FINAL GUIDELINES
FOR AN ENVIRONMENTAL IMPACT ASSESSMENT:
GEODEX SISSON BROOK PROJECT
(OPEN PIT MINE)

Issued by the Minister of Environment
for the Province of New Brunswick

to

Geodex

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1.0 INTRODUCTION

1.1 Background

The proposed project includes the development, operation and ultimate reclamation of an open pit molybdenum (Mo) and tungsten (W) mine with an on-site ore processing facility to produce mineral concentrates. The concentrates would be shipped off-site by truck or, if feasible, by rail to a facility for further processing. The plant would operate at 20,000 tonnes of ore per day, 343 working days per year and employ approximately 300 people for a minimum of 30 years.

Development of the minesite would include construction and operation of the following:

- An approximately 90 ha open pit to mine ore by drilling and blasting. Approximately 20, 000 tonnes per day of ore would be mined;
- An ore processing plant capable of producing 20 tonnes per day of tungsten and molybdenum concentrates;
- Tailings management area;
- Stockpile areas for waste rock and overburden;
- A power distribution system to link to existing power transmission line;
- Warehouses, maintenance offices, assay lab and administration complex;
- A freshwater supply, storage and distribution system;
- A sewage treatment system and waste disposal facilities;
- Fuel tanks and fuel handling facility; and
- Access and service roads.

Site preparation would include tree clearing, development of on-site roads, camp construction and installation of a permanent power supply.

1.2 Purpose

These Guidelines are to be used by Geodex Minerals Ltd (Geodex) as a framework for conducting an Environmental Impact Assessment (EIA) of the development, operation and ultimate reclamation of an open pit molybdenum (Mo) and tungsten (W) mine with an on-site ore processing facility.

The Final EIA Guidelines outline the requirements of the New Brunswick Clean Environment Act *Environmental Impact Assessment Regulation* (87-83). The environmental assessment will examine the potential environmental effects (both positive and negative) of the construction and operation of the project and all related facilities and infrastructure, and will identify appropriate mitigative/optimization measures.

1.3 Environmental Impact Assessment (EIA) Process

Under *Regulation 87-83* of the NB Clean Environment Act, Geodex, as the proponent of the

project, was required to register the Project as an undertaking for EIA review. The proposal was registered on September 5, 2008. On October 24, 2008 the Minister of the New Brunswick Department of Environment (the Minister) determined that the completion of a Comprehensive EIA was required to assess the nature and significance of the proposal's potential impacts.

This project will also likely require an environmental assessment federally and on October 2, 2008, the project description for the development proposal was distributed by the Canadian Environmental Assessment Agency to Environment Canada, Fisheries and Oceans Canada, Health Canada, Indian and Northern Affairs Canada, Natural Resources Canada, and Transport Canada, in accordance with the requirements of the *Regulations Respecting the Coordination by Federal Authorities of Environmental Assessment Procedures and Requirements*.

Federal authorities will meet to discuss the requirements of the environmental assessment process under the Canadian Environmental Assessment Act, including the type of review, scope of project and scope of assessment.

When the type of federal environmental assessment is determined, as well as the scope of the review, options for coordination of the federal and provincial environmental assessment requirements will be determined.

The Minister has appointed a Technical Review Committee (TRC) comprised of technical specialists from various government agencies whose jurisdictions may be affected by the undertaking. The agencies include:

- NB Department of Environment (DENV);
- NB Department of Agriculture and Aquaculture (DAA);
- NB Department of Natural Resources (DNR);
- NB Department of Public Safety (DPS);
- NB Department of Energy (DOE);
- NB Department of Fisheries (DOF);
- NB Department of Transportation (DOT);
- NB Museum (NBM);
- NB Wellness, Culture and Sport - Archaeological Services Unit (WC&S);
- NB Department of Health (DOH);
- Worksafe NB;
- Rural Planning District Commission;
- Canadian Environmental Assessment Agency (CEAA);
- Fisheries and Oceans Canada (DFO);
- Transport Canada (TC);
- Environment Canada (EC);
- Natural Resources Canada (NRCan);
- Local Service District of Bright;
- Health Canada (HC); and
- Indian and Northern Affairs Canada (INAC).

The TRC will include those listed above, with the addition of other provincial and federal

government agencies as required. The Guidelines outline the approach the proponent must follow in conducting the EIA. The Guidelines identify important issues, which must be considered in assessing the potential impacts of the proposal.

Members of the public, stakeholders and the Aboriginal community have been provided an opportunity to comment on the Draft Guidelines and to identify any issues of concern that do not appear in the document. The Draft EIA Guidelines were released for public comment from December 18, 2008 to January 30, 2009. Following the comment period, the draft guidelines were updated based on public input received and a detailed review by the TRC. The Minister will be issuing the Final Guidelines for the EIA.

In response to the Final EIA Guidelines Geodex and/or its consultant must provide the Minister with detailed Terms of Reference (TOR), which describe the approach to be used in conducting the EIA. The TOR will be evaluated through a consultative process involving the proponent and the appropriate government review agencies (TRC). Geodex will also be required to provide the public, stakeholders and the Aboriginal community with a meaningful opportunity to review and comment on the TOR.

The principle objective of the EIA is to predict the potential impacts that can be expected should the project proceed, evaluate them and propose methods to avoid, mitigate, and/or compensate for identified impacts. The EIA study, conducted in consultation with the residents from the area of potential impact, is also expected to identify methods of optimizing positive impacts and minimizing negative impacts resulting from the project.

