DRAFT
Application Information Requirements
Red Mountain Underground Gold Project

Proposed by:
IDM Mining Ltd.

September 26, 2016
Pursuant to the Environmental Assessment Act, S.B.C. 2002, c.43
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<td>• Section 3.1.1 - added table number and title ‘Selected VCs and ICs’&lt;br&gt;• Section 5 - added a table: Valued Components, Assessment Endpoints and Measurement Indicators for the Economic Assessment</td>
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PREFACE TO THE AIR

The Application Information Requirements (AIR) specifies the information that IDM Mining Ltd. (the Proponent) is required to provide in their Application for an Environmental Assessment Certificate (Application) under the Section 16(2) of BC Environmental Assessment Act (the Act).

The Proponent is proposing to develop the Red Mountain Underground Gold Project (the proposed Project), as described in the Project Description (http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_document_436_39515.html) and as shown in Figure 1. The proposed Project is an underground gold and silver mine located in northwest British Columbia, approximately 18 km northeast of Stewart. Since the proposed Project is a mine that will have a production capacity of approximately 1,000 tonnes per day (tpd) and 275,000 tonnes per year, it is subject to a provincial EA review under Part 8 of the Reviewable Projects Regulation (BC Reg 370/02) of the Act.

The BC Environmental Assessment Office (EAO) issued a Section 10 Order to IDM on November 2, 2015, confirming that the proposed Project requires an Environmental Assessment Certificate (EAC), pursuant to Section 10(1)(c) of the Act, before it may receive provincial permits to construct and operate the proposed Project.

Canadian Environmental Assessment Act 2012 (CEAA 2012) Applicability

The proposed Project also exceeds the minimum daily ore production threshold of 600 tpd identified in Section 16 of the Schedule of the Regulations Designating Physical Activities of the Canadian Environmental Assessment Act 2012 (CEAA 2012). The proposed Project will therefore require a decision pursuant to CEAA 2012.

List of Reviewing Agencies

The following government agencies, municipal and regional agencies, Aboriginal Groups, and the public have had the opportunity to review and comment on the draft Valued Component Selection Document and the draft AIR.

Provincial Agencies:

- BC Environmental Assessment Office
- Ministry of Forests, Lands, and Natural Resource Operations
- Ministry of Energy and Mines
- Northern Health Authority
- Ministry of Transportation and Infrastructure
- Ministry of Environment
Federal Agencies:

- Canadian Environmental Assessment Agency
- Natural Resources Canada
- Fisheries and Oceans Canada
- Environment and Climate Change Canada
- Health Canada
- Natural Resources Canada

Municipal and Regional Agencies:

- Regional District of Kitimat Stikine
- District of Stewart

Aboriginal Groups identified in the section 11 Order:

- Nisga’a Nation, as represented by the Nisga’a Lisims Government

This Application Information Requirements (AIR) has been prepared with consideration of the comments received from the BC Environmental Assessment Office (EAO), Working Group members, and Nisga’a Nation. Consultation has included targeted discussions with NLG representatives and Working Group members and a Working Group meeting. The Proponent has maintained a comment and response tracking table to document the feedback received from NLG and Working Group members and IDM’s responses. The Proponent anticipates that further consultation activities, including a public comment period, a public open house, and open houses in Nisga’a Nation communities, will be completed prior to the finalization of the AIR.
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<td>Table 50:</td>
<td>Summary Table of the Results of Aboriginal Consultation related to Aboriginal Interests/Other Matters of Concern to TSKLH and MNBC</td>
<td>11-7</td>
</tr>
<tr>
<td>Table 51:</td>
<td>Nisga’a Nation 8(e) Concordance Table</td>
<td>12-2</td>
</tr>
<tr>
<td>Table 52:</td>
<td>Nisga’a Nation 8(f) Interest Concordance Table</td>
<td>12-5</td>
</tr>
</tbody>
</table>
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TABLE OF CONCORDANCE

A Table of Concordance will be included in the Application. The Table of Concordance will demonstrate where the requirements in the AIR are found in the Application, with volume, section, and page references and following the format of Table 1. A well-constructed Table of Concordance will assist in a timely application evaluation to determine whether the Application contains the required information.

Table 1:  Example Table of Concordance between AIR and Application

<table>
<thead>
<tr>
<th>AIR Section &amp; Page No.</th>
<th>AIR Title</th>
<th>AIR Section Language</th>
<th>Application Section Title</th>
<th>Application Volume Section and Sub-Section</th>
<th>Relevant Appendix</th>
</tr>
</thead>
</table>
### ABBREVIATIONS AND ACRONYMS

The Application will include a list of abbreviations and acronyms including the following:

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Act</td>
<td><em>BC Environmental Assessment Act</em></td>
</tr>
<tr>
<td>AEMP</td>
<td>Aquatic Effects Monitoring Program</td>
</tr>
<tr>
<td>Agency</td>
<td>Canadian Environmental Assessment Agency</td>
</tr>
<tr>
<td>AIR</td>
<td>Application Information Requirements</td>
</tr>
<tr>
<td>Alberta EUB</td>
<td>Alberta Energy and Utilities Board</td>
</tr>
<tr>
<td>Application</td>
<td>Application for an Environmental Assessment Certificate</td>
</tr>
<tr>
<td>ARD</td>
<td>Acid rock drainage</td>
</tr>
<tr>
<td>BC</td>
<td>British Columbia</td>
</tr>
<tr>
<td>BCEAA</td>
<td><em>BC Environmental Assessment Act</em></td>
</tr>
<tr>
<td>CAAQs</td>
<td>Canadian Ambient Air Quality Standards</td>
</tr>
<tr>
<td>CEAA 2012</td>
<td>Canadian Environmental Assessment Act, 2012</td>
</tr>
<tr>
<td>CO</td>
<td>Carbon Monoxide</td>
</tr>
<tr>
<td>CO₂</td>
<td>Carbon Dioxide</td>
</tr>
<tr>
<td>CRA Fisheries</td>
<td>Commercial, Recreational, and Aboriginal Fisheries</td>
</tr>
<tr>
<td>CULRTP</td>
<td>Current Use of Land and Resources for Traditional Purposes</td>
</tr>
<tr>
<td>dBA</td>
<td>Decibels (A-weighted)</td>
</tr>
<tr>
<td>EA</td>
<td>Environmental Assessment</td>
</tr>
<tr>
<td>EAC</td>
<td>Environmental Assessment Certificate</td>
</tr>
<tr>
<td>EAO</td>
<td><em>BC Environmental Assessment Office</em></td>
</tr>
<tr>
<td>EIS</td>
<td>Environmental Impact Statement</td>
</tr>
<tr>
<td>ESCIA</td>
<td>Nisga'a Economic, Social, and Cultural Impact Assessment</td>
</tr>
<tr>
<td>Acronym</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
</tr>
<tr>
<td>FEMA</td>
<td>Failure Modes and Effects Analysis</td>
</tr>
<tr>
<td>IDM</td>
<td>IDM Mining Ltd.</td>
</tr>
<tr>
<td>IC</td>
<td>Intermediate Component</td>
</tr>
<tr>
<td>ISO</td>
<td>International Organization for Standardization</td>
</tr>
<tr>
<td>ISOG</td>
<td>Interim Sediment Quality Guidelines</td>
</tr>
<tr>
<td>km</td>
<td>Kilometer</td>
</tr>
<tr>
<td>LNG</td>
<td>Liquefied Natural Gas</td>
</tr>
<tr>
<td>LSA</td>
<td>Local Study Area</td>
</tr>
<tr>
<td>m</td>
<td>meter</td>
</tr>
<tr>
<td>ML</td>
<td>Metal leaching</td>
</tr>
<tr>
<td>MEM</td>
<td>British Columbia Ministry of Energy and Mines</td>
</tr>
<tr>
<td>NBC</td>
<td>Métis Nation BC</td>
</tr>
<tr>
<td>MoE</td>
<td>Ministry of Environment</td>
</tr>
<tr>
<td>N₂O</td>
<td>Nitrous oxide</td>
</tr>
<tr>
<td>NAAQO</td>
<td>National Ambient Air Quality Objectives</td>
</tr>
<tr>
<td>NFA</td>
<td>Nisga’a Final Agreement</td>
</tr>
<tr>
<td>NLG</td>
<td>Nisga’a Lisims Government</td>
</tr>
<tr>
<td>NO₂</td>
<td>Nitrogen dioxide</td>
</tr>
<tr>
<td>PEL</td>
<td>Probable Effects Level</td>
</tr>
<tr>
<td>PM₂.₅</td>
<td>Particulate matter less than 2.5 microns in diameter</td>
</tr>
<tr>
<td>PM₁₀</td>
<td>Particulate matter less than 10 microns in diameter</td>
</tr>
<tr>
<td>PY</td>
<td>Person Year</td>
</tr>
<tr>
<td>Project area</td>
<td>the area in which construction and operation of the Project components occurs</td>
</tr>
<tr>
<td>Acronym</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>------------------------------------</td>
</tr>
<tr>
<td>QA/QC</td>
<td>Quality Assurance / Quality Control</td>
</tr>
<tr>
<td>RSA</td>
<td>Regional Study Area</td>
</tr>
<tr>
<td>TEK</td>
<td>Traditional Ecological Knowledge</td>
</tr>
<tr>
<td>tpd</td>
<td>Tonnes per Day</td>
</tr>
<tr>
<td>TSKLH</td>
<td>Tsetsaut Skii km Lax Ha</td>
</tr>
<tr>
<td>VC</td>
<td>Valued Component</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organization</td>
</tr>
</tbody>
</table>
APPLICATION SUMMARY

The Application will include a summary, including the following:

- a summary of the proposed Project including the project scope, project benefits, and applicable permits. If the proponent has already requested or intends to request concurrent permitting, this will also be stated;

- a brief overview of the assessment process including project reviewability and the pre-application and application review stages of the EA;

- a brief overview of consultation approaches with Aboriginal Groups, the public, and government agencies to date;

- a summary of the key issues raised by Aboriginal Groups, the public, and government agencies;

- a summary of key adverse effects on Aboriginal Interests and mitigation measures;

- a summary of key effects, proposed mitigation measures, and residual and cumulative effects on Valued Components; and

- Proponent’s conclusions regarding the potential for significant adverse effects on Valued Components.
PART A – INTRODUCTION

1.0 OVERVIEW OF PROPOSED PROJECT PROPOSENT DESCRIPTION

A description of the Proponent is included in the Project Description at:

The Application will:

- describe the Proponent, including history, type of company or organization, and affiliations;
- provide contact information for the Proponent;
- be provided in an unlocked and bookmarked portable document format; and
- include a list of parties involved in the preparation of the Application, their appropriate professional qualifications, and the section(s) for which they were responsible.

1.1 Description of Proposed Project

A description of the proposed Project is included in the Project Description at:
http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_document_436_39515.html

The Application will:

- describe the purpose of the proposed Project from the perspective of the Proponent and identify whether the objectives of the proposed Project relate to any broader private or public sector policies, plans, or programs;
- describe the location of the proposed Project, the latitude and longitude coordinates of the site, geography, climate, and geologic setting (regional, local, site, and surficial), including maps showing both regional context (identifying nearby communities and geographic features) and the specific location of the proposed Project;
- describe the location of the proposed Project relative to Aboriginal Groups’ asserted traditional territories or Treaty Lands;
- discuss the relevant history of the proposed Project, including exploratory or investigative history;
- describe all phases of the proposed Project, including their duration and proposed scheduling;
• describe all on-site and off-site components associated with the proposed Project, with figures. The description will include relevant design, geological, geochemical and hydrogeological characteristics of the underground mine, process plant and ore processing facility, location of the crusher, water treatment plan (if applicable), conveyance of ore from portal to the mill, waste rock stockpiles, ore stockpiles, overburden and soil stockpiles, borrow sources, site equipment, water management and diversion structures for all mine phases (underground and surface), explosives, ancillary facilities, power supply, power line, access road, traffic access, and tailings management facility;

• with respect to underground development, a description of:
  o the underground development plan, including typical sections, profiles, and mining sequence;
  o feasibility-level geotechnical and hydrogeological investigations (including rock quality, geology, geologic structure, stresses, and water inflows);
  o geotechnical and hydrogeological considerations for underground development, including expected rock quality, geology, geologic structure, stresses, and water inflows;
  o conceptual ground control management plan for the underground workings, including proposed support for typical ground, areas of poor rock quality, and any major excavations;
  o the methods used to estimate the areal extent of any potential surface subsidence, the degree of expected subsidence, and potential effects on infrastructure and environment;

• specifically with respect to waste rock and soil stockpiles, include a description of:
  o feasibility-level design including locations, footprints, volumes, heights, and design slopes of waste rock storage and soil stockpiles;
  o foundation conditions including foundation angle and soil properties;
  o feasibility-level geotechnical stability assessment, including preliminary factors of safety;
  o water management features;
  o a conceptual plan for any proposed instrumentation or monitoring;
  o a risk analysis (e.g. failure modes effects analysis);
  o details of the development sequence; and
  o reference to the interim Guidelines of the BC Mine Waste Rock Pile Research Committee;
specifically with respect to the tailings management facility (TMF), include a description of:

- surface and structural geology of the area;
- feasibility-level embankment design including heights, capacity, slopes, and method of construction;
- details pertaining to foundation conditions, including foundation angle and soil properties;
- embankment construction materials, volumes, and potential borrow source locations;
- feasibility-level geotechnical stability assessment, including preliminary factors of safety;
- storage capacity and description of tailings properties;
- a conceptual plan for any proposed instrumentation or monitoring;
- any water diversion structures and spillways;
- seepage control rates and seepage management; and
- reference to the CDA Dam Safety Guidelines for consequence classification, seismic design criteria, and inflow design flood.

with respect to the site access road, include a description of:

- the types of vehicles and traffic volumes anticipated for pre- and post-construction activities;
- the level and seasonality of road use;
- peak flows of Bitter Creek that the road will be designed for;
- sediment and erosion control measures;
- how road construction will mitigate stream channel changes along the alignment; and
- details regarding the suitability of materials for road construction, including the presence or absence of glacial till along the road alignment.

include the description and design of additional water storage facilities or sediment ponds;

include the conceptual design of the Project including design objectives and principles, the characteristics and volumes of cover materials required, construction methods, assessment of expected performance and long-term effectiveness under the expected range of climatic conditions, impact on the water balance and water quality, monitoring and maintenance requirements, contingency plans, and long-term monitoring and maintenance;
• include feasibility-level information pertaining to descriptions of geohazard influences along the roads, portals, TMF, waste storage and stockpile areas, mill, admin buildings, etc.;

• if water treatment is proposed, the Application will describe water treatment requirements and provide a conceptual design of the water treatment facilities, including:
  o location;
  o characterization of influent and effluent chemistry and flow;
  o treatment process information and demonstration of its effectiveness;
  o information on the drainage collection and conveyance systems;
  o predicted reagent use;
  o assessed performance under the expected range of flow and climatic conditions;
  o identification of operating, monitoring and maintenance requirements; and
  o anticipated capital and operating costs.

• if water treatment is proposed, the Application will provide a conceptual design of the disposal facility for the handling of any water treatment plant by-product, including:
  o liquid effluent sources;
  o predicted volumes;
  o variation with season, project phase and component;
  o physical and geochemical characteristics of waste (including long-term geochemical stability); and
  o disposal/management plans.

• describe monitoring commitments and responsibilities related to water management;

• describe the activities associated with the components and phases of the proposed Project, with figures;

• describe the proposed mine production schedule, including ore, waste rock, and tailings tonnages;

• describe the proposed activities for closure, reclamation, and post-closure;

• include conceptual plans and design for the lower portal plug, with consideration of the CDA Dam Safety Guidelines for seismic, monitoring, and long-term design requirements, as well as alternatives to a plug to contain flooded workings;

• discuss the relevant history of the proposed Project, including exploratory or investigative history;
• summarize existing and planned land use that overlaps or may be potentially impacted by the proposed Project components and activities, including:
  
  o land ownership [e.g. private land, provincial Crown land, federal land (including Indian Reserves), Aboriginal title];
  o local government zoning or plans;
  o tenures (municipal, provincial, federal), licences, permits, or other authorizations;
  o non-tenured current land uses;
  o provincial land use plans (e.g. Land and Resource Management Plans) and provincial land use designations (e.g. Agricultural Land Reserve, Old Growth Management Areas, Forests and Range Practices Act designations) and provincial land use management objectives;
  o any other development or activities, whether or not directly related to the proposed Project;
  o maps showing location of other uses referenced above in relation to the proposed Project; and
  o references to the Application section that assesses land use and potential overlaps/impacts in more detail.

• describe the Project’s economic benefits, including:
  
  o capital construction cost estimates, including:
    ▪ breakdown of costs (e.g. land, buildings, equipment) associated with the proposed Project;
    ▪ estimated operating costs over the life of the proposed Project, including breakdown of costs by category (e.g. labour, supplies and materials, administration); and
    ▪ estimated costs for decommissioning, closure, abandonment, and reclamation.
  o employment estimates including:
    ▪ direct employment to be created, by job category by Project phase, in number of person year (PY) jobs for construction and decommissioning and full-time equivalent (FTE) jobs for operations. Direct employment estimates will be broken down into full-time, part-time, and seasonal job categories;
    ▪ average wages, by major job category, for the construction and operating periods;
    ▪ breakdown of jobs that will be filled from local, provincial, national, or international labour markets;
• indirect and induced employment to be generated, by Project phase; and
• information about an employment strategy, if any.

• contractor supply services estimates, including:
  o list of the major types of businesses/contractors to be used, broken down at the local, provincial, and national level, by Project phase;
  o value of supply of service contracts expected, by Project phase; and
  o information about a local purchasing strategy, if any.

• annual government revenues, by type (e.g. income tax, licence rent, property tax, mineral tax) and jurisdiction (e.g. local, provincial, federal) for all phases of the proposed Project;

• any benefits the Project may have to the five pillars of assessment (Environmental, Economic, Social, Health and Heritage);

• Canadian dollar estimates, which will be provided in real dollars and with an explanation of how they are measured (e.g. discount rates); and

• statement of all assumptions and references for the above information.

If new and/or innovative mitigations are proposed for the Project and are not in conventional use at mine sites in BC, the Application will include the results of pilot testing, research and development work, and/or provide relevant analogues from other mining applications, to demonstrate their effectiveness and appropriateness for the proposed Project.

1.2 Applicable Authorizations

A list of required authorizations, to the extent that was known at the time, is available in the Project Description at: http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_document_436_39515.html

The Application will:

• list in table format (see example below) all applicable licenses, permits, and/or approvals that are already received or required for the phases of the proposed Project and the associated responsible regulatory body; and

• state if the proponent has or intends to request concurrent permitting under the Act pursuant to the Concurrent Approval Regulation (BC Reg. 371/2002).
<table>
<thead>
<tr>
<th>Name of Authorization</th>
<th>Statute and Authorizing Agency</th>
<th>Description Need for Authorization</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PROVINCIAL</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental Assessment Certificate</td>
<td><em>BC Environmental Assessment Act, BC Environmental Assessment Office</em></td>
<td>The Project exceeds minimum annual ore production capacity of 75,000 tonnes identified in Part 3 of the Reviewable Projects Regulation (B.C. Reg 370/02). The Project is therefore expected to acquire an Environmental Assessment Certificate (EAC) pursuant to the <em>BC Environmental Assessment Act</em> (BCEAA).</td>
</tr>
<tr>
<td>Licence to Cut</td>
<td><em>Forest Act, Ministry of Forests, Lands, and Natural Resource Operations</em></td>
<td>The <em>Forest Act</em> regulates clearing of trees on Crown land. The Project is therefore expected to obtain a License to Cut.</td>
</tr>
<tr>
<td>Road Use Permit</td>
<td><em>Forest Act, Ministry of Forests, Lands, and Natural Resource Operations</em></td>
<td>The construction of a road on Crown land is regulated by the <em>Forest Act</em>. The Project is therefore expected to obtain a Road Use Permit.</td>
</tr>
<tr>
<td>Burning Reference Number</td>
<td><em>Wildfire Act, Ministry of Forests, Lands, and Natural Resource Operations</em></td>
<td>The Project will occasionally need to burn materials in a manner consistent with a Category 3 open fire. Therefore, the Project will acquire a Burning Reference Number in accordance with the <em>Wildfire Act</em>.</td>
</tr>
<tr>
<td>S.11 Approval or Authorization for Changes in and About a Stream</td>
<td><em>Water Sustainability Act, Ministry of Forests, Lands, and Natural Resource Operations</em></td>
<td>Construction of diversion channels to divert water from areas up-slope of the mill, temporary stockpiles and tailings facility, and upstream Goldslide Creek will require an S.11 Approval or Authorization for Changes in and About a Stream pursuant to the <em>Water Act</em>.</td>
</tr>
<tr>
<td>Mining Lease</td>
<td><em>Mineral Tenure Act, Ministry of Energy and Mines</em></td>
<td>In compliance with the <em>Mineral Tenure Act</em> the Project will acquire a Mining Lease.</td>
</tr>
<tr>
<td>Mines Act Permit</td>
<td><em>Mines Act, Ministry of Energy and Mines</em></td>
<td>The Project will require a Mines Act Permit under Section 10 of the BC <em>Mines Act</em>.</td>
</tr>
<tr>
<td>Mining Right of Way Permit</td>
<td><em>Mining Right of Way Act, Ministry of Energy and Mines</em></td>
<td>Construction of the Project’s access road may require a Mining Right of Way Permit pursuant to the <em>Mining Right of Way Act</em> in order to acquire a Right of way on Crown land.</td>
</tr>
<tr>
<td>Permit to Operate a Food Premise</td>
<td><em>Public Health Act – Food Premises Regulation and DWP Act, Northern Health Authority</em></td>
<td>Operation of a cafeteria at the Project site would require a Permit to Operate a Food Premise as described in the <em>Public Health Act</em>.</td>
</tr>
<tr>
<td>Name of Authorization</td>
<td>Statute and Authorizing Agency</td>
<td>Description Need for Authorization</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>General Application for Health Approval</td>
<td>Public Health Act – Sewage Disposal Regulation, Northern Health Authority</td>
<td>Operation of a food service venue at the Project site would require General Application for Health Approval by the Northern Health Authority’s Public Health Act – Sewage Disposal Regulation.</td>
</tr>
<tr>
<td>Water System Operating Permit</td>
<td>Drinking Water Protection Act, Northern Health Authority</td>
<td>Development of a water system for use at the Project site is permitted under the Northern Health Authority’s Drinking Water Protection Act. IDM will obtain a Water System Operating Permit.</td>
</tr>
<tr>
<td>Highway Access Permit / Provincial Public Highway Permit Application</td>
<td>Transportation Act and Motor Vehicle Act, Ministry of Transportation and Infrastructure</td>
<td>The Transportation Act and Motor Vehicle Act regulate use of a public highway. The Project’s transportation requirement will therefore obtain a Highway Access Permit / Provincial Public Highway Permit.</td>
</tr>
<tr>
<td>Utility Permit</td>
<td>Transportation Act and Motor Vehicle Act, Ministry of Transportation and Infrastructure</td>
<td>Construction of overhead power lines within a provincial right of way requires a Utility Permit pursuant to the Transportation Act and the Motor Vehicle Act.</td>
</tr>
<tr>
<td>Fuel Storage Permit</td>
<td>Environmental Management Act, Ministry of Environment</td>
<td>Fuel storage is regulated under the Environmental Management Act. The Project is therefore expected to obtain a Fuel Storage Permit.</td>
</tr>
<tr>
<td>Effluent Discharge Permit</td>
<td>Environmental Management Act, Ministry of Environment</td>
<td>The discharge of waste to the environment is regulated under the Environmental Management Act. The Project is therefore expected to obtain an Effluent Discharge Permit.</td>
</tr>
<tr>
<td><strong>FEDERAL</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Explosives Permit</td>
<td>Explosives Act, Natural Resources Canada</td>
<td>The use and storage of explosives is regulated under the Explosives Act. The Project is therefore expected to obtain an Explosives Permit.</td>
</tr>
<tr>
<td>Decision pursuant to CEAA 2012</td>
<td>Canadian Environmental Assessment Act, 2012, Canadian Environmental Assessment Agency</td>
<td>The Project exceeds the minimum daily ore production threshold of 600 t/day identified in the Section 16 of the Schedule of the Regulations Designating Physical Activities of CEAA 2012. The Project is therefore expected to require a decision pursuant to CEAA 2012.</td>
</tr>
</tbody>
</table>
1.3 Project Design and/or Alternative Means of Carrying out the Project

The Application will include:

- an assessment of the alternative means of carrying out the proposed Project that are technically and economically feasible including, but not limited to, the alternatives identified in the AIR;
- the rationale and criteria used to select the proposed means of undertaking the proposed Project; and
- the methodology and criteria used in the assessment of alternatives.

Various mining, processing, and site development alternatives have been developed and analyzed by past owners and currently by IDM. The range of alternative means of carrying out the proposed Project is outlined in the table below:

Table 3: Summary of Alternative Means of Carrying Out the Project

<table>
<thead>
<tr>
<th>Project Component</th>
<th>Alternative Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>520 m long adit with a 1,000 tpd mill</td>
<td>• Considered alternate mill site near Bitter Creek (proposed by previous proponents), in conjunction with longer (7 km) adit. Not economically viable.</td>
</tr>
</tbody>
</table>
| Processing | • Flotation concentrate followed by concentrate cyanide treatment has been tested. Resulting test work recoveries indicated the option was not economically viable.  
• Flotation concentration has been tested extensively and off site concentrate sale potential evaluated. Due to a low concentration ratio, lower gold and silver recovery, and high smelter treatment charges for a low gold grade pyritic concentrate, the option was not considered economically viable. |
| Power line and step down facilities. | • Considered on-site liquefied natural gas (LNG) and diesel generation versus power line for the supply required. LNG and diesel power costs for the life of the mine were 3 to 10 times higher than the proposed scheme. |
| Access road from existing road along Bitter Creek | • Road access is the only viable access. Must connect to the existing road and avoid crossing Bitter Creek for safety reasons.  
• Design and detailed siting will be informed by environmental and terrain studies. |
| Water Treatment Facility | • Location between Hartley Gulch and Otter Creek may be considered. |
### Tailings management facility

- Cirque area near portal considered and rejected because of geotechnical risk and meteorological considerations.
- Roosevelt Creek area considered and rejected because of environmental risk, geotechnical risk, and economic viability.
- Bitter Creek alternate sites down valley considered but not chosen because of proposed mine layout and mill location.

### Project Component

<table>
<thead>
<tr>
<th>Project Component</th>
<th>Alternative Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tailings management facility</td>
<td>• Cirque area near portal considered and rejected because of geotechnical risk and meteorological considerations.</td>
</tr>
<tr>
<td></td>
<td>• Roosevelt Creek area considered and rejected because of environmental risk, geotechnical risk, and economic viability.</td>
</tr>
<tr>
<td></td>
<td>• Bitter Creek alternate sites down valley considered but not chosen because of proposed mine layout and mill location.</td>
</tr>
</tbody>
</table>

For the following Project components, there are no alternatives or options available:

- Surface warehouse and mine dry facilities;
- Site office;
- Surface maintenance shop;
- Project offices in Stewart, BC; and
- Warehouse in Stewart, BC.

The alternatives assessment in the Application will identify the rationale for selecting the preferred alternative, and will assess alternative means for the following Project components:

- mining method(s);
- power source(s);
- underground access (e.g., access corridor and tunnel routes, portal locations, conveyor routes);
- water management options (e.g., water disposal, treatment and re-use);
- on-site haulage options (e.g., truck haulage versus conveyor); and,
- tailings and waste rock storage and disposal.

The following methods will be used to evaluate alternatives in the Application:

- identifying alternative means to carry out the Project, such as:
  - developing specific criteria to determine the technical and economic feasibility of the alternative means; and
  - identifying those alternative means that are technically and economically feasible, describing each alternative means in sufficient detail to allow for a comparison among alternatives.
• assessing the effects of each alternative means, including:
  o identifying those elements of each alternative that could result in effects in sufficient
detail to allow for a comparison with the effects of the proposed Project.

The effects referred to above include both environmental effects and potential adverse
impacts on potential or established Aboriginal or Treaty rights and related interests.

• preferred means:
  o identifying the preferred means based on the relative consideration of effects and of
technical and economic feasibility; and
  o determining criteria to examine the effects of each remaining alternative means to
identify the preferred means.

1.4 Tailings Management Alternatives Assessment

EAO has established additional information requirements for mines undergoing environmental
assessments specific to consideration of tailings management. Per the “Application Information
Requirements Template Tailings Management Requirements for Mining Projects Undergoing an
Environmental Assessment” (dated August 2015), the Application will provide the following
information:

• a description and an assessment of alternative means of undertaking the proposed Project
with respect to options for tailings management that considers technology, siting, and water
balance;

• a presentation and comparison of best practices and best available technologies for tailings
management for the Project, along with options for managing water balance to enhance
safety and reduce the risk (likelihood and consequence) of a tailings dam failure during all
phases of mine life (construction, operations, closure, post-closure);

• a presentation and comparison of technically and economically viable engineering solutions
that are available to adequately address site conditions;

• a clear and transparent evaluation of the factors that supported the selection of the most
suitable option. Factors that will be taken into consideration in the evaluation include
safety, technical and financial aspects, and implications for environmental, health, social,
heritage, and economic values. The assessment will consider these factors in relation to
tailings management options in both the short and long-term context. Life cycle cost
assumptions (construction, operations, closure, post-closure) will be included in the analysis
of options.

The requirements outlined above are intended to ensure that IDM has:

• considered other options that can address the potential for adverse effects on the factors
noted above;
• considered the potential risks and implications of the selected option, and have a technically- and economically-feasible plan to address the potential risks and implications; and,

• provided a clear and transparent rationale for the selected option(s).
Figure 1: Proposed Project Components
2.0 ENVIRONMENTAL ASSESSMENT PROCESS

2.1 Provincial EA Process

The Application will include:

- a statement that the proposed Project is subject to review under the Act, identifying the trigger(s) for the review under the Act;

- a statement that the Application has been developed pursuant to the AIR approved by EAO and complies with relevant instructions provided in the Section 11 Order and any other direction provided by EAO;

- a table documenting applicable milestones, including, but not limited to, issuance of Section 10 and 11 Orders, working group meetings, any public comment periods or open houses, and the issuance of the AIR, including links to documents on EAO’s public website;

- a list of the government agencies and Aboriginal Groups that participated in the EA, a summary of their participation, and a list of the key issues raised by each party and the status of issue resolution. (The Proponent will cross-reference, as appropriate, other sections of the Application that deal further with consultation and issues raised); and

- a summary of public participation in the EA, a list of the key issues raised, and the status of issue resolution (with cross-references, as appropriate, to other sections of the Application that deal further with consultation and issues raised).

2.2 Federal EA Process

The Application will include:

- the relevant review threshold that has been met under the federal Regulations Designating Physical Activities;

- whether the Canadian Environmental Assessment Agency has determined that a federal EA is required, including a link to the relevant documents on the CEAA Registry;

- whether the proposed Project is undergoing a substituted, coordinated, or other type of federal and provincial review process; and

- a table documenting applicable completed and upcoming federal milestones. Milestones include, but are not limited to, any public comment periods, notice of commencement, and finalization of the Environmental Impact Statement Guidelines.
2.3 **Nisga’a Final Agreement**

The Application will include:

- a description of the approach used to address the EA provisions required under Chapter 10 paragraphs 8(e) and (f) in the Nisga’a Final Agreement (NFA); and

- a description of the approach used to assess the effects of the Project on Nisga’a Nation’s Treaty interests, including recommendations to prevent or mitigate those effects, as required under Chapter 10 paragraph 8(e) and (f) of the NFA.
PART B - ASSESSMENT OF ENVIRONMENTAL, ECONOMIC, SOCIAL, HERITAGE AND HEALTH EFFECTS

3.0 ASSESSMENT METHODOLOGY

This section of the Application must describe the methods used to assess the potential adverse effects of the Project. The assessment methodology must be based on EAO’s Guideline for the Selection of Valued Components and Assessment of Potential Effects (September 2013).

A standardized effects assessment methodology will be applied to all assessment topics. This methodology will follow recommended provincial and federal guidelines and legislated requirements, pursuant to the Act and CEAA 2012. Guidance documents used to inform the assessment methods will be referenced in the Application and are detailed for each component in Sections 4 to 8 of this AIR.

Figure 2 provides an overview of the key steps of the effects assessment methodology per EAO guidelines (EAO 2015).

Figure 2: Overview of Key Steps in Effects Assessment

Specific steps will be provided in each discipline section of the Application.

3.1 Issues Scoping and Selection of Valued Components

The Application will summarize the process and methodologies used to identify and select the Valued Components (VCs) and Intermediate Components (ICs) for assessment. The Application will also include the rationale for any differences in the list of VCs or ICs presented in the Application from those listed in the AIR.
3.1.1 Issues Scoping

Issues, as defined in EAO’s Guidelines, are the broad range of environmental, economic, social, heritage, and health interests of government, Aboriginal Groups, and the public with respect to the proposed Project. IDM has gathered a list of issues through research, literature review, and engagement and consultation with interested parties. Based on this list, as well as through consultation with the technical Working Group and Nisga’a Nation, IDM has scoped the appropriate issues based on the following steps:

- review of the Project Description, including the review of the Project components, works, and activities that will be undertaken and a consideration of the spatial and temporal boundaries over which they will be conducted;
- compilation and review of available information about the environment that may be affected by the Project;
- identification of potential interactions between Project activities and the environment, as well as potential pathways for environmental effects, based on literature review and professional experience;
- consultation with Nisga’a Nation; and
- review of existing regulatory guidance documents.

The issues reflect criteria such as:

- presence of the VC or IC in the local or regional Project area;
- potential for Project interaction with, and effect on, the VC or IC;
- particular concern expressed by Nisga’a Nation, the government, or the public;
- relevance to legislative or regulatory requirement or government management priority (e.g., species at risk);
- relevance to Aboriginal Interests, including claimed or proven Aboriginal rights (including title) and Treaty rights;
- sensitivity or vulnerability to disturbance;
- measurability of parameters related to the VC or IC;
- similarity of potential effects for more than one VC or IC;
- similarity of mitigation measures, best management practices and/or standard operating procedures for more than one VC or IC; and
- relationship of VCs or ICs to one another and the pathway of effect.
3.1.2 Selection of Valued Components

This Application will include an identification of potential effects that may occur as a result of the interaction between the Project and selected ICs and receptor VCs.

Intermediate Components represent the pathway of potential effect between a Project component or activity and a VC. ICs and their measurement indicators require assessment to understand the effects pathways and the effects of the Project on the selected VCs and their assessment endpoints. Thus, the ICs and their measurement indicators will be assessed comprehensively, within dedicated chapters of the Application.

A VC is potentially affected either indirectly through linkage with an IC, or directly affected by a Project component or activity. As linkages are clear, effects of the Project on ICs must be incorporated into the overall effects on VCs. This helps ensure that all Project effects are accounted during the assessment.

The Application will provide a comprehensive assessment of both types of components, and will present a significance determination only for VCs as the assessment will focus on VCs as the ultimate receptor.

IDM has identified assessment endpoints for each VC. These are qualitative descriptions used to assess the significance of residual effects on VCs and are intended to represent the key properties of the component that should be protected. For example, the assessment endpoint of the VC Fish is the maintenance of self-sustaining populations. Significance is determined against the identified assessment endpoint for each VC.

The identification and characterization of one or more ICs is often required to understand effects to VCs. For example, changes in hydrology and groundwater quality (two separate ICs) may affect the ability of a fish population to remain self-sustaining. Characterization and assessment of change to various ICs along an effect pathway is therefore almost always necessary to understand the influence that a Project may have on a VC or its assessment endpoint. ICs and their measurement indicators form the fundamental basis for the assessment of the majority of effects pathways.

Figure 3 illustrates an example of how the significance of effects from the Project on Fish (the VC) in the regional study area will be evaluated by linking potential Project-related changes in ICs and their measurement indicators to effects on the maintenance of self-sustaining fish populations (the assessment endpoint for the Fish VC). The example pathway focuses on effects that may occur to fish health via exposure to change in water quality.
IDM’s evaluation of candidate VCs included whether the environmental aspect was better represented as an IC or VC, i.e., whether the candidate represents a pathway of potential effect, or an ultimate receptor at the end of an effect pathway, for which an impact assessment and significance determination will be made.

The results of IDM’s evaluation and rationale for the selection of VCs and ICs are documented in each relevant subsection of this AIR. The Application will identify the discipline-specific VCs and ICs that have been selected for the purposes of the assessment. The selected VCs and ICs have been organized under EAO’s five pillars (BC EAO 2013) per below. In addition, IDM has included one VC under the pillar of Aboriginal Interests. This VC will be discussed in detail in Part C of the AIR.

