



**SELWYN CHIHONG
MINING LTD.**

**Developer's Proposed Terms of Reference
for
Howard's Pass Access Road Upgrade Project
Selwyn Chihong Mining Ltd.**

September 16, 2015

Submitted to:
Mackenzie Valley Review Board
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ACRONYMS AND GLOSSARY OF TERMS

To be completed by the Developer and finalized by the Review Board.

Acronyms

DAR	Developer's Assessment Report
DPToR	Developer's Proposed Terms of Reference
HPAR	Howard's Pass Access Road
MOU	Memorandum of Understanding
MVEIRB	Mackenzie Valley Environmental Impact Review Board
MVRMA	Mackenzie Valley Resource Management Act
NWT	Northwest Territories
PDR	Project Description Report
SCML	Selwyn Chihong Mining Ltd.

Terms

Bedrock Geology	The hard and consolidated rock beneath surface geological materials such as sand and gravel.
Borrow material	Soil, gravel or sand that has been dug for use at another location
Community wellness	The status of the physical, emotional, social, cultural and economic well-being of a community. The state of community wellness depends on the health and well-being of every aspect of a community, the individual, families, etc.
Concentrates	The product generally produced by a metal ore mine, whereby waste rock is removed and the raw ore is ground finely, thus concentrating the metal.
Follow-up	A program for verifying the accuracy of the environmental assessment of a project and determining the effectiveness of any measures taken to mitigate the adverse environmental effects of the project.
Height of land	Boundary between watersheds; in relation to this project, this is the boundary between the Mackenzie River drainage and the Yukon River drainage, and corresponds with the NWT/Yukon boundary.
HPAR Upgrade Project (the Project)	The proposed upgrade the existing Howard's Pass Access Road (HPAR) to a two-lane all-season mine access road, eventually to be used for the bulk haul of zinc and lead concentrates.
Merchantable Timber	Timber that is considered to have financial value that is generally based on diameter, overall quality, location and other commercial factors.
Pre-feasibility Study	An evaluation of a proposed mining project to determine whether the mineral resource can be mined economically
Selwyn Project	SCML's proposed zinc-lead mine on the Yukon side of Howard's Pass

Significance	<p>An informed judgement of what is important based on the available evidence. An opinion or determination of the significance of an impact takes into account</p> <ul style="list-style-type: none">• nature or type of the impact;• geographical extent of the impact;• timing of the impact (including duration, frequency and extent);• magnitude of the impact (what degree of change is expected);• reversibility of the impact; and,• likelihood of the impact.
Surficial Geology	<p>Surficial geology, can also be referred to as Quaternary Geology, refers to unconsolidated sediments and landforms that overlies bedrock.</p>
Valued Components	<p>Aspects of the economic, social, biophysical or cultural fabric of a community or region that are important to the party who defines them. They are important because they provide economic value, reflect connections that are vital to a way of life, or are vital to maintaining quality of life in the community. Valued components provide a focus for the collection and reporting of appropriate information, thus narrowing of the scope of EIA.</p>

1 INTRODUCTION

1.1 Overview

To be populated by the Review Board.

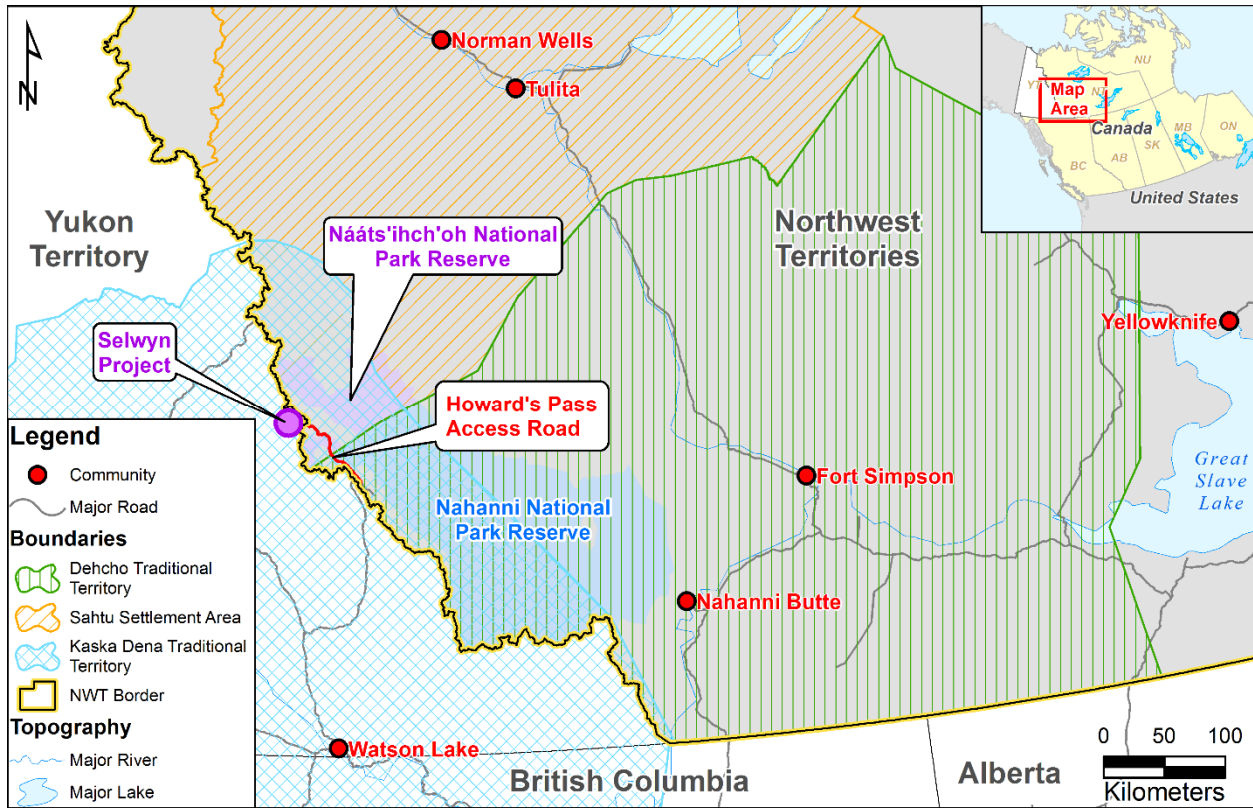
1.2 Background

The Howard's Pass Access Road (HPAR) is a 79 km gravel road located in southwestern Northwest Territories. It branches off the Nahanni Range Road, near Tungsten, and ends at the height of land in Howard's Pass at the NWT–Yukon border.

The HPAR was originally built in 1978 to 1979 for access to the extensive zinc-lead deposit that straddles the Yukon–NWT border at Howard's Pass in the Selwyn Mountains ([Figure 1](#) ~~Figure 1~~ and [Figure 2](#)). The road underwent an environmental assessment and approval prior to its construction. Nahanni National Park was created in 1972 and had a smaller footprint than it has today. It did not overlap with the area of the new mine access road. The expansion of Nahanni National Park Reserve in 2009 and the creation of Nááts'ihch'oh National Park Reserve in 2014 brought the section of the HPAR from km 14 to km 60 within the jurisdiction of Parks Canada. The HPAR also passes through Sahtu Settlement Area, Dehcho Traditional Territory, and (overlapping) Kaska Dena Traditional Territory, as shown on [Figure 1](#) ~~Figure 1~~.

When mineral exploration activity declined in the 1980s, the road fell into disuse and gradually deteriorated. Renewed interest in the Howard's Pass mineral deposit since 2005 has renewed the need for access to this potential mine site, both for exploration and mine development, and as part of a route for transporting zinc and lead concentrates to market when the mine is operational.

Figure 1: Project Location of the Howard's Pass Access Road: Regional View



This map illustrates the Selwyn Project area in Yukon, Canada, focusing on the Nahanni Range Road and the Howard's Pass Access Road. The main map shows a red line representing the road, with blue dots indicating bridge locations and green dots marking kilometre intervals. The road starts at the top left and runs generally south-southwest, crossing several creeks and rivers. Key features include:

- Legend:**
 - Blue dot: Bridge Location/Major Crossing
 - Green dot: HPAR Kilometre Marker
 - Purple dot: Selwyn Project
 - Black line: Nahanni Range Road
 - Blue shaded area: Nahanni National Park Reserve
 - Purple shaded area: Nááts'ihch'oh National Park Reserve
 - Yellow outline: Yukon & NWT Border
- Topography:**
 - Blue line: Watercourse
 - Blue wavy line: Wetlands
 - Blue area: Waterbody
 - Green area: Vegetation
 - Brown line: 100m Contour
- Key Locations and Features:**
 - Bridges:** Placer Creek Bridge, Steel Creek Bridge, March Creek Bridge, Logan Creek Bridge, Fork Creek Bridge, Guthrie Creek Bridge, Mac Creek Bridge, Unnamed Bridge.
 - Rivers/Creeks:** Nahanni River, Little Nahanni River, Flat River.
 - Roads:** Nahanni Range Road, Howard's Pass Access Road.
 - Markers:** 70 Km, 60 Km, 50 Km, 40 Km, 36 Km, 30 Km, 20 Km, 14 Km, 10 Km.
 - Other:** Tungsten (black dot), Selwyn Project (purple dot), Map Area (red box in inset).
- Inset Map:** Shows the location of the Selwyn Project within Yukon and the Northwest Territories. The Selwyn Project is marked with a purple dot, and the Map Area is indicated by a red box.
- Scale:** 0 to 10 Kilometers.

Selwyn Chihong Mining Ltd. (SCML), a Vancouver-based mineral exploration and development company, is currently conducting a pre-feasibility study for a proposed zinc-lead mine on the Yukon side of Howard's Pass, referred to as the Selwyn Project. SCML has held a number of authorizations that allow for the maintenance, reconstruction and use of the HPAR to provide access to the Selwyn Project. The road was reconstructed to a single-lane all-season road under these authorizations during 2014. The HPAR was in a deteriorated condition before the reconstruction program in 2014. The purpose of the reconstruction was to return the road to its original purpose as a single-lane all-season mine access road. As part of this reconstruction, new bridges and culverts were installed.

SCML is now proposing to upgrade the HPAR to a two-lane all-season mine access road and to use the access road to support the evolving needs of the Selwyn Project in the Yukon, including the bulk haul of zinc and lead concentrates. The proposed upgrade is sufficient to meet the long-term needs of the Selwyn Project.

The history of the HPAR from its original construction to this proposal is summarized in [Figure 3](#).

Figure 3: History of the Howard's Pass Access Road



The proposed HPAR upgrade program is to widen the road to 8.5 m and make minor adjustments in alignment to improve the road design. The current surface area disturbed is approximately 35.6 ha for the road footprint, 63.2 ha for cut/fill slopes and areas cleared of vegetation along the HPAR, and a 2.3 ha area that was cleared for the construction camp and laydown area for the 2014 road reconstruction. Road widening and local re-alignments associated with this Project would result in a further estimated 85.9 ha being disturbed. In addition, construction activities will require land for

additional temporary camps/laydown areas and for quarries, resulting in a disturbance of about 20.4 ha. Overall, the Project will approximately double the disturbed surface area (from 101 ha to 207 ha), including land that will be progressively reclaimed during and immediately following the construction period.

The current status of the HPAR is a single-lane road with very little traffic. The road was not readily passable until reconstruction in 2014. In 2014 and 2015 the main use has been for access by SCML and its contractors to the Selwyn Project and to undertake baseline studies on the road itself. Estimated current traffic, including mine access and public use, is less than one vehicle per day.

The upgraded HPAR would be used for transportation of equipment and supplies during the period of development of the Selwyn Project mine. Once the mine is in operation, the zinc and lead concentrates would be hauled by truck and trailer from the mine along the HPAR to the road's beginning near Tungsten, then southwest along the Nahanni Range Road, crossing into the Yukon about 5 km from the start of the HPAR. Trucks would continue on to port facilities at Stewart, BC. Fuel and supplies would be hauled to the mine site along the HPAR. Personnel, however, would access the mine by air transport, not via the HPAR. The estimated traffic volume on the HPAR during mine operation is 100 trips per day in each direction.

1.3 Referral to Environmental Assessment

To be populated by the Review Board.

1.4 Legal Context and the Terms of Reference Development Process

To be populated by the Review Board.

1.5 Consideration of Previous Environmental Assessment Material

To be populated by the Review Board.

