# FINAL TERMS OF REFERENCE
# ENVIRONMENTAL IMPACT ASSESSMENT (EIA) REPORT

## FOR THE PROPOSED

## BIRCH MOUNTAIN RESOURCES LTD.'S
## HAMMERSTONE PROJECT
**A Quicklime Plant and Quarry near**
**Fort McKay, Alberta**

**ISSUED BY: Alberta Environment**

**DATE: June 2, 2005**

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# 1.0 INTRODUCTION

## 1.1 Nature and Scope of Environmental Impact Assessment (EIA) Report

The purpose of this document is to identify for the public and Birch Mountain Resources Ltd. (Birch Mountain), the information required by provincial government agencies for an Environmental Impact Assessment (EIA) report with respect to the proposed Hammerstone Project (a quicklime plant and limestone quarry) on Metallic and Industrial Mineral Leases 9400080004, 9403120367, 9494070001, and 9499030555 in Township 94-10-W4M in the Regional Municipality of Wood Buffalo, located approximately 5 km from the community of Fort McKay, and approximately 60 km north of Fort McMurray.

Birch Mountain will prepare and submit an EIA report to describe the environmental effects of its proposed Hammerstone Project (the Project) and associated activities related to the Project. Birch Mountain is responsible for the preparation of the EIA report and related applications. The final submission will be based upon these Terms of Reference and issues raised during the public consultation process.

The EIA report will include a glossary of terms and a list of abbreviations to assist the reader in understanding the material presented. The EIA report will include tables that cross-reference the report to the EIA Terms of Reference and to any current applications submitted pursuant to the *Environmental Protection and Enhancement Act* (EPEA) and the *Water Act*.

The EIA report will be prepared in accordance with the requirements prescribed under the EPEA, and any federal legislation, which may apply to the Project. It will form part of Birch Mountain's application to the Natural Resources Conservation Board (NRCB).

## 1.2 Public Consultation

Birch Mountain must provide the public with opportunities to obtain information about the Project, and to identify their concerns. The public consultation program is to communicate with those members of the public who may be affected by the Project and to provide them with an opportunity to participate in the Environmental Assessment process. The EIA report will document public concerns or suggestions and demonstrate how they have been addressed.

# 2.0 PROJECT OVERVIEW

Provide a corporate profile, an overview of the Project, the key environmental, resource management and economic issues that are important for a public-interest decision and the results of the Environmental Assessment. Describe who will be responsible for the development, management and operation of the Project. Indicate what, if any, environmental management system the corporation responsible for the development, management and operation of the Project will follow.

# 3.0 REGULATORY AND PLANNING FRAMEWORK

Identify the legislation, policies, approvals and current multi-stakeholder planning initiatives applicable to the review of the Project. Discuss the primary focus of each regulatory requirement, such as resource allocation, environmental protection, land use development and the elements of the Project that are subject to each regulatory requirement. List the major components of the Project that will be applied for and constructed under the EPEA, *Water Act* and the *Public Lands Act*.

Address other regulatory approvals that exist or will be required for the Project under provincial, municipal and applicable federal government requirements.

Discuss any regulatory systems that apply to the Project, such as solid waste, air pollution classifications [e.g., National Pollutant Release Inventory (NPRI), Accelerated Reduction and Elimination of Toxics (ARET), Priority Substances List (PSL1), PSL2], land use zones, wildlife management areas and forest management areas.

Address the relevant parts of the Fort McMurray Athabasca Oil Sands Integrated Resource Plan (IRP) that have been reviewed and considered in the preparation of the EIA report.

## 4.0 PROJECT DESCRIPTION AND MANAGEMENT PLANS

The scope and detail of the project description information shall be sufficient to allow quantitative assessment of the environmental consequences.

Describe the project components, infrastructure and activities, describing the anticipated development stages (e.g., construction, operations, decommissioning and reclamation), project schedule and timing of the key construction and operational activities. Discuss the site alternatives considered, the potential effects that activities and infrastructures may have on the environment and the natural resources to be used for the Project. Outline the management plans to minimize the discharge of pollutants, manage wastes, reclaim disturbed lands and waterbodies, optimize resource use and monitor effects.

