Operational Policy Guidance

The Guidelines state:

> *"Environmental components that would not be affected by the project or would be affected positively by the project can, therefore, be omitted from the cumulative effects assessment" (page 31).*

In accordance with this guidance, VCs that are affected positively by the Magino Project are omitted from the cumulative effects assessment.

CEAA's Technical Guidance Document suggests:

> *Documentation of the scoping step can take the form of two lists of VCs: those that are carried forward to Step 2, and those that are not carried forward, supported by a rationale.*

In addition, there should be clear, well-supported documentation of the:

1. *criteria used to determine whether a VC should be carried forward to Step 2;*
2. *rationale for why further analysis was not warranted on any VCs, including why significant adverse environmental effects are not likely to occur; and*
3. *description or definition of a VC, especially if the identified VC differs from any identified in the project-specific EIS Guidelines or from those considered so far in the EA of the project.*

Table 11-3 presents a list of criteria developed in accordance with the CEAA's Technical Guidance Document for screening of VCs. Table 11-5 indicates how these criteria were applied for the screening of VCs.

Table 11-3: Criteria for Determining Whether VC should be carried forward to Step 2

Criteria	Description / Rationale	Reference Section of the Magino Project EIS
Level of public concern	Documents public concerns for the valued component as expressed during public consultation, legislative requirements or other stakeholder intervention.	Chapter 7 – Legislative Requirements Chapter 12 – Aboriginal Engagement Chapter 13 – Public Consultation
Current state of the valued component	Refers to the status, health, conditions of the valued components as established by baseline studies presented in Chapter 4 of the EIS. The baseline studies cover the PSA, LSA and RSA as defined in Chapter 4 for the Magino Project.	Chapter 4 – Existing Conditions
Potential for cumulative effects	Based on the effects assessment presented in Chapter 7, the significance of adverse residual effects on each VC is established. Two possibilities arise: 1) No potential for any type of cumulative effects be it additive, synergetic, compensatory or masking (No) a. Residual effect of Magino Project is not significant; b. Residual effect of Magino Project is limited to the PSA; c. Residual effect caused by Magino Project can be mitigated at Project site or project fence line: i. atmospheric and/or effluent discharges are in compliance with regulatory standards at site fence line/point of discharge; ii. worker safety and public health	Chapter 7 – Effects assessment Chapter 8 – Accidents and Malfunctions, Workers safety Chapter 9 – Effects of the Environment on the Project Chapter 10 – Human Health Assessment Appendix 7-1 IRC-1 Response

Criteria	Description / Rationale	Reference Section of the Magino Project EIS
	concerns mitigated by actions of the Proponent while carrying out the Project); 2) Potential for additive or synergetic cumulative effects of past or future activities with the residual effects of the Magino Project (Yes) a. Residual effect of the Magino Project extends to LSA and beyond; or, b. Future activities could be implemented within LSA and RSA that could result in additive or synergetic cumulative effects with Magino Project residual effects.	
Uncertainty in prediction of cumulative effects	Uncertainty in prediction cumulative effects. 1) Low – well known indicators and measurable parameter can be used to monitor and quantify residual or cumulative effect 2) Moderate – uncertainty associated with predicted behavior although indicators and measurable parameters may be available for monitoring of potential effects. 3) High – subjective observations difficult to quantify or qualify the potential significance of residual or cumulative effect	Professional judgement
Requirement for additional mitigations or follow up in the context of cumulative effects	1) Yes – follow up monitoring, specific management plans, and/or adaptive management measures may be required for future activities within the LSA or RSA. 2) No – No additional mitigation or follow up required.	Chapter 7 – Mitigation and follow-up measures for the Magino Project For future activities (i.e. logging), mitigation and follow up measures are required by proponent of the specific activity.

11.4.3.1.2 Aboriginal Consultations and Aboriginal Interests

Aboriginal groups, including First Nations and Métis in Canada, have Constitutionally-protected Aboriginal and treaty rights. The Agency and provincial government have identified seven Aboriginal groups with potential rights and/or interests in the Project, to be included from a consultation and assessment perspective. These are as follows:

- Michipicoten First Nation (MFN);
- Missanabie Cree First Nation (MCFN);
- Métis Nation of Ontario (MNO);
- Red Sky Métis Independent Nation (RSMIN);
- Pic Mobert First Nation (PMFN);
- Batchewana First Nation (BFN); and
- Garden River First Nation (GRFN).

The Project occurs entirely within the Robinson-Superior Treaty area. The MFN and PMFN are the two Aboriginal groups with Treaty rights. The MFN reserve is located approximately 50 km south of the project; and the PMFN reserve is situated approximately 100 km northwest.

Prodigy has engaged with Aboriginal groups during the Project planning/environmental assessment process (as described in Chapter 12). Traditional Knowledge Studies/Traditional Land Use Studies (TKS/TLUS) and other reports provided an important source of information gained through Aboriginal engagement. This information assisted Prodigy in describing the existing environment, and predicting potential Project effects, for the Traditional Use of Lands and Resources VC.

TKS/TLUS and other reports have been provided by the following five Aboriginal groups:

- Michipicoten First Nation (Hamilton, 2014);
- Missanabie Cree First Nation (MERC, 2014);
- Métis Nation of Ontario (Shared Value Solutions, 2014);
- Batchewana First Nation (Hensel, 2015); and
- Red Sky Métis Independent Nation (RSMIN, 2013f).

Aboriginal Employment and Business Opportunities was identified as a Valued Component (VC) through ongoing engagement activities and discussions with Aboriginal group leadership and members. Aboriginal groups have stated their interest in participating in employment and business opportunities associated with the Project. Several Aboriginal groups have expressed interest in pursuing contract and business opportunities either through their own enterprises or as part of Joint Ventures or other form of partnership. There is also a desire that employment training opportunities be made available to Aboriginal people in advance of the construction and operation phases, and that these skills should be ‘meaningful’ and ‘transferrable’. Prodigy is discussing and developing various types of bilateral agreements with First Nation and Métis groups.

11.4.3.1.2.1 Consultations with Aboriginal Groups regarding Cumulative Effects Assessment

Discussions of potential cumulative effects of the Magino Project were addressed on several occasions and were integrated in the overall Magino Project consultation efforts.

In May 2016, the cumulative effect assessment was discussed with MFN. Of particular interest was the potential impacts caused by the current operations situated in close proximity to the Magino Project. MFN asked if there have been any discussions between the two companies (relating to environmental effects). Prodigy noted that the companies are considering using the same reference Lake (i.e. Mountain Lake). Other synergies may occur as the Magino project advances.

MFN also expressed concerns about cumulative effects from past mining and development and what is the methodology to include the current mining operations. Prodigy stated that the cumulative effects evaluation that appeared in the 2014 working draft will be revised to reflect the changes to the Project. The assessment will include current and historical mining operations. During the November 2016 meeting with MFN, Prodigy noted that no significance effects are predicted for the project including the analysis of cumulative effects. MFN queried whether or not the cumulative effects assessment incorporated the closure period. Prodigy responded yes.

During the review of the 2014 Working draft, MNO observed the cumulative effects assessment was organized into 6 categories: atmospheric, physical, biological, social, economic, and Aboriginal and for the analysis the value components were integrated. MNO technical consultants stated the evaluation was qualitative and there is no transparency in how the conclusions were reached. During a February 2015 meeting MNO technical consultants made the following observations:

(i) Historic iron ore processing, Prodigy noted the disturbed land has been reclaimed and was included during the baseline data collection.

(ii) Mercury discharge by paper mill, Prodigy noted that mercury in the ore is similar to the host rock and during the kinetic tests no mercury leaching was observed. An MNO member stated the Dubreuilville was a “lumber plant” and not a “pulp and paper mill”.

(iii) Forestry operations herbicide spraying, Prodigy noted that some forested area within the PSA will be removed. It is unlikely that air emissions from the operation will stress vegetation growth to cause a cumulative effect from the operation. It was noted that SO_2 emissions are not associated with the processing of the Magino ore. The removal of forest growth will be assessed in the terrestrial and cumulative effects chapter.

(iv) Three small mines in the Dubreuilville area and a tailings dam spill near Dubreuilville 3-4 years ago, Prodigy requested more information on the incidents identified. No additional information was provided by MNO.

(v) Spills/seepage from gold mine operation near Marathon, Prodigy noted that the Marathon operation is over 100 kilometres from the Magino property therefore cumulative effects are unlikely.

(vi) Mine in Renabie – open tailings pond, Prodigy noted that this operation has been closed for the past two decades, is over 60 kilometres east of the Magino mine and the tailings area and pond is in the Hudson Bay watershed and not the Great Lakes watershed.

(vii) Lampricide, Prodigy noted there is no discernible link or pathway between the Project and lampride activity in the Great lakes, and will not be considered.

(viii) During the October 2016 meeting, Prodigy noted that no significant effects or cumulative effects of the project are predicted. A MNO member asked how the loss of fish habitat could not be considered a significant cumulative effect. Prodigy stated that loss of fish habituated will be mitigated by the fishery offset program and therefore is not considered a significant effect. The MNO consultant questioned the cumulative effects assessment methodology. Prodigy indicated the methodology will be reviewed (note: the methodology was revised from the 2014 working draft).

The Red Sky Metis Independent Nation identified the cumulative loss of hunting areas within the territory. Land and resource development and restricted access throughout the territory has resulted in being forced to find other hunting sites and/or a decline in population of harvested animals. While this project may only impact a small of the territory, the cumulative loss of use of the land is cause for concern. During the November 2016 meeting the Company discussed the areas disturbed by the project. It was noted that the amount moose habitat lost in the LSA as a result of the project is around 3 to 5 %. Considering the size of the RSMIN territory, the amount of habitat loss is negligible.

During the review of the 2014 EIS working draft the MCFN technical consultants queried if Prodigy considered the potential cumulative effects of dewatering as a function of the

groundwater depression identified surrounding the Richmont mine and extending up to the subject site? The MCFN consultant also observed that the some of the cumulative effects identified relate to past human activity in the potential mine area and whether cumulative effects can be minimized by restoring forest, and implementing fish habitat enhancement and rigorous environmental monitoring programs. During meetings with MCFN noted the cumulative effects analysis will help in the understanding historical industrial land use of the area and potential long-term impacts of the project. Prodigy met with MCFN in January and November 2016 to review potential effects. Traditional Knowledge and Land Use Studies together along with other studies undertaken by Prodigy will be incorporated into the IEIS. During the January 2016 meeting, it was stated that no significant effects resulting from the Project are predicted to occur. It was further explained that the term “significance” was explained in the context of undertaking an environmental assessment.

There were no specific comments on the cumulative effects of the project during meetings or the traditional land use study provided by BFN.

11.4.3.1.2.2 Summary of Aboriginal Consultations Regarding Potential Cumulative Effects

It is generally perceived by most Aboriginal groups that the Magino Project will bring positive benefits for employment, skills and training, and business ventures. Prodigy is in discussions with Aboriginal groups about the specific training programs and supports required. Aboriginal people will be provided with opportunities to receive specific mine training and skills upgrading.

Positive residual effects of the Magino Project on Aboriginal Employment and Business Opportunities are anticipated. These include:

- Increased employment/jobs for Aboriginal people;
- Increased wage levels for Aboriginal employees;
- Enhanced levels of education/training for the Aboriginal labour supply as a result of the Project; and
- Opportunities for existing and new Aboriginal businesses, Joint Ventures and other partnerships to participate in the Project.

The positive effects on Aboriginal employment and business activity will be initiated with the site preparation phase, peak during construction and operations, decline substantially with the closure and rehabilitation phase, and cease post-closure. No residual adverse effects have been identified.

In discussion with Aboriginal groups, Prodigy acknowledged that depending on location within the LSA or RSA, aboriginals involved in traditional uses such as hunting, fishing and gathering may experience some noise, vibration, light (sky glow, light trespass), or visual effects. These adverse effects will decrease with distance from the Project, and will be influenced by topography. Interferences with traditional land users will begin with site preparation, increase during construction, peak during the operations phase, decrease during closure activities, and cease post-closure. To mitigate adverse effects on traditional land users, Prodigy will establish an Environmental Monitoring Committee. Aboriginal groups that have been involved in the Project’s environmental assessment process will be invited to participate on this Committee, which will review mitigation and monitoring plans, and review monitoring results.

No significant adverse effects on the Traditional Use of Lands and Resources (hunting, fishing, trapping, or gathering) in the PSA, LSA or RSA were identified for the Magino Project.

Although traditional land use by Aboriginal groups (hunting, fishing, trapping) are likely to be impacted by future activities, proponents of these future activities are expected to continue to engage with Aboriginal groups to avoid significant effects on VCs of Aboriginal Interest.

Therefore, cumulative effects related to VC concerning Aboriginal Interests and Traditional Use of Land and Resources are not carried forward for the cumulative effects assessment.

11.4.3.1.3 Community Consultation

The leadership and residents of the primary communities impacted by the Magino Project identified "Population and Demographics" as a Valued Component (VC). Each of the primary communities (Dubreuilville, Wawa and White River) noted during public consultation activities that they are experiencing declining populations. These primary communities want to maintain their size, if not grow, in order to enhance community well-being and better support community facilities, services, organizations, and to expand the tax base. There is also a desire to attract or retain younger individuals/families. It is anticipated that a portion of the Project workforce will reside in the primary communities. It is anticipated that there will be a moderate increase in the populations of Dubreuilville, Wawa and White River as a result of in-migrating workers for the Project, during the operations period in particular. This will result from former residents returning to the communities due to employment opportunities, or the in-migration of new residents employed at the Project. However, although house prices and rents are relatively low, housing supply (owned or rented) is aging and limited in Dubreuilville and in White River in particular.

During public consultation, workforce accommodation was an interest in Dubreuilville in particular. All three primary communities expressed a desire to increase their populations and sought to assure Prodigy that there is capacity to accommodate growth within each community. Emergency services, in particular fire departments, are interested in ensuring adequate planning and response, coordination of services, and sharing of information between the volunteer fire departments and Prodigy.

Residents of the primary communities have provided insight into the elements contributing to community vitality, and their expectations for the Project. Of particular note was the preference of Dubreuilville for the accommodations complex to be located in-town, rather than on-site; this was supported by both Wawa and White River. Prodigy has modified its initial proposal (accommodations complex on-site for both the construction and operations phases) to now include a temporary on-site accommodation complex during the construction phase, and a permanent accommodation complex in-town during the operations phase).

The public also noted the need to ensure that the Project and its employees can contribute positively to community vitality, for example by having employees residing in the communities, supporting local businesses, using local facilities, and participating in events and organizations.

The leadership and residents of the primary communities are well aware of the short term adverse effects of the Project but are confident that these challenges will be overcome by the commitments made by Prodigy in the Project EIS and effective community planning. Considering the mitigations proposed by Prodigy, the residual effects of the Project are mainly positive, and the adverse effects are deemed to be transitional in nature, and of short duration.

Therefore, none of the VCs identified for Community Vitality, Infrastructure and Cervices, and, Land Use and Tourism are carried forward for the cumulative effects assessment.

11.4.3.1.4 Screening based on Possible Pathways for Cause of Cumulative Effects

The pathway is the route the sources takes to reach a VC and are the mechanisms through which a change in the environment occurs. Pathways can include physical or chemical transport through air, water, soil, animals, food supplies, etc. In order to consider cumulative effects, it is essential to understand these mechanisms and the state of the receiving environment within which a project takes place.

The potential for the cumulative effects to result from the Magino Project, and/or for residual effects of past, current and future activities to result in cumulative effects, considers the pathways by which such cumulative effects can occur. The identification of these pathways justifies the environmental components that will constitute the focus of the cumulative effects assessment as required by item 1 of the EIS Guidelines. For the biophysical and biological VCs, the pathways are:

- The atmosphere for air quality, noise, vibration, greenhouse gases, light and visual resources;
- Interaction and connectivity between watershed as its relates to terrains and soils, groundwater, surface hydrology, water quality, stream and lake sediments and aquatic resources;
- Loss of bird and wildlife habitat as it relates to terrains and soils, vegetation, wetlands, and significant wildlife habitat;
- Mortality as it relates to wildlife due to actions or increased human activities caused by the Project; and
- Increased population in the primary communities (Dubreuilville, Wawa and White River), and workers housed in accommodation complexes.

For past, current and future activities, and, for each atmospheric, physical and biological VC considered in the cumulative effects assessment, the pathways that could lead to potential cumulative effects are identified in Table 11-4. A rationale is provided for the reason why the VC should not be carried forward for cumulative effects assessment.

Table 11-4: Screening Considerations for Atmospheric, Physical and Biological VCs to Carry Forward to Step 2

Project Valued Component	Significance Of Residual Effects for Magino Project		Potential for Activities Likely to Cause Additive or Synergetic Cumulative Effects within the Regional Study Area			Carried forward for cumulative effects assessment
	Rating	EIS Chapter	Pathway	Rationale		
				Magino Project Contribution to Probable Cause	Potential Cumulative Effect	
Biophysical Valued Ecological Components						
Air Quality	Not significant	7.2.1	Atmospheric	Unlikely - No significant effects at Project boundary. Air quality will be in compliance with Ontario regulatory standards at Magino Project boundary.	Third party activities are unlikely to be additive or synergetic with residual effects of the Magino Project.	No
Noise	Not significant	7.2.2	Atmospheric	Unlikely - No significant effects at Project boundary. Noise will be in compliance with Ontario regulatory standards at closest receptors near the Magino Project boundary	Third party activities are unlikely to be additive or synergetic with residual effects of the Magino Project.	No
Vibrations	Not significant	7.2.3	Atmospheric	Unlikely - No significant effects at Project boundary. Vibrations will comply with DFO standards for blasting near waterbodies.	Third party activities are unlikely to be additive or synergetic with residual effects of the Magino Project.	No
Light	Not significant	7.2.6	Atmospheric	Unlikely - Visibility of light does not reach closest community and is not significant at closest receptors in the LSA.	Third party activities are unlikely to be additive or synergetic with residual effects of the Magino Project.	No
Greenhouse Gas	Not significant		Atmospheric	Increased emissions. Ontario and Canadian regulatory requirement to measure GHG.	Third party industrial activities are required to report on their GHG emissions.	Yes
Climate Change	Not significant		Atmospheric	As per GHG	Credible third party activities within the Algoma District are unlikely to impact on climate change.	Not applicable

Project Valued Component	Significance Of Residual Effects for Magino Project		Potential for Activities Likely to Cause Additive or Synergetic Cumulative Effects within the Regional Study Area			Carried forward for cumulative effects
Terrain and Soils	Not significant	7.3.1	Terrain	Unlikely as residual effects of the Project are not significant and are limited in their geographical extent to the PSA. No additional development is foreseen within the PSA.	Third party activities (land disturbances) are unlikely to be additive or synergetic with residual effects of the Magino Project.	No
Groundwater	Not significant	7.3.2	Groundwater	Unlikely as residual effects of the Project are not significant and are limited in their geographical extent to the PSA. Groundwater quality will be in compliance with Ontario regulatory standards at the PSA boundary.	Third party activities are unlikely to be additive or synergetic with residual effects of the Magino Project.	No
Surface Water Hydrology	Not significant	7.3.3	Surface Water	Change to surface hydrology limited to project area and does not impact significantly on regional hydrology. Modification to surface hydrology is limited to the PSA.	Third party activities are unlikely to be additive or synergetic with residual effects of the Magino Project.	No
Surface Water Quality	Not significant	7.3.4	Surface Water	Single point of discharge is to Otto Lake. No significant effect on water quality. Receiving water quality in Otto and Herman lakes in compliance with CCME standards for the protection of aquatic life.	Third party activities are unlikely to be additive or synergetic with residual effects of the Magino Project.	No
Stream and Lake Sediment	Not significant	7.3.5	Surface Water	Single point of discharge is Otto Lake. No significant effect on water quality and hence sediments. Receiving water quality in Otto and Herman lakes in compliance with CCME standards for the protection of aquatic life.	Third party activities are unlikely to be additive or synergetic with residual effects of the Magino Project.	No
Visual Resources	Not significant	7.3.6	Atmospheric	Light not visible beyond 5 km from site.	Third party activities are unlikely to be additive or synergetic with residual effects of the Magino Project.	No Rationale presented in Table 11-4
Biological Valued Ecological Components						

Project Valued Component	Significance Of Residual Effects for Magino Project		Potential for Activities Likely to Cause Additive or Synergetic Cumulative Effects within the Regional Study Area			Carried forward for cumulative effects
Fish and Fish Habitat	Not significant	7.4.1	Aquatic Resources	Under the Fisheries Act, a compensation plan must be provided for lost fish habitat (create new or enhance existing habitat).	Third party activities are unlikely to be additive or synergetic with residual effects of the Magino Project. Compensation is provided for lost fish habitat.	No Regulatory obligations for compensation plan for loss fish habitat
Alterations to Fish and Fish Habitat Functionality	Not significant	7.4.1	Aquatic Resources	Unlikely as residual effects of the Project are not significant and are limited in their geographical extent mainly to the PSA and the near field of the LSA. Furthermore, final effluent from the site will be compliance with Ontario Regulations for effluent quality and receiving water in Otto Lake remain within CCME standards for the protection of aquatic life.	Third party activities are unlikely to be additive or synergetic with residual effects of the Magino Project.	No Receiving waterbodies for Magino effluent compliant with CCME guidelines for the protection of aquatic life.
Terrestrial Vegetation	Not significant	7.4.2	Vegetation	Lost vegetation for Magino is not significant relative to the ecotypes within the RSA.	Third party activities within RSA are additive for the loss of vegetation cover.	Yes
Wetlands	Not significant	7.4.3	Vegetation	Loss of wetlands for Magino is not significant relative to the RSA.	Third party activities are additive for loss of wetlands within RSA.	Yes
Significant Wildlife Habitat	Not significant	7.4.4	Wildlife	Loss of significant wildlife habitat for Magino is not significant relative to its availability within RSA.	Third party activities are additive for loss of significant wildlife habitat within RSA	Yes
Migratory Birds	Not significant	7.4.5.	Birds	The Magino Project has a limited footprint and its activities result in no significant residual effects for migratory and breeding birds.	Third party activities within RSA could result in effects for migratory and breeding bird due additive loss of foraging and nesting habitat.	Yes
Mammals	Not significant	7.4.6	Wildlife	Limited Project footprint and activities – no significant effect within RSA.	Third party activities are unlikely to be additive.	No

Project Valued Component	Significance Of Residual Effects for Magino Project		Potential for Activities Likely to Cause Additive or Synergetic Cumulative Effects within the Regional Study Area			Carried forward for cumulative effects
Species at Risk	Not significant	7.4.7	Wildlife	The Magino Project has no significant effects on species at risks.	Few species at risk within the RSA. Third party activities are unlikely to be additive or synergetic with residual effects of the Magino Project.	No
Other Considerations						
Effects of Accidents and Malfunctions	No rating	8.1	Not applicable	Emergency Response and Spill Contingency Plan (ERSCP) in place to deal with these rare events. Effects are localized.	Third party activities are unlikely to be additive or synergetic with residual effects of the Magino Project.	Not applicable Site and proponent specific
Effects of the Environment on the Project	Not significant	9.0	Not applicable	Design of Project components considers extreme climatic events.	Third party activities are unlikely to be additive or synergetic with residual effects of the Magino Project.	Not applicable Facilities designed in accordance with Ontario construction Codes and Standards

11.4.3.1.5 Other Considerations for Cumulative Effects

Accidents and malfunctions, worker safety, public health, effects of the environment, and climate change were not considered to have the potential for cumulative effects for the following reasons:

- The effects of accidents and malfunctions are hypothetical. The Project has a well-defined ERSPC Plan (TSD 20) and will respond rapidly and effectively to spill events. The residual effects following a major accident or malfunction event have a very low probability of occurrence, are localized, and cumulative effects that could result from such incidents are not quantifiable. This is consistent with the Agency's Practitioners Guide which acknowledges that such events are "rare" and that their potential effects are too extreme to be assessed together with those caused by normal operational activities;
- Work hazards are inherent to the Project and any actions. The Project has a well-defined Health and Safety Management Plan to ensure that occupational health and safety hazards are minimized (TSD 20). In terms of other actions, occupational health and safety standards are a requirement of provincial regulations for all proponents;
- Public health is considered in the context of potential effects of the Project's emissions (atmospheric and effluent) on the nearest receptors (human use of the land and its resources). The human health assessment carried out for the Project (Chapter 10) takes into consideration effects from other actions within the vicinity of the Magino site and concludes that the Project has no significant effects on its identified receptors; and
- The effects of the environment on the Project and climate change are important considerations for the design and operation of the Project. The implementation of building code and standards, and Best Management Practices (BMPs) for both design and operation ensures that facilities can withstand extreme weather events. Hence, these concerns are not subject to cumulative effects.

11.4.3.1.6 Outcome of VCs Screening

The outcome of this screening exercise is presented in Table 11-5 which lists all of the VCs that were assessed for the Magino Project. A colour code (blue) is used in this table to identify which VC and related residual effect is to be carried forward to Step 2 of the cumulative effects analysis. The VCs retained for the cumulative effects assessment are then summarized in Table 11-6.

The screening step concludes that:

1) For the atmospheric VCs, "greenhouse gases" is the only VC carried forward cumulative effects assessment;
2) No physical VCs need to be carried forward as the residual effects of the Magino Project on physical VCs are limited to the PSA;
3) For biological VCs, the cumulative effects assessment should focus on the cumulative loss of terrestrial habitat within the RSA such as:
    1. the additive loss of terrestrial vegetation cover,
    2. the additive loss of wetlands,
    3. the additive loss of significant wildlife habitat.
    4. The additive loss of habitat for species of special concern.
4) None of the socio-economic VCs are carried forward since the potential effect on the VC identified is of short duration and can be address with effective community planning.; and,

5) No VCs related to Aboriginal interests need to be carried forward.

Table 11-5: Scoping of VCs for Cumulative Effects Assessment

ATMOSPHERIC ENVIRONMENT											
VALUED COMPONENT	RESIDUAL ADVERSE EFFECTS FOR MAGINO PROJECT				CRITERIA FOR DETERMINING WHETHER FURTHER ASSESSMENT IS WARRANTED (FROM TABLE 11-3)					CARRIED FOR CUMULATIVE EFFECTS ASSESSMENT	
	RESIDUAL ADVERSE EFFECTS	SPACIAL BOUNDARIES	TEMPORAL BOUNDARIES	EIS FINDING	LEVEL OF PUBLIC CONCERN	CURRENT STATE OF THE VEC HEALTH / STATUS / CONDITION	POTENTIAL FOR SIGNIFICANT CUMULATIVE EFFECTS	UNCERTAINTY IN PREDICTION OF CUMULATIVE EFFECTS	REQUIREMENT FOR FOLLOW UP OR ADDITIONAL MITIGATION	YES / NO	RATIONALE
Air Quality	Increased ambient air concentrations of TSP, PM_{10}, $PM_{2.5}$, NO_2, SO_2, and CO	Effect extends into the LSA excluding area within the PSA.	21 years (Construction, Operation, and Closure phases)	Not Significant	HIGH	GOOD Modelling indicates ambient air quality will be in compliance with O.Reg 419/05 at Project fence line.	NO Compliance with Provincial air quality standards at Project fence line	LOW Measurable parameters at point of reception	Air quality monitoring carried out at Magino Project fence line to ensure compliance with OReg 419/05	NO	The Project will be in compliance with air quality standards of O.Reg 419/05 at fence line.
Noise	Increased nighttime noise levels (L_{eq}) at PORs 1 to 5	Effect extends into the Project's Local Study Area	10 years (Operation Phase)	Not Significant	MODERATE	GOOD Modelling indicates that nightime noise levels at closest receptors are at acceptable level. Project related noise levels do not exceed MOECC noise level limit	NO	LOW Measurable parameters at point of reception	NO	NO	Nigh time noise levels are at acceptable levels at closest receptors near PSA. Project related noise levels do not exceed MOECC noise level limit at receptors. Potential for cumulative effects is low. Effects of noise are immediately reversible.
Vibration	Increased air vibration levels above 90 dbL in the site vicinity and at PORs 1-5, 9 and 10	Effect extends into the LSA.	10 years (Operation Phase)	Not Significant	LOW	Source of vibrations are limited periodic underground blast by Island Gold	LOW	LOW Measurable parameters at point of reception	NO	NO	Residual vibration effects of the Project on the identified PORs will not be significant. Although vibration effects were considered to have a "High" frequency and rated as medium in terms of duration, vibration effects associated with the Project were determined to be low in magnitude and immediately reversible. Effects of blast vibrations are immediately reversible.
Light	Increased anthropogenic light and reduced sky quality due to increased light trespass and sky glow at points of reception	Night glow effect extends into the local study area	18 years (Construction, Operation, and Closure phases)	Not Significant	LOW	Low district brightness	LOW	LOW Visible parameter at point of reception	NO	NO	Magino Project effects on sky glow not expected to be significant at receptors.
Greenhouse Gases	Contribution of GHG emissions to Provincial, Canadian and global annual GHG emissions	Effect extends into the LSA.	21 years (Construction, Operation, and Closure phases)	Not Significant	HIGH	Low levels of GHG emissions	LOW	LOW Measurable parameters for GHG emissions and annual reporting	YES Annual reporting	YES	The GHG emissions from the Project are a very minor contribution to the totals reported for the Provincial and federal reporting programs and are not considered major (estimated at less than 0.1% of Ontario GHG emissions).

PHYSICAL ENVIRONMENT											
VALUED COMPONENT	RESIDUAL ADVERSE EFFECTS FOR MAGINO PROJECT				CRITERIA FOR DETERMINING WHETHER FURTHER ASSESSMENT IS WARRANTED					CARRIED FOR CUMULATIVE EFFECTS ASSESSMENT	
	RESIDUAL ADVERSE EFFECTS	SPACIAL BOUNDARIES	TEMPORAL BOUNDARIES	EIS FINDING	LEVEL OF PUBLIC CONCERN	CURRENT STATE OF THE VEC HEALTH / STATUS / CONDITION	POTENTIAL FOR SIGNIFICANT CUMULATIVE EFFECTS	UNCERTAINTY IN PREDICTION OF CUMULATIVE EFFECTS	REQUIREMENT FOR FOLLOW UP OR ADDITIONAL MITIGATION	YES / NO	RATIONALE
Terrain and Soils	Altered ground surface slopes and site topography	Effects limited to the PSA (Project footprint)	Permanent	Not Significant	LOW	Magino is the site of an abandoned gold mine. Site is already impacted.	NO	LOW Measurable surfaces	NO	NO	No residual effects beyond immediate footprint of the Project.
	Increased potential for slope failures and erosion of natural soils	Effects limited to the PSA (Project footprint)	Permanent	Not Significant	LOW	Magino is the site of an abandoned gold mine. Site is already impacted.	NO	LOW Quantifiable	NO	NO	No residual effects beyond immediate footprint of the Project.
	Reduced soil quality	Effects limited to the PSA (Project footprint)	Permanent	Not Significant	LOW	Magino is the site of an abandoned gold mine. Site is already impacted.	NO	LOW Measurable parameters for soil quality	NO	NO	No residual effects beyond immediate footprint of the Project.
Groundwater	Lowering of groundwater levels in the vicinity of the open pit	Effect restricted to the PSA.	70 years Life of Project	Not Significant	LOW	GOOD	NO	LOW Measurable parameter	Groundwater level monitoring within PSA	NO	The slight change in groundwater flow regime are limited to the PSA
	Increase in groundwater levels in the vicinity of the TMF and MRMF	Effect restricted to the PSA.	Permanent	Not Significant	LOW	GOOD	NO	LOW Measurable	Groundwater level monitoring within PSA	NO	The slight change in groundwater flow regime are limited to the PSA
	Reduction of the flow of groundwater due to dewatering of the pit	Effect restricted to the PSA.	70 years Life of Project	Not Significant	LOW	GOOD	NO	LOW Measurable	Groundwater level monitoring within PSA	NO	The slight change in groundwater flow regime are limited to the PSA
	Reduced groundwater quality under the TMF, MRMF and between the pit lake and the TMF/MRMF	Effect restricted to the PSA.	70 years Life of Project	Not Significant	LOW	GOOD	NO	LOW Measurable parameters	Groundwater quality monitoring within PSA	NO	Groundwater quality will be monitored within PSA. Capture and treatment will be undertaken if groundwater quality is not compliant with O.Reg 387/04 "Water Taking"
Surface Water Hydrology	Increased water levels and flows in Spring Lake and McVeigh associated with Lovell Lake dewatering during construction;	Effects extend into LSA for Spring Lake	2 months Construction Phase	Not Significant	LOW	GOOD	NO	LOW Measurable	NO	NO	Effect of Project of very short duration and reversible
	Increased water levels and flows in Goudreau Lake and Goudreau Lake outflow associated with Webb Lake dewatering during construction;	Effects extend into LSA for Spring Lake	2 months Construction Phase	Not Significant	LOW	GOOD	NO	LOW Measurable	NO	NO	Effect of Project of very short duration and reversible
	Reduction in water levels and flows in Spring Lake and Spring Lake outflow (upper McVeigh	Effects extend into LSA for Spring Lake	Permanent	Not Significant	LOW	GOOD	NO	LOW Measurable	NO	NO	Effect of Project of very short duration and reversible

	Creek) due to changes in upstream catchment area during operations, closure, and post-closure										
	Reduction in water levels of Goudreau Lake and Goudreau Lake outflows resulting from surface water takings and pit dewatering	Effects extend into LSA for Spring Lake	The 100-Year drought event is a short duration event	Not Significant	MODERATE	GOOD	NO	LOW Measurable	NO	NO	No past, current or future actions likely to impact water levels in Goudreau Lake
Surface Water Quality	Concentrations above water quality guidelines will occur for total phosphorus, copper, mercury and silver within the mixing zone, but concentrations will achieve water quality guidelines within 165 m of the discharge and will be non-toxic within the mixing zone	Extend into LSA (Otto Lake)	Permanent	Not Significant	MODERATE	GOOD	NO	LOW Measurable parameters	YES Ongoing monitoring of water quality of effluent discharge and receiving water in LSA	NO	CCME guidelines for the protection of aquatic life are maintained in receiving waters where Magino Project effluent is discharged.
Stream and Lake Sediments	Increase in phosphorus and copper sediment concentrations in Otto Lake from greater than LEL in baseline to greater than the SEL during operation	Extend into LSA (Otto Lake)	18 years (Construction, Operation, and Closure phases)	Not Significant	MODERAT	GOOD	NO - Changes in sediment chemistry are not expected to affect resource use by more than a few individuals.	LOW Measurable parameters	YES Ongoing monitoring of water quality of effluent discharge and receiving water in LSA	NO	CCME guidelines for the protection of aquatic life are maintained in receiving waters where Magino Project effluent is discharged.
	Increase in mercury sediment concentrations in Otto Lake from less than LEL in baseline to greater than the LEL during operation	Extend into LSA (Otto Lake)	18 years (Construction, Operation, and Closure phases)	Not Significant	MODERATE	GOOD	NO – Changes in sediment chemistry are not expected to affect resource use by more than a few individuals.	LOW Measurable parameters	YES Ongoing monitoring of water quality of effluent discharge and receiving water	NO	CCME guidelines for the protection of aquatic life are maintained in receiving waters where Magino Project effluent is discharged.
	Increase in arsenic, cadmium and manganese in Herman Lake from less than LEL in baseline to greater than the LEL during operation	Extend into LSA (Otto Lake)	18 years (Construction, Operation, and Closure phases)	Not Significant	MODERATE	GOOD	NO - Changes in sediment chemistry are not expected to affect resource use by more than a few individuals.	LOW Measurable parameters	YES Ongoing monitoring of water quality of effluent discharge and receiving water in LSA	NO	CCME guidelines for the protection of aquatic life are maintained in receiving waters where Magino Project effluent is discharged.
	Increase in copper sediment concentrations in Herman Lake from greater than LEL in baseline to greater than the SEL during operation	Extend into LSA (Otto Lake)	18 years (Construction, Operation, and Closure phases)	Not significant	MODERATE	GOOD	NO - Changes in sediment chemistry are not expected to affect resource use by more than a few individuals.	LOW Measurable parameters	YES Ongoing monitoring of water quality of effluent discharge and receiving water in LSA	NO	CCME guidelines for the protection of aquatic life are maintained in receiving waters where Magino Project effluent is discharged.