2 DEVELOPER'S ASSESSMENT REPORT (DAR) GENERAL REQUIREMENTS

2.1 Presentation of Material

To be populated by the Review Board.

2.2 Incorporation of Traditional Knowledge

The DPToR has considered traditional knowledge, including an understanding about the past and present use of the HPAR corridor and vicinity, in proposing valued components (VCs) and key lines of inquiry. A preliminary interview-based traditional knowledge study conducted with individuals from Tulita (Pacifica Resources Ltd. 2006), as well as public meetings (Sidena Consulting Ltd. 2015)

and observations over SCML's period of use of the road indicate that there is little current or recent use of the area by First Nations for traditional pursuits (including hunting, fishing, berry and other plant collection, and trapping). The review of the Project Description Report (PDR) for the HPAR upgrade (SLR Consulting (Canada) Ltd. 2015) by the Nahʔą Dehé Dene Band was also helpful in providing information on the Nahanni caribou herd, information that has been incorporated into proposed mitigation measures and into the identification of key lines of inquiry.

Both the Sahtu Land Use Plan (Sahtu Land Use Planning Board 2013) and the Dehcho final draft Land Use Plan (The Dehcho Land Use Planning Committee 2006) have been consulted in preparation of the PDR and in determining valued components, operating procedures, and proposed mitigation measures. These plans incorporate traditional knowledge about the area and reflect the values of the First Nations, and they will continue to guide SCML throughout the life of the Project.

SCML will undertake further traditional knowledge studies to acquire a fuller understanding of past and current use of the HPAR corridor and vicinity, as well to acquire knowledge about wildlife and wildlife habitat that could be affected by the Project, especially in relation to cumulative effects. A traditional knowledge study that follows up on the 2006 preliminary study in Tulita is planned for 2015. Other studies are at the planning stage and will be finalized following consultation with potentially affected First Nations communities. Existing available documentation of relevant traditional knowledge will also be consulted in developing the DAR. Studies to document traditional knowledge and incorporation of traditional knowledge into the DAR will respect confidentiality and will be guided by the MVEIRB's *Guidelines for Incorporating Traditional Knowledge into the Environmental Impact Assessment Process* (MVEIRB 2005) and specific relevant traditional knowledge policies and protocols (such as Deh Cho First Nation 2003, 2004).

2.3 Public Engagement

SCML began to engage with communities on plans for HPAR reconstruction and upgrading in 2006 to provide potentially affected communities with project information, and to solicit comments that would assist SCML in developing project plans, designs and operations. The potentially affected communities with whom SCML has been, and will continue to be engaged include Tulita, Norman Wells (Sahtu Dene and Metis First Nations), Nahanni Butte (Nahʔą Dehé Dene Band, Dehcho), and Ross River Dena Council and Liard First Nation (Kaska Nations). The latter two, which are located in the Yukon, have been primarily involved in consultation on the Selwyn Project development in the Yukon, but have also been included in SCML's consultation on the HPAR Upgrade Project.

SCML has established life-of-mine cooperation agreements with the Sahtu Dene and Metis First Nations and with the Dehcho First Nation, and an interim measures agreement with the Kaska Nations. SCML is in the process of developing a socio-economic participation agreement with the Kaska First Nations for the Selwyn Project.

SCML has also signed a Memorandum of Understanding (MOU) with Parks Canada on the operation of HPAR within Nahanni National Park Reserve and Nááts'ihch'oh National Park Reserve that will guide aspects of the DAR.

Engagement with these potentially affected communities has been done in accordance with guidance provided in the Mackenzie Valley Land and Water Board's Engagement and Consultation

Policy, under the terms of SCML's negotiated Cooperation Agreements with the Sahtu and Dehcho, SCML's Interim Measures Agreement with the Kaska, and following the HPAR Community Engagement Plan (Siden Consulting Ltd. 2014) developed in collaboration with community representatives and using feedback from community members.

The development of the DPToR has been assisted by consistent engagement of communities through meetings with key community leadership organizations and through public open houses, where time was provided to answer questions in an open format or one-on-one with company representatives. Written comments from attendees were also received and questions and answers were documented in a publicly accessible HPAR Community Engagement Report (Siden Consulting Ltd. 2015). SCML has also conducted numerous site tours for community members, providing opportunities for familiarization with project plans and informal discussion of plans, concerns and opportunities.

SCML has also engaged in ongoing consultation with Parks Canada and NWT government agencies, and their input was incorporated into the PDR as part of the initial application process and the DPToR. A draft of the Land Use Permit and Water Licence applications, including the PDR, was circulated to government agencies and potentially affected communities for review and comment prior to submission to the Mackenzie Valley Land and Water Board.

Input both from the First Nations consultation process and from subsequent consultation on the draft applications was used to identify community priorities and values with respect to potential effects of HPAR Upgrade Project. This input has been fundamental for the selection of valued components and key lines of inquiry in the DPToR, and it has assisted with the development of the baseline programs and current technical information that will be included in the effects assessment. Furthermore, this input has been used in development of specific mitigation measures that are outlined in the PDR, and it has been used to develop and implement plans for employment, contracting and business opportunities for the communities.

Input from public engagement throughout the life of the Project will guide development and implementation of the HPAR Upgrade Project. Throughout the environmental assessment process, SCML will continue to consult with Parks Canada, aboriginal communities, and the general public that are potentially affected by the HPAR Project. During the development of the DAR, information about the Project, its potential effects, and proposed mitigation measures will be provided to potentially affected parties and organizations with jurisdictional interests with the intent of obtaining reviews and feedback. This information will be communicated in language and formats that are accessible to community representatives.

Compliance with and reporting on auditing and environmental monitoring provisions that are contained in Sahtu and Dehcho Cooperation Agreements will guide engagement on these topics with the Sahtu and Dehcho communities.

An engagement log will be maintained and included in the DAR. This log will include details of meetings and communications with individuals and groups, Project information discussed and comments, concerns and questions raised by community members. The log will also document SCML's responses to issues raised, and if applicable, commitments and agreements made to develop project plans and designs which consider the comments and concerns of potentially affected parties.

2.4 Summary Materials

To be populated by the Review Board.

2.5 Developer

SCML is a Vancouver-based mineral exploration and development company that is currently conducting a pre-feasibility study for a proposed zinc-lead mine on the Yukon side of Howard's Pass, referred to as the Selwyn Project. SCML has no subsidiary companies, related corporations or joint venture partners. SCML is a subsidiary of Chihong Mining Canada Ltd, which is itself a subsidiary of Yunan Chihong Zinc and Germanium. The following information is required regarding SCML and, where relevant, regarding Chihong Mining Canada Ltd.:

1. a summary of the corporate history and operational experience in Canada and the Northwest Territories;
2. how SCML will ensure that it and its contractors and subcontractors honour commitments made through the environmental assessment process and information on SCML's compliance with its existing socio-economic agreements and other agreements such as the MOU with Parks Canada;
3. the developer's environmental performance records since activities related to the HPAR began. This will include discussion of regulatory compliance, for example, regarding land use permits and water licences. List situations where compliance was breached, the issue and cause, and how and when it was mitigated to the regulator's satisfaction; and,
4. a description of any corporate policies, standard operating procedures, programs or plans concerning SCML's environmental, sustainable development, community engagement, and workplace health and safety commitments or policies.

3 SCOPE CONSIDERATIONS

3.1 Scope of Development

Under Subsection 117(1) of the Mackenzie Valley Resource Act (MVRMA), the Review Board determines the scope of development for every environmental assessment it conducts. The scope of development consists of all the physical works and activities required for the project to proceed. In addition, SCML will identify all permits, licences or other regulatory approvals necessary for the different phases of the development and all land tenure agreements required. The Review Board may amend the scope of development at any time during the environmental assessment if the proposed development changes.

Table 1: Summary of the Scope of Development by Project Phase

Phase	Scope of Phase
Construction	<p data-bbox="423 338 824 369"><u>Temporary construction camps:</u></p> <ul data-bbox="472 380 1409 705" style="list-style-type: none"> • clearing of vegetation and site preparation for construction camps; • set-up and operation of construction camps and ancillary facilities (e.g., solid, liquid and gas waste management, including fuel storage, hazardous waste management, potable water supply, wastewater management and disposal, power supply); • construction laydown areas and areas for stockpiling stripped materials and for equipment maintenance; and, • progressive removal of camps and site reclamation, including of sumps for grey water disposal. <p data-bbox="423 716 581 747"><u>Borrow pits:</u></p> <ul data-bbox="472 758 1393 1251" style="list-style-type: none"> • clearing of vegetation and site preparation for borrow pits; • stripping and stockpiling of organic topsoil • construction and use of borrow pits (quarries) to obtain construction material for the HPAR upgrade, including construction of access roads to the quarries as needed; • gravel screening; • rock drilling and blasting; • rock crushing; • sorting and stockpiling borrow materials; • loading borrow material into trucks and hauling to work areas; • dust control at borrow pits, including water taking for this purpose; and, • progressive decommissioning and reclamation of borrow pits. <p data-bbox="423 1262 508 1293"><u>HPAR:</u></p> <ul data-bbox="472 1304 1401 1936" style="list-style-type: none"> • access and traffic management; • clearing of vegetation and site preparation; • road construction and upgrades to design standards for commercial use, including local re-alignments of some sections to improve horizontal and vertical alignment, increase sight distance, and improve overall safety for road operations; • drainage construction including digging ditches, installing cross culverts, and construction of ditch blocks and check dams to help control surface water runoff; • extension of existing culverts to accommodate the wider road, and relocation of some culverts to accommodate upgraded road design; • construction of roadside barriers and bridge flares on bridge approaches to provide pullouts and improve road safety at bridges; • installation of road signs at bridge approaches and other locations where signs are required; • dust control along the HPAR, including water taking for this purpose • avalanche management;

Phase	Scope of Phase
	<ul style="list-style-type: none"> • installation, operation and maintenance of a wireless communications system; • erosion and sediment control during construction; and, • spill and emergency response activities if and as needed.
Operations	<p><u>Transport:</u></p> <ul style="list-style-type: none"> • inbound transport of equipment, materials and supplies to Selwyn Project, including diesel and LNG fuels and mill process reagents; and, • outbound transport of zinc and lead concentrates from the Selwyn Project and of empty supply vehicles. <p><u>HPAR operation and maintenance:</u></p> <ul style="list-style-type: none"> • road maintenance; • bridge and culvert maintenance; • dust control, including water taking for this purpose; • avalanche management; • operation of maintenance borrow pits (including activities listed for borrow pits in the construction phase); • response to accidents and malfunctions (as required); • operation and maintenance of a wireless communications system; and, • operation of a road gate near the start of the HPAR, with potential for associated facilities, to manage road access.
Closure	<p><u>Maintenance borrow pits:</u></p> <ul style="list-style-type: none"> • progressive decommissioning and reclamation of maintenance borrow pits. <p><u>Temporary suspension of road use:</u></p> <ul style="list-style-type: none"> • measures to stabilize drainage and slopes and prevent erosion and sedimentation. <p><u>Permanent closure:</u></p> <ul style="list-style-type: none"> • measures to remove culverts, dismantle bridges, stabilize slopes and drainage, and control erosion and sedimentation; and, • restoration of disturbed areas, including site preparation and re-vegetation. <p><u>Access and traffic management:</u></p> <ul style="list-style-type: none"> • as required during decommissioning work.

3.2 Scope of Assessment

3.2.1 Effects Assessments – Valued Components

The valued components listed in Table 2 will be used in the assessment of impacts from the project on biophysical, social, economic and cultural values, as identified through SCML's scoping activities.

