

**FINAL TERMS OF REFERENCE
ENVIRONMENTAL IMPACT ASSESSMENT REPORT
FOR VALUE CREATION INC.'S PROPOSED
ADVANCED TRISTAR PROJECT**

Approximately 10 km to the Proposed Plant Site from Fort McMurray, Alberta

ISSUED BY: Environment and Sustainable Resource Development

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PURPOSE OF THE TERMS OF REFERENCE

The purpose of this document is to identify for Value Creation Inc. (VCI), aboriginal communities and appropriate stakeholders the information required by government agencies for an Environmental Impact Assessment (EIA) report prepared under the *Environmental Protection and Enhancement Act* (EPEA) for the Advanced TriStar Project (the Project).

Value Creation Inc. is a Calgary-based Canadian oil sands development company with significant oilsands leases in the Athabasca region of northern Alberta. VCI is part of the Value Creation Group of Companies, a private company, which besides oilsands leases owns proprietary bitumen processing and upgrading technology along with upgrading assets located in Strathcona County northeast of Edmonton Alberta. VCI is also part owner of the Terre de Grace leases north of Fort McMurray.

The proposed Advanced TriStar Project (ATS Project) will be the first development on VCI's TriStar leases, which are located in the Athabasca oilsands region in the Regional Municipality of Wood Buffalo. The ATS Project will be developed on VCI's TriStar northeast lease, which is comprised of 11 sections. The proposed plant site will be located approximately 10 km northeast of Fort McMurray.

The ATS Project will integrate VCI's innovative bitumen processing technology with the steam assisted gravity draining (SAGD) process to cost effectively produce and improve the quality and value of bitumen to a decontaminated crude oil called DCO. The DCO will be blended with some diluent to produce a premium medium oil with no asphaltenes and named Value Creation Medium oil (VC-M). The overall ATS Project will be implemented as 3 phases that will increase the bitumen production from an initial 15,000 barrels per day (bpd) with ATS-1, to 45,000 bpd with ATS-2, and finally to 75,000 bpd with ATS-3. DCO production will be 12,750 bpd, 38,250 bpd and 63,750 bpd, respectively. With the blending of diluent, the VC-M oil production will be 15,938 bpd with ATS-1, 47,812 bpd with ATS-2 and finally 79,688 bpd with ATS-3.

ATS-1 will produce bitumen emulsion containing 15,000 bpd of bitumen and will convert this bitumen to 12,750 bpd of decontaminated crude oil or DCO using VCI's Accelerated Decontamination "ADCTM" proprietary technology. ATS-1 will demonstrate the lower operating and capital costs of VCI's technology.

The ATS-1 Project will initially be comprised of 18 to 24 SAGD well pairs, three to four well pads, 9 to 12 observation wells, multiple source water wells and water disposal wells, a Central Processing Facility, storm water ponds, tank farm, temporary asphaltene storage area, materials storage area, administration and maintenance buildings, and a parking area. The entire ATS plant facilities will be located on the east side of the lease in the northeastern portion of Section 23, Township 89, Range 8, West of the 4th Meridian.

Natural gas will be used in ATS-1 for steam generation. ATS-2 and ATS-3 will use the combustion of asphaltenes removed from the bitumen production. A third-party supplier will provide power. VCI is currently assessing options for road access. Initial production will be transported by truck, and thereafter by pipeline or rail.

Subject to regulatory approval, construction of ATS-1 is expected to commence in late spring 2014 with an anticipated operational start date two years later in 2016. ATS-2 and ATS-3 will each have a production capacity of 30,000 bpd of bitumen converted to 25,500 bpd of DCO.

When fully constructed, there will be approximately 300 well pairs and 40 well pads producing 75,000 bpd of bitumen that will be converted to 79,688 bpd of VC-M oil, a premium medium oil with no asphaltenes. The ATS Project is expected to operate for 25 years with decommissioning commencing in 2040 decade.

SCOPE OF THE EIA REPORT

The Proponent shall prepare and submit an EIA report that examines the environmental and socio-economic effects of the Project. The EIA report shall be prepared considering all applicable provincial and federal legislation, codes of practice, guidelines, standards, policies and directives.

The EIA report shall be prepared in accordance with these Terms of Reference and the environmental information requirements prescribed under EPEA and associated regulations, and the *Canadian Environmental Assessment Act* if applicable. The EIA report will form part of the Proponent's application to the Energy Resources Conservation Board (ERCB). An EIA report summary will also be included as part of the ERCB Application.