### 4.1 Project Need

Discuss the need for the Project, the technical and operating systems considered for the Project and the rationale for those ultimately selected for the application. Include a discussion of the implications of not proceeding with the Project or delaying the Project. Address the following:

a) an analysis of the alternatives considered for carrying out the Project, with the criteria and rationale for selecting the proposed option;
b) how a balance among environmental, resource recovery or conservation, and economic goals will be achieved through planning and preliminary design, highlighting any areas where planning focused on one goal to the exclusion of others;
c) identify whether additional development phases will be considered at this site in the future and how the proposed plans for the Project takes this into consideration; and
d) contingency plans if selected major components of the Project prove to be unfeasible.

### 4.2 Project Components and Site Selection

Describe the nature, size, location and duration of the components of the Project including, but not limited to, the following:

a) the quicklime plant and quarry areas;
b) the proposed annual production required to support the life of the Project;
c) the design capacities of the Project;
d) the process components of the development focusing on material inputs and outputs including products, fuels, feedstocks, utility requirements (e.g., electricity and natural gas). As appropriate, provide material balances (energy and water balances), flow diagrams and descriptions of the processes to be used. Indicate any shared facilities with existing developments at the site;
e) water control facilities and temporary structures;
f) buildings and infrastructure, transportation, utilities and access routes;

g) major operational components of the Project and a project layout showing the linkages among these components;
h) the type and amount of solid and liquid waste materials generated and the location of those waste storage and disposal sites;
i) a project development schedule;
j) the total land area disturbed annually and during the Project;
k) potential cooperative ventures with oil sands operators and other resource users (minerals and forestry) to maximize the efficiency of the Project and/or minimize the environmental impact of the Project;
l) how Birch Mountain has incorporated community information into the project design and mitigation;
m) determine the location, area and volume of merchantable timber to be removed and the timing;
n) describe the process and factors (including exploration activities) that were considered in evaluating and delineating:
    i) the geotechnical stability of the location of the quicklime plant; and
    ii) the limits of the limestone reserves and discuss how this might affect initial and future pit development and disturbance activities.
o) the rationale for selecting the proposed site and how technical, geotechnical and environmental criteria and stakeholder input were considered in decision-making;
p) provide a map of appropriate scale (including legal description) showing all existing surface leases and clearings and illustrate how these will be used or affected by the project development;
q) provide a map of appropriate scale (including legal description) showing all existing seismic lines, access roads and other linear corridors (e.g., pipelines, utility corridors, traplines, etc.);
r) provide map(s) of appropriate scales (including legal description) that show the location of the development relative to all terrestrial components (e.g., soils, topography, watercourses, vegetation, wildlife habitat, watersheds, wetlands, etc.); and
s) provide a development plan of appropriate scale (including legal land description) showing the progression of project development, overburden and soil stockpile areas, storage areas (including any coke storage areas), quicklime plant facilities and other site improvements required in support of the development.

**4.3 Site Preparation**

Describe how the site will be developed including, but not limited to, timber salvage, debris disposal, salvage of topsoil, source of material for site development and disposal of debris from construction.

**4.4 Water Supply, Water Management and Wastewater Management**

The EPEA and *Water Act* require approvals for the use of surface and/or subsurface water including water for processing, discharge of processing water and surface runoff from the site into a surface waterbody. Identify development activities that may affect surface water or groundwater including water treatment processes and chemicals added. Identify the purpose of any drilled well(s).

Provide a water supply and water management plan to discuss the following:

a) site runoff and containment, erosion control, groundwater protection, muskeg dewatering, quarry pit dewatering and disposal of wastewater;
b) factors used in the design of water management facilities, including expected flood levels and flood protection;
c) permanent or temporary alterations or realignments to waterbodies and wetlands;
d) process, sanitary and potable water requirements during normal operations and emergencies;
e) water sources to be used including volumes expected from each source; and
f) any water minimization considerations including plans to ensure efficient water use including any variability in water quantity required on an annual basis and during construction.

**4.5 Air Emissions Management**

Identify and describe project emission sources, including point and area sources, slash burning sources, mobile sources and fugitive emissions. Estimate the range of emissions from all sources identified above for normal, worst-case and upset conditions. Discuss the following from a management perspective:

a) potential odorous or visual emissions;
b) probable deposition areas and effects to soils, vegetation and waterbodies;
c) the emission control technologies proposed for the Project in the context of best-available technologies;
d) describe the effects of fuel mixtures (e.g., natural gas, coke) on the production of gaseous and particulate emissions;
e) emissions associated with slash burning; and
f) monitoring programs that will be implemented to assess air quality and the effectiveness of mitigation measured implemented during project development and operation. Discuss how these monitoring programs are compatible with regional multi-stakeholder air initiatives.