### Table 4: Selected VCs and ICs

<table>
<thead>
<tr>
<th>Pillar</th>
<th>Selected Component</th>
<th>VC</th>
<th>IC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environment</td>
<td>Landforms and Natural Landscapes represented by:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Terrain Stability and Geohazards</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>- Soil Quantity and Quality</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydrology</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Hydrogeology</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Groundwater Quality</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Sediment Quality</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
</tbody>
</table>
### Pillar: Surface Water Quality

- Vegetation and Ecosystems represented by:
  - BC CDC Listed Ecosystems
  - Old Growth and Mature Forested Ecosystems
  - Floodplain and Wetland Ecosystems (including Cottonwood Forest)
  - Alpine and Parkland Ecosystems
  - Ecologically Viable Soil
  - Rare Plants, Lichens, and Associated Habitat

### Pillar: Health

- Air Quality
- Noise
- Human Health

### Pillar: Economic

- Commercial, Recreational, and Aboriginal (CRA) Fisheries
- Contemporary Land and Resource Use
- Project-related Employment (Direct and Indirect)
- Revenue to the Local Economy

### Wildlife represented by:

- Mountain Goat
- Grizzly Bear
- Moose
- Furbearers (Marten, Wolverine, Hoary Marmot)
- Bats (Little Brown Myotis and Northern Myotis)
- Migratory Breeding Birds (Common Nighthawk, Marbled Murrelet, Olive-Sided Flycatcher, and MacGillivray’s Warbler)
- Raptors (Northern Goshawk and Western Screech Owl)
- Non-migratory Game Birds (Ptarmigan and Sooty Grouse)
- Western Toad

### Aquatic Resources, represented by:

- Periphyton
- Benthic Invertebrates

### Fish, represented by:

- Dolly Varden
- Bull Trout
- Eulachon
- Salmonid Species

### Fish Habitat
### 3.2 Assessment Boundaries

#### 3.2.1 Spatial, Temporal, Administrative and Technical Boundaries

The Application will describe the methods used in identifying spatial, temporal, administrative, and technical boundaries. Information on spatial, temporal, administrative, and technical boundaries for specific VC or IC will be included in the appropriate VC or IC sections of this document and the Application and will encompass all relevant Project phases, components, and activities. The Application will include the rationale for any differences in boundaries from those presented in the AIR.

**Spatial Boundaries**

Spatial boundaries encompass the areas within which the proposed Project is expected to have potential effects on the selected VC or IC. Factors considered in defining the spatial boundaries for each selected component were:

- scope of the proposed Project and scope of the assessment, as defined in the Section 11 Order;
- spatial characteristics of each VC or IC;
- available environmental, social, heritage, and health information; and
- technical or scientific information.

Several scales of spatial boundaries can be relevant to an assessment; these include the Project footprint, Local Study Area (LSA), and the Regional Study Area (RSA).
The Project footprint is the smallest spatial boundary scale. It includes the temporary and permanent physical works associated with the proposed Project and the area within which physical activities will occur.

The LSA encompasses the Project footprint and typically extends beyond it to include the surrounding area where there is a reasonable potential for adverse Project-specific effects to occur. The LSA encompasses the zone of influence of the proposed Project and these boundaries vary for each VC or IC.

The RSA is a larger area that is used to provide context for the assessment of potential Project effects. The RSA will also encompass the area within which cumulative effects could be anticipated, so each RSA provides boundaries for any cumulative effects assessments. RSA boundaries vary for each VC or IC.

IDM will identify and present the LSA and RSA used for the effects assessment and include the rationale behind the selection of each assessment boundary. Maps outlining the spatial extent of the LSA and RSA will also be provided.

**Temporal Boundaries**

Temporal boundaries encompass the periods during which the proposed Project is expected to have potential effects on the selected VC or IC. The temporal boundaries proposed for the EA are based on the timing of the different phases of the proposed Project. The three main phases include the following:

- construction: 20 months following issuance of permits;
- operation: five years after completion of construction; and
- decommissioning (closure and post-closure): implemented at the end of operation.

Temporal characteristics of each VC or IC (e.g., timing and duration of sensitive or critical life stages of biological VC or IC) were also taken into account when defining temporal boundaries.

For many VCs and ICs, the temporal boundary has been defined as “Life of Project”, which includes the construction, operation, reclamation, closure, and post-closure phases of the Project.

**Administrative Boundaries**

Administrative boundaries refer to the limitations imposed on an environmental assessment by political, economic, or social constraints. Factors considered in defining the administrative boundaries for each selected VC or IC were:

- scope of the proposed Project and scope of the assessment, as defined in the Section 11 Order;
- spatial characteristics of each VC or IC;
- available environmental, social, heritage, and health information; and
• technical or scientific information.

**Technical Boundaries**

Technical boundaries refer to the constraints imposed on an environmental assessment by limitations in the ability to predict the effects of a Project. Factors considered in defining the technical boundaries for each selected VC were:

• scope of the proposed Project and scope of the assessment, as defined in the Section 11 Order;

• spatial characteristics of each VC or IC;

• available environmental, social, heritage, and health information, and

• technical or scientific information.

### 3.3 Existing Conditions

For each VC and IC, the Application will include:

• a description of the existing (or baseline) conditions within the study area in sufficient detail to enable potential Project-VC or -IC interactions to be identified, understood, and assessed;

• a description of the quality and reliability of the existing (or baseline) data and its applicability for the purpose used, including any gaps, insufficiencies, and uncertainties, particularly for the purpose of monitoring activities;

• reference to natural and/or human-caused trends that may alter the environmental, economic, social, heritage, and health setting, irrespective of the changes that may occur as a result of the proposed Project or other project and/or activities in the area;

• an explanation of if and how other past and present projects and activities in the study area have affected or are affecting each VC or IC;

• documentation of the methods and data sources used to compile information on existing (or baseline) conditions, including any standards or guidelines followed;

• where additional Project and VC- or IC-specific field studies are conducted, the scope and methods to be used will follow published documents pertaining to data collection and analysis methods, where these are available. Where methods used for the assessment deviate from applicable published guidance, the rationale for the variance will be provided in the Application; and

• description of what Traditional Ecological Knowledge (TEK), including Aboriginal Traditional Knowledge, was used in the VC or IC assessment.
The Application will contain the existing (or baseline) technical reports in the Appendices and will summarize key findings contained in these technical reports directly in the Application, in a manner that allows the reader to understand each VC or IC effects assessment.

3.4 Potential Effects

The Application will summarize the overall process and methodologies used to identify and assess the potential effects of the proposed Project on the identified VCs and ICs.

For each VC and IC, the Application will:

- identify the potential interactions of the proposed Project and the considered and selected VCs and ICs;
- identify and describe the potential adverse effects resulting from the proposed Project;
- demonstrate how feedback from Aboriginal Groups, the public, stakeholders, and government agencies on VC and IC selection and assessment was incorporated, as appropriate.

IDM will provide a matrix to identify key interactions that may contribute to potential effects for all phases of the Project. The matrix will identify the physical works and activities to be implemented during the Project as it relates to each VC or IC.

The Application will identify any Project activity-VC or -IC interactions that were excluded from further assessment, including the methods and criteria used to justify the exclusion and input received from EAO, government agencies, Aboriginal Groups, and the public regarding the exclusion.

3.5 Mitigation Measures

For each VC and IC, the Application will:

- describe the approach to identify and analyze mitigation measures, including any management and compensation plans proposed by the Proponent, which will be implemented to address potential effects;
- describe the mitigation measures incorporated into the Project, including site and route selection, project scheduling, project design (e.g. equipment selection, placement, emissions abatement measures), and construction and operation procedures and practices;
- describe any standard mitigation assumed or proposed to be implemented, including consideration of best management practices, environmental management plans, environmental protection plans, contingency plans, emergency response plans, and other general practices;
- clearly indicate how the mitigation measures will mitigate the potential adverse effects on the VC or IC;
• provide the rationale for the proposed mitigation measures, including why further avoidance or reduction measures for adverse effects may not be considered feasible and the need for and scope of any proposed compensation or offset;

• evaluate the anticipated success of each mitigation measure and describe rationale and analysis for these evaluations. If there is little relevant/applicable experience with a proposed mitigation measure and there may be some question as to its effectiveness, describe the potential risks and uncertainties associated with use of the mitigation;

• include the time required for mitigation to become effective to enable understanding of the duration of residual effects and the temporal characteristics of reversibility; and

• summarize the mitigation measures for potential Project effects by project phase and identify any mitigation measures that are in management or compensation plans.

The approach for the incorporation of environmental design features and mitigation into the proposed Project to remove an effect pathway or limit (mitigate) adverse effects will be described. Environmental design features and mitigation include engineering design elements, environmental best practices, management policies and procedures, spill response and emergency response plans, and social programs.

The Application will include a table that summarizes the Proposed Mitigation Measures and their effectiveness, as shown in Table 5.

Table 5: Proposed Mitigation Measures and their Anticipated Effectiveness

<table>
<thead>
<tr>
<th>Potential Effects</th>
<th>Mitigation Measure</th>
<th>Anticipated Effectiveness (Low/Moderate/High/Unknown)</th>
<th>Residual Effect (Y/N)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3.6 Characterization of Residual Effects

The Application will describe, in a table format, the residual effects using the residual effects criteria context, magnitude, extent, duration, reversibility, and frequency, as defined in EAO's Guideline for the Selection of Valued Components and Assessment of Potential Effects. Where feasible, these criteria will be described quantitatively in the Application for each VC or IC. When residual effects cannot be characterized quantitatively, the Application will characterize these effects qualitatively. Definitions will be provided when qualitative terms are used.

The use of any qualitative terms (e.g. high, moderate, low, etc.) will be accompanied by distinct definitions for each of these rankings. An explanation will be included for the conclusion reached for each criterion used to characterize a residual effect.
When residual effects on a VC or IC are determined and the VC or IC is also considered a “pathway” for other potential effects on other VCs, the Application will identify the linkages between the VCs or ICs and the discipline-specific studies to which the information has been forwarded for further evaluation.

The Application will provide the general definitions for the effects criteria to be characterized and will indicate that VC or IC-specific methods for applying the effects criteria will be presented in the relevant discipline-specific sections of the Application. The general definitions for effects criteria are summarized below:

- **Context**: Context refers to the sensitivity and resilience of the VC or IC indicator to further changes in the environment that may be caused by the Project. For example, an ecologically sensitive site is likely to have little resilience to additional imposed stresses. Context draws heavily on an understanding of existing conditions, which reflect cumulative effects of other projects, and activities that have been carried out, and information about the impact of natural and human-caused trends on the condition of the VC or IC. Project effects may have a higher effect if they occur in areas or regions that have already been adversely affected by human activities or exhibit ecological fragility and have little resilience to imposed stresses.

- **Direction**: Direction indicates whether the residual effect on a VC or IC is negative (i.e., adverse), positive (i.e., beneficial), or neutral. Neutral and positive changes are not assessed for significance.

- **Magnitude**: Magnitude is a measure of the intensity of a residual effect, or the degree of change caused by the proposed Project (and other developments, if applicable) relative to baseline conditions, guidelines, or threshold values. Depending on the VC or IC, the characterization of magnitude may be numerical (e.g., absolute or relative effect size) or qualitative (e.g., low, moderate, and high).

- **Geographic Extent**: This is the spatial scale of the effect, and is different from the spatial boundary (i.e., study area) for the residual effects characterization. The spatial boundary for the residual effects characterization represents the maximum area used for the assessment and is related to the spatial distribution and movement of VCs and ICs. However, the geographic extent of residual effects can occur on a number of scales within the spatial boundary of the assessment. Geographic extent refers to the area affected and is characterized according to the scale of the effect and the properties of the component or the measurement indicator.

- **Duration**: Duration is defined as the length of time the residual effect persists (usually in years) and is expressed relative to Project stages. The duration of an effect will typically be described as short-term, long-term, or permanent; definitions of short- and long-term would vary by VC or IC, and take into account VC or IC-specific temporal characteristics.

- **Frequency**: Frequency refers to how often a residual effect will occur and may be expressed as continuous, periodic, uncommon, or rare. Frequency is explained more fully by identifying when the residual effect occurs (e.g., once at the beginning of the Project). If the frequency is periodic, then the length of time between occurrences and the seasonality of occurrences (if present) is discussed.
• **Reversibility**: After removal of the Project activity or stressor, reversibility is the likelihood that the Project will no longer influence a VC or IC in a future predicted period. This term usually has only one alternative: reversible or irreversible. The period is provided for reversibility (i.e., duration) if a residual effect is reversible. Permanent residual effects are considered irreversible.

Predicted changes in measurement indicators along an effect pathway will allow IDM to determine the significance of residual Project effects on VC assessment endpoints. When residual effects on a VC or IC are determined, and it is also considered a pathway for other potential effects on other components, the Application will identify the linkages between them and the discipline-specific studies to which the information has been forwarded for further evaluation.

The Application will include a table that summarizes the residual effects to VCs and ICs as shown in Table 6.

**Table 6**: Summary of the Effects Assessment on <Subject Area> Valued Components

<table>
<thead>
<tr>
<th>Project Phase</th>
<th>VC</th>
<th>Residual Effect</th>
<th>Summary of Residual Effects Characterization Criteria</th>
<th>Likelihood (High, Moderate, Low)</th>
<th>Significance (Significant, Not Significant)</th>
<th>Confidence (High, Moderate, Low)</th>
</tr>
</thead>
</table>

3.7 **Likelihood**

The Application will assess the likelihood for all residual adverse effects using appropriate quantitative or qualitative terms and sufficient description to understand how the conclusions were reached. Definitions of any qualitative terms, such as ‘low’, ‘moderate’, or ‘high’ probability will be provided.

3.8 **Proponent’s Determination of Significance**

The Application will present the process and methodology used to define and evaluate the significance of residual effects, including how the term “significance” has been used in relation to each VC using quantitative and qualitative thresholds.

A conclusion of significance of residual adverse effects will be provided for each VC.

The Application will describe the overall approach to the determination of significance for all VCs. A determination of significance will be conducted for all residual effects. The determination will be based on the residual effects characterization in Section 3.6.
3.9 **Confidence and Risk**

The Application will summarize the process and methodology used to evaluate the levels of confidence associated with residual effects predictions and in particular, how any identified uncertainty may affect either the likelihood or the significance of the predicted residual effect. The Application will also describe any measures to reduce uncertainty through monitoring, adaptive management or other follow-up programs.

The Application will summarize the process and methodology used to determine if additional risk analysis is required. If additional risk analysis is required, the Application will summarize the process and methodology used for this analysis and the conclusions, including the range of likely, plausible, and possible outcomes with respect to likelihood and significance.

The Application will describe the approach to prediction confidence and the incorporation of uncertainty into the discipline-specific sections of the Application. The discipline-specific confidence and uncertainty sections of the Application will identify the key sources of uncertainty for each measurement indicator and assessment endpoint assessed and discuss how uncertainty was addressed to increase the level of confidence that residual effects will not be larger than predicted.

Studies will use quantitative methods (e.g., sensitivity analyses), or qualitative discussions to assess prediction confidence to the extent reasonable. Assumptions for statistical tests, as well as details on models used as part of the Application, will be discussed within applicable disciplines. Where appropriate, uncertainty may also be addressed by additional mitigation, as required, or through monitoring programs designed to verify the effects predictions and/or the effectiveness of mitigation. Each discipline section will include a discussion of how uncertainty has been addressed and an evaluation of the resulting level of confidence in the residual effects analyses. The assessment of prediction confidence and uncertainty will consider key uncertainties associated with the effectiveness of mitigations.

3.10 **Cumulative Effects Assessment**

The Application will describe the methodology for the cumulative effects assessment including justification for the inclusion of other developments likely to contribute to the cumulative effects. A cumulative effects assessment is required when a residual effect on a VC or IC is identified, as is described in CEAA 2012.

3.10.1 *Identifying Past, Present or Reasonably Foreseeable Projects and/or Activities*

The Application will identify past, present or reasonably foreseeable projects or activities that may have an impact or could contribute to the assessment of cumulative effects. For identified cumulative effects, the following development categories will be considered in the Application:

- **Certain**: Projects or activities that have already been built or conducted for which the environmental effects overlap with those of the proposed Project (i.e. certain); and
• **Reasonably foreseeable:** Projects that are either proposed (public disclosure) or have been approved to be built, but are not yet built, for which the environmental effects overlap the proposed Project.

   The Application will describe the methodology for identifying potential interactions between residual Project effects and the effects of other developments, including a description of the following:

   • The spatial boundaries for the cumulative effects assessment for each VC or IC, including maps;
   
   • The spatial and temporal boundaries of other developments; and
   
   • The potential for interaction (spatial and temporal) and linkages (overlap) of VCs or ICs with other developments.

   The Application will include:

   • A table of all past, present and reasonably foreseeable projects that will be included in the cumulative effects assessment, should one be required for a particular VC or IC;
   
   • A general description of the information sources used to identify reasonably foreseeable projects and activities; and
   
   • A map showing the location of the projects and activities.

   A preliminary list of past, present and reasonably foreseeable projects and activities is listed below in Table 7 and will be tailored for each discipline-specific cumulative effects assessment. The Application will provide rationale for any differences presented in this list from those projects and activities listed in the Application.

### Table 7: Preliminary List of Projects and Activities to be Included in the Cumulative Effects Assessment

<table>
<thead>
<tr>
<th>Project/Activity</th>
<th>Location</th>
<th>Proponent</th>
<th>Project Life</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forrest Kerr Hydroelectric Project</td>
<td>Bell II</td>
<td>AltaGas Ltd.</td>
<td>Currently Operating</td>
</tr>
<tr>
<td>Kitimat Smelter Modernization Project</td>
<td>Kitimat</td>
<td>Rio Tinto</td>
<td>Currently Operating</td>
</tr>
<tr>
<td>Long Lake Hydroelectric Project</td>
<td>25km east of Stewart</td>
<td>Long Lake Hydro Inc.</td>
<td>Currently Operating</td>
</tr>
<tr>
<td>McLymont Creek Hydroelectric Project</td>
<td>100 km northwest of Stewart</td>
<td>AltaGas Ltd.</td>
<td>Currently Operating</td>
</tr>
<tr>
<td>Project/Activity</td>
<td>Location</td>
<td>Proponent</td>
<td>Project Life</td>
</tr>
<tr>
<td>------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
<td>-----------------------------------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>Northwest Transmission Line</td>
<td>Between Skeena Substation (near Terrace) and a new substation to be built near Bob Quinn Lake</td>
<td>BC Hydro</td>
<td>Currently Operating</td>
</tr>
<tr>
<td>Red Chris Mine Project</td>
<td>18 km southeast of Iskut</td>
<td>Imperial Metals</td>
<td>Currently Operating</td>
</tr>
<tr>
<td>Stewart Bulk Terminals</td>
<td>Stewart</td>
<td>Stewart Bulk Terminals Ltd.</td>
<td>Currently Operating</td>
</tr>
<tr>
<td>Stewart World Port</td>
<td>Stewart</td>
<td>Stewart World Port</td>
<td>Currently Operating</td>
</tr>
<tr>
<td>Volcano Creek Hydroelectric Project</td>
<td>100 km northwest of Stewart</td>
<td>AltaGas Ltd.</td>
<td>Currently Operating</td>
</tr>
<tr>
<td>Brucejack Gold Project</td>
<td>65 km north of Stewart</td>
<td>Pretium Resources Inc.</td>
<td>Under Construction</td>
</tr>
<tr>
<td>Arctos Anthracite Project</td>
<td>90 km southeast of Iskut</td>
<td>Fortune Minerals Limited</td>
<td>Proposed</td>
</tr>
<tr>
<td>Bitter Creek Hydro Project</td>
<td>15 km northeast of Stewart</td>
<td>Bridge Power</td>
<td>Proposed</td>
</tr>
<tr>
<td>Coastal GasLink Pipeline Project</td>
<td>Groundbirch to Kitimat</td>
<td>Coastal GasLink Pipeline Ltd.</td>
<td>Proposed</td>
</tr>
<tr>
<td>Galore Creek Copper-Gold Project</td>
<td>150 km northwest of Stewart</td>
<td>Novagold/Teck</td>
<td>Proposed</td>
</tr>
<tr>
<td>Kinskuch Hydro Project</td>
<td>28 km Northeast of Alice Arm</td>
<td>Syntaris Power Corporation</td>
<td>Proposed</td>
</tr>
<tr>
<td>Kitimat LNG and Pacific Trails Pipeline</td>
<td>Kitimat</td>
<td>Chevron Canada and Woodside Energy</td>
<td>Proposed</td>
</tr>
<tr>
<td>Kitsault Mine Project</td>
<td>Alice Arm</td>
<td>Avanti Kitsault Mining Inc.</td>
<td>Proposed</td>
</tr>
<tr>
<td>KSM Project</td>
<td>65 km northwest of Stewart</td>
<td>Seabridge Gold</td>
<td>Proposed</td>
</tr>
<tr>
<td>LNG Canada Export Terminal Project</td>
<td>Kitimat</td>
<td>Shell Canada Ltd., Korea Gas Corporation (KOGAS), Mitsubishi Corporation and PetroChina Company Limited</td>
<td>Proposed</td>
</tr>
<tr>
<td>Morrison Copper-Gold Project</td>
<td>Granisle</td>
<td>Pacific Booker Minerals Inc.</td>
<td>Proposed</td>
</tr>
<tr>
<td>Project/Activity</td>
<td>Location</td>
<td>Proponent</td>
<td>Project Life</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>---------------------------------</td>
<td>------------------------------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>Nisga’a Nation LNG</td>
<td>Nasoga Gulf</td>
<td>Nisga’a Nation</td>
<td>Proposed</td>
</tr>
<tr>
<td>Northern Gateway Pipeline</td>
<td>Kitimat</td>
<td>Enbridge</td>
<td>Proposed</td>
</tr>
<tr>
<td>Prince Rupert Gas Transmission Project</td>
<td>Hudson's Hope to Prince Rupert</td>
<td>TransCanada</td>
<td>Proposed</td>
</tr>
<tr>
<td>Stewart Energy LNG</td>
<td>Stewart</td>
<td>Canada Stewart Energy Group Ltd.</td>
<td>Proposed</td>
</tr>
<tr>
<td>Swamp Point Aggregate Mine Project</td>
<td>50 km south of Stewart</td>
<td>Ascot Resources Inc.</td>
<td>Proposed</td>
</tr>
<tr>
<td>Westcoast Connector Gas Transmission Project</td>
<td>Cypress, BC to Prince Rupert</td>
<td>Spectra Energy</td>
<td>Proposed</td>
</tr>
<tr>
<td>Tulsequah Chief Mine</td>
<td>100 km south of Atlin</td>
<td>Chieftain Metals Inc.,</td>
<td>Proposed redevelopment</td>
</tr>
<tr>
<td>Eskay Creek Copper-Gold Mine</td>
<td>70 km north of Stewart</td>
<td>Barrick Gold Corporation</td>
<td>Complete (2008)</td>
</tr>
<tr>
<td>Snip Mine</td>
<td>120 km northwest of Stewart</td>
<td>Barrick Gold Corporation</td>
<td>Complete (1999)</td>
</tr>
<tr>
<td>Johnny Mountain Mine</td>
<td>110 km northwest of Stewart</td>
<td>Skyline Gold Corp.</td>
<td>Complete (1993)</td>
</tr>
<tr>
<td>Silbak Premier Mine</td>
<td>11 km north of Stewart</td>
<td>Westmin Resources</td>
<td>Complete (1996)</td>
</tr>
<tr>
<td>Aboriginal harvesting</td>
<td>Regional</td>
<td>Various</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Agriculture</td>
<td>Regional</td>
<td>Various</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Commercial recreations</td>
<td>Regional</td>
<td>Various</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Fishing</td>
<td>Regional</td>
<td>Various</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Forestry</td>
<td>Regional</td>
<td>Various</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Guide outfitting</td>
<td>Regional</td>
<td>Various</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Mineral exploration</td>
<td>Regional</td>
<td>Various</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Transportation</td>
<td>Regional</td>
<td>Various</td>
<td>Ongoing</td>
</tr>
</tbody>
</table>
The proposed cut-off date for incorporating any new future developments in the cumulative effects assessment in the Application is 2028. This represents the final anticipated year of the mine life after decommissioning, closure, abandonment, and reclamation are complete.

3.10.2 Conducting a Cumulative Effects Assessment

The Application will summarize the process and methodology used to conduct the cumulative effects assessment, including the identification of potential cumulative effects, identification of additional mitigation measures, and evaluation of any (residual) cumulative effects using the same methodology described above in Sections 3.6 to 3.9 of this AIR.

The following steps will be taken to conduct a cumulative effects assessment:

1. Review the residual effects for each VC and IC.

2. Identify whether there is any spatial or temporal overlap of Project-related residual effects with the effects from other past, present, or reasonably foreseeable projects or activities.

3. Evaluate whether the Project-related residual effects may interact cumulatively with past, present, or reasonably foreseeable projects or activities.

4. Identify any additional mitigation measures, beyond those identified for each VC and IC.

5. Prepare a Project activity / residual effect interaction matrix.

6. Following the interaction matrix, the Application will determine if the interaction will result in a cumulative effect in addition to the residual, Project-specific effect.

7. If a cumulative effect is determined:
   a. the effect will be characterized by magnitude, geographic extent, duration, frequency, reversibility, and context;
   b. the significance of the cumulative effect will be determined; and
   c. the likelihood, confidence, and risk of the cumulative effect will be identified.

The Application will include a table that summarizes the cumulative effects assessment, as shown in Table 8.
### Table 8: Summary of Residual Cumulative Effects Assessment

<table>
<thead>
<tr>
<th>Project Phase</th>
<th>VC</th>
<th>Residual Cumulative Effect</th>
<th>Characterization Criteria: (context, magnitude, geographic extent, duration, frequency, reversibility)</th>
<th>Likelihood: (High, Moderate, Low)</th>
<th>Significance: (Significant, Not Significant)</th>
<th>Confidence: (High, Moderate, Low)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 3.11 Follow-up Strategy

Where a residual adverse effect and/or cumulative effect has been identified for a VC or IC, the Application will include a description of a follow-up strategy, where appropriate, that:

- identifies the measures to evaluate the accuracy of the original effects prediction;

- identifies the measures to evaluate the effectiveness of proposed mitigation measures; and

- proposes an appropriate strategy to apply in the event that original predictions of effects and mitigation effectiveness are not as expected. This includes reference to further mitigation, involvement of key stakeholders, Aboriginal Groups, government agencies, and any other measures deemed necessary to manage the issue.
4.0 ENVIRONMENTAL EFFECTS ASSESSMENT

The Application will include an assessment of Environmental Effects VCs and ICs identified in the AIR. The assessment will be conducted in accordance with the methodology specified in Section 3.0 Assessment Methodology of the AIR, using the organizational structure demonstrated in this section.

Valued Component or Valued Component Group

The Application will identify the VCs and ICs selected for assessment according to the methodology specified in Section 3.1 Issues Scoping and Selection of Valued Components. The Application will also include the rationale for any differences in the list of VCs and ICs presented in the Application from those listed in the AIR.

4.1 Air Quality

A concise introduction of the air quality assessment will be provided in the Application for this intermediate component, including the purpose of the assessment, the structure of the assessment, and linkages to other disciplines. The Air Quality assessment will be informed by the baseline meteorological and air quality technical report containing information regarding siting and instrumentation of air quality monitoring stations. The baseline report will be submitted to the working group prior to using the data in the Air Quality assessment. The report will include monitoring station photos and maintenance records for the meteorological equipment.

Input from Consultation

The Application will describe the influence of consultation on issues scoping and how the input from consultation has been incorporated into the air quality assessment.

Information Sources

The Application will provide the information sources used in the assessment.

Valued Components, AssessmentEndpoints, and Measurement Indicators

The Application will identify air quality as an intermediate component (IC) that may be affected by the Project, creating an effect pathway to selected VCs (potential receptors). The Application will describe the measurement indicators used to comprehensively evaluate the potential Project-induced changes to air quality (Table 9), these include:

- greenhouse gas emissions (CO₂, CH₄, and N₂O);
- air quality, measured through concentrations of criteria air contaminants in air (e.g., particulate matter, SO₂, CO, NO₂), metals, and volatile organic compounds; and
- dustfall rate.
Rationale for inclusion or exclusion of the listed air contaminants from qualitative or quantitative assessment will be provided in this section of the Application.

Ozone has not been included as a VC. Although the Project is predicted to release emissions of ozone precursors (NOx and VOCs), ozone forms when large volumes of NOx and VOCs are present during hot, sunny, stagnant air conditions. The major components of the Project, including the plant site and mill, tailings management facility, warehouse, maintenance shop, ancillary buildings, and offices, will be powered by electricity, minimizing the release of ozone precursors of NOx and VOCs. Hot, sunny, stagnant air conditions are also not prevalent meteorological conditions at the northern latitude location of the mine.

Finally, the most recent Central Interior Air Zone Report (www.bcairquality.ca) indicates that ozone levels were relatively uniform in the Air Zone (with all monitoring locations south of the mine site) and have been consistently below the CAAQS.

Table 9: Intermediate Components, Rationale and Measurement Indicators for Air Quality

<table>
<thead>
<tr>
<th>IC</th>
<th>Primary Measurement Indicators</th>
<th>VC Where Significance will be Determined</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Quality</td>
<td>• Concentrations of criteria air contaminants in air (Particulate Matter, SO₂ and NO₂)</td>
<td>• Fish</td>
<td>The Project has the potential to change ambient air quality due to processing, transportation and emissions from equipment. The potential change in Air Quality is not anticipated to be significantly adverse because the majority of activities that generate emissions will occur underground. Potential changes in Air Quality can affect Human Health, Vegetation, and Water Quality. Air Quality modelling and monitoring will support the effects assessment of VCs, including Human Health and Rare Plants.</td>
</tr>
<tr>
<td></td>
<td>• Dustfall rate</td>
<td>• Wildlife</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• If necessary, concentrations of other air contaminants to be identified in the assessment.</td>
<td>• Vegetation and Ecosystems</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Human Health</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Recreational Value</td>
<td></td>
</tr>
</tbody>
</table>
4.1.1  Context and Boundaries

The Application will identify the spatial, temporal, administrative, and technical study area boundaries, as applicable to the IC, including maps, in a manner consistent with Section 3.2 Assessment Boundaries of the AIR.

Table 10 and Figure 4 introduce the proposed spatial boundaries to be used in the Application.

Table 10: Spatial and Temporal Boundaries for Air Quality

<table>
<thead>
<tr>
<th>Pillar</th>
<th>IC</th>
<th>Temporal Boundary</th>
<th>Spatial Boundary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health</td>
<td>Air Quality</td>
<td>Life of Project (Construction, Operation, Closure, and Reclamation Phases)</td>
<td><strong>LSA:</strong> 600 km² domain encompassing the Project area.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The selected LSA includes the nearest community of Stewart and the topographical features expected to limit the dispersion of air emissions.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>A larger RSA has not been established as the LSA is expected to be sufficiently large to include all isopleths that represent 10% of the air quality objectives, as recommended by the British Columbia Air Quality Dispersion Modelling Guideline.</td>
</tr>
</tbody>
</table>
Figure 4: Air Quality Local Study Area
4.1.2 Existing Conditions

The Application will summarize existing conditions in a manner consistent with Section 3.3 Existing Conditions of this AIR.

Baseline meteorological data has been collected at the Project site since July 30, 2014. The Project meteorological station is located near to the underground portal. A technical report will be included as part of the Application that summarizes the equipment and methods used for baseline meteorological data collection. Data from this Project meteorological station, historical site, and regional meteorological stations will be used to characterize the baseline meteorology at and near the Project site. Local meteorological conditions will be described for:

- wind (patterns and extremes of velocity and direction);
- precipitation (volume, frequency, type, spatial, and temporal variability);
- air temperature (averages, extremes, diurnal, and monthly variability);
- relative humidity (averages, extremes, diurnal, and monthly variability); and
- solar radiation (averages, extremes, diurnal, and monthly variability).

Baseline location maps, tabular summaries, and figures (i.e. wind roses, diurnal and monthly histograms) will be provided to summarize the existing meteorological conditions. The methods section will identify the quality assurance and quality control (QA/QC) and data management tools used for meteorological baseline data collection and compilation prior to use in the Application.

The remote location of the Project limits the background air monitoring stations that are already established near the Project site. Active sampling of air quality at the Project requires electrical power, which is a challenge in remote areas. This impacts the availability of air quality data to establish existing air quality conditions. Other mineral development projects (i.e., Brucejack Gold Mine Project) in the area have used regional or remote monitoring stations and information collected from other regional EAs as representative baseline air quality concentrations.

Therefore, the air quality baseline characterization for existing conditions in the Application will primarily utilize available information from other baseline studies and environmental assessment work completed recently in the region, remote monitoring stations, and information collected in the Red Mountain study area. Results from baseline studies conducted for these other regional EAs will be used in characterizing the current conditions with respect to criteria air contaminants (CACs) concentrations in the Project area, including, but not limited to:

- suspended particulates (TSP, PM_{10} and PM_{2.5});
- dust deposition;
- nitrogen dioxide (NO_{2});
- sulphur dioxides (SO_{2}); and
- carbon monoxide (CO).

An accepted approach for baseline air quality in environmental assessments conducted in the region has been to utilize data from the Canadian Air and Precipitation Monitoring Network (CAPMoN) to characterize ambient SO_{2} concentrations and historic data collected at Diavik.
Diamond Mine, Galore Creek Mine Project, and the Kitsault Mine Project to define existing conditions for particulate matter concentrations. Additional data from Kerr-Sulphurets Mitchell (KSM) Mine, Brucejack Mine, and Schaft Creek Mine have been used to define baseline dustfall deposition rates in the region and will be relied upon for the Project assessment as well.

Following the Application, prior to construction, baseline air quality conditions relevant to the Air Quality Management Plan will be characterized using specified air quality monitoring equipment. These baseline conditions will be used to establish air quality adaptive management criteria or triggers for the construction and operations of the mine. This pre-construction baseline monitoring will also serve as a comparative check of the assumptions made in characterizing existing air quality conditions derived from information obtained from regional assessments and remote monitoring stations.

In addition to establishing meteorological and air quality baseline, the Application will identify and describe the existing provincial and federal legislation, policies, best management practices, and guidance documents related to air quality. These will include:

- Canadian Environmental Protection Act (1999);
- Canadian Ambient Air Quality Standards (CAAQS);
- National Ambient Air Quality Objectives (NAAQOs);
- BC Ambient Air Quality Objectives (BC MOE 2016);
- Guidance on Application of Provincial Interim Air Quality Objectives for NO2 and SO2 (BC MOE 2014);
- The Pollution Control Objectives for the Mining, Smelting, and Related Industries of British Columbia (BC MOE 1979);
- Guideline for Air Quality Dispersion Modelling in BC (BC MOE 2015);
- Canadian Ambient Air Quality Standards (CAAQs) for Fine Particulate Matter (PM2.5) and Ozone (CCME 2013);
- Meteorological Data and Sensing Requirements in the B.C. Ministry of Environment (BC MOE 2013)
- Meteorological Sensors, Calibration and Routine Verification Ambient Air Program Standard Operating Procedures (SOP) (BC MOE 2016)
- Air Monitoring Site Selection and Exposure Criteria (BC MWLAP 2003);
- Air Monitoring Instrumentation - Guidance for Instrument Selection (BC MOE 2016);
The most up to date air quality objectives and standards developed by federal and provincial environmental and health agencies (referenced above) to provide guidance for environmental protection decisions will be summarized.

4.1.3 Potential Effects

The Application will identify potential adverse effects to the IC in a manner consistent with Section 3.4 Potential Effects of this AIR.

The Application will summarize the anticipated interactions between the proposed Project and this IC. IDM anticipates that the following proposed Project components or activities will interact with Air Quality in the Project area:

- stack emissions from Project infrastructure components, such as generators;
- dust created from infrastructure components, such as the mill and crusher, released through baghouses and dust collectors at the mill;
- exhaust emissions from equipment and vehicles such as dozers, haul trucks, forklift, graders, and fuel trucks; and
- fugitive dust created from vehicles traveling on unpaved roads, the TMF, and other fugitive dust sources.

These identified interactions will have the potential to result in changes to the measurement indicators identified for the air quality assessment.

4.1.4 Mitigation Measures

The Application will identify measures to avoid, manage or otherwise mitigate potential adverse effects to the IC in a manner consistent with Section 3.5 Mitigation Measures of this AIR. Relevant management plans will be referenced. Linkages to other sections in the Application will be identified.

IDM will evaluate the environmental design and mitigation measures that will be incorporated into the Project to mitigate adverse effects, including the outcome of the assessment, monitoring, and management plans for air emissions based on best management practices. Uncertainty associated with the effectiveness of the proposed measures will be noted. Key references to be reviewed for mitigation measures are:

- Literature Review of Current Fugitive Dust Control Practices Within the Mining Industry (Golder, 2010);
- Control of Open Fugitive Dust Sources (US EPA 1988);
- Fugitive Dust Background Document and Technical Information Document for Best Available Control Measures (US EPA 1992); and

4.1.5 Residual Effects

Where an adverse residual effect is identified, the Application will characterize the residual effect based on the context, magnitude, extent, duration, reversibility, and frequency as described in Section 3.6 Characterization of Residual Effects of this AIR.

Where an adverse residual effect is identified, the Application will also describe the likelihood, and predictive confidence, in accordance with Sections 3.7 Likelihood and 3.9 Confidence and Risk of this AIR.

The assessment will include consideration of:

• all sources (e.g., the mill) and estimated emissions of air contaminants associated with each phase of the Project;

• adaptive management planning for control of air contaminants and fugitive dust associated with the Project;

• air dispersion modelling assessment consistent with the requirements of the Guideline for Air Quality Dispersion Modelling in BC. Given the recognized uncertainty with emission estimates and dispersion modelling predictions from fugitive dust sources, the assessment will consider the predicted impacts of Project point source emission sources and fugitive dust emission sources both separately and together;

• dispersion modelling will be used as a tool to:
  o inform adaptive management and the monitoring plan for air quality;
  o identify sources or groups of sources that have the potential to impact air quality outside the project boundary or at sensitive receptors identified by other pathways;
  o predict the impacts of Project emissions on ambient air quality and dust deposition; and
  o provide air quality predictions for input to other pathways.