The Proponent shall refer to the *Guide to Preparing Environmental Impact Assessment Reports in Alberta* published by Alberta Environment (the Guide) and these Terms of Reference when preparing the Environmental Impact Assessment report. In any case where there is a difference in requirements between the Guide and these Terms of Reference, the Terms of Reference shall take precedence.

CONTENT OF THE EIA REPORT

1 PUBLIC ENGAGEMENT AND ABORIGINAL CONSULTATION

- [A] Describe the concerns and issues expressed by the public and the actions taken to address those concerns and issues, including how public input was incorporated into the Project development, impact mitigation and monitoring.
- [B] Describe the concerns and issues expressed by aboriginal communities and the actions taken to address those concerns and issues, including how aboriginal community input was incorporated into the Project, EIA development, mitigation, monitoring, and reclamation. Describe consultation undertaken with aboriginal communities and groups with respect to traditional ecological knowledge, rights, and traditional use of land and water.
- [C] Discuss the Proponent's aboriginal consultation for the Project considering the approved First Nations Consultation Plan.
- [D] Describe plans to maintain the public engagement and aboriginal consultation process during construction, operation, and reclamation as well as following completion of the EIA report to ensure that the public and aboriginal peoples will have an appropriate forum for expressing their views on the ongoing development, operation and reclamation of the Project.

2 PROJECT DESCRIPTION

2.1 Overview

- [A] Provide a brief project description in sufficient detail to provide context for the EIA, including:

- a) proponent information;
 - b) proposed extraction and bitumen processing technology;
 - c) amount and source of energy required for the Project;
 - d) water supply and disposal requirements, including process water and potable water requirements;
 - e) proposed method to transport product to markets; and
 - f) development plan and schedule.
- [B] Provide maps and/or drawings of the Project components and activities including:
- a) existing infrastructure, leases and clearings, including exploration clearings;
 - b) proposed central processing/treatment and field facilities;
 - c) other buildings and infrastructure (e.g., pipelines and utilities);
 - d) temporary structures;
 - e) transportation and access routes;
 - f) on-site hydrocarbon storage;
 - g) containment structures such as retention ponds and storage ponds (e.g., lime sludge, stormwater runoff, boiler blow-down);
 - h) water wells/intakes, pipelines, and storage structures;
 - i) sources of aggregate resources, borrow material and other construction material and locations of any stockpiles that will be developed; and
 - j) waste storage area and disposal sites.
- [C] Discuss the implications of a delay in proceeding with the Project, or any phase of the Project, or not going ahead with the Project.
- [D] Describe the benefits of the Project, including jobs created, local training, employment and business opportunities, and royalties and taxes generated that accrue to:
- a) the Proponent;
 - b) local and regional communities, including Aboriginal communities;
 - c) the local authority;
 - d) Alberta; and
 - e) Canada.
- [E] Provide the adaptive management approach that will be implemented throughout the life of the Project. Include how monitoring, mitigation and evaluation were incorporated.

2.2 Constraints

- [A] Discuss the process and criteria used to identify constraints to development, and how the Project has been designed to accommodate those constraints. Include the following:
- a) any applicable *Alberta Land Stewardship Act* Regional Plan;
 - b) land use policies and resource management initiatives that pertain to the Project;
 - c) traditional land use setting and any sensitive sites or areas identified by aboriginal communities;
 - d) all known traplines;
 - e) the environmental setting;
 - f) cumulative environmental impacts in the region;
 - g) cumulative social impacts in the region;
 - h) results of Project-specific and regional monitoring;

- i) potential for new or additional technology to increase resource recovery at later times; and
 - j) potential for changes in the regulatory regime.
- [B] Discuss the selection criteria used, options considered, and rationale for selecting:
- a) location of facilities and infrastructure (including linear infrastructure);
 - b) thermal energy and electric power required for the Project;
 - c) water supply source;
 - d) wastewater treatment, management and disposal;
 - e) air emission and air quality management; and
 - f) waste disposal.
- [C] Provide a list of facilities for which locations will be determined later. Discuss the selection criteria that will be used to determine the specific location of these facilities.

2.3 Regional and Cooperative Efforts

- [A] Discuss the Proponent's involvement in regional and cooperative efforts to address environmental and socio-economic issues associated with regional development.
- [B] Describe opportunities for sharing infrastructure (e.g., access roads, utility corridors, water infrastructure) with other resource development stakeholders. Provide rationale where these opportunities will not be implemented.
- [C] Describe how proponent's programs will be consistent with regional monitoring programs and guidelines.

