

**TERMS OF REFERENCE  
ENVIRONMENTAL IMPACT ASSESSMENT REPORT  
FOR SUNCOR ENERGY INC's PROPOSED  
MEADOW CREEK WEST IN-SITU PROJECT**

**Approximately 33 km west of Anzac, Alberta**

**ISSUED BY:** Alberta Energy Regulator

**DATE:** April 17, 2017

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## **PURPOSE OF THE TERMS OF REFERENCE**

The purpose of this document is to identify for Suncor Energy Inc. (Suncor), Indigenous 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 Meadow Creek West Project (the Project).

Suncor is seeking approval to develop the proposed Project within portions of Townships 84 and 85, Ranges 9, 10, 11 and 12, W4M, located about 33 km west of the town of Anzac and about 38 km south of the city of Fort McMurray. The Project is owned by Suncor (75% operating interest) and Nexen Energy ULC (25%). The Project will use in situ technologies for extraction of bitumen from the McMurray formation.

The Project is expected to produce 40,000 barrels of bitumen per day (bpd) from one central processing facility (CPF) for 25 to 40 years. Project components will include steam generation including natural gas-fired cogeneration, water treatment and recycling, bitumen treatment, multi-well production pads, steam delivery pipelines, product recovery pipelines, local access roads, and borrow pits. The Project will be accessed from Highway 63. Pending regulatory approval, Suncor is planning to construct the project in a single phase beginning in 2022 with first oil in 2026.

## **SCOPE OF THE EIA REPORT**

Suncor 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 Suncor's application to the Alberta Energy Regulator (AER). An EIA report summary will also be included as part of the AER Application.

Suncor shall refer to the *Guide to Preparing Environmental Impact Assessment Reports in Alberta* published by Alberta Environment and Parks (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 INDIGENOUS 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 Indigenous communities and the actions taken to address those concerns and issues, including how Indigenous community input was incorporated into the Project, EIA development, mitigation, monitoring and reclamation. Describe consultation undertaken with Indigenous communities and groups

with respect to Traditional Ecological Knowledge and Traditional Use of land, water, wildlife and vegetation.

- [C] Describe plans to maintain the public engagement and Indigenous consultation process following completion of the EIA report to ensure that the public and Indigenous 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) the amount and source of diluent required for extraction and transportation over the life of the Project;
  - e) water supply and disposal requirements, including process water and potable water requirements;
  - f) proposed method to transport product to markets; and
  - g) 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, utilities, and camp(s));
  - 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 (municipal, provincial, and federal taxes, as well as carbon taxes) generated that accrue to:
- a) Suncor;
  - b) local and regional communities, including Indigenous 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 will be 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, including the Lower Athabasca Regional Plan and associated management frameworks;
  - b) how this Project aligns with the *Comprehensive Regional Infrastructure Sustainability Plan for the Athabasca Oil Sands Area* and the *Fort McMurray-Athabasca Oil Sands Subregional Integrated Resource Plan* ;
  - c) land use policies and resource management initiatives that pertain to the Project;
  - d) provincial and federal climate change policies and legislation;
  - e) Indigenous traditional land, water, wildlife and vegetation use;
  - f) campgrounds and recreational sites;
  - g) historic resource sites;
  - h) all known traplines and registered fur management areas;
  - i) the environmental setting;
  - j) cumulative environmental impacts in the region;
  - k) cumulative social impacts in the region;
  - l) results of project-specific and regional monitoring; and
  - m) potential for new or additional technology to increase resource recovery or reduce emissions at later times; and
  - n) potential for changes in the regulatory regime.
- [B] Provide a detailed assessment of the selection criteria used, options considered, and rationale for selecting:
- a) location of facilities and infrastructure (including linear infrastructure); and
  - b) thermal energy and electric power required for the Project.
- [C] Provide a list of facilities for which locations will be determined later. Describe the selection criteria that will be used to determine the specific location of these facilities. For facilities that may be applied for and built by a third party, describe how Suncor would participate in the process to ensure constraints are considered.