Visual Resources	Degradation of visual resources due to the visibility of the TMF and MRMF during Operations and Post Closure Phases and resultant changes in visual quality	A majority of the studied vantage points fall into the background delineation zone (3 km to 13 km). The Project is only visible from more than 13 km away at PT1 - Manitou Mountain.	18 years (Construction, Operation, and Closure phases)	Not Significant	LOW	GOOD	NO - Social or cultural activities conducted at vantage points experiencing a change in Visual Resource Class may be important to a few individuals or visitors, but are not major contributors to community well-being.	LOW Fixed geographical area	NO	NO	A change in Visual Resource Class generally occurs towards the end of the Operations Phase but not throughout the Post- Closure phase

BIOLOGICAL ENVIRONMENT											
VALUED COMPONENT	RESIDUAL ADVERSE EFFECTS FOR MAGINO PROJECT				CRITERIA FOR DETERMINING WHETHER FURTHER ASSESSMENT IS WARRANTED					CARRIED FOR CUMULATIVE EFFECTS ASSESSMENT	
	RESIDUAL ADVERSE EFFECTS	SPACIAL BOUNDARIES	TEMPORAL BOUNDARIES	EIS FINDING	LEVEL OF PUBLIC CONCERN	CURRENT STATE OF THE VEC HEALTH / STATUS / CONDITION	POTENTIAL FOR SIGNIFICANT CUMULATIVE EFFECTS	UNCERTAINTY IN PREDICTION OF CUMULATIVE EFFECTS	REQUIREMENT FOR FOLLOW UP OR ADDITIONAL MITIGATION	YES / NO	RATIONALE
Fish and Fish Habitat	Changes in concentrations of metals or other potentially harmful substance in water and sediment have the potential to influence lower trophic levels (i.e., plankton, benthic invertebrates and forage fish) in the receiving environment	Concentrations of copper and phosphorus greater than the SEL are confined to the LSA	10 years Limited to Operation Phase	Not Significant	MODERATE	GOOD	NO - Concentrations of copper and phosphorus in sediment will return to background following the cessation of discharge from the WQCP at the end of operations. It is expected that the benthic community will return to baseline (if any observable changes had occurred).	LOW Measurable parameters	NO	NO	Effects to sediment will generally be confined to the depositional area of the downstream lakes which does not represent important forage habitat for the resident fish species.
	Blasting in the open pit has the potential to effect CRA fish spawning and fish in the west basin of Goudreau Lake	The effect is confined to the LSA in the near-field area of the west bay of Goudreau Lake.	10 years Effects of blasting limited to life of open pit	Not Significant	MODERATE	Not applicable	NO	LOW Measurable parameters	NO	NO	Blasting from the pit has the potential impair fish in the near-field area of the west bay of Goudreau Lake however, it is expected that mitigation measures will be employed to eliminate/manage this potential effect. Furthermore, the area affected in Goudreau Lake is very small.
	Relocation of fish prior to the drawdown of habitats will result in loss of CRA fish and supporting forage fish due to the development of the Project	Fish that will need to be relocated will come from habitats to be lost within the PSA.	One season during construction	Not Significant	MODERATE	Not applicable	NO	LOW Measurable parameters	NO	NO	While fish will need to be relocated from habitats to be lost, measures will be taken to minimize the impact and promote survival. It is expected that some individual fish will be lost but communities and populations will not be affected.
	Disruption to fish will be associated with removal of water bodies and watercourses	Loss of habitat confined to the PSA, reduction in flow within McVeigh Creek will result in some small loss of habitat within the LSA.	Permanent	Not Significant	MODERATE	FAIR to POOR (for creek tributaries) Habitat offsetting measures will be constructed prior to the loss of habitat and measures incorporated to reduce lag times should result in habitat functionality between 1 and 3 years.	YES - While an offsetting/compensation plan will be developed and approved by DFO and ECCC more than 10% but less than 35% of the area of fish habitat within the RSA will be affected. This will disrupt the fish community until offsetting measures are fully established, but once established, these measures will provide for no net loss of productive habitat.	LOW Waterbodies and types of valuable fish habitat are quantifiable	NO	NO	Fisheries Act places an obligation on proponent to compensate for the loss of fish habitat.

Terrestrial Vegetation	Removal of upland forest and associated rock barrens	Removals are confined to PSA.	70 years Life of Project	Not Significant	LOW	All ecosites are well-represented in the RSA.	YES – However, all ecosites are well-represented in the RSA.	LOW Area (ha) and types of forest cover within the LSA and RSA are quantifiable	NO	YES	Despite the fact that all ecosites are well-represented in the RSA, future actions within LSA and RSA could result in cumulative effects (additional loss of habitat)
	Fragmentation of pathways of connectivity within the Webb-Goudreau and Lovell-Spring watersheds	Removals and additional fragmentation are confined to PSA.	70 years Life of Project.	Not Significant	LOW	Removals occur once, concurrently, and alternate routes exist.	NO - Removals occur once, concurrently, and alternate routes exist.	LOW Area (ha) and types of forest cover within the LSA and RSA are quantifiable	NO	NO	The mine is surrounded by forest offering alternate pathways. Pathways are unlikely to provide resources that could be of value to Aboriginal groups.
Wetlands	Removal of organic/peat accumulating wetlands	Effects are confined to the PSA.	Permanent	Not Significant	LOW	Wetlands external to PSA are numerous and in GOOD conditions	YES – However, all wetland ecosites are well-represented in the RSA	LOW Area (ha) and type of wetland within LSA and RSA are quantifiable	NO	YES	Despite the fact that all ecosites are well-represented in the RSA, future actions within LSA and RSA could result in cumulative effects (additional loss of wetlands).
	Removal of mineral wetlands	Effects are confined to the PSA.	Permanent	Not Significant	LOW	Wetlands external to PSA are numerous and in GOOD conditions	YES – However, all wetland ecosites are well-represented in the RSA	LOW Area (ha) and type of wetland within LSA and RSA are quantifiable	NO	YES	Despite the fact that all ecosites are well-represented in the RSA, future actions within LSA and RSA could result in cumulative effects (additional loss of wetlands).
	Reduced quality / function of the retained wetlands due to altered water quality and quantity	Effects are confined to the PSA.	18 years (Construction, Operation, and Closure phases)	Not Significant	LOW	Wetlands external to PSA are numerous and in GOOD conditions	NO - All wetland ecosites are well-represented in the RSA	LOW Water quality used as indicator Measurable parameter	NO	NO	All ecosites are well-represented in the RSA. Final effluent quality discharges to Otto Lake and is expected to meet water quality guidelines.
	Reduced quality / function of the retained wetlands due to indirect effects of dust, wind and sun exposure	Effects are confined to the PSA.	18 years (Construction, Operation, and Closure phases)	Not Significant	LOW	Wetlands external to PSA are numerous and in GOOD conditions	NO - All wetland ecosites are well-represented in the RSA	LOW Water quality used as indicator Measurable parameter	NO	NO	All ecosites are well-represented in the RSA. Effects will not be measurable beyond the PSA.
Significant Wildlife Habitat	Removal of Moose calving, aquatic feeding and late winter cover habitat	Effects are confined to the PSA.	18 years (Construction, Operation, and Closure phases)	Not Significant	LOW	The habitat is well represented in the RSA.	YES - The significant wildlife habitat functions occur within the LSA and RSA and within a forest to which substantial effects have occurred and upon recovery, provide habitat.	LOW Area (ha) and type of moose habitat within LSA and RSA are easily identifiable and quantifiable	NO	YES	Despite the fact that Moose calving, aquatic feeding and late winter cover habitat are well-represented in the RSA, future actions within LSA and RSA could result in cumulative effects (additional loss of significant wildlife habitat).

	Removal of habitat for Species of Special Concern	Effects are confined to the PSA.	18 years (Construction, Operation, and Closure phases)	Not Significant	MODERATE	Common Nighthawk habitat in the PSA was strongly associated with the historical mine disturbance. Upon Closure, habitat for the Common Nighthawk would be enhanced. Similarly, the creation of a large waterbody through filling of the open pit will restore foraging habitat for Bald Eagle.	YES – However, habitats for species of special concern are well represented in LSA and PSA.	LOW Area and type of habitat for species of special concerns are well known and quantifiable	NO	YES	Despite the fact that habitat for Species of Special Concern are well-represented in the RSA, future actions within LSA and RSA could result in cumulative effects (additional loss of significant wildlife habitat).
	Removal of amphibian breeding habitat	Effects are confined to the PSA.	Permanent.	Not Significant	LOW	Amphibian breeding habitat is abundant in the RSA.	YES – However, amphibian breeding habitat is abundant in LSA and RSA.	LOW Areas (streams and wetlands) of amphibian breeding habitat are quantifiable	NO	YES	Despite the fact that Amphibian breeding habitat is abundant in the RSA, future actions could result in cumulative effects (additional loss of significant wildlife habitat).
Migratory and Breeding Birds	Loss of mature forest canopy habitat for warblers	Effects limited to PSA.	18 years (Construction, Operation, and Closure phases)	Not Significant	MODERATE	The habitat is well represented in the RSA.	YES -	LOW Habitat for water fowls are quantifiable	NO	YES	Potential for cumulative dependent on the nature of future actions within LSA and PSA (additional loss of canopy coverage – loss of foraging, breeding habitat).
	Loss of foraging and staging habitat for waterfowl	Effects limited to PSA.	18 years (Construction, Operation, and Closure phases)	Not Significant	MODERATE	The habitat is well represented in the RSA.	YES	LOW Valuable foraging and staging habitat for waterfowl is quantifiable	NO	YES	Potential for cumulative dependent on the nature of future actions within LSA and PSA (additional loss of habitat).
	Loss of foraging habitat for raptors	Effects limited to PSA.	18 years (Construction, Operation, and Closure phases)	Not Significant	MODERATE	The habitat is well represented in the RSA.	YES	LOW Valuable foraging habitat for raptors is quantifiable	NO	YES	Potential for cumulative dependent on the nature of future actions within LSA and PSA (additional loss of habitat).
Mammals	Removal of Black Bear berry foraging habitat	Effects limited to PSA.	18 years (Construction, Operation, and Closure phases)	Not Significant	LOW	Habitat is available elsewhere and no other critical habitat was identified.	YES – potential for cumulative effects dependent on areas (ha) impacted by future actions.	LOW Area and type of habitat is quantifiable	NO	NO	Potential for cumulative effects dependent on areas (ha) impacted by future actions
	Creation of barriers to landscape connectivity (including removal of moose travel corridors)	Effects limited to PSA.	18 years (Construction, Operation, and Closure phases)	Not Significant	LOW	Limited barriers	NO – Project effects are constrained to PSA.	LOW Measurable	NO	NO	Project effects are constrained to PSA
	Changes in mammal behaviour due to noise, vibration and light	Effects limited to PSA.	18 years (Construction, Operation, and Closure phases)	Not Significant	LOW	The habitat is well represented and already disturbed by commuting vehicles, operating mines and	NO – mammals have habituated to human activities within the LSA and RSA	LOW Quantifiable based on monitoring	NO	NO	Effects restricted to PSA and mammals habituate to Project activities.

						mine exploration.					
	Attraction of bears and other mammals to kitchen waste disposal areas, dining facilities and human activity where food might be available	Effects limited to PSA.	18 years (Construction, Operation, and Closure phases)	Not Significant	LOW	The habitat outside of the PSA is well represented and provides alternate corridors.	NO – site specific concerns addressed by on site management practices.	NO Quantifiable based on monitoring	NO	NO	Concerns addressed by best management practices for waste management at Project site.
	Removal of beaver lodges and furbearer habitat due to draining of waterbodies	Effects limited to PSA.	Permanent	Not Significant	LOW	The mammals affected are common in the RSA.	NO	LOW Measurable	NO	NO	Beaver lodges are abundant throughout the LSA and PSA
	Increased mammal-vehicular collisions	Effects limited to PSA.	18 years (Construction, Operation, and Closure phases)	Not Significant	LOW	Wildlife is acclimated to existing persistent traffic.	YES – direct correlation with increase in vehicular traffic	LOW Animal collisions are quantifiable	NO	YES	YES – direct correlation with increase in vehicular traffic
	Increased exposure of mammals to contaminants in water quality ponds, constructed treatment wetlands and from dustfall	Effects limited to PSA. (Otto Lake)		Not Significant	LOW	The mammals affected are common in the RSA and mitigation measures should protect them.	NO – mitigation in place at Project site to ensure compliance with regulatory standards at Project fence line.	LOW Air quality and water quality monitoring	YES Ongoing monitoring of ambient air and effluent quality at Project site	NO	Project mitigation measures ensure that regulatory standards for ambient air quality and water quality are maintained at Project fence line.
Species at Risk (Aquatic and Terrestrial)	Removal of bat hibernaculum from the RSA	Effects abandoned mine adit within PSA.	Permanent (occurs during construction phase)	Not Significant	LOW	Disturbance of habitat and removal of the hibernaculum will occur but SAR habitat functions are likely maintained elsewhere within the RSA.	NO - The anthropogenic habitat is all within the PSA and was not detected in the RSA.	LOW Species settled in abandoned mine adit.	NO	NO	One time event associated with closure of existing mine adit. The anthropogenic habitat is all within the PSA and was not detected in the RSA.

SOCIO-ECONOMIC ENVIRONMENT											
VALUED COMPONENT	RESIDUAL ADVERSE EFFECTS FOR MAGINO PROJECT				CRITERIA FOR DETERMINING WHETHER FURTHER ASSESSMENT IS WARRANTED					CARRIED FOR CUMULATIVE EFFECTS ASSESSMENT	
	RESIDUAL ADVERSE EFFECTS	SPACIAL BOUNDARIES	TEMPORAL BOUNDARIES	EIS FINDING	LEVEL OF PUBLIC CONCERN	CURRENT STATE OF THE VEC HEALTH / STATUS / CONDITION	POTENTIAL FOR SIGNIFICANT CUMULATIVE EFFECTS	UNCERTAINTY IN PREDICTION OF CUMULATIVE EFFECTS	REQUIREMENT FOR FOLLOW UP OR ADDITIONAL MITIGATION	YES / NO	RATIONALE
Community Vitality	Increased noise, vibration, light effects at nearby cabins, and increased travel time to some cabins that will have to use the new public bypass road	A measurable or noticeable effect is likely to extend into the LSA or the primary communities	18 years (Construction, Operation, and Closure phases)	Not Significant	HIGH	Conditions or phenomena causing the effects occur at regular or frequent intervals (i.e., daily or continuously)	YES - The effect is expected to diminish somewhat the overall community well-being in the LSA/primary communities.	HIGH - Subjective consideration as local communities are supportive of industrial development to promote community stability	Requirement for follow up and/or additional mitigations have to be community driven.	NO	This concern is specific to the access to Goudreau south of the PSA.
	Less attractive experience for recreational users engaged in activities in the LSA such as fishing, boating, hunting, snowmobiling, ATVing, hiking, cross-country skiing, snowshoeing, camping and berry picking	A measurable or noticeable effect is likely to extend into the LSA or the primary communities	18 years (Construction, Operation, and Closure phases)	Not Significant	HIGH	Conditions or phenomena causing the effects occur at regular or frequent intervals (i.e., daily or continuously)	YES - The effect is expected to diminish somewhat the overall community well-being in the LSA/primary communities.	HIGH - Subjective consideration ad local communities are supportive of industrial development to promote community stability	Requirement for follow up and/or additional mitigations have to be community driven.	NO	Attractiveness is a highly subjective and individual notion which is not quantifiable.
	Increased in demand for local health and social services associated with moderate increase in population in the primary communities	A measurable or noticeable effect is likely to extend into the LSA or the primary communities	18 years (Construction, Operation, and Closure phases)	Not Significant	HIGH	Conditions or phenomena causing the effects occur at regular or frequent intervals (i.e., daily or continuously)	YES - The effect is expected to diminish somewhat the overall community well-being in the LSA/primary communities.	HIGH - Subjective consideration as local communities are supportive of industrial development to promote community stability	Requirement for follow up and/or additional mitigations have to be community driven.	NO	Primary communities and Aboriginal groups are actively seeking to diversify local economy and maintain sustainable growth. Concerns over community vitality will be address at the community level through planning.
	Increased demand for local/regional training programs to take advantage of Project employment opportunities	A measurable or noticeable effect is likely to extend into the LSA or the primary communities	18 years (Construction, Operation, and Closure phases)	Not Significant	HIGH	Conditions or phenomena causing the effects occur at regular or frequent intervals (i.e., daily or continuously)	YES - The effect is expected to diminish somewhat the overall community well-being in the LSA/primary communities.	HIGH - Local communities are supportive of industrial development to promote training programs and improve skill levels in community	Requirement for follow up and/or additional mitigations have to be community driven.	NO	Primary communities and Aboriginal groups are actively seeking to diversify local economy and maintain sustainable growth. Concerns over community vitality will be address at the community level through planning.
Infrastructure and Services	Increased demand for housing (owned/rented) in the primary communities, with corresponding potential increase in prices	A measurable or noticeable effect is likely to extend into the LSA or the primary communities	18 years (Construction, Operation, and Closure phases)	Not Significant	HIGH	The effect is not expected to measurably affect overall community well-being in the primary communities.	YES - Potential cumulative effects dependent on magnitude of future actions in the RSA.	MODERATE Human behaviour difficult to predict	Requirement for follow up and/or additional mitigations have to be community driven.	NO	Primary communities and Aboriginal groups are actively seeking to diversify local economy and maintain sustainable growth. Concerns over community vitality will be address at the community level through planning.
	Increased demand for emergency services in	A measurable or noticeable effect is	18 years (Construction,	Not Significant	HIGH	The effect is not expected to	YES - Potential cumulative effects	MODERATE Human behaviour	Requirement for follow up and/or	NO	Primary communities and Aboriginal groups are actively seeking to diversify

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	RESIDUAL ADVERSE EFFECTS	SPACIAL BOUNDARIES	TEMPORAL BOUNDARIES	EIS FINDING	LEVEL OF PUBLIC CONCERN	CURRENT STATE OF THE VEC HEALTH / STATUS / CONDITION	POTENTIAL FOR SIGNIFICANT CUMULATIVE EFFECTS	UNCERTAINTY IN PREDICTION OF CUMULATIVE EFFECTS	REQUIREMENT FOR FOLLOW UP OR ADDITIONAL MITIGATION	YES / NO	RATIONALE
	Dubreuilville, and to a lesser extent in Wawa and White River	likely to extend into the LSA or the primary communities	Operation, and Closure phases)			measurably affect overall community well-being in the primary communities.	dependent on magnitude of future actions in the RSA.	difficult to predict	additional mitigations have to be community driven.		local economy and maintain sustainable growth. Concerns over community vitality will be address at the community level through planning.
	Increased demand on utilities (landfill, water supply, waste water management) related to moderate population increases in the primary communities and the permanent camp accommodations complex in Dubreuilville used during the operations phase	A measurable or noticeable effect is likely to extend into the LSA or the primary communities	18 years (Construction, Operation, and Closure phases)	Not Significant	HIGH	The effect is not expected to measurably affect overall community well-being in the primary communities.	YES - Potential cumulative effects dependent on magnitude of future actions in the RSA.	MODERATE Human behaviour difficult to predict	Requirement for follow up and/or additional mitigations have to be community driven.	NO	Primary communities and Aboriginal groups are actively seeking to diversify local economy and maintain sustainable growth. Concerns over community vitality will be address at the community level through planning.
	Increased travel time for those travelling to the Goudreau settlement via the new 'Public Bypass' road (or 'Ring Road') that relocates the on-site portion of Goudreau Road	A measurable or noticeable effect is likely to extend into the LSA or the primary communities	18 years (Construction, Operation, and Closure phases)	Not Significant	HIGH	The effect is not expected to measurably affect overall community well-being in the primary communities.	YES - Potential cumulative effects dependent on magnitude of future actions in the RSA.	MODERATE Human behaviour difficult to predict	Requirement for follow up and/or additional mitigations have to be community driven.	NO	Primary communities and Aboriginal groups are actively seeking to diversify local economy and maintain sustainable growth. Concerns over community vitality will be address at the community level through planning.
	Increased traffic levels on Highway 519 and Goudreau Road	A measurable or noticeable effect is likely to extend into the LSA or the primary communities	18 years (Construction, Operation, and Closure phases)	Not Significant	HIGH	The effect is not expected to measurably affect overall community well-being in the primary communities.	YES - Potential cumulative effects dependent on magnitude of future actions in the RSA.	MODERATE Human behaviour difficult to predict	Requirement for follow up and/or additional mitigations have to be community driven.	NO	Primary communities and Aboriginal groups are actively seeking to diversify local economy and maintain sustainable growth. Concerns over community vitality will be address at the community level through planning.
	Increased vehicular traffic in the community of Dubreuilville	A measurable or noticeable effect is likely to extend into the LSA or the primary communities	18 years (Construction, Operation, and Closure phases)	Not Significant	HIGH	Existing road network is in good condition	YES – increase in residents will lead to increase traffic	LOW Measurable	Requirement for follow up and/or additional mitigations have to be community driven.	NO	Primary communities and Aboriginal groups are actively seeking to diversify local economy and maintain sustainable growth. Concerns over community vitality will be address at the community level through planning.
	Increase in demand for telephone, cellular and Internet communications capacity by workers residing in the primary communities	A measurable or noticeable effect is likely to extend into the LSA or the primary communities	18 years (Construction, Operation, and Closure phases)	Not Significant	HIGH	Services by providers is dependent on demand/number of users	YES – increase in community population will increase demands for services providing incentives for services providers to improve delivery of services.	LOW Measurable	Requirement for follow up and/or additional mitigations have to be community driven.	NO	Improved delivery of service by providers. Primary communities and Aboriginal groups are actively seeking to diversify local economy and maintain sustainable growth. Concerns over community vitality will be address at the community level through planning.
	Possible disruption of power supply during the re-routing of the power line	Limited to PSA	6 month (Construction Phase)	Not Significant	LOW	Not applicable	NONE	LOW Quantifiable	NO	NO	Short term, localized effect.

SOCIO-ECONOMIC ENVIRONMENT											
VALUED COMPONENT	RESIDUAL ADVERSE EFFECTS FOR MAGINO PROJECT				CRITERIA FOR DETERMINING WHETHER FURTHER ASSESSMENT IS WARRANTED					CARRIED FOR CUMULATIVE EFFECTS ASSESSMENT	
	RESIDUAL ADVERSE EFFECTS	SPACIAL BOUNDARIES	TEMPORAL BOUNDARIES	EIS FINDING	LEVEL OF PUBLIC CONCERN	CURRENT STATE OF THE VEC HEALTH / STATUS / CONDITION	POTENTIAL FOR SIGNIFICANT CUMULATIVE EFFECTS	UNCERTAINTY IN PREDICTION OF CUMULATIVE EFFECTS	REQUIREMENT FOR FOLLOW UP OR ADDITIONAL MITIGATION	YES / NO	RATIONALE
Land Use and Tourism	Increased traffic on Goudreau Road will be experienced by Richmont Mines and other users	Extent to LSA and PSA	18 years (Construction, Operation, and Closure phases)	Not Significant	MODERATE	The effect is not expected to measurably affect overall community well-being in the LSA/primary communities.	YES – dependent on scale and nature of future actions in LSA and PSA	LOW Measurable	NO	NO	This increase in traffic on Goudreau road has been assessed with the Magino Project. Cumulative effect dependent on future activities within the LSA.
	Loss of resource for public and commercial fuel wood operation in the PSA	Limited to PSA	50 years Life of Project	Not Significant	LOW	The effect is not expected to measurably affect overall community well-being in the LSA/primary communities.	YES – dependent on scale and nature of future actions in LSA and PSA	LOW Measurable surface to quantify losses	NO	NO	One time event limited to the PSA.
	Less attractive experience for users of the outfitting camp in Goudreau settlement as a result of noise, vibration, light, and visual effects, and increased travel time	Limited to PSA	18 years (Construction, Operation, and Closure phases)	Not Significant	MODERATE	The effect is not expected to measurably affect overall community well-being in the LSA/primary communities.	NO - effects are limited to well defined geographical area (PSA)	MODERATE Subjective -	NO	NO	Effects no detectable beyond PSA for the duration of the Project
	Loss of on-site trails and a small portion of trail along the Goudreau Road's western arm as a result of the proposed public bypass road	Limited to PSA	18 years (Construction, Operation, and Closure phases)	Not Significant	LOW	The effect is not expected to measurably affect overall community well-being in the LSA/primary communities.	NO - effects are limited to well defined geographical area (PSA)	LOW Measurable	NO	NO	Effects no detectable beyond PSA for the duration of the Project
	Loss of public access points at Lovell Lake and Goudreau Lake	Limited to PSA	18 years (Construction, Operation, and Closure phases)	Not Significant	LOW	The effect is not expected to measurably affect overall community well-being in the LSA/primary communities.	NO	LOW Fixed location - measurable	NO	NO	Numerous other access points to Goudreau Lake remain available to the public
	Loss of portions of two trapline areas in the PSA and potential disturbance of furbearers elsewhere in the LSA by the Project	Limited to PSA	18 years (Construction, Operation, and Closure phases)	Not Significant	LOW	The effect is not expected to measurably affect overall community well-being in the LSA/primary communities.	YES – dependent on scale and nature of future actions in LSA and PSA	LOW Measurable	NO	NO	One time situation limited to trap lines located within PSA.
	Loss of portions of bear management areas in the	Limited to PSA	18 years (Construction,	Not Significant	MODERATE	The effect is not expected to	YES – dependent on scale and nature of	LOW Area lost is	NO	NO	Unlikely but somewhat dependent on nature and scale of future action with

SOCIO-ECONOMIC ENVIRONMENT											
VALUED COMPONENT	RESIDUAL ADVERSE EFFECTS FOR MAGINO PROJECT				CRITERIA FOR DETERMINING WHETHER FURTHER ASSESSMENT IS WARRANTED					CARRIED FOR CUMULATIVE EFFECTS ASSESSMENT	
	RESIDUAL ADVERSE EFFECTS	SPACIAL BOUNDARIES	TEMPORAL BOUNDARIES	EIS FINDING	LEVEL OF PUBLIC CONCERN	CURRENT STATE OF THE VEC HEALTH / STATUS / CONDITION	POTENTIAL FOR SIGNIFICANT CUMULATIVE EFFECTS	UNCERTAINTY IN PREDICTION OF CUMULATIVE EFFECTS	REQUIREMENT FOR FOLLOW UP OR ADDITIONAL MITIGATION	YES / NO	RATIONALE
	PSA and potential disturbance of bears in the LSA by the Project		Operation, and Closure phases)			measurably affect overall community well-being in the LSA/primary communities.	future actions in LSA and PSA	quantifiable			LSA.
	Loss of access to baitfish resources in the PSA	Limited to PSA	18 years (Construction, Operation, and Closure phases)	Not Significant	LOW	The effect is not expected to measurably affect overall community well-being in the LSA/primary communities.	YES – dependent on scale and nature of future actions in LSA and PSA	LOW Loss is quantifiable	NO	NO	One time event limited to PSA.

Table 11-6: Summary of VCs and Residual Effects Retained for Cumulative Effects Assessment (Step 2)

VALUED COMPONENT	RESIDUAL ADVERSE EFFECTS FOR MAGINO PROJECT				CRITERIA FOR DETERMINING WHETHER FURTHER ASSESSMENT IS WARRANTED					CARRIED FOR CUMULATIVE EFFECTS ASSESSMENT	
	RESIDUAL ADVERSE EFFECTS	SPACIAL BOUNDARIES	TEMPORAL BOUNDARIES	EIS FINDING	LEVEL OF PUBLIC CONCERN	CURRENT STATE OF THE VEC HEALTH / STATUS / CONDITION	POTENTIAL FOR SIGNIFICANT CUMULATIVE EFFECTS	UNCERTAINTY IN PREDICTION OF CUMULATIVE EFFECTS	REQUIREMENT FOR FOLLOW UP OR ADDITIONAL MITIGATION	YES / NO	RATIONALE
ATMOSPHERIC ENVIRONMENT											
Greenhouse Gases	Contribution of GHG emissions to Provincial, Canadian and global annual GHG emissions	Effect extends into the LSA.	18 years (Construction, Operation, and Closure phases)	Not Significant	HIGH	Low levels of GHG emissions	LOW	LOW Measurable parameters for GHG emissions and annual reporting	YES • Ontario's GHG Emissions Reporting Regulation (O. Reg. 452/09); • Ontario's Cap and Trade Regulation (O. Reg. 144/16); and • Government of Canada GHG Reporting Program (the GHGRP).	NO	The GHG emissions from the Project are a very minor contribution to the totals reported for the Provincial and federal reporting programs and are not considered major (estimated at less than 0.1% of Ontario GHG emissions).
BIOLOGICAL ENVIRONMENT											
Terrestrial Vegetation	Removal of upland forest and associated rock barrens	Removals are confined to PSA.	70 years Life of Project	Not Significant	LOW	All ecosites are well-represented in the RSA.	YES – However, all ecosites are well-represented in the RSA.	LOW Area (ha) and types of forest cover within the LSA and RSA are quantifiable	YES By proponent of future activities (i.e. Forestry operation with Forest management Plan)	YES	Despite the fact that all ecosites are well-represented in the RSA, future actions within LSA and RSA could result in cumulative effects
Wetlands	Removal of wetlands	Effects are confined to the PSA.	Permanent	Not Significant	LOW	Wetlands external to PSA are numerous and in GOOD conditions	YES – However, all wetland ecosites are well-represented in the RSA	LOW Area (ha) and type of wetland within LSA and RSA are quantifiable	YES By proponent of future activities (i.e. Forestry operation with Forest management Plan)	YES	Despite the fact that all ecosites are well-represented in the RSA, future actions within LSA and RSA could result in cumulative effects
Significant Wildlife Habitat	Removal of Moose calving, aquatic feeding and late winter cover habitat (associated with removal of terrestrial vegetation and wetlands)	Effects are confined to the PSA.	18 years (Construction, Operation, and Closure phases)	Not Significant	LOW	The habitat is well represented in the RSA.	YES - The significant wildlife habitat functions occur within the LSA and RSA and within a forest to which substantial effects have occurred and upon recovery, provide habitat.	LOW Area (ha) and type of moose habitat within LSA and RSA are easily identifiable and quantifiable	YES By proponent of future activities (i.e. Forestry operation with Forest management Plan)	YES	Despite the fact that Moose calving, aquatic feeding and late winter cover habitat are well-represented in the RSA, future actions within LSA and RSA could result in cumulative effects.

VALUED COMPONENT	RESIDUAL ADVERSE EFFECTS FOR MAGINO PROJECT				CRITERIA FOR DETERMINING WHETHER FURTHER ASSESSMENT IS WARRANTED					CARRIED FOR CUMULATIVE EFFECTS ASSESSMENT	
	RESIDUAL ADVERSE EFFECTS	**SPACIAL BOUNDARIES**	**TEMPORAL BOUNDARIES**	**EIS FINDING**	**LEVEL OF PUBLIC CONCERN**	**CURRENT STATE OF THE VEC HEALTH / STATUS / CONDITION**	**POTENTIAL FOR SIGNIFICANT CUMULATIVE EFFECTS**	**UNCERTAINTY IN PREDICTION OF CUMULATIVE EFFECTS**	**REQUIREMENT FOR FOLLOW UP OR ADDITIONAL MITIGATION**	**YES / NO**	**RATIONALE**
Migratory and Breeding Birds	Removal of habitat for Species of Special Concern (associated with removal of terrestrial vegetation and wetlands)	Effects are confined to the PSA.	18 years (Construction, Operation, and Closure phases)	Not Significant	MODERATE	Common Nighthawk habitat in the PSA was strongly associated with the historical mine disturbance. Upon Closure, habitat for the Common Nighthawk would be enhanced. Similarly, the creation of a large waterbody through filling of the open pit will restore foraging habitat for Bald Eagle.	YES – However, habitats for species of special concern are well represented in LSA and PSA.	LOW Area and type of habitat for species of special concerns are well known and quantifiable	YES By proponent of future activities (i.e. Forestry operation with Forest management Plan)	YES	Despite the fact that habitat for Species of Special Concern are well-represented in the RSA, future actions within LSA and RSA could result in cumulative effects.
	Removal of amphibian breeding habitat (associated with removal of wetlands)	Effects are confined to the PSA.	Permanent.	Not Significant	LOW	Amphibian breeding habitat is abundant in the RSA.	YES – However, amphibian breeding habitat is abundant in LSA and RSA.	LOW Areas (streams and wetlands) of amphibian breeding habitat are quantifiable	YES By proponent of future activities (i.e. Forestry operation with Forest management Plan)	YES	Despite the fact that Amphibian breeding habitat is abundant in the RSA, future actions could result in cumulative effects.
	Loss of mature forest canopy habitat for warblers (associated with removal of terrestrial vegetation)	Effects limited to PSA.	18 years (Construction, Operation, and Closure phases)	Not Significant	MODERATE	The habitat is well represented in the RSA.	YES -	LOW Habitat for water fowls are quantifiable	YES By proponent of future activities (i.e. Forestry operation with Forest management Plan)	YES	Potential for cumulative dependent on the nature of future actions within LSA and PSA.
	Loss of foraging and staging habitat for waterfowl (associated with removal of waterbodies and wetlands)	Effects limited to PSA.	18 years (Construction, Operation, and Closure phases)	Not Significant	MODERATE	The habitat is well represented in the RSA.	YES	LOW Valuable foraging and staging habitat for waterfowl is quantifiable	YES By proponent of future activities (i.e. Forestry operation with Forest management Plan)	YES	Potential for cumulative dependent on the nature of future actions within LSA and PSA.
	Loss of foraging habitat for raptors (associated with removal of terrestrial vegetation and wetlands)	Effects limited to PSA.	18 years (Construction, Operation, and Closure phases)	Not Significant	MODERATE	The habitat is well represented in the RSA.	YES	LOW Valuable foraging habitat for raptors is quantifiable	YES By proponent of future activities (i.e. Forestry operation with Forest management Plan)	YES	Potential for cumulative dependent on the nature of future actions within LSA and PSA.

11.4.3.2 Determining Spatial Boundaries

CEAA guidance:

> *To consider the environmental effects of existing and future physical activities, the spatial boundaries need to encompass the potential environmental effects on the selected VC of the designated project, in combination with other physical activities that have been or will be carried out.*

11.4.3.2.1 VC-Centered Spatial Boundaries

Spatial boundaries for cumulative effects assessment are based on setting adequate spatial boundaries for each VC and considering primarily the VC's geographic range and the zone of influence (ZOI) of the project for the VC.

A regional map of the Project area is presented in Figure 11-1. For the atmospheric, physical and biological VCs, the RSA used for the Magino Project EIS varies in size.

11.4.3.2.2 Greenhouse Gases (GHG)

The standard approach for assessment of GHG is to compare project specific GHG emissions to provincial, national and global emissions as was done for the GHG assessment of the Magino Project (refer to Chapter 4, Section 7.2.5).

11.4.3.2.3 Biological VCs

Spatial boundaries define the areas within which existing environmental conditions are described and the geographic extents within which potential environmental effects are expected to occur. With respect to the Magino Project, the Regional, Local and Project study areas applicable to the description of the biological environment are illustrated on Figure 11-2. This description includes an overview of natural heritage features, fish and fish habitat, terrestrial vegetation, wetlands, Significant Wildlife Habitat (SWH), migratory and breeding birds, mammals and Species at Risk (SAR).

The Regional Study Area (RSA) is defined by the subwatershed boundaries of the upper portion of the Dreany subwatershed, McVeigh Creek and drainage associated with the Herman-Otto Lakes basin and a subwatershed of the Webb-Goudreau basin. This study area is approximately 11,120 ha (i.e., 110 $km^{2)}$ in size and extends upstream and beyond the likely potential downstream influence of the proposed mine. The RSA is set within Ecoregion 3E, Lake Abitibi, and Site District 3E-5 Foleyet. It falls within Wildlife Management Unit 32, includes portions of Bear Management Units WA-32-044, WA-32-010 and WA-32-002, and also Baitfish Harvest Area WA00071.

The RSA includes representative diversity of lake size and depth and connecting watercourses within the region supporting fish species which prefer cold, cool and warm water temperatures, multiple trophic levels and feeding guilds. The RSA also includes diverse elements and large scale factors such as extensive ranges for big game mammals. This study area exhibits diversity both in terms of natural features and functions as well as socio-economic features related to the biological environment such as hunt camps, former mines and forestry operations.

The Local Study Area (LSA) is nested within the RSA and focused on the area in which direct and indirect effects from mine construction and operation may occur. This study area includes the subwatersheds associated with the Herman-Otto, Spring-Lovell, and Webb-

Goudreau, drainage. The LSA is approximately 3,623 ha (i.e., 36 km2) in size and includes representative vegetation communities and wildlife habitat also present in the RSA. The northeast to southwest alignment of landforms defines the drainage basins and associated wetlands, and aligns vegetation, wildlife habitat, and natural linkages. The size of the LSA was chosen to capture potential effects of the drainage from the mine project. It also captures terrestrial effects that may extend beyond the active mining operation such as blasting impacts, noise and vibration, light, odours, and changes in traffic and their transportation corridors. Most of the long term MMER monitoring will occur within the LSA to document the effectiveness of techniques and measures designed to mitigate the effects of the phases of mining construction, operations, and closure.

The Project Study Area (PSA) is nested within both the RSA and LSA, and is defined by the Magino Property boundary. The PSA is approximately 1,802 ha (i.e., 18 km^2) in size and includes the pit area, the tailings area, and the mine rock management facility area.

The same PSA, LSA and RSA of 110 km^2 are retained for assessment of cumulative effects on biological VEs as all ecotypes are well represented within this area and the area is sufficiently large to capture interactions causing cumulative effects between past/future activities within the residual effects caused by the Magino Project. A brief description of the existing conditions within the RSA is presented in Table 11-7.

11.4.3.3 Temporal Boundaries

For determining temporal boundaries, CEAA's Operational Policy states that:

> *Temporal boundaries for assessing a selected VC should take into account past and existing physical activities, as well as future physical activities that are certain and reasonably foreseeable. They should also take into account the degree to which the environmental effects of these physical activities will overlap those predicted from the designated project.*

The Magino Project phases and durations are defined in Chapter 6 of the EIS. The relationship between Project phases/duration and the temporal boundaries for cumulative effects assessment is presented in Table 11-7.

Despite uncertainties associated with forestry plans going forward, the activities of the Magino will occur over a 21-year span, from site preparation to closure. The Magino site will be rehabilitated at closure thus restoring terrestrial habitats. Post closure monitoring will continue until closure objective are met and the site can achieve a "Close Mine Status".

The time frame over which cumulative effects with the Magino Project could occur is thus 21 years. Hence, this is the period retained for the temporal boundaries of the cumulative effects assessment.

