

Report of the Joint Review Panel

EnCana Shallow Gas Infill Development Project
Canadian Forces Base Suffield National Wildlife Area, Alberta



**REPORT OF THE JOINT REVIEW PANEL ESTABLISHED BY THE
FEDERAL MINISTER OF THE ENVIRONMENT AND
THE ALBERTA ENERGY AND UTILITIES BOARD
Decision 2009-008: EnCana Shallow Gas Infill Development Project**

January 27, 2009

Published by

Energy Resources Conservation Board
640 – 5 Avenue SW
Calgary, Alberta T2P 3G4
Telephone: 403-297-8311
Fax: 403-297-7040
E-mail: Publications@ercb.ca
Web site: www.ercb.ca

and

Canadian Environmental Assessment Agency
160 Elgin Street, 22nd Floor
Place Bell Canada, Ottawa, Ontario K1A 0H3
Tel.: 613-957-0700
Fax: 613-957-0941
Web site: www@ceaa-acee.gc.ca

CONTENTS

Executive Summary	v
1 Introduction.....	1
1.1 Background	1
1.1.1 Application of the Canadian Environmental Assessment Act.....	1
1.1.2 Application to the Alberta Energy and Utilities Board.....	2
1.2 Joint Review Process.....	2
1.2.1 Joint Review Panel Agreement.....	2
1.2.2 Environmental Impact Statement Guidelines	3
1.2.3 Site Tour.....	3
1.2.4 Environmental Impact Statement.....	3
1.2.5 Information Requests and EnCana's Responses.....	4
1.2.6 Experts Hired by the Joint Review Panel	4
1.2.7 Public Hearing	4
1.2.8 Participant Funding Program	5
1.2.9 Confidentiality Requests.....	5
1.3 Purpose of This Report.....	5
2 Project Setting and Description	7
2.1 Project Setting	7
2.2 Project Components and Phases.....	7
2.2.1 Construction and Operations.....	9
2.2.2 Decommissioning and Reclamation	9
2.3 Regulatory Framework.....	10
3 Involvement of Interested Parties	13
3.1 Consultation Opportunities	13
3.2 The Participants.....	13
3.2.1 Government of Canada	13
3.2.2 Provincial Government	14
3.2.3 Aboriginal Groups	15
3.2.4 Environmental Coalition.....	15
3.2.5 Suffield Environmental Advisory Committee	15
3.2.6 Suffield Industry Range Control.....	15
3.2.7 Other Parties.....	16
4 Creation of the Suffield National Wildlife Area.....	19
4.1 Views of EnCana.....	19
4.2 Views and Concerns of Interveners	20
4.3 Panel Conclusions and Recommendations.....	21
5 Need for the Project and Alternatives Considered.....	23
5.1 Views of EnCana.....	23
5.2 Views and Concerns of Interveners	28
5.3 Panel Conclusions and Recommendations.....	29

6	Environmental Effects	35
6.1	Wildlife	35
6.1.1	Views of EnCana	36
6.1.2	Views and Concerns of Interveners	44
6.1.3	Panel Conclusions and Recommendations	53
6.2	Vegetation, Soils, and Reclamation	63
6.2.1	Views of EnCana	63
6.2.2	Views and Concerns of Interveners	71
6.2.3	Panel Conclusions and Recommendations	80
6.3	Wetlands.....	86
6.3.1	Views of EnCana	86
6.3.2	Views and Concerns of Interveners	87
6.3.3	Panel Conclusions and Recommendations	89
6.4	Water Resources.....	90
6.4.1	Views of EnCana	90
6.4.2	Views and Concerns of Interveners	94
6.4.3	Panel Conclusions and Recommendations	95
6.5	Historical and Palaeontological Resources	97
6.5.1	Views of EnCana	97
6.5.2	Views and Concerns of Interveners	98
6.5.3	Panel Conclusions and Recommendations	99
6.6	Effects of Potential Accidents and Malfunctions	99
6.6.1	Views of EnCana	99
6.6.2	Views and Concerns of Interveners	100
6.6.3	Panel Conclusions and Recommendations	101
6.7	Cumulative Environmental Effects	102
6.7.1	Views of EnCana	102
6.7.2	Views and Concerns of Interveners	105
6.7.3	Panel Conclusions and Recommendations	108
6.8	Biodiversity	115
6.8.1	Views of EnCana	115
6.8.2	Views and Concerns of Interveners	117
6.8.3	Panel Conclusions and Recommendations	119
6.9	Sustainability of Renewable Resources	119
6.9.1	Views of EnCana	119
6.9.2	Views and Concerns of Interveners	119
6.9.3	Panel Conclusions and Recommendations	119
7	Other Matters	121
7.1	Effects of the Project on Other Land Uses	121
7.1.1	Views of EnCana	121
7.1.2	Views and Concerns of Interveners	121
7.1.3	Panel Conclusions and Recommendations	122
7.2	Human Health, Noise and Air Quality	123
7.2.1	Views of EnCana	123
7.2.2	Views and Concerns of the Interveners	124
7.2.3	Panel Conclusions and Recommendations	124

7.3	Climate Change, Greenhouse Gases, and Weather	124
7.3.1	View of EnCana.....	124
7.3.2	Views and Concerns of Interveners	125
7.3.3	Panel Conclusions and Recommendations	125
7.4	Socioeconomic Effects.....	126
7.4.1	Views of EnCana	126
7.4.2	Views and Concerns of Interveners	126
7.4.3	Panel Conclusions and Recommendations	127
8	Environmental Management.....	129
8.1	Views of EnCana.....	129
8.2	Views and Concerns of Interveners	132
8.3	Panel Conclusions and Recommendations.....	137
9	Regulatory Matters.....	143
9.1	Views of EnCana.....	143
9.2	Views and Concerns of Interveners	145
9.3	Panel Conclusions and Recommendations.....	148
9.3.1	Canadian Forces Base Suffield	150
9.3.2	Proposed Project in the NWA.....	151
10	Alberta Energy and Utilities Board Application No. 1435831	165
10.1	Views of EnCana.....	165
10.2	Views and Concerns of Interveners	167
10.3	Panel Conclusions and Decision	169
11	Overall Conclusions.....	171
Appendices		
1	List of Recommendations	173
2	Glossary of Terms, Acronyms, and Abbreviations as Used in This Report.....	176
3	Panel Members—Biographical Notes.....	179
4	Agreement to Establish a Joint Panel.....	181
5	Hearing Participants.....	193
6	Ruling on Motion to Compel Alberta Environment and Alberta Sustainable Resource Development	196
Tables		
1	Milestones—Canadian Force Base Suffield National Wildlife Area	11
2	Valued ecosystem components selected by EnCana and significance of residual effects according to EnCana	37
3	Water sources and EnCana’s licensed allocation.....	91
4	Flow in the main aquifer compared to water requirements in the study area	93
Figures		
1	Project setting.....	8
2	Approximate depth and thickness of formations targeted by proposed infill wells in the NWA	23
3	Process chart for EnCana’s application process	144
4	Flowchart for Suffield Base NWA application process.....	146
5	Map showing areas applicable to the 1975 Agreement and NWA.....	156
6	Flowchart of recommended approval process	162

EXECUTIVE SUMMARY

EnCana Corporation has proposed to drill up to 1275 shallow gas wells in the Canadian Forces Base Suffield National Wildlife Area (NWA) over a three year period. The project would also include pipelines, access trails and other associated infrastructure. The NWA is located about 50 kilometres northwest of Medicine Hat, Alberta.

Approval to proceed would require a permit under the authority of the *Canada Wildlife Act*. Before such a permit may be issued, the *Canadian Environmental Assessment Act* requires an environmental assessment to be completed. EnCana also filed Application No. 1435831 with the Alberta Energy and Utilities Board pursuant to the *Oil and Gas Conservation Act* for licences to drill three wells in the NWA.

On November 16, 2006 the former Minister of the Environment, the Honourable Rona Ambrose and the former Chairman of the Alberta Energy and Utilities Board, Mr. Neil McCrank appointed this Joint Review Panel (the Panel) to undertake an environmental assessment review of EnCana's proposal and to reach a decision on the application to drill three wells. This report presents the Panel's findings, conclusions and recommendations¹ on the overall project and its decision with respect to the application to drill three wells.

The Panel held a public hearing in accordance with the Alberta Energy and Utilities Board Rules of Practice from October 6 to October 31, 2008 in Calgary and Medicine Hat. Participants who provided evidence at the hearing, in addition to those for EnCana, included members of the public, various environmental groups, energy companies, the Environmental Coalition, the Government of Canada, the Suffield Environmental Advisory Committee, the Suffield Industry Range Control and two Panel experts, Mr. J. Woosaree and Dr. T. Whidden. While participants brought many matters to the Panel's attention, the Panel considers the main issues were potential effects of the project on the native prairie grasslands, wildlife and the interjurisdictional regulatory process that applies to any development in the NWA. The most active interveners in the formal proceeding were the Government of Canada and the Environmental Coalition. The Government of Canada's overall position was that there was insufficient information to determine whether the project is likely to cause significant environmental effects. The Environmental Coalition's position was that the project should not be approved as it would have significant adverse impacts on important environmental features that were considered worthy of protection by the creation of the NWA.

Shallow gas production has occurred within the boundaries of the present-day NWA since the mid 1970s. Prior to the creation of the NWA in 2003, 1145 wells, pipelines and associated infrastructure had been constructed. The NWA was created in recognition of its ecological integrity and the diversity and abundance of native plant and animal species. The Province of Alberta owns the mineral rights underlying the NWA and the federal government owns the surface rights. An agreement between the two governments was signed in 1975, which established conditions for access by the province to produce natural gas on the property. The 1975 Agreement also spelled out the roles and responsibilities of the province or its delegate and the Department of National Defence, which administers the surface rights. The 1975 Agreement also created the Suffield Environmental Advisory Committee to assist in the implementation of environmental protection measures. However, since 1975, requirements for environmental

¹ See Appendix 1 for a list of all recommendations.

protection and indeed the legislative framework has evolved considerably with the repeal of the *Land Surface Conservation and Reclamation Act*, the passage of new legislation including the *Canadian Environmental Assessment Act*, the *Species at Risk Act* and the *Alberta Environmental Protection and Enhancement Act* and the creation of the NWA pursuant to the *Canada Wildlife Act* and the *Wildlife Area Regulations*.

The Department of National Defence manages the NWA and most of the responsibilities under the *Canada Wildlife Act* have been delegated to the Suffield Base commander. The NWA encompasses 458 km² of prairie grassland and hosts over 1100 catalogued species including 15 species listed as endangered, threatened or of special concern under the *Species at Risk Act*. It is one of the few large blocks of dry mixed-grass prairie remaining in Canada and accounts for about 30 per cent of all the protected grasslands in Alberta. Present activities in the NWA include gas production, research and cattle grazing. Military activity has been excluded from the area since 1971. There is no public access to the area as it is within the military base.

The fact that a national wildlife area was created to protect the ecological integrity of this land and the species that occupy it, suggests that great care must be taken to preserve its attributes. Considerable natural gas production occurred prior to the creation of the NWA and yet it was still considered to be worthy of such status. Although EnCana is proposing minimal disturbance techniques that the Panel considers to be best industry practices for shallow gas drilling, the environmental setting in which the project would occur is a nationally and internationally recognized area of environmental significance.

These factors in particular have influenced the Panel's overall conclusions and its recommendation that certain key requirements must be met before the proposed project or a variation of it could proceed. Failure to address these requirements would likely result in significant adverse effects on certain species at risk and consequently interfere with the conservation of wildlife. The recommended requirements are as follows:

- 1) Critical habitat for two wildlife species at risk, the Ord's kangaroo rat and the Sprague's pipit, as well as three plant species at risk, the tiny cryptanthus, the small-flowered sand verbena, and the slender mouse-ear-cress, must be finalized.**

Environment Canada has provided estimates of preliminarily assessed critical habitat within the NWA for those five species and has indicated that this determination could be finalized in six to twenty-four months. While the finalized critical habitat may differ from that presented at the hearing, it is likely that critical habitat for each of the five species will soon be designated within the Suffield NWA. The Panel has concluded that should the project proceed as planned before the critical habitat is determined, the adverse impact on these species would be significant given that they are already endangered or threatened. Opportunities to protect them under the *Species at Risk Act* would be lost. In the Panel's view, proceeding with the project at this time is likely to interfere with the conservation of wildlife in the NWA.

- 2) Once critical habitat is finalized, the proposed project facilities should not be located in the defined critical habitat for these five species, unless otherwise permitted under the *Species at Risk Act*.**

Evidence presented to the Panel suggests that Environment Canada would be reluctant to issue permits for activities that incidentally affect critical habitat under the *Species at Risk Act*. If so

and if the finalized critical habitat constitutes a high percentage of the NWA, the Panel recognizes that the proposed project may not be feasible. If, on the other hand, the finalized critical habitat is less than that currently contemplated, then the project or a reduced version of it may indeed be feasible. However, if a project proceeds after the critical habitat for the five species has been identified, there may be situations where EnCana believes it is essential to locate a facility within critical habitat for one or more of the species. In such a situation, the Panel assumes that EnCana would apply to Environment Canada for a *Species at Risk Act* permit. If a permit were to be issued, the Panel assumes that EnCana would then proceed to apply for the necessary facility approval from the Suffield Base commander and the Energy Resources Conservation Board (successor to the EUB).

3) The Suffield Environmental Advisory Committee, established under the 1975 Agreement allowing gas production in the present-day National Wildlife Area, is not able to oversee a development of this magnitude at present. Its role must be clarified and it must be resourced adequately by the governments of Canada and Alberta to be able to ensure proper regulatory oversight of the proposed project.

The regulatory process defined by the 1975 Agreement places great reliance on the Suffield Environmental Advisory Committee to oversee gas development. The agreement established a three-member Committee with membership from Environment Canada, Alberta Environment, and the Energy Resources Conservation Board in recognition of the complexity of the inter-jurisdictional issues associated with gas production on the Suffield Base. However much has changed since the committee was first formed, and there appears to be considerable uncertainty regarding the roles and responsibilities of various participants and differences in the interpretation of the 1975 Agreement.

These uncertainties and differences regarding regulatory roles have impacted negatively on the relationship between the Suffield Base and EnCana, a relationship that is fundamental to accomplishing the intent of the 1975 Agreement. Additionally, certain oversight activities intended in the 1975 Agreement do not appear to be fully functioning. An effective regulatory system is essential to minimize any negative impacts on the environment.

The Suffield Environmental Advisory Committee is presently a part-time responsibility for each of the three members. All parties agree that the committee is underresourced to deal with the size and timeframe of the proposed project. In addition, new functions have been identified for the committee under the proposed pre-disturbance assessment process and these would need to be resourced as well.

Once these requirements are met, it may be possible to proceed with the project or part of it. However, each application for a well, pipeline or associated facility should be reviewed by the Suffield Base commander to ensure that it would not interfere with wildlife conservation and that it is in compliance with any permit issued under the *Wildlife Area Regulations*.

In addition to the above key requirements, the Panel has provided a number of recommendations to further reduce possible adverse effects in this sensitive environment should it be decided that the project or a modified project should proceed.

The Panel has also made some recommendations to the Department of National Defence to assist in the overall management of the NWA regardless of whether the proposed project proceeds. The key recommendation is as follows:

The Department of National Defence, building on its existing management strategy and other management systems, develop a management plan for the National Wildlife Area.

Management plans have been developed for other national wildlife areas in Canada by Environment Canada to assist in the overall protection of the important environmental attributes of each area. Such a plan would provide an overview of the goals and objectives for the protection and restoration of the native prairie grasslands and the multitude of species that inhabit it. It should also include within it a plan to control invasive plant species. The Panel considers the presence of invasive plant species to be an ongoing problem that affects the integrity of the native prairie grasslands. It is not only caused by the presence of the petroleum industry. Control and reduction of invasive plant species will require effective management by all parties that access the NWA. Both the overall management plan and the plan to control invasive plant species should be developed in consultation with Environment Canada, all the users of the NWA and external groups such as member organizations of the Environmental Coalition.

