5 METHODOLOGY

5.1 GENERAL CONSIDERATIONS

This section presents and justifies the methodology used to describe the biophysical and socioeconomic components, identifies the environmental effects of the Project, describes mitigation measures, and assesses the significance of each effect that is identified. Where appropriate, a distinction was made between the effects generated during the Project Construction, Operations and Decommissioning and Reclamation phase.

The following steps were completed to ensure that a comprehensive effects assessment was accomplished for all physical, biological and socioeconomic components that might be affected by the Project:

	COMPONENT DESCRIPTION
1.	An LSA, RSA study area and a temporal boundary were defined for each component and valued component. Rationale is provided for the inclusion or rejection of a component as a VC;
2.	Each component and its associated baseline was described based on a literature review and traditional knowledge/land use studies, including those specific to the Howse Project. Data gaps were identified;
	ENVIRONMENTAL EFFECTS OF THE PROJECT
3.	An initial assessment of the effects of the Project on each VC was carried out by characterizing the relationship as having/not having an interaction;
4.	The effects associated with the VC that have an interaction with the Project are described;
	MITIGATION MEASURES
5.	Standard and specific mitigation measures were described and, where possible, measures are proposed by phase. For those interactions where a residual effect remains, a significance assessment was conducted;
	SIGNIFICANCE ASSESSMENT
6.	A residual effects significance assessment was conducted. The nature and direction of the effects were described and a quantitative evaluation of the effects of the project on the residual effects was completed based on six criteria;
7.	The likelihood of the environmental effect was determined, and for those where an effects is still likely, a cumulative effects assessment was conducted.
	CUMULATIVE EFFECTS ASSESSMENT
8.	Cumulative effects (i.e. combined residual effects of past, present and future projects) were assessed on those VC where mitigation measures were insufficient and an environmental effects remains. Cumulative assessment was completed using standard procedures: scoping, analysis, mitigation and significance assessment
	MONITORING AND FOLLOW-UP
9.	Recommended VC monitoring and follow-up procedures to evaluate the exactness of VC effect assessment and mitigation measures (site specific and cumulative assessments)

5.2 ENVIRONMENTAL COMPONENT DESCRIPTION

The following subsections describe each biophysical and socioeconomic components based on baseline data stemming from available literature. Technical term definitions can be found in the glossary. Where indicated, more detailed information concerning specific components has been appended to the main text of the EIS.

5.2.1 Selection of Valued Components

The identification of valued components was based on several criteria. First, VCs were identified by the CEAA under the Howse EIS guidelines. Second, we identified VCs based on their applicability (i.e. having an environmental effect) to the criteria described in Section 5 of CEAA act (see below,) and third, according to the criteria described in the Species at Risk Act. The provincial EPR guidelines submitted in December 2014 were also considered.

As required by Section 5 of the *Canadian Environmental Assessment Act* (2012), the term "environmental effects" shall mean:

(a) a change that may be caused to the following components of the environment that are within the legislative authority of Parliament:

(i) fish and fish habitat as defined in subsection 2(1) of the *Fisheries Act*,

(ii) aquatic species as defined in subsection 2(1) of the *Species at Risk Act*,

(iii) migratory birds as defined in subsection 2(1) of the *Migratory Birds Convention Act, 1994*, and

(iv) any other component of the environment that is set out in Schedule 2;

(b) a change that may be caused to the environment that would occur:

(i) on federal lands,

(ii) in a province other than the one in which the act or thing is done or where the physical activity, the designated project or the project is being carried out, or

(iii) outside Canada; and

(c) with respect to Aboriginal peoples, an effect occurring in Canada or any change that may be caused to the environment on:

(i) health and socioeconomic conditions,

(ii) physical and cultural heritage,

(iii) the current use of lands and resources for traditional purposes, or

(iv) any structure, site or thing that is of historical, archaeological, paleontological or architectural significance.

The CEAA (2012) further defines "environment” as meaning the components of the Earth, including:

(i) land, water and air, including all layers of the atmosphere,

(ii) all organic and inorganic matter and living organisms, and

(iii) the interacting natural systems that include components referred to in paragraphs (a) and (b).

