

**PROPOSED TERMS OF REFERENCE
ENVIRONMENTAL IMPACT ASSESSMENT (EIA) REPORT**

FOR THE

**DEVON CANADA CORPORATION (DEVON)
JACKFISH 2 SAGD PROJECT
150 km South of Fort McMurray & 15 Southeast of Conklin, Alberta**

ISSUED BY: Alberta Environment

DATE: October 6, 2005

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APPENDIX

1.0 INTRODUCTION

1.1 PURPOSE

The purpose of this document is to identify for Devon Canada Corporation (Devon) and for the public, the information required by government agencies for an Environmental Impact Assessment (EIA) report. Devon will prepare and submit an EIA report that examines the environmental effects of the construction, operation and reclamation of its proposed Jackfish 2 SAGD Project (the Project). Devon is proposing a steam assisted gravity drainage (SAGD) thermal recovery heavy oil project with a nominal capacity of up to 35,000 barrels per day of bitumen production. This Project will be located in Township 75 and 76, Range 7, W4M, approximately 150 km south of Fort McMurray and 15 km southeast of the community of Conklin.

1.2 SCOPE OF ENVIRONMENTAL IMPACT ASSESSMENT (EIA) REPORT

The EIA report shall be prepared in accordance with these Terms of Reference and the environmental information requirements prescribed under the *Alberta Environmental Protection and Enhancement Act* (EPEA) and Regulations, the *Oil Sands Conservation Act* (OSCA) and Regulations, and the *Canadian Environmental Assessment Act* (CEAA) and Regulations. The EIA report will:

- a) assist the public and government to understand the environmental consequences of the Project's development, operation and reclamation;
- b) assist Devon in its decision-making process;
- c) use a constraints mapping approach to delineate key environmental components, so that potential impacts are avoided or reduced early in the project planning and throughout the design/construction phase;
- d) present impact predictions in terms of magnitude, frequency, duration, seasonal timing, reversibility and geographic extent;
- e) discuss measures to prevent or mitigate impacts and monitor environmental protection measures;
- f) identify residual impacts and their significance including cumulative and regional development considerations;
- g) discuss proposed mitigation measures, protection plans, monitoring or research programs and other follow-up actions related to proposed activities, environmental performance objectives and anticipated regulatory requirements;
- h) include a glossary of terms to assist the reader in understanding the material presented;
- i) include tables that cross-reference the report (subsections) to the EIA Terms of Reference and to any current applications submitted pursuant to the EPEA and Water Act (WA); and
- j) form part of Devon's Application to the Alberta Energy and Utilities Board (EUB). A summary of the EIA report should also be included as part of the EUB Application.

1.3 PUBLIC CONSULTATION

The preparation of the EIA report will include a public consultation program documenting the results of these consultations (see Section 8.0) and providing environmental information to address the issues raised. The public consultation program is to communicate with those members of the public who may be affected, directly or indirectly, by the Project and to provide them with an opportunity to participate in the Environmental Assessment process.

1.4 PROPONENT'S SUBMISSION

Devon 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.

2.0 PROJECT OVERVIEW

2.1 THE PROPONENT

Provide:

- a) the name of the proponent;
- b) the name of the legal entity that will develop, manage and operate the Project;
- c) details on the proponent;
- d) a brief history of Devon's operations including existing activities; and
- e) an overview of the proposed Project.

2.2 THE PROJECT AREA AND EIA STUDY AREA(S)

The Project Area includes all lands subject to direct disturbance from the Project and associated infrastructure, including access and utility corridors. For the Project Area, provide:

- a) the legal land description;
- b) the boundaries of the proposed development area;
- c) a map that identifies the locations of all proposed development activities; and
- d) a map showing the area proposed to be disturbed in relation to existing topographic features, township grids, wetlands, watercourses and waterbodies.

Study Areas for the EIA report include the Project Area and other areas based on individual environmental components where an effect from the proposed development can reasonably be expected. For the Study Areas, provide:

- a) the rationale used to define Local and Regional Study Areas (see also Section 4.2), considering the location and range of probable project and cumulative effects including those related to regional or cumulative effects consistent with regional environmental monitoring and management activities where possible; and
- b) illustrate boundaries and identify Local and Regional Study Areas chosen to assess impacts on maps of appropriate scale.

2.3 PROJECT COMPONENTS AND DEVELOPMENT SCHEDULE

Provide a development plan and overview of the Project components proposed to be approved, including:

- a) the phases of development;
- b) bitumen/heavy oil recovery and field maintenance operations;
- c) processing facilities;
- d) buildings;
- e) transportation infrastructure; and
- f) utilities.

Provide an outline and/or drawings of the Project components and activities including:

- a) temporary structures;
- b) processing/treatment facilities;
- c) buildings and infrastructure (roads, pipelines and utilities);
- d) transportation and access routes;
- e) storage areas and bitumen extraction operations;
- f) containment structures such as berms and retention ponds;
- g) locations of borrow pits and salvaged soil stockpiles;
- h) aggregate resources and other road construction material required and on-site availability;
- i) types and amounts of waste materials, waste storage area and disposal sites;
- j) activities associated with development of the area, operations, reclamation and development closure; and
- k) proposed method of product transportation to markets.

Provide a development schedule outlining the proposed phasing and sequencing of components, including:

- a) pre-construction;
- b) construction;
- c) operation;
- d) decommissioning;
- e) reclamation and closure;
- f) a detailed schedule for any reclamation and related activities envisaged during the first decade of operations; and
- g) timing of key construction, operational and reclamation activities and the expected duration of each for the life of the Project.

2.4 PROJECT NEED AND ALTERNATIVES CONSIDERED

Discuss the need for the Project and alternatives considered including the following:

- a) identify and compare any alternative technologies, operational practices, mitigation, and management options for the Project and indicate their potential environmental effects and impacts;
- b) discuss reasons for not selecting any identified alternatives;
- c) discuss contingency plans if major project components for any process or during any phase prove to be unfeasible;
- d) discuss the implications of a delay in proceeding with the Project, or any phase of the Project; and
- e) identify potential cooperative development opportunities for the Project.

2.5 REGULATORY APPROVAL

Provide the following:

- a) identify the environmental and other specific regulatory approvals and legislation that are applicable to the Project at the municipal, provincial and federal government levels;
- b) identify government policies, resource management, planning or study initiatives pertinent to the Project and discuss their implications; and
- c) identify and delineate major components of the whole Project and identify those being applied for and constructed within the duration of approvals under the:
 - i) *Environmental Protection and Enhancement Act (EPEA)*,
 - ii) *Water Act (WA)*,
 - iii) *Public Lands Act (PLA)*,
 - iv) *Canada Fisheries Act*, and
 - v) *Navigable Waters Protection Act*.

2.6 EIA SUMMARY

Provide a summary of the EIA report, including:

- a) the baseline conditions in the Study Area(s) (baseline includes existing and approved facilities and activities in the Study Area);
- b) activities and components of the Project that are anticipated to influence environmental conditions;
- c) anticipated environmental impacts of the technologies and operational practices considered in the design of the Project;
- d) anticipated environmental conditions with the Project and anticipated effects of existing, approved and announced Projects in the region, with emphasis on regional and cumulative considerations;
- e) proposed mitigation measures and management plans;
- f) any residual effects and their implications for the future management of regional cumulative effects;

- g) a list and discussion of key environmental issues, and issues which are important for the achievement of sustainable environmental and resource management;
- h) a list of issues that were raised during public consultation and the response to these issues;
- i) a list of issues related to Aboriginal people;
- j) differentiate between emerging issues (with ongoing uncertainties), issues with quantifiable and significant environmental effects, and issues which can be resolved through available technology and with existing management approaches;
- k) reclamation and closure plans;
- l) historical resources and traditional use in the Study Areas;
- m) public health and safety issues related to the Project;
- n) the socio-economic impacts of the Project; and
- o) the public consultation undertaken.

3.0 PROJECT DESCRIPTION AND MANAGEMENT PLAN INFORMATION REQUIREMENTS

Describe activities and components of the Project and relevant management plans. Provide sufficient scope and detail in the project description information to allow quantitative assessment of the environmental consequences. If the scope of information varies among components or phases of the Project, provide rationale demonstrating that the information is sufficient for assessment purposes.