**4.6 Chemical Handling and Waste Management**

Characterize and estimate the quantity of any solid, liquid, and hazardous waste streams generated or stored on site. The final destination of the waste streams must be indicated. Provide waste management plans and show that these plans are consistent with current industry best practices.

Provide information on materials used or produced at the Project including a plot plan for on-site disposal areas that might be established. Describe strategies to minimize the potential for accidental release or spills and mitigation plans.

Identify the location and amount of all on-site storage of chemicals. Explain containment and environmental protection measures for handling chemicals, including explosives.

Indicate the annual volumes of any process chemicals, as well as, solid, liquid and hazardous wastes that will be trucked to and from the site and relate this to traffic volumes.

**4.7 Infrastructure, Utilities and Transportation**

Describe the project infrastructure requirements, existing and proposed, including, but not limited to, the following:

a) haul roads routing and design, rail links, limestone crushing and handling facilities, stockpile sites, and transport facilities;
b) volumes, timing (where applicable) and types of traffic associated with the movement of goods, services and personnel to and from the Project during the construction, operation and reclamation phases;

c) the impact of increased vehicle traffic on the existing roadway system considering other existing and planned developments in the region;
d) road access to and within the Project Area, the need to upgrade existing or construct new roads and the impacts of any new road construction or road improvements if required. Indicate whether or not Birch Mountain would use a potential 'East Corridor' route into the area if it is developed;
e) the result of consultation with the local transportation authorities and other stakeholders, including transportation studies that are underway or planned. Indicate how local community needs have been considered in access management; and
f) how public access to, or within the Project will be managed during different development phases of the Project.

**4.8 Environmental Management System**

Outline the elements of Birch Mountain's environmental, health and safety management system and discuss how it will be integrated into the Project. Provide the following information:

a) corporate policies and procedures, operator competency training, spill and air emission reporting procedures and emergency response plans;
b) environmental monitoring done independently by Birch Mountain in addition to monitoring performed in conjunction with other stakeholders and monitoring information in the public domain. Provide a summary of all proposed monitoring, research and other strategies or plans to minimize, mitigate and manage any potential adverse effects; and
c) describe new monitoring initiatives that may be required as a result of the Project and outline Birch Mountain's commitment to adaptive environmental management.

**4.9 Conservation and Reclamation**

Provide a conceptual Conservation and Reclamation Plan (C&R Plan) for the Project, including:

a) the concepts and objectives for reclamation, proposed end land use objectives and other factors necessary for C&R Plan implementation including:
    i) consideration of pre-development information with respect to land capability, vegetation, forest productivity, wildlife, aesthetics and land use resources;
    ii) project development phasing;
    iii) soil and reclamation material salvage, soil storage areas and soil handling procedures;
    iv) describe the suitability and availability of soils within the project footprint for reclamation. Outline the criteria to be used in salvaging soils for reclamation and provide a soil balance for the Project;
    iv) soil replacement types, depths and volumes;
    v) re-establishment of a self-sustaining natural appearing topography, drainage and surface watercourses;
    vi) closure planning and reclamation activities/sequencing for each phase of development;
    vii) post-development reforestation and forest productivity with information required for inclusion into forest management plans for the area;
    viii) post-development capability for all uses, including traditional uses (traditional vegetation and wildlife species);
    ix) the species that will be used for revegetation and discuss the use of native species in the reclamation program;
b) a discussion on how the land will be returned to pre-disturbed equivalent capability having regard for regulatory requirements and end land use;
c) describe operational or mitigative procedures that may be required to ensure that water quality and quantity in the Muskeg River is not impacted as a result of the Project; and

d) describe potential collaborative reclamation procedures considered among Birch Mountain and any other developers should the Project Area be subject to more than one land use (e.g., quarry, quicklime plant, oil sands waste dump, oil sands operational reclamation storage area), and review any discussions that Birch Mountain has had with these other developer(s).

### 4.10 Participation in Regional Cooperative Efforts

Discuss Birch Mountain's current and planned involvement in regional cooperative efforts that address environmental and socio-economic issues associated with regional development, including the Cumulative Environmental Management Association (CEMA), the Wood Buffalo Environmental Association (WBEA), and their working groups. Include Birch Mountain's participation in regional air, water and other environmental monitoring programs, health studies, research, TEK and socio-economic studies.