Regarding the application by EnCana for licences to drill three wells, the Panel finds that the three-well application lacks complete and up-to-date pre-disturbance assessments for the proposed drilling sites. Given this shortcoming, the Panel finds that it is unable to fully assess the potential environmental impacts of the three proposed wells, as required by Section 3 of the *Energy Resources Conservation Act*.

Accordingly, the Panel finds that it is not in the public interest to approve the three-well application at this time. This decision is without prejudice to any future application that may be made for the three wells once the above requirements are met for the overall project.

**REPORT OF THE JOINT REVIEW PANEL ESTABLISHED BY THE
FEDERAL MINISTER OF THE ENVIRONMENT AND
THE ALBERTA ENERGY AND UTILITIES BOARD**

**ENCANA CORPORATION
SHALLOW GAS INFILL DEVELOPMENT PROJECT
SUFFIELD NATIONAL WILDLIFE AREA, ALBERTA**

**Decision 2009-008
Application No. 1435831**

1 INTRODUCTION

1.1 Background

The joint review Panel was formed to examine a proposal by EnCana Corporation (EnCana) for a project that would be located in the Canadian Forces Base Suffield National Wildlife Area (NWA)². The 458 square kilometre (km²) NWA was created in 2003 within the boundaries of Canadian Forces Base Suffield (Suffield Base). The area has been recognized for many years as having important environmental features, including a unique contiguous block of native prairie and sensitive dune habitat. The lands of the present-day NWA have been out of bounds to military training since 1971. In 1975, an access agreement (the 1975 Agreement) was signed between the governments of Canada and Alberta allowing the production of natural gas in the area. The province owns the mineral rights within the Suffield Base, including the vast majority of the rights in the NWA. The 1975 Agreement contained various environmental protection measures for gas drilling and operations in recognition of the environmental sensitivity of the area. By the time the Suffield NWA was created, 1145 wells and associated infrastructure and pipelines had been installed.

EnCana proposed an infill drilling project of up to 1275 shallow sweet natural gas wells in the NWA over an anticipated three-year period. Infill drilling is drilling that occurs between established producing wells 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 about 220 km of additional pipeline and associated infrastructure and more than double the number of wells currently in the NWA.

1.1.1 Application of the Canadian Environmental Assessment Act

The project is subject to the *Canadian Environmental Assessment Act*, given the requirement that EnCana obtain a federal permit, pursuant to Sections 3 and 4 of the *Wildlife Area Regulations*. For the NWA, the Department of National Defence (DND) 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. With this regulatory role, DND is the responsible authority for the conduct of the environmental assessment for this project.

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 was initially subject to a comprehensive study.

² See Appendix 2 for a list of all acronyms and abbreviations used throughout the report.

As stipulated under the *Comprehensive Study Regulations* of the *Canadian Environmental Assessment Act*, DND held a public consultation on the scope of the environmental assessment and reported to the federal Minister of the Environment on the proposed 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. In February 2006, DND recommended that the Minister of the Environment refer the project to a review panel.

In April 2006, taking into account DND's recommendation and the level of public concern, the Minister of the Environment referred the environmental assessment of the project to a review Panel.

1.1.2 Application to the Alberta Energy and Utilities Board

EnCana filed Application No. 1435831 with the Alberta Energy and Utilities Board (EUB),³ pursuant to Section 2.020 of the *Oil and Gas Conservation Regulations*, for licences to drill three vertical wells at surface locations in Legal Subdivision (LSD) 11, Section 28, Township 15, Range 6, West of the 4th Meridian, LSD 13-28-15-6W4M, and LSD 15-28-15-6W4M. The purpose of the wells would be to obtain production from the Milk River, Medicine Hat, and Second White Speckled Shale Formations. The proposed well locations would be located in the southwest corner of the NWA. The projected total depth of each well would be 580 metres (m).

In Alberta, petroleum and natural gas operations are regulated provincially by the EUB. The EUB has statutory responsibilities pursuant to the *Alberta Energy and Utilities Board Act*, the *Oil and Gas Conservation Act* and *Regulations*, the *Pipeline Act* and *Regulations*, and the *Energy Resources Conservation Act*. Although EnCana's drilling and pipeline activities are subject to regulatory approvals by the EUB, the project did not trigger the environmental assessment requirements of the Alberta government. Nevertheless, the EUB is mandated to consider environmental matters in determining whether an application is in the public interest. To make this determination regarding EnCana's application, the EUB decided to participate in a joint environmental assessment process with the federal government.

1.2 Joint Review Process

1.2.1 Joint Review Panel Agreement

To avoid duplication, the Canadian Environmental Assessment Agency and the EUB agreed to establish a joint review panel consistent with the Canada-Alberta Agreement for Environmental Assessment Cooperation. In August 2006, the Canadian Environmental Assessment Agency invited public comment on a draft joint review panel agreement. In November 2006, after taking the comments received into consideration, the federal Minister of the Environment and the Chairman of the EUB signed an agreement to establish a three-member joint review panel to review the proposed project in the NWA.

³ On January 1, 2008 the EUB was replaced by the Energy Resources Conservation Board (ERCB) and the Alberta Utilities Commission. However, as Notice of the proceeding was provided to interested parties prior to January 1, 2008, the EUB retained jurisdiction over Application No. 1435831 pursuant to Section 80(3) of the *Alberta Utilities Commission Act*.

The Minister of the Environment appointed Mr. R. G. Connelly as the Panel chair and Dr. B. Ross as the other federal member of the Panel. The third Panel member appointed was Mr. J. Nichol, an EUB Board Member. In December 2007, Mr. Nichol retired from the EUB and was replaced on the Panel by Mr. G. J. DeSorcy. (See Appendix 3 for biographical notes on the Panel members.)

The Joint Review Panel Agreement (see Appendix 4) stated that the Panel shall conduct its review in a manner that discharges the responsibilities of the EUB under the *Alberta Energy and Utilities Board Act* and the *Energy Resources Conservation Act*, as well as the requirements set out in the *Canadian Environmental Assessment Act*. The Joint Review Panel Agreement described the terms and conditions, as well as the process to be followed, for conducting the joint review. The Panel's terms of reference described the scope of the environmental assessment and the key steps and associated timelines of the review process.

1.2.2 Environmental Impact Statement Guidelines

In August 2006, the Canadian Environmental Assessment Agency issued draft guidelines for the preparation of the environmental impact statement (EIS) for the proposed project. The purpose of the guidelines was to identify the scope and extent of the information to be contained in the EIS. These guidelines were the subject of a public comment period that ended in October 2006. After considering the comments received, the Panel issued the final guidelines in December 2006.

1.2.3 Site Tour

In June 2007, the Panel took part in a two-day site visit of the NWA and the Suffield Base. The Panel was accompanied by its staff and a group of interested parties, including representatives from EnCana, federal departments, the Siksika Nation, an environmental organization, and members of the public.

Because of the NWA's location within the Suffield Base, the site visit was organized by DND staff. Interested parties were invited to contribute to the site visit by proposing sites they considered important for the Panel to see. The site visit was structured to prevent direct interaction between the Panel members and interested parties on matters of substance associated with the review.

1.2.4 Environmental Impact Statement

At the end of May 2007, EnCana submitted its EIS. The Panel initiated a 60-day public comment period to obtain comments on whether the EIS adequately adhered to the guidelines. Following requests made by some interveners, the Minister of the Environment and the Chairman of the EUB amended the Joint Review Panel Agreement by extending the consultation period by 30 days, with a new deadline of August 27, 2007. EnCana was provided with an opportunity to review the comments received and respond to them. EnCana's responses to about 800 information requests were submitted to the Panel on September 7, 2007.

1.2.5 Information Requests and EnCana's Responses

Following its review of the EIS, the comments received, and EnCana's responses to those comments, the Panel informed EnCana that it did not have enough information to proceed to a hearing and requested additional information.

In November 2007, EnCana submitted its response to the Panel's request for additional information. The Panel then initiated a 30-day public comment period on the additional information.

The Panel considered all the information before it and on December 20, 2007, announced that it had adequate information to schedule a public hearing. The Panel made this decision based on a commitment by EnCana to submit a revised environmental protection plan and a draft environmental effects monitoring plan prior to the hearing.

1.2.6 Experts Hired by the Joint Review Panel

During the review of the information received, the Panel identified matters on which it required additional expertise to assist in assessing the environmental effects of the project.

Dr. T. Whidden was hired to prepare a report on wildlife; Mr. J. Woosaree was hired to prepare a report on soils, vegetation, rare plants, and reclamation issues.

These experts provided independent analysis and recommendations to the Panel on the EIS, responses to information requests and the subsequent submissions of the parties. Recognizing the nature of the review process, the experts did not have direct contact with the Panel. The two reports prepared by each expert were made available on the project's public registry, which is on the Web at http://www.ceaa-acee.gc.ca/050/viewer_e.cfm?cear_id=15620. The experts attended pertinent portions of the hearing, presented a summary of their analysis and recommendations, and were cross-examined. Neither expert participated in argument at the hearing.

1.2.7 Public Hearing

In January 2008, the Panel issued a notice of hearing. In February 2008, at the request of EnCana, the hearing was postponed and the hearing procedures were modified to include an additional round of information requests and responses.

The public hearing was held from October 6 to 31, 2008. To encourage the participation of the general public, the Panel scheduled informal and formal hearing sessions. The informal hearing sessions enabled individuals and groups that may not have been able to participate during the formal hearing to offer their views.

The Panel heard oral presentations from 21 interveners during the formal and informal hearing sessions⁴. The Panel also received 30 additional written submissions from participants who did not wish to make a presentation at the hearing. All hearing sessions were recorded by a court reporter and audio recordings were made available to the public. Hearing transcripts and all documents related to the overall environmental assessment process are available on the public registry established for the project.

⁴ See Appendix 5 for a list of hearing participants.

1.2.8 Participant Funding Program

To assist in their review of the EIS and their participation in the public hearing, the Canadian Environmental Assessment Agency awarded \$215 430 to three applicants as follows:

- Grasslands Naturalists Society, \$70 708
- Alberta Wilderness Association, \$101 931
- Nature Canada, \$42 791

1.2.9 Confidentiality Requests

The Panel received two requests to keep information confidential.

First, DND declined on the basis of confidentiality to respond to an information request by EnCana that asked for mapping and remote sensing source data and the methodology used to map linear features. In June 2007, EnCana wrote to the Panel and requested that a confidentiality order be issued. Following consultation with interested parties, the Panel concluded that it was appropriate to treat the information described as the “raster datasets from Smith and Tulis” as privileged and confidential, pursuant to Rule 12 of the *Alberta Energy and Utilities Board Rules of Practice* and Section 35 of the *Canadian Environmental Assessment Act*. On June 27, 2008, the Panel issued a confidentiality order that allowed parties who agreed to certain terms and conditions to review the raster dataset.

Second, in August 2008, EnCana requested a confidentiality order in relation to the information contained in Appendix J of EnCana’s reply submission entitled *Demonstration of the Pre-Disturbance Assessment Process*. Following consultation with interested parties, the Panel concluded that portions of the information that EnCana claimed should be kept confidential, namely, specific locations and habitat of species designated as endangered or threatened under the federal *Species at Risk Act* or under the provincial *Wildlife Act*, was not information that the Panel required to allow it to reach a decision on this matter. For this reason, the Panel directed EnCana to remove such information from Appendix J.

1.3 Purpose of This Report

This report presents the results of the Panel’s review of EnCana’s proposed project. It includes the Panel’s conclusions and recommendations, pursuant to the *Canadian Environmental Assessment Act*, and the Panel’s decisions, pursuant to the *Alberta Energy and Utilities Board Act* and the *Energy Resources Conservation Act*. DND, as the responsible authority, will lead the development of a government response to this report and seek approval of the response from the governor in council (i.e., the federal cabinet). This report also constitutes the Panel’s decision on Application No. 1435831 before the EUB.

The Panel is satisfied that it has complied with its terms of reference (see Appendix 4) and that it has gathered enough information to draw conclusions and make recommendations on the potential effects of the project.

2 PROJECT SETTING AND DESCRIPTION

2.1 Project Setting

The proposed project would be located in the Suffield National Wildlife Area (NWA), which is within the property of Canadian Forces Base Suffield (Suffield Base), about 50 km northwest of Medicine Hat and 250 km southeast of Calgary, Alberta (see Figure 1).

Gas development and cattle grazing have been conducted concurrently in this area for more than 30 years. Although part of the Suffield Base, no military training activities have occurred in the NWA since 1971. Stringent security and safety protocols are in effect for access to the Suffield Base, including the NWA, which is off limits to the public. There are no settlements within the NWA.

The NWA was created in 2003. It consists of 458 km² of largely unplowed prairie grassland landscapes of national significance, including sand hills, ancient glacial coulees, and the riverbank and breaks along the South Saskatchewan River valley. The area is found within the Dry Mixedgrass Subregion of the Grassland Natural Region of Alberta.

Differences in vegetation cover are notable between the northern (Middle Sand Hills) and southern (Mixedgrass) portions of the NWA. The northern portion of the NWA supports a much greater proportion of shrub lands and mixed shrub grasslands than the southern portion, which is dominated by upland grasslands. Wetlands and moist grasslands are considerably more common in the southern portion of the NWA.

Figure 1 provides a map of the area showing key features and locations within the boundary of the Suffield Base and the NWA that are referred to in this report.

2.2 Project Components and Phases

EnCana described the project from construction to reclamation as follows. It has proposed to drill up to 1275 infill vertical wells over three drilling seasons to extract the remaining recoverable shallow sweet gas from the NWA. EnCana submitted that the existing wells in the NWA produced 432 billion cubic feet (Bcf)⁵ of gas to the end of December 2006, and it expects the existing wells to recover an additional 120 Bcf of gas over their remaining life of 20 to 25 years. EnCana expects that the 1275 vertical infill wells would produce an incremental gas volume of 125 Bcf.

The project components include wells, gathering pipelines and associated aboveground facilities, access trails, and other infrastructure.

⁵ Gas volumes were expressed in the submissions and at the hearing primarily in imperial units and imperial units are being used in this report. The conversion factor to metric units is: 1 Bcf = 28.17 million cubic metres.