Technical information required in this section may also be required under the EUB technical information requirements or information requirements for an EPEA Approval Application or a WA Application. Information required in this section may be provided in other parts of Devon's submission(s) provided that the location of the information is referenced in the EIA report. Devon should ensure consistency in the information provided, whenever it is discussed in more than one section of the submission.

3.1 SITE DEVELOPMENT

Describe the thermal recovery and other related processes, process facilities and waste management components of the Project, and:

- a) provide a map showing any existing infrastructure (e.g., roads) and the location of the proposed central and field facilities;
- b) locate the buildings, road access, pipeline routes, water pipelines, utility corridors and waste disposal sites associated with the Project;
- c) show all existing leases and clearings, including exploration clearings, and illustrate how Devon intends to use these areas for project development;
- d) describe the process and criteria used to select all sites for facilities and infrastructure;
- e) list the facilities for which locations will be determined later;
- f) describe the planned accommodation for the workforce during construction and operations;

- g) provide a description and schedule of land clearing required for:
 - i) central plant facilities,
 - ii) field facilities,
 - iii) well pads,
 - iv) access roads,
 - v) pipelines, and
 - vi) utilities and other site preparation activities;
- h) indicate the amount of surface disturbance from plant, field and infrastructure-related activities including:
 - i) how surface disturbance (extent and duration) will be minimized,
 - ii) whether the timber is merchantable and if so, indicate anticipated volumes from clearing activities; and
- i) discuss opportunities to integrate the proposed Project with other resource development activities (minerals and forestry);

3.2 INFRASTRUCTURE AND TRANSPORTATION

Describe and locate on maps of appropriate scales the infrastructure and transportation (access) requirements for the Project and how it relates to local communities, and:

- a) discuss the amount and source of energy required for the Project;
- b) discuss the options considered for supplying the thermal energy and electric power required for the Project and their environmental implications;
- c) describe road access to and within the Project Area and identify needs to upgrade existing roads or construct new roads;
- d) describe any crossings of watercourses or waterbodies required (with appropriate maps and diagrams):
 - i) include timing,
 - ii) construction standards or methods, and
 - iii) environmental protection plans;
- e) discuss the route or site selection criteria for any linear or other infrastructure development or modification and provide the rationale for selecting the proposed alignment and design;
- f) discuss the need for access management;
- g) provide the results of consultation with Alberta Transportation and discussions with other industry operators;
- h) describe access corridors needed and/or planned by other resource stakeholders including Forest Management Areas or Quota holders. Describe how their needs are accommodated to reduce overall environmental impact from resource development. Describe the steps taken to integrate their needs into the location and design of the access infrastructure;
- i) describe the anticipated changes to traffic (e.g., type, volume) on local highways during the construction and operation of the Project. Discuss any Project and cumulative effects expected on the primary and secondary highway systems, particularly Highway 881. Consider other existing and planned operations in the region;

- j) identify the type and location of road construction and restoration materials, the volume of material needed and the availability of materials in the area. Discuss how the Project will affect Alberta Transportation's aggregate reserves that may be located on Devon leases and reserves in the region. Provide a plan of how these potentially-affected reserves will be salvaged and stockpiled with input provided by Alberta Transportation and Sustainable Resource Development;
- k) discuss how the Project design will minimize the amount of disturbance. Outline design features to prevent spills, contingencies for spill response and environmental risks associated with spills; and
- l) discuss secondary effects that may result from linear development such as increased hunter, angler and other recreational access and facilitated predator movement.

3.3 AIR EMISSIONS MANAGEMENT

Develop an emissions profile (type, rate and source) for each component of the Project including point sources, fugitive emissions, construction and vehicle emissions. Consider both normal operating conditions and upset conditions, and:

- a) discuss the emission control technologies proposed for the Project in the context of available technologies including the following:
 - i) the control technologies used to minimize air emissions such as sulphur dioxide (SO₂), hydrogen sulphide (H₂S), oxides of nitrogen (NO_x), volatile organic compounds (VOC) and particulate matter,
 - ii) any potential odorous or visual emissions from the proposed facilities,
 - iii) any National Pollutant Release Inventory (NPRI), Priority Substances List (PSL1 and PSL2) and/or Accelerated Reduction/Elimination of Toxics (ARET) substances relevant to the Project,
 - iv) use of low NO_x technology for turbines and boilers. The applicability of Canadian Council of Ministers of the Environment (CCME) National Emissions Guidelines for Stationary Combustion Turbines and CCME National Emissions Guideline for Commercial/Industrial Boilers and Heaters,
 - v) applicability of sulphur recovery, acid gas re-injection, flue gas desulphurization or other technologies to reduce sulphur emissions and applicability of EUB sulphur recovery guidelines (Interim Directive ID 2001-03),
 - vi) gas collection, conservation and applicability of technology for vapour recovery for the Project at well pads and central facilities, including the recovery of diluent,
 - vii) control technologies for minimization of venting and flaring, and
 - viii) fugitive emissions control program to detect, measure and control emissions and odours from equipment leaks and the applicability of the CCME *Code of Practice for Measurement and Control of Fugitive VOC Emissions from Equipment Leaks* and the CCME *Environmental Guidelines for Controlling Emissions of Volatile Organic Compounds from Above Ground Storage Tanks*;
- b) emergency flaring scenarios and proposed measures to ensure flaring events are minimized;
- c) the systems used to monitor and quantify air emissions;
- d) the amount and nature of any acidifying emissions, as well as deposition areas and deposition rates to soils, vegetation, and waterbodies;

- e) monitoring programs that may be implemented to assess air quality and the effectiveness of mitigation during project development and operation, and discuss how these monitoring programs are compatible with those in use by regional multi-stakeholder air initiatives;
- f) estimate the incremental loading of greenhouse gases to the atmosphere as a result of the Project. Describe emission estimates relative to total provincial and national emissions. Discuss a greenhouse gas management plan for the Project, including:
 - i) internal energy efficiency designs for the Project,
 - ii) any plans for the use of offsets (nationally or internationally),
 - iii) the expected results of implementing plans,
 - iv) the intensity of GHG emissions per unit of product produced and discuss how it compares with similar projects and technology performance,
 - v) 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*;
- g) identify other emission reduction processes or programs.

3.4 WATER SUPPLY, WATER MANAGEMENT AND WASTEWATER MANAGEMENT

3.4.1 *Water Supply*

Describe the water supply requirements for the Project, including, but not limited to, the following:

- a) the water balance(s) for each project phase and overall;
- b) the process, potable and non-potable water requirements and sources for construction, start-up, normal and emergency operating situations, decommissioning and reclamation. Include a description of the criteria for selecting the preferred source;
- c) the variability in the amount of water required on an annual and seasonal basis as the Project is implemented. Show the location of sources/intakes and associated infrastructure (pipelines);
- d) describe contingency plans for water supply, including the potential effects of extended periods of drought on the proposed water supply; and
- e) indicate options for using non-potable groundwater and provide the criteria used to assess the feasibility of its use.

3.4.2 *Water Management*

Provide a Water Management Plan for construction, operation and reclamation phases, including, but not limited to, the following:

- a) factors considered in the design of water management systems, such as:
 - i) site drainage and dewatering,
 - ii) road and well pad run-off,
 - iii) containment,
 - iv) erosion control,
 - v) slumping areas,
 - vi) groundwater protection,

- vii) groundwater seepage,
- viii) potable water,
- ix) produced water, and
- x) flood protection;
- b) measures for ensuring efficient use of water including alternatives to reduce freshwater consumption such as water use minimization, recycling, and conservation;
- c) permanent or temporary alterations or diversions to watercourses, wetlands and other waterbodies; and
- d) potential downstream impact if water is removed from local surface waterbodies.