Table 11-7: Temporal Boundaries for Cumulative Effects Assessment

Magino Project			Temporal Boundaries for Cumulative Effects Assessment
Project Phase	**Duration**	**Time span**	
Site Preparation	Up to 1 year	1 year	Time span for cumulative effects assessment is 21 years
Construction	2 years	3 years	
Operation - Mining	10 years	13 years	
Operation - Milling	15 years	18 years	
Closure	3 years	21 years	
Post Closure	4 to 50 years until closure objectives are achieved.	70 years	Magino site rehabilitated – no activities

Figure 11-1: Regional Map

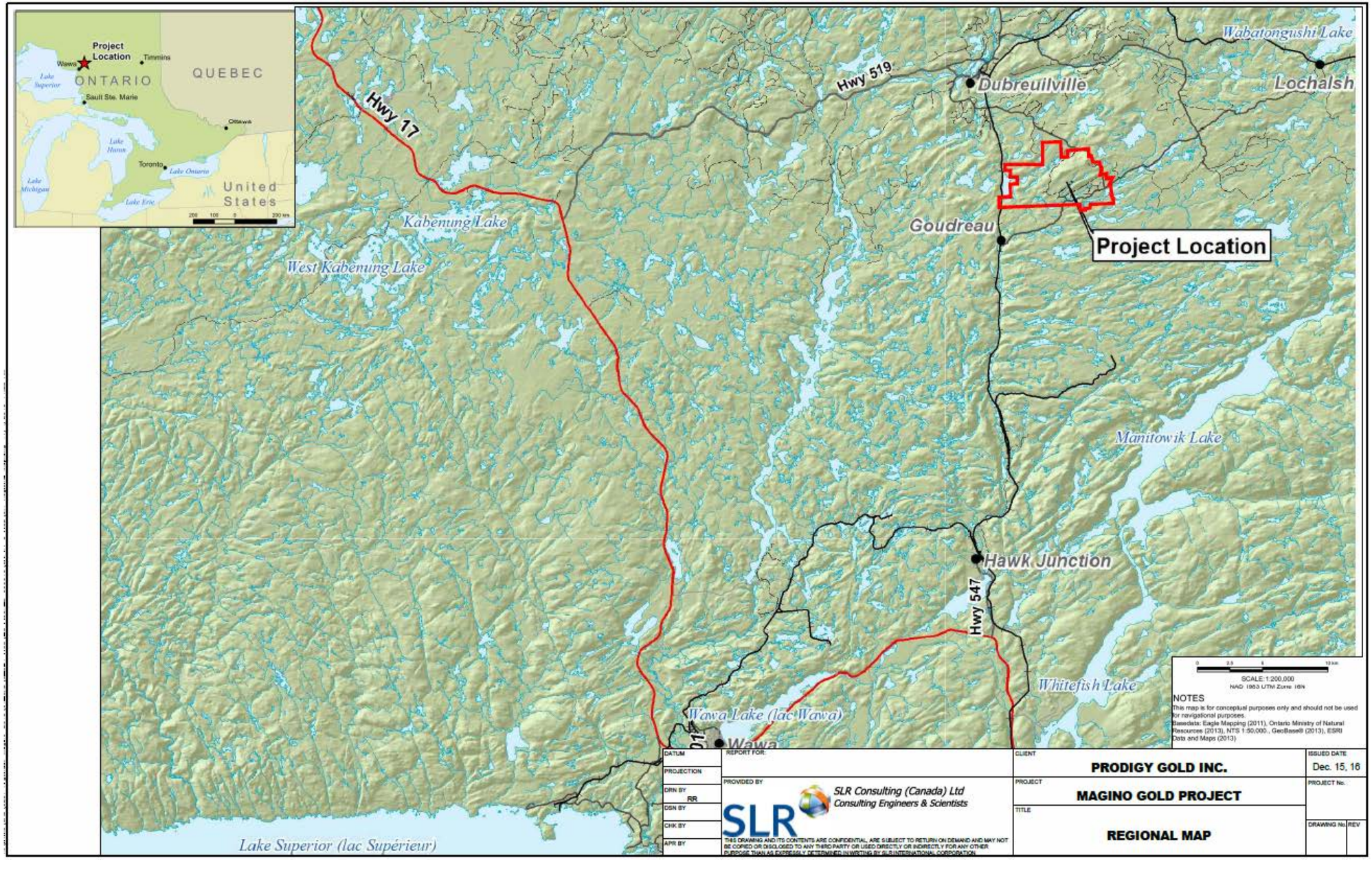
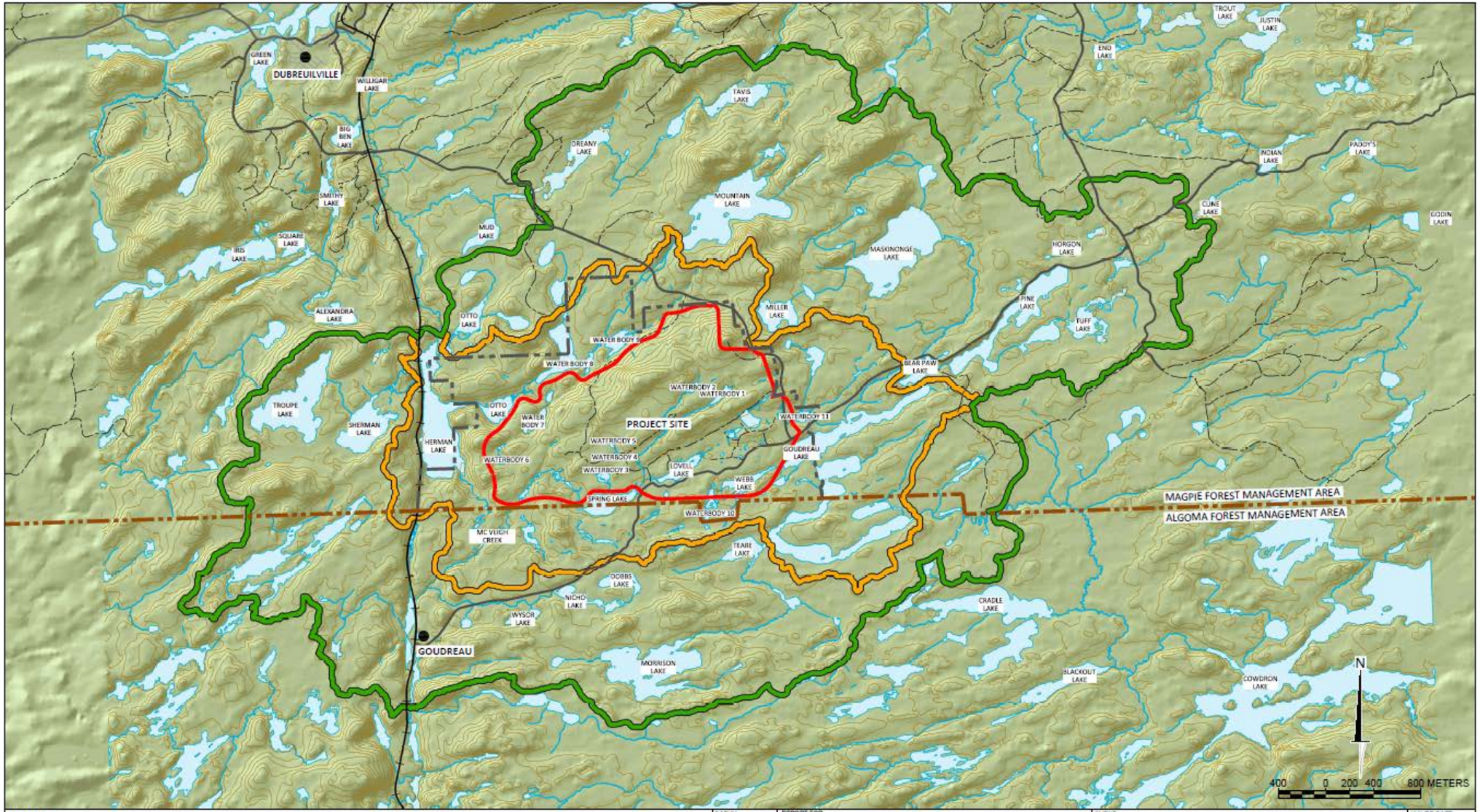


Figure 11-2: Biological Environmental Component Study Areas



11.4.4 Examining Physical Activities That Have Been or Will Be Carried Out

Human disturbance in the RSA is extensive. Existing disturbed areas are largely associated with historic forestry operations, past and ongoing mining and exploration activities, and the development of infrastructure such as roads and rail lines. These past and existing actions have all altered the Physical Environment to some extent in their immediate vicinity. It is expected that the ongoing exploration activities and the existing Island Gold Mine and Mill, along with the historic and abandoned mines and mills, will continue to be noticeable activities and features on the landscape. A brief listing and description of past, current and future activities identified for the RSA is presented in Appendices 1 & 2.

11.4.4.1 Past Activities

A list of past mining actions is presented in Table 11-8. These activities have been categorized as follows:

- Existing disturbed areas;
- Existing communities, tourism and recreational activities;
- Existing transportation network;
- Historic and abandoned mines and mills;
- Existing mineral exploration activities;
- Existing mines and mills;
- Existing forestry facilities and harvesting;
- Existing power generation facilities; and
- Existing power, oil and gas transmission facilities.

These activities have been completed or have ceased. The only possible interactions with the Magino Project are for residual effects of these activities on the physical VCs (ongoing effect on water quality of surface runoff) that could have additive or synergetic cumulative effects on the biological VCs. Such potential residual effects have been captured in the baseline condition report of the Magino Project (presented in Chapter 4 of the EIS).

With respect to biological VCs, the disturbed areas were defined using Landsat 7 imagery within the Physical and Biological environmental component RSA. There is approximately 1,076 ha that could be classified as being disturbed within this RSA. This has been taken into consideration for the evaluation of significance of residual effects for the Magino Project.

Table 11-8: List of Past Mining and Forestry Activities and their Potential for Cumulative Effects

Past Mining and Forestry Activities (Historical) (Projects in the vicinity of Dubreuilville, Lochalsh, Alden, Magpie, Joesphine, and Hawk Junction)				
Mine Site Name	**Abandoned Mines Information System (AMIS) Database No.**	**Approximate Distance from the Magino Site (km)**	**Potential cumulative effect with the Project (additive or synergetic)**	
			Atmospheric, Physical or Biological VECs Interaction	**VSECs Interaction**
Alden Goudreau Range	00867	13 S	No	No
Alden Iron Range	00886	12 S	No	No
Atnel Gold Inc.	03070	24 SW	No	No
Bear Iron Range	00893	2 S	Possible	No
Bearpaw Lake	00902	5 E	Possible	No
Bingham-Holliday Showing	04140	18 SW	No	No
Blacksmith Vein	00296	23 SW	No	No
Cascaden	00907	28 E	No	No
Cline Lake Gold Mine	00901	11 E	No	No
Dubreuil Forest Products	Not Applicable	11 NW	No	No
Edwards Gold Mine	00898	10 E	No	No
EGO Mines Claim	00011	13 SW	No	No
Emily Occurrence	00906	20 E	No	No
Farquhar Prospect	00882	13 SW	No	No
G.L White	00908	20 E	No	No
Iron Formation (Part of Goudreau Property)	00888, 00889, 00892, 00896	4 S	Possible	No
Iron Range A	00894	2 S	Possible	No
Iron Range C	00895	3 S	Possible	No
Joesphine Mine	00297	22 SW	No	No
Kathleen Iron Pros	00295	23 SW	No	No
Kathleen Iron Range	00881	23 SW	No	No
Kozak Mine	00883	10 S	No	No
Kremzar Mine	00905	4 E	Possible	No
Lochalsh Gold	00903	4 E	Possible	No
Lucy Iron Range	03065	28 SW	No	No
Magino Mine	00904	2 SE	Possible	No
Magpie Mine	00299	19 SW	No	No
McMahon Occurrence	00891	5 SW	Possible	No
Michael Syndicate	00900	7 E	Possible	No

Past Mining and Forestry Activities (Historical) (Projects in the vicinity of Dubreuilville, Lochalsh, Alden, Magpie, Joesphine, and Hawk Junction)				
Mine Site Name	**Abandoned Mines Information System (AMIS) Database No.**	**Approximate Distance from the Magino Site (km)**	**Potential cumulative effect with the Project (additive or synergetic)**	
			Atmospheric, Physical or Biological VECs Interaction	**VSECs Interaction**
Morrison Iron B	00302	3 S	Possible	No
Murphy Gold Mine	00884	11 SW	No	No
Murray-Algoma	00301	23 SW	No	No
Rand No. 1	00887	5 SW	Possible	No
Rand No. 2	00885	7 SW	Possible	No
Reed-Booth Gold	03073	22 SW	No	No
Regnery Molybdenite	03071	25 SW	No	No
Rein Gold Occurrence	00899	12 E	No	No
Ruth Iron Range	03072	24 SW	No	No
Wilks-Arnott Iron Range	03067	27 SW	No	No
Note: The potential effects of past activities are captured in the description of the baseline (Chapter 4) and the effects assessment of the Project presented in Chapter 7.				

11.4.4.2 Description of Current Economic Activities within PSA, LSA and RSA

11.4.4.2.1 Mining

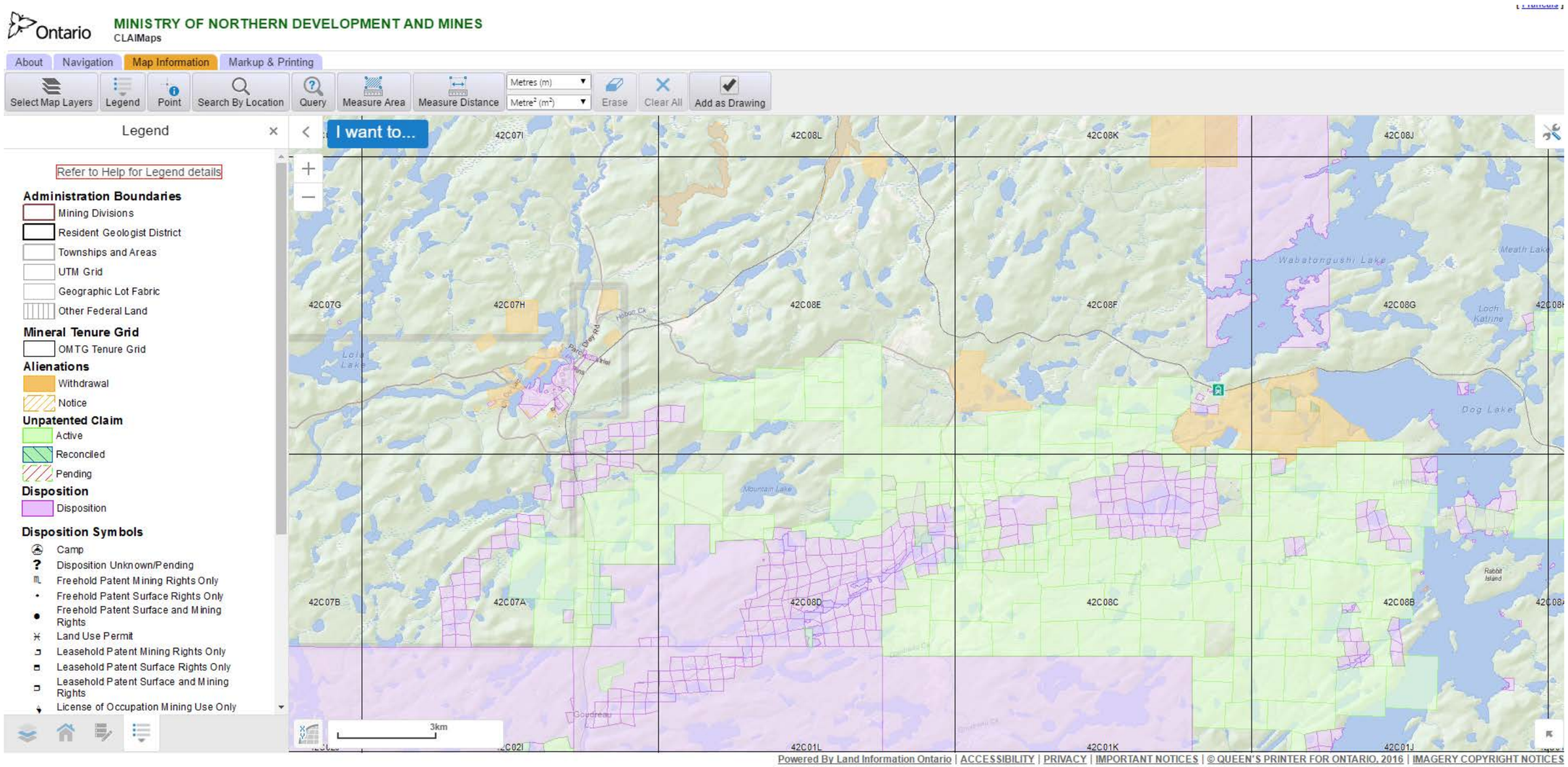
11.4.4.2.1.1 Mining in the PSA

As described elsewhere in the EIS (Section 3.1 of Chapter 3), the Magino property is a brownfield site, previously mined for gold. Prodigy is in the process of dispositioning the mining rights for lands in the PSA.

11.4.4.2.1.2 Mining in the LSA

In the LSA, there is one operating gold mine (Richmont's Island Gold Mine, located to the immediate east of the Project). Much of the land in the LSA is part of staked mineral claims or pending dispositions, as shown in Figure 11-6.

Figure 11-3: LSA Mining Claims and Pending Dispositions



Source: (Ontario Ministry of Northern Development and Mines, 2016).

11.4.4.2.1.3 Mining in the Primary Communities

Mining has occurred in the Dubreuilville, White River, and Wawa areas for over 100 years. Iron was historically mined in the Michipicoten Greenstone Belt near Wawa and Hawk Junction and exploration for Iron continues today. Similarly, gold has been mined in the area since the gold rush of 1897.

There are currently three active gold mines operating in the Wawa, Dubreuilville, and White River areas:

- The Island Gold Mine;
- Eagle River Mine; and
- The Hemlo mines.

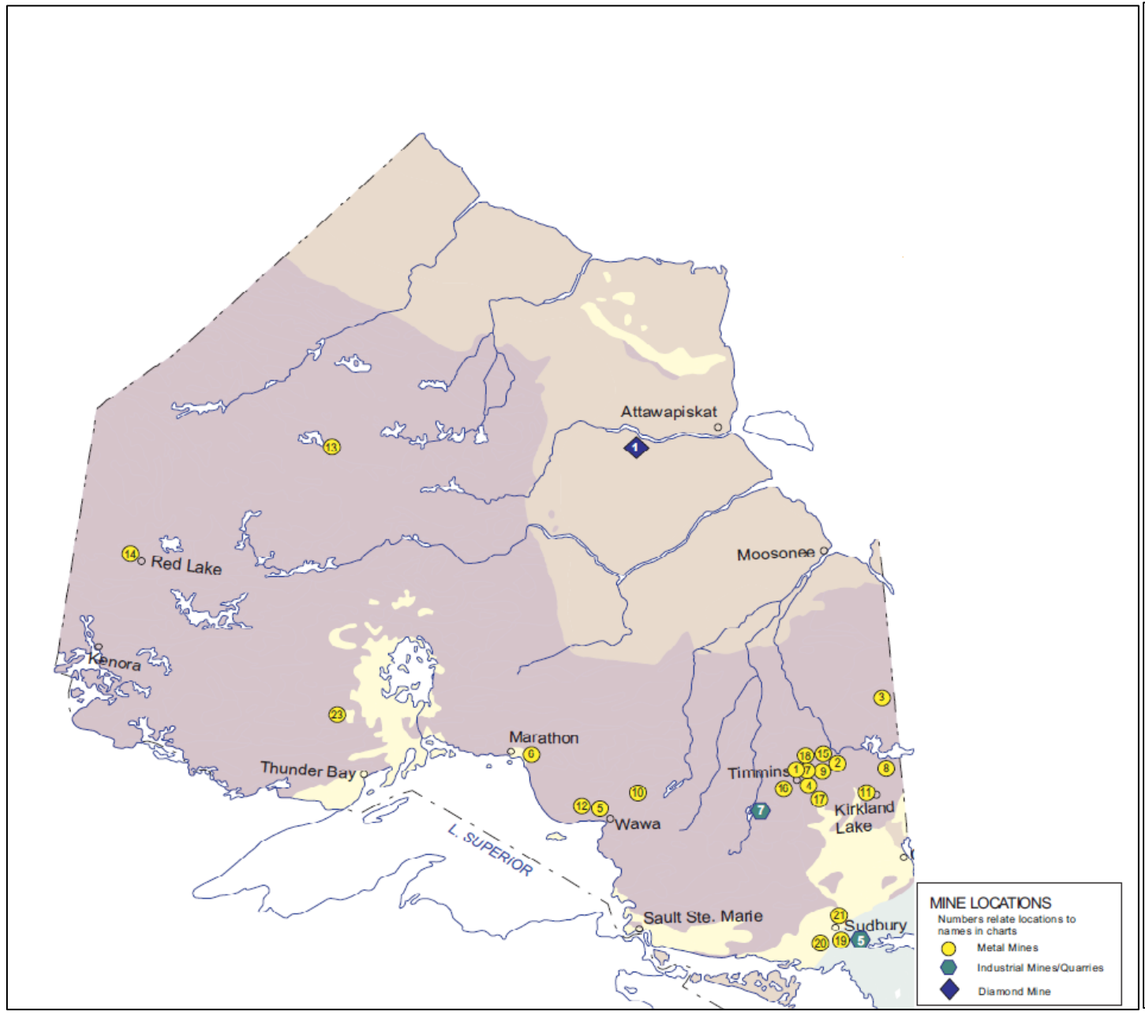
These (and others) are shown in Figure 11-7. Richmont Mines' Island Gold Mine facility is adjacent and east of the Project (Richmont Mines, 2012) [1]. The Eagle River Mine, owned and operated by Wesdome Gold Mines, is located 50 km west of Wawa (Wesdome Gold, 2012a). The company also owns two other mining properties north of Wawa (Mishi and Magnacon) and has been operating since 1995 (Pace, 2012). Barrick Gold Corporation's Hemlo property consists of the David Bell Mine (underground) and the Williams mine (underground and open pit). The property is located on the TransCanada Highway 17 approximately 60 km west of White River. However, the David Bell Mine closed in the spring 2014, resulting in a loss of approximately 100 jobs.

Several exploration projects are also active in the area. The Edwards Gold Mine property is owned by Strike Minerals Inc., and is located approximately 10 km northeast of the Magino Project off the Goudreau Road, and was identified as an "advanced mineral project" in 2013 by the Ontario Mining Association (OMA). The Strike Minerals property is fully permitted and can re-initiate mining activities as soon as financing is obtained (McSweeney, 2013). The Cline Lake Gold property is located approximately 15 km northwest of the Magino project, off the Goudreau Road in Jacobson Township (Cline Mining Corporation, 2014).

Bulk sampling at Harte Gold's 'Sugar Zone' property northeast of White River is underway and is proposed to continue into 2017. The Ontario Ministry of Natural Resources has completed its environmental assessment of the advanced exploration and bulk sampling program. Harte Gold also has in place an agreement to have its bulk sample from the Sugar Zone processed at Richmont Mines' Island Gold mill. The company is ready to proceed with construction of an access road connecting the site to Highway 631.

[1] An estimated 180- 200 people are currently employed at the Island Gold Mine. Employees come from Dubreuilville, Wawa and White River as well as Timmins, Thunder Bay, Sault Ste. Marie and parts of Quebec. This information was obtained from Dubreuilville community discussions November 2016.

Figure 11-4: Operating Mines in Northern Ontario



GOLD MINES		
	Name	**Company**
1	Bell Creek Mine	Lake Shore Gold Corp.
2	Black Fox Mine	Primero Mining Corp.
3	Detour Lake Gold Mine	Detour Gold Corp.
4	Dome Mine	Goldcorp Inc. – Porcupine Gold Mines
5	Eagle River Mine	Wesdome Gold Mines Ltd.
6	Hemlo Mine	Barrick Gold Corp.
7	Hollinger Mine	Goldcorp Inc. – Porcupine Gold Mines
8	Holloway – Hold Mine	St Andrew Goldfields Ltd.
9	Hoyle Pond Mine	Goldcorp Inc. – Porcupine Gold Mines
10	Island Gold Mine	Richmont Mines Inc.
11	Macassa Mine	Kirkland Lake Gold Inc.
12	Mishi Gold Mine	Wesdome Gold Mines Ltd.
13	Musselwhite Mine	Goldcorp Inc.
14	Red Lake Gold Mines	Goldcorp Inc.
15	Taylor Mine	St Andrew Goldfields Ltd.
16	Timmins West Mine	Lake Shore Gold Corp.
17	Young – Davidson Mine	Alamos Gold Inc.
BASE METAL MINES		
	Name	**Company**
18	Kidd Creek Mine	Glencore PLC
19	Sudbury Operations: Levack Mine McCreedy West Mine	KGHM Polska Miedez S.A.
20	Sudbury Operations: Coleman Mine Copper Cliff North Mine Creighton Mine Ellen Mine Garson Mine Stobie Mine Totten Mine	Vale S.A.
21	Sudbury Operations: Nickel Rim South Mine Fraser Mine	Glencore PLC
PLATINUM GROUP METAL MINES		
	Name	**Company**
23	Lac des Iles Mine	North American Palladium Ltd.
DIAMOND MINES		
	Name	**Company**
1	Victor Diamond Mine	De Beers Canada Inc.
MAJOR INDUSTRIAL MINERAL OPERATIONS		
	Name	**Company**
5	Mohawk Garnet Mine (garnet abrasive)	Mohawk Garnet Inc.
7	Penhorwood Mine (talc)	Imerys Talc

Source: (Ontario Mining Association, 2016)

11.4.4.2.2 Forestry

11.4.4.2.2.1 Magpie Forest

The PSA, much of the LSA, and the Township of Dubreuilville are located in the Magpie Forest Management Unit. Area forests are managed under the Magpie Forest Management Plan (Dubreuilville Forest Products Ltd., 2008). The area south of Webb Lake is managed under the Algoma Forest Management Plan, administered by Clergue Forest Management, Inc.

Forest management in Ontario - including that for the Magpie Forest - is transitioning to an enhanced sustainable forest licence development process that reflects a new approach to the relationship between First Nations and industry. The Northeast Superior Enhanced Sustainable Forest Licence development process is underway, involving the Northeast Superior Regional Chiefs Forum (including Michipicoten First Nation [MFN] and the Missanabie Cree First Nation [MCFN]), municipalities (including the Township of Dubreuilville and the Municipality of Wawa[2]), industry, and the Ontario MNRF. As part of this process, in 2014 the MFN Economic Development Corporation signed an agreement with the MNRF for $545,000 towards management planning activities for the Magpie Forest. The development of the Plan will involve MFN working with the MNRF and consultants over a two-year period (MFN, 2014a). MFN was also designated as the Forestry Excellence Centre by the Northeast Superior Regional Chiefs Forum, and received $100,000 in funding from the federal government for this purpose (MFN, 2014b).

Currently, the PSA is licenced for small public and commercial fuel wood operations.

11.4.4.2.2.2 Mill Operations in the Primary Communities

At one time, there were more than 20 mills located across the north shore of Lake Superior. Many closures occurred over the past decade in response to global and domestic downturns in the economy. While forestry activity is returning to the region, its role in the local and regional economy has diminished compared to years ago. Forestry's limited revitalization includes the re-opening of several mills (e.g., White River Forest Products, Aditya Birla Group's pulp mill in Terrace Bay), while others remained open despite the recession several years ago (e.g., the former Olav Haavaldsrud Timber Company Limited in Hornepayne (now re-opening under new ownership December 2016/January 2017), and Tembec in Chapleau. The conversion of the Rentech mill in Wawa to a pellet plant was completed in 2016. The mill in Dubreuilville has remained closed since 2008.

The White River mill was originally established in the 1970s by Abitibi Price, and continued operations under Domtar Forest Products. In 2007 the mill closed, and was subsequently purchased in 2009 by White River Forest Products, a partnership between the Town of White River Community Development Corporation, Pic Mobert First Nation and private investors. The mill re-opened in 2013. The timber supply is managed by Nawiinginokiima Forest Management Corporation (NFMC, 2014), the first local forest management corporation in Ontario, established under the *Ontario Forest Modernization Act* in 2012. Nawiinginokiima is an Ojibway word that means "working together".

[2] White River is located in the White River Forest, a distinct forest management unit.

11.4.4.2.3 Commercial Tourism and Recreation

Outfitters that operate in the LSA cater primarily to tourists travelling from outside of the region. There is for example an outfitting camp based in the settlement of Goudreau to the southwest of the Project (see Figure 11-9). It focuses on ATVing, seasonal fishing, and bear hunting.

There are no commercial lodges in the LSA, although there are several to the east of Lochalsh on Wabatongushi and Dog Lakes. Local residents may also use these camps/lodges as a means of accessing the land or water, and obtaining supplies or accommodations.

The LSA is traversed by recreational trails used for snowmobiling and ATVs, biking and hiking. Local roads (including active and inactive industrial roads used for forestry or mining purposes), a formal network of snowmobile trails (e.g., Trail D along the Goudreau Road, Ontario Federation of Snowmobile Clubs 2016), as well as informal trails located throughout the Dubreuilville area vicinity are used for these purposes by both tourists and local/seasonal residents. The network of local snowmobile trails developed/maintained by the Club Alouette Dubreuilville (Snowmobile Club) does not focus on the area around the Prodigy site.

The Northern Bypass Road and the east/west portion of the Goudreau Road south of the Project are noted on the Magpie Forest Management Plan's 'Resource Uses' and 'Resource Based Tourism Values' mapping (Dubreuilville Forest Products Ltd., 2008) as both recreation routes/trails and snowmobile trails.

Until recently, the ACR offered passenger service to various points between Sault Ste. Marie and Hearst (including 'request stop' service that provides access to lodges, camps, trails, and other remote destinations) along the line that is located to the immediate west of the Project, running north/south. The passenger services offered by the ACR ceased in 2015; although there are ongoing lobbying efforts to re-start this service by First Nations, outfitters/tourist operators, the public and other users.

11.4.4.2.4 Commercial Trapping

There are two trappers with trapping areas that include portions of the PSA. One operator has area WA047; the second has areas WA056 and WA-057.

A trapper's cabin associated with trapping area WA-047 is located to the northwest of the site, just south of Goudreau Road near Dreany Lake, as shown in Figure 11-9.

11.4.4.2.5 Parks and Protected Areas

Figure 11-5 shows several parks and protected areas in the vicinity of the Project. There are no parks or protected areas in the PSA or the LSA but there are a number located within 50 km of the Project (and within a portion of the RSA). These provincial parks, game preserves, or conservation/nature reserves are described in Table 11-9.

Figure 11-5: Magino Mine – Parks and Protected Areas

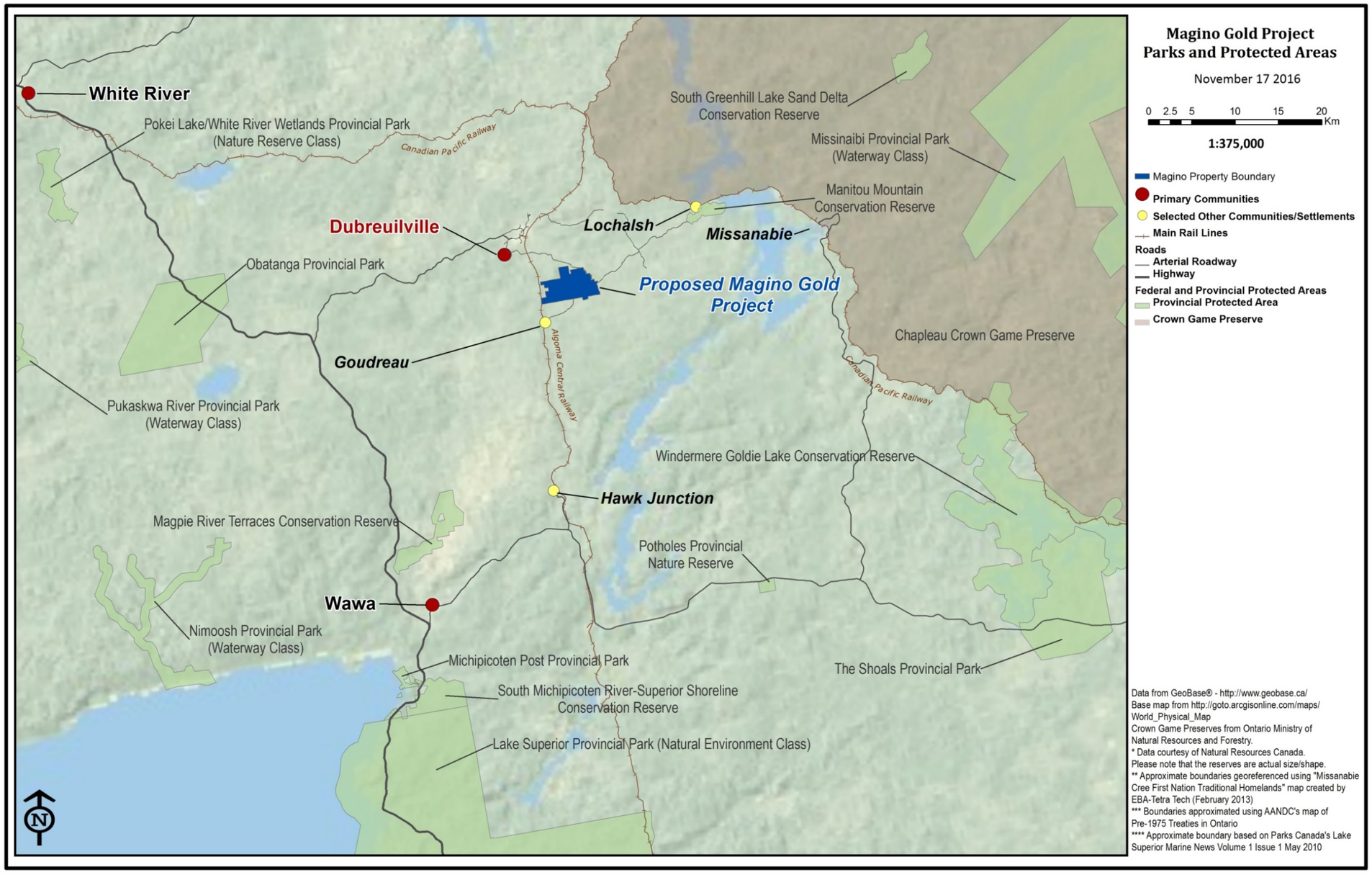


Figure 11-6: Regional Study Area – Selected Social and Economic VC

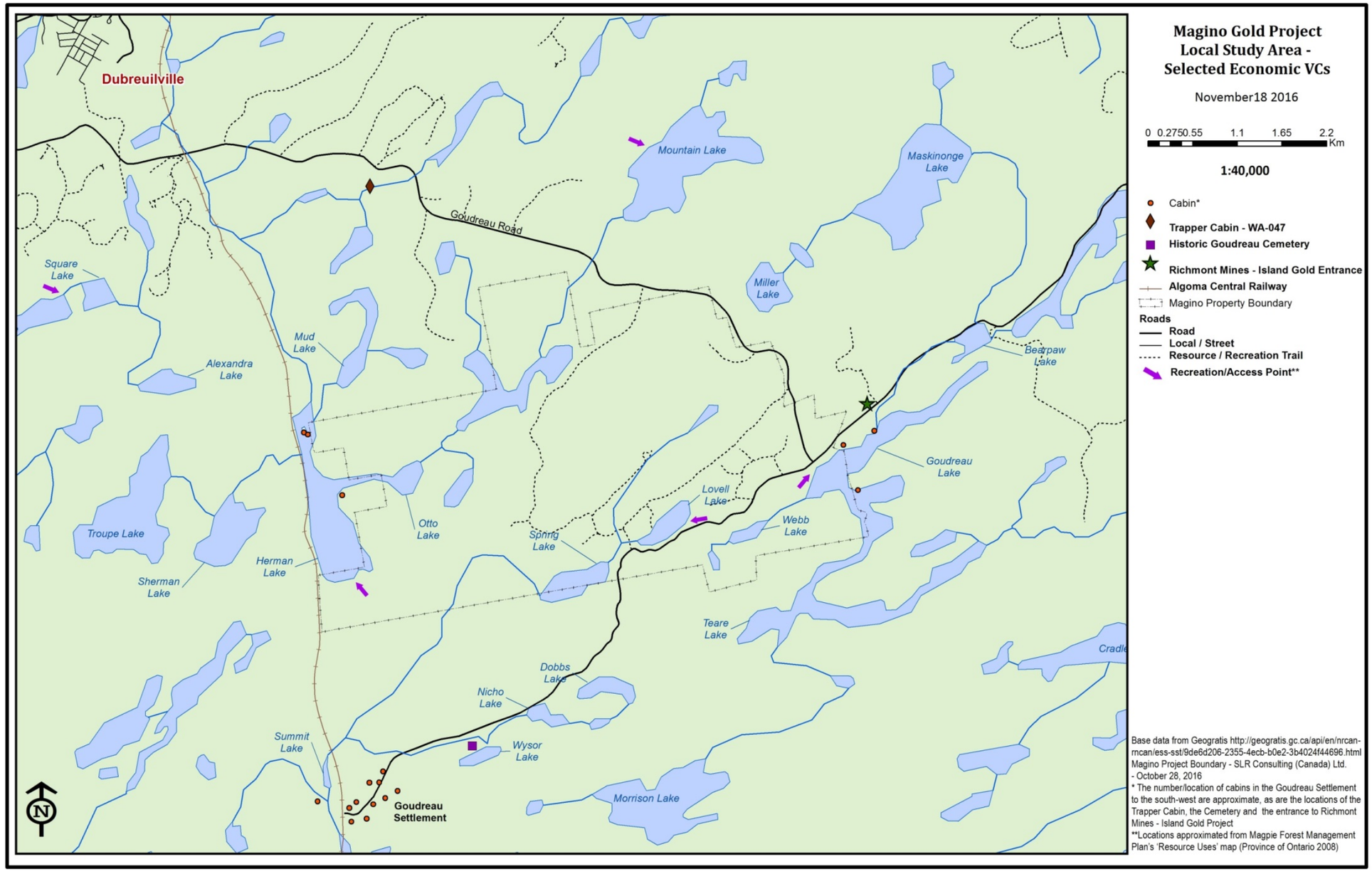


Table 11-9: Parks and Protected Areas in the Vicinity of the Project

PARK OR PROTECTED AREA	DESCRIPTION
Chapleau Crown Game Preserve	The world's largest game preserve encompasses more than 270,000 ha of land (Township of Chapleau, 2012). The Preserve is located east of Lochalsh. The Preserve was created in 1925 to provide protection for depleted fur-bearing animals. There is a range of recreational opportunities for visitors, including wildlife viewing (Ontario-Canada-Travel, 2013). In addition, this area is used for wildlife research purposes. It also contains nine tourism lakes for sport fishing.
South Greenhill Lake Sand Delta Conservation Reserve	The reserve encompasses 1,463 ha, situated within the Chapleau Crown Game Preserve. The landscape includes wetlands, rivers, lakes, and changing topography. The reserve is accessible only by aircraft (Ontario Ministry of Natural Resources, 2005a).
Missinaibi Provincial Park (waterway park)	The park is 99,090 ha within the Chapleau Crown Game Preserve. This waterway class park serves to protect and conserve the Missinaibi River, a nationally significant waterway. Activities include hiking, canoeing, swimming, boating, fishing, birding, hunting, and camping. Facilities include day use areas, rentals, park store; the park provides users access to more than 500 km of waterway extending to James Bay and encompasses scenic waterfalls and whitewater (Ontario Parks, 2014a).
Manitou Mountain Conservation Reserve	The reserve is 532 ha and is located near Lochalsh south of Wabatongushi Lake. There are no facilities for visitors in this park (Ontario Ministry of Natural Resources, 2005b).
Windermere Goldie Lake Complex Conservation Reserve	The reserve is 18,699 ha situated directly adjacent to the Shoals Provincial Park. It is adjacent to and partially overlaps the Chapleau Crown Game Preserve. It is comprised entirely of crown lands and waters. Located within the Superior Forest, with small portions extending into the Wawa Forest. Commercial tourism establishments, private recreation camps, and some private land parcels (Ontario Ministry of Natural Resources, 2005c).
Shoals Provincial Park	The park is 10,644 ha (Ontario Parks, 2014b). Non-operational park (i.e., not staffed and there are no facilities for visitors). Activities - hiking, boating, fishing, swimming, canoeing, and backcountry camping. Facilities - camping, day use area, boat launch, rentals (Algoma Kinniwabi Travel Association, N.d.).
Potholes Provincial Nature Reserve	The reserve is 347 ha. Activities include hiking and natural heritage education. Facilities in the reserve include a day use area (Ontario Parks, 2008).
South Michipicoten River-Superior Shoreline Conservation Reserve	The reserve is 180 ha which is protected in order to preserve valuable life science features. Activities include hunting, cross-country skiing, canoeing, and kayaking (Ontario Ministry of Natural Resources, 2005d). This conservation reserve also links the Michipicoten and Lake Superior Provincial parks.
Lake Superior Provincial Park (natural environment park)	The park is 160,810 ha. Activities in this park include hiking, boating, fishing, swimming, canoeing, wildlife viewing, natural heritage education, hunting, winter activities, and backcountry camping. Facilities include camping, electrical campsites, flush toilets, laundry, showers, day use area, rentals, boat launch, visitor centre, park store, and barrier free access (Ontario Parks, 2014c).
Michipicoten Post Provincial Park (historical provincial park)	The park is 289 ha along Lake Superior, and was originally established as Michipicoten Wilderness Area in May 1971. This park is a non-operational park (i.e., not staffed). There are no facilities for visitors. The park includes areas for nature viewing and hiking (Ontario Parks, 2004). It is located in Michipicoten Bay at the mouth of the Michipicoten River.