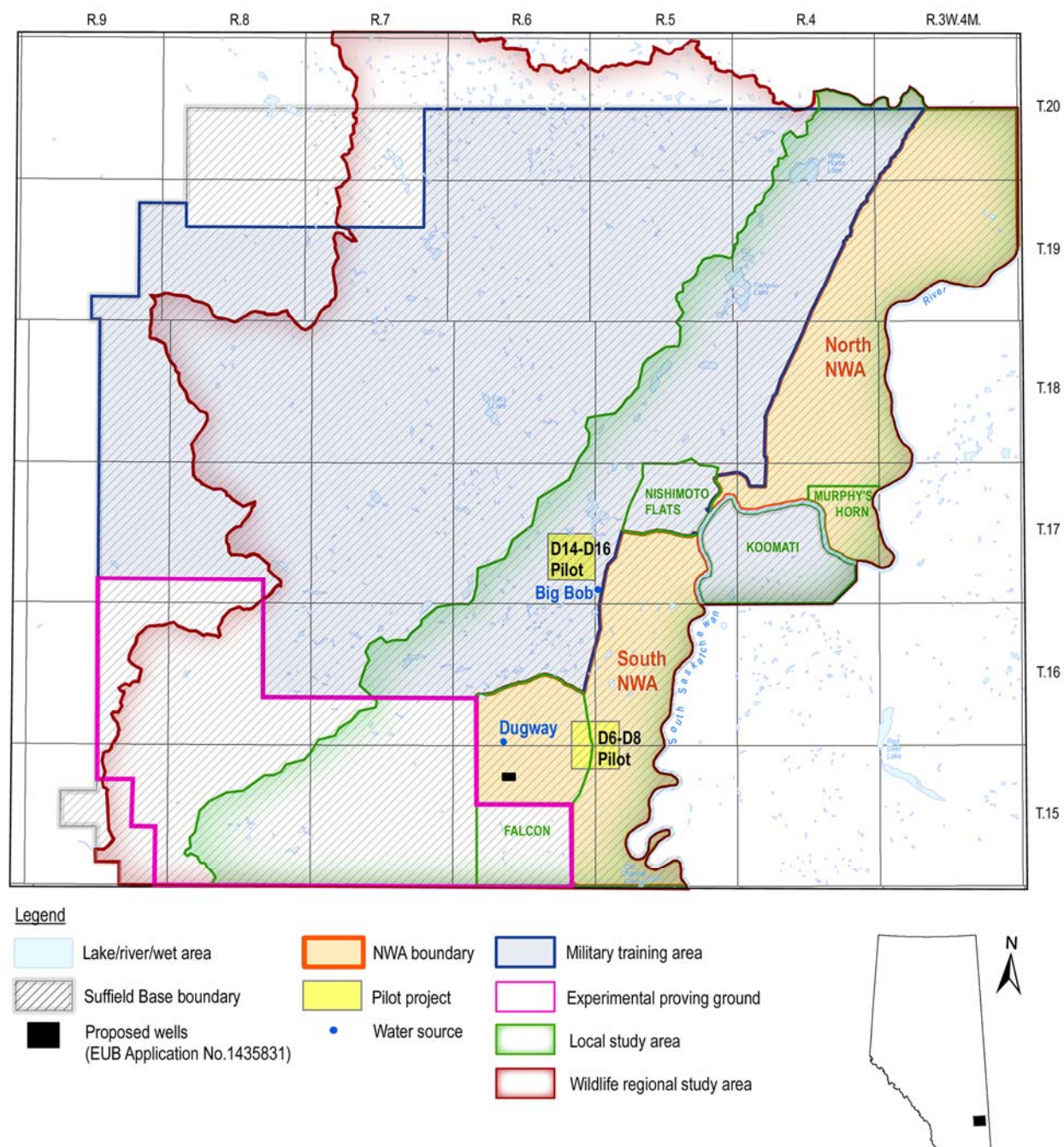


Figure 1. Project setting

The majority of wells would be tied into the existing local gathering system (laterals) using 2 inch diameter high-density polyethylene plastic pipe. About 180 km of this pipe would be required. In some cases, new gathering systems (back-end loop lines) may be required. About 40 km of 4 inch, 6 inch, or 8 inch diameter steel pipe would be required for loop lines to transport the gas to existing compressor stations outside the NWA. New loop lines may be required where there is insufficient capacity to transport the gas in existing laterals. While working areas during construction would typically be 15 m wide, the width of the linear disturbance (i.e., topsoil stripping for ditching installation of steel pipe) would be limited to 2 to 4 m. The gathering system would also include aboveground group meters, pig launchers and receivers (required for pipeline cleaning and inspection), and isolation valve stations. Typically, each battery would serve about 12 sections and would require one group meter, one pigging facility, and one to three isolation valves. A battery is the production and measurement facility for a group of wells.

Other infrastructure required for the project would include containment sumps for drilling fluids. The fluids would be collected at each well and trucked to sumps located in the military training area. The sumps would be designed to improve gravity separation of liquids and solids and reduce the amount of water used for drilling by up to 10 per cent. The sumps would generally be located in areas that have previously been disturbed. They would be reclaimed following the construction season.

To reduce the need for and frequency of site visits, data from meter sites would be acquired remotely and transmitted to the supervisory control and data acquisition (SCADA) host.

2.2.1 Construction and Operations

Each well within the project area would take about four days to develop over a 45 day period. This would include drilling, fracture treatment (fracturing causes the formation to crack open, creating passages for the gas to flow more easily into the wellbore), completion, and tie-in. Whenever possible, existing access routes and trails would be used. The footprint of each well would typically be less than 5 by 6 m. Existing access roads would be used and no new compressor stations or gas processing infrastructures would be required. Production is anticipated to continue for about 20 to 40 years.

The main activities planned during the operations phase would be well testing, well and pipeline inspections, reclamation, and maintenance. If necessary, the wells would be swabbed (water removed from the produced gas) and refractured. Well site visits in the NWA would average one visit per month in the first year of production and annually thereafter. Wells would only be visited during dry or frozen conditions for this annual test. Well site visits after the first year of production would average one visit per year, providing no water is produced in the wellbore. Pipelines and wellheads would be inspected yearly for leaks and damage.

2.2.2 Decommissioning and Reclamation

Decommissioning and abandonment of both production and pipeline facilities would be undertaken at the end of the life of each well and in accordance with all regulatory requirements applicable at the time of such activities. Although regulatory requirements may change before the time of decommissioning and abandonment, current practices would require the producing zones to be isolated with bridge plugs and topped with 8 linear metres of cement. The well would

then be filled with fluid to prevent corrosion of the casing. Finally, the well would be cut and capped at least 1 m below the surface. Pipelines would be purged, capped, and tagged.

Areas disturbed by construction and operation activities would be reclaimed. The conceptual reclamation plan provided by EnCana described the goals and objectives for reclamation in the NWA and provided a suite of reclamation measures and options that could be used in any given site-specific situation depending on circumstances.

2.3 Regulatory Framework

Natural gas development in the NWA is regulated by several agencies, and both federal and provincial legislation governs EnCana's operations. Surface rights in the NWA are owned by the Government of Canada, while the Province of Alberta owns the underlying mines and minerals. The Minister of National Defence is responsible for the administration of the Suffield Base, in accordance with the *Federal Real Property and Federal Immovables Act* and the *National Defence Act*. The federal Minister of the Environment delegated authority to manage the NWA to the Minister of National Defence through the *Canada Wildlife Act*. The Minister of National Defence delegated most of his powers, duties, and functions under the act to the Suffield Base commander. Accordingly, management decisions on the NWA, including the issuance of NWA permits, are the responsibility of the Suffield Base commander. The federal *Wildlife Area Regulations* prohibit certain activities and specify the criteria by which permits may be issued in a national wildlife area. The Suffield Base commander is also responsible for issuing range standing orders, developing an NWA management plan, and managing development.

Other federal legislation applicable to the project includes the *Species at Risk Act*, the *Migratory Birds Convention Act*, and the *Environmental Protection Act*. The *Species at Risk Act* is designed to prevent wildlife species from being extirpated or becoming extinct, to provide for the recovery of wildlife species that are extirpated, endangered, or threatened as a result of human activity, and to manage species of special concern to prevent them from becoming threatened or endangered. The *Migratory Birds Convention Act* prohibits the disturbance, destruction, or taking of a nest, egg, or nest shelter of a migratory bird without a permit. The *Environmental Protection Act* deals with environmental emergencies and registration of storage tank systems for petroleum products.

At the provincial level, the EUB (now the ERCB) is responsible for providing approvals and licences for wells and pipelines under the *Energy Resources Conservation Act* and the *Oil and Gas Conservation Act*. Accidental spills of contaminants on the Suffield Base fall under the jurisdiction of Alberta Environment under the *Environmental Protection and Enforcement Act*. Alberta Environment is also responsible for licensing groundwater use and water extraction from the South Saskatchewan River under the *Water Act*.

EnCana was created by the merger of Alberta Energy Company Ltd. and PanCanadian Energy Corporation in 2001. After the 1975 Agreement was signed, Alberta Energy Company was designated as the assignee for Alberta. The Alberta Energy Company, now EnCana, is responsible for the requirements laid out in this agreement.

The Suffield Environmental Advisory Committee (SEAC) was established and its role defined in the 1975, 1977, and 1999 memoranda of understanding between the Province of Alberta and the Department of National Defence. SEAC is an oversight and advisory body that provides advice

concerning oil and gas development upon request to the Suffield Base commander, performs annual field reconnaissance, and hears submissions from industry operators at annual general meetings. SEAC has three members: one from Environment Canada, one from Alberta Environment, and one from the Energy Resources Conservation Board.

The Suffield Industry Range Control (SIRC) was created by the 1999 Partial Assignment Agreement and was preceded by the Alberta Energy Company Range Control. SIRC is tasked with the execution and coordination of oil and gas safety and administrative requirements on the Suffield Base. This includes compiling and submitting applications for development on the Suffield Base and conducting preconstruction surface sweeps.

A summary of the key events associated with the NWA is presented below in Table 1.

Table 1. Milestones—Canadian Forces Base Suffield National Wildlife Area

1941	The Department of National Defence gained administrative control over the Suffield area. An environmentally protected area consisting of about 17 per cent of the total area was declared “out of bounds” to military training.
1971	The Canadian Forces Base Suffield was created. The area now constituting the Suffield National Wildlife Area (NWA) was classified as environmentally protected.
1973	Cattle grazing became a permanent activity on the Suffield Base.
1975	The 1975 Agreement was signed.
1992	The Department of National Defence and Environment Canada signed a memorandum of understanding to protect 458 km ² of the Suffield Base as a national wildlife area.
1999	The Partial Assignment Agreement between Alberta and Canada granted surface access to Alberta and its agents for the purpose of “deep rights” oil and gas exploration within the Suffield Base, excepting the NWA. This agreement established the Suffield Industry Range Control.
2002	The <i>Species at Risk Act</i> came into force.
2003	The NWA was created.
Mid 1970s - 2003	1145 shallow gas wells were developed in the NWA.
2005	EnCana proposed its infill project, which included 1275 new wells in the NWA.

3 INVOLVEMENT OF INTERESTED PARTIES

3.1 Consultation Opportunities

Opportunities for participation by interested parties were provided throughout the environmental assessment process by the Government of Canada, the Panel, and EnCana. The public registry allowed for public access to all documents associated with the environmental assessment. As well, a Panel Web site was available that contained information pertinent to the review of the project. Specific consultation opportunities were as follows:

- A public comment period was held by the Department of National Defence (DND) in late 2005 on the proposed scope of the project, the proposed factors to be considered and the scope of those factors, and the ability of the comprehensive study to address issues relating to the project.
- A public comment period was held by the Canadian Environmental Assessment Agency in August 2006 on the draft agreement to establish a joint review Panel.
- A public comment period was held by the Canadian Environmental Assessment Agency and the Alberta Energy Utilities Board (EUB) from August 25 to October 15, 2006, on the draft guidelines for the preparation of the environmental impact statement (EIS).
- A public comment period was held by the Panel from May 28 to August 27, 2007, on the adequacy of the EIS filed by EnCana.
- A public comment period was held by the Panel from November 13 to December 13, 2007, on the additional information submitted by EnCana.
- Public hearing sessions were held by the Panel in October 2008 in Calgary and Medicine Hat.

EnCana outlined its public consultation program in the evidence submitted to the Panel. Its program was designed to ensure that stakeholders received up-to-date information and to offer the public an opportunity to comment on the project. In 2007 and 2008, EnCana held a variety of consultations with stakeholders, including open houses, meetings, discussion group meetings, a field trip, and technical sessions. EnCana also consulted with the Siksika Nation.

3.2 The Participants

3.2.1 Government of Canada

Federal government departments that provided expertise to the Panel during the review process included Environment Canada, Fisheries and Oceans Canada, Natural Resources Canada, Agriculture and Agri-Food Canada, and Parks Canada. During the hearing, they participated as one intervener on behalf of the Government of Canada.

DND, as the responsible authority for the proposed project, provided information pertaining to its responsibility for the Canadian Force Base Suffield National Wildlife Area (NWA) and its custodial responsibilities for the Suffield Base. DND stated that its operational responsibility for

the Suffield Base was to maintain the range and training area through the proper management of military training and infrastructure, as well as through stewardship of the environment.

In its hearing submission, DND provided 61 recommendations. DND concluded that the EIS did not provide sufficient information to assess whether the proposed project was likely to cause significant adverse environmental effects. It stated that unless DND was assured that impacts of any activity on military training or the environment were not likely to cause significant adverse effects or could be mitigated, these activities should not proceed. DND indicated that substantial additional information was required to enable the Panel to reach an informed conclusion.

Environment Canada provided expertise mainly on species at risk, critical habitat, and conservation of wildlife. In its submission, Environment Canada concluded that the ecological integrity of the NWA must be maintained and that the information provided by EnCana during the review of the EIS remained inadequate. Environment Canada recommended that no additional industrial activities be allowed to proceed until there was certainty that any proposed industrial activity would not adversely impact any listed species at risk, their residences, critical habitat, preliminarily assessed critical habitat, or the ecological integrity of the NWA.

Natural Resources Canada provided expertise on geotechnical, geological, and hydrogeological issues, but did not take a position on the project.

Fisheries and Oceans Canada provided expert information and knowledge on matters related to potential impacts on fish and fish habitat. It concluded that based on the information provided, the project was not likely to cause significant adverse effects on fish and fish habitat, taking into account implementation of mitigation measures.

The Prairie Farm Rehabilitation Administration, a branch of Agriculture and Agri-Food Canada, provided expertise on the protection and management of prairie grasslands as it related to grazing. It concluded that if EnCana followed its proposed mitigation measures and consulted and cooperated as proposed, the project would not be expected to have a significant effect on grazing.

Parks Canada provided expertise on heritage and archaeological matters. In its submission, Parks Canada stated that EnCana's conclusion regarding heritage potential appeared to be based on professional and provincial standards.

3.2.2 Provincial Government

In correspondence with the Panel, Alberta Sustainable Resource Development (SRD) stated that the Suffield Base, including the NWA, represented one of the most significant parcels of natural habitat remaining in Alberta's grasslands. SRD confirmed that it had provided information on timing restrictions and matters related to wildlife and resource management from time to time to the Suffield Base but noted that application of this knowledge and advice was up to those working there. SRD did not attend the hearing, since the project area was under federal responsibility and it did not generally operate on those lands.

Alberta Environment also declined to attend the hearing, since the Suffield Base and NWA were areas of federal responsibility and Alberta Environment did not have jurisdiction on those lands.

On the first day of hearing, a motion was presented by the Environmental Coalition to compel the presence of witnesses from Alberta Environment and SRD at the hearing. Alberta Justice filed a written submission in response to the motion and argued that neither department should be compelled to participate in the proceeding. The Panel declined the motion to compel; its ruling is attached to this report as Appendix 6.

3.2.3 Aboriginal Groups

Members of the Siksika Nation participated in the review process and in the site visit to the NWA. In July 2007, the Siksika Nation filed a submission presenting its concerns with respect to the environment and traditional historic and cultural sites in the NWA. In November 2007, the Siksika Nation notified the Panel that it was formally withdrawing its opposition to the project and its application for intervener status, since it had reached an agreement with EnCana to address its concerns about the project. The Siksika Nation did not elaborate on the content of the agreement. However, EnCana indicated that it would involve the Siksika Nation in the proposed pre-disturbance assessments to assist in the identification and avoidance of historical and environmental resources of importance to the Siksika Nation.

3.2.4 Environmental Coalition

The Alberta Wilderness Association, Grassland Naturalists, and Nature Canada joined together to form the Environmental Coalition. In its submission, the Coalition recommended that EnCana's application be denied with prejudice. The Coalition did not agree with EnCana's conclusion that there would be no significant adverse environmental effects. The Coalition was of the view that this conclusion ignored overwhelming credible evidence to the contrary. It believed that the legislation and policies that created and governed the NWA recognized the importance and significance of this area and that the NWA was representative of a dwindling ecosystem and therefore must be protected and restored. The Coalition noted that any determination that the project would not result in significant adverse effects on the NWA would disregard the scientific evidence available, as well as the relevant legislation.

3.2.5 Suffield Environmental Advisory Committee

Two members of the Suffield Environmental Advisory Committee (SEAC), Mr. R. Kennedy of the ERCB and Dr. O. Jensen of Environment Canada participated throughout the review process. The Third SEAC member, an employee of Alberta Environment, declined to participate in the review process. The two members responded to information requests from the Panel and other participants, and at the request of the Panel, they filed a submission and participated in the hearing.

In their submission, the two SEAC members stated that since Alberta Environment had declined to attend the hearing, its submission should be considered as two committee members' informal presentation to the Panel and not a formal submission of SEAC.

3.2.6 Suffield Industry Range Control

The Suffield Industry Range Control (SIRC) responded to information requests from the Panel and other participants. At the request of the Panel, SIRC filed a submission and participated in the hearing, mainly to explain its role and to respond to questions.