Information gathered during the EIA study is compiled in a Draft EIA Report. The draft report is evaluated by the TRC to determine whether the study adequately addressed the issues raised in the Final EIA Guidelines. Should the TRC determine that the report does not adequately address the Guidelines; the proponent will be required to make revisions to address any identified deficiencies in order to advance the EIA process.

If, on the advice of the TRC, the Minister is satisfied that the EIA Report is adequate, the next step is additional consultation to involve the public, stakeholders and the Aboriginal community in evaluating the potential impacts anticipated from this project.

A summary of the Final EIA Report is prepared on behalf of the Minister to assist members of the public in becoming familiar with the information. A General Review Statement is also prepared summarizing TRC comments on the Final EIA Report. These documents are released for a period of at least 30 days for public review and comment, after which the schedule and location(s) of open houses/workshops and/or panel-type public meeting(s) are announced by the Minister.

Public meeting(s) generally take place near the area where the project is being proposed and provide all interested parties with an opportunity to make comments, raise concerns, or ask questions about any matter covered in the EIA study. Following the public meeting(s), a period of fifteen days is set aside for members of the public to submit written comments to the Minister. At the end of this period, a summary of public participation is made available to the public and presented to the Minister. At any time after this date, Cabinet (Lieutenant-Governor in Council)

may render a decision to issue or deny an approval for the project.

Specific procedures to be followed in conducting an EIA may be found in *Regulation 87-83, Environmental Impact Assessment Regulation* - Clean Environment Act. A procedural summary is available in the publication entitled "A Guide to Environmental Impact Assessment in New Brunswick." These documents may be obtained from the NB Department of Environment at the address provided below and the website:

http://www.gnb.ca/0009/0377/0002/index-e.asp

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1.4 Definitions/Glossary

"Environment" – Under section 31.1(1) of the Clean Environment Act, "environment" is defined as:

(a) air, water, or soil;
(b) plant and animal life including human life; and
(c) the social, economic, cultural and aesthetic conditions that influence the life of humans or a community as they are related to the matters described in (a) and (b).

"Environmental Effect" - In respect of a project, means:

a) any change that the project may cause in the environment (i.e., both positive and negative changes), including any change on health and socio-economic conditions, on physical and cultural heritage, on the current use of lands and resources for traditional purposes by Aboriginal persons, or on any structure, site or thing that is of historical, archaeological, paleontological or architectural significance, and
b) any change to the project that may be caused by the environment whether any such change occurs within or outside Canada.

"EIA" – Environmental Impact Assessment.

"EIS" – Environmental Impact Statement (synonymous with EIA report).

"Fauna" – Animals.

"Fish" – Under Section 2 of the Fisheries Act, includes fish, shellfish, crustaceans and marine mammals.

"Flora" – Plants.

"Proponent" – Refers to the individual, private firm/company, or government agency/organization proposing a specific project (undertaking). In this case, Geodex Minerals Ltd.

"TOR" – Terms of Reference.

"TRC" – Technical Review Committee.

"**VECs**" – Valued Environmental Components (biophysical, social, or economic components).

2.0 METHODOLOGICAL APPROACH TO EIA

2.1 General

The EIA process results in a detailed study of potential environmental impacts and identification of procedures that may be used to avoid, mitigate and/or compensate for identified effects. The EIA study must also identify methods of optimizing positive impacts as well as minimizing negative impacts resulting from the proposed project. Additional options identified during the environmental assessment process may be considered as appropriate.

To provide a focus for the EIA, environmental components of principal concern, commonly referred to as Valued Environmental Components (VECs), must be identified early in the assessment process. The method for determining VECs must be clearly stated by the proponent. The proponent shall seek public, stakeholder and Aboriginal community knowledge, as appropriate, during the identification of appropriate VECs. The proposed VECs must be publically reviewed prior to acceptance by the TRC in the early phases of the EIA. The EIA must clearly indicate the provisions for compliance with relevant regulatory requirements, guidelines and best management practices.

Presented in Section 4.0 of these Guidelines are a number of specific issues related to the project for study, based in part on input received during the public comment period of the Draft EIA Guidelines. However, this framework does not limit the proposed EIA study. Should additional issues arise from discussion with members of the TRC, or consultation with regulatory agencies, members of the public, stakeholders or the Aboriginal community, the proponent must incorporate these issues into the assessment of the project's potential impacts.

2.2 Study Boundaries and Scope of Factors

The review must consider the potential environmental effects of the proposed project and all associated infrastructure. Geodex must clearly describe the boundaries of the study in time (temporal) and space (spatial) used in the evaluation of environmental effects for each of the

VEC's.

The temporal boundaries of the study (the length of time over which project environmental effects are anticipated to occur) must reflect the construction period, the operating life of the project, and the extent of any potentially significant environmental effects that may remain beyond the operating period, including decommissioning/reclamation, and any potential accidents or malfunctions.

Spatial boundaries should reflect:

- the extent to which project activities are anticipated to occur in the existing environment;
- the extent of anticipated environmental effects, including cumulative environmental effects on the VEC's; and
- the extent of atmospheric, aquatic, and terrestrial ecosystems potentially affected by the project.

Boundaries such as administrative, technical, biophysical, socio-economic and project area should be defined and related to the impact assessment process as appropriate. In determining appropriate spatial boundaries, consideration should be given to environmental effects from the proposal on a local, regional and national scale as appropriate.

