Mackenzie Valley Review Board

DRAFT

Terms of Reference

Prairie Creek All Season Road and Airstrip

EA1415-01

Canadian Zinc Corporation

July 31, 2014

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1 INTRODUCTION

1.1 Overview

Canadian Zinc Corporation (CanZinc or the developer) is proposing to construct a 184 km all season road and airstrip to access the Prairie Creek mine (herein referred to as the project or the development). The purpose of this *Terms of Reference* is to help CanZinc with its formulation of the *Developer's Assessment Report (DAR).* The *Terms of Reference* outlines the information required for the environmental assessment (EA) of the Prairie Creek all season road and airstrip project. The DAR will be used to inform all interested parties about the developer's views of the potential impacts of the proposed development during the analytical phase of the environmental assessment.

1.2 Background

The Prairie Creek All-Season Road and Airstrip project has been proposed by CanZinc to improve access to the Prairie Creek Mine. The mine is surrounded by the Nahanni National Park Reserve. In the previous environmental assessment (EA0809-002), CanZinc was approved for winter road access to the mine. CanZinc is now proposing to upgrade the winter road to an all season road and to construct a second airstrip.

The road is approximately 184 km long. Nearly half of the road is within the Nahanni National Park Reserve. The proposed all season road generally follows the winter road alignment assessed during EA0809-02. CanZinc has proposed to complete the upgrade in two phases. A description of the phases as they have been described to date is presented in Section 3.1. Figure 1 shows the location of the proposed all season road.

1.3 Referral to Environmental Assessment

In April 2014 CanZinc submitted a land use application to the Mackenzie Valley Land and Water Board to construct, operate, and maintain an all season road and airstrip to the Prairie Creek Mine. The Mackenzie Valley Land and Water Board prepared a preliminary screening of the road according to Section 124 of the *Mackenzie Valley Resource Management Act* (MVRMA). Under Section 126(2)(a) of the MVRMA, the Mackenzie Valley Land and Water Board referred the project to the Mackenzie Valley Review Board (Review Board) for an environmental assessment.

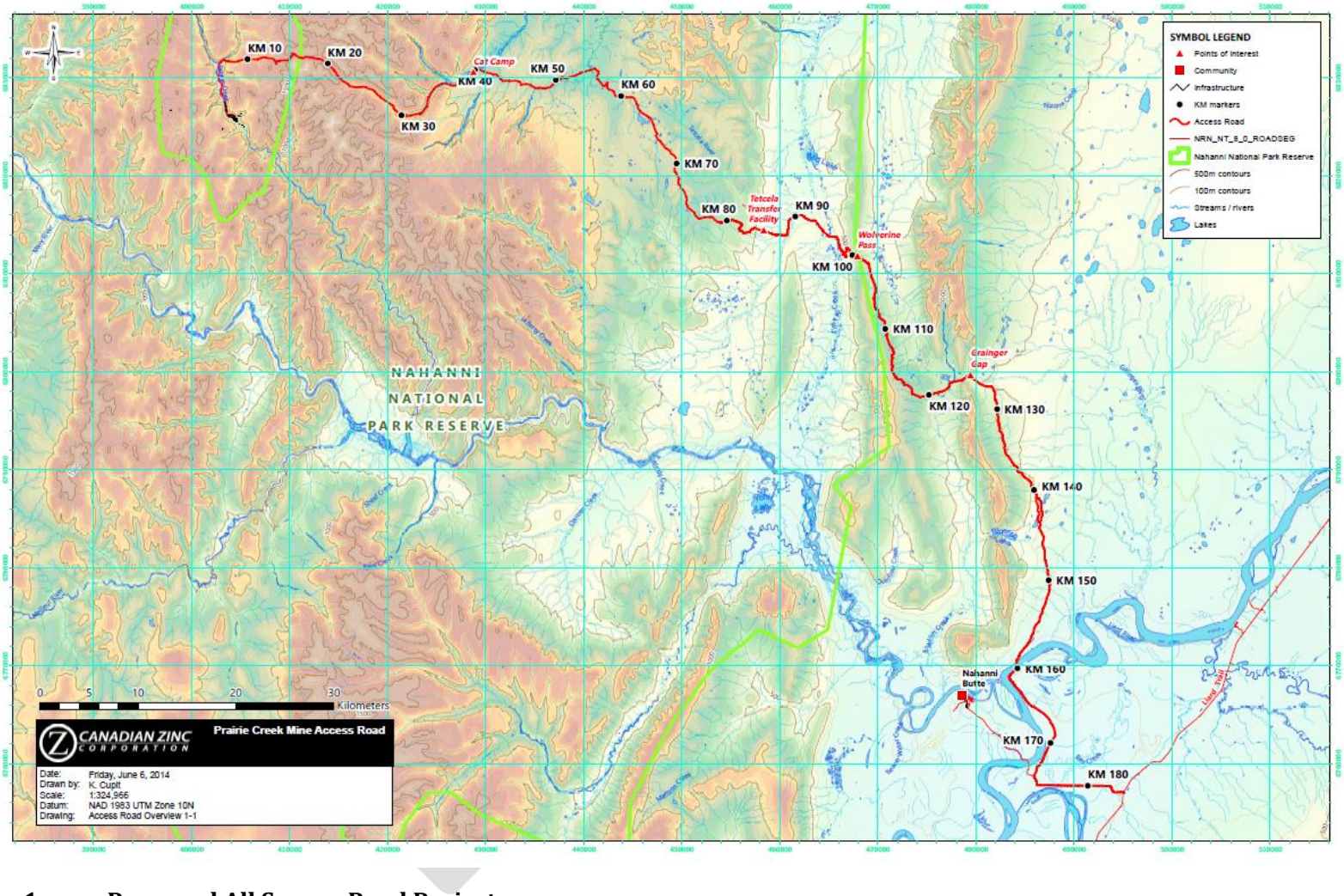

Figure 1 Proposed All Season Road Project

1.4 Legal Context and the Terms of Reference Development Process

This environmental assessment is subject to the requirements of Part 5 of the Mackenzie Valley Resource Management Act (MVRMA). Section Three of the Review Board's *Environmental Impact Assessment Guidelines* describes the environmental assessment process in detail. That document, as well as the Review Board's Rules of Procedure, other guidelines, reference bulletins and relevant policies applicable to this assessment, are available online (www.reviewboard.ca) or by contacting Review Board staff.

In accordance with Section 115 of the MVRMA, the Review Board must conduct an environmental assessment of the proposed development with regard for the protection of the environment from significant adverse impacts, and the protection of the social, cultural and economic well-being of Mackenzie Valley residents and communities. Subsection 114(c) of the MVRMA further requires the Review Board to ensure that concerns of Aboriginal people and the general public are taken into account.

The Review Board has based the Terms of Reference on an examination of information from the following sources:

1. information collected from participants at community scoping meetings held by Review Board staff in:
    i. Nahanni Butte (9 June 2014)
    ii. Fort Liard (10 June 2014)
    iii. Fort Simpson (11 June 2014)]
2. information collected from parties at the technical scoping meeting held by the Review Board staff in Yellowknife (8 July 2014)
3. information submitted by the developer during preliminary screening including the project description reports and the Developer's Proposed Draft Terms of Reference
4. information on the Review Board public registry
5. Review Board experience in the conduct of environmental assessment.

1.5 Consideration of Previous Environmental Assessment Material

Under Section 115(2) the Review Board is required to consider, and may rely on, material from previous EAs of the same development. Environmental assessment EA0809-002 was previously completed to assess the potential impacts of the Prairie Creek mine and winter access road. Studies used to support EA0809-002 can be used to inform the current EA; however, the current EA requires a stand-alone DAR and will be distinct from EA0809-002. Previous studies can be used to support responses to questions described in this Terms of Reference in the Developer's Assessment Report. Any referenced studies, reports or information from previous environmental assessments must be submitted to the Review Board by the developer or parties so that they can be placed on the public record specifically for EA1415-01.