Describe how Birch Mountain will contribute to the effective design and implementation of proposed mitigation measures, monitoring programs and research programs within these regional cooperative efforts.

## 5.0 ENVIRONMENTAL ASSESSMENT

Define assessment scenarios, including:

a) a Baseline Scenario, which includes existing environmental conditions, existing and approved projects or activities;
b) an Application Scenario, which includes the Baseline Scenario plus the Project; and
c) a Cumulative Effects Assessment (CEA) Scenario, which includes the Application Scenario (Baseline Scenario plus Project) plus planned projects or activities.

*Note*: For the purposes of defining assessment scenarios, "approved" means approved by any federal, provincial or municipal regulatory authority, and "planned" means any project or activity that has been publicly disclosed prior to the issuance of the Terms of Reference or up to six months prior to the submission of the Project Application and the EIA report, whichever is most recent.

### 5.1 Basic Information Requirements for the Environmental Assessment

The EIA report will include the following basic environmental information:

a) quantitative and qualitative information about the environment and ecological processes in the Study Area(s), including relevant information presented in previous environmental assessments;
b) information about the human activities in the Study Area(s); e.g., land disturbance, discharges of substances, changes to access status and effects that the Project may have on the present and future capacity of renewable resources;
c) a discussion of the process employed to classify and evaluate the effects associated with the Project;
d) management plans to prevent, minimize or mitigate adverse effects and to monitor and respond to expected or unanticipated conditions; and
e) a discussion of residual effects.

### 5.2 Study Area(s)

Define and provide the rationale for the spatial and temporal boundaries for the Study Area(s) used for the assessment. Discuss the selection criteria used to determine the Study Area(s), including

information sources and assessment methods. The spatial boundaries shall include all areas where measurable changes in the environment may be caused by the Project regardless of any political boundaries.

### 5.3 Land Use and Access to Public Lands

Describe baseline land use and access to public lands in the Study Area(s) and discuss the impacts on these for each scenario:

a) identify the existing land uses and discuss the potential impact(s) of the Project to these land uses. Describe strategies to mitigate the impact(s);
b) identify any land use policies and resource management initiatives that pertain to the Project Area and discuss how the Project will be consistent with these policies;
c) identify any unique sites or rare features within the Project Area that may be impacted by the Project. Describe strategies to mitigate these impact(s);
d) identify potential changes in land use, land management, other industrial uses in the region, and recreational uses that may result from the Project;
e) discuss how public access to the development area and adjacent Crown lands will be managed during the development phases and the need for access management;
f) discuss the impact of the proposed development and reclamation on commercial forest harvesting;
g) discuss the potential for increased access into the area that may be associated with project development and its impact on other resources and resource use such as increased hunter, off-highway vehicle and other recreational users;
h) provide the results of consultation with other industry operators and Aboriginal communities regarding access to the Project Area; and
i) discuss the impact project development may have on any mineable oil sands resources in the Project Area. Discuss how project development has been coordinated with adjacent development(s). Discuss any limitations that the Project may have on other potential or approved developments.

### 5.4 Air Quality

Discuss baseline ambient air quality conditions. Review current emission sources and discuss changes as a result of anticipated future industrial development within the EIA Study Areas. Consider emission point sources as well as fugitive emissions. Identify components of the Project that will impact ambient air quality locally and regionally for both the Application and Cumulative Effects Scenarios:

a) describe and discuss the air quality parameters such as, but not limited to, oxides of nitrogen ($NO_x$), sulphur dioxide (SO2), individual hydrocarbons of concern in total hydrocarbons (THC) and volatile organic compounds (VOC) mixtures, trace metals, visibility, and particulates (TSP, $PM_{10}$ and $PM_{2.5}$), that will be associated with the Project;
b) describe meteorological conditions including wind speed, direction, and inversions insofar as they affect dispersion and deposition;
c) estimate ground-level concentrations of appropriate air quality parameters. Discuss any expected changes to particulate deposition patterns. Include a comparison of modelled concentrations to actual recent monitoring results, as appropriate;
d) identify the potential for reduced air quality (including odours and visibility) resulting from the Project and discuss any implications of the expected air quality for environmental protection and public health. Provide this information specifically for communities and sensitive receptors located close to the Project, as appropriate;