2.3 Prediction of Environmental Effects

The main focus of the EIA is to predict environmental effects (i.e., both positive and negative) that may result from the proposed project and associated infrastructure, and their potential significance. Predictions must consider all aspects and phases (e.g., construction, operation, and decommissioning) of the proposed project, and any indirect environmental effects, cumulative effects, and any effects that may result from accidents or malfunctions. In addition, potential effects of the environment on the proposed project must be predicted, such as climate change effects, acid rock drainage, or effects that may be caused by extreme weather events (e.g., intense precipitation events, flooding), etc.

EIA predictions are generally based on a combination of objective and subjective evaluation. The use of objective (measurable) analysis is strongly preferred where it is technically feasible and reasonable to do so. However, in recognition of any factor that may limit the ability to predict or measure environmental responses, predictions may be based on subjective evaluation using professional judgement and experience. Community knowledge and Aboriginal traditional knowledge should also be utilized, as applicable. In consideration of this, predictive statements must be accompanied by a discussion of the limitations of the analysis, references to supporting documentation and the qualifying credentials of those making the predictions.

Predictions must be made regarding the nature (adverse or positive), magnitude, duration, frequency, geographic extent and reversibility of the proposed project's potential environmental effects. The significance of these effects must also be determined. These predictions must:

- facilitate decision-making with respect to the proposed project;
- clearly specify any degree of uncertainty inherent in the projections;

- clearly identify positive and negative environmental effects (both biophysical and socio-economic) of the proposed project; and
- be amenable to testing and verification where possible through ongoing monitoring initiatives.

To clearly distinguish potentially significant environmental effects from those likely to be insignificant, the proponent must first define "significant." The definition must be based on scientific determinations, social values, public concerns, and economic judgements, and shall be submitted to the TRC for review and approval along with the proposed VECs. In particular, the significance of proposed project-induced changes on VECs must be clearly stated in the EIA Report. The thresholds for significant effects on VECs (i.e., both positive and negative) must be related in terms of applicable criteria. Quantifiable reference to the magnitude, geographical extent, duration, frequency, reversibility and ecological context of the potential environmental effects is required. Significance must be determined in the context of project-specific and cumulative environmental effects and after taking into account the implementation of appropriate mitigation/optimization measures.

Significant effects on species (i.e., tolerance levels related to organisms in the environment), must take into account effects at the population-level. For species designated as endangered, effects on an individual constitute a population-level effect.

2.4 Cumulative Environmental Effects

The term *cumulative environmental effects* refers to those effects, over a defined period of time and distance, resulting or likely to result from the proposed project and associated infrastructure, in combination with other past, present, or likely (imminent) future projects or activities. An assessment of cumulative environmental effects must be conducted as part of the EIA study, in consideration of identified VECs and future projects that may be developed.

The goal of the cumulative effects assessment will be to place project-related impacts, their significance, and approaches to their management in the context of the "bigger picture," and must include (but is not limited to):

- identification of regional issues of concern;
- a comprehensive description of how VECs were selected;
- a clear justification for the spatial and temporal boundaries used to address cumulative effects;
- a clear description of the analysis undertaken to assess the cumulative effects on the selected VECs (i.e., both positive and negative), and presentation of the results;
- a clear description of how mitigation measures address the cumulative environmental impacts; and
- the rationale for determining whether residual cumulative effects on VECs are significant.

2.5 Mitigation, Contingency and Compensation

The EIA study must describe general and specific measures that are technically and economically feasible for the proponent to implement, to optimize any positive environmental effects and mitigate any negative effects resulting or potentially resulting from the proposed project and any associated infrastructure (i.e., maximize positive effects, and eliminate, prevent, avoid or minimize adverse effects). This must include a description of contingency measures (including emergency response plans) that have been designed to address potential accidents and malfunctions that could result in spills or unplanned releases of contaminants or products to the environment. Contingency plans must address worst-case scenarios and reflect a consideration of local conditions and sensitivities. Specific circumstances under which mitigative measures will be implemented must be clearly defined by the proponent including how scenarios would be reported, acted upon, and monitored. Mitigation options must be considered in a hierarchical manner with a clear priority placed on proactive measures for impact avoidance and pollution prevention opportunities. Opportunities to contribute to a regional approach to management of cumulative environmental effects must also be identified (refer to Section 2.4 above).

At a minimum, mitigative measures for the following for all phases of the project must be addressed:

- Air quality from all sources, including dust control;
- Water quantity and quality;
- Blasting operations;
- Processing effluents and sewage;
- Wetlands;
- Archaeological and heritage resources;
- Flora and fauna;
- Fish and fish habitat;
- Emergency releases and events; and
- Waste rock management and acid rock drainage.

An outline for contingency plans must also be provided:

- for use in the event of an environmental emergency attributable to the project and associated infrastructure, within the spatial boundaries of the study; and
- for use in the event of significant impacts, attributable to the project and associated infrastructure, which are detected through monitoring (this plan must be designed to be implemented should impacts be detected through monitoring).

The study must also consider compensation mechanisms to be used in the event that any unforeseen, accidental, or residual environmental effects occur. These compensation mechanisms/plans must be developed through consultation with federal and provincial agencies and other stakeholders, as appropriate.