2.4 Transportation Infrastructure

- [A] Provide a traffic impact assessment and discuss improvements needed to access the provincial highways. Where traffic impact assessments have been prepared for other existing and planned projects in the area, provide a summary of those studies and incorporate their recommendations into the traffic assessment for the Project.
- [B] Describe the anticipated changes to traffic (e.g., type, volume) on highways during all stages of the Project and assess their impacts, considering the cumulative effects of other existing and planned uses of the same highways.
- [C] Describe and map the locations of any new road or intersection construction, or any improvements to existing roads or intersections, related to the development of the Project, from the boundary of the Project Area up to and including the highway access point, and
- a) discuss the alternatives and the rationale for selection of the preferred alternative;
 - b) describe the impacts to local communities of the changes in transportation infrastructure; and
 - c) provide a proposed schedule for the work.

2.5 Air Emissions Management

- [A] Discuss the selection criteria used, options considered, and rationale for selecting control technologies to minimize air emission and ensure air quality management.
- [B] Provide emission profiles (e.g., type, composition, rate and source) for the Project's operating and construction emissions including point and non-point sources and fugitive emissions. Consider both normal and upset conditions. Discuss:

- a) odorous and visible emissions from the proposed facilities;
- b) annual and total greenhouse gas emissions during all stages of the Project. Identify the primary sources and provide detailed calculations;
- c) the intensity of greenhouse gas emissions per unit of bitumen produced;
- d) the Project's contribution to total provincial and national greenhouse gas emissions on an annual basis;
- e) the Proponent's overall greenhouse gas management plans;
- f) amount and nature of Criteria Air Contaminants emissions;
- g) the amount and nature of acidifying emissions, probable deposition patterns and rates;
- h) emergency flaring scenarios (e.g., frequency and duration) and proposed measures to ensure flaring events are minimized;
- i) upset condition scenarios (e.g., frequency and duration) and proposed measures to ensure upset conditions are minimized;
- j) gas collection and conservation, and the applicability of vapour recovery technology;
- k) applicability of sulphur recovery, acid gas re-injection or flue gas desulphurization to reduce sulphur emissions; and
- l) fugitive emissions control technology to detect, measure and control emissions and odours from equipment leaks.

2.6 Water Management

2.6.1 Water Supply

- [A] Describe the water supply requirements for the Project, including:
- a) the criteria used, options considered and rationale for selection of water supply sources(s);
 - b) the expected water balance during all stages of the Project. Discuss assumptions made or methods chosen to arrive at the water balances;
 - c) the process water, potable water, and non-potable water requirements and sources for construction (including, but not limited to, road construction, winter road construction, lease construction, production well drilling and dust suppression), camp(s) and plant site, start-up, normal and emergency operating situations, decommissioning and reclamation. Identify the volume of water to be withdrawn from each source, considering plans for wastewater reuse;
 - d) the location of sources/intakes and associated infrastructure (e.g., pipelines for water supply);
 - e) the variability in the amount of water required on an annual and seasonal basis as the Project is implemented;
 - f) the expected cumulative effects on water losses/gains resulting from the Project operations;
 - g) describe contingency plans in the event of restrictions on the Projects water supply source (e.g., due to license conditions, source volume limitations, climate change or cumulative impact water deficits);
 - h) potable water treatment systems for all stages of the Project;
 - i) type and quantity of potable water treatment chemicals used; and
 - j) measures for ensuring efficient use of water including alternatives to reduce the consumption of non-saline water such as water use minimization, recycling,

conservation, use of saline groundwater, cooperation with other operators, and technological improvements.

2.6.2 Surface Water

- [A] Describe the surface water management strategy for all stages of the Project, including:
 - a) design factors considered;
 - b) permanent or temporary alterations or realignments of watercourses, wetlands and other waterbodies; and
 - c) the rate, volume, timing of any storm water release to local surface.
- [B] Describe and map crossings of watercourses or waterbodies (e.g., bridges, culverts and pipelines) required and provide example diagrams of each type of crossing.

2.6.3 Wastewater Management

- [A] Describe the wastewater management strategy, including:
 - a) the criteria used, options considered and rationale for the selection of wastewater treatment and wastewater disposal;
 - b) the source, quantity and composition of each wastewater stream from each component of the proposed operation (e.g., bitumen extraction and associated facilities) for all Project conditions, including normal, start-up, worst-case and upset conditions;
 - c) the proposed disposal locations and methods for each wastewater stream;
 - d) geologic formations for the disposal of wastewaters;
 - e) design of facilities that will collect, treat, store and release wastewater streams;
 - f) type and quantity of chemicals used in wastewater treatment; and
 - g) sewage treatment and disposal.