3.2.7 Other Parties

Other interested parties provided their views throughout the review through letters to the Panel, comments during public comment periods, hearing submissions, and participation during the hearing. Numerous comments were received from members of the public; some supported the project, others opposed it.

Of the total letters received, 11 supported the project, mainly for its potential positive impact on the local economy, the agricultural community, and employment. Supporters, including over 1500 employees of supply companies, expressed confidence in EnCana's use of environmental best practices, demonstrated over the thirty years that EnCana and its predecessor had operated on the Suffield Base. Those in favour of the proposed project noted that expansion would ensure the survival of many suppliers, service companies, and ranchers in the area. Representatives from two of those companies, Cerpro Energy Services and Flint Energy Services, attended the informal hearing in Medicine Hat to convey their views to the Panel and answered questions.

Those against the project—137 letters received—were concerned about the effects of the project on the ecological and cultural attributes of the NWA, sustainability of the fragile prairie ecosystem, and species at risk and their habitat. Opponents generally questioned the legitimacy of any further industrial development in a national wildlife area and the need for this project at this time. Forty-three opponents asked for an amendment to the *Wildlife Act Regulations* to remove the minister's ability to permit industrial development within the NWA.

Twelve of the letters received expressed no position on the project. Some of the writers sought information on the process and suggested materials for the Panel's consideration. Others offered recommendations, including having supervision during the production phase, hiring good contractors, having an independent environmental supervisor during construction with the authority to shut down activities, allowing access to company site records, and restricting development to noncritical areas.

Three groups, the Alberta Lepidopterists' Guild, the Entomological Society of Alberta, and the Biological Survey of Canada, as well as Dr. R. Longair, who attended the informal hearing, commented that there was an inadequate assessment of arthropods in the environmental impact statement.

Mr. D. Hutton questioned whether the Panel should allow further drilling in a national wildlife area—an area that was clearly designated as a special place. He noted that there must be a way to avoid these places and keep some of this precious landscape in its original form.

Ms. M. Kettenback commented on the reclamation criteria that should be used by EnCana to reclaim native prairie. She provided examples to show how difficult it was to manage native prairie restoration. She stated that EnCana should do the right thing and follow EUB *Informational Letter (IL) 2002-1*, which states that "Industry should avoid disturbing native prairie." She requested that DND not provide a permit under the *Wildlife Area Regulations* and that the ERCB not approve any licences in the NWA.

The Federation of Alberta Naturalists, which made a presentation during the informal hearing, advocated a rejection of EnCana's application. The federation was of the view that no new industrial activity in the NWA should be allowed, and it requested that the Panel deny with

prejudice any applications to drill in the NWA. The federation stated that in western Canada, the Suffield Base was the only large block of intact prairie grassland where the ecological integrity remained noticeably unimpaired and consequently where the diversity in abundance of native plant and animal species had not declined.

Mr. G. Trottier presented his perspective to the Panel based on his experience as a retired professional wildlife biologist who spent 18 years working on the Suffield Base as an employee of Environment Canada. He also shared his experience as a past member of SEAC and reminded the Panel of some of SEAC's recommendations, including the need to prepare a management plan for the NWA. He noted that the Panel's review represents the first time that oil and gas activities in the NWA were being considered in a holistic manner. He expressed the view that the NWA was a natural grassland area set aside to perpetuate representative prairie land cover and its wildlife diversity and to protect its overall ecological integrity from human exploitation.

Ms. D. Dickinson made a presentation on behalf of the Society of Grasslands Naturalists. She noted that the Grasslands Naturalists were familiar with the NWA, since its members had conducted breeding bird surveys on the Suffield Base and in the NWA over several years. Ms. Dickinson noted that as residents of the area, the Grasslands Naturalists had seen an incremental loss and degradation of native prairie grasslands over the years, in spite of the adoption of best practices and mitigation measures, and that they were witnessing declining populations. The Grasslands Naturalists argued that in order to protect the NWA, the Panel must reject the project.

Mr. R. Gardner, a resident of Medicine Hat, opposed the project because it would cause environmental, social, and economic damage to the region, while all the benefits would go to EnCana's shareholders. He noted that grassland in southeastern Alberta had been reduced over the last century to a few remaining scraps of prairie. He understood that the current spacing of wells would extract substantially as much gas as the proposed wells, but over a longer period. He wondered what the urgency was to extract the gas faster. Mr. Gardner argued that the combined cumulative impacts—these small, unintentional, and unavoidable damages—had stressed the grassland ecosystem to the breaking point.

Dr. B. Gjetvaj, who represented the Saskatchewan Chapter of the Canadian Parks and Wilderness Society and Nature Saskatchewan, shared his experience of the Great Sand Hills region—an area similar to the NWA. He reminded the Panel of the importance of the NWA as a nationally and internationally significant northern refugium for endemic prairie wildlife. He noted that in Saskatchewan only 4 per cent of the original prairie remained in native vegetation, the largest contiguous area being in the Great Sand Hills. He noted further that the NWA was similar in size and had a high potential for making a difference in prairie conservation because it was in a contiguous block. Dr. Gjetvaj concluded that the project should not be approved.

Mr. D. Hagen noted that it would be in EnCana's best interest to use the existing wells to drain as much of the gas as possible before drilling more wells. He noted that the price of gas in the future should be much higher, due to increasing demand and decreasing supply and that recovery techniques might improve in the future such that the existing wells could be used to recover most of the remaining gas. He further noted that gas price increases would also allow EnCana to produce existing wells longer at even low rates. He argued that nature reserves were set aside to preserve native vegetation and wildlife and that they should be left as pristine as possible for the

benefit of all citizens and to ensure the preservation of habitat. He noted that the depletion of nonrenewable hydrocarbons needed to be delayed as long as possible to allow time for development of renewable energy sources.

Ms. J. Ernst provided several written submissions expressing opposition to the project and presenting her views for the Panel's consideration. Her concerns were linked to incidents related to EnCana's operation in other areas of the province close to her home. She argued that EnCana's track record was not good and that EnCana could not be trusted to implement the mitigation measures that it committed to. Ms. Ernst also expressed concerns related to other matters, including the involvement of the EUB with this Panel review and the posting of documents on the public registry.

Mr. S. Shields offered his views on the joint review process in a number of written submissions. He expressed his opposition to the presence of a member of the EUB on the Panel. Mr. Shields also noted his concern about the small amount of surface lease money to be collected by the federal government. He expressed opposition to the grandfathering of lease payments and noted that a deal with full royalties payable was required. Mr. Shields offered views on the 1975 Agreement and noted that the agreement should be reopened. He also commented on Alberta Environment's nonparticipation in the process. He expressed views on the inadequacy of the public hearing venue.

The views of the interveners relating to specific issues raised in this report are summarized in the relevant sections of the report.

4 CREATION OF THE SUFFIELD NATIONAL WILDLIFE AREA

The Canadian Forces Base Suffield National Wildlife Area (NWA) was created by Order in Council on June 19, 2003, under the authority of the *Canada Wildlife Act*. The regulations creating the NWA amended the *Wildlife Area Regulations*, identified the legal land area, and excluded mines and minerals. The Regulatory Impact Analysis Statement (RIAS) that was issued together with the regulations amending the *Wildlife Area Regulations* creating the NWA described the NWA as

The sole large block of intact prairie grassland where the ecological integrity remains noticeably unimpaired and, consequently, where the diversity and abundance of native plant and animal species have not declined.

The Panel understands a RIAS is a consultative document accompanying the issuance of regulations that describes the proposed regulation, various alternatives, benefits, and costs; summarizes the consultation undertaken on the proposed regulations; and addresses compliance and enforcement. This particular RIAS also summarized the results of a strategic environmental assessment of the creation of the NWA. It stated that

This study [an ecological inventory project undertaken by the Department of National Defence (DND) and Environment Canada] unequivocally determined the national significance of this area as the only remaining northern refugium from agriculture for endemic prairie wildlife in Alberta.

During the hearing, there was frequent reference to the RIAS by all parties. There was disagreement on whether EnCana's project was consistent with the intent of the regulations, as described in the RIAS. There were also differences of view expressed about the exclusion of mines and minerals from the NWA and whether this exclusion affected EnCana's proposed project.

4.1 Views of EnCana

EnCana stated in its opening remarks that it supported the creation of the NWA and that the various parties involved, including DND and Environment Canada, acknowledged that it could continue to develop its gas resources in an environmentally responsible manner. To support its position, EnCana referred to the RIAS and cited the following clause:

No major changes in land use are anticipated...Cattle grazing and shallow gas recovery which operate under existing Memoranda of Understanding will continue.

EnCana also noted that the current high-quality state of the environment in the NWA was an indication of the care it had taken in the past to protect the environment in its 33 years of drilling and operating 1145 wells in the NWA.

In final argument EnCana suggested that the Panel must make a preliminary determination regarding the interpretation of the term "Wildlife Area" and whether mines and minerals are included within the meaning of that definition. EnCana noted that the mines and minerals underlying the NWA are not "public lands" as that term is defined in Section 2(1) of the *Canada Wildlife Act*. EnCana suggested that because the mines and mineral rights were excluded from the description of the NWA, they are not part of a wildlife area and thus Section 3 of the *Wildlife Area Regulations* does not appear to apply to activities related to the extraction of those mines and minerals.

4.2 Views and Concerns of Interveners

Government of Canada

Environment Canada disagreed with EnCana's interpretation of the RIAS. In its view, the proposed project would constitute a major change in land use that was contrary to the purpose of the NWA. It quoted from the RIAS the rest of the sentence that EnCana referred to above, stating that cattle grazing and shallow gas recovery that operate under existing memoranda of agreement (MOAs) will continue,

subject to the environmental screening protocols specified in the respective MOAs controlling those activities and the *Wildlife Area Regulations*.

The Government of Canada also indicated that the RIAS did not guarantee continued use and that ownership of mineral rights did not guarantee access. It stated that the objective of the creation of the NWA was to restore and recover and not degrade the environment further.

Regarding the preliminary determination raised by EnCana in its final argument, the Government of Canada argued that the Panel did not need to decide this as a question of law. It argued that the fundamental disagreement amongst the parties on questions of this nature and importance gives rise to a reasonable concern as to whether the mitigation measures proposed by EnCana can be effectively implemented.

Environmental Coalition

The Environmental Coalition's view was that the NWA was created by the Government of Canada to protect the area with the primary objective of conserving wildlife. This decision in its view constituted a key step in meeting Canada's international and domestic wildlife conservation obligations, which included protecting species at risk and their habitats, protecting wetlands, and sustaining biodiversity. It quoted from the RIAS as follows:

This contribution to prairie species conservation, whereby large blocks of native prairie landscape are protected under a single jurisdiction for the benefit of endemic species and their habitat, is unique because no similar opportunities will arise in the future. This area will provide a secure habitat in which species can reproduce and repopulate surrounding prairie environs currently impacted by human development and population growth.

The Alberta Wilderness Association stated that it understood that existing gas wells would be grandfathered once the NWA was created, but it did not accept grandfathering as doubling the footprint. In its view, existing problems that had been created should be fixed.

The Federation of Alberta Naturalists indicated that with the creation of the NWA, there was potential for future expansion of gas wells but that it hoped that "common sense would prevail." Regarding the preliminary determination of whether the mines and minerals underlying the NWA are part of a "wildlife area" the Coalition disagreed with EnCana's position on this matter. It stated that when companies obtain mineral rights there is no guarantee that they will have an opportunity to exploit them. The Coalition concluded that EnCana has no absolute right of access to its mineral rights underlying the NWA.

Mr. G. Trottier

Mr. Trottier indicated that he was “the writer” of the RIAS, which was reviewed and finalized at higher levels in the federal public service. Mr. Trottier was of the view that EnCana had not interpreted the RIAS correctly. In his view the purpose of creating the NWA was to institutionalize the highest level of protection possible for the area. He also indicated that existing land uses would continue in the NWA and that any new developments would be further scrutinized in accordance with the *Wildlife Area Regulations* and other applicable legislation. He referred to the following clause in the RIAS:

It [the regulations] will impact on any new proposed land use developments within the NWA such as water management projects, resource extraction and agriculture. Since new activities could potentially harm wildlife habitat, such proposed activities could be subject to approval and mandatory environmental screening under these regulations.

4.3 Panel Conclusions and Recommendations

The Panel has carefully examined the RIAS and the different views on its meaning. It concludes that when the NWA was created, future development was not excluded from consideration, but any such development would need to be examined carefully to ensure that it did not interfere with the conservation of wildlife in the NWA.

The Panel also notes that before any permit would be granted for any activity in the NWA, an environmental assessment is required under the *Canadian Environmental Assessment Act*. The Panel has been constituted to conduct an assessment of the environmental effects of the proposed project. The Panel’s examination and its conclusions follow in the next sections of this report.

Finally, regarding EnCana’s request that the Panel make a preliminary determination of the interpretation the meaning of “wildlife area”, the Panel accepts that the minerals underlying the NWA are not part of a “wildlife area” as that term is defined in the *Wildlife Area Regulations* and the *Canada Wildlife Act*. However while the NWA does not include the underlying minerals, implementation of EnCana’s proposed project clearly requires access to, and the use of, the lands comprising the NWA.

The Panel does not accept EnCana’s inference that the exclusion or reservation of mines and mineral rights from the Suffield NWA and other national wildlife areas, exempts mineral production activities from the requirement to obtain a Wildlife Area permit. To the contrary, the Panel finds that there are at least two good reasons for identifying that mineral rights have been excluded from a national wildlife area. First, inclusion of this information provides a clear and accurate description of the lands which constitute the wildlife areas and the rights that do or do not accompany those lands. The Panel notes in this respect that there are a number of other national wildlife areas listed in schedule 1 where mines and minerals have been specifically excluded or reserved. Second, by noting the exclusion of mineral rights on some national wildlife areas in Schedule 1, the Panel considers that Parliament has signaled its intent to require permits for industrial and other related activities, including mineral extraction, for all national wildlife areas regardless of any other associated rights. In the Panel’s view this interpretation is more consistent with the clear purpose of the *Wildlife Area Regulations*, to ensure and promote the conservation of wildlife and wildlife habitat.

5 NEED FOR THE PROJECT AND ALTERNATIVES CONSIDERED

5.1 Views of EnCana

Subsurface Geology

EnCana explained that within the Suffield area there were three shallow gas-bearing formations being targeted by the proposed infill wells: the Second White Speckled Shale Formation, the Medicine Hat Formation, and the Milk River Formation. These formations are between 250 m and 650 m below ground level in this area and consist of interbedded layers of shales, siltstones, and fine-grained sandstones. (Figure 2) has been prepared by the Panel to illustrate the general depths and relationships of the formations based on information provided in the EIS. These formations together form a low-permeability (tight) gas reservoir. The tight nature of the reservoir results in the wells producing gas very slowly over a long period of time.