To assist with the incorporation of information from EA0809-002, CanZinc will provide a summary table of the commitments made in EA0809-002 as outlined in Appendix A.

2 DEVELOPER'S ASSESSMENT REPORT GENERAL REQUIREMENTS

2.1 Presentation of Material

The Review Board encourages the developer to present information in user-friendly ways. The use of maps, aerial photos, development component and valued component interaction matrices, full explanation of figures and tables, and an overall commitment to plain language is encouraged. When it is necessary to present complex or lengthy documentation to satisfy the requirements of the Terms of Reference, the developer should make every effort to simplify its response in the main body of the text and place supporting materials in appendices. The developer will also produce all electronic documents in Adobe portable document format (pdf) in files smaller than 40 MB.

The Developer's Assessment Report will be submitted as a stand-alone document. Relevant information and analyses from previous project descriptions should be incorporated into the Developer's Assessment Report and combined with the supplementary material and analyses required by the Terms of Reference. The developer will make all referenced information accessible.

2.2 Incorporation of Traditional Knowledge

The Review Board considers both traditional knowledge and scientific knowledge in its deliberations. In addition, Subsection 115(c) of the MVRMA states, as a guiding principle for the Review Board, the importance of conservation to the well-being and way of life of the Aboriginal peoples of Canada to whom Section 35 of the Constitution Act 1982 applies and who use an area of the Mackenzie Valley. The developer will make all reasonable efforts to assist in the collection and consideration of traditional knowledge relevant to the all season road for the Review Board's consideration. Where it is applicable, the developer will make all reasonable efforts to incorporate traditional knowledge from Aboriginal culture holders as a tool to collect information and evaluate the specific impacts required in this Terms of Reference. The developer should refer to the Review Board's *Guidelines for Incorporating Traditional Knowledge into the Environmental Impact Assessment Process*.

2.3 Public Engagement

Engagement with communities, other Aboriginal groups, other governments, or other organizations with interests related to areas that might be affected by the all season road should be considered in this section. Aboriginal groups, government agencies and other interested parties may have information useful to the conduct of this impact assessment and all reasonable efforts should be made to engage with them. The use of interpreters during meetings in Aboriginal communities is encouraged. The Review Board encourages the developer to meet with interested groups outside

the environmental assessment process and to place any information from those discussions they consider may be relevant to the Review Board's decision on the public record.

The following items are required for consideration of public engagement:

1. an engagement log describing dates, individuals and organizations engaged with, the mode of communication, discussion topics and positions taken by participants, including:
    i. all commitments and agreements made in response to issues raised by the public during these discussions and how these commitments altered the planning of the proposed all season road
    ii. all issues that remain unresolved, documenting any further efforts envisioned by the parties to resolve them
2. description of all methods used to identify, inform, and solicit input from potentially-interested parties and any plans the developer has to keep engagement moving forward
3. how the developer has engaged, or intends to engage, traditional knowledge holders. The traditional knowledge is to be used to assist in collecting relevant information for establishing baseline conditions and the effects assessment of potential impacts. A summary table indicating where and how traditional knowledge was incorporated should also be included (see Review Board's *Guidelines for Incorporating Traditional Knowledge in Environmental Impact Assessment*).
4. an engagement plan that conforms to the Mackenzie Valley Land and Water Board's *Engagement Guidelines for Applicants and Holders of Water Licences and Land Use Permits*[1] June 2013 and *Engagement and Consultation Policy*[2]

2.4 Summary Materials

The following summary materials are required:

1. plain language summary in English and South Slavey
2. a concordance table that cross references the items in the Terms of Reference with relevant sections of the Developer's Assessment Report
3. a commitments table listing all mitigation measures the developer will undertake, including but not limited to those described in the project application. These should be organized by subject (e.g. water quality, wildlife) for easy reference.

[1] See http://mvlwb.com/sites/default/files/documents/wg/MVLWB%20Engagement%20Guidelines%20for%20Holders%20of%20LUPs%20and%20WLs%20-%20Jun%201_13.pdf

[2] See http://mvlwb.com/sites/default/files/documents/wg/MVLWB%20Engagement%20and%20Consultation%20Policy%20-%20May%2015.pdf

2.5 Developer

The following information is required regarding CanZinc as well as its subsidiary companies, related corporations and any joint venture partners:

1. a summary of the corporate history and operational experience in Canada and the Northwest Territories;
2. how the developer will ensure that CanZinc and its contractors and subcontractors honour commitments made by CanZinc and an analysis of CanZinc's compliance with its existing socio-economic agreement;
3. CanZinc's environmental performance records since activities began at the Prairie Creek Mine and during associated prior exploration. This will include discussion of regulatory compliance, for example, regarding land use permits and water licences. List situations where compliance was breached, the issue and cause, and how and when it was mitigated to the regulator's satisfaction; and,
4. a description of any corporate policies, codes of practice, programs or plans concerning CanZinc's environmental, sustainable development, community engagement, and workplace health and safety commitments or policies.

3 SCOPE CONSIDERATIONS

3.1 Scope of Development

Under Subsection 117(1) of the MVRMA, the Review Board determines the scope of development for every environmental assessment it conducts. The scope of development consists of all the physical works and activities required for the project to proceed. Within this project the scope of development includes the construction, operation, reclamation, and closure of the all season road, airstrip, and Tetcela Transfer Facility. The road and airstrip are expected to be utilized during the construction, operation, closure, and reclamation of the Prairie Creek Mine. The project has been described to occur in two phases. The scope of those phases as described in the project description and during the scoping sessions is presented in Table 1.

The DAR will fully describe all required facilities and activities for the development. In addition, the developer will identify all permits, licences or other regulatory approvals necessary for the different phases of the development and all land tenure agreements required. The Review Board may amend the scope of development at any time during the environmental assessment if the proposed development changes.

Table 1 Summary of the Scope of Development by Phase

Phase	Scope of Phase
Phase 1:	• clearing the right of way • construction of a 84 km all season road from the Prairie Creek Mine to the Tetcela Transfer Facility • construction of an expanded Tetcela Transfer Facility • construction of a second airstrip • construction of a watercourse realignment of a portion of Sundog Creek
Phase 2:	• clearing the right of way • construction of a 100 km all season road from the Tetcela Transfer Facility to the Liard Highway • construction and operation of a barge crossing the Liard River • reclamation of facilities not required for ongoing operations
Both Phases	• construction of watercourse crossing structures • construction and operation of borrow sources and access to the borrow sources • construction and operation of temporary construction support infrastructure and workspaces including camps, laydown and staging areas, and bulk fuel storage • reclamation of facilities not required for ongoing operations • ongoing operations and maintenance activities • closure and reclamation of the road

3.1.1 Consideration of an Airstrip within the Nahanni National Park Reserve

The initial project description provided by CanZinc specified that it proposed a second airstrip "to facilitate air access to the mine when the mine [air]strip is inaccessible due to poor weather" (CanZinc Project Description Report). Based on the project description, Parks Canada stated that an airstrip within the Nahanni National Park Reserve cannot be authorized under the *Canada National Parks Act*. The activities within a park are restricted by Section 13 of the *Canada National Parks Act.* As noted in Parks Canada's written comments during the review of the Developer's Proposed Term of Reference (dated June 20th, 2014), and restated during the scoping session by Parks Canada, an amendment to the *Canada National Parks Act* was made when the Nahanni National Park Reserve expanded (Section 41.1) which provided a specific and limited exception to Section 13 and explicitly allowed for road access to the mine. Section 41.1 specifically states that,

> *"The Minister may enter into leases or licences of occupation of, and easements over, public lands situated in the expansion area for the purposes of...a mining access road leading to the Prairie Creek Area...including the sites of storage and other facilities connected with that road."*

Given the legislation in the *Canada National Parks Act*, Parks Canada requested that the airstrip within the Nahanni National Park Reserve be scoped out of the environmental assessment.