## **2.3 Regional and Cooperative Efforts**

- [A] Discuss-Suncor's involvement in regional and cooperative efforts to address environmental and socio-economic issues associated with regional development.
- [B] Describe opportunities for sharing existing or planned infrastructure (e.g., access roads, utility corridors, water infrastructure) with other resource development stakeholders. Identify any potential obstacles to sharing infrastructure.

## **2.4 Transportation Infrastructure**

- [A] Prepare a Traffic Impact Assessment as per Alberta Transportation's *Traffic Impact Assessment Guideline* (<http://www.transportation.alberta.ca/613.htm>). If there are any previous Traffic Impact Assessment studies that have been carried out for the Project or adjacent Projects using the same access, review and validate the findings and recommendations.

- a) Describe background traffic and consider the cumulative effects of traffic impacts due to other existing and planned developments using the same highways and accesses.
  - b) Discuss anticipated changes to highway traffic (e.g., type, volume) due to the Project.
  - c) Assess potential traffic impacts for all stages of the Project (e.g., construction, operation, maintenance, expansion, shutdown).
  - d) Determine any necessary improvements and methods to mitigate traffic impacts.
- [B] 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 points, and
- a) discuss the alternatives and the rationale for selection for the preferred alternative;
  - b) discuss compatibility of the preferred alternative to Alberta Transportation's immediate and future plans;
  - c) describe the impacts to local communities of the changes in transportation and infrastructure; and
  - d) provide a proposed schedule for the work.
- [C] Describe any infrastructure or activity that could have a potential impact on existing roads (e.g., pipelines or utilities crossing provincial highways, any facilities in close proximity of the highways, any smoke, dust, noise, light or precipitation generated by the Project that could impact the highway and road users).
- [D] Provide a summary of any discussions with Alberta Transportation in regards to the Project and its traffic impacts.

## **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 (type, 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 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) describe the Project's greenhouse gas emissions relative to the provincial greenhouse gas emission limit for oil sands developments;
  - f) the greenhouse gas management plan for the Project;
  - g) amount and nature of Criteria Air Contaminants, volatile organic compounds, polycyclic aromatic compounds, and reduced Sulphur compounds emissions;
  - h) the amount and nature of acidifying emissions, probable deposition patterns and rates;
  - i) the applicable emission standards and limits for the emission sources;
  - j) control technologies used to reduce emissions;

- k) emergency flaring scenarios (e.g., frequency and duration) and proposed measures to ensure flaring events are minimized;
- l) upset condition scenarios (e.g., frequency and duration) and proposed measures to ensure upset conditions are minimized;
- m) gas collection and conservation, and the applicability of vapour recovery technology;
- n) applicability of sulphur recovery, acid gas re-injection or flue gas desulphurization to reduce sulphur emissions; and
- o) 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) design factors considered, 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) contingency plans in the event of restrictions on the Project's 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, 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; and
  - b) permanent or temporary alterations or realignments of watercourses, wetlands and other waterbodies.
- [B] Describe and map all roadway, pipeline, powerline and any other utility crossings of watercourses, wetlands or other waterbodies.

- [C] Describe the placement of infrastructure (including processing facilities, well pads, roads, and borrow pits) in relation to water bodies and watercourses.

### **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 project-related waste disposal both on and off-site.
- [B] Characterize and quantify the anticipated dangerous goods, and hazardous, non-hazardous, and recyclable wastes generated by the Project, and describe:
- a) the composition and volume of specific waste streams and discuss how each stream will be managed;
  - b) how the disposal sites and sumps will be constructed; and
  - c) plans for pollution prevention, waste minimization, recycling, and management to reduce waste quantities for all stages of the Project.

### **2.8 Conservation and Reclamation**

- [A] Provide a conceptual conservation and reclamation plan for the Project. Describe and map as applicable:
- a) current and post-development land use and how equivalent land capability will be achieved;
  - 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 Project Area;
  - e) reclamation material salvage, storage areas and handling procedures; and
  - f) existing and conceptual final reclaimed site drainage plans.
- [B] Provide the expected timelines for establishment and recovery of vegetative communities and wildlife habitat and the expected differences in the resulting communities.
- [C] Describe how Suncor will consider 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) potential receptors, current regional air quality issues and trends (e.g. odours, exceedances of Ambient Air Quality Objectives; and
- c) appropriate ambient air quality parameters.