2.7 Waste Management

- [A] Discuss the selection criteria used, options considered, and rationale for waste disposal.
- [B] Characterize and quantify the anticipated dangerous goods, and hazardous, non-hazardous, and recyclable wastes generated by the Project, and:
 - a) describe the composition and volume of specific waste streams and discuss how each stream will be managed;
 - b) describe how the disposal sites and sumps will be constructed;
 - c) describe plans for pollution prevention, waste minimization, recycling, and management to reduce waste quantities for all stages of the Project; and
 - d) describe the planned location of off-site disposal, including landfills and deep well disposal sites.

2.8 Conservation and Reclamation

- [A] Provide a conceptual conservation and reclamation plan for the Project. Describe and map as applicable:
 - a) current land use and capability and proposed post-development land use and capability;
 - b) anticipated timeframes for completion of reclamation stages and release of lands back to the Crown including an outline of the key milestone dates for reclamation and how progress to achieve these targets will be measured;

- c) constraints to reclamation such as timing of activities, availability of reclamation materials and influence of natural processes and cycles including natural disturbance regimes;
 - d) a revegetation plan for the disturbed terrestrial, riparian and wetland areas;
 - e) discuss how the proposed reclamation methods have performed in similar situations;
 - f) reclamation material salvage, storage areas and handling procedures; and
 - g) existing and final reclaimed site drainage plans.
- [B] Discuss, from an ecological perspective, the expected timelines for establishment and recovery of vegetative communities and wildlife habitat, the expected success of establishment and recovery, and the expected differences in the resulting communities.
- [C] Describe how the Proponent considered the use of progressive reclamation in project design and reclamation planning.
- [D] Discuss uncertainties related to the conceptual reclamation plan.

3 ENVIRONMENTAL ASSESSMENT

3.1 Air Quality, Climate and Noise

3.1.1 Baseline Information

- [A] Discuss the baseline climatic and air quality conditions including:
- a) the type and frequency of meteorological conditions that may result in poor air quality;
 - b) current regional air quality exceedences and trends; and
 - c) appropriate ambient air quality parameters.

3.1.2 Impact Assessment

- [A] Identify components of the Project that will affect air quality, and:
- a) describe the potential for reduced air quality (i.e., odours and visibility) resulting from the Project and discuss any implications of the expected air quality for environmental protection and public health;
 - b) estimate ground-level concentrations of appropriate air quality parameters;
 - c) discuss any expected changes to particulate deposition, nitrogen deposition or acidic deposition patterns;
 - d) identify areas that are predicted to exceed Potential Acid Input (PAI) critical loading criteria; and
 - e) discuss interactive effects that may occur resulting from co-exposure of receptors to all emissions.
- [B] Identify stages or elements of the Project that are sensitive to changes or variability in climate parameters, including frequency and severity of extreme weather events and discuss the potential impacts over the life of the Project.
- [C] Summarize the results of the noise assessment conducted for the ERCB, and:
- a) identify the nearest receptor used in the assessment; and
 - b) discuss the design, construction and operational factors to be incorporated into the Project to comply with the ERCB's Directive 38: Noise Control.

3.2 Hydrogeology

3.2.1 Baseline Information

- [A] Provide an overview of the existing geologic and hydrogeologic setting from the ground surface down to, and including, the oil producing zones and disposal zones, and:
- a) present regional and Project Area geology to illustrate depth, thickness and spatial extent of lithology, stratigraphic units and structural features; and
 - b) present regional and Project Area hydrogeology describing:
 - i) the major aquifers, aquitards and aquicludes (i.e., Quaternary and bedrock), their spatial distribution, properties, hydraulic connections between aquifers, hydraulic heads, gradients, groundwater flow directions and velocities. Include maps and cross sections,
 - ii) the chemistry of groundwater aquifers including baseline concentrations of major ions, metals and hydrocarbon indicators,
 - iii) the potential discharge zones, potential recharge zones and sources, areas of groundwater-surface water interaction and areas of Quaternary aquifer-bedrock groundwater interaction,
 - iv) water well development and groundwater use, including an inventory of groundwater users,
 - v) the recharge potential for Quaternary aquifers,
 - vi) potential hydraulic connection between bitumen production zones, deep disposal formations and other aquifers resulting from Project operations,
 - vii) the characterization of formations chosen for deep well disposal, including chemical compatibility and containment potential, injection capacity, hydrodynamic flow regime, and water quality assessments, and
 - viii) the locations of major facilities associated with the Project including facilities for waste storage, treatment and disposal (e.g., deep well disposal) and describe site-specific aquifer and shallow groundwater conditions beneath these proposed facilities. Provide supporting geological information.