Dispersion modelling will predict the rate and accumulation of dustfall deposited from air emissions and this information will inform other VC pathways. Dustfall will be speciated based on soil samples and additional samples, such as drill core, collected during baseline studies so that individual dustfall components can be evaluated along the appropriate VC pathway under consideration (i.e. HHRA).

Results from the effects analyses will be described in terms of predicted changes to the primary measurement indicators for Air Quality.
4.1.6 **Cumulative Effects**

If a residual effect is identified, unless stated otherwise by EAO, the Application will:

- determine whether any cumulative interactions between residual effects of the proposed Project and the potential residual effects of other developments, based on the preliminary list of past, present, and reasonably foreseeable developments provided in the AIR, are likely to occur, consistent with Section 3.10.1 Identifying Past, Present or Reasonably Foreseeable Projects and/or Activities of this AIR;

- conduct a cumulative effects assessment consistent with Section 3.10.2 Conducting a Cumulative Effects Assessment of this AIR;

- identify any additional mitigation measures, consistent with Section 3.5 Mitigation Measures of this AIR; and

- where an adverse residual cumulative effect is identified as exceeding the relevant British Columbia Ambient Air Quality Objectives, the Application will also describe the likelihood and predictive confidence, in accordance with Sections 3.7 Likelihood and 3.9 Confidence and Risk of this AIR.

4.1.7 **Follow-up Strategy**

Where a residual effect and/or cumulative effect have been identified, the Application will include a description of a follow-up strategy that is consistent with Section 3.11 Follow-up Strategy of this AIR.

The Application will provide the details for any monitoring and follow-up programs recommended to confirm the assessment of Air Quality and compliance with ambient air quality objectives. Follow-up monitoring will also be integrated with a coordinated (IDM and MOE) review of any regional air quality monitoring programs. An adaptive management plan for addressing air quality and fugitive dust issues is anticipated as part of follow-up requirements.

4.1.8 **Conclusion**

The Application will provide a consolidated summary of the predicted residual effects for air quality. The Application will also indicate the VCs to which the results of this assessment have been forwarded for incorporation in their assessments.

4.2 **Noise**

A concise introduction of the noise assessment will be provided for this IC, including the purpose of the assessment, the structure of the assessment, and linkages to other VCs.

**Input from Consultation**

The Application will describe the influence of consultation on issues scoping and how the input from consultation has been incorporated into the noise assessment.
**Information Sources**

The Application will provide a list of the information sources used in the assessment.

**Valued Components, Assessment Endpoints, and Measurement Indicators**

The Application will identify that noise is an IC that may be affected by the Project, creating an effect pathway to selected receptor VCs. The Application will describe the measurement indicators used to comprehensively evaluate the Project induced potential changes to noise quality (Table 11).

**Table 11: Intermediate Components, Rationale and Measurement Indicators for the Noise Assessment**

<table>
<thead>
<tr>
<th>IC</th>
<th>Primary Measurement Indicators</th>
<th>VC Where Significance will be Determined</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise</td>
<td>• A-weighted sound pressure level (in dB) at potentially affected receptors;</td>
<td>• Human Health</td>
<td>The Project has the potential to change ambient sound during Project construction and operation and the potential change can adversely affect the nearest sensitive receptors in the Project area, inclusive of permanent and temporary (seasonal) receptor locations, such as cultural use sites (i.e. hunting camps, ceremonial areas etc.). Due to the remote location of the Project, IDM is not aware of any sensitive human receptors. Noise modelling will support the effects assessment of receptor valued components. IDM will determine the appropriate noise assessment receptor points in consultation with NLG.</td>
</tr>
<tr>
<td></td>
<td>• daytime and night time sound levels; and</td>
<td>• Wildlife</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Resident and user complaints.</td>
<td>• Recreational Value</td>
<td></td>
</tr>
</tbody>
</table>

**4.2.1 Context and Boundaries**

The Application will identify the spatial, temporal, administrative and technical study area boundaries, as applicable to the IC, including maps, in a manner consistent with Section 3.2 Assessment Boundaries of the AIR.

Table 12 and Figure 5 introduce the proposed spatial boundaries to be used in the Application.
Table 12: Spatial and Temporal Boundaries for Noise

<table>
<thead>
<tr>
<th>Pillar</th>
<th>IC</th>
<th>Temporal Boundary</th>
<th>Spatial Boundary</th>
</tr>
</thead>
</table>
| Health | Noise | Life of Project | **LSA:** 3 km buffer around the Project general layout and roads. This is anticipated to encompass the extents of changes in background noise levels and doubles the distance at which guidelines issued by the BC Oil and Gas Commission (an established guidance document, based on methods from Alberta Energy and Utilities Board Directive, commonly used in assessment of mineral development projects in BC) limit the effects of noise from industrial development (see Figure 5).

**RSA:** As blasting is underground, no RSA has been selected for Noise. Noise effects attenuate relatively quickly and vibration effects are not expected beyond the identified LSA (see Figure 5). The assessment within the LSA will be used to determine if there will be a perceptible incremental difference that requires evaluating impacts at other locations along the highway.
Figure 5: Noise Local Study Area
4.2.2 *Existing Conditions*

The Application will summarize existing conditions in a manner consistent with Section 3.3 *Existing Conditions* of this AIR.

The Application will characterize existing conditions related to Noise relevant to the assessment of the Project, particularly as it relates to generating a baseline. The Application will describe the existing conditions against which potential changes from the Project are compared and evaluated.

Due to the remote location of the Project area and underground operations, it is expected that regional noise levels will be low. The Alberta Energy and Utilities Board Directive 038 (Alberta EUB 2007) provides an estimated ambient noise level in rural areas, which is applicable to environmental assessments involving remote locations where no baseline noise monitoring has been performed. The baseline noise estimates from Alberta EUB have been used in other assessment of mineral development projects in BC. The estimated baseline night time noise levels for rural areas of 35 dBA (Ln) will be used for the Project. Daytime ambient sound levels (Ld) are commonly 10 dBA Leq higher than night time levels (WHO 1999).

The Application will describe available local knowledge related to current noise conditions. The Application will refer to any relevant documents produced for the publicly available studies for other projects in northwest BC to support the baseline estimates applied.

The Application will provide a description of the Regulatory and Policy Framework surrounding the management of noise issues, referencing relevant legislation, and a list of applicable provincial and regional best management practices and guidance documents to be implemented, which include:

- Guidance for Evaluating Human Health Impacts in Environmental Assessment (Health Canada 2011);
- Effects of Noise and Reverberation on Speech (Levitt and Webster 1991);
- Using a change in percentage highly annoyed with noise as a potential health effect measure for projects under the Canadian Environmental Assessment Act (Michaud, Bly, and Keith 2008);
- Environmental Code of Practice for Metal Mines (Environment Canada 2009);
- Description, measurement and assessment of environmental noise – Part 1: Basic quantities and assessment procedures (ISO) 1996-1:2003 (ISO1996:2);
• Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation (ISO 9613-2:1996 [ISO9613:2]); and

• Guidelines for Community Noise (WHO 1999).

4.2.3 Potential Effects

The Application will identify potential adverse effects to the IC in a manner consistent with Section 3.4 Potential Effects of this AIR.

The Application will summarize the anticipated interactions between the proposed Project and the IC being assessed within the LSA. IDM anticipates that the following proposed Project components or activities will interact with acoustic aspects of the Project area:

• sound generated from surface buildings, such as the mill and fans;

• sound generated by equipment and vehicles, such as buses and other crew transport vehicles, dozers, haul trucks, forklift, graders, and fuel trucks;

• sound generated by underground blasting and explosives; and

• sound generated by helicopter use.

These identified interactions will have the potential to result in changes to the measurement indicators identified for the noise assessment.

4.2.4 Mitigation Measures

The Application will identify measures to avoid, manage, or otherwise mitigate potential adverse effects to the IC in a manner consistent with Section 3.5 Mitigation Measures of this AIR. Relevant management plans will be referenced. Linkages to other sections in the Application must be identified.

IDM will evaluate the environmental design and mitigation measures that can be incorporated into the Project to mitigate adverse effects. Uncertainty associated with the effectiveness of the proposed measures will be noted.

4.2.5 Residual Effects

Where an adverse residual effect is identified, the Application will characterize the residual effect based on the context, magnitude, extent, duration, reversibility, and frequency as described in Section 3.6 Characterization of Residual Effects of this AIR.

Where an adverse residual effect is identified, the Application will also describe the likelihood and predictive confidence, in accordance with Sections 3.7 Likelihood and 3.9 Confidence and Risk of this AIR.

The Application will also include a discussion of how uncertainty has been addressed (in accordance with Section 3.9) and provide a qualitative evaluation of the resulting level of
confidence in the residual effects analyses for each measurement indicator and assessment endpoint. Where relevant, uncertainty associated with the effectiveness of proposed mitigation will be included in this discussion.

The Application will characterize changes in measurement indicators and predicted incremental residual effects of the Project on VC assessment endpoints. The assessment will include consideration of:

- the location of potential noise-sensitive wildlife and human receptors relative to the Project area;
- potential noise sources of noise (both tonal and impulsive) during all Project phases (e.g., traffic, processing equipment, or sirens);
- the sound emissions from major noise sources during all Project phases;
- noise model predictions of daytime and night time noise propagation from the Project site. The model will consider terrain, spatial layout of the proposed Project and sensitive noise receiver locations; and
- a comparison of predicted noise levels at sensitive receptor locations to relevant criteria during Construction and Operations phases during daytime and night time.

4.2.6 Cumulative Effects

If a residual effect is identified, unless stated otherwise by EAO, the Application will:

- determine whether any cumulative interactions between residual effects of the proposed Project and the potential residual effects of other developments, based on the preliminary list of past, present and reasonably foreseeable developments provided in the AIR, are likely to occur, consistent with Section 3.10.1 Identifying Past, Present or Reasonably Foreseeable Projects and/or Activities of this AIR;
- conduct a cumulative effects assessment consistent with Section 3.10.2 Conducting a Cumulative Effects Assessment of this AIR;
- identify any additional mitigation measures, consistent with Section 3.5 Mitigation Measures of this AIR; and
- where an adverse residual cumulative effect is identified, the Application will also describe the likelihood and predictive confidence, in accordance with Sections 3.7 Likelihood and 3.9 Confidence and Risk of this AIR.
4.2.7 Follow-up Strategy

Where a residual effect and/or cumulative effect have been identified, the Application will include a description of a follow-up strategy that is consistent with Section 3.11 Follow-up Strategy of this AIR.

The Application will provide the conceptual outline for any monitoring and follow-up programs recommended to confirm the environmental assessment predictions made for noise.

4.2.8 Conclusion

The Application will provide a consolidated summary of the predicted residual effects for Noise. The Application will also indicate the VCs to which the results of this assessment have been forwarded for incorporation in their assessments.

4.3 Landforms and Natural Landscapes

A concise introduction of the Landforms and Natural Landscapes assessment will be provided for this IC, including the purpose of the assessment, the structure of the assessment, and linkages to other disciplines.

Input from Consultation

The Application will describe the influence of consultation on issues scoping and how the input from consultation has been incorporated into the assessment.

Information Sources

The Application will provide a list of the information sources used in the assessment.

Valued Components, Assessment Endpoints, and Measurement Indicators

The Application will identify that Landforms and Natural Landscapes is an IC that may be affected by the Project, creating an effect pathway to selected receptor VCs. The Application will describe the measurement indicators used to comprehensively evaluate the Project induced potential changes to this IC (Table 13), including:

- surficial geology and terrain distribution measured through terrain type, slope, and aspect;
- soil quantity and distribution measured through depth and distribution of soil types;
- soil quality measured through concentrations of metals and non-metal constituents in soil and soil type and general characteristics and properties of soil;
- changes to intensity and frequency of snow avalanches; and
- channel morphology lateral and vertical stability (i.e., bank erosion and scour).
The Application will provide an analysis of regional seismicity and earthquake potential based on data generated by the Geological Survey of Canada (2015 Edition for the National Building Code published by Natural Resources Canada). Seismic data will be incorporated into designs for the tailings storage facilities and other structures. The application will provide information on seismic design parameters for the project and the earthquake hazard classification. Further, the overall potential of liquefaction induced settlements and lateral spread will be assessed based on the seismicity of the study area and soil and groundwater conditions.

The Application will provide a terrain stability (geohazards) analysis and geohazard risk assessment for the property at a scale of 1:5000 in the infrastructure area and 1:20,000 in the Bitter Creek study area, including the potential for landslides, avalanches and debris floods. Information generated from the terrain stability analyses will be utilized in assessing the location and design of structures such as the access road, tailings storage facility, plant, buildings, etc. along with mitigation plans. Further, the overall potential of landslides triggered by seismic events will be addressed, and incorporated into design.

**Table 13: Intermediate Components, Rationale and Measurement Indicators for Landforms and Natural Landscapes Assessment**

<table>
<thead>
<tr>
<th>IC</th>
<th>Primary Measurement Indicators</th>
<th>VC Where Significance will be Determined</th>
<th>Rationale</th>
</tr>
</thead>
</table>
| Landforms and Natural Landscapes | • Changes in terrain stability  
 • Changes in intensity and frequency of snow avalanches  
 • Changes to background surface erosion  
 • Changes to background rates of sedimentation of waterbodies  
 • Changes to volume of soil  
 • Change to quality of soil  
 • Channel morphology lateral and vertical stability (i.e., bank erosion and scour) | • Wildlife  
 • Vegetation and Ecosystems  
 • Surface Water Quality  
 • Fish  
 • Fish Habitat  
 • Human Health | Terrain Stability and Geohazards  
 • It is important to understand the dynamic physical environment in order to mitigate through design and manage the risks that Project interactions with existing geohazards and potentially unstable terrain present to the environment and the Project. Soil Quantity  
 • Soil quantity affects ecological function and quality of fish and wildlife habitat, quality of groundwater resources, and associated human and wildlife needs; affects traditional way of life of local Aboriginal peoples; protection required by Environmental Management Act (2003), Mines Act (1996). Soil Quality  
 • Soil quality is necessary to maintain ecological function of ecosystems; has direct influence on wildlife habitat availability; affects traditional hunting, fishing, |
4.3.1 **Context and Boundaries**

The Application will identify the spatial, temporal, administrative and technical study area boundaries, as applicable to the IC, including maps, in a manner consistent with Section 3.2 Assessment Boundaries of the AIR.

Table 14 and Figure 6 introduce the proposed spatial boundaries to be used in the Application.

**Table 14: Spatial and Temporal Boundaries for Landforms and Natural Landscapes**

<table>
<thead>
<tr>
<th>Pillar</th>
<th>IC</th>
<th>Temporal Boundary</th>
<th>Spatial Boundary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental</td>
<td>Landforms and Natural Landscapes</td>
<td>Life of Project</td>
<td><strong>LSA</strong>: Bitter Creek Watershed.</td>
</tr>
<tr>
<td></td>
<td>• Terrain stability and geohazards</td>
<td></td>
<td><strong>RSA</strong>: Bear River watershed, including adjacent</td>
</tr>
<tr>
<td></td>
<td>• Soil Quantity</td>
<td></td>
<td>subwatersheds, the terrain between Stewart, and</td>
</tr>
<tr>
<td></td>
<td>• Soil Quality</td>
<td></td>
<td>the proposed Project location.</td>
</tr>
</tbody>
</table>

Figure 6: Landforms and Natural Landscapes Local and Regional Study Area
4.3.2 Existing Conditions

The Application will summarize existing conditions in a manner consistent with Section 3.3 Existing Conditions of this AIR.

The Application will describe the specific methods and standards used to collect baseline Landforms and Natural Landscapes data required to support the assessment, including the location of sampling or survey points and the parameters sampled or analyzed. Applicable criteria used to characterize existing conditions will also be summarized. The methods section will identify the QA/QC and data management tools used for baseline data collection and compilation, and will include:

- surficial geology and terrain distribution, including consideration of:
  - surficial geology units and distribution;
  - site and terrain information including slope gradient, elevation, and aspect;

- soil quality, including consideration of:
  - major soil types;
  - soil moisture and nutrient regimes; and
  - chemical concentration of metals and non-metals in soil.

- soil quantity and distribution, including surface soils erosion potential;

- intensity and frequency of snow avalanches;

- background rates of sedimentation of waterbodies; and

- channel morphology lateral and vertical stability (i.e., bank erosion and scour).

4.3.3 Potential Effects

The Application will identify potential adverse effects to the IC in a manner consistent with Section 3.4 Potential Effects of this AIR.

The Application will summarize the anticipated interactions between the proposed Project and the IC being assessed within the LSA. IDM anticipates that the following proposed Project components or activities will interact with local terrain:

- soil erosion due to excavation in support of the construction of Project facilities, including the access road;

- instability of steep slopes caused by the construction of Project components and activities, including the access road;

- increased sediment being discharged into watercourses;

- compaction of soil;
• metal leaching and acid rock drainage due to rock exposure; and

• damage to Project facilities caused by earthquake-induced ground movements, such as landslides or rockfalls.

These identified interactions will have the potential to result in changes to the measurement indicators identified for the assessment.

4.3.4 Mitigation Measures

The Application will identify measures to avoid, manage or otherwise mitigate potential adverse effects to the IC in a manner consistent with Section 3.5 Mitigation Measures of this AIR. Relevant management plans will be referenced. Linkages to other sections of the Application will be identified.

IDM will evaluate the environmental design and mitigation measures that can be incorporated into the Project to mitigate adverse effects. Uncertainty associated with the effectiveness of the proposed measures will be noted.

4.3.5 Residual Effects

Where an adverse residual effect is identified, the Application will characterize the residual effect based on the context, magnitude, extent, duration, reversibility, and frequency as described in Section 3.6 Characterization of Residual Effects of this AIR.

Where an adverse residual effect is identified, the Application will also describe the likelihood and predictive confidence, in accordance with Sections 3.7 Likelihood and 3.9 Confidence and Risk of this AIR.

The Application will also include a discussion of how uncertainty has been addressed (in accordance with Section 3.9) and provide a qualitative evaluation of the resulting level of confidence in the residual effects analyses for each measurement indicator and assessment endpoint. Where relevant, uncertainty associated with the effectiveness of proposed mitigation will be included in this discussion.

The Application will present changes in measurement indicators and predicted incremental residual effects of the Project. The assessment will include consideration of:

• Terrain Stability and Geohazards
• Soil Quantity and Quality

4.3.6 Cumulative Effects

If a residual effect is identified, unless stated otherwise by EAO, the Application will:

• Determine whether any cumulative interactions between residual effects of the proposed Project and the potential residual effects of other developments, based on the preliminary list of past, present, and reasonably foreseeable developments provided in the AIR, are likely to occur, consistent with Section 3.10.1 Identifying Past, Present or Reasonably
Foreseeable Projects and/or Activities of this AIR;

- Conduct a cumulative effects assessment consistent with Section 3.10.2 Conducting a Cumulative Effects Assessment of this AIR;

- Identify any additional mitigation measures, consistent with Section 3.5 Mitigation Measures of this AIR; and

- Where an adverse residual cumulative effect is identified, the Application will also describe the likelihood and predictive confidence, in accordance with Sections 3.7 Likelihood and 3.9 Confidence and Risk of this AIR.

4.3.7 Follow-up Strategy

Where a residual effect and/or cumulative effect have been identified, the Application will include a description of a follow-up strategy that is consistent with Section 3.11 Follow-up Strategy of this AIR.

The Application will provide the conceptual outline for any monitoring and follow-up programs recommended to confirm the predictions made for Landforms and Natural Landscapes.

4.3.8 Conclusion

The Application will provide a consolidated summary of the predicted residual effects for Landforms and Natural Landscapes. The Application will also indicate the VCs to which the results of this assessment have been forwarded for incorporation in their assessments.

4.4 Hydrology

A concise introduction of the hydrology assessment will be provided for this IC, including the purpose of the assessment, the structure of the assessment, and linkages to other disciplines.

Input from Consultation

The Application will describe the influence of consultation on issues scoping and how the input from consultation has been incorporated into the Hydrology assessment.

Information Sources

The Application will provide the information sources used in the assessment, including those for local and regional climate data and local and regional flow data.

Valued Components, Assessment Endpoints, and Measurement Indicators

The Application will identify that Hydrology is an IC that may be affected by the Project, creating an effect pathway to selected receptor VCs. The Application will describe the measurement indicators used to comprehensively evaluate the Project induced potential changes to this hydrology (Table 15), including:
• average annual flows;
• average monthly flows;
• peak flows; and
• baseflow and low flows.

Table 15: Intermediate Component, Rationale and Measurement Indicators for the Hydrology Assessment

<table>
<thead>
<tr>
<th>IC</th>
<th>Primary Measurement Indicators</th>
<th>VC Where Significance will be Determined</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrology</td>
<td>Bitter Creek, Otter Creek, Goldslide Creek Hydrology: • Average annual flows, Average monthly flows, peak flows, baseflow and low flows.</td>
<td>• Wildlife&lt;br&gt;• Vegetation and Ecosystems&lt;br&gt;• Surface Water Quality&lt;br&gt;• Fish&lt;br&gt;• Fish Habitat</td>
<td>Hydrology was selected as an IC as it will provide an understanding of the change in flow regime from project impacted footprint. Change in flow regime will also be required to evaluate other VCs such as Vegetation and Ecosystems, Fish Habitat, and Water Quality. Changes in the water level regime can affect the sustainability of existing habitat. An understanding of the water level regime will allow to estimate these impacts.</td>
</tr>
</tbody>
</table>

4.4.1 Context and Boundaries

The Application will identify the spatial, temporal, administrative and technical study area boundaries, as applicable to the IC, including maps, in a manner consistent with Section 3.2 Assessment Boundaries to the AIR.

Table 16 and Figure 7 introduce the proposed spatial boundaries to be used in the Application.

Table 16: Spatial and Temporal Boundaries for Hydrology

<table>
<thead>
<tr>
<th>Pillar</th>
<th>IC</th>
<th>Temporal Boundary</th>
<th>Spatial Boundary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental</td>
<td>Hydrology</td>
<td>Life of Project</td>
<td>LSA: Bitter Creek watershed up to glacial extent.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>RSA: Bitter Creek watershed including the glacial extent, and Bear River watershed, from American Creek to Stewart and the northern end of the Portland Canal.</td>
</tr>
</tbody>
</table>

Figure 7: Surface Water Quality, Groundwater Quality, Sediment Quality, Hydrology, and Hydrogeology Local and Regional Study Areas
4.4.2 Existing Conditions

The Application will summarize existing conditions in a manner consistent with Section 3.3 Existing Conditions of this AIR.
Site specific baseline hydrological studies were completed at the site in the mid-1990s in support of an earlier environmental assessment, and were re-initiated in 2014. The historical studies included collection of climate data (1993 to 1996) and stream gauge data (1993 and 1994), and snow course surveys. Where this data has been adequately documented, it will be incorporated into the Application. The methodology for this data collection will be outlined in the Application to make it possible to assess the quality and confirm its reliability.

Baseline climate and hydrology data collection activities were reinitiated in June 2014 following recommendations in the “Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operators” (MOE 2012). The program included installation of three hydrometric monitoring stations and installation of a climate station on a tower located within the Goldslide Creek watershed. The methodology for the baseline data collection will be outlined in the Application.

The Red Mountain hydrometric monitoring network consists of monitoring in three catchments. GSC05 (Goldslide Creek) and OC04 (Otter Creek) are located close to proposed Project infrastructure, and BC02 (Bitter Creek) is located further downstream. These stations have been monitored during the open water season in 2014, 2015, and 2016. 2016 monitoring commenced in the winter with field programs conducted throughout the year to capture low flows and freshet. Monitoring will continue in 2017 to add to the current, site-specific dataset. Discharge measurements are completed using area-velocity and salt dilution methods. The program includes continuous monitoring of water level and monthly flow measurements at each of the stream gauging stations, with weekly to daily flow measurements during spring freshet to establish a rating curve.

Climate monitoring includes daily measurements and monthly downloads of barometric pressure, net radiation, wind speed and direction, total solar radiation, relative humidity, air temperature, and snow depth. Precipitation gauges were recently added to the station.

The site specific dataset does not allow for the preparation of climate and/or hydrological models on its own, as this requires several years of continuous records. The baseline climate and hydrology data will be supplemented based on a review of the public meteorological stations from Environment and Climate Change Canada and gauge stations from Water Survey of Canada. From these two regional sources, local patterns will be understood, which will then be related with the available meteorological and gauge site records. This process will enable an understanding of the relations between local climate and hydrological information in a regional context.

Baseflow and low flow conditions will be estimated using specific statistical methodologies and will be compared with the available local winter low flow measurements. Peak flows will be estimated based on statistical methodologies used on similar regional watersheds and local watersheds. The Application will include rating curves and measured information, total watershed yield, hydrologic statistics, and hydrologic trends (if required). The description of existing conditions will also consider hydrologic variability (i.e., range of annual and monthly flows), not just mean values.

The description of existing conditions will include the inflow design floods or peak flows, which will be estimated based on regional/local gauge information. Details on these calculations,
including supporting information for the various water management assumptions will be presented.

The Application will further describe the specific methods and standards used to collect baseline hydrology data, including the location of sampling or survey points and parameters sampled or analyzed, QA/QC and data management tools used for baseline data collection and compilation, and the results of the baseline data and regional analysis, including:

- summary of key climate station information in the LSA; and
- streamflow and sediment yield statistics based on publically available hydrometric data (i.e., government sources) and spot and continuous stream flow measurements collected by IDM.

Additional information will be provided for:

- climate data from regional and local climate stations; and
- monthly flow data for regional and local streams.

### 4.4.3 Potential Effects

The Application will identify potential adverse effects to the IC in a manner consistent with Section 3.4 Potential Effects of this AIR.

The Application will summarize the anticipated interactions between the proposed Project and the IC being assessed within the LSA. IDM anticipates that the following proposed components or activities will interact with the hydrological aspects of the Project area:

- changes to streamflows due to water withdrawal from Otter, Bitter, or Goldslide Creeks for industrial uses;
- changes to watercourses due to water diversions required around Project facilities;
- changes to the natural runoff coefficient due to changes in drainage patterns;
- changes to site drainage patterns due to excavation, stockpiling, temporary resurfacing, and installation of culverts;
- increased erosion and/or sedimentation of local watercourses due to changes in drainage patterns; and
- increase to the impervious area due to the construction of roads and site facilities.

These identified interactions will have the potential to result in changes to the measurement indicators identified for the hydrology assessment.
4.4.4 Mitigation Measures

The Application will identify measures to avoid, manage or otherwise mitigate potential adverse effects to the IC in a manner consistent with Section 3.5 Mitigation Measures of this AIR. Relevant management plans will be referenced. Linkages to other sections in the Application will be identified.

IDM will evaluate the environmental design and mitigation measures that can be incorporated into the Project to mitigate adverse effects. Uncertainty associated with the effectiveness of the proposed measures will be noted.

4.4.5 Residual Effects

Where an adverse residual effect is identified, the Application will characterize the residual effect based on the context, magnitude, extent, duration, reversibility, and frequency as described in Section 3.6 Characterization of Residual Effects of this AIR.

The Application will characterize the residual effects on surface water levels and rate of flow using the effects criteria in Section 3.6. Policies, guidelines, and standards considered in the analysis, as well as the model used to predict residual effects will be described.

Where an adverse residual effect is identified, the Application will also describe the likelihood, and predictive confidence, in accordance with Sections 3.7 Likelihood and 3.9 Confidence and Risk of this AIR.

The analysis will include the assessment of predicted incremental effects of the Project. This will include consideration of:

- potential changes to flows in the Goldslide Creek, Otter Creek, and Bitter Creek in the LSA;
- disruptions to drainage in headwater areas and potential changes in basin sediment yield; and
- consideration of the short- and long-term functionality of rock drains with respect to the hydrology in the aquatic LSA based on desktop analysis of available data.

The Application will also include a discussion of how uncertainty has been addressed (in accordance with Section 3.9) and provide a qualitative evaluation of the resulting level of confidence in the residual effects analyses for each measurement indicator and assessment endpoint. Where relevant, uncertainty associated with the effectiveness of proposed mitigation will be included in this discussion.

4.4.6 Cumulative Effects

If a residual effect is identified, unless stated otherwise by EAO, the Application will:

- Determine whether any cumulative interactions between residual effects of the proposed Project and the potential residual effects of other developments, based on the preliminary list of past, present, and reasonably foreseeable developments provided in the AIR, are
likely to occur, consistent with Section 3.10.1 Identifying Past, Present or Reasonably Foreseeable Projects and/or Activities of this AIR;

- Conduct a cumulative effects assessment consistent with Section 3.10.2 Conducting a Cumulative Effects Assessment of this AIR;

- Identify any additional mitigation measures, consistent with Section 3.5 Mitigation Measures of this AIR; and

- Where an adverse residual cumulative effect is identified, the Application will also describe the likelihood and predictive confidence, in accordance with Sections 3.7 Likelihood and 3.9 Confidence and Risk of this AIR.

4.4.7 Follow-up Strategy

Where a residual effect and/or cumulative effect have been identified, the Application will include a description of a follow-up strategy that is consistent with Section 3.11 Follow-up Strategy of this AIR.

The Application will provide the conceptual outline for any monitoring and follow-up programs recommended to confirm the predictions made for Hydrology.

4.4.8 Conclusion

The Application will provide a consolidated summary of the predicted residual effects. The Application will also indicate the VCs to which the results of this assessment have been forwarded for incorporation in their assessments.

4.5 Hydrogeology

A concise introduction of the Hydrogeological assessment will be provided for this IC, including the purpose of the assessment, the structure of the assessment, and linkages to other disciplines. The Hydrogeology assessment will be informed by the Hydrogeology Report, which will be appended to the Application. Specifically, the report will include conceptual models of the groundwater system at the TMF location and the mine site, details on the model assumptions and uncertainties, and the results of sensitivity analyses.

Input from Consultation

The Application will describe the influence of consultation on issues scoping and how the input from consultation has been incorporated into the hydrogeological assessment.

Information Sources

The Application will provide the information sources used in the assessment, including those for local and regional climate data and local and regional flow data.
### Valued Components, Assessment Endpoints, and Measurement Indicators

The Application will identify that Hydrogeology (or more specifically: groundwater flows and flow pathways) is an IC that may be affected by the Project, creating an effect pathway to selected receptor VCs. The Application will describe the measurement indicators used to comprehensively evaluate the potential changes to hydrogeology (Table 17).

#### Table 17: Valued Components, Rationale and Measurement Indicators for Hydrogeological Assessment

<table>
<thead>
<tr>
<th>IC</th>
<th>Primary Measurement Indicators</th>
<th>VC Where Significance will be Determined</th>
<th>Rationale</th>
</tr>
</thead>
</table>
| Hydrogeology      | Groundwater levels and groundwater flow (including base flow to streams, groundwater inflows to mine workings, and other areas of groundwater discharge) | • Wildlife  
• Fish Habitat  
• Water Quality  
• Human Health  
• Vegetation and Ecosystems | Hydrogeology, specifically groundwater flows and flow pathways have the potential to change as a result of Project activities. Hydrogeology was selected as an IC because of the potential pathway effects on VCs influenced by it in the Bitter Creek Watershed. |

#### 4.5.1 Context and Boundaries

The Application will identify the spatial, temporal, administrative and technical study area boundaries, as applicable of the IC, including maps, in a manner consistent with Section 3.2 Assessment Boundaries of the AIR.

Table 18 and Figure 7 introduce the proposed spatial boundaries to be used in the Application.

#### Table 18: Spatial and Temporal Boundaries for Hydrogeology

<table>
<thead>
<tr>
<th>Pillar</th>
<th>IC</th>
<th>Temporal Boundary</th>
<th>Spatial Boundary</th>
</tr>
</thead>
</table>
| Environmental   | Hydrogeology| Life of Project   | LSA: Bitter Creek watershed up to glacial extent, with more detailed evaluations in the area of the underground mine (including waste rock and ore stockpiles) and at the Bromley Humps TMF.  
RSA: Bitter Creek watershed including the glacial extent, and Bear River watershed, from American Creek to Stewart and the northern end of the Portland Canal. |
4.5.2 Existing Conditions

The Application will summarize existing conditions in a manner consistent with Section 3.3 Existing Conditions of this AIR.

Characterization of Hydrogeology has generally followed the methodology described in the Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operators, (BC MOE 2016). The Application will describe the specific methods and standards used to collect baseline hydrogeology data required to support the assessment, including the location of wells, hydraulic tests, flow measurement, sampling, or survey points. The geotechnical, geological and construction details of the tested drillholes or wells will be provided. The methods section will identify the QA/QC and data management tools used for baseline data collection and compilation.

The Application will characterize existing conditions for Hydrogeology in the RSA and LSA, and will include:

- overview of background information including information from published geology and hydrogeology reports, orthophoto imagery, on-site photographs, and on-site field programs;
- a description of the geological and structural context as well as maps of the overburden and bedrock geology;
- summary of existing groundwater characteristics (e.g., hydrostratigraphic units, pressure head measurements, groundwater table(s), seasonal changes in groundwater flow and head, and flow directions). Historical pressure heads included discrete measurements from three geotechnical wells located in the Red Mountain cirque, 35 open exploration boreholes, and 11 piezometers completed in the area of the proposed tailings. In 2014, three flowing artesian open exploration holes were capped and installed with water level loggers to record the changes in water levels over time;
- description of the hydraulic properties for the key hydrostratigraphic units based on the site measurements complemented by scientific literature. As of 2015, 71 hydraulic conductivity values had been measured out of 17 locations in the Red Mountain cirque and in the proposed tailing area. In 2016, four additional drillholes have been tested and the dewatering of the decline will be monitored to estimate the bulk hydraulic properties of the bedrock;
- summary of the surface flow data for regional and local streams and the measured or estimated baseflow rates during low flow and high flow periods; and
- characterization of the interactions between current surface waterbodies and the groundwater system (e.g., delineation and characterization of recharge and discharge, location map of the groundwater springs and seeps, estimation of the groundwater contribution to surface water flows).
4.5.3 Potential Effects

The Application will identify potential adverse effects to the IC in a manner consistent with Section 3.4 Potential Effects of this AIR.

The Application will summarize the anticipated interactions between the proposed Project and the IC being assessed. IDM anticipates that the following proposed Project components or activities will interact with the hydrogeology aspects of the Project area:

- changes to groundwater flow through changes to local scale flow or drainage pathways; and
- changes to subsurface characteristics and groundwater flow paths caused by Project water management activities, such as water diversions.

These interactions will be assessed using a hydrogeological model at the scale of the LSA, and the water and load balance model. The hydrogeological model will be calibrated to the available local and regional pressure head, climate data, and stream flow measurements. The sensitivity of the model to hydraulic parameters and to recharge will be tested. Results will be provided in a hydrogeology report included as an appendix to the Application.

The Application will also identify and evaluate the Project works and activities that have the potential to result in changes to the measurement indicators identified for the hydrogeological assessment. All primary effects pathways will be carried forward for further evaluation of the residual effects.

Development and calibration of the numerical hydrogeological model will follow the Guidelines for Groundwater Modelling to Assess Impacts of Proposed Natural Resource Development Activities, prepared by BC Ministry of Environment (2012). Detail on the model development and calibration will be provided in the Application.

4.5.4 Mitigation Measures

The Application will identify measures to avoid, manage or otherwise mitigate potential adverse effects to the IC in a manner consistent with Section 3.5 Mitigation Measures of this AIR. Relevant management plans will be referenced. Linkages to other sections in the Application must be identified.

IDM will evaluate the environmental design and mitigation measures that can be incorporated into the Project to mitigate adverse effects. Uncertainty associated with the effectiveness of the proposed measures will be noted.

4.5.5 Residual Effects

Where an adverse residual effect is identified, the Application will characterize the residual effect based on the context, magnitude, extent, duration, reversibility, and frequency as described in Section 3.6 Characterization of Residual Effects of this AIR.
Where an adverse residual effect is identified, the Application will also describe the likelihood and predictive confidence, in accordance with Sections 3.7 Likelihood and 3.9 Confidence and Risk of this AIR.

The Application will also include a discussion of how uncertainty has been addressed (in accordance with Section 3.9) and provide a qualitative evaluation of the resulting level of confidence in the residual effects analyses for each measurement indicator and assessment endpoint. Where relevant, uncertainty associated with the effectiveness of proposed mitigation will be included in this discussion.

The Application will present changes in measurement indicators and predicted incremental effects of the Project. The assessment will include consideration of:

- groundwater use for Project activities;
- changes to hydrogeology during operations and after reclamation; and
- changes to groundwater flow regimes.

Hydrogeology will be assessed at a number of assessment nodes in the RSA and LSA under low flow, mean flow, and high flow conditions. Assessment nodes will include locations in potentially affected systems by the proposed Project.

Results from the effects analyses are used to describe the context, direction, magnitude, geographic (spatial) extent, duration, timing, reversibility, and likelihood of the predicted changes to the primary measurement indicators for Hydrogeology (Section 3.6), with clear indication of the potential for local versus regional scale effects.