Table 2: Valued Components

Category	Valued Component	Subjects to Consider (preliminary list that may change during development of the DAR)
Physical environment components	Bedrock geology and surficial geology	Terrain stability and hazards (including permafrost); erosion and sedimentation; metals in soils; granular materials
	Air quality	Fugitive dust; vehicle and equipment emissions
	Water and sediment quality	Water quality of major streams and Little Nahanni River; risk of deleterious effects from spills on water and on stream sediment
Ecosystem components	Vegetation	Types of vegetation communities; invasive plants; rare plants; metals in vegetation
	Fish and aquatic habitat	Arctic grayling and lake trout; spawning and rearing habitat quality; lake and wetland habitat
	Wildlife and wildlife habitat	Northern mountain woodland caribou (Nahanni caribou herd); moose; grizzly bear; wolverine; breeding birds; cliff nesting raptors; waterfowl
	Species at risk	Bats and other mammals; bird species at risk
Human/ecosystem components	Traditional land use, harvesting	Past and current traditional use
	Cultural resources	Places of cultural significance
	Heritage resources	Archaeological and historical sites
	National Park Reserves	Visitor access to park areas and visitor experience; park heritage and cultural resources; ecological integrity
	Potentially affected communities	Employment and contracting opportunities; wage and salary income; training and skill development; business opportunities; and, overall community wellness.
	Road, lake and river access and use	Road access; resident hunting and fishing; recreational cabin use; Little Nahanni River use

3.2.2 Overview

The scope of assessment defines which issues will be examined in the environmental assessment. The scope of assessment includes all potential impacts on valued components of the biophysical and the human environment (for example, wildlife species or employment opportunities) from the development, by itself and in combination with other past, present and reasonably foreseeable future human activities and developments.

3.2.3 Issues Prioritization

The purpose of scoping is not only to identify issues, but also to identify key areas prioritize them and if possible focus required that will require additional work on the most important issues. However, SCML will consider all the items described in sections 6–10 because every issue identified in this Terms of Reference requires serious consideration and substantive analysis to demonstrate whether the development is likely to be the cause of, or contribute to, significant adverse impacts.

3.2.4 Key Lines of Inquiry

Valued components that are considered to be a with higherst priority are considered “key lines of inquiry” by the Review Board. Key lines of inquiry are the topics of the greatest concern that require the most attention during the environmental assessment and the most rigorous analyses in the DAR. They are designated as key lines of inquiry to ensure a comprehensive analysis of the issues most likely to cause significant environmental impacts or significant public concern. Data collection and analyses for the key line of inquiry in the DAR should be at a level of detail appropriate for other interested parties to understand the technical material prior to any technical sessions on these topics.

The key lines of inquiry will be presented in comprehensive stand-alone sections in the DAR. This will facilitate close examination of the developer’s response to these key lines of inquiry, and will require only minimal cross-referencing with other parts of the report and appendices.

Proposed key lines of inquiry:

1. **Nahanni caribou herd:** direct and indirect effects on individual caribou and on the caribou herd from road traffic and road access;
2. Accidents and Malfunctions Risk of sSpills and other accidents and malfunctions: with priority focus on risk of spills from hauling concentrates, fuels and mine reagents during mine operation; potential impacts on aquatic and terrestrial ecosystems;
3. **National park reserves:** visitor access to park areas and visitor experience; park heritage and cultural resources; ecological integrity; and,
4. **Benefits and effects on communities:** including direct and indirect effects on employment and contracting opportunities; wage and salary income; training and skill development; business opportunities and overall community wellness.

3.2.5 Subjects of Note

Valued components of a lower priority are classified as “subjects of note” and should be described in the DAR with less detail than the key lines of inquiry.

Proposed subjects of note:

- Bedrock geology and surficial geology;
- Air quality and sources of sensory disturbance, which includes dust, nnoise, and vibration and light;
- Water and sediment ~~quality~~ (excluding the impacts of accidents and malfunctions);
- Vegetation;
- Fish and aquatic habitat (excluding the impacts of accidents and malfunctions);

- Wildlife and wildlife habitat (excluding caribou);
- Species at risk;
- Traditional land use and harvesting;
- Cultural resources;
- Heritage resources; and,
- Road, lake and river access and use.

3.3 Geographic Scope

Minimum geographic scopes for assessment of valued components are specified, by project phase, in [Table 3](#), and the rationale for these are in Table 4.

Table 3: Minimum Geographic Scope for Assessment of Valued Components

Valued Component	Geographic Scope during Construction	Geographic Scope during Operations	Geographic Scope during and post-Closure
Bedrock geology and surficial geology	Project footprint and within 150 m either side of the road centreline	Project footprint and within 150 m either side of the road centreline	Within 150 m either side of the road centreline
Air quality	Within 1 km of the road centreline	Within 1 km of the road centreline	N/A
Water and sediment quality	Road; stream crossings: Within 100 m of road and 200 m downstream of a watercourse crossing Spill risk: water bodies adjacent or crossed, and downstream to extent of potential impact	Road; stream crossings: Within 100 m of road and 200 m downstream of a watercourse crossing Spill risk: water bodies adjacent or crossed, and downstream to extent of potential impact	Road; stream crossings: Within 100 m of road and 200 m downstream of a watercourse crossing
Vegetation	Within 100 m either side of the road centreline	Within 100 m either side of the road centreline	Project footprint
Fish and aquatic habitat	Road; stream crossings: Within 100 m of road and 200 m downstream of a watercourse crossing Spill risk: water bodies adjacent or crossed, and downstream to extent of potential impact	Road crossings: Within 100 m of road and 200 m downstream of a watercourse crossing Spill risk: water bodies adjacent or crossed, and downstream to extent of potential impact	Road crossings: Within 100 m of road and 200 m downstream of a watercourse crossing

Valued Component	Geographic Scope during Construction	Geographic Scope during Operations	Geographic Scope during and post-Closure
Wildlife and wildlife habitat	Dependent upon species/population ranges and habitat requirements, and also on potential effect being evaluated.	Dependent upon species/population ranges and habitat requirements, and also on potential effect being evaluated.	Dependent upon species/population ranges and habitat requirements, and also on potential effect being evaluated.
Species at risk	As above	As above	As above
Traditional land use and harvesting;	Dependent upon traditional harvesting and other traditional use patterns	Dependent upon traditional harvesting and other traditional use patterns	Dependent upon traditional harvesting and other traditional use patterns
Cultural resources	As above	As above	As above
Heritage resources	Project footprint and within 30 m of the edge of the project footprint	Project footprint and within 30 m of the edge of the project footprint	Project footprint and within 30 m of the edge of the project footprint
National Park Reserves	National Park Reserve boundaries	National Park Reserve boundaries	National Park Reserve boundaries
Potentially affected communities	Tungsten, Tulita, Norman Wells, Nahanni Butte; Dehcho and Sahtu	Tungsten, Tulita, Norman Wells, Nahanni Butte; Dehcho and Sahtu	Tungsten, Tulita, Norman Wells, Nahanni Butte; Dehcho and Sahtu
Road, lake and river access and use	Road and tracks or trails used for access, such as to mining leases and to cabins or water bodies	Road and tracks or trails used for access, such as to mining leases and to cabins or water bodies	Road and tracks or trails used for access, such as to mining leases and to cabins or water bodies

Table 4: Rationale for Minimum Geographic Scopes for Valued Components

Valued Component	Rationale for Minimum Geographic Scope
Bedrock geology and surficial geology	Direct effects on the surface and subsurface geology and terrain would be within the widened road width and cut/fill slopes, temporary camp areas, and borrow pits. They would include excavation, placement and compaction of fill material, and disturbance to permafrost. The 150m width would also include any unstable terrain on the slopes above and below the road prism and potential thaw of permafrost due to change in the thermal regime from the widened road prism and surface water drainage pattern changes. This is the geographic scope selected for the terrain stability mapping.

Valued Component	Rationale for Minimum Geographic Scope
Air quality	A wide boundary of within 1 km of the road centreline was selected to account for a zone of potential effects on humans in the vicinity. A narrower, as yet undefined, zone of potential influence would apply to vegetation and potential sensory disturbance of wildlife from dust. For effects in relation to road health and safety issues, the geographic scope would be the project footprint. Air quality will not be affected during the closure phase.
Water and sediment quality and Fish and aquatic habitat	For these VCs, two geographic scopes were selected, with the following rationale: 1) Road; stream crossings: these distances were selected in consultation with fisheries experts as reasonable distances over which to assess impact from road and water crossing construction and operation. 2) Spill risk: This is not possible to define as a specific distance, as it depends on where the spill occurs, the amount and substance spilled. Defining this geographic scope is part of the risk assessment process.
Vegetation	Direct effects of the project on vegetation (clearing) will be restricted to the project footprint, by definition. The geographic boundary of potential effects from dust or from invasive species would extend beyond this. The distance of 100 m from the road is based on initial air quality projections related to fugitive dust from road traffic (Levelton Consultants Ltd. 2011). Terrestrial ecosystem mapping has been done for a 2 km corridor along the road, and baseline information on vegetation communities and interpretation of effects will be at this broader scale.
Wildlife and wildlife habitat and species at risk	The geographic scope of assessment in relation to direct effects from traffic in the construction and operations phases (e.g., collisions, avoidance, sensory effects, wildlife encounters) will depend on the potential effect being assessed, as well as on the characteristics of the species. For effects assessment on, for example, breeding areas or patterns of movement, the geographic scope could include a regional approach, again, depending upon the species.
Traditional land use, harvesting, and cultural resources	The assessment for this VC will depend on the geographic scope of specific traditional uses and the identification of cultural resources. A wide area will be considered in order to take a holistic approach and ensure that any effect on such special areas or traditional activities are considered in the context of each community. This VC includes consideration of potential effects on traditional harvesting that occurs distant from the Project area but that might be affected by the Project – specifically, the traditional harvest in winter of the Nahanni Caribou Herd in the South Nahanni corridor. In order to assess effects, the geographic scope should be flexible and not be restricted to a number of kilometres from the road.
Heritage resources	This distance of 30 m from any proposed disturbance conforms to the Mackenzie Valley Land Use Regulations, section 6(a).
National Park Reserves	In order to assess effects of the Project on the Park Reserves in a holistic fashion, the full extent of the Park Reserves will be considered.
Potentially affected communities	The individual potentially affected communities, which were identified due to proximity or through consultation with First Nations, form the primary geographic boundary for consideration of effects, while some aspects of this VC will be better considered from the wider perspective of the Dehcho and the Sahtu regions.

Valued Component	Rationale for Minimum Geographic Scope
Road, lake and river access and use	This boundary is self-explanatory.

3.4 Temporal Scope

Temporal scopes for assessment of valued components, along with rationale, are presented in Table 5.

Table 5: Temporal Scope for Assessment of Each Valued Component

Valued Component	Temporal Scope and Rationale
Bedrock geology and surficial geology	Periods of construction, operation and closure. The most significant period for consideration of this VC is during construction, when it is important to assess and mitigate potential effects of the road upgrade in relation to terrain stability and hazards (including permafrost), to assess and reduce potential for erosion and sedimentation, and to assess effects of extraction and use of granular materials. The temporal scope for closure is related to long-term stabilization of the reclaimed project area; it will therefore include an appropriate period of monitoring.
Air quality	Periods of construction and operation. Air quality will not be affected during closure. The period on which the assessment for this VC will focus is operations, as traffic will be much heavier then.
Water and sediment quality and fish and aquatic habitat	Periods of construction, operations and closure. The effects assessment will focus on different potential impacts for these phases, and temporal considerations will vary accordingly. For construction, which includes work on stream crossings, it will be important to consider sensitive periods for fish spawning and rearing to avoid impacts on fish. For operations, attention to sensitive periods for fish remains a consideration for any bridge and culvert maintenance. For assessment of risks to these VCs from spills, consideration of sensitive periods for fish is important, as is consideration of the annual hydrological cycle. The closure phase for these VCs is linked to the prevention of erosion and sedimentation and does not include a risk of spills.
Vegetation	Periods of construction, operation and closure. The closure phase will extend to include monitoring of effectiveness of revegetation.
Wildlife and wildlife habitat and species at risk	Periods of construction, operation and closure. During construction and operation, sensitive periods for wildlife, including for bird nesting and for calving or denning, are important considerations. The operations phase, because of the volume of traffic, is the period during which activities that may affect wildlife are most intense. The temporal scope of the assessment of effects on wildlife during the closure phase will be linked to the consideration of reclamation.