For the purpose of this EIS, VCs were divided into biophysical and socioeconomic VCs. In accordance with the CEAA, only biophysical and socioeconomic VCs that could potentially be affected by the Project, whether negatively or positively, were selected. For the Howse EIS, the term "VC" includes both biophysical and socioeconomic VCs. The following criteria were also considered in the determination of a VC:

1. The component is present in the LSA or RSA.
2. The Project could possibly interact with and have a harmful effect on the component.
3. The component is listed under section 5 of CEAA Act.
4. The component is particularly vulnerable to disturbance.
5. The component includes species with special status (as per Newfoundland and Labrador's Endangered Species Act, the federal SARA and/or the Committee on the Status of Endangered Wildlife in Canada).
6. The component was specifically highlighted as valued in the consultation process or in focus groups organized for the land-use and ATK study.
7. The component was defined as an important issue at the regional level (land use plans, municipality or MRC master plans), provincial level (provincial legislation and regulations, guidelines) and/or federal level (federal legislation and regulations, guidelines).
8. The component refers to Aboriginal benefits, including claimed or proven Aboriginal rights and/or treaty rights.

The following criteria is also used for the final selection of VCs (Environmental Assessment Office, 2013):

9. If the possible effects on the VC can be effectively considered within the assessment of another VC, they should be combined (no duplication of effects assessment).

5.2.2 Definition of Spatial and Temporal Boundaries

For each component and VC, the biophysical LSA was determined and defined as the area where the physical extent of the Project activities are felt by the component, whereas the biophysical RSA corresponds to the extent of the cumulative effects (residual effects of past, present and future activities combined) of the Project on the targeted component. The LSAs and RSAs are the same for all the socioeconomic components.

Temporal boundaries were defined based on the anticipated temporal extent of the effects of the project on the component. Biological and seasonal cycles have been considered for all biophysical components and/or socioeconomic cycles and are described.

5.2.3 Existing literature

A literature review was performed for each component.

5.2.3.1 Current Study

In an effort to acquire additional information for components with scarce data, and to comply with CEAA requests, HML has overseen the completion of several studies which support the guideline documents provided by CEAA and GNL. These new studies were carried out specifically for the Howse Project and have provided a significant source of new information which has eliminated some data gaps, and include:

Appendix A. Golder Associés (2014) *Howse Pit Conceptual Slope Design - Interim Report*. CONFIDENTIAL. Report Number: 014-13-1221-0104-4000 RA. Submitted to Labrador Iron Mines.

Appendix B. Geofor Environnement (2015) *Hydrogeology and MODFLOW Modelling – Howse Property*. Technical Memorandum prepared for Howse Minerals Limited, 22 p. and 6 Appendices.

Appendix C. Raphael Picard (2014) Study on Land and Resource use by the Innu and Naskapi – Howse Property Iron Ore Project. Prepared for Howse Minerals Limited, 36 p.

Appendix D. *Human Health Risk Assessment* and supporting documents.

Appendix E. AECOM (2015) *Air Dispersion Modelling Report*s

Appendix F. AECOM (2015) *DSO Howse Property Environmental Assessment – Noise and Vibration Technical Report*. Prepared for Howse Minerals Limited, 17 p. and 3 appendices.

Appendix G. AECOM (2015) *DSO Howse Property Environmental Assessment – Ambient Light Technical Report*. Prepared for Howse Minerals Limited, 16 p. and 2 appendices.

Appendix H. Activation Laboratories Ltd. (2014) *Acid-Base Accounting and Toxicity Characterization Leach Procedure Report*. HPP-RM-20141023. A14-08392. Prepared for Tata Steel.

Appendix I. Groupe Hémisphères (2014) 2013-2014 Hydrological Campaign for the Howse Property. Field Report for Howse Minerals Limited, 6 p. and 2 appendices.

Appendix J. Permafrost Condition at Howse and supporting documents

Appendix K. Groupe Hémisphères (2014) *Terrestrial ecosystem mapping, Howse pit study area*. Technical Report submitted to Howse Minerals Limited, 45 p. and 6 appendices.