### 4.5.6 Cumulative Effects

If a residual effect is identified, unless stated otherwise by EAO, the Application will:

- Determine whether any cumulative interactions between residual effects of the proposed Project and the potential residual effects of other developments, based on the preliminary list of past, present, and reasonably foreseeable developments provided in the AIR, are likely to occur, consistent with Section 3.10.1 Identifying Past, Present or Reasonably Foreseeable Projects and/or Activities of this AIR;

- Conduct a cumulative effects assessment consistent with Section 3.10.2 Conducting a Cumulative Effects Assessment of this AIR;

- Identify any additional mitigation measures, consistent with Section 3.5 Mitigation Measures of this AIR; and

- Where an adverse residual cumulative effect is identified, the Application will also describe the likelihood and predictive confidence, in accordance with Sections 3.7 Likelihood and 3.9 Confidence and Risk of this AIR.
4.5.7 *Follow-up Strategy*

Where a residual effect and/or cumulative effect have been identified, the Application will include a description of a follow-up strategy that is consistent with Section 3.11 *Follow-up Strategy* of this AIR.

The Application will provide the conceptual outline for any monitoring and follow-up programs recommended to confirm the predictions made for the hydrogeological regime. A groundwater monitoring program will be established irrespective of the predicted results.

4.5.8 *Conclusion*

The Application will provide a consolidated summary of the predicted residual for Hydrogeology. The Application will also indicate the VCs to which the results of this assessment have been forwarded for incorporation in their assessments.

4.6 *Groundwater Quality*

A concise introduction of the Groundwater Quality assessment will be provided for this IC, including the purpose of the assessment, the structure of the assessment, and linkages to other disciplines.

*Input from Consultation*

The Application will describe the influence of consultation on issues scoping and how the input from consultation has been incorporated into the groundwater quality assessment.

*Information Sources*

The Application will list the information sources used in the assessment, including relevant environmental reports and data. Specifically, this section will cross-reference sections in the Application where Hydrology, Hydrogeology, and Water Quality predictions are reported.

*Valued Components, Assessment Endpoints, and Measurement Indicators*

The Application will identify that Groundwater Quality is an IC that may be affected by the Project, creating an effect pathway to selected receptor VCs. The Application will describe the measurement indicators used to comprehensively evaluate the Project induced potential changes to Groundwater Quality (Table 19), and will include the suite of parameters listed in Section 6.4 of the Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operators, (BC MOE 2016).

**Table 19: Valued Components, Rationale and Measurement Indicators for Groundwater Quality Assessment**

<table>
<thead>
<tr>
<th>IC</th>
<th>Primary Measurement Indicators</th>
<th>VC Where Significance will be Determined</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groundwater</td>
<td>Change in parameter</td>
<td>• Surface Water</td>
<td>Groundwater Quality has the potential to</td>
</tr>
</tbody>
</table>
Quality

concentrations compared to baseline and provincial or federal guidelines for freshwater aquatic life. These include total and dissolved metals; anions / nutrients; alkalinity / acidity; total suspended solids; pH; conductivity and temperature (BC MOE 2016).

Quality

• Vegetation and Ecosystems
• Wildlife
• Fish
• Fish Habitat
• Human Health

change as a result of Project activities. Potential effects pathways may include accidental spills, discharges or accidental releases of contact water (including surface water and groundwater seepage associated with the mine working, the ore and waste rock stockpiles, and the TMF), as well as and sediment runoff.

Groundwater Quality was selected as an IC to further inform VCs that may be affected by its quality in the Bitter Creek Watershed.

The Application will present changes in measurement indicators and potential effects of the Project on Groundwater Quality for key time-periods during the construction, operations, and closure stages of the Project. The assessment will include consideration of:

• groundwater use for Project activities;
• changes to Groundwater Quality during operations and after reclamation; and
• changes to groundwater flow regimes.

Groundwater Quality will be assessed at a number of assessment nodes in the RSA and LSA under low flow, mean flow, and high flow conditions. Assessment nodes will include locations in potentially affected systems that may be affected by the proposed Project.

Results from the effects analyses are used to describe the context, direction, magnitude, geographic (spatial) extent, duration, timing, reversibility, and likelihood of the predicted changes to the primary measurement indicators for hydrogeology (Section 3.6), with clear indication of the potential for local versus regional scale effects.

4.6.1 Context and Boundaries

The Application will identify the spatial, temporal, administrative and technical study area boundaries, as applicable of the IC, including maps, in a manner consistent with Section 3.2 Assessment Boundaries of the AIR.

Table 20 and Figure 7 introduce the proposed spatial boundaries to be used in the Application.
Table 20: Spatial and Temporal Boundaries for Groundwater Quality

<table>
<thead>
<tr>
<th>Pillar</th>
<th>IC</th>
<th>Temporal Boundary</th>
<th>Spatial Boundary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental</td>
<td>Groundwater Quality</td>
<td>Life of Project</td>
<td><strong>LSA:</strong> Bitter Creek Watershed, with more detailed technical evaluations in the area of the underground mine (including waste rock and ore stockpiles) and at the Bromley Humps TMF.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>RSA:</strong> Bitter Creek and Bear River Valleys, including Stewart and the northern end of the Portland Canal.</td>
</tr>
</tbody>
</table>

4.6.2 Existing Conditions

The Application will summarize existing conditions in a manner consistent with Section 3.3 Existing Conditions of this AIR.

Characterization of baseline Groundwater Quality has generally followed the methodology described in the Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operators, (BC MOE 2016). The Application will describe the specific methods and standards used to collect baseline data conditions related to Groundwater Quality required to support the assessment, including the location of sampling or survey points and parameters sampled or analyzed. The methods section will identify the sampling protocols, QA/QC, and data management tools used for baseline data collection and compilation. The baseline data will include the baseline Groundwater Quality collected to date from piezometers, artesian exploration drillholes, surface seeps or springs, and underground adits. Eight groundwater quality sites were established in 2014 and field programs are ongoing in 2016. Sampling sites are concentrated in upper Goldslide Creek near the historical waste dumps and underground workings. IDM will ensure that long-term monitoring locations are established to monitor groundwater prior to construction, during operation, and post-closure. Groundwater samples are analyzed for the following parameters:

- general chemistry (colour, conductivity, hardness, pH, TSS, TDS, and turbidity);
- anions and nutrients;
- total and dissolved organic carbon; and
- total and dissolved metals.

Baseline concentrations that exceed provincial and federal guidelines will be noted. IDM intends to use analysis of dissolved metals concentrations as the basis for site-specific groundwater quality objectives and the environmental effects assessment.

Table 21 provides a list of the baseline data that will be considered for the assessment.
Table 21: Baseline Data Collection for Groundwater Quality and Surface Water Quality

<table>
<thead>
<tr>
<th>Data</th>
<th>Available Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface Water Quality</td>
<td>See Section 4.8 Surface Water Quality</td>
</tr>
</tbody>
</table>

4.6.3 Potential Effects

The Application will identify potential adverse effects to the IC in a manner consistent with Section 3.4 Potential Effects of this AIR.

The Application will summarize the anticipated interactions between the proposed Project and the IC being assessed, including interactions between Groundwater Quality and the underground mine workings, waste rock and ore stockpiles, and tailings. IDM anticipates that the following proposed Project components or activities will interact with the Groundwater Quality aspects of the Project area:

- changes to watershed characteristics and local scale flow or drainage paths;
- changes to subsurface characteristics and groundwater flow paths due to Project water management activities, such as water diversions;
- potential changes to groundwater quality from infiltration/recharge through waste rock piles, stockpiles and tailings materials; and
- potential changes to groundwater quality from the storage, handling, and use of chemicals and fuels on the site and access roads.

These interactions will be assessed using a hydrogeology model at the scale of the LSA, and the water and load balance model. The hydrogeology model will be calibrated to the available local pressure head, climate data, and stream flow measurements.

Development and calibration of the numerical hydrogeological model will follow the Guidelines for Groundwater Modelling to Assess Impacts of Proposed Natural Resource Development Activities, prepared by BC Ministry of Environment (2012). Detail on the model development and calibration will be provided in the Application.
The sensitivity of the model to hydraulic parameters and to recharge will be tested, and the model will be used to identify potential recharge and discharges areas in the system, and their respective infiltration and discharge rates.

The Application will also identify and evaluate the Project works and activities that have the potential to result in changes to the measurement indicators identified for the hydrogeological assessment. All primary effects pathways will be carried forward for further evaluation of the residual effects.

4.6.4 Mitigation Measures

The Application will identify measures to avoid, manage or otherwise mitigate potential adverse effects to the IC in a manner consistent with Section 3.5 Mitigation Measures of this AIR. Relevant management plans will be referenced. Linkages to other sections in the Application must be identified.

IDM will evaluate the environmental design and mitigation measures that can be incorporated into the Project to mitigate adverse effects. Uncertainty associated with the effectiveness of the proposed measures will be noted.

4.6.5 Residual Effects

Where an adverse residual effect is identified, the Application will characterize the residual effect based on the context, magnitude, extent, duration, reversibility, and frequency as described in Section 3.6 Characterization of Residual Effects of this AIR.

Where an adverse residual effect is identified, the Application will also describe the likelihood and predictive confidence, in accordance with Sections 3.7 Likelihood and 3.9 Confidence and Risk of this AIR.

The Application will also include a discussion of how uncertainty has been addressed (in accordance with Section 3.9) and provide a qualitative evaluation of the resulting level of confidence in the residual effects analyses for each measurement indicator and assessment endpoint. Where relevant, uncertainty associated with the effectiveness of proposed mitigation will be included in this discussion.

The Application will present changes in measurement indicators and predicted incremental effects of the Project.

4.6.6 Cumulative Effects

If a residual effect is identified, unless stated otherwise by EAO, the Application will:

- Determine whether any cumulative interactions between residual effects of the proposed Project and the potential residual effects of other developments, based on the preliminary list of past, present, and reasonably foreseeable developments provided in the AIR, are likely to occur, consistent with Section 3.10.1 Identifying Past, Present or Reasonably Foreseeable Projects and/or Activities of this AIR;
• Conduct a cumulative effects assessment consistent with Section 3.10.2 Conducting a Cumulative Effects Assessment of this AIR;

• Identify any additional mitigation measures, consistent with Section 3.5 Mitigation Measures of this AIR.

Where an adverse residual cumulative effect is identified, the Application will also describe the likelihood and predictive confidence, in accordance with Sections 3.7 Likelihood and 3.9 Confidence and Risk of this AIR.

4.6.7 Follow-up Strategy

Where a residual effect and/or cumulative effect have been identified, the Application will include a description of a follow-up strategy that is consistent with Section 3.11 Follow-up Strategy of this AIR.

The Application will provide the conceptual outline for any monitoring and follow-up programs recommended to confirm the predictions made for Groundwater Quality. Monitoring program objectives will include assessment of the effectiveness of planned mitigation during the operational and closure stages and will be integrated with existing or planned monitoring programs.

4.6.8 Conclusion

The Application will provide a consolidated summary of the predicted residual for Groundwater Quality. The Application will also indicate the VCs to which the results of this assessment have been forwarded for incorporation in their assessments.

4.7 Sediment Quality

A concise introduction of the Sediment Quality assessment will be provided for this IC, including the purpose of the assessment, the structure of the assessment, and linkages to other disciplines.

Input from Consultation

The Application will describe the influence of consultation on issues scoping and how the input from consultation has been incorporated into the sediment quality assessment.

Information Sources

The Application will list the information sources used in the assessment, including relevant environmental reports and data.

Valued Components, Assessment Endpoints, and Measurement Indicators

The Application will identify that Sediment Quality is an IC that may be affected by the Project, creating an effect pathway to selected receptor VCs. The Application will describe the
measurement indicators used to comprehensively evaluate the Project induced potential changes to Sediment Quality.

Table 22: Valued Components, Rationale and Measurement Indicators for Sediment Quality Assessment

<table>
<thead>
<tr>
<th>IC</th>
<th>Primary Measurement Indicators</th>
<th>VC Where Significance will be Determined</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sediment Quality</td>
<td>Change in parameter concentrations, such as concentration of metal and non-metal constituents in stream sediments, compared to provincial or federal guidelines for freshwater aquatic life</td>
<td>Surface Water Quality • Fish • Fish Habitat</td>
<td>Mining activities may cause changes to Sediment Quality which can affect Human Health, Wildlife, Fish Habitat, and Aquatic Health.</td>
</tr>
</tbody>
</table>

4.7.1 Context and Boundaries

The Application will identify the spatial, temporal, administrative and technical study area boundaries, as applicable of the IC, including maps, in a manner consistent with Section 3.2 Assessment Boundaries of the AIR.

Table 23 and Figure 7 introduce the proposed spatial boundaries to be used in the Application.

Table 23: Spatial and Temporal Boundaries for Sediment Quality

<table>
<thead>
<tr>
<th>Pillar</th>
<th>IC</th>
<th>Temporal Boundary</th>
<th>Spatial Boundary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental</td>
<td>Sediment Quality</td>
<td>Life of Project</td>
<td><strong>LSA</strong>: Bitter Creek watershed up to glacial extent</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>RSA</strong>: Bitter Creek watershed including the glacial extent, and Bear River watershed, from American Creek to Stewart and the northern end of the Portland Canal.</td>
</tr>
</tbody>
</table>

4.7.2 Existing Conditions

The Application will summarize existing conditions in a manner consistent with Section 3.3 Existing Conditions of this AIR.

The Application will describe the specific methods and standards used to collect baseline sediment quality data required to support the assessment, including the location of sampling or survey points, parameters analyzed, and variability in replicate samples.
Nine sediment quality sites were established in 2014. Sampling locations include Goldslide Creek, Otter Creek, Bitter Creek, Bear River, and American Creek. Parameters analysed include metals, polycyclic aromatics, moisture, sulphur, total organic carbon, and particle size.

The methods section will identify the QA/QC and data management tools used for baseline data collection and compilation and will include:

- an overview of background information, including sediment quality data compiled from the review of existing information; and
- sediment quality evaluation included a comparison of sediment chemistry data to BC MOE sediment quality guidelines (BC MOE 2013), CCME sediment quality guidelines (CCME 2007), and reference concentrations.

Sediment quality sampling will continue through 2016 to address any data gaps, with baseline results included in the Application.

### 4.7.3 Potential Effects

The Application will identify potential adverse effects to the IC in a manner consistent with Section 3.4 Potential Effects of this AIR.

The Application will summarize the anticipated interactions between the proposed Project and the IC being assessed within the LSA. IDM anticipates that the following proposed Project components or activities will interact with Sediment Quality in the Project area:

- project activities that include the clearing of overburden, earthworks, and construction activities for pads and infrastructure;
- run-off from Project infrastructure including pad areas, laydown areas, roads, and airstrips;
- water that contacts mine surfaces and operations, including runoff from waste rock storage areas and ore storage areas;
- activities related to the operation of quarries and borrow pits;
- project activities related to the transportation, manufacture, storage, and use of explosives;
- project activities related to the storage of fuels, fueling and maintenance operations, and the combustion of waste; and
- project activities, such as vehicle traffic, mining operations, and milling due to the deposition of dust.

The Application will also identify and evaluate the Project works and activities that have the potential to result in changes to the measurement indicators identified for the Sediment Quality assessment. All primary effects pathways will be carried forward for further evaluation of the residual effects.
4.7.4 Mitigation Measures

The Application will identify measures to avoid, manage or otherwise mitigate potential adverse effects to the IC in a manner consistent with Section 3.5 Mitigation Measures of this AIR. Relevant management plans will be referenced. Linkages to other sections in the Application must be identified.

IDM will evaluate the environmental design and mitigation measures that can be incorporated into the Project to mitigate adverse effects. Uncertainty associated with the effectiveness of the proposed measures will be noted.

4.7.5 Residual Effects

Where an adverse residual effect is identified, the Application will characterize the residual effect based on the context, magnitude, extent, duration, reversibility, and frequency as described in Section 3.6 Characterization of Residual Effects of this AIR.

Policies, guidelines, and standards considered in the analysis will be described.

Measurement Indicators

The Application will present changes in measurement indicators and potential effects of the Project on Sediment Quality during the construction, operations, and closure stages of the Project.

Where an adverse residual effect is identified, the Application will also describe the likelihood and predictive confidence, in accordance with Sections 3.7 Likelihood and 3.9 Confidence and Risk of this AIR.

The Application will also include a discussion of how uncertainty has been addressed (in accordance with Section 3.9), and provide a qualitative evaluation of the resulting level of confidence in the residual effects analyses for each measurement indicator and assessment endpoint. Where relevant, uncertainty associated with the effectiveness of proposed mitigation will be included in this discussion.

Sediment quality concentrations associated with the Application and cumulative effects assessment will be presented in comparison to reference concentrations, baseline conditions, and relevant criteria, i.e., CCME’s (2007) Interim Sediment Quality Guidelines (ISQG) and the Probable Effects Level (PEL). ISQG are concentrations below which adverse biological effects are expected to occur rarely, and PEL are concentrations above which biological effects are expected to occur frequently.

The context, direction, magnitude, geographic (spatial) extent, duration, timing, reversibility, and likelihood of the predicted changes to the measurement indicators will be described as outlined in Section 3.6.

4.7.6 Cumulative Effects

If a residual effect is identified, unless stated otherwise by EAO, the Application will:
• Determine whether any cumulative interactions between residual effects of the proposed Project and the potential residual effects of other developments, based on the preliminary list of past, present, and reasonably foreseeable developments provided in the AIR, are likely to occur, consistent with Section 3.10.1 Identifying Past, Present or Reasonably Foreseeable Projects and/or Activities of this AIR;

• Conduct a cumulative effects assessment consistent with Section 3.10.2 Conducting a Cumulative Effects Assessment of this AIR;

• Identify any additional mitigation measures, consistent with Section 3.5 Mitigation Measures of this AIR; and

• Where an adverse residual cumulative effect is identified, the Application will also describe the likelihood and predictive confidence, in accordance with Sections 3.7 Likelihood and 3.9 Confidence and Risk of this AIR.

4.7.7 Follow-up Strategy

Where a residual effect and/or cumulative effect have been identified, the Application will include a description of a follow-up strategy that is consistent with Section 3.11 Follow-up Strategy of this AIR.

The Application will provide the conceptual outline for any monitoring and follow-up programs recommended to confirm the predictions made for Sediment Quality. Monitoring program objectives will include assessment of the effectiveness of planned mitigation during the operational, and closure stages and will be integrated with existing or planned monitoring programs.

4.7.8 Conclusion

The Application will provide a consolidated summary of the predicted residual effects for Sediment Quality. The Application will also indicate the VCs to which the results of the sediment quality assessment have been forwarded for incorporation in their assessments.

4.8 Surface Water Quality

A concise introduction of the Surface Water Quality assessment will be provided, including the purpose of the assessment, the structure of the assessment, and linkages to other disciplines.

The Water Quality assessment will be informed by the Water Quality Model Report, that will be appended to the Application. The report will include:

• the methods for the development of the geochemical source terms and the water quality predictions;

• water quality predictions for mine components, site discharge, and relevant receiving environment locations for key flow conditions and relevant phases in the mine life; and

• time to ML/ARD onset for all PAG materials.
**Input from Consultation**

The Application will describe the influence of consultation on issues scoping and how the input from consultation has been incorporated into the Surface Water Quality assessment.

**Information Sources**

This Application will provide the information sources used in the assessment, including relevant environmental reports and data on hydrology (flows), baseline groundwater quality, and water quality associated with each of the mining components (contact water quality or source terms).

**Valued Components, Assessment Endpoints, and Measurement Indicators**

The Application will identify that Surface Water Quality is a VC that may be affected by the Project. The Application will describe the measurement indicators, intermediate components, and assessment endpoints that will be used to comprehensively evaluate the potential changes to Surface Water Quality that may result from the Project (Table 24).

<table>
<thead>
<tr>
<th>VC</th>
<th>Pathways</th>
<th>Primary Measurement Indicators</th>
<th>Assessment Endpoints</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface Water Quality</td>
<td>The following ICs will inform the assessment of potential Project impacts to Surface Water Quality:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Sediment Quality</td>
<td>Change in parameter concentrations compared to baseline and provincial or federal guidelines for freshwater aquatic life. These include total and dissolved metals; anions / nutrients; alkalinity / acidity; total suspended solids; pH; conductivity and temperature.</td>
<td>• Maintenance of the quality of water in the receiving environment</td>
<td>Surface Water Quality has the potential to change as a result of Project activities. Potential effects pathways may include accidental spills, accidental releases of mine contact water, and sediment runoff. Changes to water quality as a result of the Project could affect downstream values including Human Health, Fish, Fish Habitat, and Wildlife. It could also be subject to the general prohibitions of the Fisheries Act Section 36(3) and Schedule 4 of the MMER.</td>
</tr>
</tbody>
</table>

When considered as a pathway component, the results of the Surface Water Quality assessment will be incorporated into the assessments for the following VCs:

- Human Health;
- Fish VCs;
Fish Habitat;
Wildlife VCs; and
Vegetation and Ecosystem VCs.

### 4.8.1 Context and Boundaries

The Application will identify the spatial, temporal, administrative and technical study area boundaries, as applicable of the VC, including maps, in a manner consistent with Section 3.2 Assessment Boundaries of the AIR.

Table 25 and Figure 7 introduce the proposed spatial boundaries to be used in the Application.

#### Table 25: Spatial and Temporal Boundaries for Surface Water Quality

<table>
<thead>
<tr>
<th>Pillar</th>
<th>VC</th>
<th>Temporal Boundary</th>
<th>Spatial Boundary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental</td>
<td>Surface Water Quality</td>
<td>Life of Project</td>
<td>LSA: Bitter Creek watershed up to glacial extent</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>RSA: Bitter Creek watershed including the glacial extent, and Bear River watershed, from American Creek to Stewart and the northern end of the Portland Canal.</td>
</tr>
</tbody>
</table>

### 4.8.2 Existing Conditions

The Application will summarize existing conditions in a manner consistent with Section 3.3 Existing Conditions of this AIR.

Historical water quality data were collected from 1993 to 1997 for Goldslide, Rio Blanco, Roosevelt, and Bitter Creeks. This dataset has good temporal and spatial coverage but has some data quality issues that may limit interpretation. The historical dataset will be used as a comparison for the data collected by the ongoing surface water quality baseline monitoring program, which was re-established in summer 2014.

This monitoring program was designed to meet the requirements of the Ministry of Environment’s Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operators (2012). Seventeen surface water quality sites were established in 2014 and field programs are ongoing in 2016. Sampling locations include Goldslide Creek, Rio Blanco Creek, Otter Creek, Roosevelt Creek, Bitter Creek, Bear River, and American Creek.

Surface water samples will be analyzed for the following parameters:

- general chemistry (colour, conductivity, hardness, pH, TSS, TDS, temperature, and turbidity);
- anions and nutrients;
- total and dissolved organic carbon; and
- total and dissolved metals.
The Application will describe the methods and standards used for the baseline data collection program, including information on QA/QC procedures, data management tools, and calibration with regional or analogue data as appropriate. Specifically, this assessment will provide the following information:

- an overview of background information including water quality data compiled from a review of existing information;
- a summary of water quality data from the Bitter Creek and Bear River watersheds, evaluated by comparing concentrations to water quality guidelines for the protection of aquatic life (BC MOE 2013) and to reference concentrations;
- a characterization of watercourses and interactions with shallow hydrogeology (e.g., recharge and discharge characteristics, groundwater seeps, percent contribution to surface water flows); and
- a baseline data overview, including observations from historical data and available data from the surface water monitoring program.

Baseline concentrations that exceed provincial and federal guidelines will be noted. IDM intends to use analysis of dissolved metals concentrations as the basis for site-specific water quality objectives and the environmental effects assessment.

Specifically, geochemical characterization work will be completed in accordance with the Policy for Metal Leaching and Acid Rock Drainage at Mine sites in British Columbia (MEM, 1998) and the Prediction Manual for Drainage Chemistry from Sephardic Geologic Materials (Price, 2009). The Application will include the report as an appendix to the Application. Raw data will be included within the report.

4.8.3 Potential Effects

The Application will identify potential adverse effects to the VC in a manner consistent with Section 3.4 Potential Effects of this AIR.

The Application will summarize the anticipated interactions between the proposed Project and the VC being assessed. This includes water quality interactions with the underground mine workings, waste rock storage areas, ore stockpiles, and the TMF. IDM anticipates that the following Project components or activities will interact with the VC, Surface Water Quality in the Project area:

- changes in hydrology from Project activities such as clearing of overburden, dewatering, earthworks, and construction activities for pads and infrastructure. These are measured by changes in flow and drainage patterns, total annual flow volumes, peak discharge rates, and low flow rates;
- change in groundwater flows measured by changes in potentiometric head in shallow hydrostratigraphic units, groundwater flow patterns and rates;
- changes to water quality resulting from:
• Project activities related to the transportation, manufacture, storage, and use of explosives;

• Project activities related to the operation of quarries and borrow pits;

• water that contacts mine surfaces and operations, including runoff from waste rock storage areas, ore storage areas, and underground water;

• activities that may require the water withdrawal from watercourses; and

• Project activities related to the storage of fuels, fueling and maintenance operations, and the combustion of waste;

• changes to the impervious area resulting in increased runoff coefficients on roads and site facilities, which may result in increased flow rates and increased erosion potential.

• changes to the freshwater receiving environment due to the deposition of dust generated by Project activities, such as vehicle traffic, mining operations, and milling; and

• changes to drainage patterns resulting from Project excavation, stockpiling, temporary resurfacing, and installation of culverts;

4.8.4 Mitigation Measures

The Application will identify measures to avoid, manage or otherwise mitigate potential adverse effects to the VC in a manner consistent with Section 3.5 Mitigation Measures of this AIR. Relevant management plans will be referenced. Linkages to other sections in the Application must be identified.

IDM will evaluate the environmental design and mitigation measures that can be incorporated into the Project to mitigate adverse effects. The Application management plans will address the ability of the current system to accommodate changes to flow regimes and runoff resulting from the Project and, where necessary, document the need for upgrades. Uncertainty associated with the effectiveness of the proposed measures will be noted.

4.8.5 Residual Effects and their Significance

Where an adverse residual effect is identified, the Application will characterize the residual effect based on the context, magnitude, extent, duration, reversibility, and frequency as described in Section 3.6 Characterization of Residual Effects of this AIR.

Where an adverse residual effect is identified, the Application will also describe the likelihood, Proponent’s significance determination and predictive confidence, in accordance with Sections 3.7 Likelihood, 3.8 Proponent’s Determination of Significance and 3.9 Confidence and Risk of this AIR.

The Application will also include a discussion of how uncertainty has been addressed (in accordance with Section 3.9) and provide a qualitative evaluation of the resulting level of confidence in the residual effects analyses for each measurement indicator and assessment
The assessment will present changes in measurement indicators and potential effects of the Project on Surface Water Quality during the construction, operations, and closure stages of the Project. The assessment will include consideration of:

- geochemical release of metals, major ions, and nutrients from waste rock storage areas, stockpiles and tailings;
- predicted surface water quality for water management facilities and any discharge to receiving streams;
- predicted groundwater seepage predicted to report to local surface waters;
- changes to the flow regime of Goldslide Creek, Otter Creek, and Bitter Creek; and
- surface runoff from areas disturbed by mining.

Surface Water Quality will be assessed at a number of assessment nodes in the RSA and LSA under low flow, mean flow and high flow conditions. Assessment nodes will include locations in potentially affected watercourses.

Surface water quality concentrations will be presented in comparison to reference concentrations, baseline concentrations, and relevant criteria including compliance limits and site performance objectives, guidelines and/or standards for the protection of aquatic, human and terrestrial wildlife health, recreational and aesthetic uses. Thus, the constituents that have the potential to be released by the Project will be identified.

Results will be incorporated into the assessments for Fish, Fish Habitat, Wildlife, and Human Health. Constituents above relevant recreational or aesthetic use guidelines will be forwarded to CRA Fisheries and Recreational Values assessments. Contaminants of potential concern forwarded for further assessment will be clearly identified.

**Water and Load Balance Report**

The Application will include a Water and Load Balance Report that summarizes how the water quality predictions are developed and incorporated into the Surface Water Quality assessment. These predictions will also be used in assessments conducted for the Wildlife, Fish, and Human Health VCs. A monthly water and load balance will be modelled to predict water quality at a number of nodes in the receiving environment, and that the model will extend throughout the mine life. Key inputs to the water and load balance will include:

- surface water hydrology;
- groundwater flow estimates;
- water quality estimates or source terms for the underground mine;
- waste rock and ore stockpiles;
- tailings storage facility; and
- tailings process water and undisturbed areas of the catchments.
The Water and Load Balance Report will be calibrated to the baseline hydrology data, and the calibration/validation information will be provided with the Application. The model will also incorporate hydrologic variability, including consideration of wet, average, and dry conditions.

The source term estimates will be developed based on a combination of data from the geochemical characterization program, data from the existing waste rock pile and field crib tests, and data from other geochemically analogous sites. The following results will be presented to support the analysis of potential effects:

- the predicted concentration of water quality constituents, with and without mitigations;
- temporal snapshots and assessment nodes where changes in water quality is attributed to the Project; and
- time and location where the maximum concentrations of constituents are predicted to occur.

Environmental design features and mitigation measures will be considered. The Application will describe further mitigation, if required, in relevant management plans (e.g. ML/ARD Management Plan), based on the results of the residual effects characterization.

### 4.8.6 Cumulative Effects and their Significance

If a residual effect is identified, unless stated otherwise by EAO, the Application will:

- Determine whether any cumulative interactions between residual effects of the proposed Project and the potential residual effects of other developments, based on the preliminary list of past, present, and reasonably foreseeable developments provided in the AIR, are likely to occur, consistent with Section 3.10.1 Identifying Past, Present or Reasonably Foreseeable Projects and/or Activities of this AIR;

- Conduct a cumulative effects assessment consistent with Section 3.10.2 Conducting a Cumulative Effects Assessment of this AIR;

- Identify any additional mitigation measures, consistent with Section 3.5 Mitigation Measures of this AIR; and

- Where an adverse residual cumulative effect is identified, the Application will also describe the likelihood, Proponent’s significance determination and predictive confidence, in accordance with Sections 3.7 Likelihood, 3.8 Proponent’s Determination of Significance and 3.9 Confidence and Risk of this AIR.

### 4.8.7 Follow-up Strategy

Where a residual effect and/or cumulative effect have been identified, the Application will include a description of a follow-up strategy that is consistent with Section 3.11 Follow-up Strategy of this AIR.
The Application will provide the conceptual outline for any monitoring and follow-up programs recommended to confirm the predictions made for Surface Water Quality. Monitoring program objectives will include assessment of the effectiveness of planned mitigation during the operational and closure stages of the proposed Project and will be integrated with existing or planned monitoring programs. Reference to regional management plans (e.g., Aquatic Effects Monitoring Program) and how these plans will influence the development of site-specific management plans, will be made.

4.8.8 Conclusion

The Application will provide a consolidated summary of the predicted residual effects for Surface Water Quality. The Application will also indicate the VCs to which the results of this assessment have been forwarded for incorporation in their assessments.

4.9 Vegetation and Ecosystems

A concise introduction of Vegetation and Ecosystems will be provided, including the purpose of the assessment, the structure of the assessment and linkages to other disciplines. The regulatory framework section will outline the applicable legislation, guidelines and best practices within BC and Canada relevant to the Project and to the VC.

Input from Consultation

The Application will describe the influence of consultation on issues scoping and how the input from consultation will be incorporated into the Vegetation and Ecosystems assessment.

Information Sources

The Application will describe the influence of consultation on issues scoping and how the input from consultation has been incorporated into the assessment.

Valued Components, Intermediate Components, and Measurement Indicators

The Application will identify that Vegetation and Ecosystems and its subcomponents are VCs that may be affected by the Project. The Application will describe the measurement indicators, ICs, and assessment endpoints that will be used to comprehensively evaluate the potential changes that may result from the Project (Table 26).
### Table 26: Valued Components, Intermediate Components, and Measurement Indicators for the Vegetation and Ecosystems Assessment

<table>
<thead>
<tr>
<th>VC</th>
<th>Pathways</th>
<th>Primary Measurement Indicators</th>
<th>Assessment Endpoint</th>
</tr>
</thead>
<tbody>
<tr>
<td>BC CDC Listed Ecosystems</td>
<td>The following pathways will inform the assessment of potential Project impacts to Vegetation and Ecosystems:</td>
<td>• Ecosystem Abundance (due to loss or alteration)</td>
<td>Maintenance of self-sustaining populations.</td>
</tr>
<tr>
<td>Old Growth and Mature Forested Ecosystems</td>
<td>• Air Quality</td>
<td>• Ecosystem Distribution (loss or alteration to ecosystem distribution and connectivity)</td>
<td></td>
</tr>
<tr>
<td>Floodplain and Wetland Ecosystems (including Cottonwood Forest)</td>
<td>• Landforms and Natural Landscapes</td>
<td>• Ecosystem Function (loss or alteration to the ecosystem’s ability to provide functions such as habitat, biodiversity, nutrient cycling, and soil retention)</td>
<td></td>
</tr>
<tr>
<td>Alpine and Parkland Ecosystems</td>
<td>• Surface Water Quality</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ecologically Viable Soil</td>
<td>• Groundwater Quality</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Hydrology</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rare Plants, Lichens, and Associated Habitat</td>
<td>• Ecosystem Abundance (due to loss or alteration)</td>
<td>• Loss or alteration to known occurrences of rare lichens and plants.</td>
<td></td>
</tr>
</tbody>
</table>

**Rationale for Selection**

Vegetation and ecosystems are important to provincial and federal regulators and are protected under the *Species at Risk Act*, the *Wildlife Act*, and the *Forest and Range Practices Act*. They represent a rare, threatened, or at risk component of regional and/or provincial biodiversity. Preserving biodiversity is a common goal of many government and non-governmental organizations in BC (Biodiversity BC 2008).

**BC CDC Listed Ecosystems:** These have been identified as important due to threats to viability. Best management practices and guidelines for land developments recommend that red and blue-listed ecosystems be protected (BC MOE 2006).

**Old Growth and Mature Forested Ecosystems:** Important because information on Old Growth Forests supports the assessment of potential effects on Mountain Goats. These ecosystems provide habitat for plant and animal species valued by Aboriginal Groups. Forested ecosystems provide biological processes necessary for efficient nutrient cycling, including nutrient cycling and carbon storage, as well as contributing to soil building processes. These ecosystems are protected by the *Wildlife Act* and the *Forest and Range Practices Act*. Information on Old Growth Forests supports the assessment of potential effects on Mountain Goats. They are:

- identified as an important management consideration in the Land and Resource Management Plan (LRMP) and Sustainable Resource Management Plan (SRMP);
• important for multiple COSEWIC-assessed and SARA-listed species, including Northern Goshawk, Marbled Murrelet, Western Screech Owl, and Grizzly Bear.

• contribute to soil building processes through the contribution of root exudates, root penetration, and litter decomposition;

• provide biological processes, which are critical for efficient nutrient cycling, including productivity and carbon storage; and

• habitat for several plant species valued by Aboriginal Groups.

Floodplain and Wetland Ecosystems (including Cottonwood Forest): Floodplain and Wetland ecosystems influence the productivity and quality of aquatic ecosystems. They are important for fish and wildlife habitat, and provide habitat for several plant species valued by Aboriginal Groups. The geographic areas of wetlands designated as ecologically and/or socio-economically important in the Federal Policy on Wetland Conservation, will be identified, as applicable. Habitat information on Cottonwoods supports the assessment of potential effects to Western Screech Owl and Western Toad and:

• influence the productivity and quality of aquatic ecosystems;
• are increasingly recognized important socio-cultural value;
• important for fish and wildlife habitat;
• sensitive to changes in environment (e.g., hydrology); and
• habitat for several plant species valued by Aboriginal Groups.

Alpine and Parkland Ecosystems: are important to NLG and regional stakeholders for travel, recreation, and hunting areas. Alpine and parkland ecosystems provide habitat for rare plant species, and represent important habitat for highly-valued wildlife species including migratory birds, species at risk, Mountain Goats and Grizzly Bears. They are:

• likely used by other Aboriginal Groups for travel routes and hunting areas;

• sensitive to disturbance due to slow rate of vegetation growth and sensitivity of soils to acidification;

• provide habitat for plants and lichens of cultural importance;

• habitat for rare plant and lichen species; and

• represent important habitat for highly valued wildlife species, including Mountain Goats and Grizzly Bears; and

• discussed as an important management consideration in the LRMP.

Ecologically Viable Soil: is necessary to maintain ecological functions of the ecosystem and has direct influence on ecological development, and wildlife habitat. Understanding the characteristics of the available soil resource is critical to the development of an effective reclamation plan.
4.9.1 Context and Boundaries

The Application will identify the spatial, temporal, administrative and technical study area boundaries, as applicable of the VC, including maps, in a manner consistent with Section 3.2 Assessment Boundaries of the AIR.

Table 27 and Figure 8 introduce the proposed spatial boundaries to be used in the Application.