Further information presented by CanZinc (in correspondence dated June 27th, 2014) has clarified its position to indicate that the airstrip would be used to support "road construction, maintenance/monitoring and restoration/closure." In addition, airstrips were previously used in the area to support historical road projects.

With the updated description, Parks Canada stated, at the July 8th, 2014 scoping session, that it needs to consider the information presented and would provide an official statement at a later date.

With respect to the environmental assessment process, the Review Board will not make any determinations on the legislative acceptability of an airstrip within the Nahanni National Park Reserve. The eligibility of an airstrip within the Nahanni National Park Reserve depends on the *Canada National Parks Act* and needs to be determined by Parks Canada. The Review Board's mandate is outlined in the *Mackenzie Valley Resource Management Act* and the Review Board does not have the authority to weigh in on decisions outside its legislated mandate. The environmental assessment can currently assess an airstrip outside of the Nahanni National Park Reserve. The Review Board will await guidance from Parks Canada on whether the *Canada National Parks Act* can authorize an airstrip within the Nahanni National Park Reserve and may update the Terms of Reference at that time if required.

3.1.2 Assessment of Different Project Phases

CanZinc has proposed to complete the proposed project in two phases. During issues scoping meetings and in written submissions, multiple parties requested that the DAR be separated by project phases 1 and 2. To facilitate the evaluation of existing conditions and the assessment of impacts to valued components that may differ between the two development phases, the developer will clearly describe in its DAR any varying conditions, impacts, and proposed mitigation between the two project phases. For example, if the geographic range of a species of wildlife occurs in the spatial area of one project phase but not the other, impacts to this particular species need only be evaluated in the applicable project phase. This same consideration applies to impacts from the project on all valued components.

3.2 Scope of Assessment

3.2.1 Overview

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

3.2.2 *Effects Assessments – Valued Components*

Below is a list of valued components to be used in the assessment of impacts from the project on biophysical, social, economic, and cultural values.

1. traditional harvesting
2. impacts to Nahanni National Park Reserve
3. terrain, soils, permafrost, and karst topography
4. granular materials
5. air quality
6. noise
7. water quality and quantity
8. species at risk
9. birds
10. fish and aquatic habitat
11. wildlife and wildlife habitat (moose, boreal caribou, mountain caribou, Dall's sheep, wood bison, grizzly and black bears, wolverine, wolves and furbearers)
12. vegetation
13. traditional land use and cultural resources
14. employment and benefits to the community
15. impacts on existing transportation infrastructure

3.2.3 *Key Lines of Inquiry*

The purpose of scoping is to not only identify issues but to also prioritize them. Items with high priority and require additional focused work are considered "key lines of inquiry." Key lines of inquiry are the topics of the greatest concern that require the most attention during the environmental assessment and the most rigorous analyses in the Developer's Assessment Report. They are designated as key lines of inquiry to ensure a comprehensive analysis of the issues most likely to cause significant environmental impacts or significant public concern. Data collection and analyses for the key line of inquiry in the Developer's Assessment Report should be at a level of detail appropriate for other interested parties to understand the technical material prior to any technical sessions on these topics.

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

Valued components of a lower priority are classified as "subjects of note" and should be described in the Developer's Assessment Report but with less detail.

The following were identified as key lines of inquiry:

1. **Impacts to traditional harvesting and traditionally harvested species**
2. **Effects of potential accidents and malfunctions**
3. **Impacts to Nahanni National Park Reserve**

3.3 Geographic Scope

The geographic scope will include all areas that may be affected by the development. The geographic scope for each valued component must be appropriate for the characteristics of that component. The minimum geographic scope is presented in Table 2.

Table 2 Minimum Geographic Scope

Valued Component	Minimum Geographic Scope
Harvesting	Within 50 km of the project
Terrain, soils, permafrost, and karst topography	Within 30 km of the project
Granular materials	Within 5 km of the project
Air quality	Within 30 km of the project
Noise	Within 50 km of the project
Water quality and quantity	The surface and subsurface watersheds to the point where reasonable foreseeable project effects cease to occur
Species at risk	The species-specific range of the affected species with consideration to seasonal movements, migratory movements, and life cycle requirements
Wildlife and wildlife habitat	The species-specific range of the affected species with consideration to seasonal movements
Fish and aquatic habitat	The surface water watersheds which are intersected by the project
Vegetation	Within 50 m of the project
Traditional land use	Within 50 km of the project
Ecological integrity, visitor experience and cultural resources of Nahanni National Park Reserve	Same as the geographic scope identified for the above subjects of note
Employment and benefits to the community	The Dehcho region as a whole with particular attention to Nahanni Butte, Fort Liard, Fort Simpson, Wrigley and Lindberg Landing.
Transportation infrastructure	Nahanni Butte access road and Liard Highway from Nahanni Butte to Fort Nelson

3.4 Temporal Scope

The temporal scope includes the effects of the project on valued components during construction, operation, closure and post closure. For cumulative impacts, the temporal scope includes the

period of the effects of past, present and reasonably foreseeable future projects that are predicted to combine with the impacts of the road[3].

The developer will identify and consider:

1. times during the development when activities are most intense (such as during initial construction),
2. when valued components are most sensitive to potential impacts (such as key times for wildlife, fish spawning or wildlife harvesting periods), and
3. the duration of effects with attention to how these effects will relate to the life of mining operations at Prairie Creek.

The developer will also give special attention to appropriate temporal boundaries for considering any impacts that may require long-term monitoring and management.

The developer is required to define and provide rationales for the specific temporal boundaries it used to examine the potential impacts on each of the valued components considered in its impact assessment.

3.5 Consideration of Alternatives to the Development

The developer will describe the alternatives to achieve the same objective (reliable access to the Prairie Creek Mine). The analysis of alternative methods should take into account the *Multiple Accounts Analysis* described by Roberson and Shaw (2004)[4]. The alternatives analysis should include technical feasibility, cost-benefit analysis, socio-economic effects, and environmental effects. The alternatives should be ranked with an explanation behind the ranking, why certain alternatives were rejected, and why the proposed alternative was selected.

Alternatives to the development differ from alternatives within the development. For example, alternatives to the development would include using smaller transfer facilities; whereas, alternatives within the development would include different means of carrying out the proposed development, such as methods to construct the transfer facilities. Alternatives within the project will be addressed in Section 6.

4 ASSESSMENT METHODOLOGY

4.1 Impact Assessment Steps

In assessing impacts on the biophysical and human environment for each valued component in Section 7.2, the Developer's Assessment Report will:

1. identify any valued components used and how they were determined

[3] See the Review Board's *Environmental Impact Assessment Guidelines (*Appendix H) for further guidance.
[4] See guidance at http://technology.infomine.com/enviromine/issues//cls_maa.html

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

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

10. the nature or type of the impact
11. the geographical range of the impact
12. the timing of the impact (including duration, frequency and extent)
13. the magnitude of the impact (what degree of change is expected)

14. the reversibility of the impact
15. the likelihood and certainty of the impact.

An example summary matrix has been included as Appendix B. Please use the example table to help summarize the narrative description in the DAR.

4.2 Developer's Opinion on Significance of Impacts

The criteria described above will be used by the developer as a basis for its opinions on the significance of impacts on the biophysical and human environment. The Review Board will make the ultimate determinations of significance after considering all the evidence on the public record later in the environmental assessment. For more information on the above criteria, please refer to Section 3.11 of the Review Board's *Environmental Impact Assessment Guidelines* available on the Review Board's public registry.

5 DESCRIPTION OF THE EXISTING ENVIRONMENT AND BASELINE CONDITIONS

The developer will provide a description of existing conditions in sufficient detail to enable an understanding of how the valued components might be affected (beneficially or adversely) by the proposed development. The existing conditions should be described for the study area - the area affected by the development.

5.1 Biophysical Information Requirements

The developer will provide a description of all existing regional data used in developing the environmental baseline. Where the developer generated its own data, the methodology, accuracy and precision of measurements will be provided. The developer should also describe any analysis conducted to utilize data from outside the study region to characterize the baseline environmental conditions within the study region. This would include a description of any models etc. (including assumptions and accuracy) utilized to characterize baseline conditions where local measurements are not available. The description of the baseline conditions should be sufficient to allow for a thorough assessment of the project effects.

