

**DRAFT GUIDELINES FOR THE
PREPARATION OF THE
ENVIRONMENTAL IMPACT STATEMENT**

**ENCANA SHALLOW GAS INFILL
DEVELOPMENT PROJECT IN THE SUFFIELD
NATIONAL WILDLIFE AREA**

**IN ACCORDANCE WITH THE
*CANADIAN ENVIRONMENTAL ASSESSMENT ACT***

AUGUST 2006

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PART I BACKGROUND

1. INTRODUCTION

1.1 Environmental Assessment Process

The proponent, EnCana Corporation proposes an infill drilling development project (the “project”) which would allow for up to 1,275 shallow sweet natural gas wells in the Canadian Forces Base Suffield National Wildlife Area over a three-year period. Infill drilling is drilling that occurs within the boundaries of an existing developed gas or oil field. The wells would be connected into existing and new natural gas gathering infrastructure for delivery of the produced natural gas to market. The project would add approximately 220 km of additional pipeline and will double the number of wells currently in the Suffield National Wildlife Area (Suffield NWA). Associated with these wells, EnCana is proposing new infrastructure such as sumps, water and waste management development, including disposal areas and drilling fluid management, and infrastructure that connects the wells to existing facilities.

The Suffield NWA was established in 2003 under the *Canada Wildlife Act* and protects an area in excess of 458 square kilometres within the boundaries of Canadian Forces Base Suffield. The site was recognized as having nationally significant environmental features which include the unique contiguous block of native prairie and sensitive dune habitat, a high density of species at risk and the function of the national wildlife area for baseline research and as a buffer for military activities. Lands of the Suffield NWA have been out-of-bounds to military training since 1972, as an environmentally protected zone, and were precluded from deep rights access for petroleum development. Cattle grazing and shallow gas recovery were anticipated to continue subject to the environmental screening protocols specified in the respective Memorandum of Agreements controlling those activities, the *Wildlife Area Regulations*, and the management principles of the national wildlife area that it be sustained as a place for wildlife that is effectively buffered from human influences in order to provide valuable ecological services.

The project is subject to the *Canadian Environmental Assessment Act* given the requirement for the Proponent to obtain a federal authorization pursuant to section 3 and 4 of the *Wildlife Area Regulations*. For the Suffield NWA, the Department of National Defence has been delegated the responsibility for the administration of the area and those sections of the *Canada Wildlife Act* that apply to it, including the permitting responsibilities. Because of this regulatory role, the Department of National Defence is the responsible authority for the conduct of this environmental assessment.

Since it involves the construction of a gas pipeline in a National Wildlife Area as defined in section 2 of the *Canada Wildlife Act*, the project is subject to a comprehensive study, as specified in paragraph 2(c), Part I of the *Comprehensive Study List Regulations*. As stipulated under the comprehensive study process, the responsible authority held a public consultation on the scope of the environmental assessment and reported to the federal Minister of the Environment on the scope of the environmental assessment, public

concerns, the possibility of adverse environmental effects and concerns regarding the comprehensive study's ability to address all of the questions raised by the project. Given the responsible authority's recommendation and the level of public concerns, the Minister of the Environment decided to refer the environmental assessment of the project to a review panel.

In Alberta, petroleum and natural gas operations are regulated provincially by the Alberta Energy and Utilities Board (EUB). The EUB has statutory responsibilities pursuant to the *Alberta Energy and Utilities Board Act* and the *Energy Resources Conservation Act*. Although EnCana's drilling and pipeline activities are subject to regulatory approvals by the EUB, detailed environmental assessment is not required by the province. Nevertheless, the EUB is mandated to consider environmental matters in determining whether an application is in the public interest. To help make this determination regarding EnCana's applications, the EUB has decided to participate in the federal environmental assessment process.

To avoid duplication in the process, the Canadian Environmental Assessment Agency (the Agency) and the EUB have agreed to enter into an agreement to establish a Joint Review Panel consistent with the *Canada-Alberta Agreement for Environmental Assessment Cooperation*. This Agreement is available on the Agency's web site at the following address: <http://www.ceaa-acee.gc.ca>

1.2 Objective of the Guidelines

These guidelines stipulate the nature, scope and extent of the environmental impact statement to be prepared by the proponent. These guidelines comprise two main parts, namely:

- Part I: background information useful to understand the context of this environmental assessment; and,
- Part II: the content of the environmental impact statement to be prepared.

These guidelines shall not be considered exhaustive and the proponent is required to add to its environmental impact statement any other element relevant for the environmental assessment of the project. Exchanges between the proponent and government organizations are encouraged so that the environmental impact statement responds adequately to the methodology and guidelines. The proponent shall report on exchanges with government organizations in the environmental impact statement.

1.3 Public Consultation on the Guidelines and Approval

The present draft guidelines are available for consultation until October 15, 2006. During this period, the public can submit written comments to:

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Ottawa, ON K1A 0H3
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All comments received will be placed on the public registry and made available to the public.

After taking into consideration the public's comments received during the consultation period, the guidelines will be finalized by the Joint Review Panel, sent to the proponent and made public.

2. SCOPE OF THE PROJECT

The scope of the project includes the construction, operation, reclamation and decommissioning of the project components and activities proposed by EnCana and described in section 2 of the document entitled *CFB Suffield National Wildlife Area Shallow Gas Infill Development Project – Project Description*, November 1, 2005 by Encana and as outlined in the Appendix of the draft Agreement for the Establishment of a Joint Review Panel.

In summary, EnCana has proposed to drill up to 1,275 shallow sweet natural gas wells (up to 16 wells per section of one square mile) in the Suffield National Wildlife Area (Suffield NWA) over a three-year period. The wells would be connected into existing and new natural gas gathering infrastructure for delivery of the produced natural gas to market. The project would add approximately 220 km of additional pipeline and would double the number of wells, currently in the Suffield NWA. The gas would be transported to existing compressor stations located on the perimeter of the Canadian Force Base Suffield.

The project components include:

- up to 1275 new infill wells located throughout the Suffield NWA;
- approximately 180 kilometers of two (2) inch high-density plastic pipe to tie the wells into an existing pipeline;
- approximately 40 kilometers of six (6) or eight (8) inch steel pipelines to transport the gas to compressor stations located outside of the Suffield NWA;

- ground level facilities, such as, pig catchers and gas meters;
- any additional sumps and water disposal wells;
- any new waste management facilities or modification to existing facilities;
- any modifications to compressor facilities;
- all related works and activities including all temporary facilities required for the construction and operation of the above-mentioned facilities, namely
 - permanent and temporary access roads or trails;
 - a communications system;
 - all temporary or permanent power supply;
 - water supply;
 - construction worksites and storage areas;
 - handling and storage of petroleum products and hazardous materials;
 - handling, storage and use of explosives, if any.

3. GUIDING PRINCIPLES

Certain basic principles of the environmental assessment requirements that must be met are set out below.

3.1 Environmental Assessment: A Planning Tool

Environmental assessment is an instrument of choice in planning land and resource use and development. It reflects environmental and social concerns at all stages of a project, from design to decommissioning. It helps to design a project that is more respectful of the environment, without compromising its technical and economic feasibility.

3.2 Public Participation

Public participation is a central objective of an environmental assessment process and a means to ensure that a proponent addresses public concerns. In preparing its environmental impact statement, the proponent is encouraged to consult the affected communities, interested regional and national organizations, resource users and relevant government agencies.

Meaningful public involvement can only take place if the public has a clear understanding of the nature of the proposed project as early as possible in the review process. Therefore, the proponent is encouraged to:

- continue to provide up-to-date information to the public and especially to the communities likely to be most affected by the project;
- involve the main interested parties in determining how best to deliver that information, that is, the type of information required, format and presentation methods, as well as the need for community meetings;

- explain the results of the environmental impact statement in a clear and direct manner to make the issues comprehensible to the widest possible audience.

3.3 Local Knowledge

Populations living in proximity to the project may have substantial and distinct knowledge, which may be essential to the assessment of the effects of the project, and their mitigation. Local knowledge will have an important contribution to make and the proponent shall fully consider local knowledge and expertise in preparing the environmental impact statement.

For the purposes of the present environmental assessment, local knowledge may be regarded as the knowledge, understanding and values that local populations, including First Nations, have that bear on the effects of the project and proposed mitigation measures. This knowledge is based on personal observation, collective experience and oral transmission over generations.

Local knowledge relating to factual information on such matters as ecosystem function, resource abundance, distribution and quality, social and economic well-being, and to explanations of these facts and causal relations among them, is required for the development of adequate baseline information, identification of key issues, prediction of the effects, and assessment of their significance, all of which are essential to the environmental impact statement and its review.