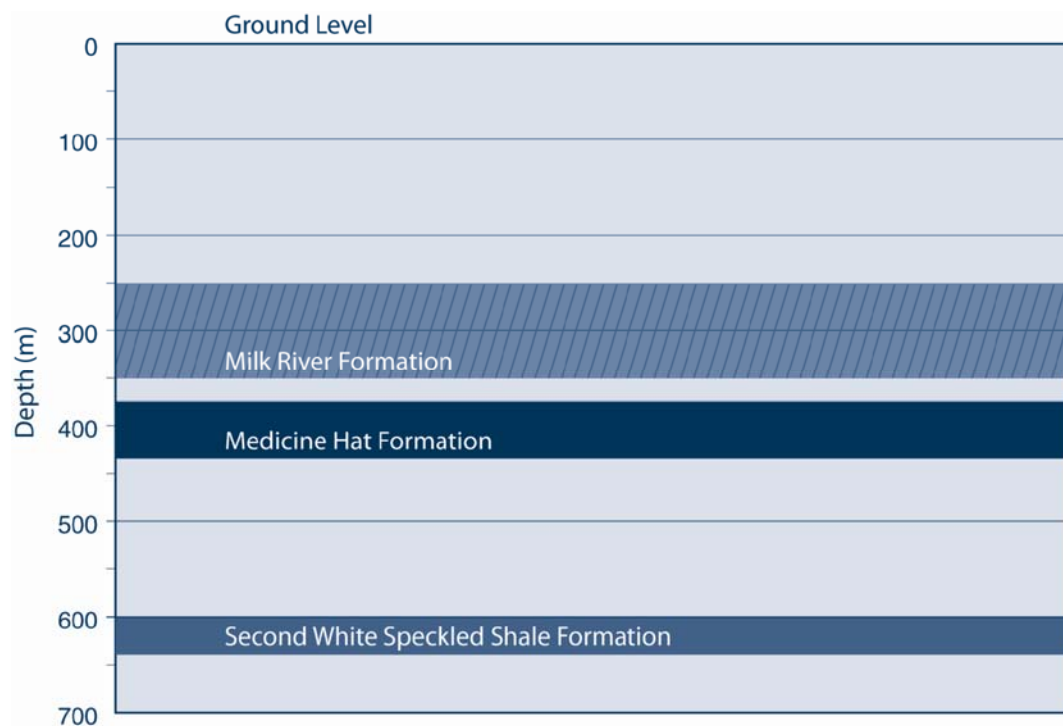


Figure 2. Approximate depth and thickness of formations targeted by proposed infill wells in the NWA

EnCana stated that the subject formations were regionally extensive in southeast Alberta and southwest Saskatchewan. It described them as follows: The Second White Speckled Shale Formation includes interlaminated sand and mud, muddy bioturbated sands, and transgressive marine sands. The Medicine Hat Formation is dark grey mudstone in the lower part, grading upwards to interlaminated and thinly interbedded mudstone, siltstone, and fine-grained sandstone. The Milk River Formation in southern Alberta forms a sandy clastic wedge that tapers northward. This natural gas-bearing formation consists of marine interlaminated shale, siltstone, and fine-grained bioturbated sandstone. The Milk River Formation is rich in clay with low permeability and has a high water saturation ranging from 70 to 95 per cent. The Milk River

Formation has the largest proportion of original gas in place and is the primary target for the infill wells.

According to EnCana, the net gas pay in the Milk River, Medicine Hat, and Second White Speckled Shale Formations is 85 m, 8 m, and 5 m respectively, with initial pressures of 3300 kPa, 4300 kPa, and 5700 kPa respectively. (Net gas pay is the summation of the thicknesses of all intervals within a formation that contribute to gas recovery from that formation.) The formations are of extremely low-permeability, with permeability differences across very small layers. Permeable silt and very fine-grained sandstone stringers are continuous over very short distances and are surrounded by very low-permeability shale to mudstone. EnCana indicated that the silt stringers are interspersed throughout the rock and are the parts of the reservoir that form the flow units. The discontinuous nature of the shale stringers and the heterogeneity of the formations limit the drainage of individual wells and do not allow wells to contact rock that is not connected by these silt stringers. According to EnCana, this is the primary reason that further infill drilling to a well density of 16 wells per section is required to recover incremental gas.

Purpose and Need for the Project

EnCana stated that the project was needed to extract the remaining shallow, sweet gas from below the NWA. It indicated that as of November 2005, 1145 shallow gas wells had been drilled in the NWA and an additional 1275 infill wells were needed to access and effectively produce the recoverable gas reserves. EnCana explained that the variation, heterogeneity, and low permeability of the formations demonstrated that the remaining gas could not be recovered at the existing well density.

EnCana pointed out that gas production began in the NWA in November 1976, with total cumulative gas production to the end of December 2006 being 432.7 Bcf. It expects the existing wells in the NWA to produce another 120 Bcf over their remaining life span of 20 to 40 years. EnCana indicated that its estimate of recovery from the existing wells was arrived at using decline analysis on the production history for the total NWA area, assuming that the decline behaviour would be hyperbolic and that the total NWA abandonment rate would be 5 million cubic feet per day (MMcf/d).

EnCana estimated that the 1275 infill wells would recover a total incremental gas volume of 125 Bcf based on pilot and reservoir modelling studies. It expected this estimated incremental recovery to be produced over a 40-year period. It indicated that it was currently developing the majority of its lands outside the NWA at a well density of 16 wells per section, in accordance with existing well spacing and commingling orders approved by the EUB. EnCana indicated that these orders acknowledged that increased well density and multizone commingling in the wellbore were required for best recovery of the natural gas. EnCana also pointed out that other companies had drilled over 3500 wells at this increased well density of 16 wells per section in the Western Canadian Shallow Gas Complex.

EnCana explained that the performance of pilot studies both within and outside the NWA served as the basis for estimating reserves recovery for infill wells in the NWA. It indicated that the D6-D8 and D14-D16 pilots were selected as the most representative of the infill wells in the NWA and were used to generate the incremental recovery type curve for the infill wells.

EnCana indicated that its estimate of incremental recovery from infill wells was based on gas produced over a finite reservoir lifetime without changing the production profile of the pre-infill wells. EnCana said that although it saw interference on a pressure basis and through the diminishing recovery per well at increasing well densities, it did not see interference through its decline analysis. However, EnCana acknowledged that although it did not see interference in early periods after infill drilling, interference would ultimately be seen in the decline curves at a later time. It argued that it would not make sense to see the pre-infill wells impacted in the short-term due to the tight nature of the reservoir. Rather, it contended that any such early effects on the decline curves for pre-infill wells were related to operational issues and not reservoir effects. EnCana stated that its analysis techniques showed only incremental production at the infill wells.

According to EnCana, its production type curve represented the behaviour of an average infill well and each infill well was expected to recover approximately 100 MMcf of gas. EnCana submitted that the incremental recovery per infill well going from 8 to 16 wells per section in the D6-D8 pilot area would be 118 MMcf/well. It disagreed with the Environmental Coalition's analysis of this pilot, which indicated that the incremental reserves were between 0 and 50 MMcf/well. EnCana indicated that because there were interpretative limitations to the use of decline analysis, it must be used in conjunction with a sound geological and reservoir description. Additionally, surface facilities and a variety of concurrent operations such as recompletions, drilling, and swabbing influenced the flow behaviour of these low-pressure commingled reservoirs. EnCana also indicated that the production period used to forecast the pre-infill performance in the Environmental Coalition's analysis included a period when commingling was occurring and steady state production had not been established.

The incremental recovery per infill well in the D14-D16 pilot area, as estimated by EnCana, ranged from 70 to 88 MMcf/well. EnCana indicated that the decline analysis for the C2 pilot estimated an incremental recovery of 130 MMcf/well and concluded that incremental reserves were recovered in all pilots.

EnCana submitted that its estimate of incremental recovery for the project was confirmed by independent reserves auditors, McDaniel & Associates Consultants Ltd. (McDaniel). A letter from McDaniel stated that its analysis of the high-density pilot projects in the area (including the offsetting D6-D8 pilot area) indicated that incremental recoveries from additional drilling of infill wells typically ranged from 75 to 125 MMcf per well. EnCana also indicated that the expected incremental gas production for the D6-D8 pilot was supported by the analysis in the GLJ Petroleum Consultants Ltd. (GLJ) report, which concluded an incremental recovery of 118 MMcf per infill well in the D6-D8 pilot area.

EnCana stated that secondary to using actual pilot information and as a complement to that approach, a conceptual simulation model incorporating components such as geology, flow regime, and reservoir modelling was developed over the last several years from the experience it gained from its pilots. It stated that the model results supported the need for drilling 16 wells per section in the NWA.

EnCana submitted that model results indicated that 42.8 per cent of the original gas in place under the NWA would be recovered at 16 wells per section, whereas only 29.2 per cent of the original gas in place would be obtained at 8 wells per section. EnCana testified that the recovery of 42.8 per cent was low for a gas reservoir, which was indicative of the tight nature of this

shallow gas reservoir and supported the need for high well densities to recover more of the gas in place.

Alternatives to the Project

EnCana stated that it qualitatively considered environmental, technical, and economic costs and benefits for alternatives to the project. It concluded that only infill vertical drilling would enable the efficient production of the remaining gas resource. EnCana argued that since the project was incremental to existing operations, it was both capital efficient and economically viable. EnCana stated that the alternative of not proceeding with the project was not considered viable, as it would not be able to fully develop the resource. EnCana noted that sterilizing the resources might potentially create higher impact activities elsewhere. EnCana also concluded that delaying the project would not substantively change the environmental costs or benefits, but would have considerable technical and economic implications.

Alternative Means of Carrying Out the Project

EnCana stated that an important element in considering alternative means of carrying out the project was proximity to existing infrastructure. The range of alternatives was limited to some degree by the nature of the project as an infill development. Alternative means were considered, using appropriate criteria for drilling techniques, pipeline integrity testing, layout and construction of the gas gathering system (pipeline routing), water supply, maintenance and production operations, layout and use of temporary and permanent access routes, and management, storage, and disposal of waste.

EnCana considered vertical, directional, slant, and horizontal drilling for its assessment of alternative drilling techniques. It explained that with directional drilling, wells are initially drilled vertical to a depth of about 60 m to 100 m and then angled (usually between 55 and 70 degrees) to penetrate one or more target reservoirs. Directional drilling allows more than one well to be drilled from one surface location. Slant wells are drilled at an angle of about 45 degrees from the surface and that angle is maintained to get maximum reach. Horizontal wells are drilled vertically and then build to reach an angle of 90 degrees in the targeted formation. Lateral distances away from the wellhead range from 400 m to 2000 m.

According to EnCana, directional drilling could not hit the primary target formation due to its shallow depth. The large drilling angles required would significantly increase drilling time and costs; additionally, there would be higher risk of the drill or other drilling tools getting stuck in the hole while drilling the well.

EnCana also indicated that the capital cost of drilling a directional well was about \$107 000 and a vertical well was about \$78 000. Completion costs and costs of water removal were also higher for deviated wells. EnCana said that new wells drilled from existing well sites would disturb a lease where natural recovery or assisted recovery had occurred and residence time on the well site would be longer, with a higher risk of damage to the lease. EnCana indicated that while wells drilled from existing well sites would require fewer access trails, there would be increased demand on existing trails. It testified that drilling from pad sites would result in reduced pipeline efficiencies, as the lines are only sized for one well.

EnCana stated that slant drilling would allow only a small portion of the target formations to be contacted and not at the optimal well spacing, resulting in an expected 20 to 30 per cent reduction in reserves per well.

In response to arguments put forward by the Department of National Defence (DND) to support directional or slant drilling alternatives, EnCana indicated that all directional wells in the DND dataset were drilled to access reserves where vertical drilling was not possible due to topographical concerns, not as part of an area development strategy. EnCana also pointed out that the mean offset distance provided by DND was based on the offset from surface to the well total depth, not the offset from surface to the shallow zone depth. Therefore, the necessary offset distance of 400 m was not achieved for any well for all targeted formations.

EnCana stated that horizontal drilling was too expensive to be commercial with the incremental reserves volumes expected for shallow gas infill drilling. Also, the nature of the reservoir—a large stacked package of unconsolidated, tight, discontinuous sands—made it impossible to effectively drain the reservoir with a horizontal well bores. EnCana added that if directional or slant drilling were required to avoid a particularly environmentally sensitive area, it would likely forego drilling the infill well.

Regarding pipeline testing alternatives, EnCana considered hydrostatic testing and air testing. On the basis of its analysis, EnCana concluded that air testing was preferable where technically possible.

For pipeline routing strategies, EnCana considered two alternatives: straight-line routing and routing around sensitive environments. EnCana stated that its preferred strategy was to avoid, where possible, sensitive environments and institute appropriate buffers for each species and environment. This is discussed further in Section 6.

EnCana stated that four options were considered for sourcing the water required for drilling and completions. It concluded that a combination of obtaining water from a licensed water source within the NWA, using water from wells or spring-fed dugouts near the NWA, and transporting water from the Municipality of Medicine Hat was its preferred option. This would provide flexibility in the event of sourcing constraints and in minimizing environmental effects related to groundwater levels, surface discharge rates, wetland surface water levels, and air emissions associated with transport. This is discussed further in Section 6.4.

Regarding maintenance and production operations, EnCana proposed collecting metering data through use of supervisory control and data acquisition (SCADA), thus reducing the frequency of visits to the well sites.

For alternatives to the layout of access routes during construction and operations, EnCana considered two potential approaches. Where new access was necessary, new access routes would be established on a “one route in and out” basis at the time of construction or one primary access route would be established at the time of construction for use during construction and all operations. EnCana stated that its preferred option was to establish access routes at the time of construction to be used throughout the life of the project. In terms of vehicles to be used, EnCana proposed the use of four-wheel drive trucks when conditions were dry or frozen, and the use of smaller vehicles (e.g., quads or all-terrain vehicles) where possible in wet conditions.

In terms of drilling waste management, EnCana concluded that its preferred alternative was to use remote sumps outside the NWA because the environmental effects were known and appropriate practices would be established. EnCana stated that the remote sump locations would be determined in consultation with DND, with consideration given to using previously disturbed lands. Regarding the waste generated by the operations of the wells, EnCana said that it was evaluating the potential to use produced water for completion fluid to reduce freshwater requirements of the project. However, at this time, its preferred alternative was to continue disposal at a provincially licensed facility.

5.2 Views and Concerns of Interveners

Government of Canada

DND stated that it explored project alternatives related to the use of directional drilling to determine whether directional drilling was being implemented on or near the NWA. DND used geographic information systems data to conduct an analysis of offset distances from the well centre for shallow gas wells on or near the NWA. The results indicated that for the shallow gas zones identified by EnCana, mean values approached the required offset of 400 m. DND concluded that current reach distances could achieve the spacing required to infill to 16 wells per section and recommended that EnCana reassess project alternatives.

DND also submitted that there were alternative technologies and methodologies available to limit the potential environmental impacts of infill projects that had not been identified in the environmental impact statement.

Environmental Coalition

The Environmental Coalition (Coalition) provided production forecasts for the existing wells and the proposed infill wells in the NWA. Its production decline analysis focused on the evaluation of the D14-D16 and D6-D8 pilots. The Coalition stated that the amount of accelerated recovery versus incremental recovery from the infill wells was a key issue and stated that there was inconsistency in EnCana's submissions regarding the degree of drainage interference between infill and existing (pre-infill) wells.

The decline analysis of the D14-D16 pilot provided in the Coalition's report (prepared by Martin & Brusset) concluded that infill wells would produce an incremental 70 MMcf/well. This report indicated that the results of the hyperbolic decline analysis for the D14-D16 pilot provided similar results in terms of incremental recovery to the analysis presented by EnCana. However, the report indicated that the results of the D6-D8 pilot analysis provided significantly different results. The analysis of this pilot provided by the Coalition indicated an incremental recovery of between 0 and 53 MMcf per infill well. The report stated that the effect of interference was readily apparent by the character of the production curve for the pre-infill wells shifting significantly downward after the infill wells were placed on production.

The report filed by the Coalition indicated that its analysis of the D6-D8 pilot evaluated the infill well performance by comparing pre-infill well performance to post-infill well performance within the pilot area, whereas EnCana evaluated the infill well performance by comparing the infill wells to the wells in the surrounding sections. It further indicated that EnCana's approach

resulted in a high estimate of incremental reserves because it compared infill well performance in a better reservoir area to pre-infill well performance in a poorer reservoir area.

The Coalition urged the Panel to accept the evidence in the GLJ report that concluded that well interference and accelerated production increase with well density, and that this causes incremental recovery per infill well to decrease at higher well densities. It also questioned the use of McDaniel's supporting letter for the purpose of this proceeding, noting that as independent reserves evaluators for EnCana, McDaniel's analysis of any single property (such as the NWA) for a corporate reserves evaluation of all of EnCana's properties would not need to include the same detail that should be included for an analysis of the proposed infill wells for this proceeding.

The Coalition indicated that how far into the future production forecasts were run played a significant role in the determination of incremental recovery. What might initially appear to be incremental recovery could be shown to be accelerated recovery if the production forecast were extrapolated over an extended time period. The Coalition contended that the accelerated recovery component of its analysis showed that EnCana's infill drilling would recover some additional gas but would also simply get the gas out faster to increase profitability.