Valued Component	Temporal Scope and Rationale
Traditional land use and harvesting	Periods of construction, operation and closure. Harvest periods would be most sensitive to effects, and the period of most intense project activity is the operations period. The temporal scope of the assessment of effects on traditional activities during the closure phase will be linked to the consideration of reclamation.
Cultural resources	Periods of construction, operation and closure. Periods of use for cultural activities would be most sensitive to effects, and the period of most intense project activity is the operations period.
Heritage resources	Construction period. The protection of heritage resources is a focus for the construction period. The project footprint will not be expanded following that period.
National Park Reserves	Construction, operations and closure. The temporal scope of national parks is “in perpetuity”, while the project phases and their associated effects are at the scale of years and decades. The summer season would be the sensitive period for visitor experience, while consideration of ecological integrity is linked to sensitive periods of fish and wildlife. The length of persistence of effects (both positive and negative) would depend on decisions made about the fate of the road post-closure, as this is linked with visitor access to the Park Reserves.
Potentially affected communities	Construction, operations and closure. There is some temporal component to contracting, business and employment opportunities, primarily for the construction phase, but in general the effects to be considered are on a longer time scale over the life of the project. The construction and operation phases offer the most opportunity for economic benefits, while the improved access afforded by the road may have longer-term benefits, such as for recreation and harvesting, depending on decisions made about the road post-closure.
Road, lake and river access and use	Construction, operations and closure. The sensitive periods are those of most potential use of the road and associated access, which would be primarily summer and hunting seasons. Sensitive periods would also be linked to periods that are sensitive for wildlife. The length of persistence of effects (both positive and negative) would depend on decisions made about the fate of the road post-closure.

4 DESCRIPTION OF THE ENVIRONMENT

SCML will provide a description of existing conditions in sufficient detail to enable an understanding of how the valued components might be affected by the proposed development. The existing conditions should be described for the area affected by the development.

4.1 Biophysical Information Requirements

SCML will develop the environmental baseline using relevant existing regional data. Where SCML generated its own data, the methodology, accuracy and precision of measurements will be provided. If baseline data for a particular valued component has not yet been collected, SCML will describe how and when this information will be provided. If SCML considers that baseline information for a particular VC is not required, a rationale for this decision will be presented. SCML

must also describe any analysis conducted that utilizes data from outside the study region to characterize the baseline environmental conditions within the study region. This would include, for example, a description of any models (including assumptions and discussion of accuracy) utilized to characterize baseline conditions where local measurements are not available. The description of the baseline conditions should be sufficient to allow for a thorough assessment of the project effects.

The following subsections provide a framework for the information required to conduct an effects assessment for each key line of inquiry and subject of note.

4.1.1 Terrain, Geology, Soils, and Permafrost

SCML will provide a description of the terrain, geology, soils and permafrost conditions in the study area. Subjects to consider include:

- topography;
- geology (bedrock, unconsolidated surficial materials);
- soil types; and,
- distribution and condition of permafrost and ice-rich soils in the area of the project.

4.1.2 Climate and Weather

SCML will provide a description of the climate conditions, climatic variability and trends from available local and regional sources. As there are few data from the immediate vicinity, and those that exist are short-term records, this will be primarily a regional climate characterization. Subjects to consider include (subject to data availability):

- the location of recording stations, length of record for any meteorological data presented, and the quality of the data (for example, are there data gaps present?);
- climatic conditions and trends (predominant winds, precipitation, temperature, etc.);
- extreme weather-related events and the frequency of occurrence;
- the current normal climate variability and trends, and the historical climate variability and trends (over the historical period of instrumental record); and,
- the contribution of traditional knowledge to the understanding of climate conditions and variability.

Changes in climate, in terms of direction, magnitude and climate element affected, can be expected to vary at a regional scale. Accordingly, the description of baseline conditions should be presented in a manner that reflects this variability and facilitates subsequent discussion of how changes in climate could affect the project.

4.1.3 Air Quality

SCML will provide a description of ambient air quality. Subjects to consider include:

- ambient dust levels, for example, measures of total suspended particulates and fine particulate matter; and,
- concentrations in the air of pollutants from typical vehicle emissions, such as nitrogen oxides (NO_x) and sulphur oxides (SO_x).

4.1.4 Sound

SCML will provide a description of background or ambient sound levels.

4.1.5 Water Quality and Quantity

SCML will provide a description of background and current water quality and quantity. Subjects to consider include:

- maps of the local and regional water bodies, major drainages and watercourses;
- a general description of the hydrological characteristics for each major drainage and watercourse, as defined and rationalized by the developer; and,
- existing water quality characteristics of the project area and plans to augment the existing information where needed.

4.1.6 Wildlife, Wildlife Habitat and Species at Risk

SCML will provide a description of the existing wildlife and wildlife habitat within the study area for all wildlife species identified as valued components or species at risk that may occur in the assessment area. Subjects to be considered include:

- wildlife species presence, distribution and abundance, seasonal movements, habitat requirements and sensitive time periods;
- habitat types and sites of special value or sensitivity;
- migratory patterns, routes, and timing in relation to project facilities and activities
- any known issues with respect to the health of species (e.g. parasites, diseases, contaminants, condition);
- use of and distribution within the project area by resident and migratory birds;
- locations of known raptor nesting sites or potential raptor nesting habitat within 1 km of the proposed project footprint; and,
- invasive species and known distribution within the region.

4.1.7 Fish and Aquatic Habitat

SCML will provide a description of the existing fish and aquatic habitat within the study area.

Subjects to be considered include:

- fish habitat present at each water crossing and in close proximity to project infrastructure;
- seasonal and life cycle movements and sensitive periods;
- habitat requirements for each life stage;
- local and regional fish species abundance, distribution and use of habitat types and known sensitive or important areas; and,
- any known issues with respect to the health of harvested species (e.g. parasites, diseases, contaminants, condition).

4.1.8 Vegetation

SCML will provide a description of the existing vegetation within the study area, and with special focus paid to species at risk. Subjects to be considered include:

- vegetation and vegetation assemblages;
- any classification system followed, as appropriate;
- identification, location and abundance of species that are rare, protected or designated (e.g. vulnerable, threatened, endangered);
- existing baseline contaminant concentrations in vegetation that may change as a result of the project;
- identification, location and abundance of existing invasive species; and,
- frequency and magnitude of forest fires and post-fire vegetation succession.

4.1.9 Environmental and Geological Events That May Affect the Project

SCML will provide a description of the frequency, magnitude and distribution of environmental and geologic events that may be present in the project area. Subjects to be considered include:

- geohazards such as:
 - avalanches
 - rockfalls
 - landslides.
- terrain and terrain stability maps with permafrost descriptions.
- extreme weather-related events such as:
 - floods; and,
 - extreme precipitation events.

4.2 Human Environment Information Requirements

SCML will develop the socio-economic baseline using existing regional data relevant to the communities that would be most affected by the Project development, in the Sahtu and Dehcho, where relevant.

The HPAR crosses the Sahtu Settlement Area and traditional territories of the Dehcho and Kaska First Nations ([Figure 1](#)). Through community engagement, each First Nation has identified communities that would be most affected by the Project development:

- Tulita and Norman Wells (Sahtu Dene and Metis)
- Nahanni Butte (Nahᑭᑦ Dehᑦ Dene Band, Dehcho First Nations)
- Ross River Dena Council and Liard First Nation (Kaska Nations)

These communities have been involved in consultation with SCML and shall be included in the description of baseline conditions. In addition, the settlement of Tungsten is located near the NWT and Yukon border and accessible by road from Watson Lake, YT and shall be include in the description of baseline conditions.

4.2.1 Education, Training, and Skills

The developer will provide a description of the existing types and levels of relevant skills and education in the communities that may be affected by the project.

SCML will provide information drawn from the most current statistical records on the level of education achieved by community members and/or NWT residents, along with other information that relate to training and skills (e.g., educational facilities, services and programs).

4.2.2 Harvesting and Hunting

SCML will provide a description of historical and existing harvesting activities, including Aboriginal, recreational and commercial harvesting within the vicinity of the HPAR to the extent possible using publicly accessible information and other sources that are not confidential. Subjects to be considered include:

- harvest levels, participation, and locations, with specific attention to high use or sensitive areas (based on regulatory records and traditional knowledge);
- hunting pressures for species of particular importance to traditional harvesters by species or population, season and geographic area;
- any known issues with respect to health of harvested species (such as parasites, disease, contaminants, condition);
- historic and current human use of vegetation, including subsistence and commercial harvesting (e.g., berry picking, forestry); and,
- value of harvesting to individuals and/or communities.

4.2.3 Heritage and Cultural Resources

SCML will provide a description of the existing heritage and cultural resources within the vicinity of the HPAR and other areas potentially disturbed by construction, to the extent possible using publicly accessible information and other sources that are not confidential. Subjects to be considered include:

- archaeological resources and historic sites ;
- burial sites;
- heritage resource potential; and,
- culturally important sites.

4.2.4 Tourism

SCML will provide a description of the types and importance of various tourism activities in the vicinity of the HPAR. Available information regarding the Nahanni and Nááts'ihch'oh National Park Reserves will be described. Subjects to be considered include:

- types of tourist activities (e.g. hiking, camping, sight-seeing, canoeing) being undertaken in the vicinity of the HPAR;
- visitor use and enjoyment of the National Parks;
- management plans relevant to the National Parks;

- revenue generated as a result of tourism in the vicinity of the HPAR; and,
- important recreational or tourism routes or trails, including river travel routes.

4.2.5 Regional and Local Economies

SCML will describe the local and regional economies using existing data relevant to the communities that would be most affected by the Project development, or to the Dehcho and Sahtu regions or the NWT as a whole, where relevant. Subjects to be considered include:

- levels of employment, unemployment rates and participation rates;
- employment by industry and occupation, including occupations related to traditional activities;
- job vacancy and unfilled positions
- trends in the labour force;
- balance between wage and non-wage sector activities;
- use of social assistance benefits;
- cost of living;
- value of harvesting to individuals and/or communities;
- current land-based activities, including those related to tourism, recreation, renewable and non-renewable resources;
- presence of local businesses; and,
- potential for increased resource development (e.g., mineral exploration) in the area.

4.2.6 Existing Transportation Routes and Related Infrastructure

The developer will describe the characteristics of the local and regional transportation network and associated infrastructure. Subjects to be considered include:

- road transportation routes, trails including current use;
- navigable waters and water transportation access points, routes and current use;
- availability of fuel services; and,
- air travel infrastructure and current use.

4.2.7 Human Health and Wellbeing

SCML will describe the local and regional indicators related to human health and wellbeing using existing data relevant to the communities that would be most affected by the Project development, or to the Dehcho and Sahtu regions, or the NWT as a whole, where relevant. Subjects to be considered include:

- current socio-economic initiatives or agreements (please list and provide the non-confidential details only);
- results of current socio-economic benefit initiatives (e.g., levels of success in improving recruitment, retention, and advancement of workers);
- rates of crime and substance abuse; and,
- availability and capacity of health and safety facilities and services (i.e., policing, medical, fire protection and emergency response, wellness centres, etc.).

5 DEVELOPMENT DESCRIPTION

SCML will describe the facilities and activities associated with all phases of the HPAR Upgrade Project. This will include development schedules and information on the need for the Project.

A list of the Project components, activities, and schedules for construction and operation that will be described fully in the DAR is provided in sections 5.1 to 5.5.

5.1 Project Phases and Schedule

SCML will provide an overall activity schedule for the Project that will include all activities associated with the three project phases (construction; operation; closure). The schedule will include estimated start time and duration for each activity.

The scheduling will be cognisant of seasonal timing constraints. For example, if the planned timing for the extension of a culvert at a stream crossing is delayed it may conflict with spawning times and inhibit construction. Discussion of timing constraints and contingency planning will be included.

5.2 Development Components and Activities

The description of development components will be separated into project phases. Subjects to include for consideration under each phase are listed in the following tables:

Table 6~~Table 6~~, construction phase; Table 7, operations phase; and, Table 8, closure phase.

Table 6: Project Description Outline for Construction Phase

Project Component	Subjects to Consider
Road upgrade Widening from 4.5 m to 8.5 m; improvements to horizontal and vertical alignments to meet design criteria.	<ul style="list-style-type: none"> land requirements (road alignment; footprint; licences of occupation and right-of-way widths); road design (data, standards and guidelines used in design; design criteria including, for example, maximum grade, minimum curve radius, minimum stopping sight distance, and maximum road cross-slope); pull-outs and safety barriers; staging areas and laydown areas; special engineering considerations for road design in areas of permafrost, near waterbodies, and under wet conditions; construction activity schedule and seasonal restrictions; cut and fill estimates and plans for excess material disposal/storage; construction equipment (including quantities and weights) and materials; estimated traffic volume during construction periods; dust control; access management and public safety measures; toxic or hazardous materials to be used, including explosives (note that no explosives storage is required); and, terrain stability and avalanche control.
Watercourse crossings Extension of all culverts to new road width; relocation of some culverts to match road realignment or reconfiguration.	<ul style="list-style-type: none"> design of existing watercourse crossings in 2014, including bridges (for which no upgrades are needed) and culverts; culvert upgrade design and methods; and, measures for protection of fish and fish habitat during construction, including measures for erosion and sediment control.
Borrow sources Selection of best borrow sources; development of borrow pits; reclamation of borrow pits after use.	<ul style="list-style-type: none"> locations of borrow pits and quarries and their access roads ; borrow material quality and quantities available; geochemical characterization of potential borrow materials and selection of suitable materials; borrow pit design criteria and development methods, including blasting, gravel crushing and sorting; and, objectives and methods for site restoration.