Local knowledge can be obtained with the cooperation of other concerned parties. The proponent shall incorporate to the environmental impact statement the local knowledge to which it has access or which it may reasonably be expected to acquire through appropriate diligence, in keeping with appropriate ethical standards and without breaching obligations of confidentiality. The proponent shall facilitate the presentation of such knowledge to the review panel, interested parties and concerned communities.

3.4 Sustainable Development

Sustainable development seeks to meet the needs of present generations without compromising the ability of future generations to meet their own needs. Its three objectives are preserving environmental integrity, improving social equity and improving economic efficiency.

A project that takes these concerns into account shall strive to integrate and balance these three objectives in the planning and decision-making process and shall incorporate citizen participation. The project, including its alternative means, shall take into account the relations and interactions among the various components of the ecosystems and meeting the needs of the population.

4. PREPARATION AND PRESENTATION OF THE ENVIRONMENTAL IMPACT STATEMENT

4.1 Study Strategy and Methodology

The proponent shall observe the intent of the guidelines by identifying and describing all environmental effects caused by the project, including situations not explicitly identified in these guidelines but that may arise from the proposed project. It is possible that these guidelines include matters that, in the judgement of the proponent, are not relevant to the review of the project. If such matters are omitted from the environmental impact statement, they shall be clearly justified so the review bodies, public and other interested parties have an opportunity to consider and comment on this judgement.

The proponent shall explain and justify methods used to predict potential environmental effects of the project on the valued environmental components, on the interactions among these components and on the relations of these components within the environment. The information presented shall be substantiated. In particular, the proponent shall describe how valued environmental components were identified and what methods were used to predict and assess the environmental effects of the project on these components.

The value of an environmental component not only relates to its role in the ecosystem but also to the value placed on it by humans from a cultural, social, scientific and economic point of view. The proponent shall indicate how the significance of effects was assessed and justify the selected criteria.

Wherever the proponent makes use of qualitative criteria to compare the various design and development options to describe the environment or to assess the effects of the project, each of these criteria shall be defined, their relative importance stated, and the differences between the categories indicated. The proponent shall substantiate the classification of each criterion.

In describing methodology, the proponent shall explain how they used scientific, engineering, local and other knowledge. All hypotheses shall be clearly identified and justified. All data, models and studies shall be documented so that the analyses are transparent and reproducible. All data collection methods shall be specified. The degree of uncertainty, reliability and sensitivity of models used to reach conclusions shall be indicated.

The sections describing the receiving environment and predictions as well as an assessment of environmental effects shall be prepared to the highest standards in the relevant subject area. All conclusions shall be substantiated. The proponent shall support all analyses, interpretation of results and conclusions with a review of the appropriate literature, providing all references required and indicating the public availability of all works consulted, when appropriate. Any contribution based on local knowledge shall be specified and sources identified.

The environmental impact statement shall identify all significant gaps in knowledge and explain their relevance to key conclusions drawn. The proponent shall indicate the appropriate measures to bridge these gaps. Where the conclusions drawn from scientific and technical knowledge are inconsistent with the conclusions drawn from local knowledge, the proponent shall present a balanced version of the various points of view as well as a statement of the final conclusions.

The proponent shall apply the precautionary approach which requires:

- the obligation to demonstrate that the proposed actions would not cause serious or irreversible damage to the environment, especially with respect to environmental functions and integrity, considering system tolerance and resilience, and will not interfere with the conservation of wildlife in a protected area;
- scientific research and high-quality information;
- access to information, public participation, and an open and transparent decision-making process.

4.2 Presentation of the Environmental Impact Statement

Whenever possible, the proponent shall avoid repetitions by describing, in the same section of the environmental impact statement, the component of the receiving environment, the anticipated effects on this component, the proposed mitigation and compensation measures, the significance of residual effects and, when relevant, the proposed monitoring and follow-up programs.

For purposes of brevity, the environmental impact statement shall also make reference to the information that has already been presented in other sections of the document, rather than repeating it. A key subject index would also be useful and should reference locations in the text by volume, section and sub-section. Sector-based or detailed studies shall be provided in separate volumes and shall be referenced by volume, section and page in the text of the main document of the environmental impact statement.

The proponent shall present the environmental impact statement in the clearest possible language. A glossary defining technical words and acronyms shall be included. The proponent shall provide charts, diagrams, tables and maps to clarify the text. Perspective drawings that clearly convey the various components of the project shall also be provided. Wherever possible, maps shall be presented in common scales and datum to allow for comparison and overlay of mapped features.

To facilitate the identification of the documents submitted and their coding in the Canadian Environmental Assessment Registry, the title page of the environmental impact statement and its related documents shall contain the following information:

- project name and location;
- title of the document, including the term “environmental impact statement”;
- subtitle of the document;
- names of the proponent;

- names of the consultants, if any;
- date.

The proponent shall provide at least 40 copies of the environmental impact statement, including an electronic version in PDF format. If addenda, resulting from the questions and comments from the review panel, are produced, 40 copies of these shall also be made available in the same format.

The proponent shall make the environmental impact statement available on an Internet site.

4.3 Executive Summary

The proponent shall provide an executive summary that allows for a concise and complete overview of the environmental impact statement, including the following information:

- project overview;
- project setting: geographic, physical, biological and human environments;
and
- key findings relevant to the decision making process.

PART II CONTENT OF THE ENVIRONMENTAL IMPACT STATEMENT

1. CONTEXT

1.1 The Proponent

The proponent shall:

1. identify itself and the name of the legal entity that will develop, manage and operate the project;
2. provide an identification of mineral rights holders in the project and surrounding area;
3. explain corporate and management structures, as well as insurance and liability management related to the project;
4. specify the mechanism used to ensure that corporate policies are implemented and respected;
5. summarize key elements of EnCana's environment, health and safety management system and discuss how the system will be integrated into the project; and
6. identify key personnel, contractors, and/or sub-contractors responsible for preparing the environmental impact statement.

In addition the proponent shall describe the EnCana Corporation and its history in Canada's oil and gas industry, with specific reference to the existing EnCana oil and gas developments, proposed developments, resource characterization and environmental studies in Alberta, including environmental studies in the prairie environment.

1.2 Overview of the Project

The intent of this overview is to provide the key components rather than a detailed description of the project, which will follow in Section 3.3, Part II of the present guidelines.

The proponent shall briefly summarize the project, by presenting the project components, associated activities, scheduling details, the timing of each phase of the project and other key features. If the project is part of a larger sequence of projects, the proponent shall outline the larger context and present the relevant references, if available.

1.3 Geographical Setting

The proponent shall provide a concise description of the geographical setting in which the project will take place. This description shall integrate the natural and human elements of the environment in order to explain the interrelationships between the

physical and biological aspects and the people and their communities. This description may include the following information:

- main ecological constraints of the environment;
- land use;
- local communities; and
- interests and main concerns of the various parties involved.

1.4 Legal Framework and the Role of Government

To understand the context of the project's environmental assessment, this section should clearly identify, for each jurisdiction, the government bodies involved in the environmental assessment process. This section should also describe the environmental assessment process and the main components of the review process. The role of the environmental impact statement in the environmental assessment process shall be explained.

The legal framework of the project shall also be described by stipulating how provincial, federal agreements, laws, regulations and policies, as well as sector-related authorizations to be obtained govern the project. In addition, this framework shall cite all property rights for use or required by this project, especially when federal land is involved. This framework shall also make reference to the elements of any agreements signed or to be signed by the proponent and the governments as well as the interests and key concerns of the parties involved.

More specifically, the proponent will identify and delineate the major components of the project that are regulated under the:

- i) *Canada Wildlife Act*;
- ii) *Species at Risk Act* ;
- iii) *Canadian Environmental Assessment Act*;
- iv) *Canadian Environmental Protection Act* ;
- v) *Migratory Birds Convention Act*;
- vi) *Fisheries Act*;
- vii) *Federal Real Property Act*;
- viii) Any other relevant legislation.

The proponent will also describe any federal or provincial policies, guidelines and/or standards that may apply to the project. Of particular relevance, the proponent shall indicate the relationship between the project and the objectives, goals and ecological services provided by the Suffield NWA.

2. PROJECT JUSTIFICATION

In this section of the environmental impact statement, the proponent shall present the purpose of and need for the project as well as the alternatives to the project.

2.1 Need and Purpose of the Project

The need for the project represents the problem to be solved or an opportunity to be seized while the purpose of the project defines what the proponent hopes to accomplish by implementing its project.

The proponent shall present the markets targeted and/or the planned use of the natural gas. The proponent shall explain the needs motivating the project as well as its objectives, and present the constraints or requirements related to its implementation. The proponent shall demonstrate that they require an additional supply of natural gas and that the best scenario for meeting that need includes the proposed project.