In addition, Geodex must include in the study an outline for closure plans to identify site-specific objectives for mine closure and the intended post-closure land-use for the site. Closure plans must

detail the processes that will be used to decommission and reclaim all aspects of the mining facility including:

- mining and ore processing facilities;
- site infrastructure; and
- water and waste management facilities, including waste rock piles and tailings management facilities.

Further, in addition to the requirements under the Mining Act, the study must evaluate the requirement for a financial security deposit to address the implementation of the decommissioning/ abandonment plan (i.e., to cover any required costs associated with on-going environmental protection measures beyond the operational phase).

2.6 Commitment to Monitoring and Follow-Up

A well-defined program of monitoring and follow-up initiatives regarding environmental effects resulting or potentially resulting from the proposed project must be outlined in the EIA Report. Geodex must describe all of their proposed monitoring and follow-up programs, including their objectives, content, and implementation and reporting schedules. Monitoring programs will be required to:

- establish baseline conditions;
- determine regulatory compliance (compliance monitoring);
- test the predictions of the EIA (environmental effects monitoring, EEM); and
- evaluate the effectiveness of measures used to mitigate environmental effects (EEM).

Monitoring programs should include protocols that would guide interpretation of monitoring results and timely implementation of appropriate corrective actions. Monitoring initiatives must be based upon accurate baseline information for the existing physical, biological and socio-economic environments. The proponent is expected to collect the necessary information through existing data sources ("data mining") and through primary research such as fieldwork and laboratory testing, as required.

Where the EIA predictions are not based on objective information, monitoring programs must be designed, where possible, to collect relevant data not previously available.

Monitoring and follow-up programs must allow for testing of the accuracy of effects predictions and effectiveness of mitigation measures. Programs must support an adaptive management approach and include provisions for changing impact mitigation in response to follow-up and monitoring results. Important components of monitoring programs will include:

- Elements of the environment that will be monitored;
- Where the monitoring will occur;
- Frequency and duration of monitoring;
- Detailed statement of objectives;

- Submission of results;
- Protocols for the interpretation of results and subsequent actions to be taken based on findings.

2.7 Public, Stakeholder and Aboriginal Community Consultation

Public consultation is an essential component of the EIA. Geodex must consult with persons and organizations potentially affected by the proposed project and associated infrastructure, and must inform and engage any interested individuals, groups, stakeholders, local hunters and trappers, recreational users, affected communities, and Aboriginal communities in this assessment. This will include local governments and specific groups with mandates/initiatives in this area. The stakeholder consultation program is to be reviewed and accepted in the early stages of the study (e.g., at the TOR stage). Potential stakeholders identified to date, include:

- Canadian Rivers Institute;
- Nashwaak Watershed Association Inc.;
- Maliseet Nation Conservation Council;
- New Brunswick Trappers Federation; and
- Interested members of the public.

This list is to be supplemented as additional stakeholders are identified during the EIA study. Geodex will be expected to hold appropriate public consultation events and to use various media to engage the public (e.g., bulletins, website, e-mails, study updates, workshops, open-houses, etc). All interested parties will be provided with an opportunity to participate in consultation initiatives in order to provide input in the assessment and/or make their views known. Various stakeholders will be consulted throughout the environmental assessment process, including interested parties from the Aboriginal community; neighbouring residents; general public; non-government organizations and interest groups. The objectives of this consultation must be:

- to ensure that the potentially affected public, stakeholders and Aboriginal community are engaged in meaningful discussion and are well informed prior to the government's decision, as to the nature and extent of environmental effects attributable to the proposed project (i.e. both positive and negative effects);
- to ensure that the values and concerns of the public, stakeholders and Aboriginal community are incorporated and adequately addressed in the study; and
- to obtain expertise (where applicable) from various members of the public, stakeholders and the Aboriginal community.

Stakeholders, including the public and the Aboriginal community must be informed of the status of the study at regular intervals/at key milestones during the study. Consultation must continue through the construction and operation phases of the project (if approved), through specific consultation mechanisms (e.g., Community Liaison Committee, etc.).

The EIA must document the dates and formats for public and other stakeholder consultation initiatives undertaken, the material presented, the opportunity for receiving input, a summary

review of any concerns expressed, and how these concerns were addressed. It must be clear how the input from consultations was used in the assessment and what changes to the process or project were made as a result of comments provided.

2.8 Terms of Reference (TOR)

The proponent must submit detailed TOR in response to the Final EIA Guidelines. The TOR must clearly describe the methods proposed for carrying out the EIA, and the means by which Geodex will consult with the public, stakeholders and Aboriginal community during the course of the EIA process.

The Proponent is required to provide, as part of the TOR, a cross-referenced index (Concordance or Disposition Table) showing where the content and issues of the Final EIA Guidelines have been addressed. The TRC will examine the TOR and comments/deficiencies may be provided to the proponent to address prior to finalization. In addition, the TOR must outline the components of any proposed field programs, any anticipated challenges/obstacles to be encountered, proposed modelling approaches, identify key members of the study team, and fully describe all specific tasks to be completed as part of the study.

The TRC will examine the TOR and comments may be provided to Geodex for inclusion. In addition, public and stakeholder consultation must be undertaken by the proponent to allow interested parties, the public, stakeholders, and Aboriginal community to provide input to the TOR prior to finalization. The final TOR must be approved by the TRC.

3.0 CONDUCT OF THE STUDY AND CONTENT OF REPORT

The EIA Report must be written in the clearest language possible. Where the complexity of the issues addressed requires the use of technical language, a glossary defining technical words and acronyms must be included. The International System of Units (SI) must be used throughout the report and all supporting documents.