**Table 27: Spatial and Temporal Boundaries for Vegetation and Ecosystems**

<table>
<thead>
<tr>
<th>Pillar</th>
<th>VC</th>
<th>Temporal Boundary</th>
<th>Spatial Boundary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental</td>
<td>• Listed Ecosystems</td>
<td>Life of Project</td>
<td>LSA: Bitter Creek Watershed</td>
</tr>
<tr>
<td></td>
<td>• Old Growth and Mature Forested Ecosystems</td>
<td></td>
<td>RSA: Bear River watershed, including adjacent subwatersheds, the terrain between Stewart, and the proposed Project location.</td>
</tr>
<tr>
<td></td>
<td>• Floodplain and wetland ecosystems (including cottonwood forest)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Alpine and parkland ecosystems</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Ecologically viable soil</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Rare Plants, lichens and associated habitat</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Figure 8: Wildlife, Vegetation, and Ecosystems Local and Regional Study Areas
4.9.2 Existing Conditions

The Application will summarize existing conditions in a manner consistent with Section 3.3 Existing Conditions of this AIR.

The Application will describe existing regional and local vegetation and ecosystem conditions, and will include data collection methods, sampling time frames, and summaries of results.

Terrestrial ecosystem baseline studies to support the Application were undertaken in 2014. The objective was to characterize the ecosystems and vegetation that could potentially be affected directly or indirectly by the Project. Terrestrial Ecosystem Mapping (TEM) was undertaken using RISC standards, at appropriate scales, to characterize ecosystems within the LSA. The mapping information is an integral component of the baseline program and provides useful information for resource management and project planning. The information collected during the baseline program will be used to carry out the effects assessments, develop management and mitigation plans, and guide the reclamation and closure plan.

Additional information has been collected during the 2016 field baseline program, and has addressed data gaps in the TEM, regional vegetation and ecosystems mapping, targeted rare plant surveys, and collection of plant tissues for baseline metals determination. Predictive Ecosystem Mapping (PEM) will be carried out in the RSA.

Vegetation tissue quality will be determined based on laboratory results of metals analysis in vegetation collected during baseline. This information will be used to inform risk assessments on wildlife and human health. An analysis of vegetation tissue quality will be assessed in relation to potential Project related changes to ecosystem function, including an evaluation of residual effects (if merited) and determination of significance.

The proposed mine site is situated above the treeline, and contains alpine ecosystems as well as an abundance of sparse terrain. In undisturbed areas, soils derived from weathered bedrock and skeletal glacial till support alpine ecosystems, mostly Alpine Tundra Class and Alpine Heath Class. Ecosystems on colluvial slopes and other dry sites are limited to Alpine Fellfield Class and Alpine Nivation Class ecosystems. Some Subalpine Shrub group ecosystems are also present.

The proposed access road follows old valley bottom forests dominated by Sitka spruce and western hemlock, with black cottonwood and Sitka spruce dominating stable wetter sites with an abundance of woody berry-producing shrubs in the understory. There are currently a number of early seral ecosystems present as well, due to frequent flooding and landslide events. These tend to be occupied by pioneering species of alder and willow. Upslope ecosystems are developing on podzolic and brunisolic soils weathering from glacial till blankets and veneers over bedrock. As the road progresses up the valley, it enters recently glaciated terrain and traverses site series of the coastal alpine, or CMAun. These ecosystems develop in very wet and very cold conditions, and experience snowpack from the middle of the fall season into early summer. This is reflected in the open understory and the prevalence of herb meadow ecosystems in sites fed by almost continuous snowmelt throughout the growing season.

The Application will describe available traditional ecological or local knowledge related to current vegetation and ecosystem conditions. The Application will refer to any relevant
documents produced for publicly available studies for other projects in northwest BC to support the baseline estimates applied.

The Application will provide a description of the Regulatory and Policy Framework surrounding the management of vegetation and ecosystems, referencing relevant legislation, and a list of applicable provincial and regional best management practices and guidance documents to be implemented, which include:

- Mines Act
- Forest and Range Practices Act
- Species at Risk Act
- BC Conservation Data Centre
- Canadian Biodiversity Strategy
- BC Weed Control Act
- BC Wildlife Act
- Environmental Management Act
- The Fisheries Act
- The Fish Protection Act and associated amendments to the provincial Water Act
- North West Invasive Plant Council

The British Columbia Ministry of Energy and Mines (MEM) requires that TEM of a proposed mine site be completed for all mining permit applications. An LSA encompassing the Project can be defined by natural features (i.e., watershed boundaries) or by buffers surrounding the proposed infrastructure. To enable the assessments of effects within a RSA or to enable ecosystem distribution comparisons over large areas, Predictive Ecosystem Mapping is typically conducted within an RSA. The RSA boundary contains the LSA and may be delineated by natural boundaries, such as river drainage basins or other landscape features, or by other criteria such as habitat required or used by key wildlife species. MEM requires characterization of baseline metal concentrations in plant tissues. This information is used to assess changes over time and to guide reclamation planning.

4.9.3 Potential Effects

The Application will identify potential adverse effects to the VC in a manner consistent with Section 3.4 Potential Effects of this AIR.

The Application will summarize the anticipated interactions between the proposed Project and the VC being assessed within the LSA. Key mitigations to be employed to minimize residual adverse effects will be identified. IDM anticipates that the following proposed Project components or activities will interact with Vegetation and Ecosystems in the Project area:

- loss of vegetation and special landscape features resulting from Project activities that include the clearing of overburden, earthworks, and construction activities for roads, pads and other infrastructure; and

- degradation of vegetation resulting from fugitive dust, reduced water quality, soil acidification, eutrophication or fumigation from air emissions from Project activities, such as vehicles and mineral processing.
These identified interactions will have the potential to result in changes to the measurement indicators identified for the Vegetation and Ecosystems assessment. The expected strength of the Project-related interactions will be determined based on available literature, baseline data, and professional experience. The status and sensitivity of the VCs to Project related effects will be considered in the evaluation of effects.

4.9.4 Mitigation Measures

The Application will identify measures to avoid, manage or otherwise mitigate potential adverse effects to the VC in a manner consistent with Section 3.5 Mitigation Measures of this AIR. Relevant management plans will be referenced. Linkages to other sections in the Application must be identified.

The Application will evaluate the environmental design and mitigation measures that can be incorporated into the Project to mitigate adverse effects. A broad range of potential mitigations for Vegetation and Ecosystem VCs will be considered, including experience from previous mining projects and environmental assessments. Uncertainty associated with the effectiveness of the proposed measures will be noted.

4.9.5 Residual Effects and their Significance

Where an adverse residual effect is identified, the Application will characterize the residual effect based on the context, magnitude, extent, duration, reversibility, and frequency as described in Section 3.6 Characterization of Residual Effects of this AIR.

The Application will present the results of the assessment of potential effects of the Project on Vegetation and Ecosystem VCs.

Where an adverse residual effect is identified, the Application will also describe the likelihood, Proponent’s significance determination and predictive confidence, in accordance with Sections 3.7 Likelihood, 3.8 Proponent’s Determination of Significance and 3.9 Confidence and Risk of this AIR.

The assessment will also include a discussion of how uncertainty has been addressed (in accordance with Section 3.9) and provide a qualitative evaluation of the resulting level of confidence. Where relevant, uncertainty associated with the effectiveness of the proposed measures will be noted.

The assessment will include quantitative analyses of predicted changes (e.g., predicted changes in the number, proportion, or areal extent of Vegetation and Ecosystem VCs) in the habitat availability, habitat distribution, plant abundance, and plant occurrence (rare plants) of Vegetation and Ecosystem VCs from pre-Project through all stages of the Project. Qualitative analyses may be conducted in some cases where a quantitative approach is not considered appropriate. The importance of changes in measurement indicators with respect to the assessment endpoint will be described within context of the known or inferred ability of each Vegetation and Ecosystem VC to accommodate disturbance. The ability of a VC to accommodate disturbance will be evaluated using the concepts of ecological adaptability and resilience.
The context, direction, magnitude, geographic (spatial) extent, duration, timing, reversibility, and likelihood of the predicted changes to the primary measurement indicators and the subsequent effects on VC assessment endpoints will be described as outlined in Section 3.6.

4.9.6 **Cumulative Effects and their Significance**

If a residual effect is identified, unless stated otherwise by EAO, the Application will:

- Determine whether any cumulative interactions between residual effects of the proposed Project and the potential residual effects of other developments, based on the preliminary list of past, present, and reasonably foreseeable developments provided in the AIR, are likely to occur, consistent with Section 3.10.1 Identifying Past, Present or Reasonably Foreseeable Projects and/or Activities of this AIR;

- Conduct a cumulative effects assessment consistent with Section 3.10.2 Conducting a Cumulative Effects Assessment of this AIR;

- Identify any additional mitigation measures, consistent with Section 3.5 Mitigation Measures of this AIR; and

- Where an adverse residual cumulative effect is identified, the Application will also describe the likelihood, Proponent’s significance determination and predictive confidence, in accordance with Sections 3.7 Likelihood, 3.8 Proponent’s Determination of Significance and 3.9 Confidence and Risk of this AIR.

4.9.7 **Follow-up Strategy**

Where a residual effect and/or cumulative effect have been identified, the Application will include a description of a follow-up strategy that is consistent with Section 3.11 Follow-up Strategy of this AIR.

The Application will provide the conceptual outline for any monitoring and follow-up programs recommended to confirm the predictions made for Vegetation and Ecosystem VCs and to track changes over the life of the Project and after and closure. Reference to management plans being developed or implemented by IDM and/or by the province, where applicable, will be outlined.

4.9.8 **Conclusion**

The Application will provide a consolidated summary of the predicted residual effects and determination of significance for Vegetation and Ecosystem VCs. The Application will also indicate the VCs to which the results of this assessment have been forwarded for incorporation in their assessments.
4.10 Wildlife

A concise introduction of the wildlife assessment will be provided, including the purpose of the assessment, the structure of the assessment, and linkages to other disciplines (e.g., vegetation, wetlands, water quality, and others).

Input from Consultation

The Application will describe the influence of consultation on issues scoping and how the input from consultation will be incorporated into the wildlife assessment.

Information Sources

The Application will provide the information sources used in the assessment.

Valued Components, Intermediate Components, and Measurement Indicators

The Application will present the measurement indicators, assessment endpoints, and VCs to be used in the assessment of Project-related effects on Wildlife (Table 28). The rationale for selection of VCs and selection of indicators will be presented in the Application. Considerations for VC selection include:

- species presence in the Project area;
- potential interaction with the Project and potential for adverse Project effects;
- regulatory requirements (e.g. species at risk);
- Aboriginal interests and Treaty rights;
- local or community concerns; and
- scientific knowledge.

Species at risk are of particular importance. Where they have been identified as VCs or focal species, potential and residual effects will be assessed for each species separately. An assessment will be conducted for federal and provincially-listed species known or expected to occur within the RSA, with a potential to interact with the project. A clear justification will be provided if a species at risk is not identified, surveyed, or assessed as part of the Application.

In addition, several species groups, including migratory birds, non-migratory birds, furbearers, and bats will be addressed. In these cases, potential effects will be assessed at the species level but residual effects will be assessed at the group level. Species contributing to these groups are often also species at risk but have been chosen with the following criteria: the species are known to or have potential to occur within the Project area; there is potential for interaction between the species and the Project that may have adverse effects on the species; and the species represent a broad range of habitat types that may be used by most species within that group and available within the Project area. For amphibians, the only group to meet the above criteria was Western Toad.

Measurement indicators are used to focus the assessment on metrics that are likely to respond as a result of adverse effects of the Project on the VC.
The assessment endpoint for all wildlife VCs is the maintenance of self-sustaining populations relative to the existing baseline. Significance thresholds for the interpretation of measurement indicators will be provided in the Application. Significance thresholds will include both quantitative and qualitative values. The significance of Project effects on measurement indicators will be interpreted using standard residual effects assessment criteria, i.e., the context, magnitude, extent, duration, reversibility, and frequency. If there are no significant Project effects to wildlife measurement indicators (i.e. habitat availability, habitat distribution, and mortality risk), the effects assessment supports that self-sustaining populations are capable of being maintained.

Measurement indicators will be specific for each species under these three categories:

- **Habitat Availability**: changes to the amount or quality of habitat available; habitat availability could change as a result of habitat loss, habitat alteration, or sensory disturbance;

- **Habitat Distribution**: changes to the distribution of habitat as a result of Project activities that could disrupt wildlife movements and habitat connectivity, making otherwise suitable habitats unavailable or unusable; and

- **Mortality Risk**: changes to animal mortality through direct and indirect effects, including: collisions with transmission lines, buildings, or vehicles, disruption or removal of nests, exposure to contaminants, human-wildlife conflicts resulting from attractants, increased access and accessibility, and increased predation.

Standard methodologies from scientific literature and provincial and federal guidance and inventory documents will be used to measure indicators for each focal species within VCs. Proposed methodologies for measurement indicators within each VC are as follows; more details will be provided in the Application.

Effects assessments will be completed for each focal species. Baseline inventory will be completed on each focal species to facilitate assessment of potential effects of the proposed Project on wildlife VCs. Baseline studies are designed to provide information necessary to assess adverse effects on focal species as a result of interaction with the Project. The objectives of baseline studies are as follows.

1. Assess the amount and distribution of habitat within the RSA for each wildlife focal species.

2. Assess the current distribution of each wildlife focal species within the LSA.

3. Identify wildlife features (e.g. mineral licks, stick nests, and movement corridors) within the LSA.

Mountain Goat, Grizzly Bear, Moose, Marten, Wolverine, and Hoary Marmot wildlife habitat ratings, including field verification, will be completed according to RISC standard (1999a) and will be based on terrestrial ecosystem mapping completed for the Project. Life requisites will be modelled for each species and will be selected based on considering the following: limiting habitat requirements, potential interaction with the Project, and potential for adverse effects.
resulting from the Project. Impacts will be discussed based on life stages, such as growing and winter season use, for specific species.

Habitat modelling for wolverine will be consistent with fundamentals in Lofroth and Krebs (2007). Generally, species specific modelling will be completed at reconnaissance level (RISC 1998) to identify Mountain Goat, Grizzly Bear, Moose, and Hoary Marmot habitat use and potential Project interactions. Bat detectors will be used with placement based on a field surveys to identify high probability areas such as forest stands with large snags or cliff areas. The acoustic detectors will be used to identify species occurrence and habitat usage. The inventory will be consistent with Best Management Practices for Bats In BC (Holroyd et al. 2016).

Focal bird species for the VCs Migratory Breeding Birds, Raptors, and Non-migratory Game Birds were selected using two criteria: i) species at risk that have potential interactions with the Project or ii) species that represent each broad habitat type that has potential interactions with the Project: alpine, old/mature forest, riparian, shrub/early successional.

Habitat ratings will be completed for focal species: Common Nighthawk, Black Swift, Olive-sided Flycatcher, MacGillvray’s Warbler, Northern Goshawk (including Queen Charlotte laingi subspecies), Western Screech Owl (including the kenneicottii subspecies), White-tailed Ptarmigan, and Sooty Grouse. Field surveys will be completed using points counts for songbirds and call playback for raptors consistent with RISC standards (1999b, 2001). Field data will be used to develop habitat models and for reconnaissance level inventory of species at risk that have low potential for interaction with the Project: Band-tailed Pigeon, Rusty Blackbird, Horned Grebe, Western Grebe, and Red-necked Phalarope. Field surveys will provide a reconnaissance level inventory for all other songbird and raptor species that potentially occur in the RSA. Species at risk and vegetation surveys will be spatially integrated, so that habitat functioning for specific species can be evaluated on a habitat (vegetation community) basis. The assessment will include and evaluate species at risk seasonal use (breeding, migration, and overwintering) of the Project area.

Potential suitable nesting habitat for Marbled Murrelet (MAMU) will be identified following Burger et al. (2009) using air photo interpretation and ortho imagery, combined with the current critical habitat model for marbled murrelet (Environment and Climate Change Canada 2016). The effects assessment for this species will be conducted in accordance with the EA Standard Guidance for the Marbled Murrelet Recovery Strategy. Direct habitat assessments will be completed in the LSA, and habitat modelling will encompass both the RSA and LSA. If suitable nesting habitat for MAMU is identified within the LSA, then species specific surveys will be conducted following “Guidance and Tools to Support the Identification of Potential Marbled Murrelet Suitable Nesting Habitat”.

The Application will include a determination as to whether impacts to suitable nesting habitat (SNH) will compromise the minimum nesting critical habitat retention level (including any conservation areas identified by the province, such as Wildlife Habitat Areas (WHAs)) for the conservation region where the project occurs.

Field surveys for amphibians will follow RISC standards (RISC 1998), including identification of suitable habitat and time constrained searches conducted in suitable breeding habitats.
Table 28: Valued Components, Intermediate Components, and Measurement Indicators for Wildlife

<table>
<thead>
<tr>
<th>VC*</th>
<th>Pathways</th>
<th>Primary Measurement Indicators</th>
<th>Assessment Endpoint</th>
<th>Rationale for Selection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mammals</td>
<td>The following pathway components will inform the assessment of potential Project impacts to Wildlife (Mammals):</td>
<td>For each species, the following measurement indicators will be used to assess potential direct and indirect effects of the Project on each VC:</td>
<td>Maintenance of ecological conditions that support self-sustaining wildlife populations.</td>
<td>VCs were selected due to their importance contributing to biodiversity, their status as listed species, and their value as a resource to the public and NLG.</td>
</tr>
<tr>
<td>Mountain Goat</td>
<td>• Air quality</td>
<td>• Habitat availability (changes to the amount or quality of habitat)</td>
<td></td>
<td>Mammals are of importance to NLG due to Nisga’a Nation’s Treaty rights to hunt and trap in the Nass Wildlife Area.</td>
</tr>
<tr>
<td>Grizzly Bear</td>
<td>• Noise</td>
<td>• Habitat distribution (changes to habitat distribution and effects to habitat connectivity)</td>
<td></td>
<td>Mountain Goats are of importance to NLG due to Nisga’a Nation’s Treaty rights to hunt in the Nass Wildlife Area and are a blue-listed species in BC.</td>
</tr>
<tr>
<td>Moose</td>
<td>• Terrain stability and Geohazards</td>
<td>• Mortality risk (changes to animal mortality through direct and indirect effects)</td>
<td></td>
<td>Grizzly Bears are of importance to NLG due to Nisga’a Nation’s Treaty rights to hunt in the Nass Wildlife Area, are a blue-listed species in BC, and are listed as Special Concern federally under the Species at Risk Act (SARA).</td>
</tr>
<tr>
<td>Furbearers including Marten, Wolverine</td>
<td>• Hydrology</td>
<td></td>
<td></td>
<td>Moose are of importance to NLG due to Nisga’a Nation’s Treaty rights to hunt in the Nass Wildlife Area.</td>
</tr>
<tr>
<td>Hoary Marmot</td>
<td>• Surface Water Quality</td>
<td></td>
<td></td>
<td>Furbearers are of importance to NLG due to Nisga’a Nation’s Treaty rights to trap in the Nass Wildlife Area.</td>
</tr>
<tr>
<td>Bats including Little Brown Myotis, Northern Myotis, and Keen’s Myotis</td>
<td>• Fish (applies to Grizzly Bear only)</td>
<td></td>
<td></td>
<td>NLG have identified Hoary Marmots as a VC due to their importance as a food source to Grizzly Bears. Wolverine are blue-listed in BC and a species of Special Concern federally under the Species at Risk Act. Marten are a species representing furbearer habitat requirements that potential interact with the Project.</td>
</tr>
<tr>
<td></td>
<td>• Project-related Traffic</td>
<td></td>
<td></td>
<td>Moose are of importance to NLG due to Nisga’a Nation’s Treaty rights to hunt and trap in the Nass Wildlife Area.</td>
</tr>
<tr>
<td></td>
<td>• Vegetation and Ecosystems</td>
<td></td>
<td></td>
<td>Little Brown Myotis and Northern Myotis will be addressed in the Bats VC. Both species are listed as Endangered under SARA and Northern Myotis is a blue-listed species in BC. Keen’s Myotis is blue-listed in BC and its SARA status is “data deficient”. This species will also be addressed within the Bats VC.</td>
</tr>
<tr>
<td>VC*</td>
<td>Pathways</td>
<td>Primary Measurement Indicators</td>
<td>Assessment Endpoint</td>
<td>Rationale for Selection</td>
</tr>
<tr>
<td>-----</td>
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<td>------------------------</td>
</tr>
<tr>
<td>Birds:</td>
<td>Air quality</td>
<td>For each species, the following measurement indicators will be used to assess potential direct and indirect effects of the Project on each VC:</td>
<td>Maintenance of ecological conditions that support self-sustaining wildlife populations.</td>
<td>These VCs were selected due to their importance contributing to biodiversity, their status as listed species, and their value as a resource to the public and NLG. Focal bird species for VCs were selected using two criteria: i) species at risk that have potential interactions with the Project or ii) species that represent each broad habitat type that have potential for interactions with the Project: alpine, old/mature forest, riparian, shrub/early successional.</td>
</tr>
<tr>
<td>Migratory Breeding Birds including Black Swift, Common Nighthawk, Marbled Murrelet, Olive-sided Flycatcher, and MacGillivray’s Warbler</td>
<td>Noise</td>
<td>- Habitat availability (changes to the amount or quality of habitat)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Terrain stability and geohazards</td>
<td>- Habitat distribution (changes to habitat distribution and effects to habitat connectivity)</td>
<td></td>
<td></td>
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<td></td>
<td>Hydrology</td>
<td>- Mortality risk (changes to animal mortality through direct and indirect effects)</td>
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<td>Surface Water Quality</td>
<td>- Project-related Traffic</td>
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<td>Sediment Quality</td>
<td>- Vegetation and Ecosystems</td>
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<td></td>
<td>Fish</td>
<td>- Air quality</td>
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<td>Project-related Traffic</td>
<td>- Noise</td>
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<td>- Terrain stability and geohazards</td>
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<tr>
<td>Raptors including Northern Goshawk and Western Screech Owl</td>
<td>- Air quality</td>
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<tr>
<td>Non-migratory Game Birds including Ptarmigan and Sooty Grouse (Blue Grouse)</td>
<td>- Noise</td>
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<td>- Vegetation and Ecosystems</td>
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<td>- Fish</td>
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<td>- Project-related Traffic</td>
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<tr>
<td>VC*</td>
<td>Pathways</td>
<td>Primary Measurement Indicators</td>
<td>Assessment Endpoint</td>
<td>Rationale for Selection</td>
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<td>-------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
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</tr>
</tbody>
</table>
| Amphibians: Western Toad | • Air quality  
  • Noise  
  • Terrain stability and geohazards  
  • Vegetation and Ecosystems (VC Group)  
  • Hydrology  
  • Groundwater Quality  
  • Surface Water Quality  
  • Sediment Quality  
  • Project-related Traffic | • Habitat availability (changes to the amount or quality of habitat)  
  • Habitat distribution (changes to habitat distribution and effects to habitat connectivity)  
  • Mortality risk (changes to animal mortality through direct and indirect effects) | Maintenance of ecological conditions that support self-sustaining wildlife populations. | • Western Toad was selected due to its importance in contributing to biodiversity, status as listed species, and value as a resource to the public.  
  • Western Toad is Special Concern under SARA and is blue-listed in BC. |

* The categories: mammals, birds, amphibians, are provided only for presentation purposes and are not stand-alone VCs.
4.10.1 Context and Boundaries

The Application will identify the spatial, temporal, administrative and technical study area boundaries, as applicable of the VC, including maps, in a manner consistent with Section 3.2 Assessment Boundaries of the AIR.

Table 29 and Error! Reference source not found. introduce the proposed spatial boundaries to be used in the Application.

Table 29: Spatial and Temporal Boundaries for Wildlife

<table>
<thead>
<tr>
<th>Pillar</th>
<th>VC</th>
<th>Temporal Boundary</th>
<th>Spatial Boundary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental</td>
<td>Wildlife VCs</td>
<td>Life of Project</td>
<td>LSA: Bitter Creek Watershed</td>
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<td></td>
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<td></td>
<td>RSA: Bear River watershed with inclusion of adjacent sub-watersheds that were interpreted as regionally important habitat for wide-ranging species. The objective was to identify a contiguous area that included habitat used by all focal group species that may interact with the Project.</td>
</tr>
</tbody>
</table>

4.10.2 Existing Conditions

The Application will summarize existing conditions in a manner consistent with Section 3.3 Existing Conditions of this AIR.

The Application will describe current wildlife and wildlife habitat conditions within the Project assessment boundaries. Methods will be detailed for characterizing existing conditions for Wildlife VCs and related indicators, including a summary of how baseline data, maps, and models were collected and/or generated. In addition, the methods section will identify the QA/QC and data management tools used for baseline data collection and compilation. The following information will be used to characterize wildlife and wildlife habitat baseline conditions:

- summary of available existing wildlife and wildlife habitat inventory and habitat use data for the RSA and LSA;
- results from wildlife baseline inventories completed for the Project in the RSA and LSA including but not limited to:
  - Wildlife habitat ratings;
  - Wildlife, bird and amphibian surveys; and
  - Incidental observations of wildlife and wildlife sign.
- results from Project wildlife habitat mapping for the RSA and LSA for select wildlife species using applicable RISC standards and best practices where standards are not available;
other data sources including but not limited to, element occurrences from the BC Conservation Data Centre, the BC Wildlife Species Inventory database, and other publically available databases; and

where available, traditional ecological knowledge or local knowledge related to wildlife and wildlife habitat.

The Application will include a description of relevant legislation and list applicable provincial and regional best management practices and guidance documents. Wildlife VCs will be assessed using guidance from, but not limited to, the following documents and legislation:

- **BC Environmental Management Act** (British Columbia 2003);
- **BC Forest and Range Practices Act** (British Columbia 2002);
- **BC Mines Act** (British Columbia 1996a);
- **BC Wildlife Act** (British Columbia 1996b);
- Canadian Biodiversity Strategy (Environment Canada 1995);
- Federal Policy on Wetland Conservation (Government of Canada 1991);
- *Migratory Birds Convention Act* (Government of Canada 1994); and
- **Species at Risk Act** (Government of Canada 2002).

Best management practices and guidelines relevant to the Project include, but are not limited to:

- **Best Management Practices for Amphibians and Reptiles in Urban and Rural Environments in British Columbia** (BC MWLAP 2004a);
- **British Columbia Environmental Assessment Guidelines for Grizzly Bears and Black Bears** (MacHutchon 2001);
- **British Columbia Wildlife Habitat Rating Standards** (RISC 1999);
- **Develop with Care: Environmental Guidelines for Urban and Rural Land Development in British Columbia** (BC MOE 2006b);
- **Environmental Best Management Practices for Urban and Rural Land Development: Special Wildlife and Species at Risk** (BC MOE 2004);
- **Environmental Mitigation Policy for British Columbia** (BC MOE 2014);
- **Guidelines for Raptor Conservation during Urban and Rural Land Development in British Columbia** (BC MOE 2013);
- **Migratory Birds Environmental Assessment Guideline** (Milko 1998a);
- **Standards and Best Practices for Instream Works** (BC MWLAP 2004b);
- **Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006** (APLIC 2006);
4.10.3 Potential Effects

The Application will identify potential adverse effects to the VC in a manner consistent with Section 3.4 Potential Effects of this AIR.

The Application will summarize the anticipated interactions between the proposed Project and the VC being assessed. Key mitigations to be employed to minimize residual adverse effects will be identified. IDM anticipates that the following proposed Project components or activities will interact with Wildlife VCs in the Project area:

- habitat loss and disturbance (e.g., displacement, behavioural effects leading to negative energetic balance, and physiological stress) resulting from Project activities that include the clearing of overburden, earthworks, and construction activities for roads, pads, and other infrastructure;

- behavioural changes due to exposure to attractants;

- displacement from habitat due to Project noise from traffic and/or blasting;

- direct disruption to movement resulting from Project activities;

- direct mortality and injury caused by interaction with the Project, such as collision with vehicles, aircraft and infrastructure, or adverse effects due to water management facilities and attractants;

- indirect mortality resulting from increased hunting pressure due to increased access;

- mortality or injury due to exposure to contaminants, including potential increases in metal concentrations in vegetation or soils, resulting from the Project; and

- reduction in reproductive productivity due to all effects of the Project combined.

The Application will identify and evaluate the Project works and activities that have the potential to result in changes to the wildlife species (including federally-listed species) and measurement indicators identified for the Wildlife assessment.
For Wildlife VCs, the strength of an interaction will likely vary across VC species; thus, a matrix identifying the strength of Project interactions for each species will be provided in the Application. The expected strength of the interactions is based on literature, baseline data, and experience with species responses to the effect pathway from proposed Project operations. Importantly, context of the existing conditions on status and sensitivity of the species to further effects from the Project will be considered in the evaluation.

4.10.4 Mitigation Measures

The Application will identify measures to avoid, manage or otherwise mitigate potential adverse effects to the VC in a manner consistent with Section 3.5 Mitigation Measures of this AIR. Relevant management plans will be referenced. Linkages to other sections in the Application must be identified.

IDM will evaluate the environmental design and mitigation measures that can be incorporated into the Project to mitigate adverse effects. A description of measures to be taken to avoid or lessen any potential effects from the Project on each Wildlife species (e.g. federally-listed) and its critical habitat will be completed. The Application will identify and describe measures to protect and avoid harming, killing or disturbing VCs such as Marbled Murrelet, or destroying or taking their nests or eggs. When mitigating the impacts to suitable nesting habitat of bird VCs, a buffer will be considered around SNH in a manner that reduces the edge/SNH area ratio to minimize effects from hard edges such as increased predation risk and microclimate effects.

Uncertainty associated with the effectiveness of the proposed measures will be noted. Monitoring will be proposed where it is identified that there may be an ongoing risk to a species or guild, or where there is some uncertainty regarding the effectiveness of mitigation measures.

4.10.5 Residual Effects and their Significance

Where an adverse residual effect is identified, the Application will characterize the residual effect based on the context, magnitude, extent, duration, reversibility, and frequency as described in Section 3.6 Characterization of Residual Effects of this AIR.

The Application will present the assessment of predicted incremental residual effects of the Project to the measurement indicators and assessment endpoints identified for Wildlife VCs. The assessment will include consideration of the following for each of the Wildlife VCs:

- habitat availability;
- habitat distribution; and
- mortality risk.

Where an adverse residual effect is identified, the Application will also describe the likelihood, Proponent’s significance determination and predictive confidence, in accordance with Sections 3.7 Likelihood, 3.8 Proponent’s Determination of Significance and 3.9 Confidence and Risk of this AIR.

The Application will also include a discussion of how uncertainty has been addressed (in accordance with Section 3.9) and provide a qualitative evaluation of the resulting level of confidence in the residual effects analyses for each measurement indicator and assessment.
endpoint. Where relevant, uncertainty associated with the effectiveness of proposed mitigation will be included in this discussion.

The context, direction, magnitude, geographic (spatial) extent, duration, timing, reversibility, and likelihood of the predicted changes to the primary measurement indicators and the subsequent effects on VC assessment endpoints will be described as outlined in Section 3.6. Mitigation measures that will be employed to avoid, minimize, or offset potential adverse effects on Wildlife VCs, will be presented and incorporated into the assessment.

4.10.6 Cumulative Effects and their Significance

If a residual effect is identified, unless stated otherwise by EAO, the Application will:

- Determine whether any cumulative interactions between residual effects of the proposed Project and the potential residual effects of other developments, based on the preliminary list of past, present, and reasonably foreseeable developments provided in the AIR, are likely to occur, consistent with Section 3.10.1 Identifying Past, Present or Reasonably Foreseeable Projects and/or Activities of this AIR;

- Conduct a cumulative effects assessment consistent with Section 3.10.2 Conducting a Cumulative Effects Assessment of this AIR;

- Identify any additional mitigation measures, consistent with Section 3.5 Mitigation Measures of this AIR; and

- Where an adverse residual cumulative effect is identified, the Application will also describe the likelihood, Proponent’s significance determination and predictive confidence, in accordance with Sections 3.7 Likelihood, 3.8 Proponent’s Determination of Significance and 3.9 Confidence and Risk of this AIR.

4.10.7 Follow-up Strategy

Where a residual effect and/or cumulative effect have been identified, the Application will include a description of a follow-up strategy that is consistent with Section 3.11 Follow-up Strategy of this AIR.

The Application will provide the conceptual outline for any monitoring and follow-up programs recommended to confirm the predictions made for Wildlife VCs and support the development of adaptive mitigation plans. Reference will be made to any reclamation monitoring programs developed to verify that predictions regarding re-establishment of wildlife usage or wildlife habitat occur as anticipated. Any recommended follow-up monitoring to confirm the results of the environmental assessment for Wildlife VCs will be integrated into that program. Reference to regional management plans being developed or implemented by IDM or by the province, where applicable, will be made.
4.10.8 Conclusion

The Application will provide a consolidated summary of the predicted residual effects and determination of significance for Wildlife VCs. The Application will also indicate the VCs to which the results of this assessment have been forwarded for incorporation in their assessments.

4.11 Aquatic Resources

A concise introduction of the Aquatic Resources assessment will be provided, including the purpose of the assessment, the structure of the assessment, and linkages to other disciplines.

Input from Consultation

The Application will describe the influence of consultation on issues scoping and assessment.

Information Sources

The Application will describe the influence of consultation on issues scoping and how the input from consultation has been incorporated into the Aquatic Resources assessment.

Valued Components, Intermediate Components, and Measurement Indicators

The Application will identify that Aquatic Resources are a VC that may be affected by the Project. The Application will describe the measurement indicators, intermediate components, and assessment endpoints that will be used to comprehensively evaluate the potential changes to Aquatic Resources that may result from the Project (Table 30).
Table 30: Valued Components, Intermediate Components, and Measurement Indicators for the Aquatic Resources Assessment

<table>
<thead>
<tr>
<th>VC</th>
<th>Pathways</th>
<th>Primary Measurement Indicators</th>
<th>Assessment Endpoint</th>
<th>Rationale for Selection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aquatic Resources represented by:</td>
<td>The following pathways will inform the assessment of potential Project impacts to Aquatic Resources:</td>
<td>Abundance and diversity of periphyton and benthic invertebrates</td>
<td>Maintenance of self-sustaining populations.</td>
<td>Aquatic Resources is of importance to NLG and regional stakeholders and are recognized as important components of the biophysical environment because of their key position in aquatic foodwebs and their potential indicators of ecosystem health. Benthic Invertebrates supports the assessment of potential effects on benthivorous fish health and fish habitat. Periphyton supports the assessment of potential effects on fish habitat via effects on Benthic Invertebrates. Benthic Invertebrate success is often based on an abundant and diverse periphyton community. Periphyton is therefore a representative indicator of benthic invertebrate health, and in turn, fish and fish health, and habitat integrity.</td>
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<tr>
<td>• Periphyton</td>
<td>• Surface Water Quality</td>
<td>Change in water quality parameter concentrations</td>
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<tr>
<td>• Benthic Invertebrates</td>
<td>• Water Quantity</td>
<td>Change in hydrology (timing, flows and volume)</td>
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<td></td>
<td>• Sediment Quality</td>
<td>Change in sediment quality parameter concentrations</td>
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4.11.1 Context and Boundaries

The Application will identify the spatial, temporal, administrative and technical study area boundaries, as applicable of the VC, including maps, in a manner consistent with 3.2 Assessment Boundaries of the AIR.

Table 31 and Figure 9 introduce the proposed spatial boundaries to be used in the Application.
Table 31: Spatial and Temporal Boundaries for Fish Habitat

<table>
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<tr>
<th>Pillar</th>
<th>VC</th>
<th>Temporal Boundary</th>
<th>Spatial Boundary</th>
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<tbody>
<tr>
<td>Environmental</td>
<td>Aquatic Resources</td>
<td>Life of Project</td>
<td><strong>LSA:</strong> Bitter Creek watershed up to glacial extent</td>
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<td></td>
<td><strong>RSA:</strong> Bitter Creek watershed including the glacial extent, and Bear River watershed, from American Creek to Stewart and the northern end of the Portland Canal.</td>
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Figure 9: Fish, Fish Habitat, and Aquatic Resources Local and Regional Study Areas
4.11.2 Existing Conditions

The Application will summarize existing conditions in a manner consistent with Section 3.3 Existing Conditions of this AIR.

The regulatory setting for BC projects with potential impacts on Aquatic Resources will be described, including reference to the Metal Mining Effluent Regulations, British Columbia Approved and Working Water Quality Guidelines (2014), and the Ministry of Environment’s Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operators (2012).

The methods used for characterizing existing conditions for the Aquatic Resources VC will be provided for the baseline program which was initiated in 2014. This will include a summary of spatial and temporal coverage of field assessments and a description of the field and lab methods used. Aquatic resources sampling was completed at nine sites in September 2014 and September 2015, and sampling is ongoing in 2016. Sampling locations include Goldslide Creek, Otter Creek, Bitter Creek, Bear River, and American Creek. Samples were analyzed for chlorophyll a, moisture, metals, and taxonomic identification. Benthic invertebrate sampling follows the Environment and Climate Change Canada Canadian Aquatic Biomonitoring Network (CABIN) protocol.

The Application will summarize results from the baseline Aquatic Resources for watercourses in the LSA and RSA, with a focus on benthic invertebrate and periphyton community metrics such as abundance, density, biomass (as chlorophyll a), richness, diversity, and proportion of sensitive or tolerant species. Pertinent information from ICs or other relevant VCs (sediment quality, water quality, and quantity) will be highlighted and referenced accordingly.

4.11.3 Potential Effects

The Application will identify potential adverse effects to the VC in a manner consistent with Section 3.4 Potential Effects of this AIR.