The proponent shall establish the purpose of the project from their perspective and offer a context for the analysis of the alternatives to the project. The environmental impact statement shall present the purpose of the project, taking into account existing development and planning schemes.

2.2 Alternatives to the Project

The alternatives to a project are defined as functionally different ways of addressing the need for the project and pursuing the purposes of the project. Analysis of alternatives to the project should confirm that the preferred “alternative” is a reasonable approach that addresses the need for the project and its purposes. Thus, the proponent shall:

- identify the alternatives to the project, including the possibility and implications of its non-implementation or postponement;
- establish criteria making it possible to identify the costs and direct and indirect benefits of the alternatives at the environmental, economic and technical levels;
- show that the project is a reasonable approach to the identified needs;
- where applicable, identify the preferred alternative to the project based on the comparative analysis of the costs and benefits at the environmental, social, economic and technical levels.

3. DESCRIPTION OF ALTERNATIVE MEANS CONSIDERED AND THE SELECTED PROJECT

3.1 Alternative Means of Carrying out the Project

The proponent shall describe the alternative means (choice of location, design, technology, features, etc.), which are technically and economically feasible, for carrying out the project and its key elements. The environmental impact statement shall indicate the feasible alternative means capable of meeting the project's objectives, including the one that initially seems to be the optimal alternative means in terms of environmental protection. The choice of feasible alternative means is based on the information collected, among other things, during the surveys of the environment and, where applicable, based on the proposals received during the public consultations held by the proponent.

The proponent shall present alternative means for at least the following elements:

- number and density of well sites, well design and recovery strategies for resource extraction;
- maintenance and production operations;
- abandonment and reclamation of production sites;
- technologies for shallow gas development;
- sumps sites and design;
- management, storage and disposal of produced fluids and oilfield wastes;
- layout and construction of the pipeline;
- compressor facilities (identify any project development scenarios or contingencies that would necessitate construction of additional compression within CFB Suffield or the National Wildlife Area;
- layout and use of the temporary and permanent roads / trails;
- water supply.

In addition, the proponent will identify technology innovations for drilling, pipelining, waste disposal, reclamation or environmental monitoring that might be used for environmental management or have potential for future application through research and development. (e.g. directional drilling of pipelines segments, restoration of native prairie).

3.2 Selection of the Relevant Alternative Means

The selection of the preferred alternative means shall be based on a clearly described method, which, for each alternative means proposed, would at least take into account the following criteria:

- ability to meet the project's purpose, as described above, taking into account its cost-effectiveness;
- technical and legal feasibility (accessibility, land tenure, zoning, availability of services, implementation schedule, availability of labour power, etc.);

- capacity to avoid or limit the key adverse effects on the biophysical and human environment, as well as the capacity to maximize the positive effects.

The proponent shall choose, among the possible alternative means, the most relevant alternative means to carry out the project, underscoring the distinctive elements that influenced this choice, whether at the environmental, social, technical or economic levels. The proponent shall explain how the selected alternative means clearly stand out from the other alternative means envisaged, and why the latter were not selected for the detailed analysis of the effects.

3.3 Description of the Selected Project

The environmental impact statement shall describe all of the known and foreseeable characteristics associated with the alternative means selected. This description shall include the activities, temporary and permanent structures as well as the work planned during the various phases of the project, namely the construction, operation, maintenance, foreseeable modifications as well as, where applicable, the abandonment, decommissioning and restoration of the sites related to all of the project's components.

The proponent shall provide **maps of** the following project's components on an appropriate scale and where applicable, indicating how they integrate with the existing works, how it relates to CFB Suffield, the National Wildlife Area, local communities, and valued environmental components (e.g., water bodies, vegetation, soils, wildlife habitat, wetlands, cultural and archaeological sites and traditional land use areas):

- temporary structures;
- geologic formations from which natural gas may be produced;
- gas pools or zone of production;
- existing and proposed drilling and production sites, processing/treatment facilities;
- existing and proposed buildings and infrastructure (roads, pipelines, compressor facilities, communications and utilities);
- existing and proposed transportation and access routes (both designated and unplanned/unofficial);
- existing and proposed storage and containment structures such as tanks, berms and retention ponds;
- existing and proposed water sources and drilling mud fluid sources;
- aggregate resources and other road construction material required and onsite availability;
- existing and proposed waste storage areas and disposal sites;

The proponent shall describe the above components and, without limiting themselves thereto, the following components:

- the well sites, including:
 - their layout and design and use of any production equipment;
 - the process and criteria used to select the well sites;
 - a summary of the petrophysical and reservoir properties of the formations that may be produced;
 - an estimate of the expected production rates for each gas zone;
 - an estimate of the reserves of natural gas for each zone and duration for wells to be on production;
 - an estimate life for wells currently producing in the area;
 - whether the existing wells can adequately deplete the resource;
 - the degree to which drilling of the proposed wells may accelerate production, deplete the reservoir more quickly or otherwise improve recovery;
 - provide a map and/or a description of potential hydrocarbons such as coal bed methane and deep natural gas which may underlie the proposed development area. Identify geologic or engineering opportunities for re-entry of existing well bores and use of infrastructure or access for the production of other hydrocarbons following depletion of shallow gas pools.
- the pipeline, including a description of the following elements:
 - layout, width of right-of-way, technical characteristics of the pipeline;
 - pigging facilities, if any;
 - compression, pumping and metering facilities, if any;
 - shutoff valves;
 - cathodic protection and anti-corrosion measures and installations, if any;
 - waste sites for hydrostatic tests;
 - water crossing methods, if applicable;
 - maintaining rights-of-way;
- all related works and activities including all temporary installations required for the construction of the above-mentioned facilities, in particular:
 - permanent and temporary access roads (both designated and /unofficial, to and within the project area, including the need to upgrade existing roads. Include the design, timing, construction standards or methods, crossings of access points, the volume of material needed, if any, and the availability of materials in the area;
 - access corridors needed and/or planned by other resource stakeholders and users of the site area. Describe how their needs are accommodated to reduce overall environmental effects from resource development. Describe the steps taken to integrate their needs into the location and design of the access infrastructure;
 - access management during the construction and operation phases;
 - borrow areas;

- telecommunications networks;
- temporary and permanent power supply lines and any other power supply system;
- construction worksites, garages and storage areas;
- handling and storage of petroleum products and hazardous materials, including;
 - the location, nature and amount of on-site hydrocarbon storage;
 - the composition, volume and management of specific waste streams;
 - a listing of chemical products to be used, including products containing substances that are:
 - i. *Canadian Environmental Protection Act* toxics,
 - ii. on the Priority Substances List 2 or Accelerated/Reduction Elimination of Toxics and those defined as dangerous goods pursuant to the federal *Transportation of Dangerous Goods Act*. Classify the wastes generated and characterize each stream under the Alberta Environment *User's Guide for Waste Managers*,
 - iii. on the National Pollutant Release Inventory, and
 - iv. on Track 1 substances targeted under Environment Canada's Toxic Substances.
- amount of drilling wastes produced by the project, the options considered for disposal and the option(s) chosen, including the strategy for onsite waste disposal versus offsite waste disposal;
- water supply (potable and non-potable) requirements, including:
 - annual volumes from each source (for groundwater sources, consider Alberta Environment's *Groundwater Evaluation Guideline*);
 - design details, location of sources/intakes and associated infrastructure;
 - the variability in the amount of water required on an annual and seasonal basis;
 - contingency plans for water supply, including the potential for extended periods of drought;
 - options for using non-potable groundwater and criteria used to assess the feasibility of its use;
 - water treatment facility, including the type and quantity of any chemicals used in treatment;
- water management plan for the construction, operation and reclamation phase, including a consideration of the following factors: site drainage, road and well site run-off, containment, erosion control, slumping areas, groundwater protection, groundwater seepage, potable water, produced water and flood protection, permanent or temporary alterations or diversions to watercourses and wetlands;

- wastewater management plan to address site runoff, groundwater protection, deep well disposal and wastewater discharge, including:
 - source, quantity and composition of each wastewater stream;
 - design of facilities that will handle, treat, store and release wastewater streams;
 - the type and quantity of any chemicals used in wastewater treatment;
 - locations and formations for the disposal of wastewaters, including:
 - i. formation characterization;
 - ii. hydrodynamic flow regime;
 - iii. water quality;
 - iv. chemical composition and compatibility;
 - v. containment potential within the disposal zones, and
 - vi. injection capacity;
- a conceptual reclamation plan considering the following:
 - reclamation requirements specified by relevant regulatory organizations and stakeholder preferences;
 - project development phasing, and reclamation sequencing for each phase of development;
 - integration of operations, reclamation planning and reclamation activities;
 - 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 appropriate sub-region of the Prairie Natural Region (e.g. Mixed Grassland Region) with reference to the use of native vegetation species;
 - re-establishment of self-sustaining topography, drainage and surface watercourses and vegetation communities representative of the surrounding area;
 - how reclamation will be implemented should the project, or portions thereof, change ownership, or the proponent becomes insolvent.
- other information:
 - work schedule according to the various phases of the project;
 - scheduling changes that could affect the project;
 - potential cooperative development opportunities for the proposed project (e.g. shared infrastructure);
 - required labour force and daily work schedules, according to each phase of the project;
 - lifetime of the project and future development phases (including need for additional compression facilities), if any;
 - estimated costs of the project and the alternative means.