The Coalition argued that EnCana had incorrectly created a vision of the reservoir as one without drainage interference or accelerated production effects. It stated that EnCana's assertion that the production forecast for pre-infill wells was unaffected by infill wells was implausible, given that EnCana stated that all rock associated with the reservoir contributed to well flow. According to the Coalition, incremental recovery was much smaller than estimated by EnCana and the project should be denied in its entirety. It noted that the incremental amount of natural gas associated with the proposed infill development represented only about 2.5 per cent of EnCana's Medicine Hat Business Unit production, less than 0.5 per cent of EnCana's total North American production, and only 0.1 per cent of Alberta's natural gas production.

5.3 Panel Conclusions and Recommendations

The Panel considers the issues respecting the need for the project and alternatives considered to be

- incremental recovery,
- alternatives to the project, and
- alternative means of developing the project.

The intended purpose of the project is to recover incremental gas reserves by infill drilling to 16 wells per section over much of the NWA. One of the interveners questioned whether that purpose would be accomplished or whether the drilling of the 1275 proposed wells would simply accelerate production that would otherwise be possible through existing wells. The Panel therefore first addresses the issue of incremental recovery.

The Panel next turns its attention to alternatives to the project, examining whether there are alternative ways of recovering the gas in question or whether alternative sources of gas or alternative forms of energy would adequately satisfy the intended purpose of the project.

The Panel then examines alternative means of developing or carrying out the project. One such possibility would include drilling the required infill wells directionally from existing well surface locations. The Panel also comments on alternative ways of testing pipeline integrity, routing of pipelines and access trails, obtaining water supplies, and the gathering of operating data.

Incremental Recovery

The three targeted gas formations are heterogeneous and of low permeability (tight). EnCana proposes to commingle production from all three formations in the wellbore where ownership and approved well spacing allow. A volumetric calculation of the gas-in-place would not be particularly accurate in these low-permeability reservoirs due to the uncertainty in estimating net gas pay. Applying a recovery factor to that gas-in-place to determine the recoverable reserves would be even more uncertain. Using material balance calculations to estimate the gas-in-place and recoverable gas for low-permeability reservoirs is similarly uncertain because of difficulties in accurately determining average reservoir pressures.

The Panel therefore agrees with EnCana that production decline analysis is the most appropriate way to estimate recoverable reserves, whatever the well spacing. Production decline analysis is a process whereby historical production behaviour is projected into the future to approximate expected production behavior. The Panel recognizes that the process involves curve fitting, which is an interpretive exercise. A range of reasonable fits are possible depending on the analyst's view and understanding of the situation.

Estimating ultimate recovery and assessing incremental versus accelerated recovery using decline analysis in a tight, commingled gas reservoir is technically complex. A number of factors, many of which are interrelated, come into play in decline analysis and impact the conclusions drawn. Some of these factors are reservoir geometry, reservoir properties, operating conditions, abandonment rate, and the long production period needed to establish stabilized flow and a clear production trend.

Infill drilling can affect the production decline behaviour of pre-infill offset wells due to drainage interference. Also, caution must be exercised when assessing the production forecast of infill wells and the impact of infill drilling on pre-infill wells immediately after the change in well density. This is because production rates are likely in transient flow at that time and not the simulated pseudo-steady-state flow required to apply standard production decline equations.

A major point of disagreement between EnCana and the Coalition is related to EnCana's presentation of future production from the NWA. EnCana chose to show the historical and forecast production that would have occurred from existing wells and then to add to that its estimate of incremental recovery from future NWA development. This could be interpreted to imply that there would be no production interference between pre-infill wells and the proposed infill wells at any time during the producing life. EnCana pointed out that to the extent that there is well interference, some portion of the production shown as production from pre-infill wells could actually be produced through infill wells. However, since it was not incremental production, it was not shown as future NWA development.

The Coalition's production declines and forecasts were shown as both rate versus time and rate versus cumulative production. The production forecasts for the pre-infill wells and for the combined wells (pre-infill and infill wells) cross in the plots of rate versus time, indicating well

interference and accelerated recovery. The Coalition pointed out that EnCana did not consider that the infill wells would have any impact on the forecast production from the pre-infill wells. This is contrary to the Coalition's analysis of the D6-D8 pilot, which shows production rates from the pre infill wells being reduced immediately when production from the infill wells commenced. It also shows that production forecasts of pre-infill and infill wells cross at some point in the future, indicating interference between wells and a component of accelerated production.

EnCana contended that the apparent drop in production in the D6-D8 pilot pre-infill wells after infill wells were put on production is attributed to non-reservoir issues related to the high initial rates and high initial flow pressure impacts on the gathering system. EnCana also indicated that the pre-infill forecast used in the report submitted by the Coalition used a production period that was not stabilized. It reiterated that interference effects for the low-permeability gas wells in the NWA cannot be expected immediately after wells are put on production and any interference effects would only be expected to be seen in the long-term production behaviour.

The Panel has carefully considered the positions of EnCana and the Coalition. It has also examined the submitted production decline analyses. Respecting the D6-D8 pilot, the Panel agrees that there is an apparent change in the production trend in the pre-infill wells at the time of the infill well production commencement. However, given the immediacy of the change, the relatively short time period over which it occurred, the changing trend within the period, and in particular, the tight nature of the reservoir, the Panel agrees with EnCana that the change in production rate must be primarily related to non-reservoir issues. This is an important conclusion because the limited incremental recovery estimated by the Coalition from its analysis of the D6-D8 pilot is a major component of its position.

The Panel also examined the estimates of incremental reserves based on the analyses of the D14-D16 and the D6-D8 pilots by EnCana, the Coalition, GLJ, and McDaniel. It agrees with EnCana that the reservoir quality in the area of these pilots is reasonably similar to the reservoir in the southern and central portions of the NWA and thus a reasonable representation of the expected reservoir performance of the proposed wells.

The Coalition questioned the use of the McDaniel supporting letter for the purpose of this proceeding, noting that as independent reserves evaluators for EnCana, the McDaniel analysis of any single property (such as the NWA) for a corporate reserves evaluation of all of EnCana's properties would not need to include the same detail that should be included for analysis for the NWA for this proceeding. EnCana responded that McDaniel has been making independent assessments of the behaviour of the pilots since their inception and that McDaniel based its assessments on the basic pilot data.

The Panel's review of the various estimates reveals that the Coalition's analysis for the D14-D16 pilot is similar to EnCana's pilot analysis but the Coalition's analysis of the D6-D8 pilot concludes that incremental recovery per infill well would likely be between 0 and 50 MMcf per infill well. This results in the Coalition concluding that the incremental reserves for the entire project can be expected to be 40 MMcf per infill well.

EnCana's estimate of 125 Bcf of incremental recovery for the 1275 proposed infill wells equates to an incremental recovery of 98 MMcf per infill well. McDaniel suggests that infill wells in the NWA will have an incremental recovery that ranges from 75 to 125 MMcf per infill well. The

GLJ analysis of the D6-D8 pilot concludes that the infill wells going from 8 to 16 wells per section will have an incremental recovery of 118 MMcf per well. The Panel therefore notes that the Coalition's evaluation of incremental reserves for the infill wells in the D6-D8 pilot is anomalously low compared to EnCana's and GLJ's analysis of the same wells and the typical incremental recovery per infill well put forward by McDaniel.

As indicated previously, the Panel believes that the apparent change in the production trend for the pre-infill wells in the D6-D8 pilot immediately following the infill wells coming on production does not relate to reservoir behaviour. In addition, the Panel recognizes that the estimate of incremental production for the infill wells in the D6-D8 pilot is sensitive to the production period used to generate the production forecast for the pre-infill wells. It concludes that the main reason for the difference in incremental reserves estimates between the parties appears to be related to differences in the historical production data relied on and the curve fitting interpretations. The Panel believes that the interpretation by EnCana is more appropriate than that of the Coalition because as stated above, the change in production trend appears to be related to non-reservoir issues.

The Coalition urged the Panel to consider a GLJ report that focused on the Milk River and Second White Specks Formations in southwestern Saskatchewan. While there are similar general conclusions in the GLJ report regarding the diminishing incremental recovery per well as well density increases, the Panel does not believe that specific conclusions regarding the incremental recovery per infill well at higher well densities in southwestern Saskatchewan should be used for the NWA. This is because the reservoir beneath the NWA is of different reservoir quality than that in the Saskatchewan study. The Panel is therefore not prepared to place reliance on the GLJ statement that incremental reserves recovery is fairly minor for a 16 wells per section development. The Panel again notes that the GLJ analysis of the D6-D8 pilot area concluded that the incremental recovery per infill well would be 118 MMcf.

In summary, the Panel concludes that although some portion of the recovery from the proposed infill wells will be accelerated production, significant incremental recovery would result from the proposed infill drilling. The balance of evidence indicates that it is reasonable to expect an incremental recovery between 75 to 100 MMcf per well for the infill wells going from 8 to 16 wells per section in the NWA. This would result in about 100 Bcf of incremental gas recovery from the project that otherwise would not be recovered by the pre-infill wells. However, this does not take into account environmental constraints that are discussed in subsequent sections of this report.

Alternatives to the Project

The Panel has concluded that the proposed project would recover significant volumes of gas that would not otherwise be recovered through existing wells. In terms of alternatives to the project, EnCana took the position that there were no real alternatives. The project must go ahead or the gas in question would be "wasted."

The Coalition suggested otherwise. It indicated that we have lots of natural gas and the alternative to the NWA gas "...might simply be an infill investment in some other southeastern Alberta gas field...." It further stated, "...the opportunity cost of not proceeding with the Suffield infill proposal, is likely to be quite small." The Coalition stressed the need for society to use gas

as efficiently as possible and pointed to the availability of low-cost energy substitutes for natural gas.

The Panel is less certain than is the Coalition that the opportunity cost of not pursuing the NWA gas is quite small. Evidence was not provided to show that there are readily available gas resources, shallow or otherwise, outside of the NWA that are not being pursued and developed. Additionally, the Panel recognizes that gas production in Alberta has peaked and is declining.

The Panel is very supportive of efforts to use gas more efficiently and to use renewable energy substitutes. However, it questions whether efforts or achievements in these directions will increase if the NWA project does not proceed.

In conclusion, the Panel is satisfied that there are no alternatives to drilling additional wells to recover the NWA incremental natural gas. With respect to alternative sources of gas or energy in other forms, the Panel sees no real evidence that low-cost alternatives are readily available as a direct substitution for the NWA incremental gas. It therefore concludes that the purpose of the proposed project, that is the recovery of some 100 Bcf of incremental gas, is valid, provided the project can be developed without significant adverse effects on wildlife in particular and the environment in general.

Alternative Means of Developing the Project

The major alternative means of increasing well density that was considered involves the drilling of the required infill wells directionally from existing well sites. The Panel accepts the position of EnCana that it would not be possible to drill directionally from existing sites in all instances and make sufficient contact with the untapped portions of the reservoir to effectively deplete the targeted formations. The site of vertical infill wells would be in the order of 400 m away from the relevant existing well sites. The Panel accepts that directional wells could not likely be sufficiently deviated to contact the top of the Milk River Formation, which can be as shallow as about 220 vertical metres below ground, at the optimal well spacing and also contact the Medicine Hat and Second White Speckled Shale Formations at the optimal spacing. As a result, the Panel accepts that the incremental recovery would be substantially less using directional wells.

The Panel also recognizes that drilling directional wells from existing well sites would have some additional effect on the environment, although likely less than would a new well site. This, coupled with the reduced recovery and the extra costs of directional drilling, satisfies the Panel that the alternative of a totally directionally drilled project would not be economically viable.

Notwithstanding this conclusion, the Panel believes that if the project proceeds, there may be certain circumstances where individual wells could be directionally drilled. These circumstances might include a surface constraint, such as a wetland, on the well location selected for reservoir drainage purposes. It might be possible to select a new well location clear of the constraint setback but close enough to the reservoir target to access the target formations at a reasonable well spacing.

The Panel also reviewed EnCana's position respecting the various alternatives for different aspects of the project should an approval be issued. The Panel agrees with EnCana's intent to air test pipelines where technically possible. It also agrees with EnCana's plan to collect metering

data remotely using a supervisory control and data acquisition (SCADA) system and to use remote sumps off the NWA to handle drilling wastes.

Regarding pipeline and access routes, the Panel believes they must be selected to minimize adverse environmental effects. These matters, along with the issue of the source of required water, are dealt with in subsequent parts of this report.

6 ENVIRONMENTAL EFFECTS

In the following sections, the Panel is dealing with the key valued ecosystem components (VECs) and issues that were examined during the environmental review process. Given the voluminous amount of information provided by both EnCana and the different interveners, the Panel has chosen to focus most of its attention and the following few sections on the issues the Panel saw as being most important, which were generally the same issues on which interveners have themselves focused their attention.

During this review, much discussion was spent on the level of details required to determine the significance of effects for each VEC and on the adequacy of the environmental impact statement (EIS).

EnCana argued that environmental assessment is a planning tool and the *Canadian Environmental Assessment Act* requires that environmental assessments be conducted as early as practicable in the planning stages of a project and before irrevocable decisions are made. EnCana noted this means that some detailed project information may not be available at the time of the preparation of the EIS and that detailed fieldwork is rarely available to help in environmental assessment predictions. EnCana added that one of the reasons for this early conduct of the environmental assessment is to ensure that the environmental assessment can influence design decisions, execution plans, mitigation and monitoring. EnCana further noted that for this project assessment, extensive real data and real experience for similar development in similar conditions were available. EnCana argued that its consultants used a conservative approach and that the EIS likely over-predicts the effects of the project.

The Government of Canada (Canada) and the Environmental Coalition (the Coalition) were of the view that the details provided in the EIS and subsequently in the responses to information requests were inadequate to determine the effects of the project and that uncertainty still remains about the significance of the effects and appropriateness of the proposed mitigation measures.

In December 2007, following its review of the EIS and information available, the Panel determined that it had sufficient information to proceed to the public hearing stage. At that time, the Panel determined that the approach proposed by EnCana—the conduct of pre-disturbance assessments (PDAs) to help in the final design of the project and to confirm the presence of VECs—was acceptable.

6.1 Wildlife

During the hearing, discussions related to wildlife focused primarily on the following species and groups of species: Ord's kangaroo rat, Sprague's pipit, burrowing owl, sharp-tailed grouse, snakes, arthropods, and pronghorn antelope. As well, much time was spent on discussing the identification of critical habitat for species listed on Schedule 1 of the *Species at Risk Act* (SARA). The following discussion is primarily focused on those listed species (species listed by SARA or the *Alberta Wildlife Act*), especially the ones that are threatened and endangered, and on the identification of critical habitat.

6.1.1 Views of EnCana

To assess the effects on wildlife, EnCana selected 48 valued ecosystem components (VECs) (Table 2) that are present during some portion of the year in the regional study area. Those include all species listed by Alberta Sustainable Resource Development (SRD) under the Alberta *Wildlife Act* as “at risk,” “may be at risk,” or “sensitive” and federally under SARA and/or by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). The Richardson’s ground squirrel and “small mammal prey” are the only two VECs that are not listed species. They were selected because of their role as keystone species.

EnCana was of the view that the Canadian Wildlife Service inventory conducted from 1994 to 1995 and existing information in the regional study area were suitable for baseline purposes. EnCana focused its field investigations on the quantification of the effects of shallow gas infill development on wildlife and wildlife habitat. In addition to the existing information, EnCana conducted

- breeding bird point count surveys,
- amphibian road transects and wetland surveys,
- ground squirrel playback surveys,
- small mammal live trapping, and
- ungulate aerial and ground surveys.

EnCana also analyzed data collected in the context of the environmental assessment of the formation-level training on the Suffield Base in 1996 and 2004 to investigate the effect of disturbance level on relative bird density. As well, EnCana conducted an additional ungulate pellet group survey and analysis in spring 2008 to address concerns related to potential effects of the project on wintering ungulates. EnCana also submitted a report dealing with monitoring of snake mortality on the Suffield Base as a result of traffic. As well, in response to concerns expressed by several groups on arthropods, EnCana provided an assessment of the potential effects of the project on arthropods.

In completing its environmental impact statement (EIS), EnCana used different methods to rate environmental effects. Information obtained from recovery strategies, action plans, and literature sources, as well as professional judgement, complemented EnCana’s field and empirical studies.