The EIA Report must provide a complete and accurate description of the project from planning through construction, operation, maintenance and decommissioning, supported with appropriate maps and diagrams. Emphasis will be placed on describing those aspects of the project, including accidents and malfunctions that have a reasonable probability of occurrence and that could be expected to affect the environment. An identification of how potential environmental and man-made hazards have influenced the design and operation of the project must also be included.

The following titles may be used as a tentative framework for the development of the EIA Report:

- Executive Summary
- Definitions/Glossary
- Introduction
- Regulatory Framework

- Scope of the Project
- Public, Stakeholder, and Aboriginal Consultation
- Scope of the Environmental Assessment
- Purpose and Description of the Project
- Alternative Means of Carrying Out the Project and their Environmental Effects
- Description of the Existing Environment
- Environmental Effects, including Effects of Malfunctions and Accidents & Cumulative Environmental Effects
- Effects of the Environment on the Project
- The Capacity of Renewable Resources that are Likely to be Significantly Affected by the Project (i.e. the sustainability of the project)
- Mitigation Measures
- Environmental Management Planning, Monitoring, and Follow-up
- Closure, Decommissioning and Reclamation
- Significance of Residual Effects
- Conclusion/Recommendation
- References

3.1 Project Description – Scope of Project

The scope of the project will include the construction, operation, and decommissioning of an open pit mine and all associated infrastructure supported with appropriate maps and diagrams. Emphasis will be placed on describing those aspects of the project (including accidents and malfunctions) with a reasonable probability of occurrence that could be expected to affect the environment.

The project to be assessed and its description in the EIA Report must include:

- description of site preparation;
- project schedule;
- detailed description of the project area and boundaries;
- the location, size, layout, capacity, boundaries of the open pit mine and all associated facilities and infrastructure (e.g., ancillary facilities including tailings management and treatment, waste rock pile, water control structures, office buildings and assay lab, freshwater systems, wastewater systems, etc. Rights of Way (RoWs) for electrical distribution lines, rail spur, and access roads);
- description of the ores to be mined;
- hours of operation and blasting schedule;
- freshwater requirements and proposed systems;
- wastewater systems and discharge locations, volume, flow, quality, recycling, re-use;
- the regulatory standards to which the components of this project will be built and operated;
- the construction methodology and design description for the open pit, waste rock pile and tailings management etc;
- storage and handling facilities;
- secondary containment systems;

- a detailed description of emissions and wastes for all phases of the project;
- upsets of environmental control equipment which may change the nature of emissions and/or effluent;
- hazardous materials management (e.g., transportation, handling and storage systems of any hazardous materials, additives and by-products used/generated in the project; chemical storage facilities including estimated concentrations, quantities, list and MSDS of chemicals to be stored on site; quantities, handling and storage of explosives, etc.);
- site access and security;
- transportation of ore – road and/or rail;
- handling and storage of ore;
- waste rock and tailings chemistry and toxicity;
- mineral/ore processing details;
- watercourse alterations including bridges, culverts, stream diversions, and dewatering;
- the impact of project related traffic on road infrastructure and the transportation network;
- road networks used for transportation on-site and off-site for all phases of the project;
- increase in traffic;
- effluent treatment systems including process tailings and water, storm water, sewage, seepage and surface runoff;
- detailed descriptions of all health and safety, and environmental protection measures including contingency plans and emergency response plans - fire prevention and control equipment; and
- reclamation plan for the site, including site rehabilitation measures to be taken post operations.

3.2 Project Rationale

The purpose and need of the project must be clearly identified. The report must provide clear justification for the project in order to allow for an evaluation of the relative environmental effects of the proposed development.

3.3 Identification and Analysis of Alternatives

Using the approach indicated below, the study should evaluate alternatives to the project as proposed that are technically and economically feasible and alternative means of carrying out the project. This analysis will contribute to a further understanding of the project rationale and will facilitate decision-making with respect to its acceptability.

(a) The null or "do nothing" alternative (not constructing and operating the mine) must be discussed. The study must examine the implications of not proceeding with the project with reference to environmental (both biophysical and socio-economic) factors/effects.

(b) The analysis must include alternative means of construction, operation, and decommissioning of the project that are technically and economically feasible, the selection criteria, and the environmental effects of such alternative means. For example, alternate

means of tailings management must be discussed (e.g. both wet and dry management methods). Additional information on alternatives which may have been considered and rejected should be provided.

3.4 Description of the Existing Environment

The EIA Report must describe the existing environment focusing on identified VECs within the study boundaries. This description must reflect the dynamics of environmental components (biophysical, social, and economic), and identify trends in the context of predicted changes over time.