The proponent is encouraged to design and build its infrastructure in the most energy efficient manner possible while minimizing adverse environmental effects. As for pollution and pollution prevention, the proponent shall use methods, products and materials that will contribute to reducing the quantity of pollutants and waste as well as global risks to human health and the environment.

4. PUBLIC CONSULTATION

The proponent shall describe the consultations and the information periods that they will hold or that they have already held within the context of the project at the local, regional and national levels, where applicable. It shall indicate the methods used and their relevance, the places where the consultation was held, the persons and organizations consulted, the concerns voiced and the extent to which this information was incorporated in the design of the project as well as in the environmental impact statement. Moreover, the proponent shall describe any outstanding issues.

Consultation will include discussions with:

- i) Alberta provincial representatives;
- ii) Federal government representatives;
- iii) First Nations organizations;
- iv) Commercial, industrial, agricultural, recreational and traditional users;
- v) Environmental organizations and citizen's coalitions; and
- vi) Other potentially interested parties.

5. DESCRIPTION OF THE RECEIVING ENVIRONMENT

This section of the environmental impact statement establishes the boundaries of one or several study areas and describes the components of the biophysical and human environments relevant to the project.

5.1 Study Area Boundaries

The proponent shall specify, justify and present the study areas. The study areas will take into account the extent of the anticipated effects and the appropriate ecological and human boundaries for the various environmental components.

The spatial boundaries shall include all areas where measurable changes in the environment may be caused by the proposed project regardless of any political boundaries. At and beyond the study areas the anticipated environmental conditions should be similar with and without the proposed project. The proponent shall provide maps of suitable scale that include legal land descriptions, topographical and other natural features that illustrate the proposed study areas.

The following spatial boundaries may be considered by the proponent:

- *Site Study Area*: The area directly affected by the preparation, construction, operation and decommissioning activities;
- *Local Study Area*: The area that could potentially be affected by preparation, construction, operation and decommissioning activities;
- *Regional Study Area*: The area that could potentially be affected by the project beyond the local and site study areas. This may include regional access routes to the site, and broader habitat ranges for wildlife that may be affected by the project.

The temporal boundaries of the project shall cover all phases of the project: construction, operation, maintenance, foreseeable modifications and, where relevant, the abandonment and decommissioning of works and the rehabilitation of the sites affected by the project. If information is inadequate to apply the full scope of temporal boundaries the report shall identify the boundaries used and provide a rationale for the boundaries selected.

5.2 Identification of the Key Issues

To better focus the environmental impact statement, the proponent shall identify the key issues related to the project. These issues refer to rather broad and general problems considered important from a scientific and social standpoint. Moreover, these issues take into account the concerns and worries of the communities affected by the project, which can tip the balance in favour of or against the project.

It is understood that the process for defining the key issues is iterative and that the list of issues can be modified during the effect analysis phase. The issues can be revised and adjusted in relation to the information acquired in the field and during consultations held by the proponent.

For information purposes, the following are a few criteria that could prove relevant in the choice of the key issues:

- public concerns related to the component;
- economic significance;
- protected status of the component;
- regulatory requirements;
- rarity or special status of the component;
- preservation of biodiversity;
- sensitivity of the component to disturbances or pollution;
- importance of the component's ecological role;
- cultural and social significance of the component.

5.3 Description of the Relevant Components

The environmental impact statement shall describe the existing environment in the study area prior to implementation of the project, which constitutes the reference state of the environment. The proponent shall present a time series of data and sufficient information to establish the averages, trends and extremes of the data. For key environmental and social components, the proponent shall determine how far back in time and how far into the future the study should be conducted. The proponent will identify any deficiencies in information, and how these deficiencies will be addressed.

Using qualitative and quantitative surveys, the study shall describe, as factually as possible, the components of the biophysical and human environments likely to be affected by the project. If the data available from government or other agencies is insufficient or no longer representative, the proponent shall complete the description of the environment with surveys according to generally accepted practices.

This description focuses on the components relevant to the key issues and effects of the project. It shall only include the data necessary to analyze the effects. The environmental impact statement shall provide all of the information required to understand or interpret the data (methods, survey dates and times, weather conditions, location of sampling stations, etc.).

In describing the biophysical environment, the environmental impact statement shall provide a general overview of the physical and biological components likely to be affected or to affect the project, paying particular attention to the significant elements of the natural heritage. The impact statement shall, wherever possible, explain the relationships and interactions between the various components of the environment, making it possible to delimit ecosystems with high potential and of particular interest.

The description of the human environment shall present land development planning at various levels of government and known projects in the area. The existing and historical human heritage shall be described so as to enable an understanding of the local communities and how they use or could use the various components of the environment, taking into account the social, cultural and economic values they place on it.

In a general way and without limiting themselves thereto, the proponent shall therefore describe, for all of the planned sites, the natural and human environments, within the study area, as they existed prior to implementation of the project, with special attention to the following:

5.3.1 Physical Environment

1. climate, including mean air and water temperatures, freezing and thawing periods, winds;
2. in accordance with the document entitled *Incorporating Climate Change Considerations in Environmental Assessment: General Guidance for Practitioners*, review and discuss climate change trends and projections and how they affect the study area;

3. the quality of ambient air, including, emission point sources and fugitive emissions. A discussion of air quality parameters such as SO₂, H₂S, total hydrocarbons (THC), NO_x, VOCs, individual hydrocarbons of concern in the THC and VOC mixtures, ground-level ozone (O₃), visibility, representative heavy metals, and particulates (road dust, PM₁₀ and PM_{2.5});
4. regional and site-specific geological formations using structure contour maps, geological cross-sections and isopach maps to illustrate depth, thickness and spatial extent of lithology, stratigraphic units and structural features including water table and potentiometric surfaces;
5. the surficial geology, terrain and soils conditions, including:
 - a topographic map of the study areas and a description of topographic patterns (e.g., elevation, slope gradient, relief);
 - surficial geology including surface topography of the study areas and the bedrock;
 - a description of the geologic formations from which natural gas may be produced;
 - description of extent and nature of sediments infilling the Lethbridge Preglacial Valley;
 - a characterization of soil properties of the representative soils types in the project area with respect to baseline soil properties required to assess agricultural capability;
 - map of the soil types, textural classes of surface and parent material and their distribution throughout the study areas using appropriate survey intensity levels. Ecological context to the soil resource, supplying a soil survey report and maps following the Soil Survey Handbook, Volume 1 (Agriculture Canada 1987) to include Survey Intensity Level 1 shall be provided;
 - an inventory of the land capability classes for soils;
 - location of saline and alkali soils, dunes, erosion sensitive, and otherwise stony surface materials;
6. for any well sites close to canyon/coulee walls, location of slope instability and unstable fractured bedrock;
7. regional, local and site-specific hydrogeology describing:
 - the spatial distribution of aquifers and aquitards, their properties and the hydraulic connections between hydrostratigraphic units (include local and regional hydrostratigraphic cross sections);
 - the hydraulic head, hydraulic gradients and groundwater flow directions and velocities;
 - the chemistry of groundwater including background, baseline concentrations of major ions, metals and hydrocarbon indicators;
 - the existing and potential discharge zones, existing and potential recharge zones and sources, areas of groundwater-surface water interaction and areas of Quaternary aquifer-bedrock aquifer interaction;
 - all water well development and groundwater use, including an inventory of all groundwater users, (field verified survey);