The Application will summarize anticipated interactions between the proposed Project and the VC being assessed within the LSA. IDM anticipates that the following proposed Project components or activities will interact with the Aquatic Resources aspects of the Project area:

- direct mortality from mine footprint development and associated infrastructure;
- direct mortality and reduction in community health from changes to water and sediment chemistry resulting from the deposition of deleterious substances, including mine effluent, blasting residues, and sediment; and
- direct mortality and reduction in community health from changes to streamflow and channel morphology resulting from water management and diversions.

4.11.4 Mitigation Measures

The Application will identify measures to avoid, manage, or otherwise mitigate potential adverse effects to the VC in a manner consistent with Section 3.5 Mitigation Measures of this
AIR. Relevant management plans will be referenced. Linkages to other sections in the Application must be identified.

IDM will evaluate the environmental design and mitigation measures that can be incorporated into the Project to mitigate adverse effects. Uncertainty associated with the effectiveness of the proposed measures will be noted.

4.11.5 Residual Effects and their Significance

Where an adverse residual effect is identified, the Application will characterize the residual effect based on the context, magnitude, extent, duration, reversibility, and frequency as described in Section 3.6 Characterization of Residual Effects of this AIR.

The Application will characterize the residual effects using the effects criteria in Section 3.6. Policies, guidelines, and standards considered in the analysis, as well as any modelling products used to predict residual effects will be described.

The analysis will include the assessment of predicted incremental residual effects of the Project to the measurement indicators and assessment endpoints identified for the Aquatic Resources VC.

Where an adverse residual effect is identified, the Application will also describe the likelihood, Proponent’s significance determination and predictive confidence, in accordance with Sections 3.7 Likelihood, 3.8 Proponent’s Determination of Significance and 3.9 Confidence and Risk of this AIR.

The Application will also include a discussion of how uncertainty has been addressed (in accordance with Section 3.9) and provide a qualitative evaluation of the resulting level of confidence in the residual effects analyses for each measurement indicator and assessment endpoint. Where relevant, uncertainty associated with the effectiveness of proposed mitigation will be included in this discussion.

The effects of the Project on Aquatic Resources within local watercourses will also be assessed in the context of potential effects on fish populations of the Bear River. The context, direction, magnitude, geographic (spatial) extent, duration, timing, reversibility, and likelihood of the predicted changes to the primary measurement indicators and the subsequent effects on the assessment endpoints will be described, as outlined in Section 3.6. Mitigation measures that will be employed to avoid, minimize, or offset potential adverse effects on Aquatic Resources will be presented and incorporated into the assessment.

4.11.6 Cumulative Effects and their Significance

If a residual effect is identified, unless stated otherwise by EAO, the Application will:

- Determine whether any cumulative interactions between residual effects of the proposed Project and the potential residual effects of other developments, based on the preliminary list of past, present, and reasonably foreseeable developments provided in the AIR, are likely to occur, consistent with Section 3.10.1 Identifying Past, Present or Reasonably Foreseeable Projects and/or Activities of this AIR;
• Conduct a cumulative effects assessment consistent with Section 3.10.2 Conducting a Cumulative Effects Assessment of this AIR;

• Identify any additional mitigation measures, consistent with Section 3.5 Mitigation Measures of this AIR; and

• Where an adverse residual cumulative effect is identified, the Application will also describe the likelihood, Proponent’s significance determination and predictive confidence, in accordance with Sections 3.7 Likelihood, 3.8 Proponent’s Determination of Significance and 3.9 Confidence and Risk of this AIR.

4.11.7 Follow-up Strategy

Where a residual effect and/or cumulative effect have been identified, the Application will include a description of a follow-up strategy that is consistent with Section 3.11 Follow-up Strategy of this AIR.

The Application will provide the conceptual outline for any monitoring and follow-up programs recommended to confirm the predictions made for the Aquatic Resources VC, consistent with the Aquatic Effects Monitoring Program. Reference to management plans being developed or implemented by IDM or by the province, where applicable, will be made.

4.11.8 Conclusion

The Application will provide a consolidated summary of the predicted residual adverse effects and determination of significance for the Aquatic Resources VC. The Application will also indicate the VCs to which the results of the Aquatic Resources assessment have been forwarded for incorporation in their assessments.

4.12 Fish

A concise introduction of the Fish assessment will be provided, including the purpose of the assessment, the structure of the assessment, and linkages to other disciplines.

Input from Consultation

The Application will describe the influence of consultation on issues scoping and assessment.

Information Sources

The Application will describe the influence of consultation on issues scoping and how the input from consultation has been incorporated into the assessment.

Valued Components, Intermediate Components, and Measurement Indicators

The Application will identify that Fish is a valued component that may be affected by the Project. The Application will describe the measurement indicators, intermediate components, and assessment endpoints that will be used to comprehensively evaluate the potential changes to Fish that may result from the Project (Table 32).
Table 32: Valued Components, Intermediate Components, and Measurement Indicators for the Fish Assessment

<table>
<thead>
<tr>
<th>VC</th>
<th>Pathways</th>
<th>Primary Measurement Indicators</th>
<th>Assessment Endpoint</th>
<th>Rationale for Selection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fish</td>
<td>The following pathways will inform the assessment of potential Project impacts to Fish:</td>
<td>• Fish species presence or absence; fish population metrics; and direct mortality.</td>
<td>Maintenance of self-sustaining fish populations.</td>
<td>Fish is a broadly defined VC that includes important fish species that are known to exist in the Project area (specifically Dolly Varden and Salmonid Species). This was selected as a VC since fish are an important resource to the public and Nisga’a Nation. Potential effects pathways include changes in water quality due to the potential impacts of Project components and activities which may affect fish. Results will be carried forward into Wildlife, Human Health, and CRA Fisheries assessments. Any contributing habitat to downstream productivity will be identified and characterized. The potential crossings along the transmission line and upgraded access road will be characterized in terms of fish resources. Effects on Fish and Fish Habitat are required to be assessed under CEAA 2012 s.5(1)(a)(i) and changes in Fish and Fish Habitat have the potential to affect current use of lands and resources for cultural purposes by Nisga’a Nation citizens (CEAA 2012 s.5(1)(c)(iii)). The Fisheries Act also prohibits the carrying out of any work, undertaking or activity that results in serious harm to fish that are part of a commercial, recreational, or Aboriginal Fishery, or to fish that support such a Fishery. Dolly Varden and Salmonids are regulated as a game fish species in Canada and are therefore important to Commercial, Recreational, and Aboriginal (CRA) Fisheries. Both Surface Water and Groundwater Quality have the potential to change as a result of Project activities. Potential effects pathways may include accidental spills, accidental releases of mine contact water, and sediment runoff. Changes to water quality as a result of the Project could affect downstream values including Fish and Fish Habitat and Wildlife.</td>
</tr>
<tr>
<td></td>
<td>• Fish Habitat</td>
<td>• Habitat loss and alteration (quantity, quality and availability).</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Surface Water Quality</td>
<td>• Water Quality in fish-bearing watercourses - change in parameter concentrations compared to provincial or federal guidelines for freshwater aquatic life; and comparison of metal concentrations in Fish tissues.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Hydrology</td>
<td>• Growth, survival, and reproduction of fish, assessed by comparison of predicted concentrations of water and sediment quality to screening values or benchmarks derived from literature-based toxicity tests.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Hydrogeology</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Groundwater Quality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All fish species in the aquatic RSA will be represented by the following:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Dolly Varden</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Bull Trout</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Eulachon</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Salmonid Species</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 4.12.1 Context and Boundaries

The Application will identify the spatial, temporal, administrative and technical study area boundaries, as applicable of the VC, including maps, in a manner consistent with Section 3.2 Assessment Boundaries of the AIR.

Table 33 and Figure 9 introduce the proposed spatial boundaries to be used in the Application.

#### Table 33: Spatial and Temporal Boundaries for Fish

<table>
<thead>
<tr>
<th>Pillar</th>
<th>VC</th>
<th>Temporal Boundary</th>
<th>Spatial Boundary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental</td>
<td>Fish</td>
<td>Life of Project</td>
<td>LSA: Bitter Creek watershed up to glacial extent.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>RSA: Bitter Creek watershed including the glacial extent, and Bear River watershed, from American Creek to Stewart and the northern end of the Portland Canal.</td>
</tr>
</tbody>
</table>

### 4.12.2 Existing Conditions

The Application will summarize existing conditions in a manner consistent with Section 3.3 Existing Conditions of this AIR.

The regulatory setting for BC projects with potential impacts on fisheries will be described, including reference to the federal *Fisheries Act*, Metal Mining Effluent Regulations (if required), and the Ministry of Environment’s Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operators (2012).

The methods used for characterizing existing conditions for Fish VCs will be provided for the baseline program which was initiated in 2014. This will include a summary of spatial and temporal coverage of field assessments and a description of the field and lab methods used. Fisheries sampling was continued in August 2014, October 2014, August 2015, and September 2015, with a field program finalized in 2016. Fish sampling by electrofishing and minnow trapping include sites located on Goldslide Creek, Rio Blanco, Hartley Gulch, Bitter Creek, Bear River, Cambria Creek, Roosevelt Creek, American Creek, Swarm Creek, and Otter Creek. Genetic sampling, metals in tissue samples, ageing, and toxicity analyses have been completed. Salmon spawning assessments were conducted in Bitter Creek and Bear River. All sampling procedures follow standard protocols detailed in the relevant Resource Inventory Standards Committee (RISC) guidelines and manuals.

Results from the baseline fisheries program will be summarized for Fish VCs in the LSA and RSA with a focus on the following information:

- fish species presence/absence;
- fish community composition;
• relative abundance and/or population density estimates;

• spatial and temporal distribution;

• potential or documented life stage usage (e.g. spawning, rearing, overwintering, feeding, and migrating) of each Fish VC. Results may be based on spawning surveys, fish size and age, or fish habitat suitability; and,

• baseline metal concentrations of fish tissues and comparison to tissue guidelines for the protection of aquatic life.

Pertinent fish habitat information, including documented barriers to fish passage, water and sediment quality conditions, hydrological conditions, and information regarding the quality and quantity of benthic invertebrates and periphyton may be provided to aid in the characterization of Fish VCs. However, the Fish Habitat VC will be referenced for detailed information.

Other sources of regional fisheries data, such as the BC Fish Inventory Data Query, Aboriginal Fund for Species at Risk (AFSAR) reports, and the Nass South Sustainable Resource Management Plan (MFLNRO, 2012) will be collated and used to understand fish community trends over time. This information will also aid in describing Fish VCs such as Eulachon that have not been captured or observed during the baseline sampling program.

4.12.3 Potential Effects

The Application will identify potential adverse effects to the VC in a manner consistent with Section 3.4 Potential Effects of this AIR.

The Application will summarize the anticipated interactions between the proposed Project and the VC being assessed within the LSA. IDM anticipates that the following proposed Project components or activities will interact with Fish VCs in the Project area:

• direct mortality from mine footprint development and associated infrastructure;

• direct mortality and changes to population abundance resulting from increased fishing pressure as a result of increased access;

• direct mortality and reduction in community health from changes to water and sediment chemistry resulting from the deposition of deleterious substances, including mine effluent, blasting residues, and sediment; and

• direct mortality and reduction in community health from changes to streamflow and channel morphology resulting from water management and diversions.

4.12.4 Mitigation Measures

The Application will identify measures to avoid, manage, or otherwise mitigate potential adverse effects to the VC in a manner consistent with Section 3.5 Mitigation Measures of this AIR. Relevant management plans will be referenced. Linkages to other sections in the Application must be identified.
IDM will evaluate the environmental design and mitigation measures that can be incorporated into the Project to mitigate adverse effects. Uncertainty associated with the effectiveness of the proposed measures will be noted.

4.12.5 Residual Effects and their Significance

Where an adverse residual effect is identified, the Application will characterize the residual effect based on the context, magnitude, extent, duration, reversibility, and frequency as described in Section 3.6 Characterization of Residual Effects of this AIR.

The Application will present the assessment of predicted incremental residual effects of the Project to the measurement indicators and assessment endpoints identified for Fish VCs.

Where an adverse residual effect is identified, the Application will also describe the likelihood, Proponent’s significance determination and predictive confidence, in accordance with Sections 3.7 Likelihood, 3.8 Proponent’s Determination of Significance and 3.9 Confidence and Risk of this AIR.

The Application will also include a discussion of how uncertainty has been addressed (in accordance with Section 3.9) and provide a qualitative evaluation of the resulting level of confidence in the residual effects analyses for each measurement indicator and assessment endpoint. Where relevant, uncertainty associated with the effectiveness of proposed mitigation will be included in this discussion.

The effects of the Project on Fish VCs within local watercourses will also be assessed in the context of potential effects on populations of the Bear River. The context, direction, magnitude, geographic (spatial) extent, duration, timing, reversibility, and likelihood of the predicted changes to the primary measurement indicators and the subsequent effects on the assessment endpoints will be described as outlined in Section 3.6. Mitigation measures that will be employed to avoid, minimize, or offset potential adverse effects on Fish VCs will be presented and incorporated into the assessment.

4.12.6 Cumulative Effects and their Significance

If a residual effect is identified, unless stated otherwise by EAO, the Application will:

- Determine whether any cumulative interactions between residual effects of the proposed Project and the potential residual effects of other developments, based on the preliminary list of past, present and reasonably foreseeable developments provided in the AIR, are likely to occur, consistent with Section 3.10.1 Identifying Past, Present or Reasonably Foreseeable Projects and/or Activities of this AIR;

- Conduct a cumulative effects assessment consistent with Section 3.10.2 Conducting a Cumulative Effects Assessment of this AIR;

- Identify any additional mitigation measures, consistent with Section 3.5 Mitigation Measures of this AIR; and
Where an adverse residual cumulative effect is identified, the Application will also describe the likelihood, Proponent’s significance determination and predictive confidence, in accordance with Sections 3.7 Likelihood, 3.8 Proponent’s Determination of Significance and 3.9 Confidence and Risk of this AIR.

4.12.7 Follow-up Strategy

Where a residual effect and/or cumulative effect have been identified, the Application will include a description of a follow-up strategy that is consistent with Section 3.11 Follow-up Strategy of this AIR.

The Application will provide the conceptual outline for any monitoring and follow-up programs recommended to confirm the predictions made for Fish VCs consistent with the Aquatic Effects Monitoring Program (AEMP). Baseline data will be evaluated and incorporated in the development of a meaningful and effective AEMP. Recommended monitoring will also include monitoring of the effectiveness of offsetting measures, if required, for the Project. Reference to management plans being developed or implemented by IDM or by the province, where applicable, will be made.

4.12.8 Conclusion

The Application will provide a consolidated summary of the predicted residual adverse effects and determination of significance for Fish VCs. The Application will also indicate the VCs to which the results of the Fish assessment have been forwarded for incorporation in their assessments.

4.13 Fish Habitat

A concise introduction of the VC Fish Habitat assessment will be provided, including the purpose of the assessment, the structure of the assessment and linkages to other disciplines.

Input from Consultation

The Application will describe the influence of consultation on issues scoping and how the input from consultation has been incorporated into the Fish Habitat assessment.

Information Sources

The Application will provide the information sources used in the assessment.

Valued Components, Intermediate Components, and Measurement Indicators

The Application will identify that Fish Habitat is a VC that may be affected by the Project. The Application will describe the measurement indicators, ICs, and assessment endpoints that will be used to comprehensively evaluate the potential changes to Fish Habitat that may result from the Project (Table 34).
Table 34: Valued Components, Intermediate Components, and Measurement Indicators for the Fish Habitat Assessment

<table>
<thead>
<tr>
<th>VC</th>
<th>Pathways</th>
<th>Primary Measurement Indicators</th>
<th>Assessment Endpoint</th>
<th>Rationale for Selection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fish Habitat</td>
<td>The following pathways will inform the assessment of potential Project impacts to Fish Habitat:</td>
<td></td>
<td>Maintenance of self-sustaining populations within Fish Habitat.</td>
<td>Fish Habitat is of importance to NLG and regional stakeholders, and is protected by the federal <em>Fisheries Act</em>. Based on studies completed for the Project, the proposed Project footprint is not located near fish habitat. The closest fish presence and habitat is approximately 6.5 km downstream from the Goldslide Creek/Bitter Creek confluence, in the vicinity of Hartley Gulch.</td>
</tr>
<tr>
<td></td>
<td>• Water Quality</td>
<td>Water Quality - change in parameter concentrations compared to provincial or federal guidelines for freshwater aquatic life.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Hydrology</td>
<td>Change in timing, flows and volume.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Sediment Quality</td>
<td>Change in sediment parameter concentrations, compared to provincial or federal guidelines for freshwater aquatic life.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Aquatic Resources</td>
<td>Periphyton and Benthic Invertebrate community metrics.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.13.1 *Context and Boundaries*

The Application will identify the spatial, temporal, administrative and technical study area boundaries, as applicable of the VC, including maps, in a manner consistent with Section 3.2 *Assessment Boundaries* of the AIR.

Table 35 and Figure 9 introduce the proposed spatial boundaries to be used in the Application.
Table 35: Spatial and Temporal Boundaries for Fish Habitat

<table>
<thead>
<tr>
<th>Pillar</th>
<th>VC</th>
<th>Temporal Boundary</th>
<th>Spatial Boundary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental</td>
<td>Fish Habitat</td>
<td>Life of Project</td>
<td><strong>LSA</strong>: Bitter Creek watershed up to glacial extent</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>RSA</strong>: Bitter Creek watershed including the glacial extent, and Bear River watershed, from American Creek to Stewart and the northern end of the Portland Canal.</td>
</tr>
</tbody>
</table>

4.13.2 Existing Conditions

The Application will summarize existing conditions in a manner consistent with Section 3.3 Existing Conditions of this AIR.

The regulatory setting for BC projects with potential impacts on fisheries will be described, including reference to the federal *Fisheries Act*, Metal Mining Effluent Regulations (if required), and the Ministry of Environment’s Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operators (2012).

The methods used for characterizing existing conditions for the Fish Habitat VC will be provided for the baseline program which was initiated in 2014. This will include a summary of spatial and temporal coverage of field assessments and a description of the field methods used. Recent fish habitat assessments were completed in August 2014, October 2014, August 2015, and September 2015, with field programs finalized in 2016. Fish Habitat assessments include sites located on Goldslide Creek, Rio Blanco, Hartley Gulch, Bitter Creek, Bear River, Cambria Creek, Roosevelt Creek, American Creek, Swarm Creek, Otter Creek, and at watercourse crossings along the existing and proposed mine access road. All survey procedures follow standard protocols detailed in the relevant Resource Inventory Standards Committee (RISC) guidelines and manuals.

Results from the baseline Fish Habitat program will be summarized for watercourses in the LSA and RSA with a focus on the following information:

- fish habitat quantity and suitability for Fish VCs in each Project watercourse; and
- the presence of documented barriers to fish passage.

Pertinent information from other relevant VC or ICs (Sediment Quality, Water Quality and Quantity, Groundwater) may be highlighted and referenced accordingly.

Other sources of regional fish habitat data will be collated and used to understand trends over time.
4.13.3 Potential Effects

The Application will identify potential adverse effects to the VC in a manner consistent with Section 3.4 Potential Effects of this AIR.

The Application will summarize anticipated interactions between the proposed Project and the VC being assessed within the LSA. IDM anticipates that the following proposed Project components or activities will interact with the Fish Habitat aspects of the Project area:

- loss or damage to habitat and availability due to mine footprint development and associated infrastructure;
- loss or damage to fish and riparian habitat and availability from changes to streamflow and channel morphology resulting from water management and diversions; and
- loss or damage to habitat from increased erosion and sedimentation due to construction activities and stream bank alteration.

These identified interactions will have the potential to result in changes to the measurement indicators identified for the Fish Habitat assessment. The expected strength of the interactions is based on literature, baseline data, and experience with responses of each VC to the effect pathway from mining operations. Importantly, context of the existing conditions on status and sensitivity of the VC to further effects from the Project is considered in the evaluation.

4.13.4 Mitigation Measures

The Application will identify measures to avoid, manage, or otherwise mitigate potential adverse effects to the VC in a manner consistent with Section 3.5 Mitigation Measures of this AIR. Relevant management plans will be referenced. Linkages to other sections in the Application must be identified.

IDM will evaluate the environmental design and mitigation measures that can be incorporated into the Project to mitigate adverse effects. Uncertainty associated with the effectiveness of the proposed measures will be noted.

4.13.5 Residual Effects and their Significance

Where an adverse residual effect is identified, the Application will characterize the residual effect based on the context, magnitude, extent, duration, reversibility, and frequency as described in Section 3.6 Characterization of Residual Effects of this AIR.

The Application will characterize the residual effects using the effects criteria in Section 3.6. Policies, guidelines, and standards considered in the analysis, as well as any modelling products used to predict residual effects, will be described.

The analysis will include the assessment of predicted incremental residual effects of the Project to the measurement indicators and assessment endpoints identified for the Fish Habitat VC.
Where an adverse residual effect is identified, the Application will also describe the likelihood, Proponent’s significance determination and predictive confidence, in accordance with Sections 3.7 Likelihood, 3.8 Proponent’s Determination of Significance and 3.9 Confidence and Risk of this AIR.

The Application will also include a discussion of how uncertainty has been addressed (in accordance with Section 3.9) and provide a qualitative evaluation of the resulting level of confidence in the residual effects analyses for each measurement indicator and assessment endpoint. Where relevant, uncertainty associated with the effectiveness of proposed mitigation will be included in this discussion.

The effects of the Project on Fish Habitat within local watercourses will also be assessed in the context of potential effects on fish populations of the Bear River. The context, direction, magnitude, geographic (spatial) extent, duration, timing, reversibility, and likelihood of the predicted changes to the primary measurement indicators and the subsequent effects on assessment endpoints will be described as outlined in Section 3.6. Mitigation measures that will be employed to avoid, minimize, or offset potential adverse effects on Fish Habitat VCs will be presented and incorporated into the assessment.

4.13.6 Cumulative Effects and their Significance

If a residual effect is identified, unless stated otherwise by EAO, the Application will:

- Determine whether any cumulative interactions between residual effects of the proposed Project and the potential residual effects of other developments, based on the preliminary list of past, present, and reasonably foreseeable developments provided in the AIR, are likely to occur, consistent with Section 3.10.1 Identifying Past, Present or Reasonably Foreseeable Projects and/or Activities of this AIR;

- Conduct a cumulative effects assessment consistent with Section 3.10.2 Conducting a Cumulative Effects Assessment of this AIR;

- Identify any additional mitigation measures, consistent with Section 3.5 Mitigation Measures of this AIR; and

- Where an adverse residual cumulative effect is identified, the Application will also describe the likelihood, Proponent’s significance determination and predictive confidence, in accordance with Sections 3.7 Likelihood, 3.8 Proponent’s Determination of Significance and 3.9 Confidence and Risk of this AIR.

4.13.7 Follow-up Strategy

Where a residual effect and/or cumulative effect have been identified, the Application will include a description of a follow-up strategy that is consistent with Section 3.11 Follow-up Strategy of this AIR.

The Application will provide the conceptual outline for any monitoring and follow-up programs recommended to confirm predictions made for the Fish Habitat VCs, consistent with the planned AEMP. Recommended monitoring will also include monitoring of the effectiveness of
offsetting measures, if required, for the Project. Reference to management plans being developed or implemented by IDM or by the province, where applicable, will be made.

4.13.8 Conclusion

The Application will provide a consolidated summary of the predicted residual adverse effects and determination of significance for the Fish Habitat VCs. The Application will also indicate the VCs to which the results of the Fish Habitat assessment have been forwarded for incorporation in their assessments.
5.0 **ECONOMIC EFFECTS ASSESSMENT**

The Application will include an assessment of Economic VCs and ICs identified in the AIR. The assessment will be conducted in accordance with the methodology specified in Section 3.0 Assessment Methodology of this AIR and reported using the organizational structure demonstrated in the Section 4.0 Environmental Effects Assessment.

Table 36 and Table 37 summarize the key indicators that will be utilized to predict, measure, and monitor the effects and potential effects of the proposed Project on the selected Economic VCs and ICs.

There is no regulatory or government management of the Economic VCs or ICs.

**Input from Consultation**

The Application will describe the influence of consultation on issues scoping and how the input from consultation has been incorporated into the economic effects assessment.

**Information Sources**

The Application will provide the information sources used in the assessment.

Baseline data will be collected through interviews with key informants and a review of existing, publicly available information on recent resource development projects in the region. Baseline information will be obtained from sources including:

- key informant interviews;
- environmental assessment applications and supporting studies of other, recent projects in the northwest region of BC, which provide comprehensive and recent descriptions of baseline social and economic conditions and primary research;
- Statistics Canada and DataBC;
- local and regional government by-laws and planning documents; and
- spatial data from provincial, regional, and local governments.

**Supporting Reports and Studies**

In order to ensure that the Application meets the requirements of Chapter 10, paragraph 8(f), of the Nisga’a Final Agreement, IDM will conduct an Economic, Social, and Cultural Impact Assessment (ESClA) as outlined in the ESCIA Work Plan agreed to by Nisga’a Nation, IDM, and the Agency.

Nisga’a Nation baseline data will be collected through desktop studies and modeling exercises conducted in support of the ESCIA. The ESCIA’s key findings related to the effects assessment of Economic VCs and ICs will be summarized in the Application, in a manner that allows the reader...
to understand each VC’s effects assessment. Section 12.4 of the Application will be dedicated to the 8(f) assessment.

**Valued Components, Assessment Endpoints, and Measurement Indicators**

The Application will present the VCs, ICs, assessment endpoints, and measurement indicators to be used in the assessment of Project-related effects on the economic pillar (Table 36). The rationale for selection of VCs, ICs, and indicators will be presented in the Application. Considerations for VC or IC selection include: potential interactions with the Project; potential for adverse Project effects; Aboriginal Interests; local or community concerns; and scientific knowledge.

The specific measurement indicators for each VC and IC are listed in Table 36 and Table 37. Indicators are used to focus the assessment on metrics that are likely to be negatively affected by the Project and important to reviewers when considering the effects of the Project on the Economic pillar.
### Table 36: Valued Components, Assessment Endpoints and Measurement Indicators for the Economic Assessment

<table>
<thead>
<tr>
<th>VC</th>
<th>Pathways</th>
<th>Primary Measurement Indicators</th>
<th>Assessment Endpoint</th>
<th>Rationale for Selection</th>
</tr>
</thead>
</table>
| Commercial, Recreational and Aboriginal (CRA) Fisheries | The following pathways will inform the assessment of potential Project impacts to CRA Fisheries:  
- Fish  
- Fish Habitat  
- Project-Related Employment | - Change in access to existing resource uses  
- Change in quantity of Fish resources and Fish health  
- Regional and Local Labour Statistics and Demographics | Continuity of CRA Fisheries. | CRA Fisheries are of importance to NLG due to Nisga’a Nation’s Treaty rights to hunt and trap in the Nass Wildlife Area. |
| Contemporary Land and Resource Use | The following pathways will inform the assessment of potential Project impacts to Contemporary Land and Resource Use:  
- Fish  
- Fish Habitat  
- Wildlife  
- Vegetation  
- Project-Related Employment  
- Visual Quality  
- Noise | - Existing land and resource users and uses (e.g., overlapping Crown tenures, guide outfitters, trapline holders, etc.)  
- Changes to access, such as prohibitions and/or increased numbers of persons wanting access | Continuity of contemporary land and resource use. | Contemporary Land and Resource Use, including Nisga’a Nation’s current domestic and cultural land and resources use, is of importance to Nisga’a Nation and to regional stakeholders. |
### Table 37: Intermediate Components and Measurement Indicators for the Economic Assessment

<table>
<thead>
<tr>
<th>IC</th>
<th>Primary Measurement Indicators</th>
<th>VC Where Significance will be Determined</th>
<th>Rationale</th>
</tr>
</thead>
</table>
| Project-Related Employment (Direct and Indirect) | • Predictive model (BCIOM)  
• Regional and Local Labour Statistics and Demographics  
• Project Person-hours of Work  
• Estimate Project Work Contract Values  
• Education, skills, and training opportunities | • CRA Fisheries: Continuity use of CRA Fisheries.  
• Contemporary Land and Resource Use: Continuity of contemporary land and resource use.  
• Social and Health Services: Continued delivery of social and health services, and no negative effects to community health and well-being as a result of the Project.  
• Housing: Continued maintenance of housing availability and affordability, and no negative effects to community health and well-being as a result of the Project.  
• Potential Social Issues Related to Project and Project Workforce: no negative effects to community health and well-being as a result of the Project.  
• Infrastructure: Continued maintenance of infrastructure availability and access. | Employment is important to NLG, regulators, and public stakeholders. |
| Revenue to the Local Economy | • Predictive model (BCIOM)  
• Regional and Local Economic Statistics  
• Local procurement opportunities  
• Regional procurement opportunities  
• Estimate Project Work Contract Values | • Social and Health Services: Continued delivery of social and health services, and no negative effects to community health and well-being as a result of the Project.  
• Housing: Continued maintenance of housing availability and affordability, and no negative effects to community health and well-being as a result of the Project.  
• Potential Social Issues Related to Project and Project Workforce: no negative effects to community health and well-being as a result of the Project. | Revenue to Local Economy is of importance to regulators and other stakeholders. |
5.1 **Context and Boundaries**

The Application will identify the spatial, temporal, administrative, and technical study area boundaries, as applicable to the VC, including maps, in a manner consistent with Section 3.2. Table 38 and Table 39 summarize the temporal and spatial boundaries for the selected Economic VCs and ICs. The local study area (LSA) and regional study area (RSA) are shown in Figure 10.

The LSA within which the potential economic effects of the proposed Project will be assessed is an area with a radius of 50 km, which includes the following communities:

- District of Stewart;
- Village of Gitlax’t’aamiks (formerly New Aiyansh);
- Village of Gitwinksihlkw (Canyon City);
- Village of Laxgalts’ap (Greenville);
- Village of Gingolx (Kincolith);
- Meziadin Junction; and
- Bell II.

The Economic effects assessment will use the Regional District of Kitimat-Stikine (RDKS) as the RSA that will be used a baseline comparison for predicting, measuring, and monitoring the effects and potential effects of the proposed Project on economic aspects of the environment. The Application will identify any federal lands and lands located outside Canada that may be affected by this Project.

### Table 38: Spatial and Temporal Boundaries of Economic VCs

<table>
<thead>
<tr>
<th>Pillar</th>
<th>VC</th>
<th>Temporal Boundary</th>
<th>Spatial Boundary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economy</td>
<td>CRA Fisheries</td>
<td>Life of Project</td>
<td>LSA: District of Stewart and nearby communities (see Figure 10).</td>
</tr>
<tr>
<td></td>
<td>Contemporary Land and Resource Use</td>
<td></td>
<td>RSA: Regional District of Kitimat-Stikine (see Figure 10).</td>
</tr>
</tbody>
</table>

### Table 39: Spatial and Temporal Boundaries of Economic ICs

<table>
<thead>
<tr>
<th>Pillar</th>
<th>IC</th>
<th>Temporal Boundary</th>
<th>Spatial Boundary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economy</td>
<td>Project-Related Employment (Direct and Indirect)</td>
<td>Life of Project</td>
<td>LSA: District of Stewart and nearby communities (see Figure 10).</td>
</tr>
<tr>
<td></td>
<td>Revenue to the Local Economy</td>
<td></td>
<td>RSA: Regional District of Kitimat-Stikine (see Figure 10).</td>
</tr>
</tbody>
</table>
Figure 10: Economic, Social, and Health Local and Regional Study Areas
5.2 Existing Conditions

The Application will include a description of the existing economic conditions within the LSA in sufficient detail to enable potential Project-VC interactions to be identified, understood, and assessed. The Application will summarize existing conditions in a manner consistent with section 3.3, Existing Conditions, of this AIR.

Anticipated Economic Interactions

IDM anticipates that the following proposed Project components or activities will interact with economic aspects of the Project area:

• employment of workforce during the development, operation, and decommissioning of the proposed Project;

• increased revenue to the local and regional economy from business and employment opportunities related to the development, operation, and decommissioning of the proposed Project;

• potential adverse effects to the local and regional economy related to workforce and resources being diverted from previous contracts to the proposed Project; and

• potential adverse effects to local commercial, recreational, and Aboriginal (CRA) Fisheries resulting from potential adverse impacts to Fish and Fish Habitat.

5.3 CRA Fisheries

The Application will provide a concise introduction of the assessment of the VC CRA Fisheries, including the purpose of the assessment, the structure of the assessment, and linkages to other disciplines.

5.4 Contemporary Land and Resource Use

The Application will provide a concise introduction of the assessment of the VC Contemporary Land and Resource Use, including the purpose of the assessment, the structure of the assessment, and linkages to other disciplines.

5.5 Project-Related Employment (Direct and Indirect)

The Application will provide a concise introduction of the assessment of the IC Project-Related Employment (Direct and Indirect), including the purpose of the assessment, the structure of the assessment, and linkages to other disciplines.

5.6 Revenue to the Local Economy

The Application will provide a concise introduction of the assessment of the IC Revenue to the Local Economy, including the purpose of the assessment, the structure of the assessment, and linkages to other disciplines.
5.7 Potential Effects

IDM anticipates that the following proposed Project components or activities will interact with economic aspects of the Project area:

- change in demand for labour, goods, and services in the regional economy;
- changes to economic activity in the regional economy;
- changes to CRA Fisheries; and
- potential effects to contemporary land and resource uses, including Nisga’a Nation use of land and resources for domestic and cultural purposes and existing Crown land tenure holders, as a result of changes to access to the Project area.

The Application will identify any potential adverse effects to Economic VCs in a manner consistent with Section 3.4, Potential Effects. The assessment will note interactions that were excluded from further assessment, including the methods and criteria used to justify the exclusion and input received from EAO, government agencies, Nisga’a Nation, and the public regarding the exclusion.

The Application will describe any effects on the socio-economic conditions of Aboriginal Groups resulting from a change in the environment and the effects of any change to the environment directly linked or necessarily incidental to federal decisions on overall socio-economic conditions.

5.8 Mitigation Measures

The Application will identify measures to avoid, manage, or otherwise mitigate potential adverse effects to the Economic VCs. With reference to Section 3.5, Mitigation Measures, the Application will identify mitigation and design measures to minimize adverse effects on the economic context of the proposed Project.

The Skills, Training, and Employment Plan that will be developed as part of the Application will include available information on local and regional workforces to estimate how many residents have a skill set suitable for participation in Project employment, or how they might be trained if not. The Plan will also include proposed efforts for maximizing employment, training, and business opportunities related to the Project. These efforts will be discussed with Nisga’a Nation and local and regional stakeholders.

The Social and Economic Management Plan that will be developed as part of the Application will include considerations of the reasonably foreseeable potential social and economic effects of the Project.

5.9 Residual Effects and their Significance

The Application will identify where the proposed Project will have an adverse residual effect on the economic setting the context, magnitude, extent, duration, reversibility, and frequency as described in Section 3.6, Characterization of Residual Effects.
Where an adverse residual effect on the economic setting is identified, the Application will also describe the likelihood, IDM’s significance determination and predictive confidence, in accordance with Sections 3.7 Likelihood, 3.8 IDM’s Determination of Significance, and 3.9 Confidence and Risk.

5.10 Cumulative Effects and their Significance

If a residual effect is identified, unless stated otherwise by EAO, the Application will:

- Determine whether any cumulative interactions between residual effects of the proposed Project and the potential residual effects of other developments, based on the preliminary list of past, present, and reasonably foreseeable developments provided in the AIR, are likely to occur, consistent with Section 3.10.1 Identifying Past, Present or Reasonably Foreseeable Projects and/or Activities of this AIR;

- Conduct a cumulative effects assessment consistent with Section 3.10.2 Conducting a Cumulative Effects Assessment of this AIR;

- Identify any additional mitigation measures, consistent with Section 3.5 Mitigation Measures of this AIR; and

- Where an adverse residual cumulative effect is identified, the Application will also describe the likelihood, Proponent’s significance determination and predictive confidence, in accordance with Sections 3.7 Likelihood, 3.8 Proponent’s Determination of Significance and 3.9 Confidence and Risk of this AIR.

5.11 Follow-up Strategy

Where a residual effect and/or cumulative effect have been identified, the Application will include a description of a follow-up strategy that is consistent with Section 3.11 Follow-up Strategy.

5.12 Summary Table

The Summary Table will capture the following information in relation to the identified economics VCs and ICs:

- potential effects to economic VCs and ICs;
- proposed mitigation measures to address the effects identified;
- potential residual effects and the significance of the residual effects; and
- key mitigation measures and commitments made by the proponent to mitigate adverse effects of the Project on economic VCs and ICs.
6.0 **SOCIAL EFFECTS ASSESSMENT**

The Application will include an assessment of social VCs and ICs identified in the AIR. The assessment will be conducted in accordance with the methodology specified in Section 3.0 *Assessment Methodology* of this AIR and reported using the organizational structure demonstrated in the Section 4.0 *Environmental Effects Assessment*.

Table 40 and Table 41 summarize the key indicators that will be utilized to predict, measure, and monitor the effects and potential effects of the proposed Project on the selected social VCs and ICs.

There is no regulatory or government management of the social VCs or ICs.

*Input from Consultation*

The Application will describe the influence of consultation on issues scoping and how the input from consultation has been incorporated into the social effects assessment.