Appendix L. Groupe Hémisphères (September 2015) *Pinette Lake Water Regime*. Technical Report submitted to Howse Minerals Limited., 13 pp. and 1 appendix

Appendix M. Groupe Hémisphères (2014) *Aquatic Survey - Howse Pit Study Area.* Technical Report Submitted to TSMC, 35 pages and 7 appendices.

Appendix N. Groupe Hémisphères (2015) *Common Nighthawk Survey* for Howse Mining Project, Labrador, Summer 2015. Technical Report submitted to Howse Minerals Ltd., 11 pp. and 3 appendices.

Appendix O. Gerald Penney Associates Limited (2014) *Goodwood-Timmins Haul Road and Howse Property Historic Resources Impact Assessment, near Schefferville, QC.* Archaeological

Investigation Permits #14.42. DRAFT Submitted to Provincial Archaeology Office and Tata Steel Minirals Canada.

These studies are appended to this report in Volume 2. A summary is presented in the EIS core document, for all components. In addition, several studies we conducted for adjacent projects for TSMC and/or NML. These are all referred to in the text. All wildlife studies produced by Groupe Hemisphères that are relevant to the Howse EIS are available in Volume 3, as well as the bird studies quoted in Section 7.4.8.

5.2.4 Data Gaps

Data gaps for each component were identified where the gaps could limit the effects assessment are listed in this section.

5.3 EFFECTS ASSESSMENT METHODOLOGY

5.3.1 Sources of Environmental Effects

Identifying and analyzing the interactions between components and Howse Project infrastructure, equipment, processes and activities is fundamental to a proper environmental effects assessment. Sources of biophysical effects associated with the Project are described in Section 3 (Project Description) and listed in Table 5-1

Table 5-1 List of Project Activities and Sources of Effects

PROJECT ACTIVITY AND RELATED PROJECT PHASE	SOURCES OF EFFECTS
Construction phase	
Upgrading/construction of the Howse haul road, upgrading of a bypass road and water management infrastructures (sedimentation and transfer ponds, drainage ditches)	Stripping of vegetation, excavation, sediment runoff, and emission of air contaminants, dust, noise, vibration, and light
Pit development	Stripping of vegetation, excavation, use of explosive, sediment runoff, and emission of air contaminants, dust, noise, vibration, and light
Transportation and traffic	Emission of air contaminants, dust, noise, vibration, and light, and handling of petroleum products
Mine construction*	Direct, indirect and induced employment, contracting opportunities (goods and services), fly-in fly-out work rotations, use of and pressure on public infrastructures and services, and changes to the visual environment
Operation phase	
Removal and storage of remaining overburden and topsoil	Stripping of vegetation, excavation, emission of air contaminants, dust, noise, vibration, and light, and sediment runoff
Blasting and ore extraction	Excavation, use of explosive, sediment runoff, and emission of air contaminants, dust, noise, vibration, and light
Mineral processing	Emission of air contaminants, dust, noise, vibration and light, and handling of petroleum products
Dewatering	Water diversion and management and handling of petroleum products

PROJECT ACTIVITY AND RELATED PROJECT PHASE	SOURCES OF EFFECTS
Operation of waste rock dumps	Sediment runoff and emission of air contaminants, dust, noise, vibration, and light
Transportation of ore and traffic	Emission of air contaminants, dust, noise, vibration, and light, and handling of petroleum products
Solid waste disposal	Transportation of solid waste, landfill fumes, and emission of air contaminants, noise, and vibration
Hazardous waste disposal	Transportation and storage of hazardous waste, and emission of air contaminants, noise, and vibration
Treatment of sanitary wastewater	Transportation of sanitary waste, leaching of sanitary waste, and emission of air contaminants, noise, and vibration
Explosives waste management	Transportation of explosives waste and leaching of explosives waste
Ongoing site restoration	Excavation, emission of air contaminants, noise, and vibration, soil decontamination, plantation, seeding, and habitat and ecosystem creation
Mine operation*	Direct, indirect and induced employment, contracting opportunities (goods and services), fly-in fly-out work rotations, and use of and pressure on public infrastructure and services
Decommissioning and reclamation phase	
Demobilization of Howse facilities and heavy machinery	Emission of air contaminants, dust, noise, vibration, and light
Transportation and traffic	Emission of air contaminants, dust, noise, vibration, and light, and handling of petroleum products
Final site restoration	Excavation, emission of air contaminants, dust, noise, and vibration, soil decontamination, plantation, seeding, and habitat and ecosystem creation
Mine decommissioning and reclamation*	Loss of direct, indirect and induced employment, loss of contracting opportunities (goods and services), and fly-in fly-out work rotations

*These activities refer to the overall project phase and are associated with sources of effects on the socioeconomic environment.