##### **3.1.2 Impact Assessment**

[A] Identify and assess components of the Project that will affect air quality, and:

- a) describe the potential for reduced air quality (including odours and visibility) resulting from the Project and discuss implications of the expected air quality for environmental protection and public health;
- b) discuss the design, construction and operational factors to be incorporated into the Project to comply with the AER's Directive 60 *Odour Management Protocol*;
- c) estimate ground-level concentrations with air dispersion modelling of appropriate air quality parameters;
- d) discuss expected changes to eutrophication, particulate deposition, nitrogen deposition or acidic deposition patterns;
- e) provide the expected gas-to-oil ratio, the expected concentrations of Sulphur in the produced gas and the requested Sulphur dioxide emission limit. Show calculations for the Sulphur dioxide limit including the basis for the expected parameters, factors and assumptions used;
- f) identify areas that are predicted to exceed Potential Acid Input critical loading criteria;
- g) discuss interactive effects that may occur resulting from co-exposure of a receptor to all emissions; and
- h) describe air quality impacts resulting from the Project, and their implications for other environmental resources.

[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. Discuss the potential impacts over the life of the Project and adaptive management options that could address related climate change impacts.

[C] Summarize the results of the noise assessment, 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 AER'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 (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 and assess 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 that may be impacted by the project.

#### **3.3.2 Impact Assessment**

- [A] Describe and assess the extent of hydrological changes that will result from disturbances to groundwater and surface water movement, and:
  - a) include an assessment of the potential impact on surface water flows from potential ground heave/subsidence, including potential changes in stream slope;
  - b) 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 water 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 and their seasonal variations. Include a description of temporal (seasonal and interannual) and spatial variability. Consider appropriate water quality parameters.

#### **3.4.2 Impact Assessment**

- [A] Describe and assess the potential impacts of the Project on surface water quality including but not limited to:
  - a) an assessment of potential impacts from thermal plumes and changes in thermally mobilized constituents;
  - b) potential impacts from sedimentation arising from Project related activities;
  - c) potential impacts from acidifying components of aerial deposition arising from Project related activities;
  - d) an assessment of potential impacts to water quality due to alteration of water levels within the Project area.

### **3.5 Aquatic Ecology**

#### **3.5.1 Baseline Information**

- [A] Describe and map the fish, fish habitat (e.g., aquatic and benthic invertebrates) of the lentic and lotic ecosystems, including intermittent and ephemeral water bodies. Describe

the species composition, distribution, relative abundance, movements and general life history parameters, including their use and potential use of habitats. Provide the methods used and rationale for the baseline data collection.

- [B] Describe any species that are:
  - a) listed as “at Risk, May be at Risk and Sensitive” in the *General Status of Alberta Wild Species* (Alberta Environment and Sustainable Resource Development);
  - b) “species at risk” identified by the *Alberta Wildlife Act* as ‘Endangered’, ‘Threatened’, or ‘Species of Special Concern’;
  - c) listed in Schedule 1 of the federal *Species at Risk Act*;
  - d) listed as “at risk” by COSEWIC; and
  - e) traditionally used species.
- [C] Describe and map fish habitat including critical or sensitive areas as well as habitat disturbances that are related to proposed, existing and approved projects overlain on surface hydrology.
- [D] Describe the current and potential use of the fish resources by Indigenous or recreational fisheries.

### **3.5.2 Impact Assessment**

- [A] Describe and assess the potential impacts of the Project to fish, fish habitat, aquatic and benthic invertebrates and key indicators, including but not limited to:
  - a) habitat loss and alteration;
  - b) potential water quality and quantity changes;
  - c) potential impacts on riparian areas that could affect aquatic resources and productivity;
  - d) changes to benthic invertebrate communities;
  - e) increased habitat fragmentation;
  - f) acidification;
  - g) groundwater-surface water interactions;
  - h) potential for thermal plumes to affect aquatic habitat; and
  - i) potential for ground heave/subsidence to affect aquatic habitat;
- [B] Discuss the rationale for the selection of the key indicators
- [C] Identify proposed plans to offset any loss in the productivity as a result of the Project. Indicate how environmental protection plans address applicable provincial and federal policies on fish habitat.