*Information Sources*

The Application will provide the information sources used in the assessment.

The Application will identify the methods used to collect the baseline data used to describe the social setting in accordance with the requirements of Section 3.3. Information will be obtained from sources including:

- key informant interviews;
- environmental assessment applications of other, recent mining projects in the northwest region of BC, which provide comprehensive and recent descriptions of baseline social and economic conditions and primary research;
- Statistics Canada and DataBC;
- local and regional government by-laws and planning documents; and
- spatial data from provincial, regional, and local governments.

*Supporting Reports and Studies*

In order to ensure that the Application meets the requirements of Chapter 10, paragraph 8(f), of the Nisga’a Final Agreement, IDM will conduct an ESCIA outlined in the ESCIA Work Plan agreed to by Nisga’a Nation, IDM, and the Agency.

Nisga’a Nation baseline data will be collected through desktop studies and modeling exercises conducted in support of the ESCIA. The ESCIA’s key findings related to the effects assessment of social VCs and ICs will be summarized in the Application, in a manner that allows the reader to
understand each VCs’ effects assessment. Section 12.4 of the Application will be dedicated to the 8(f) assessment.

**Valued Components, Assessment Endpoints, and Measurement Indicators**

The Application will present the VCs, ICs, assessment endpoints, and measurement indicators to be used in the assessment of Project-related effects on the social pillar (Table 40 and Table 41). The rationale for selection of VCs, ICs, and indicators will be presented in the Application. Considerations for VC or IC selection include: potential interactions with the Project; potential for adverse Project effects; Aboriginal Interests; local or community concerns; and scientific knowledge.

The Application will include the rationale for any differences in the list of VCs and ICs presented in the Application from those listed in the final AIR; proposed changes to the VCs and ICs identified in the AIR will be discussed in advance with EAO and Working Group members.

The specific measurement indicators for each VC and IC are listed in Table 40 and Table 41. Indicators are used to focus the assessment on metrics that are likely to be negatively affected by the Project and important to reviewers when considering the effects of the Project on the social pillar.
Table 40: Social Valued Components, Measurement Indicators, and Assessment Endpoints

<table>
<thead>
<tr>
<th>VC</th>
<th>Pathways</th>
<th>Primary Measurement Indicators</th>
<th>Assessment Endpoints</th>
<th>Rationale for Selection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social and Health Services</td>
<td>The following pathways will inform the assessment of potential Project impacts to Social and Health Services:</td>
<td>• Local and regional demographic statistics&lt;br&gt;• Estimated Project workforce demographics&lt;br&gt;• Anticipated demographic changes&lt;br&gt;• Availability and capacity of local social and health services&lt;br&gt;• Potential demands of Project workforce on local health and social services (using available statistics on industrial accidents in the BC mining sector)</td>
<td>Continued delivery of social and health services.&lt;br&gt;No negative effects to community health and well-being as result of the Project.</td>
<td>Social and Health Services are of importance to local and regional stakeholders.</td>
</tr>
<tr>
<td></td>
<td>• Potential Social Issues related to Project and Project Workforce&lt;br&gt;• Project-Related Employment (Direct and Indirect)&lt;br&gt;• Revenue to the Local Economy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>The following pathways will inform the assessment of Potential Social Issues Related to Project and Project Workforce:</td>
<td>• Estimated Project workforce demographics&lt;br&gt;• Anticipated demographic changes&lt;br&gt;• Availability of social and health services</td>
<td>No negative effects to community health and well-being as a result of the Project, including considerations for inequalities, vulnerable populations, mental illness, community cohesion, drug and alcohol abuse, increased rates of communicable diseases, and others aspects of community health and well-being that may be identified through consultation with communities.</td>
<td>Potential Social Issues related to the Project and Project workforce is of concern to Northern Health and other local and regional stakeholders.</td>
</tr>
<tr>
<td></td>
<td>• Social and Health Services&lt;br&gt;• Housing&lt;br&gt;• Project-Related Employment (Direct and Indirect)&lt;br&gt;• Revenue to the Local Economy</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Pathways and Measurement Indicators

<table>
<thead>
<tr>
<th>VC</th>
<th>Pathways</th>
<th>Primary Measurement Indicators</th>
<th>Assessment Endpoints</th>
<th>Rationale for Selection</th>
</tr>
</thead>
</table>
| **Housing** | The following pathways will inform the assessment of potential Project impacts to Housing:  
  - Potential Social Issues Related to Project and Project Workforce  
  - Project-Related Employment (Direct and Indirect) | • Local and regional demographic statistics  
  • Estimated Project workforce demographics  
  • Anticipated demographic changes  
  • Quantity and quality of housing stock | Continued maintenance of housing availability and affordability, community services, and infrastructure availability and access. | Housing is of importance to local and regional stakeholders. |
| **Infrastructure** | The following pathways will inform the assessment of potential Project impacts to Infrastructure:  
  - Project-Related Employment (Direct and Indirect)  
  - Project-related traffic | • Local and regional demographic statistics  
  • Estimated Project workforce demographics  
  • Project-related traffic  
  • Anticipated demographic changes | Continued maintenance of infrastructure availability and access. | Infrastructure is of importance to local and regional stakeholders. |
| **Recreational Values** | The following pathways will inform the assessment of potential Project impacts to Recreational Values:  
  - Visual Quality  
  - Fish  
  - Fish Habitat | • Changes to view-scapes  
  • Models of current and potential view-scapes  
  • Changes to access, such as prohibitions and/or increased numbers of persons wanting access  
  • Changes in existing recreational opportunities  
  • Project footprint | Continued use of recreational and tourism use opportunities. | Recreation is of importance to regional stakeholders. |
### Table 41: Social Intermediate Components and Measurement Indicators

<table>
<thead>
<tr>
<th>IC</th>
<th>Primary Measurement Indicators</th>
<th>VC Where Significance will be Determined</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project-related Traffic</td>
<td>• Local and regional demographic statistics</td>
<td>• Infrastructure: Continued maintenance of housing availability and affordability, community services, and infrastructure availability and access.</td>
<td>The Project is anticipated to potentially adversely impact infrastructure. IDM will assess the potential adverse impacts to infrastructure through a characterization of the potential change in Project related traffic.</td>
</tr>
<tr>
<td></td>
<td>• Estimated Project workforce demographics</td>
<td>• Wildlife: Maintenance of ecological conditions that support self-sustaining populations.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Project-related traffic</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Anticipated demographic changes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visual Quality</td>
<td>• Changes in visual quality as determined through modeling</td>
<td>• Recreational Values: Continued use of recreational and tourism use opportunities.</td>
<td>The Project is anticipated to potentially adversely impact recreational values. IDM will assess the potential adverse impacts to recreational values through a characterization of the potential change in visual quality.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Contemporary Land and Resource Use: Continuity of contemporary land and resource use.</td>
<td></td>
</tr>
</tbody>
</table>
6.1 **Context and Boundaries**

The Application will identify the spatial, temporal, administrative, and technical study area boundaries, as applicable to the VC or IC, including maps, in a manner consistent with Section 3.2. Table 42 and Table 43 summarize the temporal and spatial boundaries for the selected social VCs and ICs. The LSA and RSA for the majority of social VCs and ICs are shown in Figure 10. The LSA and RSA for the VC Social and Health Services are shown in Figure 11.

For all social VCs and ICs, with the exception of Social and Health Services, the LSA within which the potential social effects of the proposed Project will be assessed is an area with a radius of 50 km, which includes the following communities:

- District of Stewart;
- Village of Gitlaxt’aatamiks (formerly New Aiyansh);
- Village of Gitwinksihlkw (Canyon City);
- Village of Laxgalts’aap (Greenville);
- Village of Gingolx (Kincolith);
- Meziadin Junction; and
- Bell II.

For the VC Social and Health Services, the LSA also includes the City of Terrace to ensure that potential direct effects of the Project on the social and health services provided in Terrace are included in the effects assessment.

The RSA that will be used as a baseline comparison for predicting, measuring, and monitoring the effects and potential effects of the proposed Project on social aspects of the environment is the area covered by the Kitimat-Stikine Regional District. The Application will identify any federal lands and lands located outside Canada that may be affected by this Project.

### Table 42: Spatial and Temporal Boundaries of Social VCs

<table>
<thead>
<tr>
<th>Pillar</th>
<th>VC</th>
<th>Temporal Boundary</th>
<th>Spatial Boundary</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Social and Health Services</td>
<td>Life of Project</td>
<td><strong>LSA:</strong> District of Stewart, City of Terrace, and nearby communities (see Figure 11)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>RSA:</strong> Regional District of Kitimat-Stikine (see Figure 11)</td>
</tr>
<tr>
<td></td>
<td>Housing</td>
<td></td>
<td><strong>LSA:</strong> District of Stewart and nearby communities (see Figure 10)</td>
</tr>
<tr>
<td></td>
<td>Potential Social Issues Related to Project and Project Workforce</td>
<td></td>
<td><strong>RSA:</strong> Regional District of Kitimat-Stikine (see Figure 10)</td>
</tr>
<tr>
<td></td>
<td>Infrastructure</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Recreational Values</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Table 43: Spatial and Temporal Boundaries of Social ICs

<table>
<thead>
<tr>
<th>Pillar</th>
<th>IC</th>
<th>Temporal Boundary</th>
<th>Spatial Boundary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social</td>
<td>Project-Related Traffic</td>
<td>Life of Project</td>
<td><strong>LSA</strong>: District of Stewart and nearby communities (see Figure 10)</td>
</tr>
<tr>
<td></td>
<td>Visual Quality</td>
<td></td>
<td><strong>RSA</strong>: Regional District of Kitimat-Stikine (see Figure 10)</td>
</tr>
</tbody>
</table>
Figure 11: Social and Health Services Local and Regional Study Areas
6.2 Existing Conditions

The Application will include a description of the existing social conditions within the study area in sufficient detail to enable potential Project-VC or -IC interactions to be identified, understood, and assessed. The Application will summarize existing conditions in a manner consistent with Section 3.3 Existing Conditions of this AIR.

Anticipated Social Interactions

IDM anticipates that the following proposed Project components or activities will interact with social aspects of the Project area:

- increased population and demographic change due to employment opportunities related to the proposed Project;
- potential increased demand on social and health services as a result of demographic change and potential socio-economic issues and community health and wellbeing issues;
- potential effects to housing (e.g. availability including vacancy rates and rental rates) within the LSA as a result of demographic change;
- potential effects to infrastructure within the LSA as a result of demographic change and Project-related traffic requirements; and
- potential effects to recreational values as a result of changes to view-scapes, demographic change, changes in access to the Project area, and potential effects to CRA Fisheries.

6.3 Social and Health Services

The Application will provide a concise introduction of the assessment of the VC Social and Health Services, including the purpose of the assessment, the structure of the assessment, and linkages to other disciplines. The services that fall under the scope of this VC include the availability of and access to:

- protective services;
- emergency response services;
- primary health services;
- secondary health services;
- social work services;
- early childhood education services; and
- childhood education services.

6.4 Housing

The Application will provide a concise introduction of the assessment of the VC Housing, including the purpose of the assessment, the structure of the assessment, and linkages to other disciplines.
6.5 Potential Social Issues Related to Project and Project Workforce

The Application will provide a concise introduction of the assessment of the VC Potential Social Issues Related to Project and Project Workforce, including the purpose of the assessment, the structure of the assessment, and linkages to other disciplines. Social Issues Related to the Project and Project Workforce will include consideration for inequalities, vulnerable populations, mental illnesses, drug and alcohol abuse, increased rates of communicable diseases, and others aspects of community health and well-being that may be identified through consultation with communities.

6.6 Infrastructure

The Application will provide a concise introduction of the assessment of the VC Infrastructure, including the purpose of the assessment, the structure of the assessment, and linkages to other disciplines.

6.7 Recreational Values

The Application will provide a concise introduction of the assessment of the VC Recreational Values, including the purpose of the assessment, the structure of the assessment, and linkages to other disciplines.

6.8 Project-Related Traffic

The Application will provide a concise introduction of the assessment of the IC Project-Related Traffic, including the purpose of the assessment, the structure of the assessment, and linkages to other disciplines.

6.9 Visual Quality

The Application will provide a concise introduction of the assessment of the IC Visual Quality, including the purpose of the assessment, the structure of the assessment, and linkages to other disciplines.

6.10 Potential Effects

IDM anticipates that the following proposed Project components or activities will interact with social aspects of the Project area:

- increased demand on existing community facilities, services, infrastructure, and housing due to worker influx into the LSA;

- potential social issues related to the Project and Project workforce as a result of increased economic activity, changes to the community demographic, or a combination of factors;

- potential change to wilderness access and increased competition for recreational hunting and Fishing due to increased human population;

- potential change to visual quality in vicinity of the proposed Project; and
• increased education and skill development opportunities from sponsorship and local apprenticeship openings the proposed Project.

The Application will identify any potential adverse effects to Social VCs in a manner consistent with Section 3.4 Potential Effects. The assessment will note interactions that were excluded from further assessment, including the methods and criteria used to justify the exclusion and input received from EAO, government agencies, Nisga’a Nation, and the public regarding the exclusion.

The Application will describe any effects on the socio-economic conditions of Aboriginal Groups resulting from a change in the environment and the effects of any change to the environment directly linked or necessarily incidental to federal decisions on overall socio-economic conditions.

### 6.11 Mitigation Measures

The Application will identify measures to avoid, manage, or otherwise mitigate potential adverse effects to the social VCs. With reference to Section 3.5 Mitigation Measures, the Application will identify mitigation and design measures to minimize adverse effects on the social context of the proposed Project.

The Social and Economic Management Plan that will be developed as part of the Application will include considerations of the reasonably foreseeable potential social and economic effects of the Project. Mitigation and management plans will, therefore, be developed for potential negative effects to the selected Economic and Social VCs that are identified during the preparation of the Application. These plans will be included in the Application that will be submitted to the Working Group for review.

IDM will develop local procurement and hiring policies as part of the Project’s overall social management system and standard operating procedures. These will help provide mechanisms to facilitate consistent and coordinated efforts between local stakeholders, contractors, and IDM to mitigate potential effects of the Project.

### 6.12 Residual Effects and their Significance

The Application will identify where the proposed Project will have an adverse residual effect on the social setting the context, magnitude, extent, duration, reversibility, and frequency as described in Section 3.6, Characterization of Residual Effects.

Where an adverse residual effect on the social setting is identified, the Application will also describe the likelihood, IDM’s significance determination and predictive confidence, in accordance with Sections 3.7 Likelihood, 3.8 IDM’s Determination of Significance, and 3.9 Confidence and Risk.
6.13 **Cumulative Effects and their Significance**

If a residual effect is identified, unless stated otherwise by EAO, the Application will:

- Determine whether any cumulative interactions between residual effects of the proposed Project and the potential residual effects of other developments, based on the preliminary list of past, present, and reasonably foreseeable developments provided in the AIR, are likely to occur, consistent with Section 3.10.1 Identifying Past, Present or Reasonably Foreseeable Projects and/or Activities of this AIR;

- Conduct a cumulative effects assessment consistent with Section 3.10.2 Conducting a Cumulative Effects Assessment of this AIR;

- Identify any additional mitigation measures, consistent with Section 3.5 Mitigation Measures of this AIR; and

- Where an adverse residual cumulative effect is identified, the Application will also describe the likelihood, Proponent’s significance determination and predictive confidence, in accordance with Sections 3.7 Likelihood, 3.8 Proponent’s Determination of Significance and 3.9 Confidence and Risk of this AIR.

6.14 **Follow-up Strategy**

Where a residual effect and/or cumulative effect have been identified, the Application will include a description of a follow-up strategy that is consistent with Section 3.11 Follow-up Strategy.

6.15 **Summary Table**

The Summary Table will capture the following information in relation to the identified social VCs and ICs:

- potential effects to social VCs and ICs;
- proposed mitigation measures to address the effects identified;
- potential residual effects and the significance of the residual effects; and
- key mitigation measures and commitments made by the proponent to mitigate adverse effects of the Project on social VCs and ICs.
7.0 HERITAGE EFFECTS ASSESSMENT

The Application will include an assessment of Heritage VC identified in the AIR. The assessment will be conducted in accordance with the methodology specified in Section 3.0 Assessment Methodology of this AIR and reported using the organizational structure demonstrated in Section 4.0 Environmental Effects Assessment.

Table 44 summarizes the key indicators that will be utilized to predict, measure, and monitor the effects and potential effects of the proposed Project on the selected Heritage VC.

Regulatory Context

Heritage and cultural resources are protected by the BC Heritage Conservation Act R.S.B.C. 1996, chapter 187. The Application will address the requirements of the Act in relation to heritage and cultural resources.

Input from Consultation

The Application will describe the influence of consultation on issues scoping and how the input from consultation has been incorporated into the heritage effects assessment.

Information Sources

The Application will identify the methods used to collect the baseline data used to describe the heritage setting in accordance with the requirements of Section 3.3. Information will be obtained from sources including:

- the archaeological studies that have been completed to support the proposed Project, including the Preliminary Field Reconnaissance report, and the Archaeological Overview Assessment;

- environmental assessment applications of other, recent mining projects in the northwest region of BC, which provide comprehensive and recent descriptions of baseline heritage conditions and primary research;

- local and regional government by-laws and planning documents; and

- spatial data from provincial, regional, and local governments.

Supporting Reports and Studies

In order to ensure that the Application meets the requirements of Chapter 10, paragraph 8(f), of the Nisga’a Final Agreement, IDM will conduct an ESCIA in compliance with the ESCIA Work Plan agreed to by Nisga’a Nation, IDM, and the Agency.

Nisga’a Nation baseline data will be collected through desktop studies and modeling exercises conducted in support of the ESCIA. The ESCIA’s key findings related to the effects assessment of Heritage VC will be summarized in the Application, in a manner that allows the reader to
understand the VC’s effects assessment. Section 12.4 will be the section of the Application dedicated to the 8(f) assessment.

**Valued Components, Assessment Endpoints, and Measurement Indicators**

The Application will present the VC, assessment endpoints, and measurement indicators to be used in the assessment of Project-related effects on the heritage pillar (Table 44). The rationale for selection of the VC and indicators will be presented in the Application. Considerations for VC selection include: potential interactions with the Project; potential for adverse Project effects; Aboriginal Interests; local or community concerns; and scientific knowledge.

The Application will include the rationale for any differences in the list of VCs and ICs presented in the Application from those listed in the final AIR; proposed changes to the VCs and ICs identified in the AIR will be discussed in advance with EAO and Working Group members.

The specific measurement indicators for the VC are listed in Table 45. Indicators are used to focus the assessment on metrics that are likely to be negatively affected by the Project and important to reviewers when considering the effects of the Project on the heritage pillar.

### 7.1 Context and Boundaries

The Application will identify the spatial, temporal, administrative, and technical study area boundaries, as applicable to the VC, including maps, in a manner consistent with Section 3.2. Table 44 summarizes the temporal and spatial boundaries for the selected Heritage VC. The LSA is shown in Figure 12.

The LSA within which the potential heritage effects of the proposed Project will be assessed is an area roughly corresponding to the footprint of the proposed Project components with a 30 m buffer around all components.

No RSA will be used for the selected Heritage VC as cultural and heritage resources are potentially affected by only direct disturbance. A comparison between direct potential disturbance and the regional area is not appropriate.
Table 44: Valued Component, Assessment Endpoints and Measurement Indicators for the Heritage Assessment

<table>
<thead>
<tr>
<th>VC</th>
<th>Pathways</th>
<th>Primary Measurement Indicators</th>
<th>Assessment Endpoint</th>
<th>Rationale for Selection</th>
</tr>
</thead>
</table>
| Cultural and Heritage Resources | There are no pathways that will inform the assessment of the potential impacts on cultural and heritage resources. | • Loss, alteration, and/or degradation of physical objects, structures or human works, sites or places, and attributes  
• Changes to access  
• Changes to value or importance  
• Abundance  
• Distribution | Continued protection of cultural and heritage resources. | Cultural and Heritage Resources are of importance to NLG and regional stakeholders. |

Table 45: Spatial and Temporal Boundaries for Selected Heritage VC

<table>
<thead>
<tr>
<th>Pillar</th>
<th>VC</th>
<th>Temporal Boundary</th>
<th>Spatial Boundary</th>
</tr>
</thead>
</table>
| Heritage | Cultural and Heritage Resources | Mine Development   | LSA: Footprint of Project components with 30 m buffer (see Figure 12)  
RSA: Not Applicable |
7.2 Existing Conditions

The Application will include a description of the existing heritage conditions within the study area in sufficient detail to enable potential Project-VC interactions to be identified, understood, and assessed. The Application will summarize existing conditions in a manner consistent with Section 3.3, Existing Conditions, of this AIR.

Anticipated Heritage Interactions

IDM anticipates that the following proposed Project components or activities will interact with heritage aspects of the Project area:

- potential loss, alteration, and/or degradation of physical objects, structures, or human works, sites or places, and attributes caused by direct disturbance from Project components.

7.3 Cultural and Heritage Resources

The Application will provide a concise introduction of the assessment of the VC Cultural and Heritage Resources, including the purpose of the assessment, the structure of the assessment, and linkages to other disciplines.

7.4 Potential Effects

IDM anticipates that the following proposed Project components or activities would interact with heritage aspects of the Project area:

- potential disturbance of identified cultural and heritage resources in the Project area;
- potential disturbance of unidentified archaeological, paleontological, cultural, and heritage resources in the Project area;
- potential changes to access of cultural and heritage resources; and
- potential changes to the value or cultural importance of cultural and heritage resources.

The Application will identify any potential adverse effects to the Heritage VC in a manner consistent with Section 3.4, Potential Effects. The Application will note interactions that were excluded from further assessment, including the methods and criteria used to justify the exclusion and input received from EAO, government agencies, Nisga’a Nation, and the public regarding the exclusion.

The Application will describe:

- any effects of a change in the environment on physical and cultural heritage and/or any structure, site or thing that is of historical, archaeological, paleontological, or architectural significance to Nisga’a Nation; and
any effects of any change to the environment directly linked or necessarily incidental to federal decisions on physical and cultural heritage and/or any structure, site, or thing that is of historical, archaeological, paleontological, or architectural significance.

7.5 Mitigation Measures

The Application will identify measures to avoid, manage, or otherwise mitigate potential adverse effects to the Heritage VC. With reference to Section 3.5, Mitigation Measures, the Application will identify mitigation and design measures to minimize adverse effects on the heritage context of the proposed Project.

7.6 Residual Effects and their Significance

The Application will identify where the proposed Project will have an adverse residual effect on Heritage setting the context, magnitude, extent, duration, reversibility, and frequency as described in Section 3.6, Characterization of Residual Effects.

Where an adverse residual effect on the cultural or heritage setting is identified, the Application will also describe the likelihood, IDM’s significance determination and predictive confidence, in accordance with Sections 3.7 Likelihood, 3.8 IDM’s Determination of Significance, and 3.9 Confidence and Risk.

7.7 Cumulative Effects and their Significance

If a residual effect is identified, unless stated otherwise by EAO, the Application will:

- Determine whether any cumulative interactions between residual effects of the proposed Project and the potential residual effects of other developments, based on the preliminary list of past, present, and reasonably foreseeable developments provided in the AIR, are likely to occur, consistent with Section 3.10.1 Identifying Past, Present or Reasonably Foreseeable Projects and/or Activities of this AIR;

- Conduct a cumulative effects assessment consistent with Section 3.10.2 Conducting a Cumulative Effects Assessment of this AIR;

- Identify any additional mitigation measures, consistent with Section 3.5 Mitigation Measures of this AIR; and

- Where an adverse residual cumulative effect is identified, the Application will also describe the likelihood, Proponent’s significance determination and predictive confidence, in accordance with Sections 3.7 Likelihood, 3.8 Proponent’s Determination of Significance and 3.9 Confidence and Risk of this AIR.

7.8 Follow-up Strategy

Where a residual effect and/or cumulative effect have been identified, the Application will include a description of a follow-up strategy that is consistent with Section 3.11 Follow-up Strategy of this AIR, and EIS Guidelines Section 8.
7.9 Summary Table

The Application will contain a Summary Table that will summarize the following information in relation to the identified Heritage VC:

- potential effects to the Heritage VC;
- proposed mitigation measures to address the effects identified;
- potential residual effects and the significance of the residual effects; and
- key mitigation measures and commitments made by the proponent to mitigate adverse effects of the Project on the Heritage VC.
Figure 12: Heritage Local Study Area
8.0 HEALTH EFFECTS ASSESSMENT

The Application will include an assessment of health VCs identified in the AIR. The assessment will be conducted in accordance with the methodology specified in Section 3.0 Assessment Methodology of this AIR and reported using the organizational structure demonstrated in Section 4.0 Environmental Effects Assessment.

The Human Health effects assessment covered under the Health pillar will be specific to physiological human health resulting from changes to the biophysical environment due to proposed Project activities. Community and public health effects (and potential related physiological effects) resulting from social, economic, built environment, and traffic changes will be described under the Social pillar in Section 6, Social Effects Assessment.

Table 46 summarizes the key indicators that will be utilized to predict, measure, and monitor the potential effects of the proposed Project on the Human Health VC.

Input from Consultation

Application will provide a concise introduction of the assessment of the Human Health VC, including the purpose and structure of the assessment, and linkages to other disciplines.

Valued Components, Assessment Endpoints and Measurement Indicators

The VC within the Human Health Effects Assessment is Human Health. The rationale for inclusion and methodology for evaluation will be included within the Application. The key indicators used to evaluate the VC will vary somewhat by receptor, but in general will include:

1. Comparison of baseline measurements and predictions to applicable environmental quality screening thresholds (e.g., regulatory guidelines, criteria, standards for air quality metrics, soil quality, water quality) to identify constituents of potential concern (COPCs) to humans, also incorporated into the Human Health Risk Assessment (HHRA) with hazard quotient and incremental lifetime cancer risk metrics as outputs;

2. Human health risk estimates for receptors of concern for each COPC/operable exposure pathway combination, compared to Health Canada acceptability thresholds; and,

3. Lifestyle changes related to changes in non-COPC stressors such as noise and visual effects.

The Application will identify the VCs selected for assessment according to the methodology specified in Section 3.1 Issues Scoping and Selection of Valued Components.
### Table 46: Selected Health VC and Key Indicators

<table>
<thead>
<tr>
<th>VC</th>
<th>Pathways</th>
<th>Primary Measurement Indicators</th>
<th>Assessment Endpoint</th>
<th>Rationale for Selection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human Health</td>
<td>The following pathways will inform the assessment of Human Health:</td>
<td>• Baseline levels for chemical COPCs in soil, surface water, groundwater (drinking water), particulate matter, and dustfall rate.</td>
<td>Protection of Human Health is defined as physiological health resulting from changes in the biophysical environment from Project activities.</td>
<td>Human health is of importance to provincial and federal regulators, NLG, and the general public.</td>
</tr>
<tr>
<td></td>
<td>• Air Quality</td>
<td></td>
<td>Community and public health effects resulting from social, economic, built environment, and traffic changes will be described under the Social pillar in Section 6, Social Effects Assessment.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Soil Quality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Noise</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Groundwater Quality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Surface Water Quality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Fish (tissue quality)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Wildlife (tissue quality)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Vegetation (tissue quality)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Visual Quality</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 8.1 Context and Boundaries

#### 8.1.1 Spatial Boundaries

The Application will identify the spatial boundaries related to Human Health, and provide rationale for boundary selection. Table 47 summarizes the spatial and temporal boundaries for Human Health. The spatial boundaries are provided in Figure 10 of this AIR. The HHRA study boundaries are based on the spatial boundaries established for air quality, water quality, wildlife, noise, and visual effects. Any changes to the study areas will be described and rationalized in the Application.

#### 8.1.2 Temporal Boundaries

The Application will identify temporal boundaries related to the assessment of the Human Health VC and will describe the associated rationale for these boundaries. As per Health Canada Human Health Risk Assessment guidance, the outcomes represent specific points in time. The approach will be to consider baseline (pre-construction), as well as determination of safe levels of Project related COPCs in key environmental media to support ongoing monitoring during and, if necessary, after mine operations.

#### 8.1.3 Administrative Boundaries

The administrative boundaries for the HHRA will be defined by the Canadian legislative and regulatory requirements associated with the Application process as well as those federal Canadian and British Columbia regulatory requirements relevant to the completion of HHRAs.
8.1.4 Technical Boundaries

The technical boundaries for the Health Effects Assessment will be those imparted by the regulatory guidance in place for the completion of HHRAs within BC and Canada. The principal BC and Canadian federal technical guidance documents that will be considered include:


Table 47: Spatial and Temporal Boundaries of Human Health

<table>
<thead>
<tr>
<th>VC</th>
<th>Temporal Boundary</th>
<th>Spatial Boundary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human Health</td>
<td>Life of Project</td>
<td>LSA and RSA: Aligned with the study boundaries established for air quality, water quality, wildlife, noise, and visual effects.</td>
</tr>
</tbody>
</table>

8.2 Existing Conditions

The Application will include a description of the existing health conditions within the LSA in sufficient detail to enable potential Project-VC interactions to be identified, understood, and assessed. The Application will summarize existing conditions in a manner consistent with Section 3.3, Existing Conditions of this AIR.

8.2.1 Approach to Collecting Baseline Information

A range of baseline environmental quality information will be required for the assessment of baseline human health risk levels supporting the evaluation of the Human Health VC. These include baseline levels for chemical constituents of potential concern (COPCs) in soil, surface water, groundwater (drinking water), particulate matter, dustfall rates, along with chemical COPC baseline levels in Country Foods such as fish, plants, birds, and mammals, which will be based primarily on modeling from local air, soil, and water quality data. Fish tissue data and vegetation tissue data are also being collected as part of baseline sampling programs. Through consideration of potential human exposures to these media via relevant pathways (e.g., inhalation, purposeful or incidental ingestion, dermal contact), a baseline of human health risk will be established. Additional non-chemical baselines will also be established for visual effects and noise. The Application will detail the field programs for the acquisition of soil quality data, sediment quality data, water quality data, air quality data, vegetation tissue data, and fish tissue data.
A set of surrogate foods representing all Country Foods will be identified in order to conduct a food consumption risk assessment. The surrogate foods selected are those known to be consumed by local receptors with a higher likelihood of being exposed to contaminants, and foods such as those represented by baseline tissue residue analysis. Any information provided by NLG in this matter will be considered. IDM intends to consult the available literature, including previous studies, to identify types of food consumed by local receptors that could serve as surrogate foods. During completion of the HHRA study, the list of selected surrogate foods will be provided for comment.

Details pertaining to the specific methods used to estimate non-carcinogenic risk levels (i.e., hazard quotients [HQs]) and cancer risk levels (i.e., incremental lifetime cancer risks [ILCRs]), are described within referenced literature, and will be cited in the Application.

The risk assessment will include an assessment of baseline exposure and an assessment of predicted exposure. The risk assessment paradigm includes the following major sections:

1. Introduction
2. Problem Formulation
3. Exposure Assessment
4. Toxicity (Effects/Hazard) Assessment
5. Risk Characterization

The introduction will provide background and context for the assessment including objectives, summary of supporting studies, and regulatory framework.

The problem formulation is a key component and will include identification of likely sources of COPCs, identification of the COPCs that will require quantitative assessment in the HHRA, identification of release and transport mechanisms of COPCs, identification of the receptor groups of concern, identification of relevant exposure pathways between receptors and COPCs, and summarize this information in a conceptual site exposure model. Sources of information to support this will include:

- measured concentrations will be established for metals and non-metals in soils and dust;
- measured total and dissolved metal concentrations will be characterized for groundwater sources;
- measured concentrations of metals and PAH will be established for sediment samples;
- Project activities, such as vehicle traffic, mining operations, and milling due to the deposition of dust will be identified as having a potential for an adverse effect on sediment quality;
- concentrations of total and dissolved metals will be measured in surface water samples; and
- Project activities, such as vehicle traffic, mining operations, and milling will be identified as having a potential adverse effect on surface water quality.
The exposure assessment will include an estimation of the reasonable maximum exposure (RME) levels for each COPC, identification of the receptor exposure characteristics that influence exposure (e.g., inhalation rates, food consumption rates, etc.), and estimation of receptor exposures via operable exposure pathways. Exposure characteristics will be based on Health Canada guidance and on information available from local communities. Exposure concentrations for environmental media will be based on measured or modeled concentrations.

The toxicity assessment, sometimes referred to as a hazard or effects assessment, will describe the COPC toxicity along with summarizing relevant regulatory, toxicity-based exposure thresholds. These are known as toxicity reference values (TRVs).

The risk characterization will combine the exposure assessment results with the toxicity assessment information to provide an estimate of non-cancer HQ results and ILCR (cancer) risk estimates. A consideration of the uncertainties within the study will also be provided to add context to the findings.

**8.2.2 Summary of the Regulatory or Government Context**

The regulatory risk assessment guidance documents that will inform the approach for completion of the Human Health Risk Assessment will include, but may not be limited to:

- Preliminary Quantitative Risk Assessment (Health Canada 2012);
- Guidance on Human Health Detailed Quantitative Risk Assessment for Chemicals (Health Canada 2010);
- Supplemental Guidance on Human Health Risk Assessment for Country Foods (Health Canada 2010); and,
- Guidance on Human Health Risk Assessment (Northern Health 2015)

Additional regulatory chemical screening levels will also be considered to support identification of COPCs and the approach will be documented within the Human Health Risk Assessment in the Application. Additional regulatory guidance considered for evaluation of potential noise effects on health includes:

- Guidelines for Community Noise (World Health Organization 1999); and,

**8.2.3 Technical Reports**

A Human Health Risk Assessment (HHRA) report that follows regulatory guidance will be prepared and included as a technical appendix to the Application. The results of this report will inform and be incorporated directly into the Health Effects section of the Application.

Worker health and safety will be addressed in the Occupational Health and Safety Plan as part of the Application Environmental Management System.
The Application will summarize existing conditions in a manner consistent with Section 3.3, Existing Conditions of this AIR.

### 8.3 Potential Effects

Human health can be affected by a variety of stressors including those of a physical or chemical nature. Project-related stressors will be considered within an HHRA framework that considers qualitative and quantitative information, as well as potential for risk or adverse effects at a local and/or regional scale. The stressors that will be evaluated in relation to the Project will include the chemical emissions into the atmosphere, and terrestrial and aquatic environments, along with physical stressors, such as light and noise. Receptors of concern will include: residents, recreational users within the area, and non-occupational work exposures (i.e., non-mine workers in area). Aboriginal Groups will also be specifically considered given cultural and Treaty use of Country Foods within the area of the proposed Project.

IDM anticipates that the following potential VC interactions with Project components:

- purposeful consumption of Country Foods and drinking water by Aboriginal Groups;
- incidental ingestion of surface soil (all receptor groups);
- dermal contact with surface soil (all receptor groups); and
- inhalation of air particulate (dust) (all receptor groups).

Project components that may contribute to the above exposure pathways will be determined within the risk assessment process, but may include dust generation from existing unpaved roads or proposed road construction activities, milling operations, waste rock or exposed tailing storage areas. Current soil quality baseline within these areas will be used to assess baseline risk levels using conservative particulate emission factors. Similarly, it’s recognized that wildlife that feed directly or indirectly on species exposed to mine-related areas such as waste rock, tailings, and roadways have the potential to take up COPCs into tissue. This will be considered in the baseline risk assessment as well.

The Application will identify potential adverse effects to the VC in a manner consistent with Section 3.4 Potential Effects of this AIR.

### 8.4 Mitigation Measures

The Application will identify measures to avoid, manage, or otherwise mitigate potential adverse effects to the VC in a manner consistent with Section 3.5 Mitigation Measures of this AIR. Relevant management plans will be referenced. Linkages to other sections in the Application must be identified.

### 8.5 Residual Effects and their Significance

Where an adverse residual effect is identified, the Application will characterize the residual effect based on the context, magnitude, extent, duration, reversibility, and frequency as described in Section 3.6 Characterization of Residual Effects of this AIR.
Where an adverse residual effect is identified, the Application will also describe the likelihood, Proponent’s significance determination and predictive confidence, in accordance with Sections 3.7 Likelihood, 3.8 Proponent’s Determination of Significance and 3.9 Confidence and Risk of this AIR.

8.6 Cumulative Effects and their Significance

If a residual effect is identified, unless stated otherwise by EAO, the Application will:

- determine whether any cumulative interactions between residual effects of the proposed Project and the potential residual effects of other developments, based on the preliminary list of past, present, and reasonably foreseeable developments provided in the AIR, are likely to occur, consistent with Section 3.10.1 Identifying Past, Present or Reasonably Foreseeable Projects and/or Activities of this AIR;

- conduct a cumulative effects assessment consistent with Section 3.10.2 Conducting a Cumulative Effects Assessment of this AIR;

- identify any additional mitigation measures, consistent with Section 3.5 Mitigation Measures of this AIR; and

- where an adverse residual cumulative effect is identified, the Application will also describe the likelihood, Proponent’s significance determination and predictive confidence, in accordance with Sections 3.7 Likelihood, 3.8 Proponent’s Determination of Significance and 3.9 Confidence and Risk of this AIR.

8.7 Follow-up Strategy

Where a residual effect and/or cumulative effect have been identified, the Application will include a description of a follow-up strategy that is consistent with Section 3.11 Follow-up Strategy of this AIR.