The following sections describe the topics to consider and the information specifically required to adequately assess each topic.

5.1.1 Terrain, Geology, Soils, and Permafrost

Describe the existing terrain, geology, soils and permafrost in the study area, including a description, location, and geographic extent of the following features:

1. topography and geology, including key terrain features such as rivers, lakes, karst features and wetlands and other important processes and features
2. bedrock type and depth

3. unconsolidated surficial materials and terrain types, including thickness of landforms
4. soil types, including group, series and type, as applicable.

Describe borrow materials including:

5. locations
6. ice content
7. size of borrow areas
8. volumes to be removed
9. quality of materials at each location (including acid generation potential)
10. existence and extent of ice rich permafrost areas that may be excavated
11. ownership.

Provide a description of permafrost and ice-rich soils in the area of the all season road, including:

12. distribution (thickness and lateral extent) on land, water, shoreline and slope crossings,
13. permafrost processes, features and landforms and their stability, including slopes, shorelines and stream banks
14. ground ice conditions, temperature and ground thermal regime
15. active layer thickness, seasonal frost, penetration, thaw sensitivity and frost susceptibility
16. how fires may affect ground temperature regimes and permafrost
17. thaw slumps in the project area
18. how regional climate variation and documented warming of ground temperatures in the region may affect ground conditions.

5.1.2 Climate

Provide a description of the existing or baseline climate conditions and climatic variability and trends, including, but not necessarily limited to:

1. the location of recording stations, length of record for any meteorological data presented, and the quality of the data
2. prevailing climatic conditions, seasonal variations, predominant winds including direction and velocity, temperature and precipitation (snowfall, snow depth, rain, fog, wind)
3. spatial and temporal boundaries for the description of climate
4. any current climate-related extreme events that may affect the project and frequency of occurrence.

In support of the baseline description:

5. define the variability and trends within the “current” climate normal period and within the historical period of instrumental record
6. discuss the contribution of traditional knowledge to the understanding of climate conditions and variability

7. identify the location of recording stations and length of record for any meteorological data presented.

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

5.1.3 Water Quality and Quantity

Provide a description and maps of the existing water resources in the study area including:

1. surface water bodies, watercourses and major drainage areas
2. groundwater and subsurface water sources with particular attention to water within karst features
3. watercourses that have year-round flow
4. the extent of connectivity to adjacent watercourses including any potential seasonal variation
5. seasonal and perennial springs including ephemeral streams located within or near the boundaries of the development
6. naturally occurring icings.

Provide a description of major drainages and watercourses, including the basis for their selection. For each major drainage or major watercourse, as appropriate, provide a description of its hydrologic or hydrogeologic characteristics, including:

7. hydraulic characteristics of surface watercourses adjacent to or intersecting the road including:
    i. surface water flow regimes, variability and seasonal patterns
    ii. channel characteristics including channel width, normal water depth, and high water depth, with consideration of interannual variability
    iii. estimated peak flow rates, water surface elevation, and erosion potential for flood events (considering multiple events from a 1 in 10 year event to a 1 in 250 year event)
    iv. channel and bed morphology and stability
    v. bank stability and areas of erosion
    vi. sediment load – suspended and bed load
8. sediment quality (type of sediment and concentrations of organics and inorganics in sediment)
9. water quality, including seasonal variability in quality
10. active and historical floodplains
11. freeze and thaw timing
12. permafrost distribution and stability beneath waterbodies
13. the role of wetlands (e.g., bogs, fens and peat plateaus)

14. hydrogeologic characteristics including:
    i. subsurface and groundwater flow paths with particular attention to flow within karst features
    ii. hydraulic conductivity.

5.1.4 Species at Risk

For species at risk[5], describe:

1. wildlife species presence, distribution and abundance
2. seasonal movements, habitat requirements (e.g., breeding, calving, feeding) and sensitive time periods
3. population status and trends, limits and size, sensitivity and any other limiting factors
4. habitat types including local and regional distribution and abundance
5. habitat or sites of special value or sensitivity, including species use and timing
6. migratory patterns, routes and timing in relation to all season road route alternatives, construction activities, and operation
7. harvest pressures (subsistence, resident and non-resident harvesting) by species, season and geographic area
8. current and historic levels of natural and human-caused fragmentation and connectivity
9. baseline contaminant concentrations in harvested species that may change as a result of the all season road
10. any known issues with respect to the health (e.g. parasites, diseases, condition)
11. location of raptor nesting sites within 1km of the proposed road

In the discussion, please distinguish between different species such as boreal woodland caribou and northern mountain woodland caribou.

5.1.5 Fish and Aquatic Habitat

Provide a description of the existing fish and aquatic habitat within the study area, including:

1. a description of fish habitat present at each of the planned water crossings and realignments, including references (such as photographs and diagrams) at those locations with particular emphasis on riparian areas
2. fish species including forage fish (non-harvested) and any other aquatic resources of value present
3. seasonal and life cycle movements and sensitive periods
4. habitat requirements for each life stage
5. local and regional abundance, distribution and use of habitat types, including aquatic and riparian vegetation

[5] Refer to both the Government of Canada (http://www.sararegistry.gc.ca/default_e.cfm and http://www.cosewic.gc.ca/eng/sct5/index_e.cfm) and Government of the Northwest Territory (http://www.nwtspeciesatrisk.ca/) guidance.

6. known sensitive or important areas in terms of habitat type (e.g., spawning, overwintering, refugia, feeding), species and timing of use
7. baseline contaminant concentrations in harvested species that may change as a result of the all season road and as available
8. any known issues with respect to health of harvested species (e.g. parasites, disease, condition)
9. locations and species of particular importance to subsistence harvesters (including Bluefish creek, Tetcela River, and Fishtrap creek)
10. harvest pressures by species, season and geographic area
11. a listing of existing invasive species.

5.1.6 Wildlife and Wildlife Habitat

Provide a description of the existing wildlife (including birds) and wildlife habitat within the study area, including:

1. wildlife species presence, distribution and abundance
2. seasonal movements, habitat requirements (e.g., breeding, calving, feeding) and sensitive time periods
3. habitat types including local and regional distribution and abundance
4. species of importance to subsistence harvesters
5. habitat or sites of special value or sensitivity, including species use and timing
6. migratory patterns, routes and timing in relation to all season road route alternatives, construction activities, and operation as well as in relation to construction activities and operation of the airstrip
7. harvest pressures (subsistence, resident and non-resident harvesting) by species, season and geographic area
8. listing and location(s) of existing invasive species
9. current and historic levels of natural and human-caused fragmentation and connectivity
10. baseline contaminant concentrations in harvested species that may change as a result of the all season road
11. any known issues with respect to the health of harvested species (e.g. parasites, diseases, condition)
12. use of the project area by birds protected by the *Migratory Birds Convention Act*, 1994.

5.1.7 Vegetation

Provide a description of the existing vegetation within the study area, including:

1. vegetation and vegetation assemblages
2. any classification system followed, as appropriate
3. identification of species or assemblages that are rare, valued, protected or designated (e.g., vulnerable, threatened, endangered)

4. location and abundance of rare plants
5. historic and current human use of vegetation, including subsistence and commercial harvesting, (e.g., berry picking, forestry)
6. baseline contaminant concentrations in harvested species or vegetation (e.g. berries) that may change as a result of the all season road and as available
7. locations and quantities of merchantable timber
8. listing and location(s) of existing invasive species
9. frequency of forest fires and post-fire vegetation succession.

5.2 Human Environment Baseline Information Requirements

5.2.1 Education, Training, and Skills

Provide a description of the education, skills and training levels in the communities relevant to the road, including graduation and achievement rates including high school or higher, and trade certification levels.