Project Component	Subjects to Consider
Temporary construction camps Camps sited at three locations at various times during one pre-construction year and two construction years; reclamation of camp sites	<ul style="list-style-type: none"> • camp locations and footprints; • site preparation, including clearing; • camp mobilization; • camp design, facilities and operation; • fuel storage and management; • water use; • domestic wastewater disposal; • solid, liquid and gas waste management, including hazardous waste management; • wildlife attractant control and wildlife encounter minimization; • camp demobilization; and • objectives and methods for camp site restoration, including revegetation.
Workforce, payroll and purchasing Workforce requirements and project spending on wages, salaries, goods and services.	<ul style="list-style-type: none"> • direct employment opportunities (i.e., numbers of jobs or full-time equivalents); • contracting opportunities; • form of employment (full time, part time, seasonal) and skills category; • wages and salaries; • purchasing of goods and services; and • training and procurement policies and programs.

The project description for the construction phase will be supported by Standard Operating Procedures and management plans in final or draft format, as appropriate, including SCML Standard Operating Procedures for fuel handling, working in and around water, work site cleanliness, and plans for waste management, erosion and sediment control, avalanche management, and quarry operations.

Table 7: Project Description for Operations Phase

Project Component	Subjects to Consider
Traffic and traffic control	<ul style="list-style-type: none"> • traffic volume and frequency, and vehicle types, weights and types of loads during mine development and mine operation; • traffic control systems and protocols; • access management and public safety measures; • communications along the road; and, • measures to prevent wildlife-vehicle collisions and to reduce impact of traffic on wildlife.
Emergency response	<ul style="list-style-type: none"> • emergency response plans (e.g., wildfires, avalanches, vehicle collisions, medical emergencies); and, • spill contingency planning for fuels, mine reagents and zinc and lead concentrates.
Hauling zinc and lead concentrates	<ul style="list-style-type: none"> • concentrate confinement during transport (e.g., truck and trailer design and performance); • options to reduce traffic frequency (e.g., use of backhauling, truck capacity, convoys); and, • prevention of contamination of soil and vegetation from trucks and equipment.
Road maintenance	<ul style="list-style-type: none"> • monitoring of road conditions and routine maintenance measures (e.g., grading, brushing,); • inspection and maintenance of drainage works, bridges, culverts; • snow removal, scarification and sanding; • maintenance measures to facilitate wildlife crossing the road (e.g., for snow ploughing); • ongoing erosion and sediment control; • avalanche and terrain hazard management; • dust control; and, • maintenance equipment and materials.
Borrow sources	<ul style="list-style-type: none"> • requirements for borrow materials for ongoing road maintenance; • geochemical characterization of potential borrow materials and selection of suitable materials; • borrow pit design criteria and development methods, including gravel crushing; and, • objectives and methods for site restoration.

Project Component	Subjects to Consider
Workforce, payroll and purchasing Workforce requirements and project spending on wages, salaries, goods and services.	<ul style="list-style-type: none"> • direct employment opportunities; • contracting opportunities; • form of employment and contracting (full time, part time, seasonal) and skills category; • wages and salaries; • purchasing of goods and services; and, • training and procurement policies and programs.

The project description for the operations phase will be supported by management plans in final or draft format, as appropriate, including plans for road operations, wildlife and wildlife habitat protection, emergency response, spill response, waste management, erosion and sediment control, and avalanche management.

Table 8: Project Description for Closure Phase

Project Component	Subjects to Consider
Temporary suspension of road and bridge use	<ul style="list-style-type: none"> • measures for temporary closure, including for prevention of washouts and erosion and slope stabilization; and, • road access and signage.
Permanent suspension of road and bridge use	<ul style="list-style-type: none"> • planning for full road closure with other road users, including alternatives to permanent closure; • measures to close road including culvert removal, bridge dismantling, slope stabilization, erosion prevention; and, • restoration and re-vegetation.
Workforce, payroll and purchasing Workforce requirements and project spending on wages, salaries, goods and services.	<ul style="list-style-type: none"> • direct employment opportunities; • contracting opportunities; • form of employment (full time, part time, seasonal) and skills category; • wages and salaries; • purchasing of goods and services; and, • training and procurement policies and programs.

The project description for the closure phase will be supported by management plans in final or draft format, as appropriate, including plans for road closure, wildlife and wildlife habitat protection, and erosion and sediment control.

5.3 Road Design Considerations

To address potential effects of the project on valued components, SCML will provide a detailed description of the road design considerations in the DAR. Subjects that will be considered include:

- design standards;
- road width
- minimum horizontal and vertical curves
- longitudinal slope and cross slope of the road;
- safety barriers on bridge approaches;
- signage
- cut and fill side slopes;
- watercourse crossings (culvert extensions and realignments);
- pull-outs;
- dust control;
- reduction of risk of wildlife collisions;
- geotechnical stability;
- sediment and erosion control especially where immediately adjacent to a waterbody;
- geohazards and environmental hazards; and,
- design features and controls that would enable the safe use of the road by non-mine-related users.

The rationale for the road design considerations will be described and the basis for the selection of the criteria will be presented.

Where relevant, the applicability of these design considerations will be included in the discussions of the key lines of inquiry, subjects of note, effects of the environment on the project and potential accidents and malfunctions.

5.4 Existing Infrastructure

This section will describe previously assessed and approved, and existing facilities that will be used as part of the project. The existing infrastructure consists of a single-lane all-season road with bridges and culverts. There are no structures, camps or other facilities. There is one camp site that was cleared for use in 2014, at km 3. All equipment and materials have been removed but the site has not been restored, as it is planned to be used for the HPAR Upgrade Project.

The proposed changes to existing infrastructure are as follows: the road will be widened, upgraded and realigned in places, and the culverts will be extended and some will be replaced. No changes are proposed for the bridges, as they were replaced in 2014 and are suitable for all phases of the Project.

More detailed description of the existing road and the stream crossings will be provided in the project description for construction (Section 5.2), as it is relevant to the proposed upgrade. This will include discussion of how the existing infrastructure will be used in the context of the proposed development, and discussion of the capacity of existing infrastructure to support the proposed development.

Projected increase in traffic along the HPAR and the Nahanni Range Road will be provided in the project descriptions for the construction and operations phases (Section 5.2).

5.5 Management and Monitoring Plans

SCML will provide a list of all monitoring and management plans, as well as standard operating procedures, and will summarize the purpose and details of these plans and procedures in this section. References to these plans will be made throughout the DAR where appropriate, as indicated in this document. Monitoring and management plans, in either final or interim versions, will be submitted as appendices to the DAR for adequacy review.

6 IMPACT ASSESSMENT STEPS

6.1 Impact Assessment Methodology

For each valued component described in Table 2, an assessment of effects will be done. This assessment will include:

Identification of potential effects: The potential interactions of the development with the valued component and resulting potential effects to the valued component will be identified. The developer will present quantitative or qualitative parameters to measure potential environmental and cumulative effects on the valued component. The spatial and temporal boundaries for the assessment of effects on the valued component will be presented and justified.

Mitigation measures and residual effects: The developer will describe all mitigation measures that will be put into effect during project design, construction or operation to avoid or reduce the severity of potential adverse environmental effects. The developer will identify the likely residual effects on the valued component taking into consideration the implementation of mitigation measures. Residual effects will be clearly identified and characterized based on methodology presented in DAR.

Assessment of cumulative effects: For each residual effect resulting from the development, SCML will conduct an assessment of the potential for cumulative effects resulting from a combination of effects of the development with effects from other past, present and reasonably foreseeable human activities and developments. The way in which a cumulative effect may occur and its potential spatial and temporal scope, will be discussed. Residual cumulative effects will be identified. The developer will characterize the significance of residual project and cumulative environmental effects and identify any further mitigation measures that may exist for cumulative effects beyond those for project specific effects.

The board requires that these topics are addressed in order to understand the potential for significant adverse effects. The developer will:

1. identify the natural range of background conditions (where historic data are available), and current baseline conditions, and analyze for discernible trends over time in each valued component, where appropriate, in light of the natural or existing variability for each;

2. identify any potential direct and indirect impacts on the valued components that may occur as a result of the proposed development, identifying all analytical assumptions;
3. identify and evaluate any proposed mitigation measures as to their technical and; economic feasibility to reduce the predicted impacts and discuss constraints, uncertainties and implementation challenges to the effective use of the proposed measures and clearly identify all mitigation commitments;
4. predict the likelihood of each impact occurring after the mitigation commitments are implemented, and provide a rationale for the confidence held in the prediction. The developer will also present the predictions in a manner that facilitates the formulation of testable questions for future follow-up programs, as well as textually and schematically indicate the pathways of predicted impacts;
5. compare the predicted impacts to pre-development conditions or to conditions without the Project as appropriate. Include a description of any plans, strategies or commitments to avoid, reduce or otherwise manage and mitigate the identified potential adverse impacts, with consideration of best management practices in relation to the valued component or development component in question;
6. describe techniques such as models utilized in impact prediction including techniques used where any uncertainty in impact prediction was identified;
7. identify and provide an opinion on the significance of any residual adverse impacts predicted to remain after any mitigation measures and indicate the methodologies for reaching such conclusions; and,
8. describe monitoring, evaluation, and adaptive management plans used to:
 - a. detect potential unexpected changes
 - b. ensure that predictions are accurate
 - c. proactively manage against developing adverse impacts when they (or unexpected changes) are encountered.

SCML will describe how the predicted impacts are expected to arise from the proposed development, as well as its opinion on impact significance. This will include describing the mechanisms for cause and effect and providing supporting references (including where Traditional Knowledge was used). Where professional judgment has been used in determining impacts, this must be made clear by describing the assumptions, methodologies or other tools used to inform the professional's judgement. SCML will also provide a discussion on the uncertainty involved with each prediction. For each predicted impact, SCML will describe the:

1. nature or type of the impact;
2. geographical extent of the impact;
3. timing of the impact (including duration, frequency and extent);
4. magnitude of the impact (what degree of change is expected);
5. reversibility of the impact; and,
6. likelihood of the impact.

6.2 Developer's Opinion on Significance of Impacts

The criteria described above will be used in the DAR as a basis for SCML's opinions on the significance of impacts on the biophysical and human environment. The Review Board will make

the ultimate determinations of significance after considering all the evidence on the public record in the environmental assessment. For more information on the above criteria, please refer to Section 3.11 of the Review Board's *Environmental Impact Assessment Guidelines*, available on the Review Board's website.

7 ASSESSMENT OF ENVIRONMENTAL IMPACTS AND CUMULATIVE EFFECTS

SCML will identify and assess effects of the development on the biophysical and human environment. The developer will also assess cumulative effects resulting from the development in combination with past, present and reasonably foreseeable human activities and developments. The assessment of effects will be divided into the key lines of inquiry and subjects of note, as identified in Section 3.2.4 and 3.2.5.

The following subsections provide frameworks for the information required to undertake effects assessments for the key lines of inquiry and subjects of note. ~~Each subsection does not necessarily correspond with one key line of inquiry or subject of note, as information listed in any one subsection may be relevant to effects assessments for more than one valued component.~~

7.1 Key Lines of Inquiry

7.1.1 Nahanni Caribou Herd

SCML will describe and evaluate, ~~to the extent possible~~ using the best available knowledge, the potential effects of the project on caribou ~~within the HPAR cCorridor.~~

7.1.1.1 Mortality risk

Including:

- mortality risk due to potential increased harvesting; and,
- mortality risk from vehicle collisions, especially during the operations phase.

7.1.1.2 Direct and indirect alteration of habitat, including disturbance

Including:

- direct impact on habitat ~~from the of~~ road footprint;
- the project's influence as visual or other ~~sensory auditory~~ disturbance, including effect on habitat avoidance and effective habitat loss; and,
- effects of the HPAR on caribou movement patterns.