A description of the existing environment in the study area should consider, but not be limited to, the following:

- Atmospheric environmental components, including climatic and ambient air quality data;
- Terrestrial environmental components, including topography, watershed hydrology and hydrogeology, surface and groundwater resources;
- The local geology and mineralogy; depth to water table and groundwater flow direction(s) for the site; recharge and discharge zones; aquifer characteristics, such as hydraulic conductivity, transmissivity, storativity, boundary conditions, location of bedrock fractures (especially in area of open pit); average groundwater flow rates; type, thickness and continuity of surficial overburden and any confining or impervious layers in the area;
- Potential for Acid Rock Drainage (ARD), metal leaching, and mobilization of other contaminants should be discussed in relation to the geology and mineralogy of the site;
- Terrestrial biological environmental components, including species at risk and their habitats (flora and fauna), ecologically sensitive or significant areas, and protected areas/critical habitat features. Migratory bird descriptions must include when each species is likely to be present in the study area and areas typically used for nesting, foraging, and/or staging;
- Wetlands – identification of wetland resources including location, size and functional assessment;
- Migratory routes for both birds and mammals;
- Aquatic biological environmental components including fish, fish habitat, fishery resources, benthic environment and species, species at risk and their habitats, species migratory patterns,
- Ecologically sensitive or significant areas, and protected areas/critical habitat features;
- Any commercial, recreational, or Aboriginal fisheries;
- Aquatic physical environmental components including bathymetric/geomorphologic, hydrodynamic, water quality, sediment and ice regime;
- The Provisional Classification of the Nashwaak watershed;
- Navigable waters;
- Ambient surface and ground water quality/quantity conditions (baseline assessment) prior to construction;
- Socio-economic environmental components, including demographic data (e.g., population and labour force), local economy, local services, past, current and foreseeable land use (including agriculture), zoning restrictions, the seasonal variations of fishing activities, archaeological and heritage resources, transportation and associated

infrastructure.

- With specific reference to fisheries, the description must include a socio-economic profile of each identified fishery;
- The potential for encountering contaminated soils/materials (including mobilization of naturally occurring contaminants), with attention paid to metals known to be elevated such as arsenic and lead that may be mobilized as the pit is accessed;
- Localized seismic activity;
- Local road networks;
- Existing public health and safety concerns;
- Ambient noise levels;
- Transportation (traffic volumes and types of vehicles), and
- Current use of land and resources for traditional purposes by Aboriginal persons.

In developing the description of the existing environmental setting, field investigations will be required to address information deficiencies and facilitate the assessment.

The above must also be characterized for all corridors related to infrastructure associated with this proposal including wastewater treatment, freshwater sources, railway spur, electrical, etc.

3.5 Cross-Referenced Index

To assist the readers, a cross-referenced index (i.e., Concordance or Disposition Table), which shows where the content and issues outlined in the Final EIA Guidelines are addressed in the report, is required. This index must be submitted with the Draft EIA Report.

4.0 POTENTIAL ENVIRONMENTAL EFFECTS

Presented here are a number of specific issues for study. However, this framework does not limit the assessment. Should additional relevant issues, concerns, or potentially significant environmental effects be identified through discussion with members of the TRC, regulatory agencies, the public, stakeholders or the Aboriginal community, Geodex must incorporate these issues into the assessment. The assessment must include consideration of, but not be limited to, the appropriate regulations and guidelines.

The capacity of renewable resources that are likely to be significantly affected by the project (either positively or negatively) to meet the needs of the present and those of the future should also be considered.

Baseline conditions for each VEC must be established and proposed assessment methods described. All potential project-related environmental effects (i.e., both positive and negative) resulting from the proposed construction and operation of the mine and all associated infrastructure (including potential effects resulting from accidents or malfunctions), must be included in the assessment. Cumulative environmental effects are to be considered individually for each identified VEC. The nature, spatial extent, frequency, duration, magnitude (qualitative and quantitative), and

significance of each, should be described. Mitigation measures, monitoring and follow-up must be proposed.

4.1 Effects on Atmospheric Environment

Assess the environmental effects of the construction, operational/maintenance and decommissioning phases of the project on the atmospheric environment, including air quality, sound quality, odour and climate. Any substantive emissions will first need to be quantified. This will be done on a local and regional basis. This will include an analysis of routine air emissions including sources from ore crushing, screening, stockpiles, vehicles, road surfaces, and upset conditions, including accidents and malfunctions. The effects of transportation-related emissions will be considered, including impacts on air quality and human health (e.g., emissions resulting from any change in traffic patterns, etc.). Transportation related emissions would include emissions from construction equipment, additional traffic associated with the facility, etc.

Potential impacts to climate change must be included.

An assessment of noise impact on humans and wildlife must be included.

Provide details on how emissions will be controlled and mitigated at each emissions source and briefly discuss why the proposed technology was selected over other potential methods of control.

A discussion of the climatology of the area shall be provided including both micro and macro climatological effects.

4.2 Effects on Freshwater Resources (Groundwater and Surface Water)

Assess the potential environmental effects of the construction, operational/maintenance and decommissioning phases on groundwater and surface water resources. Water conservation through innovative technologies including recycling and using treated wastewater will need to be fully explored and evaluated as part of this assessment.

A detailed water budget for the project that incorporates quantity and quality of water required for all components for each phase of the project (including domestic needs and fire protection) under a range of climatic conditions must be provided.

A *Water Supply Source Assessment* must be undertaken if the volume of water to be used is greater than 50 m^3 per day, including water for fire protection. The potential for interference with domestic wells and surface water supplies must be examined and assessed.

Potential project-related changes to groundwater flow regime, water balance and alterations to groundwater recharge and discharge areas must also be included. Potential changes to aquifer characteristics, such as hydraulic conductivity and storage, through blasting and open pit mining must also be evaluated.

In addition, any potential impacts to local groundwater users (water quantity and quality issues) due to construction and operation of the mine and associated infrastructure will need to be discussed.
The study will include characterization of the disposal area for tailings, and the hydraulic conductivity at the base of the pit and the potential to impact groundwater and surrounding watersheds.