5.2.2 Harvesting

Provide a description of current and traditional harvesting, focusing on subsistence and commercial harvesting, including harvesting activities and other traditional uses by Aboriginal peoples within study area. This will include harvest levels, participation, and locations (with specific attention to high use areas and areas of sensitivity, and seasonal access). Describe any recent and current encroachments and restrictions of harvesting activities (i.e. by competing uses of land and resources or related regulations).

5.2.3 Cultural and Heritage Resources

Describe the existing archaeological, paleontological, and historic resources, collectively referred to here as cultural and heritage resources, within the study area, including:

1. archaeological, paleontological and historic sites and resources
2. culturally important sites
3. burial sites
4. heritage resource potential.

5.2.4 Tourism

Describe the current tourist activity in the study area and revenue generated as a result of tourism in the region with specific attention to the revenue generated both directly and indirectly by Nahanni Butte.

5.2.5 *Regional and Local Economies*

Provide a description of the local and regional economies and their performance, including:

1. employment rate
2. employment by industry and occupation, including occupations related to traditional activities
3. job vacancy and unfilled positions, labour force growth, participation and balance between wage and non-wage sector activities and earnings growth
4. poverty levels and annual level of social assistance benefits and recipients
5. the level of local households consuming harvested meat and fish and current harvest activities
6. current and projected land-based enterprises and economic activities, including those related to tourism, recreation, renewable and non-renewable resources.

5.2.6 *Existing Transportation Routes and Related Infrastructure*

Describe the local and regional infrastructure. Particular attention will be given to:

1. fuel services
2. road transportation routes including current usage
3. water transportation routes.

6 DEVELOPMENT DESCRIPTION

The developer will fully describe the facilities and activities associated with all phases of the development. This should include a summation of the need for the project. In addition, the alternative methods of carrying out the project and development schedule should be described in the following sections.

6.1 Project Components and Activities

The project includes three distinct components: construction and operation of an all season road, construction and operation of transfer facilities along the road, and construction and use of an air strip. A commentary on the alternative means to complete each of these components will be included. Alternative means encompasses the potential road alignments and airstrip locations.

The following activities will be considered for each component, where applicable:

1. design standards (for all project components)
2. land requirements (footprint, location, permanent or temporary, ownership, zoning)
3. right of way clearing
4. road construction methods
5. cut and fill estimates and plans for excess material disposal/storage
6. water crossing structures and locations

7. alterations to stream flow
8. borrow source locations, quality and quantities, activities and methods
9. temporary winter or all season access roads to borrow areas
10. camps, staging areas, laydown areas, access roads and other support facilities
11. fuel storage and management
12. explosives manufacturing, storage, transportation, and use
13. toxic or hazardous materials to be used
14. equipment requirements (by phase)
15. concentrate containment
16. solid, liquid, and gas waste management
17. water use
18. wastewater treatment
19. mobilization and demobilization (this should include a discussion of related activities and land requirements which are necessary for construction but not a part of the project)
20. frequency of vehicle and aircraft movement during construction
21. routine maintenance activities
22. expected traffic volumes during operational phase
23. clean-up and restoration of work areas during construction phase
24. reclamation
25. procurement and implementation approach
26. training, employment and business opportunities
27. ongoing operations and maintenance of the all season road (including access control)
28. land ownership and jurisdiction
29. land requirements including footprint, location, permanent or temporary, ownership, and zoning.

Please describe the differences between the proposed all season road and approved winter road. The changes to the project footprint, both in aerial extent and in permanence of structures, will be discussed for all project components. The aerial extent should account for the components listed above.

6.2 Road Design Considerations

To address the effect of the project on the key lines of inquiry and other valued components, it is important to understand the road design considerations. The following design considerations will be described:

1. longitudinal slope of the road
2. runaway lanes
3. safety railings
4. side slopes
5. channel bank reinforcement

6. freeboard when adjacent to or crossing watercourses for multiple flood events (see Section 5.1.3 for flood events)
7. pull-outs
8. dust control
9. geotechnical stability
10. sediment and erosion control especially where immediately adjacent to a waterbody
11. landslide and avalanche protection.

Where relevant, the applicability of these design considerations will be included in the discussions of the key lines of inquiry (Section 7.2), subjects of note (Section 7.3), effects of the environment on the project (Section 8), and potential accidents and malfunctions (Section 9).

6.3 Construction Phases and Schedule

The development description will contain an overall activity schedule for the development which describes the scheduling and duration of each activity. This can be done in the form of a Gantt chart. The scheduling should be cognisant of any timing constraints and include potential mitigation steps. For example, if the planned timing for the construction of a stream crossing is delayed it may conflict with spawning times and inhibit construction. Scheduling should describe timelines and contingencies for the timing of each project activity during the construction, operation, and closure.

6.4 Existing Infrastructure, Facilities, and Management Plans

For previously assessed, existing, and approved facilities that are to be used as part of the project, the developer will describe:

1. the infrastructure and facilities, including
    i. operation of the airstrip, frequency of use, type of aircraft, and estimated number of passengers and volume of material
    ii. potential increase in the number of vehicles travelling along existing roads and highways
2. how it will be used in the context of the proposed development
3. the capacity of existing facilities and infrastructure to handle the proposed development
4. any changes to the existing infrastructure or facilities that will occur as a result of the project.

6.5 Existing Management Plans

As part of the environmental assessment, the Review Board will assess the adequacy of existing monitoring programs with respect to detecting and preventing potential significant adverse impacts from developing. Please provide a list and summarize the status of existing monitoring and management plans and their relevance to the project. In addition, please describe the adequacy of

the plans and any amendments that will be needed to address the upgrade from winter road to an all season road. Guidelines for monitoring and management plans have been listed in Appendix C.

7 ASSESSMENT OF ENVIRONMENTAL IMPACTS AND CUMULATIVE EFFECTS

The developer will be responsible for the identification and assessment of effects of the development on the biophysical and human environment and for the assessment of cumulative effects resulting from the development in combination with past, present and reasonably foreseeable developments and activities. The developer is encouraged to utilize information and lessons learned from previous environmental assessments in the preparation of its Developer's Assessment Report.

To be clear, the project as defined in this EA is the proposed all season road and airstrip. The cumulative effects assessment should consider the approved Prairie Creek Mine as an "other" development that may affect the valued components listed in this EA.

7.1 Effects Assessment

For each valued component described in this section, the following topics will be addressed, consistent with the methodology identified in Section 4 of this document.

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

Mitigations and residual effects: The developer will describe all mitigations that will be put into effect during project design, construction or operation to mitigate potential environmental effects. The developer will assess potential effects on the valued component after implementation of mitigations. Residual effects will be clearly identified and characterized based on methodology presented in DAR.

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

7.2 Key Lines of Inquiry

Key lines of inquiry are areas of concern that have been identified as requiring the most attention during the environmental impact assessment and the most rigorous analysis and detail in the *Developer's Assessment Report*. Key lines of inquiry are identified to ensure a comprehensive detailed analysis of the issues that were identified as potentially significant during the scoping process. The developer will provide a standalone assessment of the key lines of inquiry to facilitate public evaluation. The assessment work will encompass project-specific effects and cumulative effects.