3.4.3 Wastewater Management

Provide a Wastewater Management Plan to address site runoff, groundwater protection, deep well disposal and wastewater discharge, including, but not limited to, the following:

- a) source, quantity and composition of each wastewater stream from the existing and proposed facilities;
- b) NPRI, PSL1, PSL2, or ARET substances relevant to the Project;
- c) design of facilities that will handle, treat, store and release wastewater streams;
- d) type and quantity of chemicals used in water and wastewater treatment;
- e) options considered for treatment, wastewater management strategies and reasons (including water quality and environmental considerations) for selecting the preferred options (consider the Industrial Release Limits Policy when determining whether either technology or water quality standards will define acceptable release limits);
- f) the discharge of aqueous contaminants (quantity, quality and timing) beyond plant site boundaries and the potential environmental effects of such releases;
- g) aquifers for the disposal of wastewaters, including:
 - i) formation characterization,
 - ii) hydrodynamic flow regime,
 - iii) water quality,
 - iv) chemical compatibility,
 - v) containment potential within the disposal zones, and
 - vi) injection capacity;
- h) the chemical composition of disposal waters;
- i) wastewater disposal alternatives;
- j) current and proposed monitoring programs;
- k) potable water and sewage treatment systems that will be installed as components of the Project for both the construction and operation stages; and
- l) the principles that have been incorporated into the project design for pollution prevention, waste minimization and recycling.

3.5 HYDROCARBON, CHEMICAL AND WASTE MANAGEMENT

Estimate the quantity and composition of each waste stream. Classify each waste stream according to applicable provincial regulations and guidelines. Demonstrate that the plans are consistent with current industry practices, and:

- a) describe the proposed storage and handling methods and disposal for each waste stream. Consider both central plant and field operations;
- b) provide a listing of chemical products to be used for the Project. Identify products containing substances that are:
 - i) *Canadian Environmental Protection Act (CEPA)* toxics,
 - ii) on the PSL 2,
 - iii) on the NPRI, and
 - iv) on Track 1 substances targeted under Environment Canada's Toxic Substances Management Policy for virtual elimination from the environment;
- c) describe, in general terms, how these products will be stored and managed. Discuss options for the substitution or replacement of these products and identify how future changes to this list of chemical products will be handled to ensure adequate protection to both the environment and to employee health and safety;
- d) identify the location, nature and amount of on-site hydrocarbon storage. Discuss containment and other environmental protection measures;
- e) identify the amount of drilling wastes produced by the Project. Determine the amount of surface disturbance caused by drilling waste disposal. Describe any mitigative options to reduce the disturbance;
- f) discuss the strategy for onsite versus offsite waste disposal, including, but not limited to, the following:
 - i) identify the locations of onsite waste disposal, including landfills, if applicable, and the general suitability of the site from a groundwater perspective (provide geotechnical information to support siting options),
 - ii) industrial landfills, and
 - iii) on and offsite waste treatment and storage areas;
- g) describe plans for waste minimization, recycling and management over the life of the Project; and
- h) discuss methods and technologies to reduce waste quantities, and associated potential risks, to the lowest practical levels.

3.6 RECLAMATION/CLOSURE (SEE APPENDIX)

Devon is expected to provide an overview of the detailed, comprehensive reclamation and closure plans for all phases of the Project with consideration to the following:

- a) reclamation requirements specified by relevant regulatory organizations and stakeholder preferences;
- b) pre-development information with respect to land capability, vegetation, commercial forest land base by commercialism class, forest productivity, recreation, wildlife, aquatic resources, aesthetics and land use resources;
- c) project development phasing;

- d) integration of operations, reclamation/closure planning and reclamation activities;
- e) reclamation sequencing for each phase of development;
- f) a revegetation plan for the disturbed terrestrial and aquatic areas, identifying the species types that will be used for seeding or planting, and the vegetation management practices. Include the rationale for selection based on the need for the development of self-sustaining biologically diverse ecosystems consistent with the Central Mixedwood Subregion of the Boreal Forest Natural Region with reference to the use of native vegetation species;
- g) details about soil and reclamation material salvage, soil storage areas and soil handling procedures;
- h) details on areas of soil replacement indicating depth, volume and type of reclamation material;
- i) identify any soil-related constraints or limitations that may affect reclamation;
- j) re-establishment of self-sustaining topography, drainage and surface watercourses and vegetation communities representative of the surrounding area;
- k) pre-development and final closure site drainage plans;
- l) management of waste, wastewater, and other waters;
- m) restoration of pre-development traditional use with consideration for traditional vegetation and wildlife species in the closure landscape;
- n) post-development capability for all uses;
- o) post-development reforestation and forest productivity, with information required for inclusion into the FMA (Forest Management Agreement) Detailed Forest Management Plan;
- p) wetlands or other alternatives to reclaim the land; and
- q) a detailed monitoring plan (including soils, vegetation, wildlife and aquatic resources) with schedules, methodologies and limitations to measure and evaluate reclamation performance and success.

Discuss the closure landscape design with reference to the following:

- a) appropriate productivity equivalent to pre-development levels having regard for regulatory requirements and stakeholder end land use preferences;
- b) discussion on how Devon will incorporate into the reclamation plan, the issues raised by regional environmental monitoring and management activities;
- c) promotion of biodiversity;
- d) integration and interconnectivity to the surrounding landscapes;
- e) integrating surface and near-surface drainage within the development area;
- f) incorporating into project planning and development;
- g) resemblance to the pre-disturbed landscape;
- h) aquatic components of the post-reclamation landscape including;
 - i) issues related to the design of a self-sustaining and productive aquatic ecosystem,
 - ii) a hydrological analysis of the post-reclamation landscape including pre-development and final closure site drainage plans,
 - iii) contrasts of the pre-disturbed aquatic ecosystem to the post-reclamation situation, and
 - iv) a discussion of how the reclamation plan incorporates diversity, size and extent of wetlands into the final design;

- i) anticipated timeframes for completion of reclamation phases and release of lands back to the Crown, including an outline of the key milestone dates for reclamation and a discussion of how progress will be measured in the achievement of these targets. Discuss any constraints to reclamation such as timing of activities, availability of soil materials and influence of natural processes and cycles; and
- j) development of a conceptual ecological land classification (ELC) map for the post-reclamation landscape considering all potential land uses and how the landscape and soils have been designed to accommodate future land use.

3.7 ENVIRONMENTAL MANAGEMENT SYSTEMS AND CONTINGENCY PLANS

Summarize key elements of Devon's existing or proposed environment, health and safety management system and discuss how it will be integrated into the Project, addressing the following:

- a) outline plans for monitoring all inputs of the Project and associated facilities, including the key elements of the operating plans and performance standards to be developed prior to the commissioning of the plant, such as:
 - i) policies and corporate procedures,
 - ii) operator training,
 - iii) emergency reporting procedures for spill containment and management, and
 - iv) emergency response and safety procedures;
- b) describe plans to minimize the production or release into the environment of substances that may have an adverse effect, including:
 - i) modifying existing plans, or
 - ii) developing new conceptual contingency plans that consider environmental effects associated with operational upset conditions such as serious malfunctions or accidents that represent deviations from normal operating performance;
- c) review monitoring information, including:
 - i) monitoring done independently by Devon,
 - ii) monitoring performed in conjunction with other stakeholders,
 - iii) publicly-available monitoring information, and
 - iv) new monitoring initiatives that may be required as a result of the Project;
- d) address air emissions, water emissions, waste tracking, process inputs and outputs. Present conceptual contingency plans that consider the environmental effects of serious malfunctions or accidents;
- e) discuss how regional environmental management initiatives will be incorporated into management practices; and
- f) include an emergency response system to deal with emergency situations and minimize adverse environmental effects. Discuss the emergency response plan's capability to deal with unpredicted negative impacts. Comment on contingency plans that have been or will be developed to respond to unpredicted negative impacts that are realized during and after project development.

3.8 ADAPTIVE PLANNING

Describe adaptive management plans that reduces the impact of the Project at the design stage. Describe how the adaptive management plans will be used throughout the life of the Project to site facilities and infrastructure associated with future phases of the Project.

3.9 PARTICIPATION AND MONITORING IN COOPERATIVE EFFORTS

Document Devon's involvement in regional cooperative efforts to address environmental and socio-economic issues associated with oil sands development during the life of the Project, including:

- a) regional air monitoring networks and studies, health studies, biomonitoring and research, aquatics monitoring, wetlands management, end land use planning and socio-economic studies;
- b) potential cooperative ventures that Devon has initiated, could initiate or could develop with other oil sands operators and other resource users (minerals and forestry) to minimize the environmental impact of the Project or the environmental impact of regional oil sands development;
- c) how Devon will work to develop such cooperative opportunities and identify a timeframe for their implementation;
- d) the improvements in environmental performance achieved as a result of such ventures; and
- e) describe monitoring activities that will be undertaken to assist in managing environmental effects, confirm performance of mitigative measures and improve environmental protection strategies. Discuss how any result will contribute to Devon's participation in regional efforts.