- the depth of potable water and /or indicate provincial-defined base of groundwater protection in the region;
 - the recharge potential for Quaternary aquifers;
 - the potential hydraulic connection between production zones and other aquifers;
 - the site-specific aquifer(s), shallow groundwater and geotechnical conditions beneath these proposed facilities;
 - groundwater quality in a regional and site-specific context;
8. any watercourses potentially affected by the project, including:
 - the width, depth, flow, current velocity, bank slope, substrate type (clay, silt, sand, gravel, cobble, rock, etc.). Indicate if the watercourse is permanent or intermittent;
 - local and regional surface flow baseline data, including low, average and peak flows;
 - description and map of existing drainage patterns;
 - any alterations in flow on the local and regional hydrology;
 - identification of all temporary and permanent alterations, channel realignments, disturbances or surface withdrawals, their magnitude, duration and frequency;
 9. the water quality and sediment quality of watercourses potentially affected by the project including baseline and any historical data, using all appropriate water and sediment quality parameters, their seasonal variations and relationships to flow and other controlling factors. Where appropriate include seasonal or large alkalai;
 - relevant water quality parameters to include, but not limited to, temperature, pH, dissolved oxygen, major ions, metals, trace organic compounds, suspended solids and nutrients and compare water quality data to the Surface Water Quality Guidelines for Use in Alberta (AENV 1999), Canadian Water Quality Guidelines (CCME 1999) and USEPA Guidelines;
 10. sound environment (at site boundaries and at sensitive sites), including a description of the project's components that have the potential to increase noise levels;
 11. baseline biophysical information in a manner that enables an ecological land classification of the study areas to be completed to the prairie ecosite classification;

5.3.2 Biological Environment

12. existing wildlife resources, their use and potential uses of habitats in the study areas;
13. description and quantification of soil-landscape units as plant and wildlife habitat;
14. composition, distribution and abundance of terrestrial vegetation, using the land cover classification template developed for the NWA and in use at CFB Suffield;
15. description and quantification of the disturbance footprint, including the level of land cover fragmentation and native prairie loss outstanding as a result of the linear disturbance footprint;
16. specific composition, distribution, abundance, seasonal movements, movement corridors, habitats requirements, key habitat areas and general life history, including endemics, of wildlife in the Study Area;
17. prairie endemic wildlife and plant species (in terms of abundance, distribution and diversity) and their significant habitats, whether they are terrestrial or aquatic;
18. species that are included in Schedules 1, 2 or 3 of the Species at Risk Act, and include extirpated, endangered, threatened, or special concern, or likely to be designated as such, and COSEWIC (2002) . Describe the use of the environment and habitat by these species;
19. species listed in the Provincial *General Status of Alberta Wild Species* 2000);
20. mapping of exceptional plant communities and wildlife habitats requiring special protection;
21. existing range/pasture use and capability in the Study Area(s). Conduct and discuss a pre-development rangeland health assessment using Range/Pasture Health Assessment (Alberta Rangeland Health Task Group, 2000) to assess pre-disturbance and post reclamation rangeland capability and the return of equivalent capability;
22. description and location of wetlands in the study area, including type, function (water quality, quantity, habitat, etc.) and area of each wetland, using the *Alberta Wetlands Inventory Standards Manual* (AWI) Version 1.0;
23. description of the fish and other aquatic resources (e.g., benthic invertebrate) in or reliant upon the waters found in the study area and in other fish-bearing water likely to be impacted by the project, including:
 - species composition, distribution, relative abundance, movements and general life history parameters;
 - a description (including maps) of the habitat likely to be affected;
 - key indicator species (provide the rationale and selection criteria used);
 - critical or sensitive areas such as spawning, rearing, and over-wintering habitats. Discuss seasonal habitat use including migration and spawning routes;

24. all of the bird species that are present in the study area, including those listed in the *Migratory Birds Convention Act*, and are likely to use it, including the characteristics of their habitats (e.g., nesting, feeding, migration, etc.) that could be affected by the project. The proponent, without limiting themselves thereto and depending on the circumstances, shall:
- provide a list of bird species that are likely to use the environment targeted by the project and indicate precarious species that appear on federal and provincial lists;
 - specify the location and areas of bird habitats and describe, on a quantitative basis (e.g., number of nesting couples/ha), how they could be used by birds (breeding, nesting, feeding, resting, migration);
 - accurately locate and describe the habitats well-suited for precarious bird species that appear on federal and provincial lists and have been or are likely to be found in the study area;
 - provide a list of bird species present in the study area that are of scientific, social, economic or cultural interest (explain why);
25. discuss soil-landscape units of CFB Suffield in consideration of their potential to support rare plant species, plants for traditional and medicinal purposes and communities of limited distribution. Consider their importance for local and regional habitat, rare plant habitat and the hydrologic regime;
26. determine the suite of biotic and abiotic biodiversity indicators for terrestrial and aquatic ecosystems that characterize naturally functioning ecosystems in the study area(s) and represent broader taxonomic assemblages using the definition for biodiversity provided in the Canadian Biodiversity Strategy (1995);
- discuss the selection process and rationale used to select biotic and abiotic biodiversity indicators;
 - ensure that baseline information collected in each terrestrial and aquatic community is accompanied by sufficient plots in each soil-landscape phase to provide statistically sound data using a suitable sampling method;
 - discuss the regional presence and abundance of species in each soil-landscape phase or ecological type within selected taxonomic groups;
 - provide species lists and summaries of observed and estimated species richness and evenness;
 - rank each ecological unit for biodiversity potential by combining measures of species richness, overlap in species lists, importance of individual species or association, uniqueness and other appropriate measures. Describe the techniques used in the ranking process;
 - provide a measure of biodiversity on baseline sites that are representative of the proposed reclamation soil-landscape;
 - compare biodiversity at sites with existing oil and gas activities with comparable sites proposed for development;

5.3.3 Human Environment

27. cadastral mapping of the project's main components;
28. ownership status of land by describing the rights of ownership and use granted, the procedure for acquiring these rights or the status of the agreements to be signed;
29. status of Prairie Farm Rehabilitation Administration agreements for the study areas;
30. occupation and current and planned land use of the study area, including other petroleum and natural gas rights and dispositions, agreements for military activities;
31. the use of fish resources for sport or commercial fisheries;
32. the gathering of country food and collection of plant propagules for reclamation purposes, in project area or such areas that could be affected by the project;
33. current use of land, wildlife and plant resources, both terrestrial and aquatic, by Aboriginal communities for traditional purposes;
34. land use policies and resource management initiatives, including those that pertain to the protected area designation of the study area;
35. unique sites or special features in the Study Area(s), including any Special Places candidate sites, Environmentally Sensitive Areas, reserves or other protected areas, conservation agreement lands and habitat enhancement projects;
36. cultural, historical, archaeological and paleontological resources. This study should be prepared by a professional archaeologist or historical resource consultant. It should include:
 - an overview of regional archaeological knowledge with an emphasis on land use through time;
 - a preliminary overview of the region's post-contact history with an emphasis on historical land use;
 - an identification of all known historical/archaeological resources in the project area;
 - an analysis and evaluation of the significance of known resources and their relationship to the landscape;
 - a landscape analysis of the area and preparation of a ranking/sensitive system. Areas of potential impact should be evaluated utilizing the ranking/sensitive system and should include detailed mapping evaluating the sensitivity of the potential impact areas to contain historical/archaeological resources;
 - a summary of consultation with appropriate Aboriginal groups and an evaluation of their interests in this area;
 - an explanation of criteria used to establish the ranking system employed;
 - recommendations for the most appropriate approaches to the identification of historical/archaeological resources likely to be impacted during the drilling operations, and the identification of most-appropriate mitigation procedures;
37. landscapes, including a visual study to determine exceptional scenic quality;
38. social, economic and cultural profiles of the region.

6. DETERMINATION AND ASSESSMENT OF THE ENVIRONMENTAL EFFECTS

6.1 General Points

This section shall describe the project's effects on the biophysical and human environment. The proponent shall indicate the project's effects during construction, operation, maintenance, foreseeable changes and, when relevant, abandonment, decommissioning of works and rehabilitation of sites affected by the project, and describe these effects using the appropriate criteria. They shall consider both the direct and indirect, reversible and irreversible, short- and long-term environmental effects of the project. In predicting and assessing the project's repercussions, the proponent shall indicate important details and clearly state the elements and functions of the environment that may be affected, specifying the location, extent and duration of these effects and their overall impact. This assessment shall focus primarily on the key issues identified by the proponent.

Predictions shall be based on clearly stated cause-effect hypotheses. The proponent shall specify the indicators and how they were used to measure and verify these effects, particularly to distinguish between the effects of the project and those resulting from other activities or processes. With respect to quantitative models and predictions, the proponent shall discuss the hypotheses that underlie the model, the quality of the data and the degree of certainty of the predictions obtained. In terms of the degree of certainty of the methods and data used, the proponent shall exercise caution in assessing the effects and, therefore, also in the choice and scope of the mitigation measures as well as the follow-up programs.

The assessment of the effects of each of the works and activities, in both the construction and operation phase, shall be based on a comparison of the physical and biological environments in their present and future conditions and the interactions between these two elements. The assessment shall reveal the effects of the project before any mitigation measures are implemented. The level of confidence and relevance in adopting a precautionary approach may be influenced by the amount of effort invested in well documenting the physical or biological component of the environment with respect to the component affected.