e) describe air quality impacts (including dispersion modelling of significant pollutants showing isopleths of concentration) resulting from the Project, and their implications for other environmental resources, including vegetation resources, and water and soil quality;
f) for acid deposition modelling, provide deposition data predictions including magnitude and location of predicted maximum levels for all areas within the 0.25 keq/ha/yr and 0.17/keq/ha/yr Potential Acid Input (PAI) isopleth; include analysis of PAI deposition levels consistent with the CEMA acid deposition management framework;
g) completion of the modelling in accordance with Alberta Environment's *Air Quality Modelling Guidelines* (March 2003);
h) describe how air quality impacts resulting from the Project will be mitigated and any monitoring programs to be implemented for assessing air quality or the effectiveness of mitigation measures;
i) discuss the use of ozone depleting substances; and
j) estimate the quantity released of any compounds regulated under the NPRI or National Emissions Reduction Masterplan (NERM).

### *5.4.1 Greenhouse Gas Emissions*

Provide the following:

a) the expected annual and total greenhouse gas (GHG) emissions over the construction, operation and decommissioning phases of the Project;
b) the Project's marginal contribution to total provincial and national GHG emissions on an annual basis;
c) the intensity of GHG emissions per unit of product produced and discuss how it compares with similar projects and technology performance;
d) how the project design and GHG management plans have taken into account the need for continuous improvement with respect to GHG emissions and their consideration of the national *Climate Change Plan for Canada* and *Alberta's Climate Change Action Plan*; and
e) Birch Mountain's overall GHG management plans, any plans for the use of offsets, (nationally or internationally) and the expected results of implementing the plans.

### *5.4.2 Climate Change*

Discuss the following:

a) in accordance with the guidance document *Incorporating Climate Change Considerations in Environmental Assessment: General Guidance for Practitioners*, review and discuss climate change and the local and/or regional, inter-provincial/territorial changes to environmental conditions resulting from climate conditions, including trends and projections where available;
b) identify stages or elements of the Project that are sensitive to changes or variability in climate parameters. Discuss what impacts the change to climate parameters may have on elements of the Project that are sensitive to climate parameters; and
c) comment on the adaptability of the Project in the event the region's climate changes. Discuss any follow-up programs and adaptive management considerations.

## 5.5 Noise

Discuss baseline noise conditions. Identify the project components and activities that have a potential for increased noise levels. Describe any changes in noise levels due to project development, and discuss the implications of these changes. Discuss mitigation options, considering such factors as intensity, magnitude, frequency, duration and time of day.

## 5.6 Terrestrial and Aquatic Ecosystems

### *5.6.1 Geology, Soils, Terrain*

Provide the following:

a) describe the baseline conditions of bedrock and surficial geology, soils and terrain in the Study Area(s). Where appropriate, use maps, cross-sections and figures to illustrate these features;
b) describe and map the soil types and their distribution in the Project Development Area and Study Areas. Provide an ecological context to the soil resource by supplying a soil survey report and maps; and
c) describe changes to these baseline conditions that may occur due to development of the Project.

### *5.6.2 Vegetation*

Describe and map vegetation communities in the EIA Study Area(s), using as appropriate, the Alberta Vegetation Inventory (AVI) Standards Manual 2.1, *The Field Guide to Ecosites of Northern Alberta* (Beckingham and Archibald, 1996), and the Alberta Wetland Inventory Standards Manual (AWI) Version 1.0. For each assessment scenario, discuss the following:

a) ecosite phases based on their potential to support rare plant species, old growth forests or other communities of restricted distribution (e.g., fens). Verify the presence of species of rare plants and the ecosites in which they are found using recommended survey methods;
b) the species associated with each ecosite phase and address:
    i) special status plant species (rare, threatened or endangered);
    ii) the importance of the size, distribution and variety of vegetation units assessed in habitat suitability indices for wildlife and riparian habitat;
    iii) the importance of peatland and wetland species and landscape units for local and regional habitat, sustained forest growth and the hydrologic regime. Determine the rarity or abundance of peatlands and wetlands from local and regional perspectives; and
    iv) vegetation used for food, medicinal and cultural purposes.
c) the sensitivity to disturbance of each of the vegetation communities and their ability to be restored, as well as the techniques used to estimate sensitivity to disturbance and reclamation (e.g., sensitivity to air emissions);
d) the nature, size, distribution and timing of changes to vegetation communities, including the effects of air emissions;
e) the availability of plants for traditional and medicinal purposes;
f) the area of productive and non-productive forest land base that will be disturbed and taken out of production during the life of the Project. Describe plans for the return of pre-disturbance forest ecosites by area, species and productivity;
g) introduction of non-native plant species on native species composition and potential plant changes to communities;
h) indicate the extent to which existing seismic lines, and linear corridors and other existing disturbances will be used for project facilities;
i) the area and distribution of all vegetation communities existing prior to the project development and expected at closure; and
j) discuss plans to mitigate the adverse effects of site clearing and other development activities and operations on vegetation, including rare plant species.