## **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. Describe the occurrence, relative abundance and distribution of all plant species providing methods used and rationale for the baseline data collection.
- [B] Describe any species that are:
  - a) listed as “at Risk, May be at Risk and Sensitive” in the *General Status of Alberta Wild Species* (Alberta Environment and Sustainable Resource Development);

- b) “species at risk” identified by the *Alberta Wildlife Act* as ‘Endangered’, ‘Threatened’, or ‘Species of Special Concern’;
- c) listed in Schedule 1 of the federal *Species at Risk Act*;
- d) listed as “at risk” by COSEWIC; and
- e) traditionally used species.

[C] 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 upland and wetland vegetation communities, and key indicators, including, but not limited to:
- a) both temporary (include timeframe) and permanent impacts;
  - b) the potential for introduction and colonization of weeds and non-native invasive species;
  - c) potential increased fragmentation and loss of upland, riparian and wetland habitats; and
  - d) implications of vegetation changes for other environmental resources (e.g., terrestrial and aquatic habitat diversity and quantity, water quality and quantity, erosion potential).
- [B] Provide the rationale for the selection of the key indicators.
- [C] Describe how the Alberta Wetland Policy was considered in the assessment of impacts.

## **3.7 Wildlife**

### **3.7.1 Baseline Information**

- [A] Describe and map the wildlife resources (amphibians, reptiles, birds, and terrestrial and aquatic mammals). Describe species relative abundance, distribution and their use and potential use of habitat, providing methods used and rationale for the baseline data collection.
- [B] Describe any species that are”
- a) listed as “at Risk, May be at Risk and Sensitive” in the *General Status of Alberta Wild Species* (Alberta Environment and Parks);
  - b) “species at risk” identified by the *Alberta Wildlife Act* as ‘Endangered’, ‘Threatened’, or ‘Species of Special Concern’;
  - c) listed in Schedule 1 of the federal *Species at Risk Act*;
  - d) listed as “at risk” by COSEWIC; and
  - e) traditionally used species.

[C] Describe and map existing wildlife habitat and habitat disturbance including exploration activities. Identify 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, and key indicators, including, but not limited to:
- a) how the Project may affect wildlife relative abundance, , 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 human-wildlife incidents and increased hunting pressures
- c) the spatial and temporal changes to habitat availability and function;
- d) how increased habitat fragmentation may affect wildlife. Consider edge effects, the availability of core habitat and the influence of linear features and infrastructure on wildlife movements and predator-prey relationships;
- 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 Suncor's proposed and planned exploration, seismic and core hole activities, including monitoring/4D seismic.

[B] Discuss the rationale for the selection of the key indicators.

### **3.8 Biodiversity**

#### **3.8.1 Baseline Information**

[A] Describe and map the existing biodiversity.

[B] Identify the biodiversity metrics, biotic and abiotic indicators that are used to characterize the baseline biodiversity. Discuss the rationale for their selection.

#### **3.8.2 Impact Assessment**

- [A] Describe and assess the potential impacts of the Project to biodiversity including, but not limited to :
- 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 to exceed Potential Acid Input critical loading criteria.

#### **3.9.2 Impact Assessment**

- [A] Describe project activities and other related issues that could affect soil quality (e.g., compaction, contaminants) and:
- a) indicate the expected amount (ha) of surface disturbance from the plant, field (e.g., pads, pipelines, access roads), aggregate and borrow sites, camps, drilling waste disposal and other infrastructure-related construction and operational activities;
  - b) discuss the relevance of any changes for the local and regional landscapes, biodiversity, productivity, ecological integrity, aesthetics and future use;
  - c) identify the potential acidification impact on soils and discuss the significance of predicted impacts by acidifying emissions; and

d) 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.

### **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 dispositions and Crown Reservations (Holding Reservation, Protective Notation, Consultative Notation).

[B] If known, 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 such as Parks and Protected Areas, Heritage Rivers, Historic Sites, Environmentally Significant Areas, culturally significant sites and other designations (e.g., World Heritage Sites, Ramsar Sites, Internationally Important Bird Areas).