Three key lines of inquiry were identified:

1. **Impacts to traditional harvesting and traditionally harvested species**
2. **Effects of potential accidents and malfunctions**
3. **Impacts to Nahanni National Park Reserve**

7.2.1 Traditional Harvesting and Traditionally Harvested Species

Describe and evaluate the potential impacts of the all season road, for the preferred and alternate routes, on wildlife such as caribou, moose, sheep, furbearers, and fish and other traditional harvesting. This section will also include any other potential impacts to harvesting of other species. This will include an examination of:

1. sensitive or important harvesting areas or habitat both inside and outside the Nahanni National Park Reserve
2. direct and indirect alteration of habitat including all season road footprint impact
3. sensory disturbance, and predicted changes in behaviour (including habitat avoidance and effective habitat loss in relation to all season road facilities or activities), energetics, health and condition
4. wildlife movement patterns, home ranges, distribution and abundance
5. wildlife mortality due to harvesting and vehicle collisions
6. disruption of sensitive life stages or habitat (e.g., migration, calving, denning, overwintering)
7. effect to population cycles
8. effects to predator-prey relationships
9. increased human-wildlife interactions
10. contaminant levels in harvested species that could be impacted by the all season road.
11. changes in access, including increased access to the land and surrounding waters, as well as increased access to environmentally and culturally sensitive areas
12. changes in hunting and fishing pressures from people who do not reside in the region and how road-related changes in harvest pressures could impact the resource

13. changes in the abundance and distribution of harvested resources, including caribou, moose, sheep, and other wildlife (e.g. furbearers, waterfowl) that would adversely affect harvesting
14. disturbance of harvest patterns, or loss or alteration of high-value harvest areas including:
    i. changes to harvest effort as perceived by harvesters
    ii. changes in harvester travel patterns
    iii. changes in harvest levels
    iv. changes in harvesters' costs
    v. changes in seasonal harvesting patterns
15. competition among harvesters within and between communities as a result of increased access and loss or alteration to the land resulting from the project
16. changes in the quality of harvested species (including contamination) that would negatively affect their consumption
17. measures to avoid or minimize changes in the abundance, distribution, or quality of harvested species, or mitigate the consequences of such changes
18. mechanisms to control project workforce-related hunting, fishing, or disturbance of wildlife
19. other traditionally harvesting activities such as for berries or medicinal plants
20. mechanisms of resource management agencies and other parties to manage hunting, and fishing by:
    i. resident hunters and fishers
    ii. non-resident hunters and fishers
    iii. Aboriginal harvesters.

7.2.2 Effects of Potential Accidents and Malfunctions

Describe and evaluate the potential impacts of potential accidents and malfunctions along the all season road for the preferred and alternate routes. For each project phase, accidents and risks related to consider include:

1. contamination to soil from concentrate aerial dispersal and spills along the road
2. contamination of surface water, groundwater, and subsurface water from concentrate aerial dispersal and spills along the road
3. spills of concentrate at transfer facilities
4. leaks of fuel or other materials during transport
5. fuel leaks during extraction for road building
6. fuel or contaminant leaks at storage facilities
7. how the environment may contribute to potential accidents, malfunctions, and spills including consideration of:
    i. flooding
    ii. overland flow

iii. landslides and ground movement
iv. seismic activity
v. avalanche activity

To help inform the discussion, the developer should describe how the road design considerations (Section 6.2) and the transfer facility design will help minimize the risks.

Particular attention should be given to the potential effect of spills to sensitive environments and the effect on fish and wildlife. Of particular importance are spills to subsurface water within karst and the overall integrity of the karst.

When evaluating the potential spills for each phase the following should be completed:

8. A risk assessment using best practices[6] for the Project including components, systems, hazards, and failure modes
9. Assessment of the likelihood and severity of each risk identified including:
    i. a map of high risk zones
    ii. site-specific contingencies for high risk areas
10. A description of contingency plans for accidents, malfunctions, or unforeseen impacts of the environment on the development and the development on the environment
11. A description of emergency response plans that will be in place.

7.2.3 Impacts to Nahanni National Park Reserve

Describe how the construction activities and completed projects will affect the overall ecological integrity and visitor experience of the Nahanni National Park Reserve. The evaluation should be completed in the context of Parks Canada's legislated and mandated priorities. Topics to consider include:

1. ecosystem and habitat loss
2. wilderness quality
3. habitat fragmentation and barriers to movement and gene flow
4. ability of habitat or species to recover
5. response to edge effects
6. changes to species distribution and abundance
7. changes to the karst formations
8. invasive species (vegetation and wildlife)
9. ecosystem functioning
10. overall visitor experience
11. long term changes to Nahanni National Park Reserve.

[6] See http://www.robertsongeoconsultants.com/rgc_enviromine/issues/cls_fmea-2.html

7.3 Subjects of Note

Subjects of note require a thorough analysis including a cumulative effects assessment, but do not require the same level of detail as the key lines of inquiry. The following subjects of note are based on concerns expressed by the various interest parties and the general public during scoping meetings.

7.3.1 Terrain, Soils, Permafrost, and Karst Topography

Describe and evaluate the potential effects of the project on terrain, geology, soils, permafrost, and karst topography including a consideration of:

1. slope and soil stability, erosion and subsidence
2. the effect of changes in road bed weight relative to the winter road, drainage, traffic volume, traffic speed, and borrow site development on karst topography
3. the effects on wetlands with particular attention to the wetland areas between Second Gap and Silent Hills, near the Tetcela Transfer Facility, and between Second Gap and Wolverine Pass
4. thaw slumps, compaction of organic peat lands, and potential for melt of ice rich ground
5. snow distribution and consequences on ground thermal regime
6. drainage beside and beneath the road, channelization and non-channelization flow and permafrost degradation
7. avalanche risks and the effect of avalanche management on the environment.

With respect to potential impacts of the all season road on permafrost, include consideration of:

8. permafrost as a design feature in the road bed, failure modes analysis and associated contingency plans
9. changes to permafrost beneath the Tetcela Transfer Facility
10. thermal conditions, active layer thickness, thaw depth, distribution and stability
11. ice rich soils (thaw settlement, thermokarst) permafrost thaw and related settlement
12. frost heave or frost susceptible soils in thin permafrost as well as seasonally frozen soils
13. thaw or settlement-related impacts on drainage and surface hydrology (see also Section 7.3.5 on water and water quality)
14. shorelines and channels
15. combined impacts of the all season road and fires
16. how warming ground temperatures and deepening active layers will affect the all season road and how mitigation measures will remain effective in various climate warming scenarios.

7.3.2 Granular Materials

For the proposed project, describe:

1. locations, areas and volumes of material from each proposed borrow site

2. potential for excavation and use of hot rocks (rocks with high sulphur content within shale)
3. measures to limit the effect on the surrounding environment
4. excavation requirements
5. talus slope stability
6. ownership and operation of borrow pits
7. remediation and reclamation of borrow pits
8. potential for acid rock drainage.

Please also provide a summary of the rankings for each borrow pit location.

7.3.3 Air Quality

Describe and evaluate the potential effects of the project on air quality including consideration of:

1. dust and carbon emissions from vehicles, equipment and stationary sources
2. emissions by source for each phase (construction, operation and maintenance, and closure), including quantity, timing and duration, normal operation conditions and upsets
3. how changes in air quality could have an impact on humans, wildlife, vegetation, and waterbodies
4. methods of dust suppression.

7.3.4 Noise

Describe and evaluate the potential effects of the project on noise including consideration of:

1. road (including borrow pits) and airstrip components and activities that could produce undesirable noise including source location, timing and duration
2. sensory disturbance to fish, birds and wildlife, including caribou and moose
3. disturbance of harvest and recreational activities, including tourism
4. potential impacts to wildlife harvesting activities and impacts to communities.

7.3.5 Water Quality and Quantity

Describe and evaluate the potential effects of the project on water quality and quantity including consideration of:

1. changes to surface drainage patterns and surface water hydrology including changes caused by road-related impacts on terrain, soils and permafrost
2. alterations to streamflow
3. possible contamination to surface water, subsurface water and groundwater including within karst features
4. drinking water quality for humans and wildlife
5. recreational water quality

6. discharge or seepage of wastewater effluent, contaminants, chemical additives, etc.
7. changes to water quality at water crossings and realignments (bridges, culverts and other wetted areas)
8. changes to water quality due to thaw slumps and other slope instability at water crossing
9. changes to snow distribution and potential impacts on drainage
10. issues related to borrow extraction including melting of ground ice and potential changes to drainage patterns etc.
11. erosion, sediment deposition, sediment re-suspension
12. changes to flow or water levels including potential for glaciation and icings at watercourse crossings
13. water withdrawal and volume of withdrawal (e.g., for potable water, dust suppression)
14. potential effects on the aquatic environment including invertebrates.