7.1.1.3 ~~with the HPAR~~ Effects on caribou population

Including:

- effects on predator-prey relationships;
- effects on sensitive life stages or sensitive or important habitat;
- how road-related changes in harvest pressures could affect the resource;
- ability of habitat or populations to recover; and,

- overall effects on herd abundance and distribution.

The effect of activities associated with all project phases will be considered, as will methods to minimize the effect of the all phases of the project on caribou, including strategies for mitigation and monitoring.

The evaluation of effects related to caribou and caribou habitat will be supplemented by management ~~plan or~~ plans covering wildlife and wildlife habitat protection and wildlife effects monitoring.

7.1.2 Risk of Spills and Other Accidents and Malfunctions

The highest priority for assessment of risk for environmental effects is related to Accidents and mMalfunctions will be evaluated using a risk-based approach for the construction, operational and decommissioning phases. ~~which includes s and emergency response will be evaluated using a risk based approach in the construction, operation and decommissioning phases of the project~~Additional.

Management plans for aAccidents and mMalfunctions will also be provided to ensure adequate tracking and verification of the risk-based approach and to ensure there is evidence for timely and effective follow up as required.

7.1.2.1 Risk assessment and mitigation

ASSESSMENT OF POTENTIAL ACCIDENTS AND MALFUNCTIONS

SCML will describe and evaluate the effects of potential accidents and malfunctions associated with the project. For project construction, operation and closure, the assessment of accidents and malfunctions will include:

- a risk assessment;
- the identification of high-risk areas for geohazards and spills, and locations and seasonal conditions where spills response and/or clean-up is challenging, including a description of site-specific contingencies for high risk areas; and,
- a description of emergency -response plans and/or other contingency plans that will be in place for accidents, malfunctions, or unforeseen impacts of the environment on the development or of the development on health and safety or on the environment.

For each project phase, accidents and risks to consider include (where relevant for the project phase):

- emergency health and safety responses;
- concentrate spills, fuel spills, spills of mine reagents, and risk of resulting contamination of soil and/or water;
- explosions and/or fires; ~~and, and,~~
- transportation / traffic accidents that do not result in contamination of soil and/or water. ~~and,~~
- emergency health and safety responses.

To help inform the discussion, SCML should describe how the road design considerations (section 5.3) will help minimize the risks associated with the project.

7.1.2.2 Effects on aquatic and terrestrial ecosystems

SCML will describe and evaluate the effects of potential accidents and malfunctions associated with the project. This will include:

- ~~effects~~impacts on water and sediment quality;
- effects on stream and lake biota;
- effects on soil and vegetation;
- effects on wildlife; and,
- effects on ecosystem services, including drinking water and recreation.

Management plans for spill contingency and emergency response will supplement this assessment of potential accidents and malfunctions.

7.1.3 National Park Reserves

SCML will describe how the construction, operation and ~~decommissioning~~ closure activities will affect the Park Reserves.

The evaluation shall be completed in the context of Parks Canada's legislated and mandated priorities, including current Park Management Plans. The assessment shall identify potential long-term changes to the Parks. Main subjects to be addressed are:

7.1.3.1 Visitor access to park areas and visitor experience

7.1.3.2 Park heritage and cultural resources

7.1.3.3 Ecological integrity

~~National Park Reserves~~

SCML will describe how the construction, operation and closure activities will affect the Park Reserves. Subjects to consider include:

- ~~— visitor access to park areas and visitor experience;~~
- ~~— park cultural resources; and,~~
- ~~— ecological integrity.~~

The evaluation shall be completed in the context of Parks Canada's legislated and mandated priorities, including current Park Management Plans. The assessment shall identify potential long-term changes to the Parks.

7.1.4 Benefits and Effects on Communities

Potentially Affected Communities

SCML will identify potentially affected communities and describe the potential effects ~~adverse impacts and benefits~~ of the project on their residents and those of the Northwest Territories as a whole. Subjects that will be considered include:

7.1.4.1 Employment and contracting opportunities

~~Direct and indirect employment opportunities and contracting opportunities generated by the development and the potential for uptake of these opportunities locally and/or by Aboriginal peoples.~~

7.1.4.2 Wage and salary income

7.1.4.3 Business opportunities

~~Direct and indirect business opportunities generated by the development and the potential for uptake of these opportunities locally and/or by Aboriginal peoples.~~

7.1.4.4 Community Wellness ~~and~~

~~The effects from the project on overall potential for adverse effects on overall community wellness.~~

7.1.4.5 Socio-economic initiatives and agreements

SCML shall describe current or proposed socio-economic initiatives or agreements (please list and provide non-confidential details) aimed at maximizing potential benefits, such as :

~~measures, plans and commitments for maximizing local and Aboriginal employment, contracting and business activity, including any proposed training, skills development or procurement policies and programs.~~

7.2 Subjects of Note

7.2.1 Bedrock Geology and Surficial Geology

~~The developer~~SCML will describe and evaluate the potential effects of the project on ~~terrain stability (including permafrost); erosion and sedimentation; metals in soils; and granular materials.~~ Subjects that will be considered include:

7.2.1.1 Terrain stability

Including:

- effects on landforms for road widening and alignment and borrow sources;
- effects on permafrost including degradation, changes in the ground thermal regime, mass movement, thaw slumps, compaction of degradation of organic ~~lanforms~~landforms such as peat lands and otherst lands;
- snow distribution; ~~and consequences on ground thermal regime;~~
- flooding; and, and,
- avalanche risks and the effect of avalanche management on the environment.

7.2.1.2 Erosion and sedimentation

Drainage beside and beneath the road, channelization and non-channelization flow causing erosion and sedimentation.

7.2.1.3 Metals in soils

7.2.1.4 Granular materials

Including:

- locations, areas and volumes of material from each proposed borrow site;
- excavation requirements;
- ownership and operation of borrow pits; potential for acid rock drainage and metal leaching; ~~and,~~
- ~~abundance and distribution of granular materials for future users; and,~~
- ~~The developer will also describe~~ plans for remediation and reclamation of borrow pits.

The evaluation of effects related to bedrock geology and surficial geology will be supplemented by management plans, for example, in relation to quarry development and operation, avalanche control, and erosion and sediment control.

7.2.2 Air Quality and Sources of Sensory Disturbance (Light, Dust, Air Quality, Noise and Vibration)

Air quality includes vehicle emissions and dust, and will be assessed in relation to effects on the environment (including greenhouse gas emissions) and on human health. Dust is also a potential sensory disturbance to wildlife, as are noise, light and vibration. The effects of these sensory disturbances to wildlife will be discussed in the wildlife and wildlife habitat subject of note and the caribou key line of inquiry.

7.2.2.1 Air quality

The assessment of effects on air quality will consider the effects of the project on the determinants of ambient air quality within the HPAR Corridor and the ~~Effects during construction and operation phases from point sources such as vehicle traffic, construction equipment, dust and other sources. of aerial contaminants or emissions on other valued components are addressed in those~~

sections. SCML will describe and evaluate the potential effects of the project on air quality including consideration of:

- fugitive dust emissions from moving vehicles and other equipment, unpaved roads and stationary sources;
- contaminants of concern emissions by source for each phase (construction, operation and maintenance, and closure), including emission rate, timing and duration; and,
- potential effects on human health

Once potential effects of the project on air quality have been identified, the Review Board must understand what mitigations are in place in order to minimize the adverse effects of these impacts. Towards this end, SCML will describe:

- methods of dust suppression and emission control; and,
- greenhouse gas emission reduction strategies.

7.2.2.2 ~~The evaluation of effects related to air quality will be supplemented by material in the road operations management plan.~~ Noise, vibration and light

SCML will describe and evaluate the potential effects of the project on ambient noise conditions. The effects of noise emissions and vibration on VCs will be addressed in the relevant sections. For example, effects of noise on breeding birds will be considered in the assessment of Wildlife and Wildlife Habitat. SCML will describe and evaluate the potential effects of the project on ambient noise conditions, including consideration of:

- all types of noise emissions by source for each phase (construction, operation and maintenance, and closure), including quantity, timing and duration, during both normal operating conditions and that may result from accidents and malfunctions;
- vibration caused by blasting;
- light from road traffic; and,
- potential effects of noise on human health.

The evaluation of effects related to air quality, noise and vibration will be supplemented by material in the road operations management plan.

7.2.3 Water and Sediment

This subject of note does not include the impacts from accidents and malfunctions, as they are dealt with in a key line of inquiry. Effects of erosion and sedimentation are also covered in the fish and aquatic habitat subject of note.~~Quality~~

7.2.3.1 Water drainage patterns and flows

Including: ~~and Quantity~~

SCML will describe and evaluate the potential effects of the project on water quality and quantity. Subjects that will be considered include:

- changes to surface drainage patterns and surface water hydrology including changes caused by road-related impacts on terrain, soils and permafrost;
- changes to snow distribution and potential impacts on drainage;

- water withdrawal and volume of withdrawal (e.g., for potable water, dust suppression);
- changes to flow or water levels including potential for icings at watercourse crossings; and,
- issues related to borrow extraction including melting of ground ice and potential changes to drainage patterns;

7.2.3.2 Water and sediment quality

Including:

- possible ~~effects~~ contamination on surface water, subsurface water and groundwater including
 - drinking water quality for humans and wildlife; and,
 - recreational water quality;
 - discharge or seepage of wastewater effluent, contaminants and chemical additives;
- changes to water quality at water crossings and realignments (bridges, culverts and other wetted areas);
- changes to water quality due to thaw slumps and other slope instability at water crossing; and,
- changes to sediment quality from dust and discrete point sources contamination related to road traffic and transport of concentrates, fuels and mine reagents; and,
- changes to water quality due to erosion, sediment deposition and re-suspension.

The evaluation of effects related to water and sediment quality and quantity will be supplemented by material in management plans, including for road operations, spill contingency planning, and prevention of erosion and sedimentation.

~~7.2.1.1 Noise and Vibration~~

~~SCML will describe and evaluate the potential effects of the project on ambient noise conditions. Noise itself is not a valued component, but it has the potential to affect VCs. The effects of noise emissions on VCs will be addressed in the relevant sections. For example, effects of noise on breeding birds will be considered in the assessment of Wildlife and Wildlife Habitat. SCML will describe and evaluate the potential effects of the project on ambient noise conditions, including consideration of:~~

- ~~• noise emissions from vehicles, equipment and stationary sources;~~
- ~~• vibration caused by blasting;~~
- ~~• all types of noise emissions by source for each phase (construction, operation and maintenance, and closure), including quantity, timing and duration, during both normal operating conditions and that may result from accidents and malfunctions; and,~~
- ~~• potential effects on human health.~~

~~The evaluation of effects related to noise and vibration will be supplemented by material in the road operations management plan.~~

~~7.31.1 Air Quality~~

~~The assessment of effects on air quality will consider the effects of the project on the determinants of ambient air quality. Effects of aerial contaminants or emissions on other valued components are addressed in those sections. SCML will describe and evaluate the potential effects of the project on air quality including consideration of:~~

- ~~• fugitive dust emissions from moving vehicles and other equipment, unpaved roads and stationary sources;~~
- ~~• contaminants of concern emissions by source for each phase (construction, operation and maintenance, and closure), including emission rate, timing and duration; and,~~
- ~~• potential effects on human health~~

~~Once potential effects of the project on air quality have been identified, the Review Board must understand what mitigations are in place in order to minimize the adverse effects of these impacts. Towards this end, SCML will describe:~~

- ~~• methods of dust suppression and emission control; and~~
- ~~• greenhouse gas emission reduction strategies.~~

~~The evaluation of effects related to air quality will be supplemented by material in the road operations management plan.~~

~~7.41.1 Water Quality and Quantity~~

~~SCML will describe and evaluate the potential effects of the project on water quality and quantity. Subjects that will be considered include:~~

- ~~• changes to surface drainage patterns and surface water hydrology including changes caused by road related impacts on terrain, soils and permafrost;~~
- ~~• changes to snow distribution and potential impacts on drainage;~~
- ~~• water withdrawal and volume of withdrawal (e.g., for potable water, dust suppression);~~
- ~~• changes to flow or water levels including potential for icings at watercourse crossings;~~
- ~~• issues related to borrow extraction including melting of ground ice and potential changes to drainage patterns;~~
- ~~• possible contamination to surface water, subsurface water and groundwater including
 - ~~○ drinking water quality for humans and wildlife; and,~~
 - ~~○ recreational water quality;~~~~
- ~~• discharge or seepage of wastewater effluent, contaminants and chemical additives;~~
- ~~• changes to water quality at water crossings and realignments (bridges, culverts and other wetted areas);~~
- ~~• changes to water quality due to thaw slumps and other slope instability at water crossing; and,~~
- ~~• changes to water quality due to erosion, sediment deposition and re-suspension.~~

~~The evaluation of effects related to water quality and quantity will be supplemented by material in management plans, including for road operations, spill contingency planning, and prevention of erosion and sedimentation.~~

~~7.4.1~~ 7.2.4 Vegetation

SCML will describe and evaluate the potential effects of the project on vegetation. ~~Subjects that will be considered include:~~

7.2.4.1 Vegetation cover and composition

Including:

- ~~• amount of vegetation clearing;~~
- ~~• changes to the soil, hydrological or permafrost regimes related to vegetation changes;~~
- ~~• vegetation control during operations;~~
- ~~• re-establishment of vegetation and reclamation of borrow sites and other disturbances (particularly identification of vegetation types and seed mixes to be used, and identification of the specific borrow site to be re-vegetated, and those borrow sites that will not be re-vegetated); and,~~
- ~~• vegetation control during operations.~~
- ~~• amount of merchantable timber removed during clearing and the potential for facilitating use of waste timber by communities.~~

7.2.4.2 Invasive plants

Introduction of invasive species and associated threats.