### *5.6.3 Wildlife*

Describe existing wildlife resources and their use of habitats in the Study Area(s). Document the anticipated changes to wildlife in the Study Area(s) under each scenario. Specifically:

a) discuss the criteria and process used in the selection of wildlife indicator species, including those listed by Alberta Fish and Wildlife (at risk, may be at risk and sensitive species in the

*General Status of Alberta Wild Species 2000*) and COSEWIC (endangered, threatened, special concern in *Canadian Species at Risk 2002*);

b) identify species composition, distribution, relative abundance, seasonal movements, movement corridors, habitat requirements, key habitat areas, and general life history in the Study Area(s);
c) include current field data, using recognized sampling protocols, for the species chosen for evaluation in the EIA report;
d) evaluate potential adverse impacts on, habitat availability, quality, and effective wildlife use of habitat due to the Project, including the effects of increased noise and traffic in the area. If habitat models are used to evaluate impacts, demonstrate how wildlife data from the Study Area(s) were used in conjunction with the selected models;
e) describe the spatial and temporal changes to habitat and to wildlife distribution, relative abundance, movements, and the potential to return the area to pre-disturbed wildlife habitat conditions, including:
    i) anticipated effects on wildlife as a result of changes to air and water, including both acute and chronic effects on animal health;
    ii) anticipated effects on wildlife as a result of project activity and noise; and
    iii) anticipated effects on wildlife due to improved or altered access into the area (e.g., vehicle collisions with wildlife, obstructions to daily or seasonal movements, and hunting mortality during operations and after project closure);
f) discuss the protection of riparian habitats, interconnectivity of such habitat, and the movement by wildlife species using the habitat;
g) indicate what measures will be taken to prevent habituation of wildlife, the potential for human-wildlife encounters and consequent destruction of wildlife (e.g., black bears);
h) describe the effects of the Project on those wildlife species selected for evaluation. Identify residual impacts and discuss their significance at the local and regional scales; and
i) provide a strategy and mitigation plan to minimize impacts on habitat and wildlife populations through the life of the Project and to return productive wildlife habitat to the area, considering:
    i) habitat enhancement measures in adjacent undisturbed areas, and a schedule for the return of habitat capability to areas impacted by the Project;
    ii) consistency of the plan with applicable regional, provincial and federal wildlife habitat objectives and policies; and
    iii) monitoring programs to assess wildlife impacts from the Project and the effectiveness of mitigation strategies and habitat enhancement measures.

### *5.6.4 Biodiversity*

Describe ecosystem characteristics in the Study Area(s), and explain the significance of potential project impacts from the perspective of biodiversity, including consideration of potential local and regional project impacts on:

a) ecosystem fragmentation;
b) habitat diversity and quantity; and
c) species diversity.

### *5.6.5 Groundwater*

Describe the groundwater regime in the Study Area(s), using map(s), cross section(s) and/or other drawings as appropriate. Discuss the following:

a) the lithology, stratigraphic and structural continuity, thickness, hydraulic properties, major groundwater features (aquifers, aquitards, aquicludes), groundwater flow direction and velocity, and groundwater quality of the geologic units in the Study Area(s);
b) historical and current hydrogeological investigations, including methodology and results;

c) the use of numerical models/appropriate calculations used for the assessment (if any), including any shortcomings or constraints on findings and how any limitations were addressed;
d) the potential for hydraulic connection between geological zones affected by the Project (e.g., quarry zones, groundwater production and the land surface);
e) parameters to be used as indicators of potential aquifer contamination;
f) the potential for changes in the groundwater regime and the effects of these changes that may arise from the Project, including:
    i) changes in groundwater quality, vertical gradients and aquifer recharge rates;
    ii) changes resulting from any proposed diversion;
    iii) an inventory of all groundwater users, and potential water use conflicts and proposed resolutions;
    v) the effect(s) of groundwater withdrawal and/or surficial dewatering and their implications for other environmental resources, including habitat diversity and quantity, surface water quality and quantity, vegetation, wetlands and soil saturation;
    vi) the inter-relationship of the groundwater to the surface water and the potential for impacts on water quality and quantity due to recharge from and discharge to local waterbodies and wetlands; and
g) a conceptual plan and implementation program for the protection of groundwater resources, including the following:
    i) the early detection of potential contamination and remediation planning;
    ii) groundwater remediation options in the event that adverse effects are detected; and
    iii) monitoring the sustainability of groundwater production or dewatering effects.