A discussion of the environmental effects on freshwater quantity and quality is required for all watercourses within the project footprint and within the zone of influence of the project.

4.3 Effects on the Freshwater/Aquatic Environment

Assess the environmental effects of the proposed project on the freshwater environment, including (but not limited to) water quality, fish and fish habitat, and benthic environment within the environmental assessment boundaries (including the corridors required for any associated infrastructure). A number of watercourses will potentially be impacted by this project (mine and associated infrastructure) and will need to be assessed. Predict the environmental effect of any potential deterioration/improvement in water quality and quantity on the freshwater environment.

Discuss in detail the mineralogy of the deposit, tailings and waste rock and potential changes in the composition of the deposit, tailings and waste rock as different areas are mined over time. Include a discussion of the processing of the ore and the chemicals used and the potential degradation or persistence of the chemicals in the environment and any chemical by-products that may be produced. Evaluate the geochemical reactivity of the tailings and waste rock and any potential changes in reactivity over time, in different conditions and with different seasons (temperatures, precipitation). The impacts of blasting and waste rock storage to water quality should be discussed.

Characterization of the tailings management area must also include details on the specific infrastructure required, collection and treatment of seepage water, discussion on the effects of climate and time on stability of tailings infrastructure and the maintenance and monitoring required.

Discuss the chemistry and reactivity of the pit water, along with storage, treatment and disposal of the pit water.

Discuss in detail all wastewater treatment and disposal options (domestic waste, pit water, tailings and waste rock water, surface runoff, etc.), as well as any chemicals of concern that cannot be removed by water treatment, treatment by-products and effluent quality.

Describe the procedures for the development and the anticipated components of an environmental protection/emergency response plan as they relate to the freshwater environment, including spill prevention and spill response contingency planning.

In addition, the following will need to be discussed:

- Potential for accidental releases of chemicals and petroleum products that could impact surface water/groundwater environment;
- Production of mine water and tailings; treatment and release and impacts to surface water/groundwater; and
- Expected loadings on the environment.

4.4 Effects on the Terrestrial Environment

Assess the potential environmental effects of construction, operation/maintenance and decommissioning of the project and associated infrastructure on terrestrial environments, including all plant and animal species and their habitat. Key issues that will need to be evaluated as part of this assessment are existing vegetation, terrestrial country foods, terrestrial wildlife (e.g., the pine marten and Canada lynx), and wildlife habitat. Since this project could affect a large area, this will require extensive field surveys and review.

The effects of the project (direct and indirect) and associated infrastructure on migratory birds and migratory bird habitat will also need to be evaluated. This would include any works that are likely to impact avian movement and/or migration routes, or any structure or infrastructure that may impact migratory species.

Assess the environmental effects of the project and associated infrastructure on species (flora and fauna) considered to be at risk under national, provincial and regional classification systems (i.e., endangered, threatened, species of special conservation status, and rare species) including species listed under the NB Endangered Species Act as well as the federal Species at Risk Act (SARA). Include consideration of any species at risk known to occur within the zones of influence of the proposed project and for which there are potential project-VEC interactions anticipated that could result in significant environmental effects.

The following information sources on species at risk in the general project area (and corridors for any associated infrastructure) must be consulted:

- Atlantic Canada Conservation Data Centre (AC CDC);
- SARA Species List (SARA Public Registry);
- COSEWIC List (latest version on the website);
- New Brunswick Museum;
- NB Endangered Species Act;
- Canadian Wildlife Service (CWS); and
- Local naturalist and interest groups such as the Fredericton Nature Club, the N.B. Nature Federation, the N.B. Botany Club, the Canadian Rivers Institute, etc.

Site-specific information must be obtained from field investigations carried out by the appropriate specialists.

4.5 Effects on the Wetland Environment

An assessment of all wetlands within the study area, including any impacts associated with infrastructure related to the project, must be undertaken. The approach described in the *Federal Policy on Wetland Conservation (EC, 1991)* and the *New Brunswick Wetlands Conservation Policy* (2002) and draft NBDNR *Wetland Mitigation Guidelines for New Brunswick (2003)* must be followed.

4.6 Effects on Labour and Economy (and other Socio-economic Effects)

Predict the benefits of the project on labour and economy within the area surrounding the mine and the Province of New Brunswick. Assess the direct and indirect creation of employment in the area associated with the construction and operation of this facility. The availability and potential use of skilled and unskilled workers in the local area to meet the job requirements should be outlined, along with predictions for the increase in the population of the surrounding area as vacant jobs are filled.

The effect on existing tourism and recreational activities must be included.

The effect on local property values must be considered.

The effect on industries, including the recreational, commercial and Aboriginal fishing industries must be included.

Discuss any aesthetic/potential visual impacts of the proposed project and how these could impact the local or regional economy.

The estimated total reserves and value in present day Canadian dollars and the planned annual extraction rates must be reported.

A study on socioeconomic impacts of the life cycle of the mine on surrounding communities must be carried out by a qualified individual, including the impacts of mine closure, unexpected or otherwise, citing examples of other mining projects where appropriate. The possible impacts on stakeholders including Aboriginal communities, residents within the project area, neighbouring communities, along haul roads, recreational businesses and recreational groups, hunters, trappers, guides, outfitters, etc. must also be included.