7.2.4.3 Rare plants

Alteration or loss of species, or vegetation assemblages that are rare, valued, protected or designated sensitive or important areas or habitat.

7.2.4.4 Metals in vegetation

~~alteration or loss of species, or vegetation assemblages that are rare, valued, protected or designated sensitive or important areas or habitat;~~

~~amount of merchantable timber removed during clearing and the potential for facilitating use of waste timber by communities;~~

~~amount of vegetation clearing;~~

~~introduction of invasive species and threats;~~

~~E~~ffects of road emissions including dust and deposition of metals.

~~changes to the soil, hydrological or permafrost regimes related to vegetation changes;~~

~~re-establishment of vegetation and reclamation of borrow sites and other disturbances (particularly identification of vegetation types and seed mixes to be used, and identification of the specific borrow site to be re-vegetated, and those borrow sites that will not be re-vegetated); and,~~

~~vegetation control during operations.~~

The evaluation of effects related to vegetation will be supplemented by material in management plans, including for road operations and for reclamation.

7.4.2.5 Fish and Aquatic Habitat

SCML will describe and evaluate the potential effects of the project on fish and aquatic habitat. This section will not include assessment of the effects of potential accidents and malfunctions, as that is the subject of a key line of inquiry. Subjects that will be considered include:

7.2.5.1 Fish distribution, abundance and habitat

SCML will evaluate potential alteration or loss of fish distribution, abundance and habitat (including riparian areas) due to development activities during all project phases, including the following:

- effects of watercourse crossings and temporary vehicle crossing methods;
- effects on sensitive or important areas or habitat, including spawning and rearing habitat;
- blockages to movement;
- effects of water withdrawal;
- potential for increased fishing; and,
- potential for and effectiveness of reclamation; and,
- relevant policies, management plans or other measures to protect or enhance fish and aquatic habitat, including timing restrictions, protected areas or regulations.

7.2.5.2 Lake and wetland habitat

Including:

- effects on lake and wetland habitat; and,
- effects on aquatic species in these lakes and wetlands, including birds.

7.2.5.3 Priority fish species

SCML will assess project effects with a focus on Arctic grayling and lake trout. These species are identified as being of priority due to distribution, regional cultural, economic and ecological importance, and sensitivity.

7.4.2.1

- ~~alteration or loss of fish distribution, abundance and habitat (including riparian areas) due to development activities during all project phases;~~
- ~~effects of watercourse crossings and temporary vehicle crossing methods;~~
- ~~relevant policies, management plans or other measures to protect or enhance fish and aquatic habitat, including timing restrictions, protected areas or regulations;~~
- ~~effects on sensitive or important areas or habitat;~~
- ~~blockages to movement;~~
- ~~effects of water withdrawal;~~
- ~~potential for increased fishing; and,~~
- ~~potential and effectiveness of reclamation.~~

The evaluation of effects related to fish and aquatic habitat, will be supplemented by material in management plans that cover road operations, prevention of erosion and sedimentation, spill contingency planning, and reclamation.

7.4.37.2.6 Wildlife and Wildlife Habitat

This subject of note will not include detailed assessment of effects on caribou, as caribou are the subject of a key line of inquiry.

SCML will describe and evaluate, to the extent possible using the best available knowledge, the potential effects of activities associated with all phases of the project on wildlife and wildlife habitat (including birds) and methods to minimize the effect of the project on wildlife, including strategies for mitigation and monitoring.

7.2.6.1 ~~Subjects that will be considered include:~~ Mortality risk

Including:

- mortality risk due to potential increased harvesting;
- mortality risk from vehicle collisions, especially during the operations phase; and,
- mortality from collisions with temporary or permanent structures and wires (such as those related to communications systems).

7.2.6.2 Direct and indirect alteration of habitat, including disturbance

Including:

- direct impact on habitat of road footprint;
- the project's influence as visual or auditory disturbance, including effect on habitat avoidance and effective habitat loss;
- effects on wildlife movement patterns and wildlife movement corridors;
- habitat fragmentation;
- potential disturbance to raptors nesting within 1km of the proposed project footprint;
- effects on use of the project area by resident and migratory birds protected by the *Migratory Birds Convention Act, 1994*;
- response to edge effects; and,
- potential for and effects of invasive species;
-

7.2.6.3 ~~increased H~~ human-wildlife conflicts

Potential for and measures to reduce conflicts (e.g., ~~e.g., bear encounters~~) in camps, and during construction and maintenance activities.

7.2.6.4 Effects on wildlife populations

- effects on predator-prey relationships, including for birds and bird eggs;
- effects on sensitive life stages (e.g., migration, breeding, calving, denning, overwintering) or sensitive or important habitat;
- how road-related changes in harvest pressures could affect the resource;

- ability of habitat or populations to recover; and,
- overall effects on wildlife abundance and distribution.
- ~~• methods to minimize the effect of the project on wildlife including strategies for mitigation and monitoring;~~
- ~~• direct and indirect alteration of habitat, including direct road footprint impact;~~
- ~~• the project's influence as visual or auditory disturbance, including effect on habitat avoidance and effective habitat loss;~~
- ~~• effect of activities associated with all project phases;~~
- ~~• wildlife mortality risk due to potential increased harvesting and vehicle collisions;~~
- ~~• effects on sensitive life stages (e.g., migration, breeding, calving, denning, overwintering) or sensitive or important habitat;~~
- ~~• wildlife movement patterns, wildlife movement corridors, distribution and abundance;~~
- ~~• habitat fragmentation;~~
- ~~• effects on wildlife populations;~~
- ~~• effects on predator-prey relationships, including for birds and bird eggs;~~
- ~~• increased human-wildlife conflicts (e.g., bear encounters);~~
- ~~• mortality from collisions with temporary or permanent structures and wires (such as those related to communications systems);~~
- ~~• potential disturbance to raptors nesting within 1km of the proposed project footprint;~~
- ~~• use of the project area by resident and migratory birds protected by the Migratory Birds Convention Act, 1994;~~
- ~~• how road-related changes in harvest pressures could affect the resource;~~
- ~~• ability of habitat or species to recover;~~
- ~~• response to edge effects; and,~~
- ~~• invasive species.~~

The evaluation of effects related to wildlife and wildlife habitat, will be supplemented by management plan or plans covering wildlife and wildlife habitat protection and wildlife effects monitoring.

7.4.47.2.7 Species at Risk

In addition to the requirements outlined in s. 6.6 and 6.7, SCML will identify and evaluate the impacts of the project to any species at risk¹. This includes bird species at risk, and bats and other mammals. (including birds). Subjects that will be considered include:

- the geographic extent of the species;
- the timing and duration of key life cycle stages; and,
- methods to minimize the effects of the project on the species.

The evaluation of effects related to species at risk, will be supplemented by management plan or plans covering wildlife and wildlife habitat protection and wildlife effects monitoring.

¹ Refer to (http://www.sararegistry.gc.ca/default_e.cfm http://www.cosewic.gc.ca/eng/sct5/index_e.cfm) and (<http://www.nwtspeciesatrisk.ca/>) for guidance.

7.4.5.2.8 Traditional Land Use and Harvesting

- SCML will describe and evaluate the potential impacts of the construction, operation and closure of the project on traditional land use and harvesting. Traditional land use and harvesting is considered to include fishing, hunting, trapping and gathering of fish, wildlife and vegetation for human use. Human use includes, for example, food, medicine, furs, or the dissemination of culture. Subjects that will be considered include: the abundance and distribution of harvested resources;
- the quality of harvested species as it relates to human use and consumption;

7.2.8.1 Access and harvesting pressures

Including:

- access levels including increased access to the land and surrounding waters, as well as increased access to important areas or routes used for traditional harvesting; and,
- hunting and fishing pressures from people who do not reside in the region and how road-related changes in harvest pressures could impact the resource;
- ~~• the abundance and distribution of harvested resources;~~

7.4.5.17.2.8.2 ~~the quality of harvested species as it relates to human use and consumption;~~

Harvest patterns

Effects on harvest patterns and high-value harvest areas, including, where relevant, and where information is available:

- changes to harvest effort as perceived by harvesters;
- changes in harvester travel patterns;
- changes in harvest levels;
- changes in harvesters' costs; and,
- changes in seasonal harvesting patterns.

7.2.8.3 Overall effects on harvested resources

Including:

- the abundance and distribution of harvested resources; and,
- the quality of harvested species as it relates to human use and consumption.

7.2.8.4 Mitigations

Once potential effects of the project on traditional harvesting have been identified, the Review Board must understand what mitigations are in place in order to minimize the negative effects of these impacts. Towards this end, SCML will describe:

- measures to avoid or minimize changes in the abundance, distribution, or quality of harvested species, or mitigate the consequences of such changes;
- mechanisms to control project workforce-related hunting, fishing, or disturbance of wildlife; and,

- mechanisms of resource management agencies and other parties to manage hunting, and fishing by:
 - resident hunters and fishers;
 - non-resident hunters and fishers; and,
 - Aboriginal harvesters.

The evaluation of effects related to traditional land use and harvesting, will be supplemented by management plans, for example, related to wildlife, road access, and road operations.

7.4.6.2.9 Cultural Resources

SCML will describe and evaluate the potential effects of the development on cultural resources (beyond those described in response to the discussion of impacts on harvesting). ~~Subjects that will be considered include:~~

~~7.4.6.17.2.9.1 T~~raditional lifestyles, values and culture; ~~and,~~

~~7.4.6.27.2.9.2 C~~ultural and spiritual sites and activities~~.~~

SCML will describe activities taken with community members to ensure that all cultural sites along the route have been identified, and SCML's degree of confidence that it has identified all such sites.