3.2.2 Impact Assessment

- [A] Describe Project components and activities that have the potential to affect groundwater resource quantity and quality at all stages of the Project.
- [B] Describe the nature and significance of the potential Project impacts on groundwater with respect to:
- a) inter-relationship between groundwater and surface water in terms of both groundwater and surface water quantity and quality;
 - b) implications for terrestrial or riparian vegetation, wildlife and aquatic resources including wetlands;
 - c) changes in groundwater quality, quantity and flow;
 - d) conflicts with other groundwater users, and proposed resolutions to these conflicts;
 - e) potential implications of seasonal variations; and
 - f) groundwater withdrawal for Project operations, including any expected alterations in the groundwater flow regime during and following Project operations.

3.3 Hydrology

3.3.1 Baseline Information

- [A] Describe and map the surface hydrology in the Project Area.
- [B] Identify any surface water users who have existing approvals, permits or licenses.

3.3.2 Impact Assessment

- [A] Describe the extent of hydrological changes that will result from disturbances to groundwater and surface water movement:
 - a) include changes to the quantity of surface flow, water levels and channel regime in watercourses (i.e., during minimum, average and peak flows) and water levels in waterbodies;
 - b) assess the potential impact of any alterations in flow on the hydrology and identify all temporary and permanent alterations, channel realignments, disturbances or surface water withdrawals;
 - c) discuss the effect of these changes on hydrology (e.g., timing, volume, peak and minimum flow rates, river regime and lake levels), including the significance of effects for downstream watercourses; and
 - d) identify any potential erosion problems in watercourses resulting from the Project.
- [B] Describe impacts on other surface water users resulting from the Project. Identify any potential water use conflicts.
- [C] Discuss the impact of low flow conditions and in-stream flow needs on water supply and water and wastewater management strategies.

3.4 Surface Water Quality

3.4.1 Baseline Information

- [A] Describe the baseline water quality of watercourses and waterbodies. Discuss the effects of seasonal variations, flow, and other factors on water quality.

3.4.2 Impact Assessment

- [A] Identify the potential components that may influence or impact surface water quality.
- [B] Describe the potential impacts of the Project on surface water quality:
 - a) discuss any changes in water quality resulting from the Project that may exceed the *Surface Water Quality Guidelines for Use in Alberta* or the *Canadian Water Quality Guidelines*;
 - b) discuss the significance of any impacts on water quality and implications to aquatic resources (e.g., biota, biodiversity and habitat);
 - c) discuss seasonal variation and potential effects on surface water quality;
 - d) assess the potential Project related and cumulative impacts of acidifying air emissions on surface water quality; and
 - e) discuss the effect of changes in surface runoff or groundwater discharge on water quality in surface waterbodies.

3.5 Aquatic Ecology

3.5.1 Baseline Information

- [A] Describe and map the fish, fish habitat and aquatic resources (e.g., aquatic and benthic invertebrates) of the lakes, rivers, ephemeral water bodies and other waters. Describe the species composition, distribution, relative abundance, movements and general life history parameters of fish resources. Also identify any species that are:
- listed as “at Risk, May be at Risk and Sensitive” in the General Status of Alberta Wild Species (Alberta Sustainable Resource Development);
 - listed as species of special concern or threatened according to Alberta’s Endangered Species Conservation Committee (ESCC);
 - listed in Schedule 1 of the federal *Species at Risk Act*;
 - listed as “at risk” by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC); and
 - traditionally used species.
- [B] Describe and map existing critical or sensitive areas such as spawning, rearing, and overwintering habitats, seasonal habitat use including migration and spawning routes.
- [C] Describe the current and potential use of the fish resources by aboriginal, sport or commercial fisheries.

3.5.2 Impact Assessment

- [A] Describe and assess the potential impacts of the Project to fish, fish habitat, and other aquatic resources, considering:
- potential habitat loss and alteration;
 - potential impacts on riparian areas;
 - potential increased fishing pressures in the region that could arise from the increased population and improved access from the Project. Characterize current use of local and regional fisheries resources to support the assessment of potential changes in angling pressure;
 - changes in benthic invertebrate communities;
 - potential increased habitat fragmentation;
 - potential acidification; and
 - potential groundwater-surface water interactions.
- [B] Identify the key aquatic indicators that the Proponent used to assess project impacts. Discuss the rationale for their selection.
- [C] Identify plans proposed to offset any loss in the productivity of fish habitat. Indicate how environmental protection plans address applicable provincial and federal policies on fish habitat including the development of a “No Net Loss” fish habitat objective.