4.7 Effects on Community Services and Infrastructure

An assessment of the community services and infrastructure will be required in order to evaluate the potential impacts from the large number of workers associated with the construction and operation of this facility both on a temporary and permanent basis. Community services and infrastructure includes: local emergency response, ongoing support services (health and social services), accommodation, food services, and entertainment.

Any additional demand on local emergency response services and ongoing support services will need to be assessed. These services may be affected by the occurrence of an accidental event, or by the routine presence of workers associated with either construction or operation. There may also be impacts to local accommodations as a result of temporary and permanent workers required for this project.

Any increased demands on the above community services and infrastructure, (as large numbers of temporary workers in an area could create unique concerns during the construction phase) will need to be assessed. Such a situation may result in increased need for policing and social services in certain areas.

4.8 Effects on Private/Public Land and Resource Use

Assess the effects of the project and associated infrastructure on the current use of lands (including Crown land) and resources by the public and private sectors.

Describe the impacts the project would have on access to the lands surrounding or within the project site.

Evaluate the environmental and socio-economic effects of the project on land use in the immediate vicinity of the project (i.e., within the defined environmental assessment boundaries of the project).

Assess any potential impacts of the project on other areas that could be affected by the project and associated infrastructure.

4.9 Effects on the Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons

Assess the effects of all aspects of the project (including any associated infrastructure) on the current use of lands and resources for traditional purposes by Aboriginal persons. This includes traditional hunting, fishing, snowshoeing, and gathering of food or medicine by Aboriginal communities.

4.10 Effects on Heritage and Archaeological Resources

An assessment of heritage and archaeological resources will be required for the mine site as well as for any required infrastructure.

The effect of the proposed project on physical and cultural heritage, and any structure, site or thing that is of historical, archaeological, paleontological or architectural significance must also be included.

4.11 Effects on Land-Based Transportation/Road Infrastructure

Assess the environmental effects of the proposed project on traffic patterns/flows, including a prediction with respect to current/future road infrastructure and use with reference to safety and the integrity of infrastructure on traffic flows, level of service, and accident rates. Predict the impacts of increased ground transportation in the region and specifically traffic to and from the proposed mine site with reference to noise, safety, risks of spills and air quality. The study should consider localized impacts that may occur from fossil fuel combustion as a result of increased traffic.

During the construction phase of the project there would be substantial land-based activity that will require the movement of equipment, material and personnel to and from the project site. There may be concern regarding the condition, allowable weights and dimensions of the existing road infrastructure. These potential effects will need to be evaluated.

Any effects associated with project-related traffic during the operation phase will also need to be assessed, as project related traffic will continue in the form of personnel transportation and truck traffic carrying supplies, materials and products.

A transportation plan outlining site access routes, description of loads and frequency of trips must be provided.

It is anticipated that some processed products may be shipped via rail. A new rail spur would be needed to allow for this. If a rail spur is to be constructed, an assessment of the routing will need to be undertaken. An additional concern is the potential environmental effects on road traffic, either resulting in greater congestion or higher collision rates, associated with any at grade crossings. In addition, an assessment of the emergency routes that may be impacted as a result of the rail spur will need to be undertaken.

4.12 Effects of the Environment on the Project

Sensitivity of the proposed project to variations in meteorological conditions, including extreme events, must be investigated. Among the parameters to be considered are the effect of extreme precipitation events on site water management and the influence of wind and ice on mine operations (including any associated infrastructure). In addition, the sensitivity of the proposed project to climate variability and climate change must be identified and discussed. Not only will the assessment look at the current climatic setting in the area, but must also include a consideration of the potential future climatic conditions due to climate changes in the foreseeable and long-term future (e.g., global warming over a 50 and 100 year period).

The assessment must take into account how the existing environment/natural and man-made hazards could adversely affect the project (e.g., acid rock drainage, severe meteorological conditions, seismic events, etc.).

4.13 **Effects on Public Health and Safety**

Public health will need to be assessed both in light of long term (chronic) conditions as well as short term (acute) conditions. Public health can be affected by effluents and emissions and environmental effects on air quality, drinking water quality and food, among other factors.

An assessment of the potential for environmental effects on public health must be carried out by conducting a Human Health and Ecological Risk Assessment (HHERA). The HHERA will consider the potential risks of adverse environmental effects of all project-related effluents, emissions and waste products during all phases of the project. Cumulative environmental effects will need to be considered as part of the HHERA.

The potential effects of the project on the health and safety of employees, their families, local communities, Aboriginal communities and wildlife must be assessed and identified. Mitigation measures for any possible impacts must be described.

Provide a description of the source, quantity, mechanism, rate, form and characteristics of contaminants and other sources likely to be released to the environment (i.e., in the context of worker exposure during normal operation, a postulated malfunction and accident event).

Potential effects to public safety will be considered as they relate to accidents, spills, collisions, vehicle accidents, etc. Identify sources and characteristics of any potential risks to workers during construction and subsequent operation.

Describe the specific, important malfunction/accidental events that have a reasonable probability of occurring during the operational life of the project.

Describe the procedures for the development and the anticipated components of an environmental protection/emergency response plan for construction, commissioning, operation and decommissioning, including spill prevention, and spill response contingency planning.

Describe the key components relevant to safety during the construction activity and details regarding security considerations with respect to the site and associated infrastructure.

Potential impacts from metal contamination resulting from dust or airborne particulate matter (including metals such as lead and arsenic) must be investigated for significant on and off site impacts using dispersion modelling if necessary. Impacts to humans and wildlife must be considered.