7.3.6 Species at Risk

For species not addressed in the key line of inquiry on traditional harvesting and traditionally harvested species (Section 7.2.1), identify and evaluate the impacts of the project to the identified (in Section 5.1.4) species at risk[7] including:

1. methods to minimize the effect of the project on the species including strategies for mitigation and monitoring
2. direct and indirect alteration of habitat including direct road footprint impact
3. visual or auditory disturbance, including habitat avoidance and effective habitat loss in relation to all season road facilities or activities
4. effect of construction and pre-construction activities, including aircraft effects
5. mortality due to harvesting and vehicle collisions
6. disruption of sensitive life stages or habitat (e.g., migration, calving, denning, overwintering)
7. changes to movement patterns and corridors, home ranges, distribution and abundance
8. effects to sensitive or important areas of habitat
9. habitat fragmentation
10. effects to population cycles
11. effects to predator-prey relationships
12. attraction of predators to birds and bird eggs
13. increased human-wildlife conflicts (e.g. bear encounters)
14. mortality from collisions with temporary or permanent structures and wires
15. changes to the location of raptor nesting sites within 1km of the proposed road
16. use of the project area by birds protected by the *Migratory Birds Convention Act*, 1994

[7] Refer to both the Government of Canada (http://www.sararegistry.gc.ca/default_e.cfm and http://www.cosewic.gc.ca/eng/sct5/index_e.cfm) and Government of the Northwest Territory (http://www.nwtspeciesatrisk.ca/) guidance.

17. how road-related changes in harvest pressures could impact the resource
18. ability of habitat or species to recover
19. response to edge effects
20. invasive species (vegetation, wildlife and other threats).

7.3.7 Fish and Aquatic Habitat

Describe and evaluate the potential effects of the project on fish and aquatic habitat including consideration of:

1. alteration or loss of fish habitat due to development activities during all project phases
2. the estimated time to redevelop habitat
3. effects of proposed watercourse crossings, realignments and temporary vehicle crossing methods
4. standards or guidelines related to watercourse crossings and realignments that would be applied
5. relevant policies, management plans or other measures to protect or enhance fish and aquatic habitat, including timing restrictions, protected areas or regulations
6. disruption of sensitive life stages or habitat (e.g., spawning and incubation, rearing, overwintering) including loss of substrate habitat and known sensitive or important sites
7. effects on riparian areas
8. effects to locations and species of particular importance to subsistence harvesters (including Bluefish creek, Tetcela River, and Fishtrap creek)
9. impacts related to changes in water quality or quantity
10. changes to distribution or abundance
11. effects to sensitive or important areas or habitat
12. contaminant levels in harvested species that could be changed by the all season road, if applicable
13. potential effects on fish health
14. blockages to movement
15. effects of blasting (if required)
16. dredging or disposal of sediments
17. effects of water withdrawal
18. potential for increased pressure on the resource that could arise from improved access
19. reclamation of in-stream and riparian work areas during construction and also during maintenance operations
20. criteria for evaluating the success of mitigation or reclamation measures and indicate when and how this evaluation would be conducted (see also Section 11).

7.3.8 Wildlife and Wildlife Habitat

For species not addressed in the key line of inquiry on traditional harvesting and traditionally harvested species (Section 7.2.1), describe and evaluate the potential effects of the project on wildlife[8] and wildlife habitat (including birds) including consideration of:

1. direct and indirect alteration of habitat including direct road footprint impact
2. visual or auditory disturbance, including habitat avoidance and effective habitat loss in relation to all season road facilities or activities
3. effect of construction and pre-construction activities, including aircraft effects on wildlife
4. wildlife mortality due to increased harvesting and vehicle collisions
5. disruption of sensitive life stages or habitat (e.g., migration, breeding, calving, denning, overwintering)
6. wildlife movement patterns and corridors, home ranges, distribution and abundance
7. effects to sensitive or important areas or habitat
8. habitat fragmentation
9. effects to population cycles
10. effects to predator-prey relationships
11. attraction of predators to birds and bird eggs
12. increased human-wildlife conflicts (e.g. bear encounters)
13. mortality from collisions with temporary or permanent structures and wires
14. changes to the location of raptor nesting sites within 1km of the proposed road
15. use of the project area by birds protected by the *Migratory Birds Convention Act*, 1994
16. how road-related changes in harvest pressures could impact the resource
17. ability of habitat or species to recover
18. response to edge effects
19. invasive species (vegetation and wildlife)

7.3.9 Vegetation

Describe and evaluate the potential effects of the project on vegetation including consideration of:

1. alteration or loss of species, or vegetation assemblages that are rare, valued, protected or designated sensitive or important areas or habitat
2. amount of merchantable timber removed during right of way clearing and the potential for facilitating use of waste timber by communities
3. amount of vegetation clearing
4. introduction of invasive species and threats
5. effects to rare plants
6. effects of fire management practices

[8] Including birds

7. potential changes to fire risk
8. effects of road emissions including dust
9. how changes in right of way clearing might impact permafrost and the all season road itself
10. changes to the soil, hydrological or permafrost regimes related to vegetation changes
11. re-establishment of vegetation and reclamation of borrow sites and other disturbances (particularly identification of vegetation types and seed mixes to be used, and identification of the specific borrow site to be re-vegetated, and those borrow sites that will not be re-vegetated)
12. vegetation control during operations.

7.3.10 Cultural and Heritage Resources

Describe and evaluate the potential effects of the development on culture and heritage resources (beyond those described in response to the discussion of impacts on harvesting). This will include:

1. traditional lifestyles, values and culture
2. cultural and spiritual sites and activities
3. impacts to archaeological sites.

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

7.3.11 Employment and Benefits to the Community

Describe and evaluate the potential impacts of the all season road on the community, including a consideration of:

1. direct and indirect employment opportunities generated by the development and the potential for uptake of these opportunities locally by Aboriginal peoples and within the Nor
2. current or proposed socio-economic initiatives or agreements (please list and provide the non-confidential details)
3. the effectiveness of past or present socio-economic benefit initiatives including levels of success in improving recruitment, retention, and advancement of workers from potentially affected communities
4. employment and income for every phase and year of construction and operation, with particular reference to wage and salary employment by length of employment, form of employment (full time, part time, seasonal), and skills category
5. location of camps (new or existing, temporary or permanent)
6. employee drug and alcohol policy
7. security personnel at the sites
8. anticipated access of crews to surrounding communities
9. potential negative effects of the project such as crime and substance abuse

10. changes to policing demands
11. measures, plans and commitments for maximizing local and Aboriginal employment and businesses
12. effects on tourism activities in the region from all season access
13. potential for increased exploration in the area
14. speculative migration into the area
15. changes to the cost of living in the area
16. how local and Aboriginal participation in contractor and sub-contractor business opportunities will be maximized
17. effects on capacity of local businesses to service other sectors during the construction phase
18. the timing and duration of education and skills development programs that would be required for road-related employment
19. proposed education and training programs required for road-related construction and operation employment, including:
    i. training required for use of the proposed road
    ii. local and regional training opportunities
    iii. timing and duration of programs, in relation to the development schedule
    iv. skills and experience gained that could be applied to other available projects or sectors
    v. the number of people expected to be employable and available
    vi. the potential for local development of skills for senior professional positions (e.g. labourer or heavy equipment operator vs. supervisor or manager)
    vii. proposed programs that would be provided by or sponsored by the developer.

7.3.12 Impacts on Existing Transportation Infrastructure

Describe how the development will affect existing transportation infrastructure, including:

1. effect on the Nahanni Butte access road and the Liard Highway from increased traffic during the construction and operation of the all season road with particular attention to:
    i. possible accidents with tourist traffic and wildlife
    ii. increased dust along the highway and the effect on adjacent properties
    iii. safety along the highway
    iv. spills along the highway
2. effects on existing water crossings (i.e. Liard River crossing).