5.3.2 Interaction of the Project and Potential Effects

Sources of information were extracted from scientific literature, field studies, models built to assess the magnitude or extent of targeted effects and/or from Aboriginal/traditional knowledge sources. Available data extracted from the monitoring or the follow-up of similar mining projects also were also considered as valid sources of information to assess the effects of particular project activities.

For each of the previously-defined interactions, the potential environmental effects were described and quantified whenever possible. Effect determination was based on the available sources of information described in Section 5.3.6.

This section concludes with a statement on the nature and direction of the specific phase's activities on the component.

5.4 MITIGATION MEASURE SELECTION

The mitigation measures proposed for each component are often based on TSMC's EPP document (Volume 1 Appendix Ia), as measures have been developed over time by TSMC, based on past experiences. Section 6.2.1 provides information on the EPP in general, and how it will be adapted for the Howse Project.

To have the most beneficial effect on the biophysical and socioeconomic environments, mitigation measures were designed to meet the following criteria:

- Be technically and economically feasible to implement;
- Be concrete and demonstrably effective to reducing effect significance;
- Have a well-known significant positive effect on the targeted VC;
- Be aimed at counteracting a specific effect or series of effects;
- Have been suggested/accepted by local communities; and
- Have been suggested/accepted by the scientific community.

Mitigation measure description includes a clear statement of its efficiency in reducing the effect significance using, whenever possible, quantitative examples. Mitigation measures were presented by project phases.

5.4.1 Standard Mitigation Measures

TSMC, the assigned operator, has already developed a series of general mitigation measures for the ELAIOM and Project 2a EIS, and these will be amended to include general mitigation measures for the Howse Project. The full list of standard mitigation measures is presented in Volume 1 Appendix VI. From these, the relevant measures will be highlighted for each VC in the appropriate section and their effect on the VC will be described.

5.4.2 Specific Mitigation Measures

Specific mitigation measures were selected to reduce effect significance for a given VC. The mitigation measures must be described and documented, using a sufficient amount of detail to explain how they will effectively minimize the environmental effect. The full list of specific mitigation measures is presented in Volume 1 Appendix XVI.

5.5 RESIDUAL EFFECTS ASSESSMENT METHODOLOGY

Residual environmental effects are those that remain after the implementation of the standard and specific mitigation measures. They were assessed for each VC using the methodology described in the section below.

5.5.1 Residual Effects Significance Assessment

The following subsection presents the methodological approach used to assess the significance of the residual effects on the VCs, by Project phase. Emphasis was placed on VCs that undergo the most significant effects and the same methodological approach was adapted for each VC according to specific thresholds, standard governmental guidelines, laws and regulations.

Six criteria that were used to quantify the significance of the residual effects of the project on the VCs are described below. For each criteria, three levels of effects on the VC are described and an associated value is assigned (value of 1, 2 or 3), with the lowest value representing the least detrimental effect. These values were tabulated to assist with the numerical determination of VC effect significance.

This EIS follows the Operational Policy Statement published by the CEAA in November 2015. As such, the EIS assesses effects on VCs *within the present ecological context* CEAA, 2015b). The assessment of socioeconomic components was completed while consulting the CEAA'S *Technical Guidance for Assessing Physical and Cultural Heritage or any Structure, Site or Thing that is of Historical, Archeological, Paleontological or Architectural Significance under the* Canadian Environmental Assessment Act, 2012 (CEAA, 2015d).

The environmental setting of ELAIOM is significantly disturbed by past IOCC activities as well as by present TSMC/LIM exploration and operation activities. The Howse Project footprint adds relatively little disturbance to the area, except for the presence of an old access road and some exploration drill holes and related access.