4.0 ENVIRONMENTAL ASSESSMENT

4.1 ASSESSMENT SCENARIOS

Define assessment scenarios including:

- a) a Baseline Case, which includes existing environmental conditions, existing and approved projects or activities;
- b) an Application Case, which includes the Baseline Case plus the Project; and
- c) a Cumulative Effects Assessment (CEA), which includes past studies, existing and anticipated future environmental conditions, existing projects or activities, plus other or planned projects or activities.

Note: For the purposes of defining assessment scenarios, "approved" means approved by any federal, provincial or municipal regulatory authority. "Planned" is considered 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 EIA report, whichever is sooner.

4.2 ASSESSMENT REQUIREMENTS

Discuss the methods, criteria and assumptions used in Devon's Environmental Assessment process, and:

- a) provide information on the environmental resources and resource uses that could be affected by the construction, operation and reclamation of the Project. Provide a sufficient base for the prediction of positive and negative impacts and the extent to which negative impacts may be mitigated by planning, project design, construction techniques, operational practices and reclamation techniques. Discuss how the EIA report ensures that the same level of information is provided for all phases of the Project;
- b) quantify and assess impact significance where possible, taking into consideration spatial, temporal and cumulative aspects. Discuss the sources of information used in the assessment including a summary of previously conducted environmental baseline work related to Devon's operations. Information sources will include literature and previous baseline reports and environmental studies, operating experience from current oil sands operations, industry study groups, traditional knowledge, and government sources. Identify any limitations or deficiencies that the information may place on the analysis or conclusions in the EIA report. Discuss how these limitations or deficiencies will be addressed within the current EIA report;
- c) describe the stakeholder consultation process (including, but not limited to, the public, Aboriginal people, industry and regulatory representatives) used to select and rationalize the Key Indicator Resources (KIRs). Where required, undertake studies and investigations to obtain additional information for establishing a sound baseline in the Study Area(s). From a broad-based examination of all ecosystem components including previous environmental baseline work, describe and rationalize the selection of key components and indicators examined; and
- d) for each environmental parameter:
 - i) describe baseline conditions (includes existing and approved facilities and activities). Comment on whether the available data are sufficient to assess impacts and mitigation measures. Identify environmental disturbance from previous activities that have now become part of baseline conditions,
 - ii) describe the nature and significance of the environmental effects and impacts associated with the development activities. Discuss the impacts of both the baseline case, as well as, the application case (includes baseline conditions and project),
 - iii) present plans to minimize, mitigate or eliminate negative effects and impacts and discuss the key elements of such plans,
 - iv) identify residual impacts and comment on their significance,
 - v) present a plan to identify possible effects and impacts, monitor environmental impacts and manage environmental changes to demonstrate the Project is operating in an environmentally-sound manner,
 - vi) present a plan that addresses the adverse impacts associated with the Project that may require joint resolution by government, industry and the community,
 - vii) describe how this plan will be implemented and how it will incorporate the participation of government, industry and the community, and
 - viii) summarize the mitigation measures, which Devon is committed to implement in the Project.

4.3 MODELLING

Document any assumptions used to obtain modelling predictions submitted as part of the EIA report. Clearly identify the limitations of the model(s) including sources of error and relative accuracy.

4.4 EIA STUDY AREAS

The spatial Study Areas shall include all areas where measurable effects of the Project alone and in combination with other activities are anticipated. At and beyond the Study Area boundary, the anticipated environmental conditions should be similar with and without the Project. The Study Area should address the areas where effects may reasonably be expected regardless of any political boundaries, and should not be limited by such boundaries.

Temporal boundaries should facilitate a cumulative effects assessment extending from natural/undisturbed conditions, through the exploration, site development, operational and reclamation/decommissioning phases of the Project. If historical information or future information is inadequate to apply the full scope of temporal boundaries, the EIA report shall identify the boundaries used and provide a rationale for the boundaries selected.

4.5 BIODIVERSITY AND FRAGMENTATION

4.5.1 Biodiversity

Using the definition for biodiversity provided in the Canadian Biodiversity Strategy (1995), determine the suite of target elements that will be used to assess biodiversity in terrestrial and aquatic ecosystems, that will be used to characterize the existing ecosystems and that will be used to represent broad taxonomic assemblages, and:

- a) describe the process and rationale used to select biotic target elements for biodiversity;
- b) within selected taxonomic groups, determine the presence and abundance of species in each ecosite phase or ecological type. Provide species lists and summaries of observed and estimated species richness and evenness for each ecosite phase;
- c) ensure that baseline vegetation information collected in each terrestrial and aquatic community is accompanied by sufficient plots in each ecosite phase to provide statistically sound data using a suitable proportional sampling method;
- d) provide a measure of biodiversity on baseline sites that are representative of the proposed reclamation ecosites;
- e) rank each ecological unit for biodiversity potential by combining measures of species richness, overlap in species lists, significance of individual species or associations, uniqueness and other appropriate measures. Provide the rationale and techniques for the ranking system chosen for this section;
- f) discuss the contribution of the Project to any anticipated changes in regional biodiversity, including measures to minimize such changes;

- g) identify and describe Devon's participation in regional programs that will allow for the collection and submission of baseline information in a timely manner; and
- h) determine the variety, distribution, and abundance of non-biotic systems including, but not limited to, landforms and waterbodies, at the local, regional and landscape levels of analysis.

4.5.2 Fragmentation

Determine the current and proposed level of habitat fragmentation for the Study Area. Describe the techniques used in the fragmentation analysis. Identify and evaluate the extent of potential effects from fragmentation (e.g., potential introduction of non-native plant species on native species composition and any changes to plant communities).

4.6 CUMULATIVE ENVIRONMENTAL EFFECTS

Assessment of cumulative effects will be an integral component of the EIA report. Devon will conduct a cumulative environmental effects assessment of the Project based on the EUB/AENV/NRCB Information Letter "Cumulative Effects Assessment in Environmental Impact Assessment Reports under the Alberta Environmental Protection and Enhancement Act," June 2000. This will include a comprehensive summary of all proposed monitoring, research and other strategies or plans to minimize, mitigate and manage any potential adverse effects. The identification and assessment of the likely cumulative environmental effects of the Project will:

- a) define the spatial and temporal Study Area boundaries with due consideration for RSDS recommendations, and provide the rationale for assumptions used to define those boundaries for each environmental component examined;
- b) provide a discussion of historical developments and activities that have created the current conditions, clearly describing the state of the environment that will be affected by the proposed development, the potential interactions of stresses created by the Project and other stresses and, if possible, predict the cumulative consequences of these combined effects;
- c) assess the incremental consequences that are likely to result from the Project in combination with other existing, approved and proposed (projects that have been advanced to the public disclosure stage) or reasonably foreseeable activities in the region;
- d) demonstrate that any information or data used from previous oil sands and other development projects is appropriate for use in this EIA report;
- e) consider and describe any deficiencies or limitations in the existing database for all relevant components of the environment (and provide Supplemental Information where required);
- f) explain the approach and methods used to identify and assess cumulative impacts, including cooperative opportunities and initiatives undertaken to further the collective understanding of cumulative impacts, and provide a record of all assumptions, confidence in data and analysis to support conclusions; and
- g) discuss any deviations from the EUB/AENV/NRCB Information Letter "Cumulative Effects Assessment in Environmental Impact Assessment Reports under the Alberta Environmental Protection and Enhancement Act"(June 2000).