PARK OR PROTECTED AREA	DESCRIPTION
Magpie River Terraces Conservation Reserve	The reserve is 20.8 ha and is classified as a Living Legacy Conservation Reserve. The reserve was created in 2002 to protect ten distinct and expansive terraces (Ontario Ministry of Natural Resources, 2004). It is also referred to as the Wawa blueberry patch, fume kill or "treeless area" by local residents (Rowe, 2012). Mining, commercial forest harvesting, hydroelectric power development, extraction of aggregate, and peat, as well as other industrial activities, occurred previously on the site (Rowe, 2012). There are no facilities for visitors.
Nimoosh Provincial Park (waterway park)	The park is 3,557 ha (Ontario Ministry of Natural Resources, 2002). It is also known as University River Complex Provincial Park and is non-operational. There are no facilities for visitors. The park is not easily accessible. Nimoosh River waterway connects Obatanga Provincial Park to the Lake Superior coast (Ontario Parks, 2006).
Obatanga Provincial Park (natural environment)	The park is 9,409 ha and is non-operational. Viewing opportunities for canoeing and wildlife are provided. The park is utilized as a staging area for canoe trips down Dog River (Ontario Parks, 2014d).
Pukaskwa River Provincial Park (waterway park)	The park is 1,465 ha and is non-operational (not staffed). There are no facilities for visitors (Ontario Ministry of Natural Resources, 2006b; Ontario Parks, 2014e).
Pokei Lake/White River Wetlands Provincial Park (nature reserve)	The park is 1,768 ha and is non-operational. There are no facilities for visitors (Ontario Parks, 2014f).

11.4.4.2.6 Other Land Uses

Other land uses in the LSA include bear management areas and baitfish operations. Local outfitters (including one operating from the Goudreau Settlement) have bear management areas that include portions of the site as well as off-site areas. There are three bear management areas, managed by two outfitter companies which include portions of the PSA and cover much of the LSA: WA-32-011, WA-32-002, and WA-32-044.

A single commercial operator has several baitfish licences that cover much of the PSA and the LSA; a second operator has a licence that includes the east end of Goudreau Lake.

11.4.4.2.7 List of Existing Activities within RSA and Potential for Cumulative Effects

Current activities consist of land uses or other activities that may affect the VCs within the RSA. A review of available information was undertaken to identify which current activities have a potential for cumulative effects with the residual effects of the Magino Project.

The relevance criteria for cumulative effects assessment of these existing activities are mainly the pathways by which an additive and/or synergetic cumulative effect could occur with the potential residual effects of the Magino Project. Pathways for cumulative effects are described in Table 11-3 while relevance criteria for cumulative effects of current and future activities is presented in Table 11-10.

The list of existing activities within the RSA and LSA is presented in:

- Table 11-11 for existing active mines;
- Table 11-12 for existing active mineral exploration activities;
- Table 11-13 for power generation activities; and,
- Table 11-14 for existing forestry facilities and harvesting.

These tables also present the results of the pre-screening for potential interactions between these current actions and the Project (based on criteria presented in Table 11-10). A colour code (blue) is used to identify the activities that are carried forward for cumulative effects assessment.

While the relevance criteria for biophysical VCs can readily be established by consideration of possible pathways and cumulative losses of habitat, relevance criteria for socio-economic VCs are more obscure due to the inherent propensity for humans to travel or commute longer distances based on personal preference. For the purpose of this cumulative effects assessment, it is assumed that an activity occurring at more than 100 km distance from the Project is not being relevant.

Table 11-14 presents a pre-screening summary of existing projects for potential interactions with residual effects of the Magino Project.

Table 11-10: Relevance Criteria for the Potential Additive and Synergetic Cumulative Effects for Current and Future Activities

Valued Component	Relevance Criteria for Potential Additive or Synergetic Cumulative effects with Magino Project			Rationale
	Yes	Possible	Not relevant	
All physical VCs	Within PSA or less than 5 km separation from the Project. Within LSA	5 to 15 km distance separation from the Project. Within LSA	Compliance with regulatory standards at Project fence line. Physical distance from the Magino Site is greater than 10 km, beyond the LSA. Watersheds impacted by the Project are remote and not impacted by the future action.	Effects on biophysical VECs are localized and unlikely to extend beyond the Local Study Area (LSA) or watershed of the action for each specific biophysical VECs and are unlikely to have quantifiable cumulative effects with the residual effects of the Project.
Water resources Aquatic resources	Actions within Project LSA.	External to watershed directly impacted by Project (LSA).	External to Project LSA.	A compounding effect can occur if action is occurring or occurred previously within same watershed as the Project. Surface drainage is a good indicator of potential cumulative effects.
Terrain and soils	Within PSA or less than 5 km separation from the Project.	Not applicable.	Action is external to PSA.	Effects of actions on terrain and soil are localised, usually limited to the action footprint and overlapping with Project component is not likely.
All biological VCs	Action within PSA or impacts on watersheds within LSA.	External to Project LSA but within RSA.	Actions are located beyond the Project RSA. The physical separation (greater than 100 km) is used for the criteria.	Loss of habitat is one of the primary cause of effects on biological VCs. Loss of habitat is additive within the RSA. Effects on biological VECs for actions occurring beyond the RSA are unlikely to have quantifiable cumulative effects with the residual effects of the Project.
All socio-economic VCs and Aboriginal Interests	Actions have to be located within the Project RSA.	Under 100 km travelling distance.	External to RSA – over 100 km traveling distance. External to Algoma District.	Actions beyond the RSA unlikely to cause quantifiable cumulative effects. Some effects are inherently possible due to the propensity for humans to travel.

Valued Component	Relevance Criteria for Potential Additive or Synergetic Cumulative effects with Magino Project			Rationale
Greenhouse Gas	Emissions are quantifiable.	Not applicable.	Not applicable.	Emissions can be quantified and are cumulative.

Table 11-11: Existing Active Mines and their Potential for Cumulative Effects

Present - Active Mines (Projects in the vicinity of Thunder Bay, Marathon, Wawa, Sudbury and Timmins)				
Mine Name	**Proponent**	**Approximate Distance from the Magino Site (km)**	**Potential additive or synergetic cumulative effect with the Magino Project**	
			VECs	**VSECs**
Bell Creek Mine	Tahoe Resources	246 E	Not relevant	Not relevant
Black Fox Mine	Primero Mining Corp.	308 E	Not relevant	Not relevant
Coleman Mine	Vale S.A.	297 SE	Not relevant	Not relevant
Copper Cliff North Mine	Vale S.A.	326 SE	Not relevant	Not relevant
Creighton Mine	Vale S.A.	322 SE	Not relevant	Not relevant
Dome Mine	Goldcorp Inc. Porcupine Gold Mine	241 E	Not relevant	Not relevant
Eagle River Mine	Wesdome Gold Mines Ltd.	80 SW	Not relevant	Yes
Ellen Mine	Vale S.A.	316 SE	Not relevant	Not relevant
Garson Mine	Vale S.A.	334 SE	Not relevant	Not relevant
Hemlo Mine	Barrick Gold Corp.	114 W	Not relevant	Not relevant
Hollinger Mine	Goldcorp Inc. Porcupine Gold Mine	236 E	Not relevant	Not relevant
Hoyle Pond Mine	Goldcorp Inc. Porcupine Gold Mine	252 E	Not relevant	Not relevant
Island Gold Mine	Richmont Mines	2 E	Yes	Yes
Kidd Creek Mine	Glencore PLC	235 E	Not relevant	Not relevant
Lac des Iles Mine	North American Palladium Ltd.	390 NW	Not relevant	Not relevant
Levack Mine	KGHM Polska Miedez S.A.	297 SE	Not relevant	Not relevant
Mishi Gold Mine	Wesdome Gold Mines Ltd.	75 SW	Not relevant	Yes
McCreedy West Mine	KGHM Polska Miedez S.A.	296 SE	Not relevant	Not relevant
Stobie Mine	Vale S.A.	328 SE	Not relevant	Not relevant
Taylor Mine	Kirkland Lake Gold	288 E	Not relevant	Not relevant
Timmins West Mine	Tahoe Resources.	218 E	Not relevant	Not relevant
Totten Mine	Vale S.A.	312 SE	Not relevant	Not relevant
Young-Davidson Mine	Alamos Gold Inc.	286 E	Not relevant	Not relevant
Note: The potential effects of current actions that have synergetic effects with the project are captured in the description of the baseline (Chapter 4) and the effects assessment of the Project presented in Chapter 7.				

Table 11-12: Existing Active Mineral Exploration and their Potential for Cumulative Effects

Present – Existing Mineral Exploration[2] (Projects in the regional vicinity of Thunder Bay, Marathon, Wawa, Sudbury and Timmins)				
Property Name	**Proponent**	**Approximate Distance from the Magino Site (km)**	**Potential cumulative effect with the Project (additive or synergetic)**	
			VECs	**VSECs**
Abbie Lake-Keating Gold	Giyani Gold Corp.	70 SW	Not relevant	Not relevant
Augustine Wawa Gold	Augustine Ventures Inc.	40 SW	Not relevant	Not relevant
Ballard Lake	RT Minerals Corp	29 SE	Not relevant	Not relevant
Clement Property	Strike Minerals Inc.	7 NE	Not relevant	Not relevant
Cline Lake Property	Cline Mining	11 E	Not relevant	Not relevant
DAC Property	Daniel Cyr	12 E	Not relevant	Not relevant
Edwards Gold Property[3]	Strike Minerals Inc.	7 E	Not relevant	Not relevant
Ego Property	Richmont Gold Mines Inc.	12 W	Not relevant	Not relevant
Forge Lake Project	Zara Resources Ltd.	13 SE	Not relevant	Not relevant
Holdsworth Property	Noble Mineral Exploration	21 SW	Not relevant	Not relevant
James Rastel Property	James Rastal	48 SW	Not relevant	Not relevant
Leadbetter Diamond Deposit	Dianor Resources Inc.	28.4 SE	Not relevant	Not relevant
Midas Property	Lakeland Resources Inc.	20 SE	Not relevant	Not relevant
Rockstar Property	Upper Canada Explorations	17 E	Not relevant	Not relevant
Smith Lake Gold	Conquest Resources	47 E	Not relevant	Not relevant

Note:

1) The potential effects of current actions that have synergetic effects with the project are captured in the description of the baseline (Chapter 4) and the effects assessment of the Project presented in Chapter 7.
2) The scope of mineral exploration is small and of short duration. Most exploration activity is east of the Magino Site which does not impact on the Project receptors. Therefore, unlikely to impact Project VCs.
3) Edwards Gold property is located east of the Magino Site and receptors do not interact with Project. Operation activities have been intermittent and current status is unknown.

Table 11-13: Existing Power Generation Facilities their Potential for Cumulative Effects

Present – Existing Power Generation Facilities				
Project Name	**Proponent**	**Approximate Distance from the Magino Site (km)**	**Potential additive or synergetic cumulative effect with the Magino Project**	
			VECs	**VSECs**
Hydroelectric Stations on the Magpie River	Bullfrog Power	47 SW	Not relevant	Possible
Hydroelectric Stations on the Michipicoten River	Bullfrog Power	49 SW	Not relevant	Possible
Umbata Falls Generating Station	Innergex Renewable Energy and the Ojibways of the Pic River First Nation.	138 NW	Not relevant	Not relevant (refer to Table 11-8)
White River Hydro Project	Pic Mobert First Nation and Regional Power	109 NW	Not relevant	Not relevant (refer to Table 11-8)
Present – Existing Power, Oil and Gas Transmission Facilities				
Canadian Mainline	TransCanada	150 N	Not relevant	Not relevant
Note: The potential effects of current actions that have synergetic effects with the project are captured in the description of the baseline (Chapter 4) and the effects assessment of the Project presented in Chapter 7.				

Table 11-14: Existing Forestry Facilities and Harvesting and their Potential for Cumulative Effects

Present – Existing Forestry Facilities and Harvesting				
Project Name	**Proponent**	**Approximate Distance from the Magino Site (km)**	**Potential additive or synergetic cumulative effect with the Magino Project**	
			VECs	**VSECs**
Algoma Forest	Sustainable Forest License held by Clergue Forest Management Inc.	Project RSA is within the management unit	Relevant	Possible
Magpie Forest	Ontario Crown	Project RSA is within the management unit	Relevant	Possible
Niska North Mill	Niska North Inc.	93 SE	Not relevant	Possible
Olav Haavaldsrud	Olav Haavaldsrud	104 N	Not relevant	Possible

Present – Existing Forestry Facilities and Harvesting				
Project Name	**Proponent**	**Approximate Distance from the Magino Site (km)**	**Potential additive or synergetic cumulative effect with the Magino Project**	
			VECs	**VSECs**
Timber Co. Ltd Mill & Co-generation Facility	Timber Co. Ltd			
Rentech Mill (Pellet Mill)	Rentech	39 SE	Not relevant	Possible
Tembec Inc. Mill	Tembec	93 SE	Not relevant	Possible
Terrace Bay Pulp Mill	Aditya Birla Group	202 NW	Not relevant	Not relevant
White River Mill	White River Forest Products Ltd	69 NW	Not relevant	Possible
Note: The potential effects of current actions that have synergetic effects with the project are captured in the description of the baseline (Chapter 4) and the effects assessment of the Project presented in Chapter 7.				

11.4.4.3 Identification of Future Activities with Potential Project Interactions

Future activities (reasonably foreseeable) consist of land uses or other activities that may affect the VECs or VSECs within the RSA for the VCs carried forward for the cumulative assessment.

The list of likely future actions is presented in Table 11-15 which also presents the results of the pre-screening for potential interactions between these future actions and the Project. The relevance criteria for cumulative effects assessment of these future actions with the Project VECs or VCs are presented in Table 11-10.

Table 11-15: List of Future Activities and their Potential for Cumulative Effects

Project Name	**Proponent**	**Approximate Distance from the Magino Site (km)**	**Potential additive or synergetic residual effect with the Magino Project**	
			VECs	**VSECs**
Future - Mines Undergoing EA Permitting (Projects in the vicinity of Thunder Bay, Marathon, Wawa, Sudbury and Timmins)				
Borden Gold Mine Project	Goldcorp Borden Limited	103 SE	Not relevant	Not relevant
Hammond Reef Gold Project	Canadian Malartic Corporation	519 W	Not relevant	Not relevant
Hardrock Gold Mine	Greenstone Gold Mines	237 NW	Not relevant	Not relevant
Marathon Platinum Group Metals and Copper Mine	Stillwater Canada Inc.	147 NW	Not relevant	Not relevant

Project Name	Proponent	Approximate Distance from the Magino Site	Potential additive or synergetic residual effect with the Magino Project	
Future - Advanced Exploration (Projects in the vicinity of Thunder Bay, Marathon, Wawa, Sudbury and Timmins)				
Bradshaw	Gowest Gold	252 E	Not relevant	Not relevant
Eco Ridge	Pele Mountain Resources	259 SE	Not relevant	Not relevant
TTM - Timmins Talc/Magnesite	Globex Mining	238 E	Not relevant	Not relevant
Thunder Bay North	Rio Tinto	331 W	Not relevant	Not relevant
Sugar Zone	Harte Gold	71 NW	Not relevant	Not relevant
Future - Forestry Operations (Magpie and Algoma Forest Management Units)				
Pellet Mill (Algoma Unit (Limer, ON))	RTK WP Canada, ULC	39	Not relevant	Possible
Algoma Forest Management Unit	Sustainable Forest License held by Clergue Forest Management Inc.	Project RSA is within the management unit	Possible	Unlikely
Magpie Forest Management Unit	Ontario Crown	Project is within the management unit	Possible	Unlikely
Future - Highway Construction				
Highway 17 and 101 resurfacing/culvert rehabilitation	South of Hwy 101 northerly, Wawa	42	Not relevant	Possible
Future - Municipal Development				
Community development	Dubreuilville	N/A	Not relevant	Possible
Landfill	Dubreuilville	N/A	Not relevant	Not relevant
Future - Power, Oil and Gas Transmission Facilities				
Algoma Power Inc. System Upgrades	Algoma Power Inc.	Within the Project RSA and LSA	Yes	Yes
East West Tie Electrical Transmission Project	Upper Canada Transmission Inc.	45 SW	Not relevant	Not relevant
Energy East Pipeline	TransCanada	150 N	Not relevant	Not relevant

11.4.4.4 List of Current and Future Activities Carried Forward for Cumulative Effects Assessment

Table 11-16 summarizes the list of current and future activities that have a potential for interaction with the Magino Project and result in additive or synergetic cumulative effects.

Table 11-16: Current and Future Activities Relevant for Cumulative Effects

Mine Name	Proponent	Approximate Distance from the Magino Site (km)	Potential cumulative effect with the Project	
			VECs	VSECs
Current - Active Mines				
Eagle River Mine	Wesdome Gold Mines Ltd.	80 SW	Not relevant	Yes
Island Gold Mine	Richmont Mines	2 E Within LSA	Yes	Yes
Mishi Gold Mine	Wesdome Gold Mines Ltd.	75 SW	Not relevant	Yes
Future - Forestry Operations (Magpie and Algoma Forest Management Units)				
Pellet Mill (Algoma Unit (Limer, ON))	RTK WP Canada, ULC	39	Not relevant	Possible
Magpie Forest Management Unit	Ontario Crown	Project is within the management unit	Possible	Unlikely
Algoma Forest Management Unit	Sustainable Forest License held by Clergue Forest Management Inc.	Project RSA is within the management unit	Possible	Unlikely
Algoma Power Systems Upgrades	Algoma Power Inc.	Proximity	Yes	Yes
Future - Highway Construction				
Highway 17 and 101 resurfacing/culvert rehabilitation	South of Hwy 101 northerly, Wawa	42	Not relevant	Possible
Future - Municipal Development				
Community development	Dubreuilville	N/A	Not relevant	Possible

11.5 STEP 2 – ANALYSIS

11.5.1 Additive or Synergetic Effects of Past and Current Activities within the RSA

11.5.1.1 Past Activities

The historic and abandoned mines and mills often have exposed soils, some of which may have contaminant levels exceeding relevant standards. Ongoing erosion by water and wind contributes to local dustfall, suspended sediments and contaminants in RSA water bodies. The ongoing effects of these past actions have been captured or included in the Biological Environment existing conditions described in Chapter 4. It is noteworthy that terrestrial vegetation in the RSA has already been extensively logged in the past and disturbed by historic mining activities and more recent forest harvesting and mineral exploration. Much of the RSA's forest is currently undergoing renewal and tending work.

11.5.1.2 Current and Ongoing Activities

Existing facilities (Island Gold Mines) are subject to routine maintenance, and exploration sites are subject to periodic clean-up. Only three current industrial activities have been identified within the RSA that have the potential for additive cumulative effects with the Magino Project. They are:

- Island Gold Mine operated by Richmont Mines Ltd., located within the LSA at 5 km east of the Magino site.
- Eagle River Mine, operated by Wesdome Gold Mines Ltd., located 80 km NW of the Magino site;
- Mishi Gold Mine also operated by Wesdome Gold Mines Ltd, located 75 km SW of the Magino site; and,

The on-going operation of the Island Gold Mine could be the source of cumulative effects with the Magino Project. This development is an underground mine with a limited above ground footprint. Under its current operating permit, the Company has obligations to monitor its discharges to the receiving environment. As there is no expansion of the facility for the foreseeable future, additional residual effects on atmospheric, physical and biological VCs are not expected. The socio-economic effects of this operation within the RSA is well understood.

The residual effects of the Island Gold Mine operation have already been considered within the effects assessment of the Magino Project, as the facility lies within the LSA. The baseline conditions reported in Chapter of the Magino EIS reflect any potential adverse effects caused by this operation. The conclusions Magino Project EIS are that the combined residual effects of the Island Gold Mine operation and the Magino Project are not significant.

The Wesdome Mines Gold operation are too distant to have any measurable cumulative effects on the atmospheric, physical and biological VCs retained for the cumulative effects assessment. However, as these operations are located within the RSA, they have an effect on the socio-economic VCs.

11.5.1.3 Future Activities

11.5.1.3.1 Algoma Power System Inc.

Algoma Power Inc. System Upgrade has the potential for cumulative effects with the Project. The effects of this future action have been anticipated and evaluated in the Project EIS. The alternatives considered for power generation are presented in Chapter 5 and the extension of the power line is described in Chapter 6. The residual effects from this future action are expected to be not significant.

11.5.1.3.2 Forest Management Units

The cumulative effects analysis for forestry operations was limited to the watershed RSA. This area falls within the Magpie and Algoma Forest Management Units. The 10-year forest management plan (2009-2019) for the Magpie Forest identifies four planned harvest areas within the RSA. No planned harvests within the RSA, LSA, or PSA encompassing the Algoma Forest were identified. The planned harvest areas in the Magpie Forest are identified as ORB 185, ORB 114, ORB 116 and ORB 115. Listed below are the planned harvests for these areas.

Harvest Area	Area to be Harvested (ha)
ORB-185	123.5
ORB-114	323.3
ORB-116	141.1
ORB-115	61.2

Under Phase 2 of the 10-year forest management plan (2014-2019) for the Magpie Forest, approximately 649.1 ha of forested area will be harvested within the RSA. This represents 8% of the forested area in the regional study area (inclusive of the LSA and PSA).

11.5.2 Matrix of Interaction for Current and Future Activities with the Magino Project.

A matric of potential interactions between the Magino Project residual effects and past, current and future activities within the RSA is presented in Table 11-17.

Table 11-17: Matrix of Interaction for Current and Future Activities with Magino Project

	RESIDUAL ADVERSE EFFECTS FOR MAGINO PROJECT				Criteria for assessing significance of cumulative effect	Past Activities[1]	Current Activities			Credible Future Activities					
	Residual Adverse Effects	SPACIAL boundaries	TEMPORAL boundaries	EIS FINDING			Island Gold Mine[2]	Eagle River Mine	Mishi Gold Mine	Pellet Mill (Algoma Unit (Limer, ON))	Magpie Forest Management Unit	Algoma Forest Management Unit	Algoma Power Systems Upgrades	Highway 17 and 101 resurfacing/culvert rehabilitation	Dubreuilville Community Development
Greenhouse Gases	Contribution of GHG emissions to Provincial, Canadian and global annual GHG emissions	Effect extends into the LSA.	21 years (Construction, Operation, and Closure)	Not Significant	Annual quantity of GHG emission		X	X	X	X	X	X	X	X	X
Terrestrial Vegetation	Removal of upland forest	Removals are confined to PSA.	21 years (Construction, Operation, and Closure)	Not Significant	Area of forest removed (ha)						X	X			
Wetlands	Removal of organic/peat accumulating wetlands	Effects are confined to the PSA.	Permanent	Not Significant	Areas of wetland removed (ha)										
Significant Wildlife Habitat	Removal of Moose calving, aquatic feeding and late winter cover habitat (associated with removal of terrestrial vegetation and wetlands)	Effects are confined to the PSA.	21 years (Construction, Operation, and Closure)	Not Significant	Area of habitat removed (ha) for waterbodies, wetlands or forests						X	X			
	Removal of habitat for Species of Special Concern (associated with removal of terrestrial vegetation and wetlands)	Effects are confined to the PSA.	21 years (Construction, Operation, and Closure))	Not Significant	Area of habitat removed (ha) for waterbodies, wetlands or forests						X	X			
	Removal of amphibian breeding habitat (associated with removal of waterbodies, streams and wetlands)	Effects are confined to the PSA.	Permanent.	Not Significant	Area of habitat removed (ha) for waterbodies, wetlands or forests										

	RESIDUAL ADVERSE EFFECTS FOR MAGINO PROJECT				Criteria for assessing significance of cumulative effect	Past Activities[1]	Current Activities			Credible Future Activities					
	Residual Adverse Effects	**SPACIAL boundaries**	**TEMPORAL boundaries**	**EIS FINDING**			**Island Gold Mine[2]**	**Eagle River Mine**	**Mishi Gold Mine**	**Pellet Mill (Algoma Unit (Limer, ON))**	**Magpie Forest Management Unit**	**Algoma Forest Management Unit**	**Algoma Power Systems Upgrades**	**Highway 17 and 101 resurfacing/culvert rehabilitation**	**Dubreuilville Community Development**
Migratory and Breeding Birds	Loss of mature forest canopy habitat for warblers (associated with removal of terrestrial vegetation)	Effects limited to PSA.	21 years (Construction, Operation, and Closure)	Not Significant	Area of forest removed (ha)						X	X			
	Loss of foraging and staging habitat for waterfowl (associated with removal of waterbodies and wetlands)	Effects limited to PSA.	21 years (Construction, Operation, and Closure)	Not Significant	Area of habitat removed (ha) – aquatic or terrestrial						X	X			
	Loss of foraging habitat for raptors (associated with removal of terrestrial vegetation and wetlands)	Effects limited to PSA.	18 years (Construction, Operation, and Closure phases)	Not Significant	Area of habitat removed (ha) – aquatic or terrestrial						X	X			
	Notes: 1 – Effects of past activities have been documented and are integrated in the baseline condition reports for the Magino Project (EIS refer to Chapter 4) 2 – Effects of the Island Gold Mine activities documented and integrated in the baseline condition reports for the Magino Project (EIS refer to Chapter 4)														

11.5.3 Availability of Data and Information for Identification of Cumulative Effects

Collecting and using appropriate data and information is central to the analysis of cumulative effects.

Extensive baseline studies have been completed to characterize the receiving environment within the PSA, LSA and the RSA. Baseline information related to all the VCs under consideration for the cumulative effects assessment is summarized in EIS Chapter 4. The RSA straddles the Magpie Forest Management Unit and the Algoma Forest Management Unit. Additional information (extending beyond the RSA) on biological VCs is available from the Ontario Ministry of Natural Resources website (www.efmp.lrc.gov.on.ca/eFMP/homeLocale.do) for these two Forest Management Units.

It is important to note that residual effects caused by past activities and current activities within the LSA and the operation of the Island Gold Mine located 5 km to the East of the Magino property have been incorporated in the baseline condition reports summarized in EIS Chapter.

There is no data gap in the information available for the assessment of cumulative effects.

11.5.3.1 Description of Existing Conditions within RSA, LSA and PSA

Chapter 4 of the Magino EIS presents the state of knowledge for the existing biological environment of the RSA, LSA and PSA.

1) Section 4.1 addresses the atmospheric environment, with Section 4.1.9 focusing on greenhouse gases emissions.
2) Section 4.3 addresses the biological environment:
    a. Section 4.3.5 – Terrestrial vegetation
    b. Section 4.3.6 – Wetlands
    c. Section 4.3.7 – Significant wildlife habitat
    d. Section 4.3.8 – Migratory and breeding birds

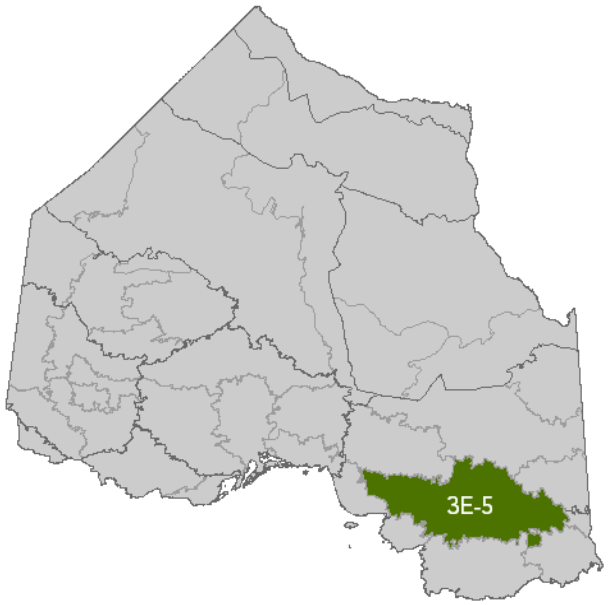
Several maps can also be consulted on the Ontario Ministry of Natural Resources website (www.efmp.lrc.gov.on.ca/eFMP/homeLocale.do) for the Algoma and Magpie Forest Management Units that complement the description of existing baseline conditions presented in Chapter of the Magino EIS (management areas, fisheries and wetlands, wildlife and forestry, resources use, trap line areas).

11.5.3.2 Overview of Terrestrial Vegetation within RSA

The RSA is located within Ecoregion 3E: Lake Abitibi and is generally characterized by boreal forest underlain generally by granitic or gneissic bedrock, although the surficial geology can be diverse in this Ecoregion (Crins *et al*., 2009). Soil in this western portion of the Ecoregion is generally poorly developed. Over the entire Ecoregion, mixed forest and coniferous forest comprise approximately 30% of the land area each, while sparse forest comprises 11% and deciduous forest comprises 7%. Eight percent of the Ecoregion has been cut over, and 7% is comprised of lakes and watercourses (Crins *et al.,* 2009). The boreal forest as a whole is subject to fire as the dominant disturbance regime. Fires are stand-replacing, with varied cycles, and are logically shorter for upland forest than for lowland forest (Crins *et al.,* 2009). The forest

is dominated by typical boreal forest species: Black Spruce (*Picea mariana*), White Spruce (*Picea glauca*), Jack Pine (*Pinus banksiana*), Balsam Fir (*Abies balsamea*), White Birch *(Betula papyrifera),* Tamarack (*Larix laricina*), and Balsam Poplar (*Populus balsamifera*). In Ecoregion 3E there are small, isolated pockets of species typical of the Great Lakes – St. Lawrence Forest Region but they do not occur within the RSA (Crins *et al.,* 2009).

Figure 11-7: Ecoregion 3E



Within Ecoregion 3E, the RSA is located within the Foleyet Ecodistrict (3E-5) (Figure 11-10). Soils within this Ecodistrict are classified as morainal (Crins *et al.*, 2009). They are largely Humo-Ferric Podzol soils, formed over coarse-textured material. Over half of the Ecodistrict is comprised of mixed forest, dominated by Trembling Aspen (*Populus tremuloides*), White Birch, Balsam Fir, Black Spruce, and White Spruce. This is true of the RSA, where deciduous species are often in the canopy with coniferous species in the understory. Coniferous stands of Jack Pine and Black Spruce are often located on glaciofluvial terraces and on shallow substrates, which is generally true of the RSA. Trembling Aspen stands are found on mid-slopes in the Foleyet Ecodistrict, which dominate the RSA (EBAb, 2013)

The RSA straddles two Sustainable Forest Licenses: the Magpie Forest, managed by Dubreuil Forest Products Limited (Sustainable Forest License 542003) and the Algoma Forest which is managed by Clergue Forest Management Inc. (Sustainable Forest License 542257). The RSA is at the southern limit of the Magpie and the northern limit of the Algoma Forests. Landscape level age class distributions for the large area encompassing the Magpie forest are more representative of the RSA. Of the productive forests available, Dubreuil Forest Products Limited (2008) reports a significant imbalance in the forest age class structure, dominated by young and mature and over-mature stands. It is significantly lacking in forest stands aged 31 to 70 years. In addition, most of the Magpie Forest is fragmented by recent disturbances, and as a result, the 1 to 20 years old age class is common throughout the area (Dubreuil Forest Products Limited, 2008).

As shown in Table 11-18, the most abundant forest types in the RSA are dominated by early successional White Birch and Trembling Aspen with variable moisture regimes. These deciduous stands compose approximately two-thirds of the upland forest within the RSA. Conifer stands are comprised of variable percentages of Black or White Spruce and Jack Pine, depending on moisture regimes. Large lakes are present throughout the RSA (12% of the cover) and are often fringed with organic fen. Coniferous swamps with organic substrates compose almost 15% of the vegetation and are aligned in roughly a north east to south west direction in the hollows between sculptured bedrock hills with only thin soil cover. Lichen-covered rock barrens are exposed infrequently (less than 1% cover). Without the influence of recent logging operations that have opened up the canopy to mimic a more open forest, possibly on drier soils, the canopy would be largely closed (EBAb, 2013).

Table 11-18: Upland Forest and Bare Ground / Disturbed Vegetation Communities within RSA

Ecosite Code	Name	Area (ha)	Area % of Total	Area % of subcategory
UPLAND FOREST				
B049	Dry to Fresh, Coarse: Jack Pine, Black Spruce	840	8	11
B052	Dry to Fresh, Coarse: Spruce, Balsam	373	3	5
B055	Dry to Fresh, Coarse: Trembling Aspen, Birch	3,651	33	47
B065	Moist, Coarse: Jack Pine, Black Spruce	990	9	13
B067	Moist, Coarse: Spruce Conifer	256	2	3
B070	Moist, Coarse: Aspen Birch Hardwood	1,296	12	17
B114	Moist, Fine: Black Spruce – Pine Conifer	185	2	2
B119	Moist, Fine: Aspen – Birch Hardwood	209	2	3
Total		**7,800**	**70**	**100**

Ecosite Code	Name	Area (ha)	Area % of Total	Area % of subcategory
BARE GROUND/DISTURBED				
B164	Rock Barren	9	0	2
ES	Exposed Soil	8	0	2

Ecosite Code	Name	Area (ha)	Area % of Total	Area % of subcategory
RS	Road Side	88	1	21
RZ	Road	212	2	50
CF	Cultivated Field	2	0	0
HU	Disturbed/Anthropogenic Influence	107	1	25
Total		**426**	**4**	**100**

11.5.3.3 Overview of Wetlands within RSA

The Regional Study Area (RSA) is located within a boreal forest that is dominated by Upland Forest which accounts for 70% of the total vegetation in the RSA. Wetlands including bogs, fens, and marshes are often found within boreal forests. Within the RSA, wetlands are the next most dominate vegetation covering approximately 14% of the RSA. Within the Wetland Community, Organic Intermediate Conifer Swamp is the most dominant wetland vegetation covering 5% or 553 ha of the RSA yet accounting for 36% of the RSA wetland vegetation as seen in Figure 11-8 and Table 11-19. Shrub Shore Fen and Sparse Treed Fen are also common in the RSA wetlands covering 472 ha combined or 4% of the RSA and 31% of the RSA's wetland vegetation. Wetlands provide a habitat for many species including birds and amphibians and provide a natural filtration system for water.