5.5.1.1 Nature and Direction of an Effect

In order to further characterize the relationship between the project and the environment, the nature and direction of the effects were described. Effects may be direct or indirect in nature, or both. Direct effects are those that occur as a direct cause-effect consequence of a project activity (Sadar, 1996), such as the destruction of habitat due to the development of an iron ore mine pit. Indirect effects are those that are caused by another project effect, such as a reduction in the size of an animal population resulting from the destruction of habitat.

The direction of an effect could be either positive (Project interactions having positive effects on the biophysical or socioeconomic environments) or negative (Project interactions having negative effects on the biophysical or socioeconomical environments). The CEAA only considers negative effects in their review, as described in the Reference Guide: Determining Whether a Designated Project is Likely to Cause Significant Adverse Environmental Effects (CEAA, 2015b). Like their nature, the direction of effects is not a criterion of significance.

The nature and direction of the socioeconomic effects are considered insofar as the Howse Project's effects on the environment affects the socioeconomic values of the Aboriginal people. One purpose of the consultation program described in Section 4.0 was to gain insights into how the groups and individuals consulted would define the direction of the effects of the Project.

5.5.1.2 Timing of the Effect

The timing of an effect of the Project on a valued component is considered. Seasonal effects, biorhythms and ecological cycles are considered.

5.5.1.3 Geographic Extent of an Effect

Geographic extent refers to the area or distance over which a given VC will be affected by the source of an effect. As the LSA and RSA are specific to each selected VC, these will be used to describe the geographic extent of the effects of the Howse Project on each VC.

5.5.1.4 Duration of an Effect

Duration refers to the period of time during which a VC will be affected by the source of an effect. Consideration is given to effects that are expected to be seasonal and/or extend beyond the lifespan of the Howse Project.

5.5.1.5 Reversibility of an Effect

Ecosystems, including their human components, are dynamic and have, to varying degrees, the capacity to return to a pre-existing state when a source of effects ceases. Reversibility assessment criteria is adapted for each VC.

5.5.1.6 Magnitude of an Effect

Magnitude refers to the degree to which a given VC is affected by the source of an effect Magnitude could be higher if an effect is cumulative (e.g., several different water contaminants reaching the same water source), delayed (e.g., a contaminant such as mercury bioaccumulates in a living structure and shows its toxicity long after the beginning of the exposure) or synergistic (e.g., several low-toxicity chemical substances interact to produce a highly-toxic by-product).

The criteria to assess the magnitude of an effect is adapted according to each VC's particular scientific, technical and socioeconomic contexts and so are presented in each VC's respective section.

5.5.1.7 Frequency of an Effect

Frequency refers to the number of times that a given source of effect is active. Criteria used to determine frequency is provided for each VC.

5.5.2 Determining the Significance of a Residual Effect

The matrix below presents the conceptual evaluation of the significance of the residual effects, based on six criteria. The matrix shows how these effects were quantified; each criteria was first categorized into three incremental value categories, where 1 is the smallest and 3 is the largest environmental effect. The final numbers are tabulated into values between 6 and 18, and from these, five levels of effects are defined, from very low to very high. From these five levels, 'very high' and 'high' effects are defined as significant. Figure 5-1 shows how the criteria of magnitude/ecological context, geographic extent, frequency and duration/reversibility were aggregated to yield a measure of an effect. Levels determined as high or very-high are considered as significant. Level determined as 'moderate', 'low' or 'very low' are not considered as significant.

When the residual effects remain significant, compensation measures were adopted. The summary of the logic used to define the significance for each inter-relation is presented at the end of each assessment section.

A concluding statement is provided at the end of this section on the significance of the residual effect.