8.8 Conclusion

The Application will provide a consolidated summary of the predicted residual effects and determination of significance for the VC Human Health. The Application will also indicate the disciplines of study to which the results of this assessment have been forwarded for incorporation in their assessments.
9.0 ACCIDENTS AND MALFUNCTIONS

The Application will include the following:

• Identification of potential accidents and malfunctions;

• The overall methodology for assessing the potential risk of an event (likelihood and consequence);

• Definitions of each category of likelihood;

• Definitions for each category of consequence;

• An assessment of the likelihood of the event occurring, based on historical trends and predictive models;

• Identification of proposed measures to reduce the likelihood of the event;

• Assessment of consequence of the event, in a manner consistent with the direct effects assessments outlined in this document;

• Identification of measures to mitigate the consequences to valued components; and

• Conclusions on the potential risk (likelihood multiplied by consequence) of the accident or malfunction.

The Application will identify potential accidents, malfunctions, and unplanned events that may occur in any phase of the Project. The circumstances under which these events could occur will be described. Proposed risk mitigations and contingency plans will be provided in the Application and cross-referenced with the Environmental Management and Monitoring programs (Section B9 and B10) for the Project. Residual effects are defined in terms of risk and risk criteria will be used to evaluate the classification of residual effects based on the likelihood that a specific severity of environmental or public consequence could occur.

Accidents and/or malfunction events that will be assessed include, but are not limited to:

• spills of hazardous substances stored on site (reagents, fuels, contained liquid waste);

• leakage or spill of materials with potential risks to the environment (including petroleum products, chemicals and other materials) as a result of road, air, and/or water line transportation;

• accidental release of contaminants from ore/waste rock stockpiles;

• breach or failure of tailings dam or other containment structure;

• accidental discharge of off-specification effluent from treatment plants;
- sediment releases into watercourses;
- accidents related to construction and operation of underground facilities;
- fires or explosions;
- failure of permanent and temporary waste rock dumps or stockpiles;
- safety to personnel resulting from inrushes to the underground mine;
- safety to personnel resulting from fly rock from blasting; and
- failure of the lower adit plug, installed on closure of the mine.

The Application will include a Failure Modes and Effects Analysis (FMEA), developed for the feasibility study, to evaluate the likelihood of a hypothetical failure of a designed system and the potential consequences (effects) of that failure on the selected VCs or ICs. The assessment will:

- describe the key environmental effects of such failures, including any effects on CEAA 2012 s.5 components;
- identify mitigation/controls that are incorporated into the proposed Project design to reduce the risk; and
- identify contingency plans and response options to address residual risks.
10.0 EFFECTS OF THE ENVIRONMENT ON THE PROJECT

The Application will include:

- The environmental factors deemed to have possible consequences on the proposed Project, including, but not necessarily limited to, consideration of natural hazards such as:
  - predicted climate change effects throughout the Project lifecycle, including extreme weather events (e.g., heavy rain/snowfall, flooding, extreme temperatures, drought and wind);
  - avalanches;
  - landslides;
  - natural seismic events; and
  - lightning and forest fire.

- A description of any changes or effects on the proposed Project that may be caused by the above-mentioned environmental factors;

- The likelihood and consequence of the changes or effects to relevant VCs or ICs;

- Practical mitigation measures, including design strategies and environmental contingency plans, to avoid or minimize the likelihood and consequence of the effects of the environment on the proposed Project; and

- A conclusion about the potential risk of an effect of the environment on the proposed Project and to relevant VCs or ICs.

The Application will assess the effects of the environment on the Project, including consideration of natural hazards. The Application will identify how local environmental conditions and natural hazards may adversely affect the proposed Project.

The “Incorporating Climate Change Considerations in Environmental Assessment: General Guidance for Practitioners” (2003; Federal-Provincial-Territorial Committee on Climate Change and Environmental Assessment) guidance document will be considered in preparing the assessment of how climate change could affect the Project. The effects of the environment on the Project assessment will identify the likelihood and severity of the changes or effects, and identify mitigation measures, including environmental management plans and design strategies, planned to avoid or minimize the likelihood and severity of the changes or effects.
PART C – ABORIGINAL CONSULTATION

The Aboriginal Groups discussed in the Application will include:

- Nisga’a Nation;
- Tsetsaut Skii km Lax Ha (TSKLH); and
- Métis Nation BC (MNBC).

Section 11 of the Application will apply to TSKLH and MNBC; Section 12.0 will apply specifically to Nisga’a Nation.

11.0 TSETSAUT SKII KM LAX HA AND MÉTIS NATION BC

11.1 Consultation Summary

For TSKLH and MNBC, the Application will include:

- A summary of past and planned consultation activities;
- A summary of proposed changes to the Aboriginal Consultation Plan resulting from the TSKLH and MNBC’s feedback, or experience from consultation to date, including any such changes which have been implemented;
- A summary of the key issues and concerns raised by TSKLH and MNBC relevant to the environmental assessment, IDM’s responses to those issues and concerns, and the status of resolution;
- Traditional Ecological Knowledge and Traditional Land Use information, as available, with a description of how Traditional Ecological Knowledge (TEK) and Traditional Land Use Studies (TLUS) information was gathered and incorporated into the assessment of impacts of the proposed Project on Aboriginal Interests;
- A summary of any outstanding Aboriginal Interests issues identified by TSKLH or MNBC; and
- A summary of publically available arrangements or agreements reached between the proponent and TSKLH or MNBC.

11.2 Current Use of Land and Resources for Traditional Purposes

In order to meet the requirements of paragraph 5.1(c) of CEAA 2012 and Section 6.3.4 of the Environmental Impact Statement (EIS) Guidelines issued by the Agency for the Project, the Application will include an assessment of the VC Current Use of Land and Resources for Traditional Purposes (CULRTP) under Part C. The assessment of this VC will be located in Part C.
in order to focus the discussion on Aboriginal Interests, which are usually covered in Part C. This section of the Application will include:

- A map that identifies Indian Reserves and Aboriginal communities, for the TSKLH and MNBC and the Project location;

- A description of the Aboriginal Interests of each group identified through secondary research techniques or provided directly through consultation activities. The description will include background information on ethnography, language, governance, economy and reserves;

- A description of potential adverse effects of the proposed Project on Aboriginal Interests;

- A description or summary of mitigation measures to avoid or reduce potential adverse effects on Aboriginal Interests consistent with Section 3.5 Mitigation Measures of this AIR; and

- A characterization of the residual adverse effects on Aboriginal Interests after mitigation using the methodology described in Sections 3.6 Characterization of Residual Effects, 3.7 Likelihood, and 3.9 Confidence and Risk of this AIR and incorporating the findings of the VC chapters in the Application that are relevant to Aboriginal Interests.

The Application will include a concise introduction of the CULRTP, including the purpose of the assessment, the structure of the assessment, and linkages to other disciplines.

**Regulatory Context**

The assessment of potential effects of the Project on CULRTP is a requirement of paragraph 5.1(c) of CEAA 2012 and is outlined in Section 6.3.4 of the EIS Guidelines issued for the Project.

**Input from Consultation**

The Application will describe the influence of consultation on issues scoping and assessment.

**Information Sources**

The Application will provide the information sources used in the assessment.

The Application will identify the methods used to collect the baseline data used to describe the social setting in accordance with the requirements of Section 3.3. Information will be obtained from sources including:

- environmental assessment applications of other, recent mining projects in the northwest region of BC, which provide comprehensive and recent descriptions of baseline social and economic conditions and primary research;

- spatial and demographic data from federal, provincial, regional, and local governments; and

- local and regional government by-laws and planning documents.
Valued Components, Intermediate Components, and Measurement Indicators

The Application will identify that CULRTP is a valued component that may be affected by the Project. The Application will describe the measurement indicators, intermediate components, and assessment endpoints that will be used to comprehensively evaluate the potential changes to CULRTP that may result from the Project (Table 48).

Table 48: Valued Component, Intermediate Components, Measurement Indicators, and Assessment Endpoints for CULRTP

<table>
<thead>
<tr>
<th>VC</th>
<th>Pathways</th>
<th>Primary Measurement Indicators</th>
<th>Assessment Endpoint</th>
<th>Rationale for Selection</th>
</tr>
</thead>
</table>
| Current Use of Land and Resources for Traditional Purposes (CULRTP) | The following pathways will inform the assessment of CULRTP:  
• Fish  
• Fish Habitat  
• Wildlife  
• Vegetation  
• CRA Fisheries |  
• Changes to availability of fish, wildlife, or birds trapped or hunted for traditional purposes.  
• Changes to availability of traditional use plants.  
• Changes to access. | Continuity of CULRTP. | The assessment of CULRTP is a requirement of CEAA 2012. |

11.2.1 Context and Boundaries

The Application will identify the spatial, temporal, administrative, and technical study area boundaries, as applicable to the VC, including maps, in a manner consistent with Section 3.2. Table 49 summarizes the temporal and spatial boundaries for CULRTP. The LSA and RSA are shown in Figure 13.

The LSA within which the potential CULRTP effects of the proposed Project will be assessed is an area roughly corresponding to the LSA and RSA for the social and economic pillars, adjusted to the relevant traditional territory boundaries. The rationale for roughly following the LSA and RSA for the social and economic pillars is to allow for straightforward comparison between these aspects.
Table 49: Spatial and Temporal Boundaries for CULRTP

<table>
<thead>
<tr>
<th>Pillar</th>
<th>VC</th>
<th>Temporal Boundary</th>
<th>Spatial Boundary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aboriginal Interests</td>
<td>CULRTP</td>
<td>Life of Project</td>
<td>LSA: Area with roughly 50 km radius around the Project, adjusted for appropriate</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>traditional territory boundaries. See Figure 13.</td>
</tr>
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<td></td>
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<td></td>
<td>RSA: Regional District of Kitimat-Stikine, adjusted for appropriate traditional</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>territory boundaries. See Figure 13.</td>
</tr>
</tbody>
</table>

11.2.2 Existing Conditions

The Application will include a description of the existing CULRTP conditions within the LSA in sufficient detail to enable potential Project-VC interactions to be identified, understood, and assessed. The Application will summarize existing conditions in a manner consistent with Section 3.3, Existing Conditions, of this AIR.

Anticipated CULRTP Interactions

IDM anticipates that the following proposed Project components or activities will interact with CULRTP aspects of the Project area:

- changes to the environment resulting in changes to availability of wild game, birds, and fish trapped and hunted for traditional purposes;
- changes to the availability of traditional use plants, such as medicinal plants and berries, in the Project area; and
- changes to access to the Project area.

11.2.3 Potential Effects

The Application will identify any potential adverse effects to CULRTP in a manner consistent with Section 3.4, Potential Effects. The Application will note interactions that were excluded from further assessment, including the methods and criteria used to justify the exclusion and input received from EAO, government agencies, TSKLH, MNBC, and the public regarding the exclusion.

11.2.4 Mitigation Measures

The Application will identify measures to avoid, manage or otherwise mitigate potential adverse effects to CULRTP. With reference to Section 3.5, Mitigation Measures, the Application will identify mitigation and design measures to minimize adverse effects on CULRTP in the Project area.
11.2.5 Residual Effects and their Significance

The Application will identify where the proposed Project will have an adverse residual effect on CULRTP, including the context, magnitude, extent, duration, reversibility, and frequency of a potential adverse residual effect, as described in Section 3.6, Characterization of Residual Effects.

Where an adverse residual effect on CULRTP is identified, the Application will also describe the likelihood, IDM’s significance determination and predictive confidence, in accordance with Sections 3.7 Likelihood, 3.8 Determination of Significance, and 3.9 Confidence and Risk.

11.2.6 Cumulative Effects and their Significance

If a residual effect is identified, unless stated otherwise by EAO, the Application will:

• Determine whether any cumulative interactions between residual effects of the proposed Project and the potential residual effects of other developments, based on the preliminary list of past, present, and reasonably foreseeable developments provided in the AIR, are likely to occur, consistent with Section 3.10.1 Identifying Past, Present or Reasonably Foreseeable Projects and/or Activities of this AIR;

• Conduct a cumulative effects assessment consistent with Section 3.10.2 Conducting a Cumulative Effects Assessment of this AIR;

• Identify any additional mitigation measures, consistent with Section 3.5 Mitigation Measures of this AIR; and

• Where an adverse residual cumulative effect is identified, the Application will also describe the likelihood, Proponent’s significance determination and predictive confidence, in accordance with Sections 3.7 Likelihood, 3.8 Proponent’s Determination of Significance and 3.9 Confidence and Risk of this AIR.

11.2.7 Follow-up Strategy

Where a residual effect and/or cumulative effect have been identified, the Application will include a description of a follow-up strategy that is consistent with Section 3.11 Follow-up Strategy of this AIR.

11.2.8 Summary Table

The Application will contain a Summary Table that will summarize the following information in relation to CULRTP:

• potential effects to CULRTP;

• proposed mitigation measures to address the effects identified;

• potential residual effects and the significance of the residual effects; and

• key mitigation measures and commitments made by the proponent to mitigate adverse effects of the Project on CULRTP.
Figure 13: Current Use of Land and Resources for Traditional Purposes Local and Regional Study Areas
11.3 Other Matters of Concern

The Application will include:

- A list of other matters of concern raised by TSKLH and MNBC with respect to potential environmental, economic, social, heritage, and health effects of the proposed Project, which have not already been considered in the discussion about Aboriginal Interests or in the statutory requirements under CEAA 2012 where applicable;

- A description (or summary if described elsewhere in the Application) of the mitigation measures to address potential effects on other matters of concern to TSKLH and MNBC;

- A characterization of the residual adverse effects after mitigation, in a manner consistent with assessment methodology in this AIR; and

- A description of how these matters of concern have been addressed from the perspective of TSKLH or MNBC and IDM.

11.4 Issue Summary Table

The Application will include:

- A Summary Table (see example below) that identifies Aboriginal Interests or other matters of concern to TSKLH and MNBC that may be impacted by the proposed Project, and the measures to avoid, mitigate or otherwise manage the effects; and

- An Appendix, the Aboriginal Consultation Report, which contains comments received from TSKLH and MNBC regarding this section of the Application.

Table 50: Summary Table of the Results of Aboriginal Consultation related to Aboriginal Interests/Other Matters of Concern to TSKLH and MNBC

<table>
<thead>
<tr>
<th>Topic</th>
<th>Issue, Interest, or Concern Raised</th>
<th>Analysis of Potential Effect</th>
<th>Proposed Measures to Avoid, Mitigate or Otherwise Manage Effects</th>
<th>Status of Resolution (e.g. resolved, ongoing resolution, referred to agency, etc.)</th>
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</tbody>
</table>


12.0 NISGA’A NATION

12.1 Nisga’a Nation Background and Context

- background information about Nisga’a Nation’s cultural and political context, including information regarding the NFA;
- a description of the Nisga’a Nation Treaty Rights, including background information on ethnography, language, governance, and economy; and
- a map that identifies Nisga’a Lands, the Nass Area, and the Nass Wildlife Area under the NFA, and the Project location.

12.2 Nisga’a Nation Consultation

The Application will include:

- a summary of past and planned consultation activities with Nisga’a Nation;
- a summary of proposed changes to the Nisga’a Consultation Plan resulting from Nisga’a Nation feedback, or experience from consultation to date, including any such changes which have been implemented;
- a summary of the key issues and concerns raised by Nisga’a Nation relevant to the environmental assessment, IDM’s responses to those issues and concerns, and the status of resolution; and
- a summary of publically available arrangements or agreements reached between the proponent and Nisga’a Nation.

12.3 Environmental Effects Assessment (Pursuant to Chapter 10 Paragraph 8(e) of the NFA)

The Application will include:

- the Proponent’s analysis of whether or not the proposed Project can reasonably be expected to have an adverse environmental effect on the residents of Nisga’a Lands, Nisga’a Lands, or Nisga’a interests as set out in the NFA; and
- the measures proposed by the Proponent to prevent or mitigate those effects.

Table 51 outlines the relevant Chapter 10 Paragraph 8(e) Nisga’a Nation Treaty interests to be analyzed in the Application.
### Table 51: Nisga’a Nation 8(e) Concordance Table

<table>
<thead>
<tr>
<th>NFA Ref.</th>
<th>Nisga’a Nation Treaty Interest Identified in NFA Chapter 10 Paragraph 8(e)</th>
<th>Related Section of AIR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chapter 8</td>
<td>Nisga’a Treaty right to manage and harvest Fish, including, specific allocations for:</td>
<td>2.3, 4.4, 4.8, 4.9, 4.11, 4.12, 4.13, 5.3, 5.4, 12.3</td>
</tr>
<tr>
<td></td>
<td>• Nass salmon (i.e., sockeye, pink, chinook, coho, and chum salmon originating in the Nass Area);</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Nass steelhead (i.e., winter run and summer run steelhead originating in the Nass Area); and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Eulachon (also known as Oolichan) within the Nass Area.</td>
<td></td>
</tr>
<tr>
<td>Chapter 8</td>
<td>Nisga’a Treaty right to harvest non-salmon species of Fish and aquatic plants, including marine mammals, for domestic purposes in the Nass Area.</td>
<td>2.3, 4.4, 4.8, 4.9, 4.11, 4.12, 4.13, 5.3, 5.4, 12.3</td>
</tr>
<tr>
<td>Chapter 9</td>
<td>Nisga’a Treaty right to manage and harvest wildlife, including wildlife Fish, for domestic purposes in the Nass Wildlife Area, with specific allocations for:</td>
<td>2.3, 4.10, 4.12, 5.3, 5.4, 9.0, 12.3</td>
</tr>
<tr>
<td></td>
<td>• Grizzly bear;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Moose;</td>
<td></td>
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<tr>
<td></td>
<td>• Mountain goats; and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Other species as designated through annual management plans.</td>
<td></td>
</tr>
<tr>
<td>Chapter 9</td>
<td>Nisga’a Treaty right to manage and harvest migratory birds for domestic purposes in the Nass Area.</td>
<td>2.3, 4.10, 5.4, 9.0, 12.3</td>
</tr>
<tr>
<td>n/a</td>
<td>Guide Outfitting Licence</td>
<td>2.3, 4.10, 5.3, 5.4, 6.9, 12.3</td>
</tr>
<tr>
<td>Chapter 6</td>
<td>Nisga’a Treaty right to access to other lands:</td>
<td>2.3, 5.4, 6.5, 9.0</td>
</tr>
<tr>
<td></td>
<td>• agents, employees, and contractors of Nisga’a Nation, Nisga’a Villages, Nisga’a Corporations and members of the Nisga’a Police Service and Nisga’a Institutions access to Nass Wildlife Area to carry out their responsibilities; and</td>
<td></td>
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<tr>
<td></td>
<td>• Nisga’a citizens reasonable access to Crown lands to allow for the exercise of Nisga’a Treaty rights and for the normal use and enjoyment of Nisga’a interests set out in the NFA.</td>
<td></td>
</tr>
</tbody>
</table>

Reference: Nisga’a Final Agreement, April 27, 1999

Spatial and temporal boundaries will be consistent, as appropriate, with the related section of AIR as noted in Table 51.

#### 12.3.1 8(e) Assessment Methodology

The 8(e) assessment will summarize the environmental baseline data and effects assessments in Part B of the Application and link them to the relevant Nisga’a Nation Treaty interests. It will
consider direct and indirect interactions between the proposed Project and the biophysical environment.

12.3.2 Existing Environmental Conditions, Potential Effects, and Mitigation Measures

This section of the Application will summarize the existing environmental conditions, potential environmental effects of the proposed Project, and the proponent’s proposed mitigation measures as they relate to Nisga’a Nation Treaty rights.

Baseline environmental conditions will be summarized from information contained in Part B of the Application and a literature review of existing information. The sources for the information contained in Part B of the Application will be listed under each relevant section. Additional sources may include, but are not limited to:

- consultation with Nisga’a Nation;
- similar regulatory applications and project effects assessments for the Kitsault Mine Project, Kerr-Sulphurets-Mitchell (KSM) Mine Project, Brucejack Mine Project, Prince Rupert Gas Transmission Project (PRGT), and Westcoast Connector Gas Transmission Project; and
- consultation with local and regional stakeholders to obtain insight into local and regional issues.

If additional information is required to conduct the analysis and assessment of effects on topics identified in paragraph 8(e) of the NFA, the Proponent will, subject to any direction from EAO, consult with NLG and seek to reach agreement on terms of reference for the collection and integration of additional data.

12.3.3 8(e) Assessment

For each interest listed in Table 51, the Application will consider in the following parameters in accordance with the Agency’s EIS Guidelines for the proposed Project, dated January 2016:

- Ecological Effects: The extent that a given component of the ecosystem could be altered by the Project so as to cause an adverse effect on that component of the ecosystem.

- Treaty Right to Use: The extent that a given component of the ecosystem which is currently used or could be used in the future by Nisga’a citizens (regardless of actual levels of past or current use) could be altered by the Project so as to cause an adverse effect on the use of that component of the ecosystem by Nisga’a citizens (or Nisga’a entity).

- Human Health: The extent that a given component of the ecosystem could be altered by the Project so as to cause an adverse effect to the health of Nisga’a citizens and other residents of Nisga’a Lands who use that component of the ecosystem:

Only those Treaty rights that are identified as having an interaction with the proposed Project will be carried forward.
In conjunction with the consideration of ecological effects, effects on Treaty right to use, and on human health, IDM will carry out the following steps in support of the 8(e) assessment:

- identify the geographic extent of the Treaty right as set out in the NFA, and establish whether or not the geographic extent of the Treaty right differs in any way from the spatial boundaries applicable to any related VC or indicator discussed elsewhere in the Application. If a difference is identified, determine the relevance to assessing potential adverse environmental effects to the Nisga’a Nation Treaty right;

- provide a narrative that clearly describes assumptions and limitations in understanding the full extent of potential adverse environmental effects on residents of Nisga’a Lands, Nisga’a Lands, and Nisga’a interests, as set out in the NFA, and identifies any empirical evidence or professional opinion that has been relied upon;

- identify any additional information being used to inform the assessment of potential adverse environmental effects on the Nisga’a Nation Treaty right;

- determine whether there is the potential for an adverse environmental effect on the Nisga’a Nation Treaty right;

- provide descriptions of any actions proposed for the purpose of impact prevention or mitigation of potential adverse environmental effects on the Nisga’a Nation Treaty right;

- determine whether a residual adverse environmental effect, after mitigation, is reasonably expected, having a regard to the likelihood of an impact on the Nisga’a Nation Treaty right and confidence level of such predictions;

- describe any residual adverse environmental effect on the Nisga’a Nation Treaty right in terms of its magnitude, duration, frequency, reversibility, context, and confidence level of such predictions; and

- views of NLG, if provided, on any of the above-noted information requirements.

12.4 Economic, Social, and Cultural Effects Assessment (Pursuant to Chapter 10, Paragraph 8(f) of the NFA)

This section of the Application will include the Proponent’s analysis of the effects of the proposed Project on the existing and future economic, social, and cultural well-being of Nisga’a citizens, in accordance with paragraph 8(f) of Chapter 10 of the NFA. The analysis of the potential effects will be based on the Nisga’a Economic, Social, and Cultural Impact Assessment (ESCIA) conducted for the proposed Project. The proposed approach and work plan for the ESCIA is described in Section 12.4.1, below.

Table 55 outlines the Nisga’a Nation 8(f) interests to be assessed in the Application, as stated in the Nisga’a Economic, Social, and Cultural Impact Assessment Guidelines (2010).
### Table 52: Nisga’a Nation 8(f) Interest Concordance Table

<table>
<thead>
<tr>
<th>Nisga’a Nation 8(f) Interests</th>
<th>Related Section of AIR</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Economic:</strong></td>
<td></td>
</tr>
<tr>
<td>• Nisga’a citizens’ employment and income</td>
<td>0, 2.3, 4.7, 4.9, 4.10, 4.11, 5.0, 9.0, 12.0, 12.3</td>
</tr>
<tr>
<td>• Nisga’a citizens’ business activities</td>
<td></td>
</tr>
<tr>
<td>• Natural resource activities and related earnings or values</td>
<td></td>
</tr>
<tr>
<td>• Future Nisga’a citizens’ economic opportunities and economic development</td>
<td></td>
</tr>
<tr>
<td><strong>2. Social:</strong></td>
<td></td>
</tr>
<tr>
<td>• Migration and population effects in Nisga’a Nation communities</td>
<td>0, 2.3, 4.1, 4.2, 5.2, 6.0, 8.0, 9.0, 12.3</td>
</tr>
<tr>
<td>• Infrastructure and services in the Nisga’a Nation communities</td>
<td></td>
</tr>
<tr>
<td>• Occupational and non-occupational health and accident risks</td>
<td></td>
</tr>
<tr>
<td>• Crime</td>
<td></td>
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<tr>
<td>• Family and community well-being</td>
<td></td>
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<tr>
<td><strong>3. Cultural:</strong></td>
<td></td>
</tr>
<tr>
<td>• Effects of environmental impacts (including those resulting from accidents and malfunctions) on the cultural activities and practices of Nisga’a citizens.</td>
<td>2.3, 4.1, 4.2, 4.9, 4.10, 4.11, 5.3, 5.4, 7.0, 9.0, 12.3</td>
</tr>
<tr>
<td>• Effects of changing work patterns on Nisga’a cultural activities and practices</td>
<td></td>
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<tr>
<td>• Effects on Nisga’a language</td>
<td></td>
</tr>
</tbody>
</table>

Reference: Nisga’a Nation Economic, Social, and Cultural Impact Assessment Guidelines, 2010

### 12.4.1 8(f) Assessment Methodology

The ESCIA will consider all Nisga’a Nation Treaty interests identified in Table 52. A scoping exercise within the ESCIA will review and assess the potential for interaction between the proposed Project’s activities and components and aforementioned Nisga’a Nation interests. Where an interaction is not identified to be relevant to the effects assessment of the proposed Project due to lack of interaction with Project components, the Treaty interest will not be brought forward. IDM will present a rationale for any interest that is not brought forward through the ESCIA.

To assess the potential economic, social, and cultural effects carried forward for further consideration IDM will:

- meet with NLG staff and other interested parties to discuss the 8(f) assessment approach;
- review relevant Nisga’a Nation reports and previous 8(f) reports to support the current assessment process and conclusions;
• solicit feedback from Nisga’a Nation citizens through community open houses and social media on the interest for employment, training, and business opportunities related to the Project, and how they think it would affect their economic, social, and cultural wellbeing;

• develop mitigation measures and avoidance strategies in consultation with NLG and other interested Nisga’a organizations and citizens; and

• prepare and circulate a draft 8(f) assessment to NLG for review and comment prior to finalization and submission with the Application.

The development scenarios for assessing potential cumulative effects will be based on a re-evaluation of the various development scenarios presented in the previous ESCIA reports including those for:

- Avanti Kitsault Mine Project;
- KSM Project;
- Brucejack Project;
- PRGT Project; and
- Westcoast Connector Gas Transmission Project.

The spatial boundary that will be used for the 8(f) assessment is the Nass Area. Temporal boundaries will consider the life of the proposed Project (construction, operations, reclamation, and post-closure) to the extent to which those effects may persist into the future.

12.4.2 Existing Economic, Social, and Cultural Conditions, Potential Effects, and Mitigation Measures

This section of the Application will describe the baseline economic, social, and cultural information of Nisga’a Nation citizens. Information will be collected as part of the ESICA and will be drawn from other sections in Part B of the Application. Sources include, but are not limited to:

- consultation with Nisga’a Nation;

- ESCIA conducted by IDM for the proposed Project;

- similar regulatory applications and project effects assessments for the Kitsault Mine Project, Kerr-Sulphurets-Mitchell (KSM) Mine Project, Brucejack Mine Project, Prince Rupert Gas Transmission Project, and Westcoast Connector Gas Transmission Project;

- provincial and federal databases;

- land use plans and sustainable resource management plans

If additional information is required to conduct the analysis and assessment of effects on topics identified in paragraph 8(f) of the NFA, the Proponent will, subject to any direction from EAO, consult with NLG, and seek to reach agreement on terms of reference for the collection and integration of additional data.
12.4.3 8(f) Assessment

The 8(f) assessment, submitted as part of the Application, will include:

- a description of the likelihood and confidence of the proposed Project causing an effect on a Nisga’a Nation’s 8(f) interests;

- descriptions of any measures proposed to avoid, minimize, mitigate, manage, or monitor potential adverse economic, social, or cultural effects and to maximize any positive effect for Nisga’a citizens;

- where residual effects are expected on a Nisga’a Nation’s 8(f) interests, a characterization of the residual effects, with regard to magnitude, duration, frequency, reversibility, context, and confident level of such predictions;

- descriptions of other major projects likely to proceed within the Nass Area within the same relative time period as the proposed Project could be carried out, and an analysis of the potential cumulative effects of the proposed Project relative to Nisga’a Nation’s 8(f) interests; and

- any remaining or unresolved issues or concerns identified as a result of the review by NLG of the draft 8(f) assessment.

12.5 Other Matters of Concern to Nisga’a Nation

The Application will include:

- a list of other matters of concern raised by Nisga’a Nation with respect to potential environmental, economic, social, heritage and health effects of the proposed Project, which have not already been considered in the discussion with Nisga’a Nation or in the statutory requirements under CEAA 2012, where applicable;

- a description (or summary if described elsewhere in the Application) of the mitigation measures to address potential effects on other matters of concern to Nisga’a Nation;

- a characterization of the residual adverse effects after mitigation, in a manner consistent with assessment methodology in this AIR; and

- a description of how these other matters of concern have been addressed from the perspective of IDM.

12.6 Issue Summary Table

The Application will include a Summary Table (see example below) that identifies Nisga’a Nation Treaty Rights or other matters of concern to Nisga’a Nation that may be impacted by the proposed Project and the measures to avoid, mitigate, or otherwise manage the effects.

An Aboriginal Consultation Report will be appended to the Application, which will contain comments received from Nisga’a Nation throughout the Pre-Application Phase of the EA.
<table>
<thead>
<tr>
<th>Topic</th>
<th>Issue, Interest, or Concern Raised</th>
<th>Analysis of Potential Effect</th>
<th>Proposed Measures to Avoid, Mitigate or Otherwise Manage Effects</th>
<th>Status of Resolution (e.g. resolved, ongoing resolution, referred to agency, etc.)</th>
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</table>
PART D – PUBLIC CONSULTATION

13.0 PUBLIC CONSULTATION

The Application will include a report on the results of implementation of the approved Public Consultation Plan including:

- Background information:
  - identification of local governments, residents, property owners, and other rights holders who are potentially impacted by the proposed Project;
  - maps of local government boundaries, private land, tenures/authorizations, or residences with respect to the proposed Project; and
  - background information about each potentially affected municipality and/or stakeholder group.

- Public Consultation:
  - a summary of the past and planned consultation activities;
  - a summary of any proposed changes to the approved Public Consultation Plan as a result of feedback from local governments, stakeholders or individuals, or experience from consultation to date; and
  - a description of the key issues raised by the public that are relevant to the Application, the responses to those issues, and the status of their resolution.

- Summary Table:
  - Identification of concerns raised by the public and the measures to avoid, reduce or mitigate those impacts. This information will be provided in the form of a table.

Table 54: Summary Table of the Results of Public Consultation

<table>
<thead>
<tr>
<th>Stakeholder Group</th>
<th>Topic</th>
<th>Issue, Interest, or Concern Raised</th>
<th>Proponent Response or Proposed Mitigation</th>
<th>Status of Resolution (e.g. resolved, ongoing resolution, referred to agency, etc.)</th>
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</thead>
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</table>
PART E - MANAGEMENT PLANS AND FOLLOW-UP PROGRAMS

14.0 MANAGEMENT PLANS

The Application will include:

- a list of Management Plans for all phases of the proposed Project; and

- a comprehensive description of the contents of each Management Plan, including the identification of any mitigation measures described within the Application that will be included within the plans.

The Application will identify and describe the management and monitoring plans that will be developed in a manner consistent with an Environmental Management System (EMS). This EMS will be based on criteria provided in the ISO 14001 framework, and it will contain conceptual level plans required for the construction, operation, closure, and post-closure phases of the Project. IDM will detail how the use principles such as the precautionary approach and adaptive management will be integrated through all management plans in the Application.

The management/monitoring plans will include:

- Access Management Plan;
- Air Quality Management Plan;
- Aquatic Effects Management Plan (including Aquatic Effects Monitoring Program (AEMP), Surveillance Network Program, Effluent Monitoring Program, and Groundwater Monitoring Program);
- Community Involvement Plan
- Cultural and Heritage Resources Protection Plan
- Emergency Response Plan;
- Environmental Management Plan
- Erosion and Sediment Control Plan;
- Explosives Management Plan
- Fuel Management Plan
- Groundwater Monitoring Plan;
- Hazardous Materials Management Plan;
- Health and Social Services Plan
• Heritage Management Plan;
• Human Resources Plan
• Mine Closure and Reclamation Plan
• ML/ARD Management Plan;
• Noise Abatement Plan
• Occupational Health and Safety Plan;
• Ore Storage Management Plan
• Skills, Training and Employment Plan
• Spill Prevention and Response Plan;
• Tailings Management Plan;
• Terrain and Soil Management Plan;
• Traffic Control Plan
• Vegetation and Ecosystems Management Plan (including invasive plant management);
• Waste Rock Management Plan;
• Social and Economic Management Plan
• Surface and Groundwater Management Plan;
• Waste Management Plan
• Waste Rock Management Plan
• Wildlife Management and Monitoring Plan.

Where relevant, such as for the Emergency Response Plan and Spill Prevention and Response Plan, the Application will include consideration of communication with Aboriginal Groups and local stakeholders regarding potential effects to their interests.

The Mine Closure and Reclamation Plan will address regulatory requirements such as closure plan objectives, soil management, revegetation, closure and reclamation of mine components, sediment and erosion control, and temporary, final closure, and post-closure overviews and monitoring plans.

Additional environmental management and monitoring plans may be developed and added as the Application is prepared to implement mitigation measures identified in the effects assessment. Where applicable, the Application will identify the monitoring programs that involve empirical data collection to allow for data analysis and comparison between data collection periods.
15.0 MONITORING & FOLLOW-UP PROGRAMS

The Application will include:

- a description of the monitoring and follow-up programs IDM will implement, including their activities, objectives, and reporting; and

- the reporting structure as identified within the environmental management plans, monitoring plans and EA Certificate Conditions.

The Application will provide the framework for environmental assessment follow-up programs to be undertaken during the construction, operation, and closure stages of the Project. The focus of these programs would be to test the predictions made in the environmental assessment and the effectiveness of mitigation.

Monitoring programs will be identified to evaluate the performance of the environmental, economic, social, heritage, or health mitigation strategies and be employed to achieve regulatory compliance. Monitoring programs will be adaptively managed to meet the objectives of validating the predictions made by the environmental assessment at all phases of the Project. Monitoring programs will be developed in consultation with Nisga’a Nation and agencies having jurisdiction. Specifically, the following will be outlined in the Application:

- draft management plans prepared to evaluate the implementation and performance of mitigation measures to be undertaken during all stages of the Project;

- responsible parties involved in developing and implementing environmental assessment follow-up programs;

- planned approach to data management;

- planned approach to how the results of the follow-up program will be used to inform an adaptive management approach, if applicable;

- communication protocols with Nisga’a Nation, local governments, and other interested parties; and

- linkages to various other Environmental Management Plans and Monitoring programs.
PART F – CONCLUSIONS

16.0 CONCLUSIONS

The Application will:

• provide IDM’s conclusions regarding the potential for significant adverse effects on VCs and ICs from the Project;

• request an EA Certificate for the proposed Project; and

• acknowledge the need, if applicable, to successfully complete a federal assessment and subsequent permitting/authorization processes prior to proceeding with Project construction, operation, and decommissioning.

16.1 Summary of Residual Effects

The Application will summarize all potential residual effects, including cumulative residual effects, in a table format that depicts the potential effect, Project phases, Project activity, or physical work linked to the effect, proposed mitigation and significance of effect on VCs.

16.2 Summary of Mitigation Measures

The Application will include a table that identifies the proposed measures to mitigate potential impacts to VCs and ICs as shown in Table 55. This information provides the foundation for the development of a Table of Conditions for the proposed Project, which would be appended to an EA Certificate, should one be issued.

Table 55: Summary of Proposed Mitigation Measures

<table>
<thead>
<tr>
<th>No.</th>
<th>VC and Effect</th>
<th>Management Plan</th>
<th>Proposed Mitigation Measure</th>
<th>Timing</th>
<th>Legal Requirement?</th>
<th>Responsible Agency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Environmental</td>
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<td>1.1</td>
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<td>1.2</td>
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<td>Social</td>
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<td>2.1</td>
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<td></td>
</tr>
</tbody>
</table>
17.0 REFERENCE MATERIAL

The Proponent will provide a list of reference material used in developing the Application.


BC Environmental Assessment Office. 2015. Application Information Requirements Template. Published by the British Columbia Environmental Assessment Office, August 2015.


Resources Inventory Committee [RIC now RISC]. 1996. Guidelines and Standards to Terrain Mapping in British Columbia. Resources Inventory Committee.

BC Resources Inventory Committee [RIC now RISC]. 1998. Species Inventory Fundamentals: Standards for Components of British Columbia’s Biodiversity No. 1. Resources Inventory Committee.


18.0 APPENDICES

The Application will include the appendices referenced in the Application.

Information prepared by professionals and provided under their professional seal will be identified in the Application and the related sealed studies will be included in an Appendix.