Figure 11-8: Regional Study Area Wetland Vegetation Composition

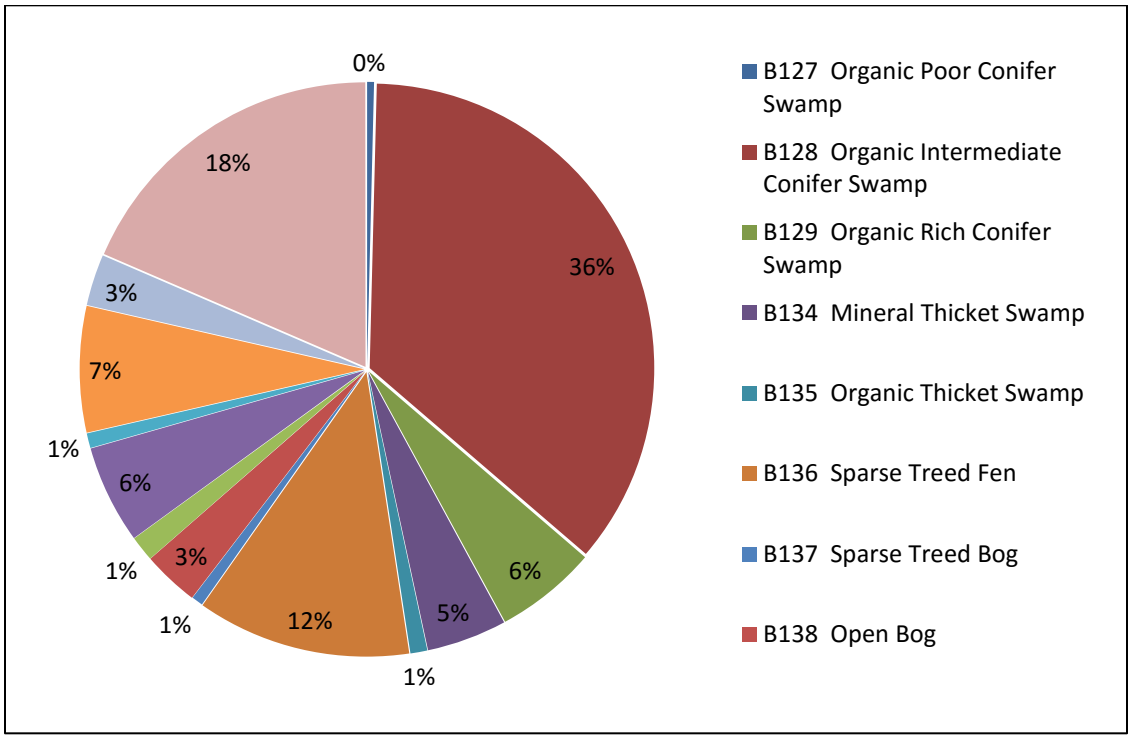


Table 11-19: Vegetation of the RSA

ECOSITE CODE	NAME	AREA (ha)	AREA % OF TOTAL	AREA % OF SUBCATEGORY
Upland Forest		7,800	70	100
WETLAND				
B127	Organic Poor Conifer Swamp	6	0	0
B128	Organic Intermediate Conifer Swamp	553	5	36
B129	Organic Rich Conifer Swamp	89	1	6
B134	Mineral Thicket Swamp	70	1	5
B135	Organic Thicket Swamp	15	0	1
B136	Sparse Treed Fen	187	2	12
B137	Sparse Treed Bog	10	0	1
B138	Open Bog	49	0	3
B139	Poor Fen	22	0	1

ECOSITE CODE	NAME	AREA (ha)	AREA % OF TOTAL	AREA % OF SUBCATEGORY
B140	Open Moderately Rich Fen	86	1	6
B141	Open Extremely Rich Fen	13	0	1
B144	Organic Meadow Marsh	110	1	7
B146	Open Shore Fen	45	0	3
B147	Shrub Shore Fen	285	3	18
Total Wetlands		1,542	14	100
Upland Forest		7,800	70	100
Aquatic (Lakes, Rivers, Streams, and Ponds)		1,353	12	100
Bear Ground/ Disturbed Area		426	4	100
AREA TOTAL		**11,119**	**100**	

11.5.3.4 Overview of Significant Wildlife Habitat within RSA

Significant Wildlife Habitat has been identified as one of the natural heritage feature areas under the Provincial Policy Statement (MMAH, 2014) which specifically identifies wildlife habitat as:

> *"…areas where plants, animals, and other organisms live, and find adequate amounts of food, water, shelter, and space needed to sustain their populations. Specific wildlife habitats of concern may include areas where species concentrate at a vulnerable point in their annual or life cycle; and areas which are important to migratory or non-migratory species."*

In Ontario, wildlife habitat is considered significant where it is:

> *"…ecologically important in terms of features, functions, representation or amount, and contributing to the quality and diversity of an identifiable geographic area or Natural Heritage System."*

Criteria for the identification of Significant Wildlife Habitat have been recommended by the Ontario Ministry of Natural Resources (MNRF, 2012). These criteria vary by Ecoregion.

Species of Special Concern (SSC) are Species at Risk listed under Ontario's Endangered Species Act and the federal Species at Risk Act (SARA). They are present in the study areas but their habitats are not afforded protection under legislation. Therefore, habitat protection depends on their consideration as Significant Wildlife Habitat in accordance with the guidelines established under Provincial Policy Statement.

The RSA is located within Ecoregion 3E: The types of Significant Wildlife Habitat that are likely present in this Ecoregion and potentially present in the RSA are described below:

- ***Seasonal concentration areas*** where wildlife species occur annually in numbers at certain times of the year, sometimes highly concentrated within relatively small areas. In

spring and autumn, migratory wildlife species will concentrate where they can rest and feed. Other wildlife species require habitats where they can survive winter. Examples of Seasonal Concentration Areas identified by the MNRF in Ecoregion 3E are: Moose Late Winter Cover, Waterfowl Stopover and Staging Areas, Bat Hibernacula, Turtle Wintering Areas, and various Colonially-Nesting Bird Breeding Habitat;

- ***Rare vegetation communities*** which often contain rare species, particularly plants and small invertebrates. A rare vegetation community is defined to include areas that contain a provincially rare vegetation community and/or areas that contain a vegetation community that is rare within the planning area. The rare vegetation communities identified by MNRF for Ecoregion 3E are: cliffs and talus slopes, various forest stands (i.e., Red and White Pine Stands, Black Ash, Elm, Oak, Red and Sugar Maple, and Yellow Birch), rock barrens, sand dunes, and hardwood swamps;
- ***Specialized habitat for wildlife*** are large areas of suitable habitat for their long-term survival. (e.g., habitat for successful breeding). In general, the largest and least fragmented habitats within an area tend to support the most significant populations of wildlife. Examples of the specialized habitat for wildlife identified in Ecoregion 3E are: rare vegetation communities; waterfowl nesting areas; Bald Eagle and Osprey nesting; foraging and perching habitat; seeps and springs; Moose aquatic feeding habitat; denning sites for various furbearers and mammals; and amphibian breeding habitats;
- ***Habitats of Species of Conservation Concern*** includes wildlife species that are listed as Special Concern or are rare, declining, or are featured species. Habitats of species of conservation concern do not include habitats of endangered or threatened species as identified by the *Endangered Species Act* (2007). Examples in Ecoregion 3E are: marsh bird breeding habitat; open country bird breeding habitat; shrub/early successional bird breeding habitat; and special concern and rare wildlife species; and
- ***Animal movement corridors*** used by wildlife to travel from one habitat to another. It is recognized that animal movement corridors function at different scales often related to the size and home range of the animal. Examples in Ecoregion 3E are: amphibian, cervid (e.g., moose) and furbearer movement corridors.

Given that the RSA is very similar to the LSA in terms of its topography, bedrock and surficial geology, soil conditions, upland forest composition, and wetland types; it is most likely that the types of Significant Wildlife Habitat present in the RSA would be similar to that in the LSA. These are identified below.

11.5.3.5 Overview of Migrating and Breeding Birds within RSA

Birds are a diverse group, and are expected to occupy virtually all habitat types within the RSA for nesting, feeding, and or staging. The majority of birds observed within the RSA are summer residents, which migrate into the area for the purpose of breeding and nesting. As with breeding territories, the routes of travel between wintering and breeding grounds are traditional and are normally used each year. However, the specific routes of travel are as diverse as the birds themselves. Birds migrating through the RSA may follow one of several principal routes of the Mississippi and Atlantic Flyway systems; both flyways that extend from northern Canada, through the Great Lakes systems, and ultimately merge with the major flyway routes along the Mississippi River or the Atlantic coast. These Flyways pass over or around the Great Lakes systems, including Lake Superior. Once near their individual end point, their nesting or over-wintering area, birds simply begin to deviate off the flyway systems.

11.5.3.5.1 Raptors

For this report, the term raptor includes hawks, eagles, falcons, ospreys, owls, vultures, and corvids (crows and ravens). A total of 25 raptor species are expected to occur or potentially occur in the RSA for at least some portion of their life history stage (does not include rare visitors). In general, raptors can be locally common to abundant on an annual basis. While some are only migrants through the RSA, others remain on a year-round basis. However, the majority of species may occupy the RSA for reproduction. Twenty-one of the 25 potential raptor species occurring in the RSA are expected breeders in the area, wherever appropriate habitat exists In addition, nine of the 25 species may remain in the RSA over winter. Also, the Bald Eagle may over-winter if a sufficient long-term food source is available (e.g., open water for fishing or a landfill for scavenging) (Sibley, 2003; Cadman *et al*., 2007).

Table 11-20 presents the raptor species detected in the RSA during the 2012 studies. The federal and provincial conservation status of each species is also presented. Of those species observed in the RSA, the Bald Eagle is a potential breeder in the RSA and also has special conservation status. Raptors associated with the project area are not protected under the federal *Migratory Birds Convention Act*.

Table 11-20: Raptor Species Observed within the RSA

COMMON NAME	SCIENTIFIC NAME
Turkey Vulture[B]	*Cathartes aura*
Bald Eagle[BW]	*Haliaeetus leucocephalus*
Sharp-Shinned Hawk[B]	*Accipiter striatus*
Broad-winged Hawk[B]	*Buteo platypterus*
Red-tailed Hawk[B]	*Buteo jamaicensis*
American Kestrel[B]	*Falco sparverius*
Merlin[B]	*Falco columbarius*
Great Horned Owl[BW]	*Bubo virginianus*
Northern Saw-whet Owl[B]	*Aegolius acadicus*
American Crow[BW]	*Corvus brachyrhynchos*
Common Raven[BW]	*Corvus corax*

Notes:
[1] - (EBA, 2013)
[B] = possible breeder assumed from species summer range
[M] = spring/fall migrant only
[W] = winter resident

The Bald Eagle is not considered to be a SAR federally, but is listed as a SSC under Ontario's *Endangered Species Act*. The Bald Eagle is a bird of prey and is protected from hunting and trapping under Ontario's *Fish and Wildlife Conservation Act* (MNR, 2012c). Large expanses of mixed or deciduous (hardwood) forests, close to large lakes and rivers are present throughout the RSA, and could provide suitable Bald Eagle habitat. Mixed wood and hardwood forests are the most common habitat types in the RSA, and moderate to large-sized fish bearing lakes are present.

11.5.3.5.2 Passerines and Other Upland Nesting Birds

A total of 122 Passerines and other upland nesting bird species potentially occur within the RSA as summer and or winter residents, migrants, and infrequent visitors. This depends on the available habitat. The majority of these species migrate into the RSA primarily for breeding, and then migrate out to over-winter in the south. Of the 122 species potentially occurring in the RSA, 22% are considered year-round residents. Only four of these potential species breed elsewhere but migrate into the area principally to over-winter. In general, peak spring migration to the RSA can be expected in mid-May (with birds arriving as early as April and as late as early June), and the peak fall migration is expected through the month of September.

Sixty-nine Passerines and other upland species were observed in the RSA during the 2012 studies. The majority of these bird species are protected under the *Migratory Birds Convention Act.* Four of these species observed in the RSA have special federal and or provincial conservation status: the Canada Warbler, Olive-sided Flycatcher, Rusty Blackbird, and the Common Nighthawk.

11.5.3.5.3 Marsh Birds

The term Marsh Birds is used to describe waders (e.g., bitterns, herons), cranes, species in the rail family (including American Coot), and the Pied-billed grebe. A total of eight marsh bird species have the potential to occur in the RSA depending on the availability of suitable habitat. All marsh birds are expected breeders in the region.

Table 11-21 presents the marsh bird species observed in the RSA during the 2012 studies:

- One American Bittern (likely the same individual heard twice on different days); One Pied-billed Grebe;
- Two Great Blue Herons; and
- Fourteen Sandhill Cranes.

None of the species observed in the RSA have special conservation status provincially or federally. Overall, marsh bird habitat in the RSA is limited for most of the observed species. However, pockets of suitable habitat are present.

Table 11-21: Marsh Bird Species Observed within the RSA

COMMON NAME	SCIENTIFIC NAME
Pied-billed Grebe[B]	*Podilymbus podiceps*
American Bittern[B]	*Botaurus lentiginosus*
Great Blue Heron[B]	*Ardea herodias*
Sandhill Crane[B]	*Grus canadensis*

Notes:
[1] - (EBA, 2013)
[B] = possible breeder assumed from species summer range
[M] = spring/fall migrant only
[W] = winter resident

11.5.3.5.4 Waterfowl

Waterfowl are ducks, geese, swans, loons, grebes (with the exception of Pied-billed grebe, which was discussed above), gulls, terns, and cormorants.

A total of 33 waterfowl species may potentially use the RSA at some time throughout the year. Additional species may rarely or infrequently visit the area as migrants. The majority of waterfowl species occur as summer residents and migrate into the area principally for nesting. Whereas, other species may only utilize the RSA as a brief stop-over while on their spring and fall migrations. The timing of these annual migrations is influenced by weather, and therefore, may vary annually. For instance, species advance northward from their wintering areas as the weather warms and ice recedes from wetlands, rivers, and lake shores. The departure time and speed of migration varies among species and by year. In general, waterfowl are expected to occur in the RSA as early as ice-out and as late as ice-in. Peak waterfowl spring migration generally occurs at the beginning of May, and peak fall migration generally occurs from mid-October to mid-November (Cadman *et al.,* 2007; Sibley, 2003).

Table 11-22 presents the waterfowl species observed in the RSA during the 2012 studies. Each of the waterfowl species observed in the RSA is protected under the *Migratory Birds Convention Act.* None are listed under the federal *Species at Risk Act*.

Table 11-22: Waterfowl Species Observed within the RSA

COMMON NAME	SCIENTIFIC NAME
Canada Goose[B]	*Branta canadensis*
American Black Duck[B]	*Anas rubripes*
Mallard[B]	*Anas platyrhynchos*
Green-winged Teal[B]	*Anas crecca*
Ring-necked Duck[B]	*Aythya collaris*

COMMON NAME	SCIENTIFIC NAME
Common Goldeneye[B]	*Bucephala clangula*
Hooded Merganser[B]	*Lophodytes cucullatus*
Common Merganser[B]	*Mergus merganser*
Red-breasted Merganser[B]	*Mergus serrator*
Common Loon[B]	*Gavia immer*
Herring Gull[BW]	*Larus argentatus*

Notes:
[1] - (EBA, 2013)
[B] = possible breeder assumed from species summer range
[W] = winter resident

In the RSA, waterfowl can be expected to occupy all aquatic habitats (including seasonal and permanent waterbodies) and the surrounding uplands. Within the study areas, productive beaver ponds, wetlands, and small to large sized lakes (including man-made ponds) provide sufficient habitat for waterfowl. A total of 123 waterfowl were detected incidentally throughout the 2012 field surveys. The most commonly observed species were the Common Loon, Ring-necked Duck, and Common Merganser. Five additional species that were detected incidentally across the RSA, but were not detected during the waterfowl surveys included the Mallard, Lesser Scaup, Common Merganser, Green-winged Teal, and Canada Goose.

11.5.3.6 Overview of Mammals within RSA

The RSA is located within the Ontario Ministry of Natural Resources Wildlife Management Unit (WMU) 32. WMU 32 is dominated by conifer species such as Spruce, Jack Pine, Balsam Fir, and Tamarack, and deciduous species such as White Birch and Poplar. The unit consists of two discrete portions: the western portion where licensed hunting is allowed and the eastern portion is Chapleau Crown Game Preserve (CCGP) where licensed hunting is not allowed. As noted previously, the most abundant forest types in the RSA are dominated by early successional White Birch and Trembling Aspen with variable moisture regimes. These deciduous stands compose approximately two-thirds of the upland forest within the RSA. Conifer stands are comprised of variable percentages of Black or White Spruce and Jack Pine, depending on moisture regimes. Large lakes are present throughout the RSA (12% of the cover) and are often fringed with organic fen. Coniferous swamps with organic substrates compose almost 15% of the vegetation and are aligned in roughly a north east to south west direction in the hollows between sculptured bedrock hills with only thin soil cover.

The upland forests, wetlands, and waterbodies in the RSA provides suitable habitat for a potential of 48 mammal species. As a group, mammals within the RSA are diverse and require a variety of habitat types for their life requirements. All potentially occurring mammal species are year-round residents to the RSA. Of the 48 mammal species potentially occurring in the RSA, a total of 10 were detected during the field programs, through visual sightings and other signs. Beaver was the most commonly observed or detected mammal species, followed by Moose, Black Bear and Red Squirrel. Marten, Fox, Wolf, Lynx, and Star-nosed Mole were the least detected mammals, typically through sound or tracks. Notably though, a large number of Snowshoe Hares were observed incidentally along the roads and trails. Other species known to

be trapped in the RSA but not observed during field studies include mink, muskrat, otter, and fisher.

11.5.3.6.1 Beaver

Beavers are dependent on aquatic habitats which represent approximately 26% of the RSA (14% wetlands and 12% lakes, rivers, streams, and ponds). However, riparian and upland vegetation that surrounds water bodies is an important determinant of beaver use. Beaver prefer Aspen, Willow and Balsam Poplar trees for foraging and typically forage for these species within 30 m of a waterbody, and rarely forage more than 100 m away for a waterbody.

Evidence of beaver, particularly lodges and dams, occur regularly in lakes, ponds, and creeks across the RSA. Numerous lodges were recorded in the RSA, typically located in small ponds or large lakes (e.g., Goudreau Lake) as well as in large wetlands. Either a large dam or a series of smaller dams were common along each creek, as well as at the inlet and outflow of lakes and ponds. As such, the water levels and flow regimes of many of these lakes, ponds and creeks are heavily influenced by beaver activity.

11.5.3.6.2 Moose

Moose are year-round residents across the RSA, but their preferred habitat varies with the seasons. Potential suitable summer habitat for moose in the RSA is comprised of dense mixed forest, dense deciduous forest, regenerating forest, and wetland. Potential suitable winter habitat is comprised of dense coniferous and dense mixed forest. Moose aquatic feeding areas are generally found in cool water lakes, along medium-sized and shallow rivers and on shallow basins of cold water lakes. Early winter habitat is primarily made up of mature or over-mature, open canopy, mixed-wood stands with less than 60% tree cover, as well areas that had been burned or cutover about 5 to 20 years ago. Late winter habitat consists of denser stands of mature conifer with good overhead cover. Mixed stands made up of less than half mature conifer should also be considered as late winter habitat if pure conifer stands are not available. Upland sites are preferred.

Virtually all of the RSA represents suitable moose habitat and therefore habitat quantity and quality are not considered to be limiting for the moose population in the RSA. In addition, some forms of disturbed habitat (e.g., regenerating clearcuts, road sides, roads, and trails, and other disturbed areas such as old mine sites) can also be suitable habitat. Moose Late Winter Cover and Moose Aquatic Feeding Areas are Significant Wildlife Habitat (SWH) features in the RSA. Moose also utilize the large network of roads and trails throughout the RSA as travel corridors. No mineral licks were observed during field surveys.

The MNRF has calculated the overall average carrying capacity, or the number of moose that the habitat can support, for WMU 32 at about 37 moose per 100 square kilometres (km^2). The ministry's management goal is to maintain a moderate to high density population. In 2009, a total population estimate of 1,243 (+/- 237) moose with a density of 28 moose per 100 km^2 was estimated for WMU 32. This population is within the limits of the desired ecological density of 20 to 40 moose per 100 km^2 (EBAa, 2013).

Relative moose density within the RSA was calculated on the basis of aerial surveys. In June 2012, the relative moose density was estimated at 6.59 moose per 100 km^2, with an estimated

abundance of 9 ± 12.18 moose across the RSA. In October 2012, the relative moose density was estimated at 8.33 moose per 100 km^2, with an estimated abundance of 12 ± 3.87 moose across the RSA. In February 2013, the relative moose density was estimated at 20 moose per 100 km^2, with an estimated abundance of 29 ± 7.63 moose across the RSA (EBAa, 2013).

To place these estimates in the broader regional context, estimated moose densities across the RSA are at or below the MNRF's estimate for the entire WMU. In Pukaskwa National Park, approximately 70 km west of the Magino property, moose densities have been declining since 2000. The estimated density of moose in Pukaskwa National Park (i.e., approximately 8 moose/100 km^2 in 2008) is a similar relative density estimated within the RSA in June and October 2012 (EBAa, 2013).

11.5.3.6.3 Black Bear

Generally black bears prefer mixed forest, deciduous forest, and regenerating habitats. Wetlands are considered important during the spring and summer. Jack Pine forest may be selected if there is a high abundance of berries. Mature deciduous and coniferous forests are preferred for denning. In addition, some forms of disturbed habitat can also be suitable habitat. Black bear utilize the large network of roads and trails throughout the RSA as travel corridors.

Almost all of Ontario has habitat that supports populations of black bears. Suitable black bear habitat to support all life history stages exists within the RSA. Dubreuil Forest Products Limited (2008) reported that approximately 60,800 ha of black bear breeding habitat exists in the Magpie Forest block. As such, virtually all of the RSA represents suitable black bear habitat. Therefore, habitat quantity and quality are not considered to be limiting for the bear population in the RSA. The relatively young, disturbed and regenerating forests of the RSA are not considered to be preferred habitat for denning. No black bear dens were observed during field studies.

The highest densities of bears in Ontario (more than 60 bears/100 km^2) are found in the Chapleau Crown Game Preserve of WMU 32 where bears are protected from hunting. In other areas bear densities are closer to 40 bears/100 km^2. In general, home ranges of adult female bears average 15 to 25 km^2 while the home ranges of adult males can be 10 times the size of female home ranges. The home ranges of many bears can overlap (EBAa, 2013).

Although black bears were not directly surveyed during the field programs, approximately 21 black bears and 20 signs were recorded, primarily in spring season along roads and trails. Based on the large home range sizes of black bears, the observations reported likely represent multiple observations of the same individuals (EBAa, 2013).

11.5.3.6.4 Marten

Marten have been trapped for fur for centuries. The species is listed as Secure in Ontario, and Not at Risk federally. Marten occupy large home ranges with adult males occupying ranges of up to 45 km^2, and adult females occupying ranges of up to 27 km^2 (EBAa, 2013).

Potential suitable habitat for American Marten in the RSA is comprised of dense coniferous forest, dense mixed forest, dense deciduous forest, and treed wetland habitats. According to Dubreuil Forest Products Limited (2008), approximately 10% of the current forestry landbase

within the Magpie Forest is considered suitable core marten habitat. No marten core habitat areas were located within the RSA (EBAa, 2013).

At a stand level, marten prefer a complex structure near the ground, large downed trees, snags or wildlife trees, a distinct understory layer, and a forest canopy cover between 40% to 70%. This provides suitable habitat for maternal denning, resting, feeding, and security from predators and weather. Suitable conifer and mixedwood dominated habitat exists in the RSA; however, the structural diversity, canopy cover, and soil moisture regimes vary within each ecosite in response to successional stage, substrate material, and other factors (EBA, 2013). Overall, habitat quantity and quality are not considered to be limiting for the marten population in the RSA.

No field surveys targeting marten were completed within the RSA during 2012 field studies, and no marten or their sign were incidentally observed during this time. Two days of winter track surveys were completed in 2013. Only one set of marten tracks was identified in the Goudreau Creek area. No marten tracks were observed in the Dreany Lake area. Multiple snowshoe hare tracks and scat were observed in both areas. Reportedly, marten, populations in the Magpie Forest are low possibly as a result of overharvesting and natural prey cycles (Dubreuil Forest Products Limited, 2008).

11.5.3.6.5 Red Fox

Red foxes are found in all habitats in Ontario. A pair of foxes will occupy a territory of 3 to 8 km^2. Foxes will often select den sites near human areas and are commonly found in built environments. Red foxes are omnivores, eating both plant and animal material, but they prefer animal matter such as small rodents, frogs, insects, birds, and snakes. Preferred plant foods include acorns, grasses, corn, fruits and berries. Although there were only nine visual sightings during field studies, habitat quantity and quality are not considered to be limiting for the red fox population in the RSA.

11.5.3.6.6 Wolf

Potential suitable habitats for grey wolf are dense coniferous forest, dense mixed forest, dense deciduous forest, regenerating forest, various wetland habitats, typically treed wetland, and fens. Wolves are often present where there are high densities of moose and other prey species (e.g., hares). Within the RSA, a single set of wolf tracks was observed southwest of Dreany Lake and along Goudreau Creek (EBAa, 2013). Given such few observations and the low density of moose across the RSA, the wolf population in the RSA is likely to be low as well.

11.5.3.6.7 Lynx

In Ontario, lynx are common throughout the boreal forest. Lynx are found in forests where there are sufficient numbers of their primary prey, the snowshoe hare (*Lepus americanus*). Large home ranges are required when prey density is low, and even larger ranges are evident in the summer compared to winter. As such, home range sizes are highly variable and have been reported to range between 15 to over 220 km^2 (EBAa, 2013).

In general, lynx favour old-growth boreal forest with an undercover of thickets and windfalls. Such old growth forest is uncommon in the RSA. Despite the presence of snowshoe hare, only three visual sightings of lynx were made during field studies (EBAa, 2013). Overall, lynx

populations in the Magpie Forest are considered to be low, possibly as a result of overharvesting and natural prey cycles (Dubreuil Forest Products Limited, 2008).

11.5.3.6.8 Red Squirrel

Red squirrels require mature trees for foraging, breeding, and dietary requirements. Coniferous seeds are the primary food source of red squirrels, supplemented by fungi, flowers, tree sap, tree bark, berries, seeds, bird eggs, hatchling and adult birds, and insects (EBAa, 2013). Red squirrel densities can vary from 0.3 to 2.0 squirrels/ha depending on abundance of food. Red squirrels were observed and their tracks were found in all habitat types in the RSA except for sparse forest and heavily disturbed areas. Dense coniferous forest habitats were preferred habitats in the RSA.

11.5.3.6.9 Snowshoe Hare

Snowshoe hares prefer habitats with a dense understory. Hares establish an intricate network of trails within their territory between resting and feeding areas. They consume herbaceous plants such as grasses, leaves from shrubs, small twigs, buds, and bark from both coniferous and deciduous species. Hares also eat berries during the spring and summer months.

Snowshoe hare populations are very cyclical. At their peak, hares can be extremely abundant, reaching densities of 12 to 15 hares/ha (EBAa, 2013). Snowshoe hare tracks were the most numerous tracks recorded during the winter track surveys in the RSA, and were recorded in all habitat types, except wetlands.

11.5.3.6.10 Star-nosed Mole

Star-nosed Mole is found across the eastern regions of Canada's boreal forest. The species prefers wet loamy soils near streams, lake edges, and swamps. Its diet includes worms, beetles, ants, larvae, slugs, salamanders, young snakes, and nesting mice when encountered during tunneling. Its aquatic diet includes invertebrates like caddisfly and midge larvae, as well as small fishes, worms, and insects. Crustaceans and molluscs are eaten less frequently. Although there was only one visual sighting during field studies, habitat quantity and quality are not considered to be limiting for the mole population in the RSA.

11.5.3.6.11 Bats

A total of five bat species may occur in the RSA, of which, two species (Big Brown Bat and Little Brown Myotis) may over-winter. Although no bats or occupied bat roosts were detected within the RSA during the 2012 field program, suitable foraging, roosting, maternity, and over-wintering habitat can be expected to occur. Potential roosting and maternity sites likely occur in older or mature forest stands, as well as in young cutblocks where wildlife trees remain.

Further details regarding bats at the existing mine adit on the Magino property are presented under the LSA. Bats are currently of special interest to MNRF due to the severity and spread of White-nosed Syndrome (WNS), a condition causing extensive mortality.

Local hunters and trappers anecdotally report a high population of Moose and Bear (Smedts, 2014). The Ontario’s Fur Managers Association reports at least 12 traplines in the RSA (locations confidential) and estimates the most harvested species was Marten (Table 11-23)

(EBA, 2013). However, local trappers contacted in the winter of 2014 indicated that there was virtually no Marten being harvested during the 2012-2013 season (Smedts, 2014; Hudson, 2014). The length of traplines in the RSA vary, but are on average approximately 15 km long. Local trappers estimated the harvest per trapline for the 2013 to 2014 season shown in Section 4.3.9(Smedts, 2014; Hudson, 2014). There are no known denning sites (Smedts, 2014) in the RSA.

Table 11-23: Furbearer Harvest Estimates in the RSA

SPECIES	APPROXIMATE ANNUAL HARVEST IN REGION	APPROXIMATE ANNUAL HARVEST PER TRAPLINE (2013 TO 2014 SEASON)
Marten	400	0 to 15
Beaver	300	30 to 40
Mink	50	5 to 10
Muskrat	40	Unknown
Otter	35	5 to 10
Fisher	20	2 to 6
Fox	20	Unknown
Lynx	15	3 to 6
Wolf	15	2 to 4

11.5.3.7 Overview of Species at Risk within RSA

All Species at Risk identified in the RSA, LSA, or PSA are birds. No Species at Risk (SAR) were identified in other groups, including flora.

A total of 14 bird species listed federally as a Species of Concern under the *Species at Risk Act* or identified by the Committee on the Status of Species at Risk in Ontario (COSSARO) potentially occur in the RSA as summer and or winter residents, migrants, or infrequent visitors depending on the available habitat. Of these 14 potential species, eight species were observed, heard, or recorded in the RSA.

11.5.3.7.1 Whip-Poor-Will

The Whip-poor-will is listed federally under the *Species at Risk Act* registry, Schedule 1, and on the Species at Risk Ontario registry (SARO) as Threatened. The Whip-poor-will is usually found in areas of mixed and open forest including savannahs, open woodlands, and open areas within mature deciduous, coniferous, and mixed forests. Dry deciduous and mixed forests with an open understory are preferred nesting habitats Whip-poor-wills are known to prefer nesting in habitats such as: rock or sand barrens with limited trees, old burns in a state of early forest succession, and open conifer plantations. The forested areas are used for roosting and nesting and the open areas for foraging. Suitable nesting habitat for Whip-poor-wills may possibly exist

in the Rock Barren habitat type within the RSA. A Whip-Poor-Will breeding territory typically occupies approximately 9 ha. The RSA is located close to the boundary of the species' documented northern range (EBAa, 2013).

11.5.3.7.2 Common Nighthawk

The Common Nighthawk is listed federally under the *Species at Risk Act* as Threatened, and is ranked as a species of Special Concern in Ontario under Ontario's *Endangered Species Act*. The Common Nighthawk is also federally protected under the *Migratory Birds Convention Act*, 1994. Common Nighthawks typically migrate into the RSA around mid to late May, and leave between July and October. The favoured nesting and feeding habitat of Common Nighthawks includes open areas with little to no ground vegetation, including open forests, logged or burned-over areas, forest clearings, rock barrens and gravel areas, wetlands and marshes, and lakeshores. Suitable Common Nighthawk nesting habitat exists within the Rock Barren ecotype, as well as at old mine or mineral exploration sites, roads/railroad, and trails. Additional nesting habitat may also exist in poorly developed Shrub and Dry to Fresh Jack Pine-Black Spruce dominated ecotypes. Within the RSA, Common Nighthawks were detected in the southwestern half of the RSA, within close proximity to fens, conifer swamp, and a power line (EBAa, 2013).

11.5.3.7.3 Olive-sided Flycatcher

Olive-sided Flycatchers are listed under the *Species at Risk Act* as Threatened and is ranked as a species of Special Concern in Ontario under Ontario's *Endangered Species Act*. Olive-sided Flycatchers migrate north each spring to reach their breeding areas. They are likely to be present in the RSA from approximately mid-May (arriving anytime from mid-May to mid-June depending on timing of spring arrival) through to mid-to late September. All Olive-sided Flycatchers detected were within the LSA.

Appropriate Olive-sided Flycatcher habitat is considered common throughout the RSA, including the edges of lakeshores, wetlands, rail line, trails, forestry cut blocks, and historic mine developments (EBAa, 2013).

11.5.3.7.4 Bald Eagle

The Bald Eagle is not considered to be a SAR federally but is listed as a species of Special Concern in Ontario under Ontario's *Endangered Species Act*. The Bald Eagle is a bird of prey and is protected from hunting and trapping under Ontario's *Fish and Wildlife Conservation Act* (MNRF, 2012). In Ontario, Bald Eagles nest throughout the north with the highest density of birds occurring near Lake of the Woods (approximately 800 km west of the Magino property). The birds generally migrate alone and the adult birds do not over-winter in Ontario. Upon arrival in the province between January and March, Bald Eagles use a variety of habitats for their nests and the locations are typically near major rivers or lakes. Bald Eagles prefer large continuous areas of mixed or deciduous woods, particularly those with a 30% to 50% canopy cover, and located around the shores of large rivers or lakes. They nest mostly in large trees such as Pine or Poplar where they build wide, bulky nests from large sized sticks. Nests are typically re-used in subsequent years (EBAa, 2013).

Ontario's Natural Heritage Information Centre (NHIC) rare species occurrence database indicates no Bald Eagle occurrences have been reported inside the RSA; however, the majority

of documented occurrences are known over 25 km to the north. A single unoccupied Bald Eagle nest was observed approximately 200 m from Morrison Lake in a mixed wood forest. The nest appeared to be in good condition, but no evidence of recent activity was detected.

Overall, good Bald Eagle breeding habitat is assumed to exist throughout the RSA, principally surrounding medium to large-sized lakes, based on the suitable habitat distribution in the RSA. Over-wintering of Bald Eagles in the area may be possible if there is sufficient open water to allow for winter fishing, or if there are active local landfills (such as in Dubreuilville) for scavenging (EBAa, 2013).

11.5.3.7.5 Canada Warbler

Canada Warblers are listed under the *Species at Risk Act* as Threatened, and ranked as a species of Special Concern in Ontario under Ontario's *Endangered Species Act*. The Canada Warbler is a seasonal migrant to the RSA. In Ontario, peak spring arrival is typically the last week of May, and peak fall migration ranges from late August to early September. While occupying the RSA, this species is nesting, rearing, and fledging young. Broad habitat types, such as hardwood and mixedwood forests which are common across the RSA have the potential to support Canada Warblers. Canada Warblers have also been documented breeding in early successional habitats such as regenerating mixed forest cutblocks and forest edges (natural and man-made). In the RSA, Canada Warblers were detected in early successional (pole/sapling) to young mixedwood and deciduous forest habitats with a minor component of mature tree stands remaining from previous logging activities.

11.5.3.7.6 Chimney Swift

Chimney swift is protected provincially under the *Endangered Species Act* and is listed federally under Schedule 1 of the *Species at Risk Act*. Chimney swifts are most commonly found in southern Ontario, however, can occur in the RSA given that they are almost completely adapted to man-made structures, in particular chimneys.

11.5.3.7.7 Northern Long-Eared Bat

The northern long-eared bat can be found throughout the boreal forest, choosing to roost under loose bark and in the cavities of trees. These bats typically hibernate from October or November to March or April, most often in caves or abandoned mines.

11.5.3.7.8 Little Brown Bat

The little brown bat is the most common and best-known bat in Ontario, living near forests or clumps of trees where it hunts for insects at night. Bats are primarily nocturnal creatures, sleeping during the day and hunting and feeding at night. The bats roost, hunt and breed during the summer. In the late fall they find winter roosts in which to hibernate. They hibernate in caves or abandoned mines that stay a few degrees above freezing and have humidity close to 80% (very damp). Most bats return to the same winter roost year after year. In the RSA, old mine adits and shafts provide suitable habitat for the little brown bat, and are present on the Magino property and the neighbouring Richmont Mines site.

11.5.4 Cumulative Effects Assessment

The VCs carried forward for cumulative effects assessment and residual effects of concern for additive cumulative effects are summarized in Table 11-24.

Table 11-24: VCs Carried Forward for Cumulative Effects Assessment and Residual Effects of Concern

Valued Component	Additive Residual Effect of Concern
Greenhouse gases	Additive emissions
Terrestrial vegetation	Additive loss of vegetation cover
Wetlands	Additive loss of wetlands
Significant Wildlife Habitat	Additive loss of significant wildlife habitat
Migratory and Breeding Birds	Additive loss of staging, foraging and breeding habitat

Potential cumulative (additive or synergetic) effects on biological VCs requires the use of a reliable “measurable” indicator(s). These indicators and measurable parameters are described in Table 11-25.