4.7 CLIMATE, AIR QUALITY AND NOISE

Discuss climatic and air quality conditions considering existing and approved emission sources (baseline case) alone and in combination with the Project's proposed emissions (application case). Review current and approved emission sources and discuss changes as a result of anticipated future development scenarios within the EIA Study Area(s) (cumulative effects assessment case). Consider emission point sources as well as fugitive emissions. Identify components of the Project that will affect air quality from local and regional perspectives, and:

- a) discuss appropriate air quality parameters such as: sulphur dioxide (SO₂), hydrogen sulphide (H₂S), total hydrocarbons (THC), oxides of nitrogen (NO_x), volatile organic compounds (VOCs), individual hydrocarbons of concern in the THC and VOC mixtures, representative heavy metals, visibility and particulates (road dust, PM₁₀ and PM_{2.5});
- b) discuss the formation of secondary pollutants such as ground-level ozone, secondary particulate matter and acid deposition;
- c) estimate ground-level concentrations of appropriate air quality parameters. Discuss any expected changes to particulate deposition or acidic deposition patterns. Justify the selection of the models used and identify any model shortcomings or constraints on findings. Complete modelling in accordance with Alberta Environment's "Air Quality Model Guidelines"(October 2000). Assess the need for monitoring deposition based upon evaluations of estimated Potential Acid Input (PAI). For acid deposition modelling, provide deposition data from maximum levels to areas within the 0.17 keq H⁺/ha/yr isopleth;
- d) identify the potential for reduced air quality (including odours) resulting from the Project and discuss any implications of the expected air quality for environmental protection and public health. Discuss consideration of interactive effects that may occur as a result of co-exposure of a receptor to various emissions and discuss limitations in the present understanding of this subject;
- e) describe Project-related and cumulative air quality impacts and their implications for other environmental resources, including habitat diversity and quantity, vegetation resources, water quality and soil conservation;
- f) describe how air quality impacts resulting from the Project will be mitigated. Identify ambient air quality monitoring that will be conducted during construction and operation of the Project. Identify components of the Project that have the potential for creating increased noise levels and discuss the implications and measures to mitigate. Assess the cumulative effects on the air quality of the Study Area, and include any emissions from current operations and disclosed Projects in the Study Area; and
- g) discuss noise according to the requirements and procedures outlined in EUB ID 99-8 and EUB Guide 38. Provide the following:
 - i) quantification of existing and baseline conditions,
 - ii) characterization of noise sources,
 - iii) environmental noise propagation modelling and impact assessment,
 - iv) any proposed mitigation measures;
- h) identify regional air monitoring underway in the area and describe Devon's participation in regional forums.

4.7.1 Climate Change

Discuss the following

- a) 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.

4.8 SURFACE WATER AND GROUNDWATER

4.8.1 Groundwater

Establish and discuss baseline groundwater conditions. Identify components of the Project that will affect groundwater from a local and regional perspective, including, but not limited to, the following:

- a) describe the existing local and regional groundwater conditions, including, but not limited to, the following:
 - i) major aquifers, aquitards and aquicludes between the ground surface and the Cambrian (inclusive),
 - ii) lithology, thickness, continuity, hydraulic properties within major aquifers, hydraulic connections between aquifers, piezometric and potentiometric surfaces, and structure,
 - iii) groundwater quality in formations that will be affected by the Project,
 - iv) local and regional groundwater flow regimes,
 - v) potential recharge and discharge zones, including seasonal fluctuations, and
 - vi) areas of potential groundwater/surface water interaction particularly with regard to the local wetlands and other surface waterbodies;
- b) independently assess the recharge potential for bedrock aquifers and surficial aquifers in the Local Study Area;
- c) using appropriate scales, provide maps (e.g., isopach maps) and stratigraphic sections that include, but are not limited to, the following:
 - i) geophysical data,
 - ii) piezometric and potentiometric surfaces based on hydrostratigraphic units,
 - iii) accurate data locations from sources such as monitoring wells and oilfield exploration wells, and
 - iv) all data considered in the interpretations;
- d) discuss groundwater withdrawal and its implications, including, but not limited to, the following:
 - i) the quantity of groundwater withdrawal under start-up and operating conditions,
 - ii) well locations and depths for diversion of fresh or saline (> 4000 mg/L TDS) groundwater,
 - iii) changes in vertical gradients and aquifer recharge rates,
 - iv) the extent of the area of influence (cone of depression) of the water supply well(s),

- v) identification of other groundwater users in the EIA Study Area,
 - vi) potential water use conflicts and proposed resolutions,
 - vii) potential or expected changes in groundwater quality in any aquifers,
 - viii) potential impact of decreased recharge to aquifers under prolonged drought conditions and the potential impacts of groundwater withdrawals due to project activities under such conditions, and
 - ix) the cumulative effects of industrial, municipal and domestic groundwater withdrawal;
- e) potential interactions with other environmental components, including consideration of impacts on:
- i) habitat diversity and quantity,
 - ii) surface water quality and quantity,
 - iii) vegetation resources,
 - iv) soil saturation,
 - v) water table levels, and
 - vi) reclamation;
- f) describe the effects of the Project (include steaming and production, surface facilities, and deep-well disposal of liquid wastes) on the existing groundwater quality and quantity, including, but not limited to, the following:
- i) geological data describing hydraulic and heat transfer properties,
 - ii) quality of the water in aquifers between the production zone/disposal zones and any aquifer with potable water,
 - iii) local and regional changes in aquifer pressure, temperature, hydraulic gradients, and groundwater flow patterns and velocities,
 - iv) the effects on existing domestic, commercial and industrial groundwater users;
 - v) location, status, depth and production aquifer, production capacity and available head for fresh water wells which may become affected by the Project,
 - vi) the potential for contaminant migration in groundwater and its impact on receiving surface waters and down-gradient domestic groundwater users,
 - vii) expected rates of operational heat losses from wells and steam chambers and the long-term implications on aquifers, and
 - viii) the cumulative effects on EIA Study Area groundwater regimes of project operations in combination with the operations of other projects in the area;
- g) discuss the potential for increased hydraulic connection or increased flow between potable groundwater, the bitumen production zone(s) and proposed disposal zones as a consequence of production or disposal operations, and the significance of any expected changes. Consider:
- i) baseline conditions,
 - ii) producing conditions during the life of the Project, and
 - iii) after cessation of operations;
- h) discuss the long-term environmental consequences of groundwater recharge through post-production abandoned steam chambers, and subsequent discharge of this groundwater to surface waterbodies;

- i) describe the proposed groundwater monitoring programs (for quantity and quality) including:
 - i) on- and off-lease monitoring well locations,
 - ii) well construction details,
 - iii) position of any pressure transducers and thermisters,
 - iv) sampling and measurement schedules,
 - v) quality assurance/quality control measures and reporting,
 - vi) surrogate parameters to be used as indicators of potential aquifer contamination due to oil production activities, such as total phenols, dissolved organic carbon, total extractable hydrocarbons, chlorides, sulfides, benzene, toluene, ethylbenzene, xylene, trace elements including arsenic, major ions, nutrients, glycols, total purgeable hydrocarbons and selected CCME regulated polynuclear aromatic hydrocarbons,
 - vii) include an inventory of all surface water and groundwater users in the area, and
 - viii) discuss how monitoring programs will allow early detection of (potential) contamination, changes in water quality and assist in remediation planning;
- j) discuss the potential of using a numerical model that quantitatively assesses subsurface hydraulic and hydrochemical changes to aid in monitoring and predicting long-term and cumulative effects due to groundwater withdrawal, wastewater disposal, bitumen recovery and dispersion of non-recovered heat;
- k) discuss monitoring requirements for validation of the model and verification of impacts;
- l) describe management plans, mitigation measures, monitoring and response strategies (in the event that changes show up in monitoring) that will be implemented to minimize any adverse impacts; and
- m) describe groundwater remediation options that may be considered for implementation in the event that adverse impacts on groundwater and the associated environment are detected.