### *5.6.6 Surface Water*

Discuss baseline hydrological conditions in the Study Area(s). Identify project activities that may affect surface water quality and quantity during all stages of the Project and mitigation measures to prevent or minimize potential impacts, including:

a) appropriate surface water quality and hydrological parameters, their seasonal variations (provide hydrographs as appropriate) and relationships between flows and water quality as they pertain to the Project;
b) describe the project components or activities during construction, operation and reclamation that have the potential to affect surface water quality and flows, including;
    i) any changes in water quality and quantity resulting from the Project that may indicate a potential adverse effect or non-compliance with appropriate guidelines;
    ii) the significance of any impacts on water quality and quantity and implications to aquatic resources (e.g., biota, biodiversity and habitat);
    iii) the effect on water quality and quantity in surface waterbodies due to the change in groundwater discharge; and
    iv) the significance of any seasonal change to surface water flows;
c) describe any activities to be conducted in or near waterbodies and describe the connection(s) between these activities and the affected waterbodies;
d) identify and justify the selection of monitoring locations, and the integration of these sites into an overall aquatic assessment and monitoring program. Identify any cooperative monitoring and assessment initiatives; and
e) describe any aspect of the Project that is likely to affect a navigable waterway.

### *5.6.7 Fisheries and Aquatic Resources*

Describe existing fisheries and aquatic resources, their use and potential use of habitats in the Study Area(s). Document the anticipated changes to the fisheries and aquatic resources in the Study Area(s). Specifically:

a) describe the existing aquatic resources in the portion of the Muskeg River watershed that will be affected by the Project. Identify fisheries species composition, distribution, relative abundance, seasonal movements, habitat requirements, key habitat areas, and general life history in the Study Area(s);
b) describe the spatial and temporal changes to habitat and to fish distribution, relative abundance, movements, including:
    i) anticipated effects on fisheries as a result of changes to air and water, including both acute and chronic effects on fish health; and
    ii) anticipated effects on fisheries due to improved or altered access into the area (e.g., increased fishing pressure during operations and after project closure);
c) discuss the use of setbacks to provide for the protection of riparian habitats, fish and aquatic habitat and evidence to support their effectiveness. Identify any construction, operation and reclamation activities that may affect aquatic resources. Indicate whether blasting could harm aquatic resources. Describe mitigation to prevent adverse impacts and provide evidence to support its effectiveness; and
d) describe any potential changes and the significance of the potential changes to fisheries and aquatic resources in the portion of the Muskeg River watershed that will be affected by the Project and monitoring programs, as applicable, to assess fisheries and aquatic resource impacts from the Project and the effectiveness of mitigation strategies.

## 6.0 ENVIRONMENTAL MONITORING

Describe the environmental monitoring that Birch Mountain will undertake to manage predicted effects and improve environmental protection strategies.

Describe any proposed mitigation plans and identify any anticipated residual effects.

## 7.0 PUBLIC HEALTH AND SAFETY

Describe those aspects of the Project that may have implications for public health. Determine whether there may be implications for public health arising from the Project. Specifically:

a) identify and discuss the data and methods Birch Mountain used to assess impacts of the Project on human health and safety;
b) assess the potential health implications of the compounds that will be released to the environment from the proposed operation in relation to exposure limits established to prevent acute and chronic adverse effects on human health;
c) identify the human health impact of the potential contamination of country foods and natural food sources taking into consideration all project activities;
d) for those substances related to the Project that accumulate in and/or on vegetation, provide the information on samples of selected species of vegetation known to be consumed by humans;
e) discuss the potential to increase human exposure to contaminants from changes to water quality, air quality and soil quality taking into consideration all project activities;
f) document any health concerns identified by Aboriginal stakeholders due to the impacts of the Project specifically on their traditional lifestyle. Determine the potential impact of the Project on the overall health of Aboriginal stakeholders and identify possible mitigation strategies;
g) discuss the cumulative health effects that are likely to result from the Project in combination with other existing, approved and planned projects;
h) identify, as appropriate, the anticipated follow-up work, including regional cooperative studies. Identify how such work will be implemented and coordinated with ongoing air, soil and water quality initiatives;