Table 11-25: Indicators and Measurable Parameters for Cumulative Effects within the RSA

VC Carried Forward for Cumulative Effect	Expected Residual Effect	Indicator /Measurable Parameter	Rationale
Greenhouse gases	Contribution of GHG emissions to Provincial, Canadian and global annual GHG emissions	• Ontario's GHG Emissions Reporting Regulation (O. Reg. 452/09); • Ontario's Cap and Trade Regulation (O. Reg. 144/16); and • Government of Canada GHG Reporting Program (the GHGRP).	Operators of industrial facilities must report GHG emissions on an annual basis. Fuel and energy use in Algoma District is a measurable quantity.
Biological VCs			
Terrestrial Vegetation	Removal of upland forest	Area of vegetation removed (ha)	Measurable surfaces (ha)
Wetlands	Removal of organic/peat accumulating wetlands	Area of wetland removed (ha)	
Significant Wildlife Habitat	Removal of Moose calving, aquatic feeding and late winter cover habitat (associated with removal of terrestrial vegetation and wetlands)	Area of terrestrial vegetation and wetland removed used as indicator of potential significant habitat losses.	Using total areas of vegetation losses and wetland losses provides an over estimate of potential significant wildlife habitat last.
	Removal of habitat for Species of Special Concern (associated with removal of terrestrial vegetation and wetlands)		
	Removal of amphibian breeding habitat (associated with removal of waterbodies, streams and wetlands)		
Migratory and Breeding Birds	Loss of mature forest canopy habitat for warblers (associated with removal of terrestrial vegetation)	Area of terrestrial vegetation, wetland and waterbodies removed used as indicator of potential significant habitat losses.	Using total areas of vegetation losses and wetland losses provides an over estimate of potential losses of nesting, foraging and staging habitat for migratory and breeding birds.
	Loss of foraging and staging habitat for waterfowl (associated with removal of waterbodies and wetlands)		
	Loss of foraging habitat for raptors (associated with removal of terrestrial vegetation and wetlands)		

11.5.4.1 Cumulative Effects of Greenhouse Gas Emissions

A comparison of the GHG emissions from the Magino Project to the annual GHG emissions (in CO_2e) for Ontario, Canada and globally is provided in Table 11-27. Data for Ontario and Canada GHG releases are provided by Environment Canada (Environment Canada, 2013b). The global baseline emissions for 2000 were listed by the IPCC as 16,927 Mt CO_2e (Nakicenovic and Swart, 2000). The GHG emissions from the Magino Project are a very minor contribution to the totals reported for the Provincial and federal reporting programs and are not considered major.

Table 11-26: Comparison of the Magino Project GHG

SOURCE	ANNUAL GHG EMISSIONS (KT CO_2E/YR)	EMISSIONS AS A RELATIVE PERCENTAGE OF THE PROJECT	PROJECT EMISSIONS AS A RELATIVE PERCENTAGE OF LISTED TOTALS
Project direct emissions	137	89.3	—
Project indirect emissions	16	10.7	—
Project total emissions	153	100	100
Ontario (2014)	170,200	—	0.1%
Canada (2014)	732,000	—	0.02%
Global (2000)	16,927,000	—	0.001%

All future human activities within the Algoma District will contribute to GHG emissions in combination with the Magino Gold Project. Proponents of industrial activities have an obligation to report annual emissions of GHG under the federal and provincial regulations.

11.5.4.1.1 Significance of Current and Future GHG Emissions

The expected GHG emissions of the Magino Project is estimated at less than 0.1% of Ontario GHG emissions. Withinin the temporal boundaries of the cumulative effects assessment (21 years), the additive contributions of future activities in the Algoma District will most likely be the result of forestry operations. The contribution of these operations to Provincial, Canadian or global annual emission will remain negligible. Overall, the cumulative effects of GHG emissions within the Algoma District is NOT SIGNIFICANT.

11.5.4.2 Cumulative Effects on Biological VECs within RSA

Biological VCs carried forward for the cumulative effects assessment include:

- Terrestrial vegetation;
- Wetlands;
- Significant wildlife habitat;
- Migratory and breeding birds;

Although the residual effects on these VCs identified for the Magino Project were assessed to be **NOT SIGNIFICANT**, the rationale to carry these VCs to Step 2 of the cumulative assessment

is that the potential for cumulative effects is dependent on the nature of future activities within the LSA and RSA.

11.5.4.2.1 Type of Cumulative Effects

The most likely cumulative effects for biological VCs are:

1) The additive loss of habitat (cause by eradication or degradation);
2) The increase in mortality of species due to increase human interaction.

Synergetic, compensatory or masking cumulative effects are not likely to occur due to the physical distances separating the mining, forestry and tourism activities occurring within the Algoma District.

Cumulative Effects Mechanism

The **additive loss** of habitats can be indirectly measured by surface area of terrestrial vegetation, wetlands and waterbodies impacted by past, current and future activities within the LSA and RSA. Potential cumulative effects on significant wildlife habitat, migratory and breeding bird foraging and breeding habitat, and mammals are directly correlated to the cumulative loss of terrestrial vegetation, wetlands and waterbodies for which impacted surfaces areas within the LSA and RSA can readily be estimated (hectares impacted).

Assumptions and the Conservative Approach

In general, there is a high level of confidence and conservativeness incorporated in the assessment of effects on terrestrial vegetation, because:

- Preliminary baseline mapping (EBA, 2013), based on aerial photography interpretation and stratified sampling, was confirmed by field verification;
- The two terrestrial vegetation indicators (i.e., upland forest and rock barrens) are broad categories that capture the range of terrestrial vegetation types present within the study areas and associated biodiversity;
- The assumed area of disturbance within the PSA was conservatively defined to include all areas within the public bypass road (i.e., the re-routed Goudreau Road); and
- Conservative assumptions were incorporated into the air quality modeling, hydrologic modeling, and surface water and groundwater modeling. The zones of influence from dustfall and dewatering are therefore likely overestimated, while changes in water levels in streams and lake are also likely overestimated.

A data limitation exists regarding confidence in the Ecological Land Classification (ELC) for terrestrial vegetation in the RSA, but outside of the LSA and PSA. Classification was based exclusively on aerial photography interpretation and aerial observations. As such, these data were not applied in the quantitative analysis. Rather, the data were used to demonstrate that the representation of terrestrial vegetation removed approximated that represented in the RSA.

11.5.4.2.2 Cumulative Effects Analysis – Terrestrial Vegetation

11.5.4.2.2.1 Residual Effects of the Magino Project

There are 1259 ha of terrestrial vegetation in the PSA representing 70% of the natural cover. The area occupied by the past-producing mine is located between Webb Lake and Water Body 1, and includes an extensive barren ground campus at the site of the mine infrastructure (now largely removed), as well as the historical mine adit, ventilation raises, access roads, a tailings pond area and a polishing pond area.

The PSA has been subject to logging and historic mining activities that have substantially fragmented the forest and altered the dominant cover by creating openings in the canopy. In some areas, the understory is very dense, but in other places, the openings are enhanced by naturally occurring areas of exposed bedrock, creating an open parkland effect. Small swaths of forest access roads and mining exploration roads and trails form a network of disturbance that is heavily used by local wildlife such as moose, black bear, wolf and lynx. Almost 75% of the upland forest in the PSA will be removed; however, all ecosites are well-represented in the LSA and RSA.

The duration of the residual effect for the Magino Project will be the construction phase, the lifetime of active mining and processing operations, and the closure phase. Progressive rehabilitation plans are to replace terrestrial vegetation in a pattern that will restore connectivity of terrestrial vegetation across the LSA.

The removals and/or disturbance will occur once during clearing operations. The effect is reversible in that both the forest and associated bedrock clearings can be restored as part of the Closure Plan. The outcome of restoration activities will be defined within the context of wildlife habitat requirements, such as ground-nesting birds that select for open woodlands (e.g., Common Nighthawk).

- ***Effects on Upland Forest***

Table 11-27 provides a summary of the measures used to evaluate effects to upland forests.

Table 11-27: Effects of Magino Project on Upland Forest within RSA

MEASURE	PSA	LSA	RSA
Area (ha) of upland forest removed	919 of 1,259 ha	919 of 2,505 ha	919 of 7,802 ha
Percentage (%) of upland forest removed in the context of upland forest present within the watersheds of the PSA, LSA and RSA	73%	37%	12%
Comparison of representation of upland forest	• 5 ecosites represented. • No ecosite is	• 6 ecosites represented. • These are represented in proportion to those	• 8 ecosites represented. • These are

MEASURE	PSA	LSA	RSA
removed to the representation of forest present in the RSA	unique or rare compared to the LSA or RSA.	within the PSA.	represented in proportion to those within the PSA and LSA
Potential for indirect effects from changes in groundwater levels and overland flow/infiltration rates.	• No effect on upland forests is anticipated. • The soils upon which the forest depend are naturally droughty and the forest is pre-adapted to this. • The remaining forest is largely upgradient of the mining activity; therefore, overland flow will not be affected.	• No effects on upland forests in the LSA is anticipated. • Soils are naturally droughty and the forest is pre-adapted • The remaining forest is upgradient; therefore, overland flow will not be affected.	• No drawdown effect in the RSA outside of the LSA is anticipated. • No changes to the flow regime that would affect upland forest are anticipated in the RSA.
Potential for indirect effects from increased dustfall	• Low potential for effects on terrestrial vegetation; the high levels of deposition (>7 g/m^2/day) will be confined to the PSA.	• Effects on terrestrial vegetation are not likely detectable in the LSA. Dustfall will be generally <7 g/m^2/day across the LSA. • Dust on vegetation along the gravel Goudreau Road may be visible.	• Effect on terrestrial vegetation will not be detectable in the RSA.

- ***Effects on Rock Barrens***

Baseline studies identified one ecosite in the PSA that is classified as rock barren, as defined by the MNRF. There are rock barren openings among the trees of the upland forest that were too small to map, and therefore have not been included in the assessment of forest effects. Rock barren of sufficient size to map amounts to 1 ha in the LSA, and 9 ha within the RSA. There were no rock barren communities large enough to map in the PSA.

Regardless, it is anticipated that some small rock barren sites will be removed in the PSA coincident with the forest removal; this area cannot be quantified. Project effects to rock barrens are similar to those to forests, and include effects from dust, spills, and release of sediments, all of which will be controlled through the implementation of Best Management Practices.

Final rehabilitation of the Magino mine site will provide substantial opportunities for enhancing the representation of rock barrens in the study areas. The loss of upland forest and rock barrens will be partially offset through the implementation of the Closure Plan and the creation of approximately terrestrial habitat, primarily on top of the regraded TMF and MRMF. In addition, the embankments of the TMF and MRMF will provide extensive substrates for the colonization

of moss and lichen removed during the clearing operation. The presence of rock barren will maintain this open aspect permanently, in contrast to the forest succession that would occur on deeper soils.

11.5.4.2.2.2 Significance of the Magino Project Residual Effects on Terrestrial Vegetation

Taking into consideration the design of the Project and the mitigation measures recommended above, the following residual adverse effects on terrestrial vegetation are anticipated:

- Removal of upland forest and associated rock barrens; and
- Fragmentation of pathways of connectivity within the Webb-Goudreau and Lovell-Spring Lake watersheds.

Taking into consideration the design of the Project and the mitigation measures recommended above and the Closure Plan in particular, one (1) beneficial effect is anticipated.

- Increased area of rock barrens in the PSA and representation in the LSA and RSA

The criteria and effects levels for determining significance on terrestrial vegetation within the RSA are outlined in Table 11-28. These residual effects were determined to be “NOT SIGNIFANT” for the Magino Project (refer to Table 11-5 for scoping of VCs to carry forward for the cumulative effects assessment).

Table 11-28: Criteria and Effects Levels for Determining Significance on Terrestrial Vegetation within the RSA

EFFECTS CRITERIA	EFFECTS LEVEL DEFINITION		
Magnitude (of effect)	**Low**	**Medium**	**High**
	Net removed or disrupted vegetation communities constitute 25% or less of the watersheds comprising the RSA (Environment Canada, 2013) and net % forest cover in the watersheds achieves 40% or more.	Net removed or disrupted vegetation communities constitute more that 25% and less than 70% of the vegetation in the watersheds that comprise the RSA (Environment Canada, 2013).	Net removed or disrupted vegetation communities constitute 70% or more of the vegetation in the watersheds that comprise the RSA.
Geographic Extent (of effect)	**Low**	**Medium**	**High**
	Removals or indirect Project effects are confined to the PSA.	Removals or indirect Project effects have the potential to affect vegetation within the LSA.	Removals or indirect Project effects are likely to create a measurable effect beyond the LSA.
Timing and Duration (of conditions causing the effect)	**Low**	**Medium**	**High**
	Short-term effects result from site preparation construction activities and operations - the vegetation communities are progressively rehabilitated.	Moderate-term effects result from Operation activities - vegetation community functions are interrupted until final closure and rehabilitation is commenced.	Long-term effects result from Operation activities - vegetation community functions are interrupted until final closure and rehabilitation is completed.
Frequency	**Low**	**Medium**	**High**

EFFECTS CRITERIA	EFFECTS LEVEL DEFINITION		
(of conditions causing effect)	Effect occurs once or infrequently.	Effect occurs occasionally.	Effect occurs continuously or cyclically.
Degree of Irreversibility (of effect)	**Low**	**Medium**	**High**
	Effect is reversible and spontaneous.	Effect is reversible but requires management.	Effect is unlikely to be reversible.
Ecological Context	**Low**	**Medium**	**High**
	The effect occurs in terrestrial vegetation types that are relatively abundant in the LSA and RSA or in previously disturbed habitat.	The effect occurs in terrestrial vegetation types that are common in the LSA but uncommon in the RSA.	The effect occurs in terrestrial vegetation types that occur only in the LSA and not in the RSA.
Social Context	**Low**	**Medium**	**High**
	The vegetation communities affected are not likely to used, nor have they been identified as important to the community.	The vegetation communities affected may be used or may be important to the community.	The vegetation communities affected are used and/or have been identified as important to the community.

Notes:
(a) The assumptions and limits of the effects criteria will be described as part of the environmental effects assessment.
(b) Criteria relate to the effect.
(c) Where available, existing environmental standards, guidelines, or objectives will be used to define the effects level definitions.
(d) Criteria relate to the conditions causing the effect.

A comparison of significance of the Magino Project residual effect on terrestrial vegetation and potential cumulative effects on terrestrial vegetation within the RSA is presented in Table 11-27.

- ***Removal of upland forests and associated rock barrens***

The removals of upland forest and associated rock barrens are not significant, largely because the ratings of effects levels for magnitude, geographic extent, and ecological context are low.

The terrestrial forests removed from the PSA consist of 89% Aspen-White Birch forest and 11% Jack Pine – Black Spruce, totaling 919 ha. The PSA forest presents evidence of the effects of past logging operations, historical mining and the more recent mine exploration activity, in addition to the recreational use by trucks, all-terrain-vehicles (ATVs), and snowmobiles. Environment Canada (2013) suggests that watershed effects of forest loss are evident when the forest cover drops below 40%. The immediate removals within the PSA result in a reduction from 70% to 19% forest; however, the site mitigation / progressive rehabilitation will stabilize the potential effects of erosion, sedimentation, and dust deposition that could result in effects beyond the PSA. With mitigation, a substantial area of the forest removed can be restored on the TMF and MRMF, and possibly more, depending on the availability of growth medium.

The same removals represent a change from 69% to 44% forest cover in the LSA, and 70% to 62% forest cover in the RSA. With restoration, the net cover in the LSA has the potential to exceed 54%, and that of the RSA will exceed 65%, at a minimum.

The forest restoration will be designed to provide open forest habitat that supports the plant and wildlife communities that exist in the RSA. A design that facilitates the growth of forested corridors with interspersed rock barren will mimic existing conditions.

- ***Fragmentation of pathways of connectivity with the adjacent watersheds***

The fragmentation of pathways of connectivity within the Webb-Goudreau and Lovell-Spring Lake watersheds is not significant, largely because the ratings of effects levels for magnitude, geographic extent, and ecological and social context are low.

The forest within the PSA is contiguous with the surrounding forest, all of which is threaded with a matrix of trails, forest access roads, and gravel roads. In terms of provision of pathways of connectivity for plant communities, plant propagules can move easily across the landscape, transported by wind, water, and animals. The removal of the natural cover within the PSA represents a barrier to such movement for the duration of the mine operation. These functions will continue to occur in the surrounding forest. After restoration of the forest and rock barren communities (primarily on the TMF and MRMF, but also on other disturbed areas on the Project site), this function will resume across the mine footprint. A key element will be the implementation of the invasive species management plan to promote recovery with native species at the expense of non-native invasive species.

11.5.4.2.2.3 Residual Effects of Past, Current and Future Activities

The existing areas disturbed by past human activity in the RSA amount to approximately 1076 ha. The maximum area to be disturbed by the Magino Gold Project is estimated to be approximately the same, at 1,070 ha.

Ongoing and planned forest harvesting by the Magpie Forest Management Unit is estimated to result in additional disturbance of 649 ha. Although the ten year “Forest Management Plans” are not available beyond 2020 for either the Magpie Forest Management Unit or the Algoma Forest Management Unit, it is highly probable that logging will continue to occur within the RSA.

The forestry regulations in Ontario require that the forestry operators prepare and submit a 10-year management plan of their proposed harvesting operation for public review and ministry approval. These management plans must include measures for protection of sensitive environment and wildlife. The plans are posted on the website of the Ministry of Natural Resources and Forestry (www.efmp.lrc.gov.on.ca/eFMP/homeLocale.do). This site allows public access to draft and approved forest management plans prepared for Crown forests in all management units in Ontario. The details of the activities described in the plans are also posted to this site annually in what are called annual work schedules. These schedules describe all forestry activities to be carried out that year namely harvest, renewal, road construction, prescribed burns, aerial pesticide spraying projects and insect pest management programs. Management plans are developed for significant wildlife habitat, sensitive environmental landscape and wildlife management. At the end of each year, an annual report of the completed activities for each management unit is posted. Plans, schedules and reports are made up of text tables and maps. Given these requirements, the ongoing forestry operations are unlikely to result in significant cumulative effects for terrestrial vegetation, significant wildlife habitat, migratory and breeding bird habitat, species of special concerns and mammals.

API's system upgrades are not anticipated to substantially add to this cumulative effect as most upgrades would be undertaken within existing rights-of-way.

Thus, the cumulative area of the RSA to be disturbed by human activity into the foreseeable future is estimated to be 2975 ha, which represents 25% of the surface area of the RSA retained for the cumulative effects assessment (RSA is 110 km^2 or 11,000 ha).

11.5.4.2.2.4 Significance of Cumulative Effects on Terrestrial Vegetation

The anticipated residual adverse effects of the Magino Project were assessed by considering the criteria and effect level ratings provided in Table 11-27 and Table 11-28. A description of the effects and their significance is provided below and summarized in Table 11-29. The same criteria were applied for the assessment of significance of cumulative effects on terrestrial vegetation within the RSA.

The cumulative effects of current and future activities on terrestrial vegetation is assessed to be NOT SIGNIFICANT.

Table 11-29: Terrestrial Vegetation - Significance of Magino Project Residual Effects Compared to Significance of Expected Cumulative effects within RSA

RESIDUAL ADVERSE EFFECT	MAGNITUDE	GEOGRAPHIC EXTENT	DURATION	FREQUENCY	DEGREE OF IRREVERSIBILITY	ECOLOGICAL CONTEXT	SOCIAL CONTEXT	OVERALL ASSESSMENT OF SIGNIFICANCE
Significance of Magino Project residual effects								
Removal of upland forest and associated rock barrens	**Low**	**Low**	**High**	**Low**	**Medium**	**Low**	**Medium**	**Not Significant**
	919 ha removed = 73% of forest in PSA (19% of area of PSA remaining as forest); 37% of forest in LSA (44% of area of LSA remaining as forest; 12% of RSA (62% of area of RSA remaining as forest).	Removals are confined to PSA.	Vegetation community functions are interrupted until final closure and rehabilitation is completed.	Removals occur concurrently, once, or may be alterations instead of removals.	The effect can be reversed by restoring forest.	All ecosites are well-represented in the RSA.	These forests likely provide resources that could be of value to Aboriginal groups.	
Fragmentation of pathways of connectivity	**Low**	**Low**	**High**	**Low**	**Medium**	**Low**	**Low**	**Not Significant**
	Restoration will mimic pre-construction connectivity.	Removals and additional fragmentation are confined to PSA.	Vegetation community functions are interrupted until final closure and rehabilitation is completed.	Removals occur once, concurrently, and alternate routes exist.	The effect can be reversed by restoring forest.	The mine is surrounded by forest offering alternate pathways.	Pathways are unlikely to provide resources that could be of value to Aboriginal groups.	
Significance of cumulative effects of past, current and future activities within RSA								
Removal of upland forest and associated rock barrens		Low	Low	Low	Medium	Low	Medium	**Not Significant**
	Future activities expected to remove an additional 949 ha Total area removed of 2795 ha (25% of RSA coverage)	Within RSA	Vegetation community functions are interrupted temporarily	Removals occur, once, or may be alterations instead of removals.	The effect can be reversed by restoring forest.	All ecosites are well-represented in the RSA.	These forests likely provide resources that could be of value to Aboriginal groups.	

11.5.4.2.3 Cumulative Effects Analysis – Wetlands

Wetlands are valued for their ecological services and economic, social, and cultural benefits. From a regulatory perspective, significant wetlands are protected under Section 2.1.4 of the Ontario Provincial Policy Statement (2005). The federal government has expressed its interest in protecting wetlands on federal lands through the Federal Policy on Wetland Conservation (1991), which aims to promote the conservation of Canada's wetlands to sustain their ecological and socio-economic functions, now and in the future. Wetlands improve water quality by trapping sediments, filtering out pollutants, and absorbing nutrients that would otherwise result in poor water quality for downstream users. Wetlands in the LSA and RSA provide wildlife habitat for species such as amphibians, mammals, migratory and breeding birds, and fish, including SAR. Wetlands act as sinks for CO_2 and other GHGs. In terms of economics, wetlands also support sustainable forestry, which continues to be important to the regional economy of the Algoma District. Wetlands are often of high cultural significance to Aboriginal people, who value their connection to the land and the biodiversity that wetlands support.

11.5.4.2.3.1 Residual Effects of the Magino Project

There are 320 ha of wetlands within the PSA, representing 12% of the natural cover in the PSA. Of this, 287 ha of all wetlands in the PSA are classified as organic/peat accumulating wetlands. Many of them have been crossed by mineral exploration roads, and to a lesser extent, by forest service roads. They are located along the drainage systems that flow roughly northeast to southwest in the three watersheds that form the LSA. Although 2/3 of those located in the PSA will be removed, they are wetlands that are well-represented in both the LSA and RSA.

With the initiation of construction, 199 ha of organic/peat accumulating wetlands within the area of disturbance will be removed through filling and/or re-use as water quality control ponds and detainment basins. The fen at the west end of Spring Lake will be largely removed to enable the restoration of a historical drainage pathway to McVeigh Creek. The duration of the impact of removals will be permanent.

Table 11-30 provides a summary of the measures used to analyze effects on organic/peat accumulating wetlands.

Table 11-30: Effects of Magino Project on Organic/Peat Accumulating Wetlands within RSA

MEASURE	PSA	LSA	RSA
Area (ha) of wetland vegetation removed	199 of 287 ha	199 of 507 ha	199 of 1,509 ha
Percentage of wetland vegetation removed in the context of wetland vegetation present within the watersheds of the PSA, LSA and RSA	69%	39%	13%
Comparison of representation of wetland vegetation removed to the representation of wetlands present in the RSA	• 11 ecosites represented. • No ecosite is unique or rare compared to the LSA or RSA.	• 15 ecosites represented. • These are represented in proportion to those within the PSA.	• 15 ecosites represented. These are represented in proportion to those within the PSA.
Potential for indirect effects from changes in	• Some effects on wetlands receiving	• Effects in the LSA are unlikely;	• Effects in the RSA are very unlikely.

MEASURE	PSA	LSA	RSA
surface water to downstream wetlands or from changes in groundwater levels	water directly from TMF or MRMF. • Predicted groundwater drawdown effects (i.e., > 0.1 ha) to > 40 ha of wetland area (i.e., Waterbody 10). • Effects where drawdown is > 2 m are predicted in areas where wetlands will be removed.	predicted drawdown of 2 m is confined to PSA. • Drawdown of 0.1 to 0.5 m extends into the south-eastern end of LSA.	• Predicted drawdown effects do not extend into the RSA.
Potential for indirect effects from increased dustfall.	• Low potential for effects. • High levels of deposition (>7 g/m^2/day) is confined to wetlands that will be removed.	• Effects on wetland functions are not likely not detectable. • The highest levels of deposition are confined to the PSA, extending only slightly south and east, including along Goudreau Road where there are existing effects.	• Effects on wetland functions will not be detectable.

Table 11-31 provides a summary of the measures used to analyze effects to mineral wetlands. There are 320 ha of wetlands within the PSA, representing 12% of the natural cover in the PSA. Of this, 33 ha of all wetlands are classified as mineral wetlands.

Table 11-31: Effects of Magino Project on Mineral Wetlands within RSA

MEASURE	PSA	LSA	RSA
Area (ha) of wetland vegetation removed	16 of 33 ha	16 of 36 ha	16 of 70 ha
Percentage of wetland vegetation removed, in the context of wetland vegetation present within the watersheds of the PSA, LSA and RSA	48%	44%	23%
Comparison of representation of wetland vegetation removed to the representation of wetlands present in the LSA and RSA.	• One ecosite represented. • No ecosite is unique or rare compared to the LSA or RSA.	• One ecosite represented. It is represented in proportion to those within the PSA.	• One ecosite represented. This is well represented in the PSA.
Potential for indirect	• Some effects to	• Effects to wetland	• Effects to wetland

MEASURE	PSA	LSA	RSA
effects from changes in surface water on downstream wetlands or changes in groundwater levels	wetland function are likely for those receiving water directly from TMF or MRMF. • Predicted groundwater drawdown effects to 0.05 ha of mineral wetlands.	function in the LSA are unlikely.	function will not be detectable.
Potential for indirect effects from increased dustfall	• Low potential for effects to wetland function. • The high levels of deposition (>7 g/m2/day) are confined to wetlands that will be removed.	• Effects to wetland function are not likely to be detectable. • Highest dust deposition levels are confined to PSA, extending only south and east, including along Goudreau Road where there are existing effects.	• Effects to wetland function will not be detectable.

11.5.4.2.3.2 Significance of the Magino Project Residual Effects on Wetlands

Taking into consideration the design of the Project and the mitigation measures incorporated in the Magino Project, the following residual adverse effects on wetlands are anticipated:

- Removal of 199 ha of organic/peat accumulating wetlands;
- Removal of 16 ha of mineral wetlands;

The anticipated residual effects were assessed by considering the criteria and effect level ratings provided in Table 11-32.

Removal of Organic/Peat Accumulating and Mineral Wetlands

The removals of organics/peat-accumulating and mineral wetlands are not significant, largely because the ratings of effects levels for geographic extent, frequency, and ecological context are low. Wetland habitat removed from the PSA consists of organic conifer swamps, thickets, fens, bogs, and marsh, which, together with open-water components (over 2 m deep), total 199 ha, with mineral wetlands totaling 16 ha. The percentage of all wetlands in the watersheds of the RSA (12%) remains substantially greater than the minimum 6% threshold recommended by Environment Canada for representation in sub-watersheds and the percent change in wetland area is less than the maximum threshold of 20%.

Table 11-32: Criteria and Effects Level for Determining Significance on Wetlands within RSA

EFFECTS CRITERIA	EFFECTS LEVEL DEFINITION		
Magnitude (of effect)	**Low**	**Medium**	**High**
	Net percent wetlands remaining in the RSA after removals or disruptions constitute 6% or more of the watersheds comprising the RSA (Environment Canada, 2013). Wetland functions are maintained across the RSA.	Net percent wetlands remaining in the RSA after removals or disruptions constitute 6% or more but less than 20% of the wetlands that comprise the RSA (Environment Canada, 2013).	Net percent wetlands remaining in the RSA after removals or disruptions constitute less than 6% of the watersheds comprising the RSA (Environment Canada, 2013), and removals or disruptions exceed 20% or the wetlands within the RSA (Suter, *et. al*., 1995).
Geographic Extent (of effect)	**Low**	**Medium**	**High**
	Removals or indirect Project effects are confined to wetlands within the PSA.	Removals or indirect Project effects have the potential to affect wetlands within the LSA.	Removals or indirect Project effects are likely to create a measurable effect to wetlands beyond the LSA.
Timing and Duration (of conditions causing the effect)	**Low**	**Medium**	**High**
	Short-term effects result from site preparation and construction activities; wetlands are subject to progressive rehabilitation.	Moderate-term effects result from operations activities; wetland functions are interrupted until final closure and rehabilitation is commenced.	Long-term effects result from operations activities; wetland functions are interrupted until final closure and rehabilitation is completed.
Frequency (of conditions causing effect)	**Low**	**Medium**	**High**
	Effect occurs once or infrequently.	Effect occurs occasionally.	Effect occurs continuously or cyclically.
Degree of Irreversibility (of effect)	**Low**	**Medium**	**High**
	Effect is reversible and spontaneous.	Effect is reversible but requires management.	Effect is unlikely to be reversible.
Ecological Context	**Low**	**Medium**	**High**
	The effect occurs in wetland types common in the LSA and the RSA.	The effect occurs in wetland types common in the LSA but uncommon in the RSA.	The effect occurs in wetland types that occur only in the LSA and not in the RSA.
Social Context	**Low**	**Medium**	**High**
	The wetlands affected are not likely to be used nor have they been identified as important to the community.	The wetlands affected may be used or may be important to the community.	Based on specific Aboriginal TK or other community knowledge, the wetlands affected are used and/or have been identified as important to the community.

EFFECTS CRITERIA	EFFECTS LEVEL DEFINITION

Notes:
(a) The assumptions and limits of the effects criteria will be described as part of the environmental effects assessment.
(b) Criteria relate to the effect.
(c) Where available, existing environmental standards, guidelines or objectives will be used to define the effects level definitions.
(d) Criteria relate to the conditions causing the effect.

11.5.4.2.3.3 Residual Effects of Past, Current and Future Activities

Past and current activities were taken into consideration for the evaluation of significance of residual effects of the Magino Project.

Foreseeable future activities are limited to logging within the Algoma Forest Management Unit and the Magpie Forest Management Unit. Harvesting of lumber is unlikely to removed additional wetlands. Therefore, the potential for additional losses of wetland habitat within the RSA is not significant.

11.5.4.2.3.4 Significance of Cumulative Effects on Wetlands

As the removal of additional wetlands within the RSA is unlikely, no foreseeable additive cumulative effects to wetland with the RSA are predicted. The cumulative effects of future activities on wetlands is NOT SIGNIFICANT.

11.5.4.2.4 Cumulative Effects Analysis – Significant Wildlife Habitat

Significant wildlife habitat (SWH) are valued components because they are “areas where species concentrate at a vulnerable point in their annual lifecycle; and areas which are important to migration or non-migratory species” (MNR, 2000). From a regulatory perspective, SWH is protected under Section 2.1.4 of the Provincial Policy Statement (2014). Guidance for designation of SWH is provided under the Provincial Policy Statement (2014) through criteria developed by MNRF for Ecoregion 5E.

11.5.4.2.4.1 Residual Effects of the Magino Project

The assessment of effects on significant wildlife habitat was undertaken using GIS environment and the review of predicted impacts on surface water, groundwater, and air quality (i.e., dust):

- Direct removal of SWH was assessed by querying the data layers for the indicators with the anticipated disturbance area within the PSA. The amount (%) of habitat removed within the PSA, and within the context of the LSA and RSA was then calculated by indicator;
- Removals of habitat for species of special concern (all bird species) were evaluated in terms of the numbers of locations and how many individuals were recorded as well as a habitat value associated with the observation. Habitat for species of special concern is defined by the area around the location where individuals were observed during surveys. This approach provides a basis to assess the scale of impacts based on locations of actual sightings, not common habitat associations;

- Indirect effects on SWH from changes in surface water quantity and quality and groundwater interactions were assessed qualitatively based on the review of results from available hydrologic modeling and the surface water quality assessment;
- Indirect effects on significant wildlife habitat from changes in air quality (i.e., dustfall) were assessed by the identification of upland forest potentially exposed to dustfall in excess of 7 g/m^2/day on the mine site and the site vicinity. Effects of dustfall due to vehicle traffic along Goudreau Road and the public bypass road on-site were assessed qualitatively;
- Where relevant, noise and light effects were considered qualitatively; and
- Consideration was given to the results of the fish and fish habitat assessment as they relate to the significant wildlife habitat (i.e., effects on significant wildlife habitat were cross-referenced with the effects on fish and fish habitat).

In general, there is a high level of confidence and conservativeness incorporated in the assessment of effects on significant wildlife habitat because:

- The Moose calving areas described in Chapter 4 of the Magino EIS were delineated based on topography at a broad scale, and noted as possibly being suitable for this purpose during public consultation;
- Moose aquatic feeding areas (MAFA) described in Chapter 4of the Magino EIS are delineated by MNRF for a portion of the study area. Through direct observation of suitable habitat and its correlation with ELC classifications (MNRF identified layers associated with ELC classification), a MAFA was delineated in the study areas;
- The Species of Special Concern (SSC) in the study areas are bird species. No SSC plants, mammals, herptiles, or fish were observed. The identification of their habitat is based on breeding bird survey observations (as opposed to nest surveys), with a buffer area delineated around the location where the species was observed. This approach facilitated a large area of the PSA to be searched resulting in a higher potential for detection. The buffer distances applied are based on life history of the individual species and guidelines provided by Environment Canada (2014); and
- The assumed area of disturbance within the PSA was conservatively defined to include all areas within the public bypass road (i.e., the rerouted Goudreau Road).

- ***Effects on Moose Calving, Aquatic Feeding, and Late Winter Cover Areas***

Table 11-33 summarizes the indicators and measures used to analyze Project effects on Moose calving, aquatic feeding and late winter cover areas.

Within the area of disturbance, site clearing, grubbing, and pre-stripping will remove 123 ha of the available moose calving area within the PSA. This represents 7% of available habitat in the PSA, and 4% and 1% of that available in the LSA and RSA, respectively. Similarly, 17 ha of Moose aquatic feeding areas will be removed, representing 35% of the habitat available within the PSA, and 18% and 11% of the LSA and RSA, respectively. With respect to Moose late winter cover areas, the Project will result in the removal of 163 ha of this SWH, which represents 32% and 29% of this habitat available across the LSA and RSA, respectively. While these areas are considered as SWH, they are well represented in the LSA, RSA, and beyond. For example, calving areas at comparable heights occur elsewhere in the RSA and beyond; and late winter cover areas for Moose are well represented in the Dreany Lake subwatershed and likely beyond the RSA as well.

Final rehabilitation of mining facilities provides opportunities for restoring the upland forest removed that might be used for Moose calving on the height of the TMF and MRMF. Once fully established, this replaced habitat could also be utilized by Moose for late winter cover. As recommended in the following Sections, it will be necessary to engineer shallow slopes at several places along the TMF and/or MRMF embankments to create suitable substrates that would allow Moose to access this habitat in the Post Closure Phase.

Table 11-33: Effects on Moose Calving, Aquatic Feeding, and late Winter Cover Areas within RSA

MEASURE	PSA	LSA	RSA
MOOSE CALVING AREAS			
Area (ha) and number of Moose Calving Areas removed.	123 ha on the high ridge between Spring-Lovell and Herman-Otto watershed.	No additional removal will occur in the LSA.	No additional removal will occur in the RSA.
Percentage (%) of Moose Calving Areas.	7%.	4%.	1%.
Representation of Moose Calving Areas.	Removal confined to the PSA.	Comparable heights occur elsewhere in the LSA.	Comparable heights occur elsewhere in the RSA and beyond.
MOOSE AQUATIC FEEDING AREAS			
Area (ha) and number of Aquatic Feeding Areas removed.	17 ha.	No additional removal will occur in the LSA.	No additional removal will occur in the RSA.
Percentage (%) of Aquatic Feeding Areas.	35%.	18%.	11%.
Representation of Aquatic Feeding Areas.	6 areas (48 ha).	7 areas (94 ha).	13 areas (148 ha).
MOOSE LATE WINTER COVER AREAS			
Area (ha) and number of Late Winter Cover Areas removed.	163 ha.	No additional removal will occur in the LSA.	No additional removal will occur in the RSA.
Percentage (%) of Late Winter Cover Areas removed in the context of those present within the RSA, LSA and PSA.	84%.	32%.	29%.
Representation of Late Winter Cover Areas.	Borders southern boundary of PSA.	Borders southern boundary of LSA to Webb-Goudreau subwatershed boundary.	Further representation in the Dreany Lake subwatershed.
POTENTIAL FOR INDIRECT EFFECTS ON MOOSE AND MOOSE HABITAT			
Potential for indirect effects from changes in water quality.	Effect confined to features created in the PSA.	Unlikely effect except in Otto Lake.	No effect anticipated.
Potential for indirect effects from changes in groundwater levels.	Effect confined to features less than 2 ha outside the area of direct disturbance.	No effect anticipated.	No effect anticipated.
Potential for indirect effects on	Dustfall in excess of	Effect likely not	Effect not likely to be

MEASURE	PSA	LSA	RSA
vegetation eaten by moose from changes in air quality (i.e., dustfall).	the high levels of deposition (>7 gm/m^2/day) is confined to habitat that will be removed.	detectable; highest levels confined to PSA and extending only slightly south, and east including Goudreau Road – an existing source of dust.	detectable.