4.8.2 *Surface Hydrology*

Discuss baseline surface hydrology conditions. Identify components of the Project that will affect these conditions from a local and regional perspective, including, but not limited to, the following:

- a) surface hydrology in the EIA Study Area(s) (provide appropriate map), including, but not limited to, the following:
 - i) existing flow regimes in channels and wetlands in the area,
 - ii) local and regional surface flow and lake level baseline data,
 - iii) low, average and peak flows for key creeks and rivers,
 - iv) seasonal fluctuations in key creeks and rivers,
 - v) the pattern and volume of seasonal flows for key creek and rivers,
 - vi) low, average, and peak levels for key lakes,
 - vii) seasonal fluctuations in key lakes, and
 - viii) the need for modelling to estimate streamflows in the absence of data;
- b) the extent of changes to the quantity of surface flow and water levels in local creeks, rivers and lakes during minimum, average and peak flows and levels that will result from disturbances associated with the Project;

- c) the potential impact of any alteration in flows on local and regional hydrology and identify all temporary and permanent alterations, diversions or disturbances, their extent, duration and any proposed mitigation measures;
- d) the effect of these changes on hydrology (e.g., timing, volume, peak and minimum flow rates), including the significance of effects for downstream watercourses;
- e) the connectivity between surface water and groundwater, and describe the potential for drawdown of surface waterbodies both in the Project Area and regionally due to groundwater withdrawals;
- f) changes in surface and near surface drainage conditions, potential flow impediment and potential changes in open-water surface areas caused by construction of access roads, drilling and well pads and other facilities;
- g) changes in sediment concentrations in the receiving streams caused by all phases of the Project;
- h) how Devon will minimize and mitigate the impact of temporary roads and well pads on peatland/wetland types. Discuss plans to return disturbed areas to a self-sustaining habitat considering previous capability, biodiversity and land uses;
- i) the effects of water withdrawal, including cumulative effects;
- j) the impact on users within the EIA Study Area who have existing approvals, permits or licenses; and
- k) water management plans, mitigation measures and monitoring programs recommended for surface water during the start-up, operations, closure and reclamation phases, including, but not limited to, the following:
 - i) monitoring programs to gauge time-related impacts to key creeks, streams and rivers,
 - ii) rationales for the selection of location and type of key monitoring stations,
 - iii) impact on stream/river bank stability caused by changes in flow regime, and
 - iv) identify residual impacts on surface drainage patterns and surface water hydrology and comment on their significance.

4.8.3 *Surface Water Quality*

Describe the baseline water quality in the EIA Study Area, considering all creeks, rivers, tributaries and waterbodies likely to be affected by the Project. The description of water quality will consider all appropriate water quality variables, their seasonal variation and relationship to flow and other controlling factors, and a summary of existing water quality data. Variables will include at least cations, anions, metals, dissolved oxygen, temperature, pH, conductivity, suspended and dissolved solids, nutrients and all potential contaminants related to oil sands development, and include, but not be limited to, the following:

- a) components within each stage of the Project that may influence or impact both surface and near-surface water quality;
- b) wastewater effluents, site drainage and runoff from the Project Area in terms of source, volume, quality and seasonal timing during the life of the Project;
- c) potential impacts of the Project on surface water quality within the EIA Study Area with respect to location, magnitude, duration and extent, and significance;
- d) the sensitivity of local and affected waterbodies in the Study Areas to acid deposition;

- e) potential project-related and cumulative impacts of wastewaters, acid or other aerial emissions on surface water quality;
- f) monitoring programs to determine whether wastewater, acid and other aerial emissions are affecting water quality;
- g) changes in water quality resulting from the Project that may indicate adverse effects or an exceedance of the *Surface Water Quality Guidelines for Use in Alberta* (AENV, November 1999) and identify any contaminants of potential concern for which no guidelines exist (e.g., naphthenic acids, various salts);
- h) the effect on water quality in surface waterbodies due to a change in groundwater discharge;
- i) the significance of the effects on water quality of flowing and standing waters affected by the Project and their implications for other environmental resources including:
 - i) habitat diversity and quantity,
 - ii) vegetation resources,
 - iii) aquatic resources (fish and other aquatic biota), soil conservation, and
 - iv) reclamation;
- j) proposed mitigation and monitoring measures during the construction, operation and reclamation phases of the Project;
- k) seasonal variation and effects; and
- l) for any monitoring implemented for the Project, justify the selection of monitoring locations, and the integration of these sites into an overall aquatic assessment and monitoring program. Describe how the methods are in accordance to Alberta Environment standards for surface water quality monitoring. Identify cooperative monitoring and assessment initiative(s), such as with regional stakeholders.

4.8.4 Aquatic Resources

Describe the existing aquatic biological resources (e.g., fish, benthic invertebrates) and associated habitat in the watercourses and other wetlands and waterbodies within the Studies Area(s), including, but not limited to, the following:

- a) the selection of the Study Area(s), information sources, and assessment methods;
- b) previous and proposed studies on fish and aquatic resources in the Local Study Area;
- c) key indicator species, with the rationale and selection criteria used. Describe the critical life stages and requirements for key species and any species of concern (provincial or national);
- d) using scientifically standard methods, provide current field data for the aquatic biological resources of waterbodies affected by the Project. Discuss composition, distribution, relative abundance, and critical or sensitive seasonal habitat use and movement patterns;
- e) the implications of any construction, operation and reclamation activities in the Study Area(s) for aquatic biological resources and habitat, including how stream alterations, changes to substrate conditions, stream flow conditions and water quality may affect these resources and habitats;

- f) the nature of the potential effects; their duration; whether they are site-specific, local or regional in spatial extent; and the mitigation measures and habitat enhancement techniques that will be implemented to prevent or minimize any anticipated adverse effects, including:
 - i) the potential for tainting of flesh; survival of eggs and fry; chronic or acute health effects; changes in the invertebrate community and food base; and increased stress on fish, populations from release of contaminants, sedimentation and habitat changes,
 - ii) potential impacts on riparian habitat in the Local Study Area that could affect aquatic biological resources, and
 - iii) potential for increased fishing pressure that could result from increased use of the area and increased access in the area;
- g) the implications of potential effects and the need for access controls or other management strategies to protect the resources and plans to offset any incremental loss in productivity. Indicate how environmental protection plans for the Project will address applicable provincial and federal policies for fish habitat, including the 'No Net Loss Guiding Principle';
- h) programs to monitor aquatic biological resources, and the effectiveness of mitigation strategies;
- i) any monitoring programs that have been, or will be, conducted in cooperation with other oil sands operators to identify and manage effects from the Project and to confirm the effectiveness of mitigation strategies employed to ensure protection of the fisheries resources;
- j) identify residual impacts on aquatic biological resources and discuss their significance in local and regional contexts; and
- k) submit aquatic biological resource data in the required format to FMIS (fisheries management information system).

4.9 TERRESTRIAL

4.9.1 *Geology, Terrain and Soils*

Provide the Local Study Area and Regional Study Area geological, terrain and soils conditions, including the following:

- a) describe surficial geology including surface topography of the Study Area and the bedrock;
- b) describe the regional soils that could be affected by the Project with emphasis on potential acidification, erosion;
- c) describe and map the soil types and their distribution in the Project footprint and Local Study Area using appropriate survey intensity levels;
- d) describe the sensitivity of the soil types to acid deposition. Comment on the predicted acidifying impacts of the Project with reference to Study Area(s) modelled acidic deposition patterns. Propose mitigative actions that will reduce the effects of acid deposition on sensitive soils. Using modelled predictions of acidic deposition from the Project including local studies, describe the regional cumulative effects of acid deposition on regional soils;
- e) provide a pre- and post-disturbance land capability assessment of the Local Study Area and describe the impacts to land capability due to the Project. Identify the distribution of pre- and post-disturbance land capability on a map. Suggest ways in which surficial disturbances can be minimized;

- f) describe the availability and suitability of soils within the Project Area for reclamation and provide a soil balance for all phases of the Project;
- g) present all baseline biophysical information in a manner that enables a detailed ELC of the Project Area to be completed to the boreal ecosite classification. Describe the impact of the Project on each ELC unit based upon the key characteristics of the soil;
- h) identify and locate erosion sensitive soils and discuss potential effects of the Project on these soils including mitigative actions;
- i) identify the environmental effects of proposed drilling methods on the surface landscape, surficial and bedrock geology. Identify environmental impacts of drilling over the life of the Project. Consider the potential for new or additional technology to increase resource recovery at later stages of the field development and to affect the number of wells required;
- j) discuss the potential environmental effects of casing failures. Identify measures to reduce the environmental risks from casing failures. Describe methods of detecting casing failures and propose an action plan in the event of a casing failure; and
- k) discuss the potential for changes in the ground surface during operations (e.g., ground heave and ground subsidence). Summarize applicable experience with surface heaving and subsidence and the factors involved in their occurrence. Describe the environmental implications of any terrain changes during the steaming and recovery operations. Identify any activities that may cause soil contamination and describe mitigative actions.