Under examination by the Government of Canada (Canada), EnCana stated that its field programs would likely not detect small effects on wildlife populations from infill drilling but that its sampling was sufficient to detect large, biologically meaningful changes.

Table 2. Valued ecosystem components selected by EnCana and significance of residual effects according to EnCana

Valued ecosystem component	Designation ¹				Significance rating by project phase ²		
	Provincial		Federal		Construction	Operation	Decommissioning
	General	Wildlife Act	COSEWIC	SARA Schedule			
Lesser scaup	Sensitive				Insignificant	Insignificant	Negligible
Sharp-tailed grouse	Sensitive				Insignificant	Insignificant	Negligible
Pied-billed grebe	Sensitive				Negligible	Negligible	Negligible
Horned grebe	Sensitive				Negligible	Negligible	Negligible
American white pelican	Sensitive		Not at risk		Negligible	Negligible	Negligible
American bittern	Sensitive				Negligible	Negligible	Negligible
Great blue heron	Sensitive				Negligible	Negligible	Negligible
Black-crowned night-heron	Sensitive				Negligible	Negligible	Negligible
Northern harrier	Sensitive		Not at risk		Insignificant	Insignificant	Negligible
Swainson's hawk	Sensitive				Insignificant	Negligible	Negligible
Ferruginous hawk	At risk	Endangered	Special concern	3	Insignificant	Insignificant	Negligible
Golden eagle	Sensitive		Not at risk		Insignificant	Insignificant	Negligible
Prairie falcon	Sensitive		Not at risk		Insignificant	Insignificant	Negligible
Upland sandpiper	Sensitive				Insignificant	Negligible	Negligible
Long-billed curlew	May be at risk	Special concern	Special concern	1	Insignificant	Insignificant	Negligible
Caspian tern	Sensitive		Not at risk		Negligible	Negligible	Negligible
Black tern	Sensitive		Not at risk		Negligible	Negligible	Negligible
Forster's tern	Sensitive		Data deficient		Negligible	Negligible	Negligible
Burrowing owl	At risk	Threatened	Endangered	1	Insignificant	Insignificant	Negligible
Short-eared owl	May be at risk		Special concern	3	Insignificant	Insignificant	Negligible
Common nighthawk	Sensitive				Insignificant	Insignificant	Negligible
Pileated woodpecker	Sensitive				Negligible	Negligible	Negligible
Eastern phoebe	Sensitive				Negligible	Negligible	Negligible
Loggerhead shrike	Sensitive	Special concern	Threatened	2 ³	Insignificant	Negligible	Negligible
Sprague's pipit	Sensitive	Special concern	Threatened	1	Insignificant	Insignificant	Negligible
Common yellowthroat	Sensitive				Negligible	Negligible	Negligible
Brewer's sparrow	Sensitive				Insignificant	Insignificant	Negligible
Lark bunting	Sensitive				Insignificant	Insignificant	Negligible
Grasshopper sparrow	Sensitive				Insignificant	Insignificant	Negligible
Baird's sparrow	May be at risk		Not at risk		Insignificant	Insignificant	Negligible
McCown's longspur			Special concern	Note ⁴	Insignificant	Insignificant	Negligible
Western small-footed bat	Sensitive				Insignificant	Negligible	Negligible
Olive-backed pocket mouse	Sensitive				Negligible	Negligible	Negligible
Ord's kangaroo rat	May be at risk	Endangered	Endangered	3 ⁵	Insignificant	Insignificant	Insignificant
Long-tailed weasel	May be at risk		Not at risk		Insignificant	Insignificant	Negligible
American badger	Sensitive	Data deficient	Not at risk		Insignificant	Insignificant	Negligible
Bobcat	Sensitive				Negligible	Negligible	Negligible
Pronghorn antelope	Sensitive				Insignificant	Insignificant	Negligible
							(continued)

Valued ecosystem component	Designation ¹				Significance rating by project phase ²		
	Provincial		Federal		Construction	Operation	Decommissioning
	General	<i>Wildlife Act</i>	COSEWIC	SARA Schedule			
Richardson's ground squirrel					Insignificant	Negligible	Negligible
Small mammal prey					Insignificant	Negligible	Negligible
Plains spadefoot toad	May be at risk		Not at risk		Insignificant	Insignificant	Negligible
Great plains toad	May be at risk	Data deficient	Special concern	1	Insignificant	Insignificant	Negligible
Northern leopard frog	At risk	Threatened	Special concern	1	Negligible	Negligible	Negligible
Western hognose snake	May be at risk				Insignificant	Insignificant	Negligible
Bullsnake	Sensitive		Data deficient		Insignificant	Insignificant	Negligible
Wandering garter snake	Sensitive				Insignificant	Insignificant	Negligible
Plains garter snake	Sensitive				Insignificant	Insignificant	Negligible
Prairie rattlesnake	May be at risk	Data deficient			Insignificant	Insignificant	Negligible

¹ Designation according to Table 5-1, Volume 3 of the Environmental Impact Statement, May 2007, except as noted in footnotes.

² Significance ratings were either Negligible, Insignificant, or Significant.

³ According to the Environment Canada Submission, the Loggerhead shrike is listed on Schedule 1.

⁴ According to the Environment Canada submission, the McCown's longspur is now listed on Schedule 1.

⁵ According to the Environment Canada submission, the Ord's kangaroo rat is now listed on Schedule 1.

The key effects on wildlife considered by EnCana were direct habitat loss and alteration, sensory disturbance and effective habitat loss, habitat fragmentation, direct mortality, and barriers to movement.

Habitat loss was quantified for the Canadian Forces Base Suffield National Wildlife Area (NWA) and the local study area using Habitat Suitability Index (HSI) models based on three suitability classes, low, moderate, and high. For assessing effects, EnCana focused on quantifying effects on habitat rated as having a “high” suitability for each wildlife VEC. EnCana acknowledged that HSI models were often poor predictors of actual wildlife use at the site level, but were an appropriate method for assessing project effects at a landscape scale.

Sensory disturbance and reduction in effective habitat were quantified by applying disturbance buffers (zone of influence) to major facilities and reducing habitat suitability ratings within the buffer (habitat effectiveness). EnCana noted that this approach was applied only to major facilities and was not used within the NWA, as no major facilities were proposed in the NWA.

The Panel requested that EnCana provide further details on its assessment of sensory disturbance and describe the effects on wildlife and on habitat avoidance. In response to this request, EnCana noted that the duration and extent of habitat avoidance resulting from sensory disturbance depended on a number of factors, including the type of human use, seasonality, duration and intensity of human use, the sensitivity of the species in question, and habitat characteristics. EnCana noted that the main sources of sensory disturbance associated with the project would exist during the construction phase, which was scheduled for late fall and winter. Sensory disturbance during operations would be associated with well testing, well and pipeline inspection, swabbing (if necessary), and reclamation maintenance. EnCana also noted that studies from other areas indicated that species such as pronghorn antelope did not demonstrate population-level effects from similar shallow gas development.

EnCana did not consider fragmentation impacts on wildlife to be a key issue for this project, as the anticipated surface disturbance from pipelining would be less than 2 m wide for well tie-ins and less than 4 m for loop lines—widths insufficient, according to EnCana, to result in habitat fragmentation. EnCana noted that it had reviewed references provided by Environment Canada on this subject. EnCana was of the view that this review revealed that the scientific literature did not support Environment Canada’s and other interveners’ positions that trails and minor pipelines would contribute to fragmentation. In addition, few disturbances of comparable scale to those of the project were documented in the literature. EnCana also concluded that the vegetation structures were similar between disturbed and undisturbed areas. This low contrast would not contribute to fragmentation. EnCana noted that vehicle traffic during operation would be extremely low; on average, 3.1 vehicles per day were anticipated. During the hearing, EnCana referred to a 2008 study entitled “Effects of Oil and Gas Development on Grassland Birds,” as well as to its own work in the NWA that found no statistically or biologically significant association between the effect of well density or distance from trails and breeding bird density or nesting location. EnCana maintained its conclusion that the project would not contribute to fragmentation.

EnCana was of the view that the potential for wildlife mortality due to collisions with vehicles existed. EnCana intended to minimize this potential by restricting speeds in the NWA to 70 km/h from October 15 to April 15, by educating personnel, by confining drilling, completion, and

decommissioning activities to the period between October 15 and April 15, when most susceptible wildlife was inactive or not present, and by accessing the NWA using main access routes to avoid greater disturbance by using multiple routes.

EnCana stated that little potential existed for impairment of wildlife movement due to the project, as no new roads or other potential barriers would be constructed. Pipeline trenches would remain open for a short time and construction would occur mainly from October 1 to April 15, when most susceptible wildlife, such as snakes, were not active.

EnCana has committed to identify specific environmental features through the pre-disturbance assessment (PDA) process and to apply species-specific setbacks (or buffers).⁶ It noted that in the event of a conflict among competing constraints such as setbacks, expert advice would be sought to determine the appropriate path forward. EnCana was asked by several interveners to clarify what was meant by its statement that a buffer distance may be reduced in exceptional circumstances where resource extraction would be severely compromised. EnCana responded that “severely compromised” meant not being able to extract the resource in an economic, efficient, and environmentally responsible manner. The most likely circumstance where EnCana would consider a reduction to the setback distance would be the construction of loop lines. Due to their length, there was a potential that an alternative route that maintained all applicable setbacks may not be possible.

During the hearing, EnCana explained that in the event of a conflict between competing setbacks and environmental constraints or conflicts involving a significant impact on resource recovery, the proposed PDA process would provide a mechanism to identify and avoid environmentally sensitive features. Site-specific mitigation plans would be developed by qualified experts for submission to the Suffield Environmental Advisory Committee (SEAC). Sites involving SARA-listed species might also require application for SARA permitting. EnCana was of the view that the project would not involve any activities prohibited under SARA and that it would not likely require a permit. However, in the event that such a permit were required, EnCana would apply for one and ensure that it met the conditions in Section 73 of SARA.

EnCana anticipated that using the PDA process would result in about 80 per cent of all wells, access trails, and rights-of-way being located without environmental or operational issues. In the exceptional circumstances where a PDA indicated that EnCana would be unable to avoid the feature or must be active within a setback, the PDA would be sent to SEAC for its review and recommendation to the Suffield Base commander for approval or denial under the nonroutine application process. In such cases, EnCana, in consultation with its environmental specialists, would propose site-specific mitigation measures. If the mitigation were impractical or deemed to be ineffective, alternative sites or route adjustments would be proposed. Alternatively, EnCana noted that it might also elect to defer the well or cancel it all together.

Regarding the effects of the project on Ord’s kangaroo rat, EnCana noted that the two dominant factors limiting the Ord’s kangaroo rat population were habitat loss due to diminishing open or active sand dunes and winter mortality from hypothermia and starvation. On the issue of potential increased mortality resulting from increased traffic, EnCana mentioned that it could not find mention of any incidences of Ord’s kangaroo rats being killed by vehicles in the numerous studies conducted in the Suffield area. In particular, EnCana referred to a study conducted by

⁶ The terms “buffer” and “setback” are used interchangeably throughout the report.

Dr. D. Gummer⁷ in conjunction with the North Suffield Pipeline. According to EnCana, that study found no construction-related mortalities, no decrease in survival, no effect on reproduction, no effect on large-scale dispersals, and no differences in the frequency of carrying food. EnCana believed that the limited vehicle mortality of Ord's kangaroo rats was probably due to their nocturnal activity pattern. Drilling of wells was planned for the frozen winter months, when Ord's kangaroo rats would be largely inactive in burrows.

EnCana submitted that prior to drilling and pipeline construction, it would complete PDA surveys for Ord's kangaroo rat dens and avoid those areas using standard setbacks. EnCana also noted that traffic for operational purposes would at times occur during the active season, but volumes would be low and travel would occur during the day, when Ord's kangaroo rats would be far less active. EnCana concluded that the vehicle traffic had not caused increased mortality for Ord's kangaroo rats in the NWA in the past and was unlikely to do so in the future. EnCana also noted in its submissions that habitat for Ord's kangaroo rat might be expanded as a result of disturbances to sand dunes that had become stabilized by vegetation establishment. EnCana stated there was no conclusive evidence that roadways or other anthropogenic habitats for Ord's kangaroo rat were "habitat sinks" (low-quality habitat, in which mortality exceeds recruitment), as suggested by Environment Canada. EnCana stated that it was not certain if construction activity would affect torpor or sluggishness of hibernating Ord's kangaroo rats during winter construction, but it was not aware of any evidence suggesting such effects. It noted that dens would be avoided by a distance of 250 m during winter.

EnCana did not agree with the resource selection function model developed by Environment Canada to delineate preliminarily assessed critical habitat for Sprague's pipit or with Environment Canada's conclusion that there would be negative impacts on the species as a result of the project. EnCana noted that Environment Canada's model portrayed an ever-decreasing Sprague's pipit population in the NWA. However, the model was unable to explain actual field data that showed a 200 per cent increase in the numbers of Sprague's pipits between 1994-1995 and 2006. EnCana further noted that it made no sense that the map of preliminarily assessed critical habitat for Sprague's pipit included areas of extensively disturbed and seeded grassland, because Sprague's pipits avoided using disturbed lands. EnCana stated that Environment Canada assigned "preliminary critical habitat" on the basis of a 10 per cent probability that a Sprague's pipit might be present, when the law defined critical habitat as "necessary" for the survival or recovery of a species. EnCana doubted the accuracy and usefulness of the preliminary critical habitat assessment done by Environment Canada. EnCana stated that it would not conduct surveys for Sprague's pipit during PDAs, indicating that it was difficult to locate nests of this species and that the surveys might cause more disturbance to nesting Sprague's pipits than the project itself.

EnCana confirmed that no surveys were conducted in assessing project effects on burrowing owls. EnCana was of the view that surveying for this species would not have been helpful in terms of determining the effects of the project on the species, partly due to the time delay between surveying and project start-up. EnCana argued that surveying for burrowing owls would be an integral component of its PDAs. EnCana noted that essentially the entire NWA would be surveyed over a three-year period, providing a detailed picture of the occurrence of burrowing

⁷ Gummer, D.L., and S.E. Robertson, 2003. Evaluation of activities and survival of Ord's kangaroo rats during and post-construction of the North Suffield pipeline. Report for EnCana Corporation.

owls. Other than in exceptional circumstances, EnCana proposed a 500 m setback around any burrowing owl nest sites identified.

During cross-examination, EnCana confirmed that sharp-tailed grouse were present year round and that they assembled on leks for the breeding period in March and April. EnCana submitted that during the PDA process it would conduct an NWA-wide survey for sharp-tailed grouse leks. EnCana noted that it was committed, except in unusual circumstances, to honour a 500 m setback from sharp-tailed grouse leks year round. EnCana also noted that construction would not occur while grouse were on their leks breeding. EnCana concluded that the environmental effects of the project on sharp-tailed grouse would be insignificant for the construction and operating phases and negligible for the decommissioning phase.

During the hearing, EnCana concluded that concerns about increased snake mortality were unfounded for a number of reasons. First, EnCana would not be constructing during high-risk periods for snakes when they migrate to and from the escarpments of the South Saskatchewan River. Second, the level of activity in the NWA during project operations would be very low. Speed limits during periods when snakes were active would be restricted to 50 km/h within a snake protection area identified in the draft environmental protection plan. EnCana argued that at this speed, drivers were more able to see and avoid snakes and snakes should have sufficient time to move out of the way. EnCana also argued that low levels of snake mortality would be insignificant in view of the large numbers of snakes occupying the NWA.