- ***Effects on Amphibian Breeding Areas***

Table 11-34 summarizes the indicators and measures used to analyze Project effects on amphibian breeding areas.

Within the area of disturbance, site clearing, grubbing, and pre-stripping will remove 17 ha of amphibian breeding habitat areas identified in the PSA. This represents 35% of the habitat represented in the PSA, and 18% and 11% of the habitat represented in the LSA and RSA, respectively.

Table 11-34: Effects on Amphibian Breeding Areas within RSA

MEASURE	PSA	LSA	RSA
Area (ha) and number of amphibian breeding areas removed.	17 ha.	No additional removal will occur in the LSA.	No additional removal will occur in the RSA.
Percentage (%) amphibian breeding areas removed in the context of amphibian breeding areas present within the LSA, PSA, and RSA.	35%.	18%.	11%.
Comparison of representation of amphibian breeding areas removed to the representation of amphibian breeding areas present in the RSA.	• Amphibian habitat is well distributed in the PSA including in wetlands created as a result of historical mine operations	• Opportunities for amphibian habitat are common and widespread.	• Opportunities for amphibian habitat are common and widespread.
Potential for indirect effects from changes in water quality.	• Effect confined to features created in the PSA.	• Effects are not likely except in breeding areas of Otto Lake where contaminants in discharge waters are anticipated to be the greatest.	• No effects on amphibian or their habitat are anticipated.
Potential for indirect effects from changes in groundwater levels.	• Effect confined to <1 ha of amphibian breeding habitat	• No effects on amphibian or their habitat are	• No effects on amphibian or their habitat are

MEASURE	PSA	LSA	RSA
	outside the area of disturbance.	anticipated.	anticipated.
Potential for indirect effects on vegetation eaten by mammals from changes in air quality (i.e., dustfall).	• Dustfall in excess of the high levels of deposition (>7 gm/m^2/day) is largely confined to habitat that will be removed.	• Effect likely not detectable. • Highest levels confined to PSA and extending only slightly south, and east including Goudreau Road – an existing source of dust.	• Effect not likely to be detectable.

- ***Effects on Habitat for Species of Special Concern***

Table 11-35 summarizes the indicators and measures used to analyze Project effects on Species of Special Concern.

Within the area of disturbance, site clearing, grubbing, and pre-stripping will remove habitat for four species of special concern.

Removal of large bodies of water and fish habitat associated with Webb and Lovell lakes will reduce foraging habitat for Bald Eagle. Construction activities and operations will generate dust and noise that may affect other SSC located outside of the area of disturbance and the LSA.

Effects noted above will continue into the closure phase, however, it is noteworthy that Common Nighthawk habitat in the PSA was strongly associated with the historical mine disturbance north and west of Webb Lake and trail edges. As such, it is anticipated that upon Closure, habitat for the Common Nighthawk would be enhanced. Similarly, the creation of a large waterbody through filling of the open pit will restore foraging habitat for Bald Eagle.

Table 11-35: Effects on Species of Special Concern within RSA

MEASURE	PSA	LSA	RSA
COMMON NIGHTHAWK			
Area (ha) of habitat areas removed.	74 ha associated with 4 locations, 9 records.	No additional removal will occur in the LSA. 3 locations, 3 records.	No additional removal will occur in the RSA. 8 locations, 11 records
Percentage (%) of habitat areas removed in the context of habitat areas present within the LSA, PSA, and RSA.	76%.	67%.	45%.
CANADA WARBLER			
Area (ha) of habitat areas removed.	5 ha, 1 location, 1 record.	No additional removal will occur in the LSA. 0 locations.	No additional removal will occur in the RSA. 2 locations, 2 records. 2 additional locations were identified outside the RSA near Blackout

MEASURE	PSA	LSA	RSA
			Lake, southwest of RSA.
Percentage (%) of habitat areas removed in the context of habitat areas present within the LSA, PSA, and RSA.	19%.	13%.	5%.
OLIVE-SIDED FLYCATCHER			
Area (ha) of habitat areas removed.	122 ha 5 locations, 6 records	No additional removal will occur in the LSA. 0 locations	No additional removal will occur in the RSA. 1 location, 1 record
Percentage (%) of habitat areas removed in the context of habitat areas present within the LSA, PSA, and RSA.	95%.	83%.	73%.
BALD EAGLE			
Area (ha) of habitat areas removed.	30 ha. 5 locations, 6 records.	No additional removal will occur in the LSA. 2 locations, 2 records.	No additional removal will occur in the RSA. 2 locations, 2 records.
Percentage (%) of habitat areas removed in the context of habitat areas present within the LSA, PSA, and RSA.	26%.	8%.	8%.
MEASURE	**PSA**	**LSA**	**RSA**
RUSTY BLACK BIRD			
Area (ha) of habitat areas removed.	0.	0.	1 location was identified outside the RSA near Blackout Lake, southwest of RSA.

11.5.4.2.4.2 Significance of Residual Effects on Significant Wildlife Habitat for the Magino Project

Taking into consideration the design of the project and the mitigation measures recommended above, the following residual adverse effects on significant wildlife habitat are anticipated:

- Removal of Moose calving, aquatic feeding, and late winter cover habitat;
- Removal of habitat for SSC; and
- Removal of amphibian breeding habitat.

The anticipated residual adverse effects on significant wildlife habitat were assessed by considering the criteria and effect level ratings provided in Table 11-36.

Table 11-36: Effects Criteria and Effects Level Definitions for Determining Significance on Significant Wildlife Habitat within RSA

EFFECTS CRITERIA	EFFECTS LEVEL DEFINITION		
Magnitude	**Low**	**Medium**	**High**

EFFECTS CRITERIA	EFFECTS LEVEL DEFINITION		
(of effect)	Net removals or indirect Project effects on the SWH will reduce the availability or quality of SWH in the RSA without a reduction in overall function of SWHs available in the RSA.	Net removals or indirect Project effects on the SWH will result in a reduction of function of SWHs available in the RSA.	Net removals or indirect Project effects on the SWH will result in a loss of function of SWHs available in the RSA.
Geographic Extent (of effect)	**Low**	**Medium**	**High**
	Removals or indirect Project effects are confined to the PSA.	Removals or indirect effects may affect function of SWH within the LSA.	Removals or indirect Project effects are likely to likely to create a measurable effect to the functions of SWHs across the RSA.
Timing and Duration (of conditions causing the effect)	**Low**	**Medium**	**High**
	Short term effects that result from site preparation and construction activities where the SWH is progressively rehabilitated.	Moderate term effects that result from operations activities where SWH functions are interrupted until final closure and rehabilitation is commenced.	Long term effects that result from operations activities where SWH functions are interrupted until final closure and rehabilitation is completed.
Frequency (of conditions causing effect)	**Low**	**Medium**	**High**
	Effect occurs once or infrequently.	Effect occurs occasionally.	Effect occurs continuously or cyclically.
Degree of Irreversibility (of effect)	**Low**	**Medium**	**High**
	Effect is reversible and spontaneous.	Effect is reversible but requires management.	Effect is unlikely to be reversible.
Ecological Context	**Low**	**Medium**	**High**
	The effect occurs in SWH relatively abundant in the RSA.	The effect occurs in SWH common in the LSA but uncommon in the RSA.	The effect occurs in SWH that occurs only in the LSA and not in the RSA.
Social Context	**Low**	**Medium**	**High**
	The SWH affected is not likely to use nor has it been identified as important to the community.	The SWH affected may be used or may be important to the community.	Based on specific Aboriginal traditional knowledge or other community knowledge, the SWH affected is used and/or has been identified as important to the community.

Notes:
(a) The assumptions and limits of the effects criteria will be described as part of the environmental effects assessment.
(b) Criteria relate to the effect.
(c) Where available, existing environmental standards, guidelines or objectives will be used to define the effects level definitions.
(d) Criteria relate to the conditions causing the effect.

The significance of residual effects caused by the Magino Project for significant wildlife habitat is presented in Table 11-37.

- ***Removal of Moose Calving, Aquatic Feeding and Late Winter Cover Areas***

The removal of Moose habitat related to calving, aquatic feeding, and late winter cover is not significant. This is largely because the ratings of effects levels for all criteria are low or medium. Aside from the magnitude of the effects, the ecological context and reversibility of the effects are the key considerations in reaching this conclusion.

During consultation activities, it was reported by hunters that moose prefer high ridges with good sightlines for calving, a time when they are most vulnerable. The significant ridge that divides the Herman-Otto from the Spring Lovell subwatershed may provide that function where there are clearings. Comparable ridges occur within the LSA and RSA. Extensive upland open forest for Moose Calving Areas can be restored on the height of the MRMF if the slopes are suitably graded at several places on the MRMF, and suitable substrates are applied to permit access by Moose. With restoration, a large area of early successional growth designed to provide greater variety and quantity of food than mature forests would provide good feeding habitat (Cumming, 1972 in MNRF, 2012).

Moose aquatic feeding areas occur in the wetlands in the Webb-Goudreau and Spring-Lovell subwatersheds but to a much greater extent in the RSA and beyond. Recovering groundwater levels will restore water supply to the remaining wetlands within the PSA.

Late winter cover is important for the survival of moose and a large area extends from Spring and Lovell lakes south to the Webb-Goudreau subwatershed boundary. The feature is 508 ha, located in an area of historical logging that created young browse. The clearing will remove 32% of this feature, however, another 48 ha exists in the Dreany Lake subwatershed to the north. With restoration that focuses on conifer composition of 70% or greater, winter cover can be restored, especially the habitat associated with restored wetlands sheltered at the toe of the TMF and MRMF (Cumming, 1972 in MNRF, 2012).

- ***Removal of Habitat for Species of Special Concern***

The removal of habitat for Species of Special Concern is not significant. This is largely because of the ratings of effects levels for all criteria are low or medium. Although, the habitat of four SSC documented in the PSA will be removed, the key consideration is that these removals are not a threat to the population because the reasons for decline of the species is not related to habitat, and the habitat removed due to the Project will be restored progressively and/or at closure. Each species is discussed individually below:

Common Nighthawk

Habitat for this species consists of mature conifer forests with a limited understory (e.g., Spruce-Fir Conifer), anthropogenic sites (recently logged forests, roads, trails, power line right-of-way, railway line, and mine tailings), and dry wetland edges. The favoured nesting and feeding habitat typically includes open areas with little to no ground vegetation, including open forests, logged or burned-over areas, forest clearings, rock barrens and gravel areas, wetlands and marshes, and lakeshores. Nighthawks are generally tolerant of human activity and may feed on insects attracted by lights. The observations of this species in the RSA were associated with gravel clearings of the historical mine site, edges created by trails, and rock barren clearings within Jack Pine – Black Spruce and Aspen – Birch Hardwood forest. These are habitats that can and will be restored as part of progressive restoration and/or closure plan.

Canada Warbler

Much like many songbird species, fidelity to specific nest sites is reportedly high (Reitsma *et al.,* 2010). The Canada Warblers detected during the point-count surveys are likely to return each year. Although the Canada Warbler has been reported nesting in a variety of habitats, it is most abundant in older, moist, low-lying mixed and deciduous forests that have a well-developed understory (Reitsma *et al.,* 2010; Cadman *et al.,* 2007). Broad habitat types, such as hardwood and mixedwood forests (common habitat types across the RSA) have the potential to support Canada Warblers. Throughout its range, Canada Warblers have also been documented breeding in early successional habitats such as regenerating mixed forest cut blocks and forest edges (natural and planted). However, predictors of favourable breeding habitat include a high understory leaf density (i.e., shrubby), moderate forest moisture, and mature-large diameter trees (Reitsma *et al.,* 2010). Canada Warblers were detected mostly in the RSA with one location in the PSA. They occurred in early successional (pole/sapling) to young open canopy mixedwood and deciduous forest habitats that had a minor component of mature tree stands remaining from previous logging activities including a dense shrub layer of alder, willow, paper birch, ash, maple, fir, and spruce on fresh to moist soils. This habitat can and will be restored as part of progressive restoration and/or closure plan.

Olive Sided Flycatcher

This species is generally associated with mature coniferous or mixed forests with a relatively open canopy, and situated adjacent to either a forest edge (e.g., lake, wetland, cutblocks, and burns). It may also nest in early successional forests and previously harvested forest stands with some remaining mature tree stands (Altman and Sallabanks, 2012). Appropriate Olive-sided Flycatcher habitat is common throughout the LSA and RSA, including the edges of lakeshores, wetlands, rail line, trails, forestry cutblocks, and historical mine developments.

Most Olive-sided Flycatchers were detected inside the LSA. The habitat is common throughout the RSA and Ontario, and their populations are known to respond positively to forest harvesting (Cadman *et al.,* 2010). This forest and wetland edge will be included in the progressive restoration plans.

Bald Eagle

Bald Eagles were the most commonly observed raptor observed in the RSA. They prefer large continuous areas of mixed or deciduous woods, particularly those with a 30% to 50% canopy cover, which are located around the shores of large rivers or lakes. Wide, bulky stick nests are built in large trees such as pine or poplar and typically are re-used in subsequent years. Although fish are their main source of food, Bald Eagles will also hunt mammals and other birds, (including ducks), and feed on carrion and scavenged items (OMNR, 1984; OMNR, 1987; OMNR, 2012c).

Large expanses of mixed or deciduous (hardwood) forests, close to large lakes and rivers are the most common habitat types in the RSA and a majority of moderate to large-sized fish bearing lakes are present. The majority of the Bald Eagle sightings were adjacent to lakes that also had mixed or hardwood forest close by. Bald Eagle sightings were distributed throughout the RSA. One inactive nest was located outside of the southwest quadrant of the RSA, near Morrison Lake representing a density of one raptor nest for each 240 km flown. This suggests that Bald Eagle foraging is an important habitat function offered by the PSA. The creation of a

large waterbody over time as the open pit fills will progressively restore the habitat lost over the 20 years of construction, operation and closure.

- ***Removal of Amphibian Habitat***

The removal of amphibian breeding habitat is not significant. This is largely because the ratings of effects levels for all criteria are low or medium. Aside from the low magnitude of the effects, the ecological context and reversibility of the effects are the key considerations in reaching this conclusion.

Amphibians calling, as recorded in count surveys were concentrated in the PSA, however, the investigations demonstrate that they are well distributed across the landscape, including in the remnant ponds that remain after historical mining operations and in the Polishing Pond. Watercourses and the naturally occurring wetlands in which they occur are widespread throughout the RSA.

11.5.4.2.4.3 Residual Effects of Past, Current and Future Activities

Effects of past and current activities have been considered with the assessment of significance of residual effects for the Magino Project.

As the foreseeable activities are mainly related to forestry and harvesting within the Magpie Forest Management Units (a planned 949 ha to be completed by 2020), it is likely that additional significant wildlife habit will be impacted, which leads to additive cumulative effects for loss of significant wildlife habitat. Refer to Section 11.5.5.2.3 for discussion for future activities as it relates to terrestrial vegetation.

11.5.4.2.4.4 Significance of Cumulative Effects on Significant Wildlife Habitat

Forest Management Units have to submit a 10-year management plan describing their proposed undertaking. The Forest Management Plan incorporate measures for protection of significant wildlife habit. These plans are subject to public consultation and approved by the Ministry of Natural Resources and Forestry. No significant effects are expected from the currently approved Forest Management Plan.

Table 11-37: Significance of Magino Project Residual Effects and Potential Cumulative Effects on Significant Wildlife Habitat within RSA

RESIDUAL ADVERSE EFFECT	MAGNITUDE	GEOGRAPHIC EXTENT	DURATION	FREQUENCY	DEGREE OF IRREVERSIBILITY	ECOLOGICAL CONTEXT	SOCIAL CONTEXT	OVERALL ASSESSMENT OF SIGNIFICANCE
Magino Project - Significance of Residual Effects on Significant Wildlife Habitat								
Removal of Moose Calving, Aquatic Feeding and Late Winter Cover Habitat	**Medium**	**Low**	**Low**	**Low**	**Medium**	**Low**	**Medium**	**Not Significant**
	The moose calving area in the PSA and LSA will be removed and a third of the available late winter cover will be removed; potentially reducing these functions within the RSA.	Effects are confined to the PSA.	Effects occur during site preparation and progressive rehabilitation may be undertaken.	Effects occur simultaneously.	Effects can be reversed with active rehabilitation.	The SWH functions occur within the LSA and RSA and within a forest to which substantial effects have occurred and upon recovery, provide habitat.	This effect may be important to the community.	
Removal of Amphibian Breeding Habitat	**Low**	**Low**	**Low**	**Low**	**Medium**	**Low**	**Medium**	**Not Significant**
	Removal of a third of the habitat in the context of the LSA and RSA where it is common and well distributed will not create a measurable reduction in function in the RSA.	Effects are confined to the PSA.	Effects occur during site preparation and progressive rehabilitation may be undertaken.	Effects occur simultaneously.	Effects can be reversed with active rehabilitation.	Amphibian breeding habitat is abundant in the RSA.	The amphibians may be important to the community in the context of their importance to the food supply for important species.	
Removal of habitat for Species of Special Concern	**Medium**	**Low**	**Low**	**Low**	**Medium**	**Medium**	**Medium**	**Not Significant**
	Common Nighthawk appears to be correlated with disturbed areas within the PSA. Removal of this habitat may result in removal of a disproportionate number of their feeding and breeding locations.	Effects are confined to the PSA.	Effects occur during site preparation and progressive rehabilitation may be undertaken.	Effects occur simultaneously.	Effects can be reversed with active rehabilitation.	The removal of foraging opportunities for Bald Eagle combined with removals of Olive-sided Flycather and Common Nighthawk locations are a combination less likely to occur in the RSA.	The removal of habitat for these birds may be important to the community.	
Significance of Cumulative Effects on Significant Wildlife Habitat within RSA								
Removal of Moose Calving, Aquatic Feeding and Late Winter Cover Habitat Removal of habitat for Species of Special Concern	**Low**	**Low**	**Low**	**Low**	**Medium**	**Low**	**Medium**	**Not Significant**
	Forest Management Plans incorporate measures to minimize effects on significant wildlife habitat	Effects are confined to an additional 949 ha within RSA.	Phase 2 Planned Operation for the Magpie Forest Management Unit will be completed by 2020.	Completed by 2020	Effects can be reversed with active rehabilitation.	The significant wildlife habitat functions occur within the LSA and RSA and within a forest to which substantial effects have occurred and upon recovery, provide habitat.	The 10 year forests management plans are subject to public consultation.	

11.5.4.2.5 Cumulative Effects Analysis – Migratory and Breeding Birds

All bird species are valued for the important roles they play in maintaining healthy, functioning ecosystems. Examples of these roles include: seed disbursers, pollinators, insect control, scavengers, and as food for other animals including humans. They also support recreational activities and traditional Aboriginal activities (e.g., hunting). All bird species are valued for the biodiversity they support. Of principle importance, they are surrogates of ecosystem integrity and often the first warning signals that the ecosystem is changing. From a regulatory perspective, some birds are afforded protection under the federal *Migratory Birds Convention Act* (1994).

11.5.4.2.5.1 Residual Effects of the Magino Project

Table 11-38 summarizes the indicators and measures used to analyze Project effects on the Migratory and Breeding Birds VC.

Table 11-38: Selected Indicators and Measures – Migratory and Breeding Birds

SELECTED INDICATORS	RATIONALE	SELECTED MEASURES
Canopy Warblers and Their Habitat	• Canopy Warblers were selected as an indicator of this VC because they are listed under the Migratory Birds Convention Act (1994); they occupy all terrestrial vegetation types present in the study areas and thereby provide a surrogate for the consideration of overall ecosystem function; and because monitoring of Canopy Warblers is an effective means to interpret habitat type and quality. • Effects to Canopy Warblers are measured both in terms of effects on their habitat and on individuals.	• Area (ha) of Upland Forest Habitat removed. • Percentage (%) of Upland Forest Habitat removed in the context of that present within the RSA, LSA, and PSA. • Potential for indirect effects from changes in groundwater and/or surface water quality. • Potential for increased exposure to noise, light, and dust from site preparation, construction, operations, and closure.
Waterfowl and Waterfowl Habitat	• Waterfowl were selected as an indicator of this VC because they are listed under the Migratory Birds Convention Act (1994) and are considered to be game birds. Also, aspects of their habitat are designated as Significant Wildlife Habitat by the Ontario Ministry of Natural Resources and assessed separately. • Effects to Waterfowl are measured both in terms of effects on their habitat and on individuals.	• Area (ha) of waterfowl habitat removed. Waterfowl habitat is considered any waterbody in which a waterfowl species was observed during any type of survey. • Percentage (%) of Waterfowl Habitat removed in the context of Waterfowl Habitat present within the LSA, PSA, and RSA. • Potential for indirect effects from changes in groundwater and/or surface water quality. • Potential for increased exposure to noise, light, and dust from site preparation,

SELECTED INDICATORS	RATIONALE	SELECTED MEASURES
		construction, operations, and closure.
Raptors	• Raptors were selected as an indicator of this VC because they are top of the food chain predators; they also have very large home ranges, low productivity, and are vulnerable to physical disturbance at nest sites. Raptors may also include some species that are culturally important to Aboriginal peoples.	• Locations of observations indicating suitable habitat. • Potential for indirect effects from changes in groundwater and/or surface water quality. • Potential for increased exposure to noise, light, and dust from site preparation, construction, operations, and closure.

In general, effects on migratory and breeding birds and their habitat are anticipated to occur due to direct removal of habitat and indirect effects from changes in surface water and groundwater quantity and quality. Other indirect effects include changes to vegetation communities due to dust, and changes in behaviour caused by noise and light generated during all Project Phases.

The assessment of potential effects on migratory and breeding birds was undertaken using GIS and the review of predicted impacts on surface water, groundwater, air quality (i.e., dust), noise, and light:

- Direct removal of Canopy Warbler habitat was assessed by querying the data layers for areas identified as upland forest within the PSA. The area (ha, %) of habitat removed within the LSA and PSA was then calculated. Habitat defined as upland forest for Canopy Warblers is comprised of the following ELC codes: B049, B055, B070, B052, B065, and B119;
- Indirect effects on migratory and breeding birds and their habitat from changes in surface water quantity and quality and groundwater interactions were assessed qualitatively based on the review of results from available hydrologic modeling and the surface water quality assessment;
- Indirect effects on migratory and breeding birds and their habitat from changes in air quality (i.e., dustfall) were assessed by the identification of habitat potentially exposed to dustfall in excess of >7 g/m^2 (Prajapati, S.K. 2012; Farmer, 1993) on the mine site and the site vicinity. Effects of dustfall due to vehicle traffic along Goudreau road and the public bypass road on-site were assessed qualitatively; and
- Indirect effects on migratory and breeding birds from changes in noise and light from all Project phases were assessed qualitatively based on noise and light models. Birds display changes in behaviour at a noise level ranging from 65-85 dB(A) (Dawe, 2008).

In general, there is a high level of confidence and conservativeness incorporated in the assessment of effects on migratory breeding birds and their habitat because:

- Canopy Warblers were identified throughout upland forest defined by a broad range of communities classified as upland forest;
- Waterfowl were observed in low numbers that did not meet the threshold for species richness and biodiversity provided by OMNR in its guidelines for Significant Wildlife Habitat in Ecoregion 3E. However, on migration waterfowl were conspicuous. All waterbodies where waterfowl were observed were identified as habitat; and

- The assumed area of disturbance within the PSA was conservatively defined to include all areas within the public bypass road (i.e., the re-routed Goudreau Road).

- ***Effect on Canopy Warblers and Habitat***

Table 11-39 provides a summary of the measures used to evaluate effects on canopy warblers and their habitat.

Table 11-39: Potential Effects on Canopy Warblers and their Habitat

MEASURE	PSA	LSA	RSA
Area (ha) of Upland Forest Habitat removed.	919 of 1259 ha	919 of 2505 ha	919 of 7802 ha
Percentage (%) of Upland Forest Habitat removed in the context of that present within the RSA, LSA, and PSA.	73%.	37%.	12%.
Potential for indirect effects from changes in groundwater and/or surface water quality.	• Unlikely due to loss of preferred habitat.	• Migratory species will be exposed to water quality change for a short period of time, and any effect would likely not be measurable.	• Migratory species will be exposed to water quality change for a short period of time, and any effect would likely not be measurable.
Potential for increased exposure to noise, light, and dust from site preparation, construction, operations, and closure.	• Effects are confined to the PSA from which these species will be excluded.	• Effect is essentially confined to PSA.	• Effect is confined to the PSA.

Within the area of disturbance, site clearing, grubbing, and pre-stripping will remove 919 ha of forest canopy used by these species for nesting, foraging, and rearing young. This area consists largely of Jack Pine/spruce and aspen/birch forest canopy in addition to Black Spruce/Tamarack Conifer Swamp. This represents 73% of the resource in the PSA and 37% and 12% of the resource in the LSA and RSA, respectively.

As shown in Table 11-40, 16 species of canopy warblers were documented in surveys, of which 11 are sensitive to reduction in the patch sizes of the canopy.

Table 11-40: Canopy Warblers and Sensitivity to Size of Breeding Habitat

COMMON NAME	SCIENTIFIC NAME	AREA-SENSITIVE*
Bay-breasted Warbler	*Dendroica castanea*	
Black-and-white Warbler	*Mniotilta varia*	A
Blackburnian Warbler	*Dendroica fusca*	A
Black-throated Blue Warbler	*Dendroica caerulescens*	A
Black-throated Green Warbler	*Dendroica virens*	A

COMMON NAME	SCIENTIFIC NAME	AREA-SENSITIVE*
Blue-winged Warbler	*Vermivora pinus*	A
Canada Warbler	*Wilsonia canadensis*	A
Cape May Warbler	*Dendroica tigrina*	
Chestnut-sided Warbler	*Dendroica pensylvanica*	A
Magnolia Warbler	*Dendroica magnolia*	A
Nashville Warbler	*Vermivora ruficapilla*	A
Northern Parula	*Parula americana*	A
Palm Warbler	*Dendroica palmarum*	
Tennessee Warbler	*Vermivora peregrina*	
Yellow Warbler	*Dendroica petechia*	
Yellow-rumped Warbler	*Dendroica coronata*	A

Note:
*(OMNRF, 2000)

Given the size of the area of disturbance, the potential exists to reduce patch sizes below optimal. In this situation, area sensitive species might not remain within the watersheds of the LSA, but would likely move elsewhere and persist in the RSA and beyond.

At a minimum, canopy warblers would avoid the area of disturbance and vicinity during the Site Preparation, Construction, Operations, and Closure Phases of the Project in response to increased noise, vibration, light, and dust.

The final rehabilitation of mining waste management facilities and the site rehabilitation will provide opportunities for the eventual replacement of some canopy warbler habitat through the restoration of upland forests.

- ***Effects on Waterfowl and Waterfowl Habitat***

Table 11-41 provides a summary of the measures used to analyze potential effects on waterfowl and waterfowl habitat.

Table 11-41: Potential Effects on Waterfowl and their Habitat

MEASURE	PSA	LSA	RSA
Area (ha) of Waterfowl Habitat removed.	72 ha.	No additional removal will occur in the LSA.	No additional removal will occur in the RSA.
Percentage (%) of Waterfowl Habitat removed in relation to that present within the RSA, LSA, and PSA.	44%.	16%.	5%.
Potential for indirect effects from changes in groundwater and/or surface water quality.	• Potential for waterfowl to be attracted to water quality ponds and/or. • Effects on waterfowl that might be exposed to altered	• Effects on waterfowl that might be exposed to altered water quality for such a short period of time are not likely to be measurable.	• Effects on waterfowl that might be exposed to altered water quality for such a short period of time are not likely to be measurable.

MEASURE	PSA	LSA	RSA
	water quality for such a short period of time are not likely to be measurable.		
Potential for increased exposure to noise, light, and dust from site preparation, construction, operations, and closure.	• Effects on waterfowl are confined to the PSA.	• Effects are not likely to be measurable.	• Effects are not likely to be measurable.

As shown in Table 11-39 above, within the area of disturbance, site clearing, grubbing, and pre-stripping will remove open water areas on which waterfowl were observed, resulting in a reduction of staging and foraging habitat. The removals will amount to 44% of the habitat available in the PSA and 16% and 5% of habitat available in the LSA and RSA, respectively.

At a minimum, waterfowl would avoid the area of disturbance and vicinity during the Site Preparation, Construction, Operations, and Closure Phases of the Project in response to increased noise, vibration, light, and dust.

Despite these disturbances, some waterfowl may be attracted to the tailings pond and water quality control pond. However, given the abundance of larger and more preferred habitat in the LSA and RSA, this is considered unlikely. The water in these ponds and wetlands may not meet guidelines, resulting in an increased exposure of waterfowl to contaminants. Adverse effects on waterfowl that might be exposed to altered water quality for only short periods of time are not likely to be measurable.

The final rehabilitation of mining waste management facilities and site rehabilitation provides opportunities for the replacement of some of the waterfowl habitat removed (e.g., Water Quality Control Pond, (formerly Water Body 7), plus additional habitat adjacent to Otto Lake, and portions of the filled pit itself). The presence of a filled pit lake with suitable water quality for aquatic life will contribute to staging and foraging habitat for waterfowl in the Post Closure Phase.

- ***Effects on Raptors***

The Bald Eagle is a raptor, but since this is a species listed as one of Special Concern by the provincial government, effects to that species have been addressed in the assessment of potential impacts to Significant Wildlife Habitat. The focus of this analysis is on the 12 other raptor species identified in the study area (including American Crow and Common Raven). Because these species do not share common habitats, Table 11-42 presents the numbers of observations recorded rather than the area of habitat that will be removed.

There is a wide variety of raptor species. Species expected to occur within the RSA range from those which are diurnal (e.g., Turkey Vulture) to nocturnal (e.g., owls). Some prefer to nest in trees or tree cavities, while others nest on cliffs and inside buildings (e.g., Turkey Vulture). However, raptors are predators of insects, small mammals, birds, fish, and/or scavengers. Prey abundance and the availability of suitable nesting habitat largely govern species distribution and

breeding success (Campbell *et al.,* 1990). The lack of nests would imply that the condition of the forest does not provide suitable nesting sites. Therefore, the key effect of the Project on raptors in the study areas is largely confined to foraging habitat. As shown in Table 7.4.5-7 above, within the area of disturbance, site clearing, grubbing, and pre-stripping will reduce foraging habitat for five species out of the 12 recorded across the study area.

Table 11-42: Potential Effects on Raptors and their Habitat

MEASURE	PSA	LSA	RSA
Locations of observations indicating suitable habitat.	8 species. (i.e., Turkey Vulture, Broad-winged Hawk, Red-tailed Hawk, American Kestrel, and Common Raven).	5 species. (i.e., Sharp-shinned Hawk, Broad-winged Hawk, American Kestrel, Merlin, Barred Owl).	3 species. (i.e., American Kestrel, Northern Saw-whet Owl).
Potential for indirect effects from changes in groundwater and/or surface water quality.	• Potential for raptors to forage on tailings pond, water quality ponds and/or constructed treatment wetlands with water quality below guidelines; or to consume prey that have done so (e.g., amphibians, aquatic invertebrates, small mammals).	• Effects on migratory raptors that might be exposed to altered water quality for such a short period of time are not likely to be measurable.	• Effects on migratory raptors that might be exposed to altered water quality for such a short period of time are not likely to be measurable.
Potential for increased exposure to noise, light, and dust from site preparation, construction, operations, and closure.	• Effects on raptors are not likely to be measurable.	• Effects on raptors are not likely to be measurable.	• Effects on raptors are not likely to be measurable.

Aside from the loss of foraging habitat, raptors would likely avoid the area of disturbance and vicinity during the Site Preparation, Construction, Operations, and Closure Phases of the Project in response to increased noise, vibration, light, and dust.

It is not likely that raptors would be attracted to the tailings pond and water quality ponds given the abundance of more preferred foraging habitat elsewhere in the LSA and RSA. Although raptors may prey on species that have access to the water treatment ponds, they are migratory species unlikely to pick up significant body burdens while in the area for a few months. As such, adverse effects on raptors that might consume prey exposed to altered water quality are not likely to be measurable.

The final rehabilitation of mining waste management facilities and site rehabilitation will provide opportunities for the replacement of some terrestrial and waterfowl habitat that would be suitable for foraging. In addition, the presence of a filled pit lake with suitable water quality for aquatic life will also contribute to foraging habitat of raptors.

11.5.4.2.5.2 Significance of the Magino Project Residual Effects on Migratory and Breeding Birds

Taking into consideration the design of the project and the mitigation measures incorporated in the Magino Project, the following residual adverse effects on Migratory and Breeding Birds are anticipated:

- Loss of mature forest canopy habitat for warblers;
- Loss of foraging and staging habitat for waterfowl; and
- Loss of foraging habitat for raptors.

The anticipated residual adverse effects were assessed by considering the criteria and effect level ratings provided in Table 11-43. A description of the effects and their significance is provided below and summarized in Table 11-44.

Table 11-43: Criteria and Effects Levels for Determining Significance on Migratory and Breeding Birds

EFFECTS CRITERIA	EFFECTS LEVEL DEFINITION		
Magnitude (of effect)	**Low**	**Medium**	**High**
	Removals are limited to native foraging habitat for species well represented in the LSA and RSA. Habitat functions maintained elsewhere within the LSA.	Removals include species that are unique in the PSA and not represented in the LSA or RSA.	Removals include breeding habitat and unique ecosystem features that support the species, and would create a noticeable effect in the RSA.
Geographic Extent (of effect)	**Low**	**Medium**	**High**
	Removals and indirect Project effects are confined to the PSA.	Removals or indirect Project effects extend to the LSA.	Removals and indirect Project effects are likely to create a measurable effect beyond the LSA.
Timing and Duration (of conditions causing the effect)	**Low**	**Medium**	**High**
	Short term effects that result from site preparation and construction activities where habitats are subject to progressive rehabilitation.	Moderate term effect that result from operations activities where habitat functions are interrupted until final closure and rehabilitation is commenced.	Long term effects that result from operations activities where habitat functions are interrupted until final closure and rehabilitation is completed.
Frequency (of conditions causing effect)	**Low**	**Medium**	**High**
	Effect occurs once or infrequently.	Effect occurs occasionally.	Effect occurs continuously or cyclically.
Degree of Irreversibility (of effect)	**Low**	**Medium**	**High**
	Effect is reversible and spontaneous.	Effect is reversible but requires management.	Effect is unlikely to be reversible.
Ecological Context	**Low**	**Medium**	**High**
	The effect occurs in habitat types relatively abundant in the RSA or in disturbed habitat.	The effect occurs in habitat types common in the LSA but uncommon in the RSA.	The effect occurs in habitat types that occur only in the LSA and not in the RSA.

EFFECTS CRITERIA	EFFECTS LEVEL DEFINITION		
	Low	**Medium**	**High**
Social Context	The bird species or habitats affected are not likely to be used nor have they been identified as important to the community.	The bird species or habitats affected may be used or may be important to the community.	The bird species or habitats affected are used and/or have been identified as important to the community.

Notes:
(a) The assumptions and limits of the effects criteria will be described as part of the environmental effects assessment.
(b) Criteria relate to the effect.
(c) Where available, existing environmental standards, guidelines, or objectives will be used to define the effects level definitions.
(d) Criteria relate to the conditions causing the effect.

- ***Loss of Mature Forest Canopy Habitat for Warblers***

The loss of mature upland forest canopy habitat for warblers is not significant, largely because the ratings of effects levels for magnitude, geographic extent, duration, frequency, and ecological context are low. Key in reaching this conclusion is that the forest canopy to be removed in the PSA does not represent a unique resource in the context of the RSA. The forest types are typical of the area and have been modified by historical logging and mining. Moreover, in spite of the disturbance evident in the PSA, and especially in the Webb-Goudreau and southern Spring-Lovell watersheds, there are 11 (of the 16 species identified) area sensitive canopy warblers in the PSA. These are also likely to be breeding species. In addition, the ecosites utilized by the canopy warblers are well represented in the LSA and RSA, and there are no unique or rare ecosites to be removed in the PSA that are not well represented beyond. This is evidence that the surrounding forest is robust and offers breeding opportunities.

- ***Loss of Foraging and Staging Habitat for Waterfowl***

The loss of foraging and staging habitat for waterfowl is not significant, largely because the ratings of effects levels for magnitude, geographic extent, duration, frequency, and ecological context are low. There is a large amount of open water habitat that provides suitable foraging and loafing habitat for waterfowl. Staging was investigated in the spring of 2014, and although waterfowl were commonly seen on many of the waterbodies within the PSA, the numbers of individuals and diversity of species did not meet Significant Wildlife Habitat guidelines established by MNRF in Criteria for Ecoregion 3E.

- ***Loss of Foraging Habitat for Raptors***

The loss of foraging habitat for raptors is not significant, largely because the ratings of effects levels for magnitude, geographic extent, duration, frequency, and ecological context are low. It is noteworthy that the majority of raptors were detected flying through the study areas. Their home ranges are typically very large and no active nests were detected in the study area. In the context of the RSA, the magnitude of the loss within the PSA is considered to be very low.

11.5.4.2.5.3 Residual Effects of Past, Current and Future Activities

Effects of past and current activities have been considered with the assessment of significance of residual effects for the Magino Project.

As the foreseeable activities are mainly related to forestry and harvesting within the Magpie Forest Management Units (a planned 949 ha to be completed by 2020), it is likely that additional significant wildlife habit will be impacted, which leads to additive cumulative effects for loss of significant wildlife habitat. Refer to Section 11.5.5.2.3 for discussion for future activities as it relates to terrestrial vegetation.