4.9.2 *Vegetation and Forest Resources*

Map and describe vegetation communities for each landscape unit in the Project Area using the Alberta Vegetation Inventory Standards Manual (AVI) Version 2.1 and according to *The Field Guide to Ecosites of Northern Alberta* (Beckingham and Archibald), and:

- a) map and describe peatlands and wetlands affected by the Project according to the Alberta Wetlands Inventory Standards Manual (AWI) Version 1.0;
- b) discuss any shortfalls in using AVI and AWI for mapping the Project Area;
- c) address the adequacy of the Study Area, information sources and assessment methods for a cumulative effects assessment, including how baseline information was collected to enable a detailed ELC of the Project Area to be completed;
- d) identify the rare or endangered species, as listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and the Alberta Natural Heritage Information Centre (ANHIC), for each landscape unit;
- e) discuss the ecosites in consideration of their potential to support rare plant species, plants for traditional and medicinal purposes, old growth forests and communities of restricted distribution. Consider their importance for local and regional habitat, sustained forest growth, rare plant habitat and the hydrologic regime;
- f) identify and verify the presence of species of rare plants and the ecosite phases where they are found, using reliable survey methods. Discuss any potential effects the Project may have on rare plants;
- g) where landscape units are identified as rare, or where a significant percentage of a specific type may be removed by the Project, describe their regional significance;

- h) identify the amount of vegetation and wetlands to be disturbed during each stage of the Project;
- i) discuss temporary (include timeframe) and permanent changes to vegetation and wetland communities:
 - i) comment on the significance of the effects and their implications for other environmental resources (habitat diversity and quantity, water quality, erosion potential, soil conservation, recreation and other uses), and
 - ii) comment on the sensitivity to disturbance (including acid deposition), as well as the techniques used to estimate sensitivity to disturbance and reclamation, of each vegetation community and discuss permanent and temporary changes;
- j) identify and evaluate the extent of potential effects such as ecosystem fragmentation and introduction of non-native plant species on native species composition and changes to plant communities;
- k) produce an ELC map that shows the pre- and post-disturbed land surfaces. Comment on the importance of the size, distribution and variety of these landscape units for timber harvesting, agriculture and other land uses from both a local and regional perspective;
- l) determine the rarity or abundance of wetlands in the Local Study Area;
- m) predict the anticipated effect of the Project on wetlands in conjunction with other project-induced variations in hydrology, habitat quality and wildlife populations;
- n) discuss the impact of any loss of peatlands or surface wetlands, as well as how this will affect land use, fragmentation and biodiversity. Discuss measures and techniques that will be used to minimize the impact.
- o) determine the amount of commercial and non-commercial forest land base that will be disturbed within the Project Area. Compare the pre- and post-disturbance percentages and distribution of all forested communities in the Project Area. Discuss opportunities to integrate this Project with other resource development activities such as logging;
- p) determine how the project disturbance impacts Annual Allowable Cuts and quotas within the FMA. Discuss opportunities to integrate this project with other resource development activities such as logging;
- q) provide a weed management plan including provisions such as those outlined in the *Guidelines for Weed Management in Forestry Operations* (Forest Management Division Directive - 2001-06). This will detail how Devon will prevent the establishment and control the spread of restricted and noxious weeds (as listed in the *Alberta Weed Control Act*) within the Project Area;
- r) provide a fire control plan highlighting:
 - i) the potential for increased incidences of human-caused wildfires in the Project Area,
 - ii) measures taken to ensure continued access to adjacent wildland areas,
 - iii) forest fire prevention measures, and
 - iv) measures for determining the clearing width of power line rights-of-way that eliminate the potential for trees taking down the line and causing a forest fire;
- s) provide a detailed mitigation strategy that will minimize Project impacts in the Study Area;

- t) discuss plans to return disturbed areas to a self-sustaining habitat equivalent to pre-disturbance conditions, considering factors such as biological capability and diversity and end land use objectives;
- u) develop a plan to mitigate the adverse effects of site clearing on rare plants, existing cutblocks, runoff and water quality. Identify any setbacks proposed around environmentally-sensitive areas such as surface waterbodies, riparian areas and peatlands/wetlands;
- v) comment on the significance of the residual effects on vegetation resources, peatlands and wetlands, and their implications for other environmental resources; and
- w) in addition to equivalent land capability principle, discuss from an ecological perspective the expected timelines for establishment and recovery of vegetative communities and the expected differences in the resulting vegetative community structures.

4.10 WILDLIFE

Describe existing wildlife resources (amphibians, reptiles, birds and terrestrial and aquatic mammals), their use and potential use of habitats in the Study Area(s). Document the anticipated changes to wildlife in the Study Area(s). Specifically:

- a) discuss the selection criteria used to determine the Study Area(s), including information sources and assessment methods;
- b) discuss the criteria and selection process for wildlife indicator species used in the EIA report;
- c) identify wildlife species composition, distribution, relative abundance, seasonal movements, movement corridors, habitat requirements, key habitat areas, and general life history in the Study Area(s);
- d) include current field data, using recognized sampling protocols, for all key indicators and species of concern, 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, vulnerable in Canadian Species at Risk 2002);
- e) evaluate potential adverse impacts on wildlife populations, habitat use, habitat availability/quality and food supply during all phases of the Project. Consider habitat loss, abandonment, reduced effectiveness, fragmentation or alteration as it relates to reduced reproductive potential and recruitment for regional wildlife populations over the life of the Project. If habitat models are used to evaluate impacts, the models will be modified/calibrated by comparing model predictions with wildlife data from the Project Area.;
- f) describe the spatial and temporal changes to habitat (type, quality, quantity, diversity and distribution) and to wildlife distribution, relative abundance, movements, habitat availability and the potential to return the area to pre-disturbed wildlife habitat/population conditions, including:
 - i) anticipated effects on wildlife as a result of changes to air, water, including both acute and chronic effects on animal health;
 - ii) 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, noise and hunting mortality during operations and after Project closure; and
 - iii) map the changes in habitat fragmentation anticipated from the Project and other planned activities, and assess the implications;

- g) discuss the use of setbacks to provide for the protection of riparian habitats, interconnectivity of such habitat and the unimpeded movement by wildlife species using the habitat;
- h) indicate what measures will be taken to prevent habituation of wildlife and increasing the potential for human-wildlife encounters and consequent destruction of wildlife (e.g., black bears), including any staff training program, garbage containment or regular follow-up;
- i) provide a reliable impact assessment for wildlife indicators and listed wildlife species in the Study Area. Identify residual impacts to wildlife and wildlife habitat and discuss their significance in the context of local and regional wildlife populations;
- j) 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 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;
 - iii) the need for access controls or other management strategies to protect wildlife during and after project operations; and
 - iv) monitoring programs to assess wildlife impacts from the Project and the effectiveness of mitigation strategies and habitat enhancement measures, giving special attention to sensitive species in the Study Area.

4.11 LAND USE

Identify the existing recreational, commercial, residential, institutional, oil and gas development, forestry, tourism, cultural/historical use, food collection, trapping, fishing, hunting and other outdoor recreational activities in local and regional settings. Identify the potential impact of the Project on these land uses and possible mitigation strategies. Identify any anticipated impacts related to changes in public access. Discuss the aesthetic characteristics of the facilities with respect to the existing landscape, and provide the following:

- a) identify any land use policies and resource management initiatives that pertain to the Study Area and discuss how the proposed development will be consistent with the intent of the guidelines and objectives of these initiatives. Discuss the implications of those land and resource use policies for the Project, including any constraints to development;
- b) identify unique sites or special features in the Study Area such as Natural Areas, Environmentally Significant Areas, archaeological sites or Heritage Rivers, including:
 - i) discussing any impacts of the Project on these features,
 - ii) indicating the location and significance of the Caribou Protection Area, and
 - iii) outlining the process for addressing other users such as trappers, recreational clubs and holders of FMAs and Timber Quotas;
- c) discuss implications of the Project individually and in combination (cumulative) with other (existing and planned) developments for regional recreational activities, public access and other land uses during and after development activities, including:

- i) how regional environmental management initiatives from RSDS and CEMA will be incorporated into Devon's land use plan,
- ii) identifying measures to mitigate impacts created on land use by the Project. Identify anticipated impacts on public access for land use in the region, and
- iii) discussing how reclamation will restore existing land use potentials considering any recommendations of the Oil Sands Mining End Land Use Committee and the Reclamation Advisory Committee that are applicable to in-situ oil sands operations.