7.4.7.2.10 Heritage Resources

SCML will describe and evaluate the potential effects of the development on heritage resources. ~~Subjects that will be considered include:~~

~~7.2.10.1 D~~isturbance of archaeological and historical sites

~~SCML will describe activities taken with community members to ensure that all archaeological and historical sites along the route have been identified, and SCML's degree of confidence that it has identified all such sites.~~

~~7.4.7.17.2.10.2 M~~anagement and archiving of sites following legislative and First Nation requirements

~~SCML will describe activities taken with community members to ensure that all archaeological and historical sites along the route have been identified, and SCML's degree of confidence that it has identified all such sites.~~

7.5.1.1 National Park Reserves

~~SCML will describe how the construction, operation and closure activities will affect the Park Reserves. Subjects to consider include:~~

- ~~• visitor access to park areas and visitor experience;~~
- ~~• park cultural resources; and,~~

~~ecological integrity.~~

~~The evaluation shall be completed in the context of Parks Canada's legislated and mandated priorities, including current Park Management Plans. The assessment shall identify potential long-term changes to the Parks.~~

~~7.61.1 Potentially Affected Communities~~

~~SCML will identify potentially affected communities and describe the potential adverse impacts and benefits of the project on their residents and those of the Northwest Territories as a whole. Subjects that will be considered include:~~

- ~~• direct and indirect employment opportunities and contracting opportunities generated by the development and the potential for uptake of these opportunities locally and/or by Aboriginal peoples;~~
- ~~• wage and salary income;~~
- ~~• direct and indirect business opportunities generated by the development and the potential for uptake of these opportunities locally and/or by Aboriginal peoples; and~~
- ~~• the potential for adverse effects on overall community wellness.~~

~~SCML shall describe current or proposed socio-economic initiatives or agreements (please list and provide non-confidential details) aimed at maximizing potential benefits, such as:~~

- ~~• measures, plans and commitments for maximizing local and Aboriginal employment, contracting and business activity, including any proposed training, skills development or procurement policies and programs.~~

~~7.6.17.2.11 Roadways, Lake and River Access and Use~~

~~SCML will describe how the development will affect the use of existing roadways, lakes and rivers and - SCML will describe measures to avoid or minimize adverse impacts.~~

~~Subjects that will be considered include:~~

~~7.6.17.2.11.1 Access~~

~~Changes in access to areas, lakes and rivers by residents and visitors.~~

~~7.2.11.2 Use and effects on existing transportation routes~~

~~Including:~~

- ~~• increased traffic and potential for accidents along other NWT roadways;~~
- ~~• integrity of other roadways (e.g., surface damage from increased use); and,~~
- ~~• Effects on existing water transportation routes and navigation on navigable waters.~~

~~SCML will describe measures to avoid or minimize adverse impacts.~~

The evaluation of effects related roadways, lake and river access and use will be supplemented by management plans related to road access and road operations.

7.7.3 Effects of the Environment on the Project

SCML will describe the potential effects of the environment on the project. Subjects that will be considered include:

- long-term climate change scenarios² (e.g., loss of permafrost, increased evaporation and evapotranspiration, greenhouse gas emissions);
- how foreseeable changes in permafrost will affect the amount of granular material required for care and maintenance of the project;
- short-term climatic and extreme weather events;
- avalanches;
- flooding; and,
- increased potential for forest fires.

Noise and Vibration

SCML will describe and evaluate the potential effects of the project on ambient noise conditions. Noise itself is not a valued component, but it has the potential to affect VCs. The effects of noise emissions on VCs will be addressed in the relevant sections. For example, effects of noise on breeding birds will be considered in the assessment of Wildlife and Wildlife Habitat. SCML will describe and evaluate the potential effects of the project on ambient noise conditions, including consideration of:

- noise emissions from vehicles, equipment and stationary sources;
- vibration caused by blasting;
- all types of noise emissions by source for each phase (construction, operation and maintenance, and closure), including quantity, timing and duration, during both normal operating conditions and that may result from accidents and malfunctions; and,
- potential effects on human health.

The evaluation of effects related to noise and vibration will be supplemented by material in the road operations management plan.

~~8.1 ASSESSMENT OF POTENTIAL ACCIDENTS AND MALFUNCTIONS~~

~~SCML will describe and evaluate the effects of potential accidents and malfunctions associated with the project. For project construction, operation and closure, the assessment of accidents and malfunctions will include:~~

- ~~• a risk assessment;~~
- ~~• the identification of high risk areas for geohazards and spills, and locations and seasonal conditions where spills response and/or clean-up is challenging, including a description of site specific contingencies for high risk areas; and,~~

² See the Intergovernmental Panel on Climate Change's most recent assessment report at <http://www.ipcc.ch/report/ar5/>

- ~~• a description of emergency response plans and/or other contingency plans that will be in place for accidents, malfunctions, or unforeseen impacts of the environment on the development or of the development on the environment.~~

~~For each project phase, accidents and risks to consider include (where relevant for the project phase):~~

- ~~• concentrate spills, fuel spills, spills of mine reagents, and risk of resulting contamination of soil and/or water;~~
- ~~• explosions and/or fires; and,~~
- ~~• transportation / traffic accidents that do not result in contamination of soil and/or water.~~

~~To help inform the discussion, SCML should describe how the road design considerations (section 5.3) will help minimize the risks associated with the project.~~

~~Management plans for spill contingency and emergency response will supplement this assessment of potential accidents and malfunctions.~~

9.8 ASSESSMENT OF PROJECT ALTERNATIVES

The DAR will include a section on project alternatives, with subsections including those indicated below (in subsections 9.1, 9.2 and 9.3).

9.18.1 Alternatives to the Project

SCML will describe and evaluate technically and economically feasible alternatives to the project that would allow SCML to achieve the same objective as the proposed development (e.g., using a railroad or a pipeline to transfer zinc and lead concentrates and/or other materials rather than the proposed road). A no-project scenario shall be described as an alternative to the project.

9.28.2 Alternatives within the Project

Given that the project involves upgrades to an existing road, SCML will provide commentary of the selected roadway design features and their role in avoiding and/or minimizing impacts. SCML will provide a commentary on the alternative means for:

- temporary construction camps; and
- borrow pits.

9.38.3 Alternatives Analysis

SCML shall provide commentary as to why certain alternatives were rejected and why the proposed alternative was selected, giving consideration to their technical and economic feasibility, potential socio-economic effects, and environmental effects of the alternatives. The alternatives analysis should rationalize the need for the project.

109 ASSESSMENT OF CUMULATIVE EFFECTS

The Review Board is required to assess the cumulative effects of the proposed development under Section 117 (2) (a) of the MVRMA. The Review Board's *Environmental Impact Assessment Guidelines (Appendix H)* describes its requirement for cumulative effects assessment. The cumulative effects assessment will consider the residual adverse effects of the proposed project on identified VCs, placing particular attention on key lines of inquiry (see Section 3.2.4). Emphasis will be placed on the cumulative effects of the upgraded road, with the effects of the mine, other transportation infrastructure, other resource development activities, and Park operations now and into the reasonably foreseeable future.

The cumulative effects assessment shall not consider beneficial effects, the effects of accidents and malfunctions nor effects of the environment on the project. The cumulative effects of accidents and malfunctions and the effects of the environment on the project are considered to be hypothetical with a very low probability of occurrence.

110 FOLLOW-UP AND MONITORING

The DAR will include a section that summarizes commitments to follow-up and monitoring plans and programs. Follow-up and monitoring will also be covered in specific sections, where relevant, such as sections related to key lines of inquiry and subjects of note. Information and plans related to follow-up and monitoring will be part of relevant management and monitoring plans.

"Follow-up" means a program for verifying the accuracy of the environmental assessment of a project and determining the effectiveness of any measures taken to mitigate the adverse environmental effects of the project.

SCML will:

- clearly describe the regulatory and non-regulatory monitoring requirements for the life of the project;
- provide a description of the purpose of each program, responsibilities for data collection, analysis and dissemination, and how results will be used in an adaptive management process;
- describe how project-specific monitoring will be compatible with the NWT Cumulative Impact Monitoring Program or other regional monitoring and research programs; and,
- describe how the results of follow-up monitoring and the management response framework would be used and incorporated into land use permit and water licence applications in support of the project construction and operations.

SCML is encouraged to discuss and adopt common data collection and monitoring protocols with local and regional monitoring programs including GNWT-Wildlife to facilitate project impact analysis.

In addition, SCML is encouraged to use management response plans to accomplish adaptive management. Guidance on a management response framework, how to link monitoring results to management decisions, and how management activities are developed adaptively in response to changes in the environment can be found in the Wek'eezhii Land and Water Board document

Guidelines for Adaptive Management – a Response Framework for Aquatic Effects Monitoring. Draft. Oct 17, 2010.

12.11 CLOSURE AND RECLAMATION

Closure and reclamation will be covered as part of the development description (see section 5) and will be discussed in other sections of the DAR, such as those assessing environmental impacts. Closure and reclamation sub-sections will also be included in relevant management and monitoring plans.

SCML will provide a conceptual closure and reclamation plan (CCRP) for the temporary construction camps, the road, and borrow pits, based on the guidance in the Mackenzie Valley Land and Water Board / Government of Northwest Territories *Northern Land Use Guidelines for Pits and Quarries, Camp and Support Facilities and Access: Roads and Trails* and other appropriate information sources. In addition to addressing the items outlined in the guidelines, the CCRP will:

- explicitly state the proposed post-closure land use(s) for the project footprint; and,
- clearly link both the post-closure land use and the closure objectives to the information collected through the public and First Nations engagement process.

12.12 LITERATURE CITED

- Deh Cho First Nation. 2003. Traditional Knowledge Policy.
- Deh Cho First Nation. 2004. DFN Traditional Knowledge Research Protocol.
- Levelton Consultants Ltd. 2011. Air Quality Assessment for the Selwyn Mine Project.
- MVEIRB. 2005. Guidelines for Incorporating Traditional Knowledge in Environmental Impact Assessment.
- Pacifica Resources Ltd. 2006. Preliminary Report: Traditional Ecological Study, Howard Pass.
- Sahtu Land Use Planning Board. 2013. Sahtu Land Use Plan.
- Sidena Consulting Ltd. 2014. Howard's Pass Access Road LUP Application Community Engagement Plan. Prepared for Selwyn Chihong Mining Ltd., Pitt Meadows, BC.
- Sidena Consulting Ltd. 2015. HPAR LUP Application Community Engagement Report.
- SLR Consulting (Canada) Ltd. 2015. Howard's Pass Access Road Upgrade Project 2015 Land Use and Water Licence Application Package Volume 2: Project Description Report.
- The Dehcho Land Use Planning Committee. 2006. NDÉH TS'EDÎCHÁ: Dehcho Ndéh T'áh Ats'et'î K'eh Eghálats'ênda Respect for the Land: The Dehcho Land Use Plan (final draft).

APPENDIX A: GUIDELINES FOR MONITORING AND MANAGEMENT PLANS

In the interest of fair, efficient, and effective environmental assessment that successfully meshes with integrated resource management in the Mackenzie Valley, the Review Board encourages SCML to review the following non-comprehensive list of documents while assessing potential impacts from the development, as well as in creating and presenting monitoring and mitigation programs for the project. The documents include but are not limited to:

Mackenzie Valley Environmental Impact Review Board

- *Environmental Impact Assessment Guidelines (2004)*
- *Socio-Economic Impact Assessment Guidelines (2007) and,*
- *Guidelines for Incorporating Traditional Knowledge in Environmental Impact Assessment (2005)*

Mackenzie Valley Land and Water Board

- Any relevant guidelines published by the Mackenzie Valley Land and Water Board:
- *The Mackenzie Valley Land and Water Board Document Submission Standards (2012)*
- *Standards for Geographical Information Systems Submissions (2012)*
- *Guide to Completing Land Use Permit Applications (2013)*
- *Guide to Completing Water Licence Applications (2003)*
- *Engagement and Consultation Policy (2013)*
- *Engagement Guidelines for Applicants and Holders of Water Licences and Land Use Permits (2013)*
- *Water and Effluent Quality Management Policy (2011)*
- *Guidelines for Developing a Waste Management Plan (2011)*
- *Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories (2013 MVLWB/AANDC) and*
- *Draft Guidelines for Adaptive Management (2010)*

Fisheries and Oceans Canada

- *Freshwater Intake End-of-Pipe Fish Screen Guideline (1995)*
- *Protocols for Winter Water Withdrawal in the Northwest Territories (2005) and,*
- *Fish Screen Design Criteria for Flood and Water Truck Pumps (2011)*

Aboriginal Affairs and Northern Development Canada

- *Guidelines for Designing and Implementing Aquatic Effects Monitoring Programs for Development Projects in the Northwest Territories (2009)*
- *Mine Site Reclamation Policy for the Northwest Territories (2002), and*
- *Guidelines for Spill Contingency Planning (2007)*

Canadian Council of Ministers for the Environment

- *Canadian Environmental Quality Guidelines for the Protection of Aquatic Life*

Government of the Northwest Territories

- *Guideline for Ambient Air Quality Standards in the Northwest Territories Government of the Northwest Territories Guideline for Dust Suppression (2004)*
- *Northwest Territories Cumulative Impact Monitoring Program*³
- *Draft Wildlife and Wildlife Habitat Protection Plan and Wildlife Effects Monitoring Program Guideline (2013)* and
- *Guidelines for Dust Suppression (2013)*

³ See <http://www.enr.gov.nt.ca/programs/nwt-cimp>