3.6 Vegetation

3.6.1 Baseline Information

- [A] Describe and map the vegetation communities, wetlands, rare plants, old growth forests, and communities of limited distribution. Identify the occurrence, relative abundance and distribution and identify any species that are:

- a) listed as “at Risk, May be at Risk and Sensitive” in the General Status of Alberta Wild Species (Alberta Sustainable Resource Development);
- b) listed in Schedule 1 of the federal *Species at Risk Act*;
- c) listed as “at risk” by COSEWIC; and
- d) traditionally used species.

[B] Describe and quantify the current extent of habitat fragmentation.

3.6.2 Impact Assessment

- [A] Describe and assess the potential impacts of the Project on vegetation communities, considering:
- a) both temporary and permanent impacts including timeframes and mapping of land clearing activities;
 - b) the potential for introduction and colonization of weeds and non-native invasive species;
 - c) species richness and abundance;
 - d) potential increased fragmentation and loss of upland, riparian and wetland habitats; and
 - e) implications of vegetation changes for other environmental resources (e.g., terrestrial and aquatic habitat diversity and quantity, water quality and quantity, erosion potential).
- [B] Identify key vegetation indicators used to assess the Project impacts. Discuss the rationale for the indicator’s selection.

3.7 Wildlife

3.7.1 Baseline Information

- [A] Describe and map the wildlife resources (e.g., amphibians, reptiles, birds, and terrestrial and aquatic mammals). Describe species relative abundance, distribution and their use and potential use of habitats. Also identify any species that are:
- a) listed as “at Risk, May be at Risk and Sensitive” in the General Status of Alberta Wild Species (Alberta Sustainable Resource Development);
 - b) listed in Schedule 1 of the federal *Species at Risk Act*;
 - c) listed as “at risk” by COSEWIC; and
 - d) traditionally used species.
- [B] Describe and map existing wildlife habitat and habitat disturbance including exploration activities. Identify those habitat disturbances that are related to existing and approved projects.

3.7.2 Impact Assessment

- [A] Describe and assess the potential impacts of the Project to wildlife and wildlife habitats, considering:
- a) how the Project will affect wildlife relative abundance, habitat availability, mortality, movement patterns, and distribution for all stages of the Project;
 - b) how improved or altered access may affect wildlife including potential obstruction of daily and seasonal movements, increased vehicle-wildlife collisions, and increased hunting pressure;

- c) how increased habitat fragmentation may affect wildlife considering edge effects, the availability of core habitat and the influence of linear features and infrastructure on wildlife movements and predator-prey relationships;
- d) the spatial and temporal changes to habitat availability and habitat effectiveness (e.g., types, quality, quantity, diversity, and distribution);
- e) potential effects on wildlife resulting from changes to air and water quality, including both acute and chronic effects to animal health; and
- f) potential effects on wildlife from the Proponent's proposed and planned exploration, seismic and core hole activities, including monitoring/4D seismic; and
- g) resilience and recovery capabilities of wildlife populations and habitats to disturbance.

[B] Identify the key wildlife and habitat indicators used to assess Project impacts. Discuss the rationale for their selection.

3.8 Biodiversity

3.8.1 Baseline Information

[A] Identify the biodiversity metrics, biotic and abiotic indicators that are used to characterize the baseline biodiversity.

[B] Describe and map the existing biodiversity on the basis of indicators identified for the project.

3.8.2 Impact Assessment

- [A] Describe and assess the potential impacts of the Project to biodiversity considering:
- a) the biodiversity metrics, biotic and abiotic indicators selected;
 - b) the effects of fragmentation on biodiversity potential;
 - c) the contribution of the Project to any anticipated changes in regional biodiversity and the potential impact to local and regional ecosystems; and
 - d) effects during construction, operations and post-reclamation and the significance of these changes in a local and regional context.

3.9 Terrain and Soils

3.9.1 Baseline Information

[A] Describe and map the terrain and soils conditions in the Project Area.

[B] Describe and map soil types in the areas that are predicted in 3.1.2[A]d) to exceed Potential Acid Input (PAI) critical loading criteria.

3.9.2 Impact Assessment

- [A] Describe Project activities (all stages) and other related issues that could affect soil quality (e.g., compaction, contaminants) and:
- a) indicate the amount (ha) of surface disturbance from plant, field (e.g., pads, pipelines, access roads), aggregate and borrow sites, construction camps, drilling waste disposal and other infrastructure-related construction activities;
 - b) discuss the relevance of any changes for the local and regional landscapes, biodiversity, productivity, ecological integrity, aesthetics and future use;

- c) describe the impact on soils due to changes to surface water flow and shallow groundwater flow;
- d) identify the potential acidification impact on soils and discuss the significance of predicted impacts by acidifying emissions; and
- e) describe potential sources of soil contamination.