5.0 HISTORICAL RESOURCES & TRADITIONAL USE ASSESSMENT

Describe those aspects of the Project that may have implications for historical resources and traditional use and provide the following:

- a) details of consultation with Alberta Community Development and with Aboriginal communities;
- b) a Historical Resources Impact Assessment (HRIA) for the Project to Alberta Community Development, and any other interested parties, prior to or at the same time as the submission of the EIA report to Alberta Environment;
- c) a general overview of the results of any previous historical resource studies that have been conducted in the Study Area, including archaeological resources, palaeontological resources, historical period sites, and any other historical resources as defined within the Historical Resources Act;
- d) a summary of the results of the HRIA that is carried out with respect to the Project;
- e) an outline of the historical resources management program and schedule of field investigations that may be required to further assess and mitigate the potential effects of the Project on historical resources;
- f) results of consultation with Aboriginal groups to determine the extent of traditional use of the Local Study Area;
- g) document any stakeholder concerns with respect to the development of the Project based on the historical significance of sites within the Local Study Area or its current use by traditional users; and
- h) identify the existing and historical land uses including oil sands development, tourism, forestry, fishing, hunting, traditional plant harvesting, cultural use and outdoor recreation with specific regard given to the Aboriginal peoples. Determine the impact of development on these uses and identify possible mitigation strategies.

6.0 PUBLIC HEALTH AND SAFETY ISSUES

Describe those aspects of the Project that may have implications for public health and determine whether there may be implications for public health arising from the Project and provide the following:

- a) identify and discuss the data and methods used by Devon to assess the 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 or chronic adverse effects on human health;

- c) assess cumulative health effects that are likely to result from the Project in combination with other existing, approved, and proposed projects (projects that have been advanced to the public disclosure stage) or reasonably-foreseeable activities in the region;
- d) describe the potential for contamination of fish by wastewater discharges relative to fish consumption guidelines;
- e) discuss the potential for changes to water quality, air quality, soil quality and the bioaccumulation of contaminants in natural food sources in the Study Area to increase human exposure to contaminants;
- f) provide information on samples of selected species of vegetation known to be consumed by humans;
- g) as appropriate, identify 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;
- h) provide a summary of Devon's emergency response plan and discuss mitigation plans that will be implemented 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;
- i) describe how local residents will be contacted during an emergency and what type of information will be communicated to them;
- j) describe existing agreements with area municipalities or industry groups such as, safety co-operatives, emergency response associations and municipal emergency response agencies;
- k) identify and discuss potential health and safety impacts due to higher regional traffic volumes and the increased risk of accidental leaks and spills;
- l) document health and safety concerns raised by stakeholders during consultation on the Project; and
- m) describe and discuss the impacts of the proposed Project on potential shortages 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 the Regional Health Authority concerning potential housing shortages and health care services respectively.

7.0 SOCIO-ECONOMIC ASSESSMENT

Provide information on the economic effects of the Project. Specifically address the following:

- a) provide information respecting the socio-economic impacts of the Project on the communities of the region and on Alberta including:
 - i) local employment and training,
 - ii) local procurement,
 - iii) population changes,
 - iv) stresses placed on local and regional infrastructure and community services,
 - v) regional and provincial economic benefits,
 - vi) construction camps,
 - vii) housing concerns in local communities, and
 - viii) trapping, hunting and fishing;

- b) describe Devon's policies and programs regarding the use of regional and Alberta goods and services;
- c) provide a summary of estimated industrial benefits including Alberta, other Canadian, and non-Canadian percentages of total project cost for engineering and project management, equipment and materials, construction labour and total overall project;
- d) provide a description of the overall engineering and contracting plan for the Project;
- e) discuss workforce requirements for construction and operation. Identify local employment and business development opportunities that the Project may create;
- f) outline plans to work with Aboriginal and other local residents and businesses with regard to employment, training needs and other economic development opportunities arising from the construction and operation of the Project;
- g) evaluate the impact on local services and infrastructure, taking into consideration other projects that are reasonably anticipated during the life of the Project. This will include consideration of housing, transportation, education/training, health and social services, urban and regional recreation use, law enforcement and emergency preparedness. Discuss options for mitigating impacts;
- h) describe 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; and
- i) discuss strategies to mitigate socio-economic concerns raised by the Regional Municipality of Wood Buffalo and other stakeholders in the region. Document the work with other industry partners and the Regional Municipality of Wood Buffalo to identify and address socio-economic concerns.

8.0 PUBLIC CONSULTATION

Describe discussions with:

- a) residents of Conklin, Chard, Janvier, Lac Labiche, the Municipality of Wood Buffalo and others as identified during the consultative process;
- b) First Nations and Metis organizations;
- c) commercial, industrial and recreational users; and
- d) other potentially-affected parties.

Document the public consultation program implemented for the Project including methods, the type of information provided and the level and nature of Devon's response, and provide the following:

- a) describe the consultative process and show how public input was obtained and addressed;
- b) document individual participation and attendance at each meeting and record specific comments or issues raised by individuals present at the meetings;
- c) describe and document the concerns and issues expressed by the public, Devon's analysis of those concerns and issues, and the actions taken to address those concerns and issues;
- d) describe how resolution of the concerns and issues was incorporated into the project development, impact mitigation and monitoring;

- e) describe plans to maintain the public consultation process following completion of the EIA review to ensure that the public will have an appropriate forum for expressing their views on the ongoing development, operation and reclamation of the Project; and
- f) the EIA report will document the public consultation process, record any concerns or suggestions made by the public and will demonstrate how these concerns have been addressed. Consultation will include discussions with:
 - i) Alberta provincial representatives,
 - ii) federal government representatives, and
 - iii) representatives of other companies operating, or proposing to operate, oil sands, conventional oil and gas developments and other industrial activities in the region.

APPENDIX

The following information is necessary to be submitted as part of the Application under the *Environmental Protection and Enhancement Act (EPEA)*. It may not be necessary to be considered as part of the EIA report completeness decision-making process under Section 53 of EPEA. Upon review of the information submitted, a final determination will be made if it is necessary for the following information to be considered as part of the EIA report completeness decision.

Air Quality Assessment

Provide via modelling maximum ground level concentration locations of NO₂ and SO₂ near the vicinity of the central processing facility, plant or project. Provide ground-level concentrations in 50 or 100 m increments extending out from the central processing facility to 2 or 5 km.

Conservation and Closure Plan

The reclamation and closure plan in the Application will address the following:

- a) provide an ecological context of the soil resource by supplying a soil survey report and maps following the Soil Survey Handbook, Volume 1 (Agriculture Canada, 1987);
- b) provide details about soil salvage indicating areas where salvage will occur (for the pads, transportation routes, and any other similar activities), the depth and volume of soil to be salvaged, soil storage locations and methods and relate the information to pre-development conditions;
- c) provide details on area of soil replacement indicating techniques, timing, depth, volume and type of reclamation material;
- d) provide information about the reclamation topography for well pads, roads, and facilities. Identify contouring objectives, drainage restoration (surface and near-surface flow) and erosion control;
- e) compare the pre/post-disturbance percentages and distribution of all forested communities in the Project Area. Provide a timber salvage plan, highlighting end user and identifying proposed volumes for removal by species and year for the term of the proposed expansion;
- f) provide appropriately scaled maps of the area highlighting (where possible) the preceding points;
- g) discuss the potential to retain coarse woody debris for use in reclamation and to reduce the need for slash burning after clearing; and
- h) provide a timber salvage plan, highlighting end land users and identifying proposed volumes for removal by species and year for the Project. Provide a tracking mechanism to ensure the appropriate utilization of the timber volumes by species to salvage per year, or periodically as the Project progresses. Include opportunities for timber salvage, revegetation, reforestation and harvest for the reduction of fuel hazards.