6.2 Effects to Consider

The proponent shall present as accurately as possible the anticipated effects on the elements described in Section 5.3. More specifically, the assessment shall, without being limited thereto, address the following elements:

6.2.1 Physical Environment

1. the potential project effects on surface water and groundwater, including:
 - changes to the quantity of surface flow, water levels and channel regime in local watercourses (during minimum, average and peak flows), including the potential downstream effect;
 - assessment of the effect of any alterations in flow on the local and regional hydrology;
 - changes to the watershed(s), including surface and near-surface drainage conditions, potential flow impediment, and potential changes in open water surface areas caused by construction of access routes, drilling and well pads, and other facilities;
 - changes in sediment concentrations in receiving waters caused by construction;
 - changes in sediment quality, including appropriate sediment quality parameters;
 - if any surface water withdrawals are considered, description of the effects of withdrawal;
 - the effect on water quality in surface waterbodies due to a change in surface runoff or groundwater discharge;
 - the implications of any change in water quality for aquatic resources;
 - areas that have been temporarily or permanently encroached upon, drained or modified as a result of the project, with a description of these environments with respect to the various types of fish habitats (potential or confirmed);
 - modifications of hydrological and hydrometric conditions on fish habitat and the fish species' lifecycle activities (e.g., reproduction, fry-rearing, movements, etc.);
 - effects of physical-chemical changes of the environment on the fish species and their habitats (turbidity, contaminants, sedimentation, flow alterations and habitat changes, etc.);
 - identification of any potential erosion problems in the local creek channels due to existing or proposed project activities;
 - inter-relationship between groundwater and surface water in terms of surface water quantity and quality;
 - discussion of the potential for connection between surface water, groundwater, production zones and disposal zones;
 - implications on terrestrial or riparian vegetation, wildlife and aquatic resources including wetlands;
 - identify components of the project that may influence or impact surface water quality;
 - the effects of drilling practices on shallow potable groundwater quality;
 - changes in water quality that may indicate a potential adverse effect or non-compliance with the *Canadian Water Quality Guidelines*;

- conflicts with other groundwater and surface water users, and proposed resolutions to these conflicts;
 - potential implications of seasonal variations in water levels and water quality;
 - the potential impacts of air emissions on surface water quality;
2. effects on the drainage and the quality of drainage run-off from infrastructures and the environmental effects of the contaminants they may contain (oil, grease, chlorides, etc.) on the receiving environment;
 3. the project's contribution to atmospheric emissions, including:
 - emissions profile (type, rate and source) for each component of the project including point sources, fugitive emissions, construction and vehicle emissions. The proponent shall consider both normal operating conditions and upset conditions and discuss the following:
 - a. any National Pollutant Release Inventory, Priority Substance List 1, Priority Substance List 2, and/or Accelerated Reduction/Elimination of Toxics substances;
 - b. any odorous or visual emissions from the proposed facilities;
 - c. the amount and nature of any acidifying emission, probable deposition patterns and rates;
 - d. discussion of the formation of secondary pollutants such as ground-level O₃, secondary particulate matter, and acid deposition;
 - discussion of interactive effects that may occur as a result of co-exposure of a receptor to all emissions and discuss limitations in the present understanding of this subject;
 - the expected annual and total greenhouse gas (GHG) emissions;
 - the project's marginal contribution to total provincial and national GHG emissions on an annual basis;
 - the intensity of GHG emissions per unit of product produced and discuss how it compares with similar projects and technology performance;
 - 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*;
 4. components of the project that are sensitive to changes or variability in climate parameters and the effects of these changes on the project;
 5. the potential effects of any increased noise (present the result of a noise assessment as specified the EUB ID 99-8, Noise Control Directive) on potentially-affected communities, wildlife and vegetation;
 6. the potential effects of any increased road dust levels on potentially-affected communities, wildlife and vegetation;

7. effects on soil, including:

- the anticipated changes to soil quality (compaction, erosion, structure, loosening, drainage, potential acidification). Identify these soils (by soil type) with a soil map;
- the anticipated changes (type and extent) to baseline topography, elevations and drainage patterns;
- the effects of proposed drilling methods on the surface landscape, surficial and bedrock geology;
- the potential for changes in the ground surface during operations (e.g., ground heave and ground subsidence). Applicable experience with surface heaving and subsidence and the factors involved in their occurrence shall be summarized;
- identification of any activities with respect to drilling methods that may cause soil contamination;
- location of erosion sensitive, and otherwise stony surface materials and discussion of potential effects on these deposits and the associated landforms;
- the amount of surface disturbance caused by drilling waste disposal;

6.2.2 Biological Environment

8. determine the current and proposed level of habitat fragmentation for the study area. The techniques used in the fragmentation analysis shall also be described. Identify and evaluate the extent of potential effects from fragmentation, such as potential introduction of non-native plant species on native species composition, and any changes to plant and animal communities that may result from the project;
9. potential effects on wildlife populations, habitat use, habitat availability/quality and food supply;
10. consider habitat loss and change in terms of loss of native prairie, habitat change as mediated by habitat structural change, abandonment, reduced effectiveness, fragmentation or alteration, as they relate to reproductive potential, population viability and recruitment for regional wildlife populations;
11. discuss how the proposed activities will interact with the conservation of wildlife, pursuant to the *National Wildlife Area Regulations* and the *Species at Risk Act* and in the context of mandate and integrity of the National Wildlife Area;
12. describe the spatial and temporal changes to habitat (cover types, ecosite in terms of 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:
 - anticipated effects on wildlife as a result of changes to air and water quality, including both acute and chronic effects on animal health;
 - anticipated effects on wildlife due to improved or altered access into the area and the level of vehicle movements both on designated routes and at random over the landscape (e.g., vehicle collisions with wildlife, obstructions to daily or seasonal movements, dust, noise and hunting mortality during construction, operations/maintenance and after project reclamation);

- anticipated effects of habitat fragmentation and structure changes in vegetation communities and the implications to wildlife, by identifying and mapping the changes anticipated by the project and other planned activities on a local and regional scale;
 - discuss any existing wildlife studies that may be occurring in the study area(s) and how the proponent plans to integrate its operational activities and mitigation strategies with existing research;
13. the potential effects of the project on rare plants including species at risk and their critical habitat, as listed in Schedule 1, 2 and 3 of the *Species at Risk Act*, the Committee on the Status of Endangered Wildlife in Canada and the provincial *General Status of Alberta Wild Species*, 2000, for each habitat unit;
 14. where plant communities or landscape-soil classes are identified as rare, or where a significant percentage of a specific type may be removed by the project or fragmented by the disturbance footprint, describe the regional significance of those units and the anticipated effects;
 15. potential impacts on riparian areas that could impact aquatic biological resources and productivity;
 16. taking into account the anticipated modifications to fish habitat, the potential effects on fish and aquatic communities;
 17. losses, structural changes, or fragmentation of habitat (quality, area, functions) for avian species and communities, with special attention on precarious species, grassland endemics and alien species of particular social, economic and cultural interest;
 18. modifications in the abundance, distribution and productivity of land mammals;
 19. losses of area, fragmentation and functions of wetlands;
 20. the potential introduction and spread of non-native plant species, and invasive species on native species composition and any changes to plant and animal communities that may result;
 21. the effects of the project on biodiversity, including:
 - the contribution of the project to any anticipated changes in regional biodiversity including measures to minimize such change; and
 - how changes in biodiversity and endemism could potentially impact local and regional ecosystems.
 22. risk of causing significant effects on renewable resources and compromising the capacity of these resources to respond to present needs as well as those of future generations;

6.2.3 Human Environment

23. effects of the work on the natural and cultural heritage, including effects on important archaeological assets;
24. potential effects on the current use of land as well as aquatic and land resources used by Aboriginal communities for traditional purposes;
25. effects on the visual environment and changes to the aesthetic quality of the landscapes;
26. effects on public and community service infrastructures such as roads, railroads, water supplies, public safety services;
27. anticipated changes to traffic (e.g., type, and volume) on local highways during the construction and operation of the project. Discuss any effect expected on the primary and secondary highway system and other regional roads. Consider other existing and planned operations in the region;
28. the secondary effects that may result from linear development (e.g. secondary trails, increase in recreational users (e.g. anglers);
29. the effects of road maintenance on the nearby environmental components;
30. effects on the integrity of the Suffield National Wildlife Area (NWA) and the ability of the NWA to act as a research location for measuring the effects of land use activities on a native prairie ecosystem;
31. if surface water withdrawals is considered, the effects of water withdrawal on users who have existing approvals, permits or licenses;
32. local, regional and provincial economic spin-offs associated with the project and other economic factors (positive and negative) that affect the population (job opportunities, development of related services, local procurement, land and property values) as well as businesses and local government;
33. the potential effects of the project on land uses, including:
 - anticipated effects on grazing;
 - any anticipated effects related to changes in public access (e.g. by workers, operators, field technicians, etc.);
 - identification of any land use policies and resource management initiatives, including those that pertain to the “protected area designation” of the study area and discuss how the proposed development will be consistent with the intent of the guidelines and objectives of these initiatives;
 - the implications of those land and resource use policies, including any constraints to development;
34. the potential effects on unique sites or special features including Special Places candidate sites, Environmentally Sensitive Areas, reserves or other protected areas;

35. potential effects on health including discussion of the following:

- the potential health implications of the compounds that will be released to the environment from the proposed operation in relation to exposure limits established to prevent acute and chronic adverse effects on human health;
- the anticipated effects on human health related to the potential contamination of country foods;
- the potential to increase human exposure to contaminants from changes to water quality and drinking water consumption, air quality and soil quality, including:
 - a. geographical/hydrological linkage between private / community drinking water supplies and the project;
 - b. effects on private / community drinking water supplies under operational and accidental spill scenarios;
 - c. the capacity of existing community drinking water supply treatment facilities to handle contaminant loads.