REVERSIBILITY			Non-reversible									Partially reversible									Reversible								
		Duration	Long			Medium			Short			Long			Medium			Short			Long			Medium			Short		
Timing	Magnitude	Spatial Extent / Frequency	Continual	Intermittent	Once	Continual	Intermittent	Once	Continual	Intermittent	Once	Continual	Intermittent	Once	Continual	Intermittent	Once	Continual	Intermittent	Once	Continual	Intermittent	Once	Continual	Intermittent	Once	Continual	Intermittent	Once
Unfavorable	High	Regional	18	17	16	17	16	15	16	15	14	17	16	15	16	15	14	15	14	13	16	15	14	15	14	13	14	13	12
		Local	17	16	15	16	15	14	15	14	13	16	15	14	15	14	13	14	13	12	15	14	13	14	13	12	13	12	11
		Site Specific	16	15	14	15	14	13	14	13	12	15	14	13	14	13	12	13	12	11	14	13	12	13	12	11	12	11	10
	Moderate	Regional	17	16	15	16	15	14	15	14	13	16	15	14	15	14	13	14	13	12	15	14	13	14	13	12	13	12	11
		Local	16	15	14	15	14	13	14	13	12	15	15	14	14	13	12	13	12	11	14	13	12	13	12	11	12	11	10
		Site Specific	15	14	13	14	13	12	13	12	11	14	14	13	13	12	11	12	11	10	13	12	11	12	11	10	11	10	9
	Low	Regional	16	15	14	15	14	13	14	13	12	15	14	13	14	13	12	13	12	11	14	13	12	13	12	11	12	11	10
		Local	15	14	13	14	13	12	13	12	11	14	13	12	13	12	11	12	11	10	13	12	11	12	11	10	11	10	9
		Site Specific	14	13	12	13	12	11	12	11	10	13	12	11	12	11	10	11	10	9	12	11	10	11	10	9	10	9	8
Moderate timing	High	Regional	17	16	15	16	15	14	15	14	13	16	15	14	15	14	13	14	13	12	15	14	13	14	13	12	13	12	11
		Local	16	15	14	15	14	13	14	13	12	15	14	13	14	13	12	13	12	11	14	13	12	13	12	11	12	11	10
		Site Specific	15	14	13	14	13	12	13	12	11	14	13	12	13	12	11	12	11	10	13	12	11	12	11	10	11	10	9
	Moderate	Regional	16	15	14	15	14	13	14	13	12	15	14	13	14	13	12	13	12	11	14	13	12	13	12	11	12	11	10
		Local	15	14	13	14	13	12	13	12	11	14	13	12	13	12	11	12	11	10	13	12	11	12	11	10	11	10	9
		Site Specific	14	13	12	13	12	11	12	11	10	13	12	11	12	11	10	11	10	9	12	11	10	11	10	9	10	9	8
	Low	Regional	15	14	13	14	13	12	13	12	11	14	13	12	13	12	11	12	11	10	13	12	11	12	11	10	11	10	9
		Local	14	13	12	13	12	11	12	11	10	13	12	11	12	11	10	11	10	9	12	11	10	11	10	9	10	9	8
		Site Specific	13	12	11	12	11	10	11	10	9	12	11	10	11	10	9	10	9	8	11	10	9	10	9	8	9	8	7
Inconsequential timing	High	Regional	16	15	14	15	14	13	14	13	12	15	14	13	14	13	12	13	12	11	14	13	12	13	12	11	12	11	10
		Local	15	14	13	14	13	12	13	12	11	14	13	12	13	12	11	12	11	10	13	12	11	12	11	10	11	10	9
		Site Specific	14	13	12	13	12	11	12	11	10	13	12	11	12	11	10	11	10	9	12	11	10	11	10	9	10	9	8
	Moderate	Regional	15	14	13	14	13	12	13	12	11	14	13	12	13	12	11	12	11	10	13	12	11	12	11	10	11	10	9
		Local	14	13	12	13	12	11	12	11	10	13	12	11	12	11	10	11	10	9	12	11	10	11	10	9	10	9	8
		Site Specific	13	12	11	12	11	10	11	10	9	12	11	10	11	10	9	10	9	8	11	10	9	10	9	8	9	8	7
	Low	Regional	14	13	12	13	12	11	12	11	10	13	12	11	12	11	10	11	10	9	12	11	10	11	10	9	10	9	8
		Local	13	12	11	12	11	10	11	10	9	12	11	10	11	10	9	10	9	8	11	10	9	10	9	8	9	8	7
		Site Specific	12	11	10	11	10	9	10	9	8	11	10	9	10	9	8	9	8	7	10	9	8	9	8	7	8	7	6