11.5.4.2.5.4 Significance of Cumulative Effects on Migratory and Breeding Birds

Given that the cumulative effects of current and future activities are deemed NOT SIGNIFICANT for additive effects on loss of terrestrial vegetation, loss of wetlands, and the loss of significant wildlife habitat, the additive effects on migratory and breeding birds is also assessed as NOT SIGNIFICANT.

Table 11-44: Significance of Magino Project Residual Effects and Potential Cumulative Effects on Migratory and Breeding Birds within RSA

RESIDUAL ADVERSE EFFECT	MAGNITUDE	GEOGRAPHIC EXTENT	DURATION	FREQUENCY	DEGREE OF IRREVERSIBILITY	ECOLOGICAL CONTEXT	SOCIAL CONTEXT	OVERALL ASSESSMENT OF SIGNIFICANCE
Magino Project - Significance of Residual Effects on Migratory and Breeding Birds								
Loss of mature forest canopy habitat for warblers	**Medium**	**Low**	**Low**	**Low**	**Medium**	**Low**	**Medium**	**Not Significant**
	Species and habitat types are well represented in the LSA and RSA.	No removals will occur outside of the PSA.	Effects occur during site preparation and progressive rehabilitation may be undertaken.	Effects occur simultaneously.	Effects can be reversed with active rehabilitation.	The habitat is well represented in the RSA.	This effect may be important to the community.	
Loss of foraging and staging habitat for waterfowl.	**Low**	**Low**	**Low**	**Low**	**Medium**	**Low**	**Medium**	**Not Significant**
	Species and habitat types are well represented in the LSA and RSA.	No removals will occur outside of the PSA.	Effects occur during site preparation and progressive rehabilitation may be undertaken.	Effects occur simultaneously.	Effects can be reversed with active rehabilitation.	The habitat is well represented in the RSA.	This effect may be important to the community.	
Loss of foraging habitat for raptors	**Low**	**Low**	**Low**	**Low**	**Medium**	**Low**	**Medium**	**Not Significant**
	Species and habitat types are well represented in the LSA and RSA.	No removals will occur outside of the PSA.	Effects occur during site preparation and progressive rehabilitation may be undertaken.	Effects occur simultaneously.	Effects can be reversed with active rehabilitation.	The habitat is well represented in the RSA.	This effect may be important to the community.	
Significance of Cumulative Effects on Migratory and Breeding Birds within RSA								
Loss of mature forest canopy habitat for warblers	**Low**	**Low**	**Low**	**Low**	**Medium**	**Low**	**Medium**	**Not Significant**
	Forest Management Plans incorporate measures to minimize effects on migratory and breeding birds	Effects are confined to an additional 949 ha within RSA.	Phase 2 Planned Operation for the Magpie Forest Management Unit will be completed by 2020.	Completed by 2020	Effects can be reversed with active rehabilitation.	The significant wildlife habitat functions occur within the LSA and RSA and within a forest to which substantial effects have occurred and upon recovery, provide habitat.	The 10 year forests management plans are subject to public consultation.	
Loss of foraging habitat for raptors	**Low**	**Low**	**Low**	**Low**	**Medium**	**Low**	**Medium**	**Not Significant**
	Forest Management Plans incorporate measures to minimize effects on migratory and breeding birds	Effects are confined to an additional 949 ha within RSA.	Phase 2 Planned Operation for the Magpie Forest Management Unit will be completed by 2020.	Completed by 2020	Effects can be reversed with active rehabilitation.	The significant wildlife habitat functions occur within the LSA and RSA and within a forest to which substantial effects have occurred and upon recovery, provide habitat.	The 10 year forests management plans are subject to public consultation.	

11.5.5 Addressing Uncertainty of Prediction for Cumulative Effects

For the biological VCs carried forward for the cumulative effects assessment, the mechanisms by which additive or synergetic cumulative effects could occur is primarily with the direct removal of terrestrial vegetation, wetlands and waterbodies which provided habitat for the species concerned. Furthermore, the type of activities (primarily forestry, mining and tourism), along with their resulting potential effect on the receiving environment and the VCs under consideration are also well understood. Knowledge of existing conditions within the LSA and RSA has been documented in Chapter 4 of the Project Magino EIS and is also documented on the Ontario Ministry of Natural Resources website (www.efmp.lrc.gov.on.ca/eFMP/homeLocale.do) for the Algoma Forest management Unit and the Magpie Forest Management Unit. Therefore, the uncertainty associated with the prediction of significance of cumulative effects on these biological VCs is low. Therefore, the uncertainty associated with prediction of potential cumulative effects is LOW.

As human behavior is difficult to predict, there is more inherent uncertainty in assessing the significance of cumulative effects for the socio-economic VCs under consideration. The prediction of effect is based on socio-economic information currently available.

Finally, greenhouse gases emissions are directly correlated to fuel and energy consumption by human activities. Quantities of fuel consumed within the Algoma District can readily be quantified and proponents of industrial activities have an obligation to report on annual emissions of greenhouse gases under NPRI.

11.6 Step 3 - Mitigation

Step 3 of CEAA's Operational Policy for cumulative effects assessment requires the identification of technically and economically feasible measures that would mitigate any significant adverse cumulative environmental effect.

The mitigation measures incorporated in the design and execution of the Magino Project that will ensure that residual effects of this Project are NOT SIGNIFICANT are listed in Chapter 6 and Chapter 7 of the Magino Project EIS.

11.6.1 Mitigation Targeting Future Forestry Operation

As discussed in Step 2, the future activities likely to occur within the RSA, and within the temporal boundaries of this cumulative effects assessment, are mainly logging activities within the Algoma Forest Management Unit or the Magpie Forest Management Unit. The Ontario regulatory framework for approval of logging operation requires that forestry operators prepare detailed 10-year Management Plans for their proposed undertaking. Amongst several other requirements, under these long-term plans, the forestry operator must prepare and provide detailed activity schedules along with several management plan targeting bears, wildlife, significant habitat and wetlands management. These long-term management plans are submitted to public consultation and approved by the Ministry of Natural Resources and Forestry. Annual reports on performance of the forestry operator are submitted to the Ministry of Natural Resources and Forestry and posted on the Ministry's website.

The review and approval process for ongoing forestry operation ensures that adequate mitigations are incorporated in forestry management practices and that cumulative effects of forestry operations will not resulting in significant cumulative effect with the RSA.

11.6.2 Other Industrial Projects

Mining projects are another type of industrial project that have the potential to result in adverse cumulative effects within the RSA. As is the case for the Magino Project, current regulations required that mining project be subjected to an environmental assessment review under the Canadian Environmental Assessment Act 2012, and the Environmental Assessment Act of Ontario. The rigorous review process ensures that the identified potential cumulative effects of proposed mining Project are acceptable to the stakeholders.

11.6.3 Aboriginal Interest

Aboriginal groups, including First Nations and Métis in Canada, have Constitutionally-protected Aboriginal and treaty rights. Proponents of future development activities have an obligation to consult with Aboriginal groups concerned. Appropriate mitigation measures are developed in consultation with these Aboriginal groups.

Step 4 – Significance of Cumulative Effects

All other projects and activities will contribute to GHG emissions in combination with the Magino Gold Project. However, based on the activities likely to occur in the Algoma District over the temporal boundaries of this assessment (21 years), their contribution to Provincial, Canadian or global annual emissions will be negligible. The cumulative effect is NOT SIGNIFICANT.

The cumulative effects on the Biological Environment VCs are NOT SIGNIFICANT largely because the cumulative removal of terrestrial vegetation (upland forests, rock barrens and wetlands) from past, existing and identified future projects and activities represents approximately 20% of the total area within the RSA.

Cumulative effects on Significant Wildlife Habitat, Migratory and Breeding Birds, Mammals and Species at Risk resulting from the additional habitats lost across the RSA (as measured by loss of vegetation coverage) are not likely to be measurable. Furthermore, as site rehabilitation is completed, the native vegetation recovers and effects are temporary in nature.

The significance of identified potential cumulative effects is summarized in Table 11-44. All potential cumulative effects identified are deemed to be NOT SIGNICANT.

11.7 Step 5 – Follow-up

As there are no specific concerns identified with respect to cumulative effects within the RSA, no follow up measures are required.

Table 11-455: Significance of Cumulative Effects for Current and Future Activities

Valued Component	Residual Effect	Measurable Parameter	Requirement for Mitigation	Significance
Terrestrial vegetation	Removal of upland forest and associated rock barrens			Not significant
Wetlands	Removal of wetlands	Surface area (ha) impacted by activities are measurable	Additional mitigation addressed during the permitting phase of Projects/activities.	Not Significant
Significant wildlife habitat	Removal of Moose calving, aquatic feeding and late winter cover habitat			Not Significant
	Removal of habitat for Species of Special Concern			Not Significant
	Removal of amphibian breeding habitat			Not Significant
Migratory and breeding birds	Loss of mature forest canopy habitat for warblers			Not Significant
	Loss of foraging and staging habitat for waterfowl			Not Significant
	Loss of foraging habitat for raptors			Not Significant

11.8 References

Canadian Environmental Assessment Agency. (2012). *CEAA, Technical guidance for Assessing Cumulative Environmental Effects under the Canadian Environmental Assessment Act, 2012. Retrieved from* website: https://www.canada.ca/en/environmental-assessment-agency/services/policy-guidance/technical-guidance-assessing-cumulative-environmental-effects-under-canadian-environmental-assessment-act-2012-1-0-overview-outcomes-scoping.html*)*

McSweeney & Associates. (2013). Dubreuilville Community, Economic & Mining Growth Action Plan. Retrieved from the McSweeney and Associates website: http://mcsweeney.ca/photos/custom/ Dubreuilville%20Action%20Plan.pdf

Mineralogy Database. (2016). Retrieved from the Mineralogy Database website: http://www.mindat.org/

Ministry of Transportation. (2015). Northern Highways Program (2015-2019).Retrieved from the Ministry of Transportation website: http://www.mto.gov.on.ca/english/highway-bridges/pdfs/northern-highways-program-2015-2019.pdf

Ontario. (2015). Forest Resource Mills. Retrieved from the Ontario website: https://www.ontario.ca/data/forest-resource-mills

Ontario. (2015). Sustainable Forest Licenses. Retrieved from the Ontario website: https://www.ontario.ca/environment-and-energy/sustainable-forest-licences

Ontario Mining Association. (2016). Ontario Mining Operations 2016. Retrieved from the Ontario Mining Association website: http://www.oma.on.ca/en/ontariomining/Map.asp

Ontario Mining Association. (2016). Advanced Mineral Projects in Ontario 2016. Retrieved from the Ontario Mining Association website: http://www.oma.on.ca/en/ontariomining/Map.asp

Ontario Ministry of Natural Resources and Forestry. (2015). Find a Forest Management Plan. Retrieved from the Ministry of Natural Resources and Forestry website: http://www.efmp.lrc.gov.on.ca/eFMP/home.do

Ontario Ministry of Northern Development and Mine. (2016). Abandoned Mines. Retrieved from the Ministry of Northern Development and Mine website: http://www.mndm.gov.on.ca/en/mines-and-minerals/applications/ogsearth/abandoned-mines

Appendix 11-1: Description of Past and Current Actions

A review of available information was undertaken to identify actions that may need to be considered in the CEA and where relevant inform the regional issues of concern. These actions are listed in Table 11-1. Past and current actions consist mainly of land use activities (abandoned mines, advanced mineral exploration, historical development and forestry operations) that continue to affect the RSA and defined for atmospheric, physical, biological, social, and economic environments and Aboriginal interests. A brief description is presented in this Appendix. It should be noted that the descriptions below do not encompass all of the activities assessed.

Existing Transportation Network

As shown on Figure 11-1, the core of the existing transportation network is the Provincial highways and rail lines that traverse the RSA defined for the social and economic environmental component. The key Provincial highways are:

- Highway 17 (part of the Trans-Canada Highway across northern Ontario) traverses the communities of Wawa, White River, Marathon and Terrace Bay;
- Highway 519 which runs 30 km from Highway 17 to Dubreuilville;
- Highway 101 which runs east from Wawa through Chapleau to Highway 11 in Matheson;
- Highway 11 traverses the northern portion of the District of Algoma connecting the communities of Hearst to the east and Greenstone in the west;
- Highway 614 connects the community of Manitouwadge with Highway 17 to the south; and
- Highway 631 connects Hornepayne with both Highway 17 to the south and Highway 11 in the north.

There are two rail lines that traverse the RSA: the Canadian National Railway and the Canadian Pacific Railway. The rail line which passes on the west side of the project study area is the Algoma Central Railway which operates between Sault Ste. Marie and Hearst Ontario. As well as carrying freight, the CN line is used for the Agawa Canyon tour train with trips running from Sault Ste. Marie to Hearst. Ontario Northland operates a network of rail connections between communities, providing a travel corridor for tourists or for business.

Within each community there exists a network of paved and unpaved roads. Outside of the communities there is also a network of logging roads that provides access within the RSA.

The Wawa Municipal Airport (CYXZ) services the many communities in the RSA and is important for the provision of forest fire protection services, air ambulance service, chartered flights and private aircrafts.

Abandoned Forestry Operation

<u>Dubreuil Forest Products Ltd.</u>

The existing Dubreuil mill located approximately 11 km north-west of the Magino Property and is currently in ‘maintenance mode’ after closing in 2008.

Abandoned Mines

Within the regional vicinity of the Magino Site there are 38 historic or abandoned mine and/or exploration sites. These sites are a mix of underground and open pit gold or iron mines.

Existing Mineral Exploration

Edwards Gold Property

In April of 2002 Strike Minerals Inc. procured the Edwards Mine property from River Gold Mines. The property is located 50 km northeast of Wawa, and 7 km east of the Magino property. Strike Minerals currently has on-going bulk sampling program with 1000 tonnes of surface, dewatering to 140 meters and updated infrastructure in place. The Strike Minerals property is considered to be largely permitted and can re-initiate mining activities as soon as financing is obtained (McSweeney, 2013). The exploration activities utilize Goudreau Road for access and the mine could also be reached via Northern Bypass Road.

Cline Lake Gold Property

Cline Mining's Cline Lake Gold property is located in Jacobson Township approximately 11.6 km northeast of the Magino property. Cline has completed an extensive diamond drill program on the property. They have identified seven new gold zones and areas of potential for future exploration work. Exploration on the property utilizes Goudreau Road for access, but the site could also be reached via the Northern Bypass Road. The lease on the land is issued by the Government of Ontario and has been issued until 2017.

Augustine Wawa Gold Property

Augustine Ventures Inc. is undertaking exploration activities at its Wawa Gold property. This 2,345 hectare property is located in McMurray Township, southeast of the town of Wawa. The Augustine Wawa Gold property has been extensively drilled over the past several years.

Smith Lake Gold Property

Conquest Resources Ltd. owns the Smith Lake Gold property located on six (6) patented mining claims and thirty-four (34) mining claims in Stover, Leeson and Rennie Townships. In March of 2013, Conquest Resources Ltd conducted an airborne electromagnetic ("EM") survey over the southern portion of their claim block. Additional work including prospecting, mapping, and sampling has commenced. The company is also undertaking exploration activities near the Detour Gold project, King Bay (approximately 100 kilometres north of Ignace) and Alexander Red Lake (in northwestern Ontario).

Leadbetter Diamond Deposit

Dianor Resources Inc. is a mineral exploration company with diamond properties in Quebec and Ontario. The company's Leadbetter property is located 12 km northeast of Wawa and 28.4 km from the Magino property. Their inventory of precious stones includes Type 2 diamonds, rubies and sapphires. In addition to the recovery of precious stones, the company believes it may also be possible to extract gold from the tailings of the diamond recovery plant.

Abbie Lake – Keating Gold Project

The Giyani Gold Corporation owns the Abbie Lake-Keating gold project, located between Wesdome Gold Mine Ltd.'s Eagle River mine and Richmont Mines Inc.'s Island Gold mine, approximately 70 km away from the Magino property. In 2012, an exploration program comprised of geophysics and drilling was undertaken and areas were identified for further drilling.

'Sugar Zone' Mining Exploration

The Sugar Zone project is a mining exploration site owned by Harte Gold Corp. It is located 60 km east of Hemlo area gold mines and 25 km north of White River, off Highway 17 on Highway 631. Mineral exploration drilling has been undertaken for several years and bulk sampling is scheduled to continue in early 2017. The Ontario Ministry of Natural Resources has completed its environmental assessment of the advanced exploration and bulk sampling program. Harte Gold also has in place an agreement to have its bulk sample from the Sugar Zone processed at Richmont Mines' Island Gold mill. The company is ready to proceed with construction of an access road connecting the site to Highway 631.

Holdsworth Property Exploration

Owned by Noble Mineral Exploration Inc., this site is in the early stages of exploration for gold and silver. The site is located 3 km northwest of Hawk Junction or 19 km and 21 km from the Magino property. The property consists of 19 contiguous patented mining claims covering approximately 304 hectares. As of spring of 2014, the exploration program has been postponed.

Midas Project

The Midas Project, owned by Miramont Capital Corp. in partnership with New Dimension Resources, consists of 12 claims (139 units) covering 2,112 hectares and is situated approximately 50 kilometres northeast of the town of Wawa. The Property lies 20 km southeast of the Magino property. Exploration activities undertaken since 2011 have included ground magnetic, induced polarization studies and diamond drilling. To date, drilling has partially defined two gold bearing zones. Future exploration work will be contingent on the final outcome of ongoing drilling and other studies.

Forge Lake Project

Zara Resources Ltd. owns the Forge Lake property which is located 14 km from the Magino property. Past exploration activities have included a surface sampling program, an airborne magnetic survey and diamond drilling. The last set of sample drilling was completed in 2012 by Hudson River Minerals, the former owners before Zara Resources acquired the site. Since then, no major exploration activities have been undertaken. A technical report completed for Zara Resources in 2013 suggests that more sampling and an induced polarization study are planned to be completed.

Clement Property

Strike Minerals Inc. completed surface investigation on the Clement Property, located in Jacobson Township, 20 km southeast from Dubreuilville. The sampling program conducted

mapping and sampling of an identified quartz vein. Mineralization reported pyrite, chalcopyrite and gold as identified in the vein. Strike Minerals may consider follow-up exploration to test the extent and continuity of the mineralization. The only access to this property is via Goudreau Road.

DAC Property

Privately owned by Daniel Cyr, the DAC property is located approximately 20 km from Dubreuilville along Goudreau Road, south of the Magino property. Sample drilling was last completed on this site in 1992. Further exploration and sampling were completed in 2011 and diamond drilling and soil sampling is planned.

Ballard Lake Property

The Ballard Lake Property, owned by RT Minerals Corp., consists of 225 claim units encompassing approximately 3600 hectares located in Echum and Dolson Townships. Initial exploration activities were competed in 2012.

James Rastel Property

This private property owned by James Rastel, is located outside Wawa. Recent exploration for diamonds occurred in 2012. Sampling results indicated that further exploration would be required to define the resource.

Ego Property

Richmont Gold Mines Inc. owns the Ego property, which is a group of 3 claims covering an area of approximately 73 hectares, located west of their Island Gold property and 12 km from the Magino property. Exploration work was last completed on site in 2014.

Rockstar Property

The Rockstar Property owned by Upper Canada Explorations is located approximately 25 km northeast of Wawa. The Rockstar claim block is made up of 11 contiguous mineral claims, which cover an area of 2,080 hectares. Past exploration work completed on or around the Rockstar Property has been for gold and base metal mineralization as a well as diamonds.

Existing Mines and Mills

Bell Creek Mine and Mill

The Bell Creek mine is an underground gold mine owned by Tahoe Resources and is located approximately 20 km northeast of Timmins, Ontario. The mine has a current production rate of 800 tonnes per day.

Black Fox Mine and Mill

The Black Fox mine is an open pit and underground gold mine, with a mill, owned by Primero Mining Corp. and is located approximately 65 km east of Timmins, Ontario. The Black Fox mine started commercial production in 2009 and is now in its 7th year of production.

Coleman Mine

The Coleman mine is an underground nickel mine owned by Vale and is located northwest of Sudbury, Ontario.

Copper Cliff North Mine

The Copper Cliff North mine is an underground nickel mine owned by Vale and is located in the City of Sudbury.

Creighton Mine

The Creighton mine is an underground nickel mine owned by Vale and is located in the City of Sudbury. The Creighton mine is the deepest underground nickel mine in Canada.

Dome Mine

The Dome mine is an underground gold mine owned by Goldcorp and is located in the City of Timmins. This mine has been in production for over 100 years.

Eagle River Mine and Mill

The Eagle River mine is an underground gold mine located 50 km west of Wawa. The Eagle River mine started commercial production in 1996 and is now in its 18th year of production. The Eagle River property remains largely unexplored spanning 5250 ha. The mine and mill has at least five years of reserves. An opportunity exists to expand the mill capacity to service increased ore production.

Ellen Mine

The Ellen mine is an underground nickel and copper mine owned by Vale and is located west of the City of Sudbury.

Garson Mine

The Garson mine is an underground nickel mine owned by Vale and is located in the City of Sudbury. This mine has been in production for over 100 years.

Hemlo Mines

Hemlo Mines, owned by Barrick Gold Corp, is located approximately 60 km west of White River. The mine consists of the David Bell Mine, now closed, and the Williams mine which is an underground and open pit. Both mines share milling, process, and tailings facilities. Barrick has commenced a feasibility study to explore the possibility of expanding the existing open pit mine, extending the mine's life by approximately 10 years.

Hollinger Mine

The Hollinger mine is an open pit gold mine operated by Goldcorp and is located adjacent to the Timmins downtown core.

Hoyle Pond Mine

The Hoyle Pond mine is an underground mine operated by Goldcorp and is located northeast of Timmins, Ontario.

Island Gold Mine and Mill

Island Gold mine and mill is located southeast of Dubreuilville and owned by Richmont Mines. The 59.0 km² project has been in operation since 2007. The underground mine is using long-hole access by way of a ramp. Processing is done on site at the Kremzar Mill, an 850 tonne/day rated CIP mill. In 2013, an 80,000 m drilling campaign was planned at Island Gold Mine and Island Gold Deep. The mine utilizes Goudreau Road for access. As of December 2013, the mine had 48,086 ounces in proven gold reserves.

Kidd Creek Mine and Mill

The Kidd Creek mine consists of an open pit and underground base metal mine operated by Glencore PLC and is located north of Timmins, Ontario. Ore is sent 27 km southeast to a mill for processing. Kidd Creek is the deepest base metal mine in the world.

Lac des Iles Mine and Mill

The Lac des Iles mine consists of an open pit and underground gold mine operated by North American Palladium Ltd. The mine is located approximately 90 km northwest of Thunder Bay, Ontario. The Lac des Iles mill operates on a 14 day on and 14 day off schedule, with a maximum operating capacity of 15,000 tonnes per day.

Levack Mine

The Levack mine is an underground mine that extracts copper, nickel, and other precious metals such as platinum and palladium. This mine is operated by KGHM Polska Miedz and is located northwest of Sudbury, Ontario.

McCreedy West Mine

The McCreedy West mine is an underground mine that extracts copper, nickel, and other precious metals such as platinum and palladium. This mine is operated by KGHM Polska Miedz and is located northwest of Sudbury, Ontario.

Mishi Gold Mine

The Mishi and Magnacon are properties also owned by Wesdome. These properties consist of a contiguous series of patented claims and mining leases located 50 kilometres west of Wawa. The Mishi Mine is an open pit mine located 2 km from the Wesdome Mill. Wesdome broke ground in July, 2011 and announced commercial production January 1, 2012.

Stobie Mine

The Stobie mine is an underground nickel mine owned by Vale and is located in the City of Sudbury.

Taylor Mine

The Taylor mine is an underground gold mine operated by Kirkland Lake Gold and is located approximately 44 km east of Timmins, Ontario.

Timmins West Mine

The Timmins West mine is an underground gold mine owned by Tahoe Resources and is located approximately 18 km west of Timmins, Ontario. The mine has been in commercial production since 2011 and has a production capacity of 2,700 tonnes per day. Extracted ore from the Timmins West mine is shipped 42 km to Tahoe's Bell Creek Mill.

Totten Mine

The Totten mine is an underground nickel-copper mine operated by Vale and is located west of Sudbury, Ontario. The mine began commercial operation in 2014 and has a production capacity of 2,200 tonnes per day. The mine life is estimated to be 20 years.

Young-Davidson Mine

The Young-Davidson mine is an underground gold mine operated by Alamos Gold Inc. and is located approximately 60 km west from Kirkland Lake, Ontario. An open pit was mined beginning in September, 2012, and was closed soon after in June, 2014 upon ore depletion. The mine has a production capacity of 8,000 tonnes per day.

Existing Forestry Facilities and Harvesting

Algoma Forest

The Algoma forest is located immediately to the south of the Magino property. The total area of the forest under license is 1,570,776 ha, approximately half of which is on managed crown land. The Algoma forest accounts for 3,345.1 ha of the RSA. All of the Algoma Forest in the RSA is on patent lands.

Magpie Forest

The Magpie Forest is located approximately 200 km north of Sault Ste. Marie and the southern portion of the forest includes the RSA for the physical and biological environmental components. The Magpie Forest is 440,538 ha is size and is primarily composed of Crown lands although there are some areas of patent lands, cottages, camps, islands and peninsulas which are excluded from the sustainable forest License. MRNF currently manages the Magpie Forest Management Unit. The management plan covers the next two terms (term #1 from 2009 to 2014 and term #2 from 2014-2019). During Term #1, the selected harvesting was planned. This involves harvesting of mature trees, dying, unhealthy or undesirable trees, over an area of 21.5 ha within the RSA. Renewal and tending work is also ongoing. This involves the control of competing vegetation in a young developing forest to managed densities. This work is being completed in an area covering 385.8 ha from 2009 to 2014.

Niska North Mill

The Niska North sawmill, located in Chapleau, is a multi-species wood product facility with an annual capacity of 10,000,000fbm. The facility includes a main sawline, dry kilns, and special moulding equipment to manufacture various moulding products. Wood waste is used to heat the facility and wood waste is also used in the dry kiln process. The Province is investing $1.5 million to help Niska North invest in equipment, renovations and construction costs. This will help create up to 40 new jobs over the next three years. The Niska North Mill is located approximately 93 km southeast of the Magino Site.

Olav Haavaldsrud Timber Co. Ltd Mill & Co-generation Facility

The Olav Haavaldsrud Timber Co. Ltd Company has operated a wood chip facility, sawmill and planning mill in Haig Township, near the town of Hornepayne, since 1954. By-products such as wood chips and shavings are either sold to paper manufacturers or are used in value-added wood products such as fibre board. Following a temporary closure in 2016, the mill was purchased by an investor and is expected to re-open in 2017. In 2014, the company began operating a cogeneration plant with a total nameplate capacity of 15.0 MW, of which 8.0 MW is contracted to the OPA. In addition to electricity production the plant provides steam to the mill for lumber drying and space heating purposes. This facility employs approximately 40 people. The Olav Haavaldsrud Timber Co. Ltd Mill is located approximately 104 km north of the Magino Site.

Rentech Mill

Rentech operates a wood pellet facility in Wawa to produce approximately 450,000 tonnes of pellets per year, and employing about 40 full-time employees. The pellets are shipped to utilities in the United Kingdom and Canada for electricity production. Currently the mill employs approximately 100 people. The Rentech Mill is located approximately 39 km southeast of the Magino Site.

Tembec Inc. Mill

The Tembec Mill is located in Chapleau and produces softwood lumber from spruce, pine and fir, as well as wood chips. The facility also uses biomass from residue bark, shavings and sawdust to produce green steam used in the sawmill kilns and to generate electricity. The mill currently employs 150 people. The Tembec Inc. Mill is located approximately 93 km southeast of the Magino Site.

Terrace Bay Pulp Mill

As of December 2012, the Terrace Bay pulp mill, owned by Aditya Birla Group, is operating at full capacity producing northern bleached softwood kraft. The Terrace Bay Mill is considered an anchor mill due to its location and its significant consumption of residual chips produced by the regional sawmills. Aditya Birla Group was planning to invest more than $250 million in a phased manner to convert the mill to produce dissolving grade pulp with a capacity of 280,000 tpa by 2016. The Terrace Bay Pulp Mill is located approximately 202 km northwest of the Magino Site.

White River Mill & Co-generation Facility

As noted above, the forest products mill in Wawa, originally owned by Domtar, shut down in 2007 resulting in the layoff of approximately 250 workers. The Mill was purchased in 2009 by White River Forest Products Ltd. The mill was restarted in 2013. Once fully functional it is expected that operations will result in 180 jobs. The company is a privately held corporation founded and co-owned by White River Community Development Corporation, the Pic Mobert First Nation and two private shareholders. The White River Mill is located approximately 69 km northwest of the Magino Site.

Existing Power Generation Facilities

Hydroelectric Stations on Magpie River

Bullfrog Power owns three hydroelectric stations on Magpie River. These are the Steephill Generating station (installed capacity of 16.0 MW); the Harris Generating Station (installed capacity of 12.0 MW); and the Mission Generating Station (installed capacity of 16.0 MW). The projects are located approximately 47 km southwest of the Magino Site.

Hydroelectric Stations on Michipicoten River

Brookfield Renewable Power owns four stations on Michipicoten River. These are the Hollingsworth Generating Station (installed capacity of 23 MW); the McPhail Generating Station (installed capacity of 13.0 MW); the Dunford Generating Station (installed capacity of 45 MW) and the Scot Falls Generating Station (installed capacity of 22.0 MW). The projects are located approximately 49 km southwest of the Magino Site.

Umbata Falls Generating Station

The Umbata Falls Generating Station was developed for the Begetekong Power Corporation, the general partner of Umbata Falls, Limited Partnership (UFLP) and has be operation since 2008. Begetekong is majority owned by the Ojibways of the Pic River First Nation. Umbata Falls Generating Station is a 2-unit “run-of-the-river” hydroelectric generating facility with a nameplate capacity of 25 MW located on the White River, 30 kilometres southeast of Marathon. The project is located approximately 138 km northwest of the Magino Site.

White River Hydro Project

White River Hydro Project is a joint project with the Pic Mobert First Nation and Regional Power. It is located 50 km south of the Town of White River. The project consists of 2 hydroelectric sites with a combined generating capacity of 18.9 MW: Gitchi Animki Bezhig (Upper) is 9 MW & Gitchi Animki Niizh (Lower) is 10 MW. Project also includes 21 km of new 115 KV transmission line. Construction started in August 2013 and in April 2016 the project began commercial operation. The project is located approximately 109 km northwest of the Magino Site.

Existing Power, Oil and Gas Transmission Facilities

Canadian Mainline

Built in the 1950's, the Canadian Mainline pipeline is owned and operated by TransCanada Pipelines Ltd. The pipeline supplies central and eastern Canada and the American Midwest with natural gas from western Canada. The pipeline traverses the northern portion of the RSA defined for the social and economic environmental components passing approximately 150 km north of the Magino property.

Appendix 11-2: Brief Description of Future Actions

There are several proposed projects, land uses or other activities that may affect the RSA defined for the atmospheric, physical, biological, social or economic environments and Aboriginal interests. The future actions that have been identified as "certain" have been categorized and are described below. It should be noted that the descriptions below do not encompass all of the activities which were assessed.

Planned Community Development

The Dubreuilville Official Plan (2016) outlines the community plan for the future. The general foundation for the Official Plan is the community's vision: "diversify and strengthen its economic case; improve the quality and range of municipal and community services, and housing types; while maintaining a high quality of life closely linked to its wilderness setting" (Tunnock, 2016; p. 1). The Plan recognizes that future growth is dependent on continued employment growth in resource-based industries, including mining. Business retention and a flexible approach to home-based businesses will be important. The Township will be working with the province to acquire additional lands for residential development and a new golf course. Dubreuilville is anticipating future opportunities from the growing mining sector in the region, which will help support the employment base and sustain existing community programs and services, as noted in Section 7.3.9 of the Official Plan. The Official Plan, the Community, Economic and Mining Growth Action Plan (McSweeney, 2013), and the *Commercial, Industrial and Residential Study* completed in 2015 (partially funded by Prodigy) are among the most recent initiatives Dubreuilville has taken in its move to the future.

The Municipality of Wawa's Official Plan states that its goals for the community are to promote diversity, partnership and entrepreneurialism for potential "sustainable economic and social growth and development in natural resources, recreation and tourism, industry, culture, skilled trades, alternative energy, education and information technology". Economic development is planned by encouraging land use that generates employment opportunities and a broad range of commercial services, supporting existing transportation infrastructure, developing tourism, establishing employment lands and encouraging development of home-based businesses and home industries. Similar to the trend for the District of Algoma, the population of Wawa is expected to stabilize, if not decline in the foreseeable future.

The District of Algoma's population projection shows an overall decrease till 2036 when the population is estimated to be 109,000 people. This is a decline of 5.9% from the 2011 population of 115, 870.

Transportation Network Improvements

According to the Ministry of Northern Development and Mines' Northern Highways Program (2013-2017), the provincial government has no plans for any new provincial highways over this timeframe. Rather, there are plans to resurface Highway 519 and to rehabilitate bridges and culverts for the entire length of the highway.

In the Town of Dubreuilville, there are plans for proposed new roads, including a connecting link between the southwest corner of the residential area and Goudreau Road.

The funding for the Algoma Central Railway passenger service ended in 2015 with the end of federal funding. It is still unclear if the service will resume.

Planned Forestry Facilities and Harvesting

As part of the management plan for the Magpie Forest for Term 2 (i.e., from 2014-2019) four planned harvest areas within the RSA have been identified. Under Phase 2 of the 10 year forest management plan (2014-2019) for the Magpie Forest, approximately 649.1 ha of forested area within the RSA will be harvested.

Reasonably Foreseeable Projects and Activities

There are only a few proposed projects, land uses or other activities that may affect the RSA defined for the atmospheric, physical, biological, social or economic environments and Aboriginal interests. The ones that have been identified as “reasonably foreseeable” have been categorized and are described below.

Proposed Mines and Mills

Marathon Platinum Group Metals & Copper Mine

Marathon PGM Corporation is proposing to construct, operate and decommission an open pit platinum group metals and copper mine approximately 10 km from Marathon, Ontario. The proposed project would include three open pits, an ore processing plant, tailings and mine rock storage facilities, site access roads, a 7 km power transmission line, an explosives factory and magazines, water management facilities, ancillary mine infrastructure and associated activities. The rate of production would be approximately 22,000 tonnes per day with a proposed operating mine life of approximately 11.5 years. The proposed project had been undergoing an Environmental Assessment, but this has been put on hold for the foreseeable future as a consequence of an updated study that indicated that the project would not provide an acceptable level of return to its stakeholders. If the project goes ahead and the EA is approved, construction is expected to provide 1,000 construction jobs; mine operation will employ 350 people.

Borden Gold Mine Project

Goldcorp Borden Limited is proposing to construct, operate and decommission an underground gold mine near Chapleau, Ontario. The project is located approximately 160 km southwest of Timmins, Ontario. The proposed project would have a production capacity of 4,000 tonnes per day with an operating life of approximately 15 years. The mined ore would be shipped to an existing offsite processing mill owned by Goldcorp.

Hardrock Gold Mine

Greenstone Gold Mines is proposing to construct, operate and decommission an open pit gold mine and on-site metal mill near Geraldton, Ontario. The project is located approximately 5 km south of Geraldton, Ontario. The proposed project would have a production capacity of 30,000 tonnes per day and a processing capacity of 30,000 tonnes per day. The operating mine life is anticipated to be 15 years.

Hammond Reef Gold Project

Canadian Malartic Corporation is proposing to construct, operate and decommission an open pit gold mine and on-site metal mill near Atikokan, Ontario. The project is located approximately 23 km northeast of Atikokan, Ontario. The proposed project would have a production capacity of 60,000 tonnes per day and a processing capacity of 60,000 tonnes per day. The operating mine life is anticipated to be 11 years.

Proposed Power, Oil and Gas Transmission Facilities

Algoma Power Inc. System Upgrades

As noted in Chapter 4, Algoma Power Inc., (API) has completed a power supply study jointly with Great Lakes Power Transmission which determined that a number of transmission options are available that could service the Magino Gold Project as well as other potential demands in the region. API has also initiated a system impact assessment with regards to its plans to increase the capacity of its existing transmission infrastructure. For the purposes of this cumulative effects assessment (as noted in Chapter 6), the plan to meet the power requirements for the Magino Project is to have API install an additional 44 kilovolt (kV) line from Hawk Junction to the site. It is expected that API will increase the capacity of the existing transmission line within the existing right-of-way (ROW). The incoming power line will terminate at a main substation on the Magino Property.

East West Tie Electrical Transmission Project

In 2013, the Ontario Energy Board (OEB) chose Upper Canada Transmission Inc. as the licensed transmitter to complete development work for the East-West Tie Line. This 400 km transmission line will run between Thunder Bay and Wawa. The Minister of Energy identified this as a priority project in the OEB's Long Term Energy Plan. "Designation" however, does not mean that the line will be built. The proponent is started the EA process with a Terms of Reference report submitted to the MOECC in February 2014. The project was approved in 2015 and it is estimated that the line will be in-service by 2020.

Energy East Pipeline

The Energy East Pipeline is a proposed 4,600-kilometre pipeline that will carry 1.1-million barrels of crude oil per day from Alberta and Saskatchewan to refineries in Eastern Canada. The line traverses the northern portion of the RSA approximately 150 km north of the Magino property. This project involves converting an existing natural gas pipeline to an oil transportation pipeline, constructing new pipelines in Alberta, Saskatchewan, Manitoba, Eastern Ontario, Québec and New Brunswick to link up with the converted pipe and constructing the associated facilities, pump stations and tank terminals. The project is currently undergoing regulatory approvals.