[B] Discuss:

- a) the environmental effects of proposed drilling methods on the landscape and surficial and bedrock geology;
- b) the potential for changes in the ground surface during steaming and recovery operations (e.g., ground heave and/or subsidence) and their environmental implications; and
- c) the potential impacts caused by the mulching and storage of woody debris considering, but not limited to vulnerability to fire, degradation of soil quality, increased footprint, etc.

3.10 Land Use and Management

3.10.1 Baseline Information

- [A] Describe and map the current land uses in the Project Area, including all Crown land and Crown Reservations (Holding Reservation, Protective Notation, Consultative Notation).
- [B] Indicate where Crown land dispositions may be needed for roads or other infrastructure for the Project.
- [C] Identify and map unique sites or special features in the Project Area and Local Study Area such as Parks and Protected Areas, Heritage Rivers, Historic Sites, Environmentally Significant Areas, culturally significant sites and areas, and other designations (World Heritage Sites, Ramsar Sites, Internationally Important Bird Areas, etc).
- [D] Describe and map land clearing activities, showing the timing of the activities.
- [E] Describe the status of timber harvesting arrangements, including species and timing.
- [F] Describe existing access control measures.

3.10.2 Impact Assessment

- [A] Identify the potential impacts of the Project on land uses, including:
 - a) unique sites or special features;
 - b) changes in public access arising from linear development, including secondary effects related to increased hunter, angler and other recreational access and facilitated predator movement;
 - c) aggregate reserves that may be located on land under the Proponent's control and reserves in the region;
 - d) development and reclamation on commercial forest harvesting and fire management in the Project Area;
 - e) the amount of commercial and non-commercial forest land base that will be disturbed by the Project, including the Timber Productivity Ratings for the Project Area. Compare the baseline and reclaimed percentages and distribution of all forested communities in the Project Area;

- f) how the Project impacts Annual Allowable Cuts and quotas within the Forest Management Agreement area;
- g) anticipated changes (type and extent) to the topography, elevation and drainage patterns within the Project Area; and
- h) access control for public, regional recreational activities, aboriginal land use and other land uses during and after development activities.

- [B] Provide a fire control plan highlighting:
- a) measures taken to ensure continued access for firefighters to adjacent wildland areas;
 - b) forest fire prevention, detection, reporting, and suppression measures, including proposed fire equipment;
 - c) measures for determining the clearing width of power line rights-of-way; and
 - d) required mitigative measures for areas adjacent to the Project Area based on the FireSmart Wildfire Assessment System.

4 HISTORIC RESOURCES

4.1 Baseline Information

- [A] Provide a brief overview of the regional historical resources setting including a discussion of the relevant archaeological, historic and palaeontological records.
- [B] Describe and map known historic resources sites in the Project area, considering:
- a) site type and assigned Historic Resources Values (HRVs); and
 - b) existing site specific *Historical Resources Act* requirements (if applicable).
- [C] Provide an overview of previous Historical Resources Impact Assessments (HRIAs) that have been conducted within the Project Area, including:
- a) a description of the spatial extent of previous assessment relative to the Project Area, noting any assessment gap areas; and
 - b) a summary of *Historical Resources Act* requirements and/or clearances that have been issued for the Project to date (if applicable).
- [D] Identify locations within the Project Area that are likely to contain previously unrecorded historic resources. Thoroughly describe the methods used to identify these areas.

4.2 Impact Assessment

- [A] Describe Project components and activities that have the potential to affect historic resources at all stages of the Project.
- [B] Describe the results of HRIA work on Project design and scheduling.
- [C] Describe the nature and significance of the potential Project impacts on historical resources, considering:
- a) effects on historic resources site integrity; and
 - b) implications for the interpretation of the archaeological, historic and palaeontological records.

5 TRADITIONAL ECOLOGICAL KNOWLEDGE AND LAND USE

- [A] Provide:
- a) a map and description of traditional land use areas including fishing, hunting, trapping and nutritional, medicinal or cultural plant harvesting by affected aboriginal

- peoples (if the aboriginal community or group is willing to have these locations disclosed);
 - b) a map of cabin sites, spiritual sites, cultural sites, graves and other traditional use sites considered historic resources under the *Historical Resources Act* (if the aboriginal community or group is willing to have these locations disclosed), as well as traditional trails and resource activity patterns; and
 - c) a discussion of:
 - i) the availability of vegetation, fish and wildlife species for food, traditional, medicinal and cultural purposes in the identified traditional land use areas considering all Project related impacts,
 - ii) access to traditional lands in the Project Area during all stages of the Project, and
 - iii) aboriginal views on land reclamation.
- [B] Describe how TEK and TLU information was incorporated into the Project, EIA development, the conservation and reclamation plan, monitoring and mitigation.
- [C] Determine the impacts of the Project on traditional, medicinal and cultural purposes and identify possible mitigation strategies.