16-17-18 Very High	14-15 High	11-12-13 Moderate	9-10 Low	6-7-8 Very low

Figure 5-1 Matrix used to Assess level of an Effect

5.5.3 Determining the likelihood of an Environmental Effect

When environmental effects are rated as significant, it is still necessary to determine the likelihood of the environmental effect occurring or not (CEAA, 2015b). Two main criteria allow the determination of the likelihood of an effect:

- Probability of Occurrence: according to CEAA (1994), "*If there is a high probability that the identified significant adverse environmental effects will occur, obviously they are likely. Conversely, if there is a low probability of occurrence, the significant adverse environmental effects are unlikely*".
- Scientific Uncertainty: according the CEAA (1994) "*if the confidence limits are high, there is a low degree of uncertainty that the conclusions are accurate and that the significant adverse environmental effects are likely or not. If the confidence limits are low, there is a high degree of uncertainty about the accuracy of the conclusion. In this case, it will be difficult to decide whether the significant adverse environmental effects are likely or not*". Data gaps were clearly identify in each VC component description and greatly help identifying scientific uncertainty.

An assessment should then be made to determine the risk that the VC will be negatively affected. The risk that the significant effect will generate adverse effects increases with the likelihood in Figure 5-2.

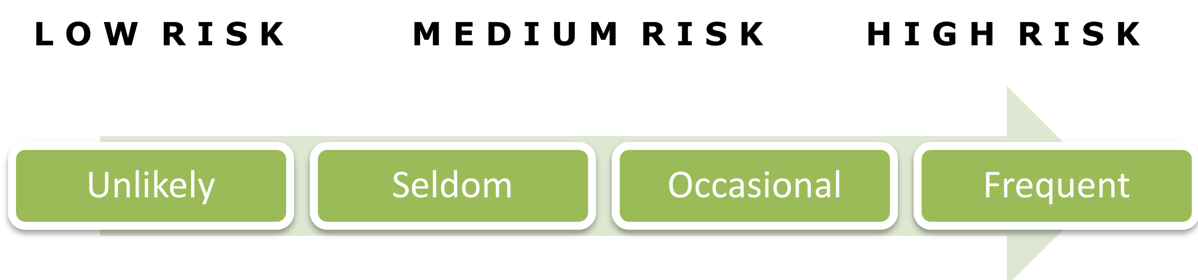

Figure 5-2 Risk assessment to determine the risk that the VC being significantly negatively affected

Evaluations of the probability of occurrence and scientific uncertainty for each VC are justified in the text in order to understand how the risk assessment was performed for the Howse EIS.

5.6 CUMULATIVE EFFECTS ASSESSMENT METHODOLOGY

Cumulative effects are defined as changes to the environment due to the project, combined with the existence of other past, present and reasonably foreseeable physical activities (CEAA, 2015c). Cumulative effects may result if:

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

According to Hegmann *et al.* (1999), the selection of future actions to consider in a cumulative environmental effects assessment should reflect "the most likely future scenario." Emphasis is given to projects with greater certainty of occurring; however, hypothetical projects might be discussed on a conceptual basis in some cases.

It should be noted that the cumulative effects assessment (Chapter 8) considered Schefferville-Sept-Îles rail traffic but that this source of effects was not assessed in the effects assessment (Chapter 7) because the infrastructure is already in place and owned by other entities. Furthermore, an assessment of the significance of the effects related to rail traffic for the Howse Project alone is not justified because of the large number of non-Howse related traffic on the rail line, but it is recognized that the significance increases when other physical activities are considered.

The document *Assessing Cumulative Environmental Effects under the Canadian Environmental Assessment Act, 2012* (CEAA, 2015c) thoroughly describes the CEAA's cumulative effect assessment approach and it is being followed closely in this EIS. This section briefly summarizes this approach and describes how it was implemented for the Howse Property Project.

5.6.1 Step 1: Scoping

As mentioned in the technical guidance document (CEAA, 2015c), only those VCs that continue to be subjected to residual effects undergo the cumulative effect assessment process.