8 EFFECTS OF THE ENVIRONMENT ON THE PROJECT

It is important to address the effect of the project on the environment and the potential effect of the environment on the project. In addition to environmental effects addressed in the key line of

inquiry on the effects of potential accidents and malfunctions (Section 7.2.2), consideration will be given to:

1. long-term climate change scenarios[9] (e.g., loss of permafrost, increased evaporation and evapotranspiration, greenhouse gas emissions)
2. how likely changes in permafrost will affect the amount the granular material required for care and maintenance of the all season road
3. short-term climatic and extreme weather events (e.g., major precipitation, wind, fog, drought)
4. changes in permafrost regime
5. subsidence
6. fires.

As stated in Section 7.2.2, the evaluation of the effects of the environment will include:

7. an assessment of the likelihood and severity of each risk identified including:
    i. a map of high risk zones
    ii. site-specific contingencies for high risk areas
8. a description of contingency plans
9. a description of emergency response plans that will be in place.

9 POTENTIAL ACCIDENTS AND MALFUNCTIONS

For each project phase, accidents and risks to consider above those considered in the key lines of inquiry include:

1. explosions
2. transportation, storage, manufacture and use of explosives
3. fires

Similar to what was described in Section 7.2.2 , when evaluating the potential accidents and malfunctions for each phase the following should be completed:

4. a risk assessment using best practices[10] for the project including components, systems, hazards, and failure modes
5. assessment of the likelihood and severity of each risk identified
6. a description of contingency plans for accidents, malfunctions, or unforeseen impacts of the environment on the development and the development on the environment
7. a description of emergency response plans that will be in place.

[9] See the Intergovernmental Panel on Climate Change's most recent assessment report at http://www.ipcc.ch/report/ar5/
[10] See http://www.robertsongeoconsultants.com/rgc_enviromine/issues/cls_fmea-2.html

10 CUMULATIVE EFFECTS ASSESSMENT

The cumulative effects of the proposed all season road must be assessed. The cumulative effects assessment must demonstrate to the Review Board that any significant cumulative effects are adequately considered and can be successfully mitigated. The analysis of the cumulative effects must enable the Review Board to gain an understanding of the incremental contribution of all projects or activities in the vicinity of the road, and of the road alone, to the total cumulative effect on the valued components over the life of the all season road. The developer must identify and assess the cumulative biophysical and socio-economic effects of the project in combination with other past, present or reasonably foreseeable projects and activities within the study area. While a project-specific assessment of cumulative effects is not responsible for assessing all cumulative impacts from other human activities, it must consider how the project's effects could interact cumulatively with the effects of other human activities, and the contribution of the all season road to the overall effect.

The cumulative effects assessment must follow the guidance of the Review Board's *Environmental Impact Assessment Guidelines*, which refers specifically to cumulative effects assessment and includes a description of how to consider reasonably foreseeable future developments. The assessment of cumulative effects of the project must include the following, but may also address other items:

1. identify the valued components, or their indicators, on which the cumulative effects assessment is focused, including the rationale for their selection. These are valued components affected by the all season road in combination with other past, present or reasonably foreseeable future developments. Present spatial and temporal boundaries for the cumulative effect assessment for each valued component selected. Emphasize valued components with special environmental sensitivities or where significant risks could be involved.
2. identify the sources of potential cumulative effects. Specify other past, present or reasonably foreseeable future developments that may substantially affect the valued components identified above. These may be in the vicinity of the road or may affect a mobile resource that moves into its vicinity (like a river or a caribou herd).
3. predict the combined effects of the road and the other activities identified above.
4. identify how the developer or others will mitigate the identified cumulative impacts.

Key Lines of Inquiry and Subjects of Note contain important cumulative effects components. In addition to providing a detailed assessment in the response to each of these, a stand-alone assessment of the cumulative effects of the proposed development in combination with past, present and reasonably foreseeable future developments is required. As a minimum, this section in the DAR must provide summaries of the analysis and results for any cumulative effects assessment done and presented under any individual Key Lines of Inquiry or Subjects of Note.

The cumulative effects assessment will consider regional plans, species recovery plans, management plans and objectives and guidelines in an integrated manner in order to understand the aspirations of people and communities in the region. The developer will make reasonable and conservative assumptions about relevant cumulative effects from other activities where there is an absence of data and where these effects could combine with those of the proposed road. The developer will consider climate trends in the cumulative context as well as the project specific context.

The developer will also provide a discussion of potential future developments that could occur as a result of, or use of, this road. In addition, a discussion of implications for long-term operation, maintenance, management, and closure should be included. It is also important to note that there may be opportunities within this project or others to mitigate the predicted cumulative effects.

11 FOLLOW-UP AND MONITORING

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

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

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

In addition, the developer is encouraged to use management response plans to accomplish adaptive management. Guidance on a management response framework, how to link monitoring results to management decisions, and how management activities are developed adaptively in response to changes in the environment can be found in the Wekeezhi Land and Water Board document *Guidelines for Adaptive Management – a Response Framework for Aquatic Effects Monitoring. Draft. Oct 17, 2010.*

12 CLOSURE AND RECLAMATION

The developer will provide a framework for the conceptual closure and reclamation of the project. Guidance on reclamation provided in the Mackenzie Valley Land and Water Board – Aboriginal Affairs and Northern Development Canada's *Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and the Mine Sites in the Northwest Territories*[11]. Consideration will be given to:

1. what the proposed closure and intermediate closure plans are, including the duration of the activities
2. identify areas where pre-project conditions will not be returned
3. identify how pre-project conditions will be reinstated (i.e.: surface drainage, water courses, topography, vegetation, floodplain extent)
4. discuss long-term physical integrity of any permanent features
5. discuss monitoring plans during reclamation and
6. identify how potentially-affected communities were engaged in determining end land use and water objectives for reclamation.

13 CONCLUSION

The Review Board anticipates that the requirements described in this document will produce a Developer's Assessment Report that clearly describes its predictions of the impacts from the all season road and the likely effectiveness of proposed mitigation and management plans. The resulting Developer's Assessment Report should therefore provide a sufficient basis for the Review Board and parties to analyze and evaluate those predictions.

[11] See http://mvlwb.com/sites/default/files/documents/wg/WLWB_5363_Guidelines_Closure_Reclamation_WR.pdf

Appendix A Example Commitments Matrix *(to be populated by CanZinc)*

Number	Description of Commitment and Mitigation Measures from EA0809-002	Does it Apply to the Proposed Project (Yes/No)	Reasoning
1	A geotechnical investigation is proposed to support the final design of the access road. The investigation will focus on portions of the access route west of km 85, specifically, the proposed polje by-pass and immediately west of Wolverine Pass	Yes	A geotechnical investigation is needed…..
10	All trucks will have communications, will be on alert for on-coming traffic or wildlife presence in the roadway and will be in contact with a controller	Yes	Safety and protection of wildlife are still a concern

Appendix B Example Assessment Matrix *(to be populated by CanZinc)*

Impact	**Significance** (High Moderate Low)	**Summary of Rationale** (including section in the document)	**Uncertainty** (High Moderate Low)	**Geographic Range** (area or distance)	**Timing** (Duration, frequency, and extent)	**Magnitude** (High Moderate Low)	**Reversibility** (High Moderate Low)	**Likelihood** (High Moderate Low)
Increased harvesting	High	Large geographic range, important to the community, and potentially irreversible	High	184 km x 100 km (based on geographic scope)	20 years (life of mine and reclamation)	Moderate	High	Moderate
Change in vegetation composition	Low	Large geographic extent but largely reversible effects	High	184 km x 0.10 km (based on the geographic scope)	40 years (life of mine, reclamation, and time for succession)	Moderate	High	Low

Appendix C Guidelines for Monitoring and Management Plans

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

Mackenzie Valley Environmental Impact Review Board

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

Mackenzie Valley Land and Water Board

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

Natural Resource Canada

- *Dam Safety guidelines (Canadian Dam Association 2007)*

Fisheries and Oceans Canada

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

Aboriginal Affairs and Northern Development Canada

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

Canadian Council of Ministers for the Environment

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

Government of the Northwest Territories

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