6.3 Other Effects to Consider

6.3.1 Accidents and Malfunctions

The proponent shall pay special attention to assessing the effects related to the risk of accidents and malfunctions. The failure of certain works caused by human error or exceptional natural events could cause major effects. It is therefore necessary to conduct an analysis of the risks of natural events, technological accidents or unintended consequences of military activity, determine their effects and present a preliminary emergency measures plan for the construction and operation phases of the works to be built and for existing works requiring a modification in management. The environmental impact statement shall present all factors that could compromise the security conditions in the region affected by the project. It shall pay particular attention to the sensitive elements of the environment (e.g., natural sites of interest, areas of major use) that may be affected in the event of an accident or major malfunction.

6.3.1.1 Risk Analysis

The risk analysis of technological accidents or unintended consequences of military activity is based on identifying dangers (degree of hazard of products, system malfunctions, sources of failure, etc.) that can be used to establish accident scenarios. A record of accidents that have occurred for similar projects may be useful to establish potential accident and malfunction scenarios.

As part of his analysis, the proponent shall take into account the effects of the environment on the project, namely exceptional meteorological conditions (e.g., strong winds). Particularly, the proponent shall conduct a study of potential landslides in areas along coulees, particularly those associated with the South Saskatchewan River valley close to proposed well sites, pipelines and road access.

The proponent should also examine the potential for casing failures and the likely environmental effects of such a failure. Measures to reduce the environmental risks from casing failures shall be identified.

As well, the proponent should assess the potential for the Lethbridge Preglacial valley to contain gas-producing horizons and the potential for coarser units within this buried valley to host shallow gas producing reservoirs. The proponent will determine whether drilling in these unique environments could result in potential accidents. The proponent will describe any specific safety measures that would be put in place to prevent any accidents that may arise in these unique areas.

The proponent shall examine all of the factors that could compromise or improve the security conditions in the regions affected by the project. They shall carry out the risk analysis according to generally-accepted practices. The analysis shall include a description of the methods and hypotheses that constitute the basis of the risk analysis, and specify the limitations of the methods employed and the uncertainties regarding the results, where applicable. In addition, the analysis shall take into account the laws, regulations, standards and codes of practice to which the planned complex shall conform.

The risk analysis shall include an estimate of the repercussions related to accident scenarios. This step shall serve to define the areas where the safety of the surrounding populations and the integrity of the environment could be affected, as well as the presence of sensitive elements.

6.3.1.2 Safety Measures

To reduce the risks identified in the previous section, the proponent shall describe the safety measures planned for the different project locations. Specifically, the proponent shall provide the following information:

- security systems and prevention measures (leak detection systems, monitoring systems, Blow-Out Protectors, fire-control systems, standby emergency systems, hazard detection systems, etc.);
- how the systems' design and the management of their operations will minimize the risks of accidents and natural hazards;
- methods of detecting pipeline and casing failures and action plan in the event of a failure;
- 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;
- description of the measures that would be taken to restrict public access to any hazard zones.

6.3.1.3 Emergency Action Plan

The proponent shall present a preliminary emergency action plan for the project's main components that provide for an adequate response in the event of an accident. An emergency action plan generally includes the following elements:

- alert and evacuation plans for employees;
- relevant information in the case of an emergency (persons in charge, equipment available, plans and maps locating works, etc.);
- emergency intervention structure and decision-making mechanisms within the company;
- existing agreements with area municipalities or industry groups such as safety cooperatives, emergency response associations and municipal emergency response agencies and methods of communication with these external emergency preparedness organizations;
- protection measures to protect populations facing potential risks;
- methods for efficiently alerting populations facing potential risks, in collaboration with municipal and government bodies concerned (alerting public authorities and providing up-to-date information on the situation);
- program to update and re-evaluate emergency measures.

This plan will address the main actions to be taken to deal with crisis situations. It shall present the risks related to the safety of people and property, describe the measures planned to protect the population and the environment in the event of an accident and indicate the type of expertise required at the site.

The preliminary plan shall clearly describe the relationship with municipal authorities as well as communications mechanisms and the possibilities for integrating it into the emergency plans of local communities. If an emergency plan has already been submitted for a given territorial unit, it should be updated in order to integrate the new facility.

6.3.2 Cumulative Effects

The proponent shall identify and assess the project's cumulative effects. Cumulative effects are defined as changes to the environment due to an action (projects and human activities) combined with the existence of other works or other past, present and future human activities.

In the cumulative effects assessment, the proponent shall adhere to the approach described in the Canadian Evaluation Assessment Agency's *Cumulative Effects Assessment Practitioners Guide* (1999).

Cumulative effects may result if:

- implementation of the project being studied caused direct residual negative effects, taking into account the application of technically and economically feasible mitigation measures on the environmental components;

- the same environmental components are affected by other past, present or future actions (projects or activities).

The environmental components that will not be affected by the project or will be affected positively by the project can, therefore, be omitted from the cumulative effects assessment. A cumulative effect on an environmental component may, however, be important even if the assessment of the project's effects on this component reveals that the effects of the project are minor.

Accordingly, the proponent shall:

- identify and justify the environmental components that will constitute the focus of the cumulative effects assessment. The proponent's assessment should emphasize the cumulative effects on the main valued environmental components that could potentially be most affected by the project. To this end, the proponent must consider, without limiting itself thereto, the following components likely to be affected by the project:
 - endangered or valued wildlife;
 - endangered or valued plant species, including native prairie ecosystem;
 - sensitive soils or landforms such as sand hills or dunes;
 - the Suffield National Wildlife Area and the conservation of wildlife pursuant to the *National Wildlife Area Regulations* and in the context of the mandate and integrity of the National Wildlife Area;
 - surface water and groundwater;
- present a justification for the geographic and temporal boundaries of the cumulative effects assessment. The proponent shall note that these limits can vary from one environmental component to the next. Based on new information, unknown at the beginning of the project assessment, it may be necessary to modify these limits;
- describe and justify the choice of projects and selected activities for the cumulative effects assessment. These shall include past activities and projects, those being carried out and any future project or activity likely to be carried out;
- describe the mitigation measures that are technically and economically feasible, determine the significance of the cumulative effects. The proponent shall assess the effectiveness of the measures applied to mitigate the cumulative effects. To minimize the predicted effects, they shall assess the significance of the long-term residual effects. In cases where measures exist that are beyond the scope of the proponent's responsibility that could be effectively applied to mitigate these effects, the proponent shall identify these effects and the parties that have the competence to act. In such cases, the proponent shall summarize the discussions that took place with the other parties in order to implement the necessary measures over the long term;
- develop a follow-up program to verify the accuracy of the assessment or to dispel the uncertainty concerning certain cumulative effects.

7. MITIGATION, COMPENSATION AND RESIDUAL EFFECTS

7.1 Mitigation and Compensation Measures

Under the *Canadian Environmental Assessment Act*, mitigation is defined as the elimination, reduction or control of the adverse environmental effects of the project, and includes restitution for any damage to the environment caused by such effects through replacement, restoration, compensation or any other means. As a first step, the proponent is encouraged to use an approach based on the avoidance and reduction of the effects at the source. Such an approach may include the modification of the design of the project or its relocation.

The proponent shall describe the standard mitigation practices, policies and commitments that constitute mitigation measures and that will be applied as part of standard practice regardless of location. The proponent shall then describe its environmental protection plan and their environmental management system, through which it will deliver this plan. The plan shall provide an overall perspective on how potentially adverse effects will be minimized and managed over time. As well, the proponent shall describe its commitments, policies and arrangements directed at promoting beneficial or mitigating adverse socioeconomic effects. The proponent shall discuss any requirements for contractors and sub-contractors to comply with these commitments and policies.