Complementary information to the effects assessment is presented at the beginning of the cumulative assessment section. Information from various sources is considered, including the public consultation processes (Aboriginal or non-Aboriginal), ATK, the scientific literature, government websites and monitoring information coming from other physical activities effect assessment processes. Scoping is needed to determine how the VC effects associated with Howse Project interact with other physical activities and if these interactions are strong enough to justify a comprehensive analysis (Step 2). Spatial and temporal boundaries are essential elements to perform the scoping.

Spatial boundaries are always associated with the component's RSA and are described at the beginning of the component description section. Sufficient level of details is presented to properly justify the RSA selection. Along with the temporal boundaries, the LSA and RSA definitions serve to provide focus for the cumulative assessment of a project's effects on a VC.

Temporal boundaries are considered around the RSA and are usually directly related with the duration of the past, present and future physical activities of the Howse Project, as described in Section 8. However, an adaptive approach was taken and temporal boundaries adjustments were made where necessary for a VC, in which case justifications will be provided. The recovery period of the VC was also be considered and identified as the period of time needed for the VC to return to its initial state or to a new ecological equilibrium.

The goal of Step 1 is to identify VCs that will be carried forward into the analysis step. Further, Step 1 will identify and characterize the past, present and future physical activities that are susceptible to interact with the VC. Projects that are likely to be associated with cumulative effects on the Howse VCs are presented in Section 8.2. The specific activities which are anticipated to interact with Howse VCs are also presented.

5.6.2 Step 2: Analysis

Cumulative assessment analysis was done using the best available information. Sources of information are numerous and sometimes available from adjacent projects (Section 8.2). In addition, for past IOCC projects, historical information is available from the McGill Research Center, from the IOCC historical documents as well as through data gathered by the various ATK processes done for ELAIOM and Howse Projects. For other activities, sources of information are extremely scarce and primarily available on the internet. The types of data and information gathered to assess each VC is presented and logic for their selection clearly introduced.

Standard analytical methods were applied to present quantifiable results to assess the cumulative effects of the Howse Project on VCs. Numerical models are used to assess the cumulative effects of the Howse project on air quality and human health. Dilution factors were used for air and water analyses to consider the effect of physical activities within the Schefferville region. Spatial analyses using geographical information system (GIS) were used to characterize the spatial interactions between the Project and the other physical activities. GIS was also used to evaluate the cumulative loss of wetlands and sensitive or unique ecosystems over the Schefferville region. Methodology used to assess cumulative effect are described in detail in their respective section and choice for their selection is also clearly introduced.

The cumulative effect assessment for socioeconomic VCs was primarily accomplished using data gathered through the consultation process, sources of ATK as well as with data available from Provincial and Federal authorities. Information on land use and subsistence and traditional activities by Aboriginal groups has been obtained from the land-use study conducted for the purpose of the Howse project and from previous studies conducted in the area.

5.6.3 Step 3: Mitigation

The mitigation measures presented in the effects assessment continue to be applicable for the cumulative effects assessment. However, cumulative effect mitigation also considers interactions with other physical activities, and longer-term effects. Further, new mitigation measures were proposed, where relevant, to target the effects of cumulative effects on the VC effect. Rationales for their selection are also clearly presented. Commitments made by the proponent are described.

5.6.4 Step 4: Significance Assessment

The same methodology used for VC effect assessment (Section 5.4) was used to assess the cumulative effects. In addition, the definitions for the six criteria (timing, geographic extent, duration, reversibility, frequency, magnitude) are used, and their definitions are modified accordingly.

5.6.5 Step 5: Follow-up

The methodology used to develop the monitoring and follow-up program to assess the effectiveness cumulative assessment mitigation measures is presented in Section 9, along with the methodology to develop the follow-up program for the Howse Project (Section 9 for further details). The section highlights which measures are specifically selected to follow the cumulative assessment of a specific VC.

5.6.6 Physical Activities Considered

An overview of active and foreseeable projects are located in the vicinity of the Howse Project and/or share infrastructure with the Project is presented in Section 8.2. A list of VCs identified for the cumulative effects assessment are presented in Section 8.1.

5.6.7 Monitoring and Follow-up Methodology

A short methodological approach to develop monitoring and follow-up program for each VC is presented in section 9. Both site specific and cumulative effect assessments monitoring and follow-up are presented in section 9.