6 PUBLIC HEALTH AND SAFETY

6.1 Public Health

- [A] Describe those aspects of the Project that may have implications for public health or the delivery of regional health services. Determine quantitatively whether there may be implications for public health arising from the Project.
- [B] Document any health concerns raised by stakeholders during consultation on the Project.
- [C] Document any health concerns identified by aboriginal communities or groups resulting from impacts of existing development and of the Project specifically on their traditional lifestyle and include an aboriginal receptor type in the assessment.
- [D] Describe the potential health impacts resulting from higher regional traffic volumes and the increased risk of accidental leaks and spills.

6.2 Public Safety

- [A] Describe those aspects of the Project that may have implications for public safety. Determine whether there may be implications for public safety arising from the Project. Specifically:
- a) describe the Proponent's emergency response plan, including public notification protocol and safety procedures, to minimize adverse environmental effects, including emergency reporting procedures for spill containment and management;
 - b) document any safety concerns raised by stakeholders during consultation on the Project;
 - c) describe how local residents will be contacted during an emergency and the type of information that will be communicated to them;
 - d) describe the existing agreements with area municipalities or industry groups such as safety cooperatives, emergency response associations, regional mutual aid programs and municipal emergency response agencies; and

- e) describe the potential safety impacts resulting from higher regional traffic volumes.

7 SOCIO-ECONOMIC ASSESSMENT

7.1 Baseline Information

- [A] Describe the existing socio-economic conditions in the region and in the communities in the region.
- [B] Describe factors that may affect existing socio-economic conditions including:
 - a) population changes;
 - b) workforce requirements for the Project, including a description of when peak activity periods will occur;
 - c) planned accommodations for the workforce for all stages of the Project;
 - d) the Proponent's policies and programs regarding the use of local, regional and Alberta goods and services;
 - e) the project schedule; and
 - f) the overall engineering and contracting plan for the Project.

7.2 Impact Assessment

- [A] Describe the effects of construction and operation of the Project on:
 - a) housing;
 - b) availability and quality of health care services;
 - c) local and regional infrastructure and community services;
 - d) recreational activities;
 - e) hunting, fishing, trapping and gathering; and
 - f) First Nations and Métis (e.g., traditional land use and social and cultural implications).
- [B] Describe the socio-economic effects of any construction camp required for the Project and identify:
 - a) its location;
 - b) the number of workers it is intended to house;
 - c) estimated number of foreign workers;
 - d) whether the camp will service the Project only or other clients;
 - e) the length of time the camp will be in service; and
 - f) describe what services will be provided in the camp (e.g., security, recreation and leisure, medical services).
- [C] Describe the need for additional Crown land to manage the effects in [A] and [B].
- [D] Discuss opportunities to work with First Nation and Métis communities and groups, other local residents and businesses regarding employment, training needs and other economic development opportunities arising from the Project.
- [E] Provide the estimated total Project cost, including a breakdown for engineering and project management, equipment and materials, and labour for both construction and operation stages. Indicate the percentage of expenditures expected to occur in the region, Alberta, Canada outside of Alberta, and outside of Canada.

8 MITIGATION MEASURES

- [A] Discuss mitigation measures to avoid, minimize or eliminate the potential impacts for all stages of the Project.
- [B] Identify those mitigation measures that will be implemented for each associated impact and provide rationale for their selection, including a discussion on the effectiveness of the proposed mitigation.

9 RESIDUAL IMPACTS

- [A] Describe the residual impacts of the Project following implementation of the Proponent's mitigation measures and the Proponent's plans to manage those residual impacts.

10 MONITORING

- [A] Describe the Proponent's current and proposed monitoring programs, including:
 - a) how the monitoring programs will assess any project impacts and measure the effectiveness of mitigation plans;
 - b) how the Proponent will address any Project impacts identified through the monitoring program;
 - c) how the Proponent will contribute to current and proposed regional monitoring programs;
 - d) monitoring performed in conjunction with other stakeholders, including aboriginal communities and groups;
 - e) new monitoring initiatives that may be required as a result of the Project;
 - f) regional monitoring that will be undertaken to assist in managing environmental effects and improve environmental protection strategies;
 - g) how monitoring data will be disseminated to the public, aboriginal communities or other interested parties; and
 - h) how the results of monitoring programs and publicly available monitoring information will be integrated with the Proponent's environmental management system.