i) identify and discuss the potential health and safety impacts due to higher regional traffic volumes and the increased risk of accidental leaks and spills;
j) document the health and safety concerns raised by stakeholders during consultation on the Project;
k) provide a summary of Birch Mountain's emergency response plan and discuss mitigation plans to ensure workforce and public safety during pre-construction, construction, operation and reclamation of the Project. Include prevention and safety measures for wildfire occurrences, accidental release or spill of chemicals to the environment and failures of structures retaining water or fluid wastes;
l) describe how local residents will be contacted during an emergency and the type of information that will be communicated to them; and
m) describe the existing agreements with area municipalities or industry groups such as safety co-operatives, emergency response associations and municipal emergency response agencies.

## 8.0 HISTORICAL RESOURCES

Provide the following:

a) an overview of the results of the historic resources studies that have been conducted in the Study Area(s);
b) the results of any field investigations that may be required to assess and mitigate the effect of the Project on historical resources pursuant to the *Historical Resources Act*; and
c) document any stakeholder concerns regarding the impact of the Project on the historical resources in the Study Area(s).

## 9.0 TRADITIONAL LAND USE

Provide the following:

a) document historical and current traditional use of the Study Area(s) by First Nations and Métis, including fishing, hunting, trapping, plant harvesting and any other traditional or cultural uses as identified by Aboriginal groups;
b) map(s) of appropriate scales showing the traditional land use areas of Aboriginal peoples;
c) details of Birch Mountain's consultation with Aboriginal stakeholders to determine their concerns regarding project development on traditional use of the Study Area(s); and
d) discuss the effects of the Project on First Nations and Métis traditional land use and culture, and identify possible mitigation strategies.

## 10.0 SOCIO-ECONOMIC FACTORS

Provide the following:

a) information on socio-economic conditions before and after project development, including the number of people who may be affected, population changes, local employment, local procurement, and existing local and regional services;
b) describe and discuss the impacts of the proposed Project on the availability of affordable housing and the quality of health care services. Identify and discuss the mitigation plans that will be undertaken to address these issues. Provide a summary of any discussions that have taken place with the Municipality and Regional Health Authority concerning housing availability and health care services respectively;
c) discuss capital investment, labour requirements, and other operating costs and revenue from services relating to the Project. Include an estimated breakdown of the Alberta, other Canadian and foreign industrial benefits relating to project management and engineering, equipment and materials, construction labour. Estimate the total overall project costs and revenues;

d) discuss the employment and business development opportunities the Project may create and the economic impact in the Study Area(s), region, province and Canada;
e) discuss Birch Mountain's policies and programs respecting the use of local, regional, Alberta and Canadian goods and services;
f) evaluate potential project demands upon local services and infrastructure; and
g) quantify local, regional and provincial economic benefits arising from the Project.

## 11.0 CUMULATIVE ENVIRONMENTAL EFFECTS

For each of the environmental, social, economic, health, and land use components evaluated above, assess and discuss any cumulative effects that could reasonably be considered to result in a combined effect due to development of the Project in combination with other existing, approved and planned projects in the region. Include industrial projects as well as activities associated with other land uses and infrastructure.

## 12.0 PUBLIC CONSULTATION REQUIREMENTS

Provide the following:

a) document the public consultation process implemented for the Project including the involvement of local residents, and other key stakeholders such as oil sands operators, special interest groups, First Nations and Métis within the Study Area(s);
b) discuss the methods by which information was provided to the public, the type of information provided, and the nature of responses received, and:
    i) describe the consultative process and show how public input was obtained and addressed. Indicate where and when public meetings were held and, to the extent possible, list attendees and provide a summary of concerns and ideas that were brought to the attention of Birch Mountain;
    ii) record and discuss the concerns expressed by the public and the actions taken to address the concerns;
    iii) discuss how issues and resolution of concerns were incorporated into the project development, impact mitigation and monitoring; and
    iv) describe plans to maintain the public consultation process following completion of the Environmental Assessment review to ensure that the public will have an appropriate forum for providing their input and expressing their views on the ongoing development, operation and reclamation of the Project.