The environmental impact statement shall specify the actions, works, corrective measures or additions planned during the project's various construction and operation phases to eliminate or reduce the significance of adverse effects. The impact statement shall also present an assessment of the effectiveness of the proposed mitigation measures and provide an estimate of their costs. The reasons for judging if the mitigation measure reduces the significance of an adverse effect shall be made explicit.

Additionally, the proponent will explain how the regulatory processes, initiatives, practices and guidelines will contribute to the avoidance or reduction of adverse effects.

For inevitable residual effects, the proponent may propose compensation measures for the biological environment and the citizens and communities affected. The loss of fish habitat shall be compensated by the creation or improvement of equivalent habitats. It is important to note that the term "compensation" does not refer to financial compensation, unless the adverse effect relates to an economic loss.

The proponent will consider the following mitigation measures:

- water management plans and specific measure to maintain surface water quality;
- how surface disturbance (magnitude, extent, timing, frequency and duration) will be minimized;
- soil and reclamation material salvage indicating areas where salvage will occur (e.g. well pads, access routes), the depth and volume of soil to be salvaged, soil storage areas and soil handling procedures indicating relationship to predevelopment conditions;
- areas of soil replacement indicating depth, volume, timing, technique and type of reclamation material;

- discussion of remedial measures to alleviate anticipated erosion;
- re-establishment of self-sustaining topography, drainage and surface watercourses and vegetation communities representative of the surrounding area;
- greenhouse gas management plans, including any plans for the use of offsets, (nationally or internationally) and the expected results of such plans;
- 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;
- applicability of sulphur recovery, acid gas re-injection, or flue gas desulphurization to reduce sulphur emissions and applicability of the EUB sulphur recovery guidelines (Interim Directive ID 2001-03);
- emergency flaring scenarios (e.g., frequency and duration) and proposed measures to ensure flaring events are minimized;
- gas collection, conservation and applicability of technology for vapour recovery for the project;
- opportunities to undertake progressive reclamation to offset new disturbance;
- 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 appropriate sub-region of the Prairie Natural Region (e.g. Mixed Grassland Region) with reference to the use of native vegetation species;
- a weed/vegetation management plan that will detail how the proponent will prevent the establishment and control the spread of restricted and noxious weeds and invasive species within the site study area (as listed in the *Alberta Weed Control Act*);
- the design, construction and operational factors to be incorporated into the project for the protection of fish resources. Identify plans proposed to offset any loss in the productivity of fish habitats. Indicate how environmental protection plans address applicable provincial and federal policies on fish habitat including the development of a “No Net Loss” fish habitat objective;
- measures to protect wetlands (including avoidance), and describe how the proposed measures would be expected to meet the *Federal Policy on Wetland Conservation*;
- 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;
- methods and alternatives to re-establish native grasslands including, but not limited to, native seed salvage and native sod salvage;
- a plan to mitigate the adverse effects of site clearing on rare plants and plant communities;
- setbacks around environmentally sensitive areas such as critical habitats, surface waterbodies, riparian areas and wetlands;
- plans for using chemicals to manage weed growth near drainages or waterbodies, including strategies for minimizing adverse environmental impacts associated with the use of such chemicals;

- strategy and mitigation plan to minimize impacts on wildlife habitat through the life of the project and to return productive wildlife habitat to the area, considering:
 - habitat enhancement measures and a schedule for the return of habitat capability to areas impacted by the Project;
 - consistency of the plan with applicable regional, provincial and federal wildlife habitat objectives, policies and regulations, in particular with the National Wildlife Area Regulations and the *Species at Risk Act*;
 - the need for access controls or other management strategies to protect wildlife during and after project operations; and
 - indicate what measures will be taken to prevent habituation of wildlife and increasing the potential for human-wildlife encounters and consequent destruction of wildlife including any staff training program, garbage containment or regular follow-up;
- an access management plan to minimize effects from vehicle and foot traffic in the study area.

7.2 Determination of the Significance of Residual Effects

After having established the mitigation and compensation measures, the impact statement shall present the residual effects of the project on the components of the biophysical and human environments.

The impact statement shall include a summary of the project's residual effects so that the reader clearly understands the real consequences of the project, the degree of mitigation of the effects and which effects cannot be mitigated or compensated for. A summary table that presents the effects before mitigation on the various components of the environment, the mitigation measures applied and the residual effects shall be included in the study.

This approach implies that the proposed mitigation measures shall be considered an integral part of the project at the time when the significance of the project's environmental effects is determined. During the course of the project, the proponent shall ensure that these measures are implemented.

The impact statement shall include an evaluation of the significance of the residual effects in conjunction with the application of mitigation measures—which are technically and economically feasible—in a rigorous and objective manner. The chosen method and the criteria used to determine the significance of the effects shall be clearly described and explained. The proponent may assess the significance of predicted effects, for example, according to the following criteria:

- intensity of the effect;
- geographic extent;
- duration and frequency;
- degree to which effects are reversible or irreversible;

- sensitivity or vulnerability of the component;
- uniqueness or rarity of the component;
- value of the component at the local and regional levels;
- formal recognition of the component by an act, policy, regulation or other official decision (park, ecological reserve, threatened or vulnerable species, etc.);
- risks to health, safety or well-being of the local communities;
- capacity of renewable resources to meet present and future needs.

The analysis of the significance of the effects shall contain sufficient information to allow the authorities concerned and the public to understand and evaluate the reasoning of the proponent. In particular, the proponent will provide a summary of the regional, provincial or national objectives, standards or guidelines that have been used to assist in the evaluation of the significance of environmental effect.

If significant negative effects are identified, the proponent shall determine the degree of probability that they will occur. The proponent shall also address the degree of scientific uncertainty related to the data and methods used within the framework of its environmental analysis.

8. Monitoring and Follow-up Program

The following sections aim to establish the outline of the monitoring and follow-up programs associated with the project to be presented in the environmental impact statement.

8.1 Monitoring Program

The proponent shall prepare an environmental monitoring program, which it plan to carry out during the construction, operation, maintenance and foreseeable modification phases and, where applicable, during the abandonment, decommissioning and rehabilitation phases of the sites affected by the project and the related facilities, activities and projects.

This program will help ensure that the project is implemented as proposed, that the mitigation or compensation measures proposed to minimize the project's environmental effects is respected, and that the conditions set at the time of the project's authorization and the requirements pertaining to the relevant laws and regulations are met. The monitoring program will also make it possible to check the proper operation of works, equipment and facilities. If necessary, the program will help reorient the work and possibly make improvements at the time of construction and implementation of the various elements of the project.

Specifically, the environmental impact statement shall present an outline of the preliminary environmental monitoring program which shall include:

- identification of the interventions that pose risks to one or more of the components and the measures and means planned to protect the environment;

- description of the characteristics of the monitoring program where foreseeable (e.g., location of interventions, planned protocols, list of measured parameters, analytical methods employed, schedule, human and financial resources required);
- an intervention mechanism in the event of the observation of non-compliance with the legal and environmental requirements or with the obligations imposed on contractors by the environmental provisions of their contracts;
- the guidelines for preparing monitoring reports (number, content, frequency, format) that will be sent to the federal authorities concerned.

The proponent will document current and planned participation in regional cooperative efforts to address environmental and socio-economic issues associated with oil and gas development during the life of the project. This would include EnCana's participation in regional air, water, wildlife, vegetation and other environmental monitoring programs, health studies, research, traditional ecological knowledge and socio-economic studies.

8.2 Follow-up Program

The purpose of the follow-up program is to verify the accuracy of the predictions made in the assessment of the effects as well as the efficiency of the mitigation measures. The duration of the follow-up program shall be as long as is needed for the environment to regain its equilibrium and to evaluate the effectiveness of the mitigation measures.

The impact statement shall present a preliminary follow-up program. This program shall include:

- objectives of the follow-up program and the components targeted by the program;
- list of elements requiring follow-up;
- number of follow-up studies planned as well as their main characteristics (list of the parameters to be measured, planned implementation timetable, etc.);
- intervention mechanism used in the event that an unexpected deterioration of the environment is observed;
- commitments of the proponent regarding the dissemination of follow-up results among the concerned populations;
- accessibility and sharing of data for the general population;
- opportunity for the proponent to take advantage of the participation of stakeholders on the affected territory, during the implementation of the program;
- involvement of local and regional organizations in the design, implementation and evaluation of the follow-up results as well as any updates, including a communication mechanism between these organizations and the proponent;
- communication plan for data gathered.

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