[D] Describe and map known land clearing activities, showing the timing of the activities.

[E] Describe the status of timber harvesting arrangements.

[F] Describe existing access control measures.

[G] Identify land use activities for which locations will be determined at a later date. Discuss the approach that will be used to locate future activities on the landscape.

#### **3.10.2 Impact Assessment**

[A] Identify the potential impacts of the Project on land uses, including:

- a) unique sites or special features;
- b) traplines and registered fur management areas;
- c) changes in public access arising from linear development, including secondary effects related to increased hunter, angler and other recreational access ;
- d) aggregate reserves that may be located on land under the Proponent's control and reserves in the region;
- e) development and reclamation on commercial forest harvesting and fire management in the Project Area;
- f) 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;

- g) how the Project impacts Annual Allowable Cuts and quotas within the Forest Management Agreement area;
  - h) the operation of any agricultural crown land and provincial grazing reserves;
  - i) anticipated changes (type and extent) to the topography, elevation and drainage patterns within the Project Area; and
  - j) access control for public, regional recreational activities, Indigenous land use and other land uses during and after development activities.
- [B] Describe how Integrated Land Management will be applied (e.g., sharing of infrastructure, access requirements).
- [C] Provide a wildfire 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 wildfire equipment;
  - c) measures for determining the clearing width of power line rights-of-way; and
  - d) required mitigation measures based on the *FireSmart Field Guide for the Upstream Oil and Gas Industry*.

## **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; and
  - b) existing site specific *Historical Resources Act* requirements.
- [C] Provide an overview of previous Historical Resources Impact Assessments 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.
- [D] Identify locations within the Project Area that are likely to contain previously unrecorded historic resources. 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 nature and magnitude 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 Indigenous peoples (if the Indigenous community or group is willing to have these locations disclosed);
- b) a map of cabin sites, spiritual sites, cultural sites, gravesites and other traditional use sites considered historic resources under the *Historical Resources Act* (if the Indigenous 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, and

[B] access to traditional lands in the Project Area during all stages of the Project. Describe how Traditional Ecological Knowledge and Traditional Land Use information was incorporated into the Project design, EIA development, the conservation and reclamation plan (including Indigenous views on land reclamation), 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 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 Indigenous communities or groups resulting from impacts of existing development and of the Project, specifically on their traditional lifestyle. Include an Indigenous 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 aspects of the Project that may have implications for public safety. Specifically:

- a) describe the 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 the spill response plans and assessment approach that would address spills, including pipeline spills, flow-to-surface events, and well head blow outs, including
- d) describe how local residents will be contacted during an emergency and the type of information that will be communicated to them;

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

## **7 SOCIO-ECONOMIC ASSESSMENT**

### **7.1 Baseline Information**

- [A] Describe the recent trends and 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 all stages of the Project, including a description of when peak activity periods will occur;
  - c) planned accommodations for the workforce for all stages of the Project. Discuss the rationale for their selection and the alternatives considered;
  - d) the Proponent's policies and programs regarding the use of local, regional and Alberta goods and services;
  - e) the project schedule and periods of peak employment and production;
  - f) the overall engineering and contracting plan for the Project; and
  - g) the impacts of the 2016 Fort McMurray wildfire.

### **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.
- [B] Describe the socio-economic effects of any new or existing camp(s) required for the Project and identify:
  - a) its location and the rationale for selecting this location;
  - b) the number of workers it is intended to house;
  - c) whether the camp will service the Project only or other clients;
  - d) the length of time the camp will be in service;
  - e) describe the services that will be provided in the camp (e.g., security, recreation and leisure, medical services), including a description of the impacts on Municipal or other external services; and
  - f) outline the emergency services and evacuation plan that will be in place.
- [C] 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.
- [D] 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 planned to avoid, minimize or eliminate the potential impacts for all stages of the Project.
- [B] Identify the mitigation objectives for each associated impact and describe those mitigation measures that will be implemented. Provide rationale for their selection, including the effectiveness of the proposed mitigation.

## **9 RESIDUAL IMPACTS**

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

## **10 MONITORING**

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