On the issues of the identification of critical habitat for listed species, EnCana noted that the preliminary critical habitat for Sprague's pipit or Ord's kangaroo rat identified by Environment Canada had no legal meaning under SARA and that preconditions for the identification of critical habitat had not been fulfilled. EnCana submitted that "preliminary critical habitat" should not be treated as equivalent to "critical habitat." EnCana believed it had met the requirements of Section 73 of SARA, since it had designed specific mitigation measures to ensure that recovery of all species would not be jeopardized and since the PDA process was designed to consider all reasonable alternatives and feasible mitigation measures. EnCana noted that its identification of high-suitability habitat in the EIS was not equivalent to critical habitat, nor should it be interpreted as critical habitat. EnCana concluded that in the absence of critical habitat being identified, the Panel was left with the determinations required under Section 79(2) of SARA directing the Panel to consider the adverse effects on listed species. EnCana argued that this was what it did in preparing its EIS. EnCana also noted that Environment Canada had not engaged in a socioeconomic analysis or consulted with stakeholders or evaluated the possible requirement of compensation related to the designation of critical habitat. EnCana concluded that there was no evidence before the Panel that the project would impact critical habitat as defined under SARA and, as such, EnCana was of the view that the Panel should not follow Environment Canada's recommendations.

The Panel asked that EnCana identify how possible winter timing constraints for ungulates, outlined by SRD, may or may not be compatible with the proposed mitigation of winter drilling. In its response, EnCana noted that SRD had identified a period of restricted activity between January 1 and April 30 on the pronghorn antelope winter range. During the hearing, Mr. Heese, from EnCana, noted that he was aware of only one winter in the last eight years when SRD felt it necessary to request the suspension of oil and gas operations for a two-week period. EnCana concluded that the winter drilling program was compatible with the ungulate winter range timing

constraints and would not significantly impact ungulate wintering herds. EnCana noted that it would comply with restrictions imposed by SRD to protect this species.

Based on the pellet group survey it conducted during spring 2008, EnCana concluded that ungulates, including pronghorn antelope, did not avoid existing shallow gas facilities that included raised gravel roads. EnCana believed that wintering ungulates were not affected by roads and other linear features at the traffic levels occurring in the military training area portion of the Suffield Base during the winter and spring. The results of the study also showed a temporary and partial reduction in use by antelope and deer of quarter sections during drilling in the winter months. However, EnCana noted that use of the recently drilled sections returned to normal in spring immediately following drilling. It stated that this temporary avoidance was to be expected, given the amount of activity associated with drilling and completions.

During the PDAs, EnCana stated that it intended to focus wildlife surveys on the following species and group of species across the entire NWA:

- sharp-tailed grouse
- burrowing owl
- loggerhead shrike
- ferruginous hawk
- snakes
- prairie falcon
- golden eagle
- great plains toad
- plains spadefoot toad
- northern leopard frog

The field surveys would follow currently accepted scientific methodologies, including the recommended survey periods. If these species were identified, an appropriate buffer would be established in accordance with the Scobie and Faminow guidelines⁸ or a successor document issued by Environment Canada for setback distances. Following the preliminary well siting process, EnCana would survey for snake hibernacula (if necessary) and Ord's kangaroo rats in proximity to the proposed project disturbance locations.

EnCana stated that its assessment of residual environmental effects (summarized in Table 2) took into consideration the implementation of mitigation measures, which were assumed to include all those identified in the project description (Volume 1 of the EIS) and supporting documents (e.g., environmental protection plan and conceptual reclamation plan). Some key mitigation measures mentioned by EnCana to minimize effects on wildlife and wildlife habitat were

- avoiding wetlands using 100 m buffers whenever possible;
- restricting drilling, completion, and decommissioning to October 15 to April 15;
- restricting pipeline construction to October 1 to April 15;
- restricting vehicle speeds to 70 km/h;
- brush or vegetation mowing not occurring during the migratory bird breeding period (approximately April 15 to August 1);

⁸ Scobie, D. L., and Faminow, C., 2001. Development of standardized guidelines for petroleum industry activities that affect COSEWIC Prairie and Northern Region vertebrate species at risk, issued by Environment Canada.

- where mowing was required as a control measure against undesirable vegetation, having a qualified representative check the mowing area;
- restricting access to designated trails and rights-of-way; and
- using minimal disturbance drilling and construction methods.

Between April 15 and October 15, EnCana also intended to implement additional mitigation measures within a snake protection area, including

- restricting vehicle access on some key roads;
- undertaking grading of roads only with an environmental inspector present;
- having an environmental inspector monitor snake activity from October 1 to 15 in association with pipelining activity;
- restricting vehicle speeds to 50 km/h;
- collaborating with other stakeholders to reduce snake mortality on Box Springs Road, as well as possibly using fencing to encourage snakes to cross through culverts; and
- training workers to avoid snakes on roads.

Regarding the determination of significance, EnCana mentioned that there were no established criteria or scientific thresholds available to determine the significance of residual effects on wildlife. Rather a detectable change in biological parameters was relied upon, based on the assessors' experience and expertise, along with consideration of potential effects on population viability. For habitat loss, EnCana adopted the following guideline to assign effect magnitude: 0 per cent change – negligible; 0 to 1 per cent – low; 1 to 10 per cent – moderate; and greater than 10 per cent – high. If quantification was not available for direct mortality, sensory disturbance, or barriers to movement, the ratings were based on the assessors' experience and expertise, applicability of field surveys, and scientific literature.

Overall, EnCana concluded that the residual environmental effects on wildlife would be negligible or insignificant for the construction, operations, and decommissioning phases of the project, since minimal disturbance practices would be used and construction activities would be restricted during critical wildlife periods. The same conclusion was reached regarding the cumulative effects of the project on wildlife.

6.1.2 Views and Concerns of Interveners

Government of Canada

Environment Canada noted that Section 79 of SARA provided that every person required by or under an Act of Parliament to ensure that an assessment of the environmental effects of a project was conducted must, without delay, notify the competent minister or ministers in writing of the project if it was likely to affect a listed species or its critical habitat. Furthermore, the person must identify the adverse effects of the project on the listed species and its critical habitat and, if the project was carried out, ensure that measures were taken to avoid or lessen those effects and to monitor them. The measures must be taken in a way consistent with any applicable recovery strategy and action plans.

Environment Canada noted that recovery strategies were currently required for Ord's kangaroo rat, burrowing owl, Sprague's pipit, and loggerhead shrike—four endangered or threatened wildlife species listed on Schedule 1 of SARA and that occur in the NWA. Another four wildlife species were listed as species of special concern and would require specific management plans. In total, Environment Canada noted that eight wildlife species were known to occur in the NWA and were listed on Schedule 1. Environment Canada stated that it had completed a preliminary assessment of the critical habitat for two wildlife species at risk: Ord's kangaroo rat and Sprague's pipit. As well, Environment Canada identified what it considered important habitat for loggerhead shrike. Environment Canada noted that a preliminary assessment of critical habitat for the remaining endangered and threatened species on Schedule 1 was not identified in its submission because the necessary analysis had not yet been completed or further studies were required. It recommended that no additional industrial activities be allowed to proceed until such time as there was certainty that any proposed industrial activity would not adversely affect any listed species at risk, their residences, critical habitat, preliminarily assessed critical habitat, or the ecological integrity of the NWA. Environment Canada further recommended that for any area not preliminarily assessed as critical habitat, any industrial activity in the vicinity of species at risk and other wildlife should adhere to the setback distances proposed by Environment Canada.

Environment Canada expressed concern that EnCana's constraints map did not consider such important species as Sprague's pipit or potential critical habitat. Using the methodology outlined in EnCana's assessment, Environment Canada mapped constraints in the NWA using known locations of species at risk and appropriate setback distances. The map included constraints defined by wetlands, streams and tributaries, terrain, and slope break, as well as known snake hibernacula. A second map was produced that included these constraints, as well as preliminarily assessed critical habitat for the Ord's kangaroo rat, Sprague's pipit, and three listed plant species. Environment Canada also explained that it buffered locations of all SARA-listed species using appropriate setback distances. Considering the mapped constraints, Environment Canada further noted that even without all species included in this map, 94 per cent of the NWA would be excluded from industrial development. Environment Canada noted that the preliminarily assessed critical habitat identified for the Sprague's pipit comprises 325 km²—an area representing about 70 per cent of the NWA. On the question of how long Environment Canada anticipated it would require to finalize the determination of critical habitat, the department responded that significant consultation was required to finalize the critical habitat and noted that it expected to be finalizing the critical habitat designation for the species for which it identified preliminary critical habitat in about 6 to 24 months.

On the question of uncertainty related to the identification of preliminary critical habitat and the difference that might occur between preliminarily identified critical habitat and final critical habitat, Environment Canada noted that uncertainty was quite low for the Ord's kangaroo rat and a little higher for the Sprague's pipit. For the Ord's kangaroo rat, Environment Canada submitted that there was quite a bit of certainty on the location of active dunes and noted that the main question was whether roadside ditches would be identified as critical habitat. Environment Canada noted that the updated status report for Ord's kangaroo rat stated that the trend towards increasing use of anthropogenic habitats, roads, trails, fireguards, and bare ground associated with oil and gas facilities and the margins of cultivated agricultural lands appeared to be a threat to Ord's kangaroo rat in Canada, and that these anthropogenic habitats appeared to be low-quality "sink" habitats in which mortality exceeded recruitment. Environment Canada concluded

that whether these anthropogenic habitats would form critical habitat useful to the survival or recovery of the species was unknown but seemed unlikely at this time.

Environment Canada reviewed the data, analytic methods, and conclusion of EnCana's assessment with respect to grassland birds and raised several concerns. Environment Canada was of the view that EnCana's assessment underestimated the project footprint and ignored potential indirect effects as a result of habitat fragmentation. It noted from its own assessment that a negative effect of the project was expected on two important endemic species. It predicted a decline in Baird's sparrow of 58 per cent and that habitat suitability for Sprague's pipit would decline. Environment Canada argued that these results highlighted the uncertainty of the potential for impacts on grassland birds and the possibility that significant negative effects might occur. Environment Canada noted that Sprague's pipit was a grassland endemic species that preferred large expanses of native prairie. It avoided bare ground, such as that associated with roads and trails, and areas infested with invasive or nonnative species. According to Environment Canada, studies indicated that the NWA contained a high rate of occurrence of this species and represented high-value habitat required for the population's survival and recovery. Environment Canada noted that current levels of habitat fragmentation by roads, trails, and pipelines had reduced habitat in substantial portions of the NWA below the minimum area requirements for these two species. Environment Canada argued that its findings were supported by several other recent studies and by the analysis of other literature described in its submission. Environment Canada was of the view that this systematic review of the literature indicated that Sprague's pipit abundance declined by 8 per cent per each 10 per cent increase in nonnative plants and increased with distance from wells and trails.

Regarding the point made by EnCana that in a study conducted on the Suffield Base higher numbers of Sprague's pipits were observed in 2006 than in the original studies conducted in 1994 and 1995, Environment Canada argued that the observations in 1994 and 1995 were conducted by a series of three Environment Canada observers, while the observations in 2006 were conducted by a combination of EnCana and Environment Canada observers. Environment Canada also argued that the table to which EnCana made reference to was not standardized for observers. Environment Canada noted that the one table that was standardized for observers—Table 5J3, Appendices to Volume 3 of the EIS—showed that 40 per cent more Sprague's pipits were observed in 1994 and 1995 than in 2006 and that this was the only table relevant to show the difference that occurred in this period. Environment Canada also indicated that its resource selection function model performed well, with the exception of one time period and one land type.

Environment Canada noted that it had recorded five to eight pairs of burrowing owls at known nest sites across the Suffield Base annually over the last five years and that within the NWA one to two pairs of burrowing owls were observed at known nest sites in the last three years. Environment Canada mentioned that these numbers were not the product of comprehensive, systematic surveys and that undoubtedly more owls would be found if such efforts were undertaken. It concluded that the likelihood of parts of the NWA being identified as critical habitat for burrowing owls in the future was uncertain but possible.

Environment Canada conducted a detailed review of the effects of the project on snakes and stated that additive mortality of snakes from existing human activity was likely causing population declines and that additional development would exacerbate this situation. It felt that

prairie rattlesnakes in particular could withstand only small losses of adult females. Environment Canada noted that the NWA contained important hibernacula and other habitat requirements for maintaining population of snakes throughout their life-cycle. It noted that these species were particularly vulnerable to traffic and persecution by humans and therefore required special consideration. Environment Canada did not agree with the traffic statistics used to support EnCana's conclusion that the operations period would cause little risk to snakes because of projected limited traffic. Environment Canada believed that the risks to snakes during the operations period was underestimated and that the proposed mitigation measures would not be effective in eliminating, reducing, or controlling mortality of snakes from traffic and other project activities. It presented a map in which it proposed temporal access restrictions in five risk zones. It said that the map was generated to illustrate risk zones and time periods when construction, operation, and decommissioning disturbance should be eliminated or greatly minimized to reduce the risk of additive mortality of snakes from traffic and contact with other human activity. Environment Canada considered those proposed temporal setbacks to be an important mitigation measure. In its view, a significant reduction in traffic through appropriate scheduling of well site visits and other activities was necessary to reduce additive mortality. It stated that the risk zones encompassed essentially the entire NWA, with the most restrictive timing adjacent to the South Saskatchewan River escarpment from April 24 to October 7. Contrary to EnCana's conclusions, Environment Canada was of the view that there was sufficient information to indicate that some snake populations might already be declining from additive mortality due to shallow gas well development on the NWA and that the proposed project would exacerbate these declines.

Environment Canada's analysis suggested that the project would result in adverse effects on pronghorn antelope in the NWA. Environment Canada was concerned that the project activities and associated structures could disrupt herd movements to or displace animals from critical winter ranges during a severe weather event, when there was high mortality overall. It said that impediments to movement, such as fences and other structures, road traffic, and industrial activity, could cause pronghorn antelope to delay movements to critical winter range or to divert movement pathways, resulting in increased energetic costs and increased exposure to natural or anthropogenic hazards, leading to increased mortality or reduced reproduction. Environment Canada recommended that barriers to movement of pronghorn antelope be minimized.

In summary, Environment Canada concluded that the project would compromise the recovery and survival of several federally listed species at risk. In addition, Environment Canada noted that if SARA permits were required once critical habitat was formally designated, EnCana's EIS would not be sufficient to determine if such permits should be issued. Environment Canada identified the gold-edged gem as a newly listed endangered species with confirmed presence in the NWA in 2008.

In its supplemental submission filed in June 2008, the Department of National Defence (DND) also raised outstanding concerns about the effects of the project on pronghorn antelope. DND referred to a thesis recently completed that outlined the importance of the Suffield Base as a winter range habitat for pronghorn antelope. DND noted that the construction and operational activities during the winter months could disrupt forced movements to critical winter ranges during a severe weather event.

DND also mentioned outstanding concerns about the effect of fragmentation and effective habitat loss on grassland birds. It noted that a study conducted by Linnen⁹ in 2008 demonstrated that some grassland birds tended to avoid disturbances resulting from industrial development. DND created a map using data from previous studies cited in its earlier submission to estimate the spatial extent of the oil and gas disturbance footprint within each military training area. It showed that effective habitat loss for wildlife that avoided pipelines and well sites to a distance of 150 m was 25 per cent within the NWA. It also showed that effective habitat loss within areas currently infilled to 16 wells per section ranged from 42.8 to 46.5 per cent if a zone of influence of 150 m was used. However, the loss ranged to as high as 92.6 per cent if a zone of influence of 400 m was used.

DND submitted that with respect to species at risk, it was the federal landowner's responsibility to ensure that all activities conducted on its land complied with SARA. DND argued that at present there was insufficient information available to make a determination of which listed species would likely be affected by the project. It noted that identification of critical habitat within the NWA was currently in progress and expected to be completed during the timelines of the proposed project. DND further noted that given the short construction timeline of the project, there was serious concern that there would be insufficient time to monitor the effects of the project, analyze the results of this monitoring, and, if necessary, modify the project to avoid potential destruction of critical habitat.

DND submitted a document entitled "Director General Environment Recommendations for Species at Risk Setback Distances for CFB Suffield" (2006). It was accompanied by background information about species at risk setbacks from sources that included Environment Canada, DND, and SRD. DND indicated that its draft guidelines for setbacks and timing were incorporated within range standing orders but were not applicable to the NWA. However, it stated that DND would develop species at risk setback guidelines specific to the NWA. DND recommended that its NWA-specific guidelines be followed by EnCana and become a condition of any project approval granted to EnCana. It stated that the use of setbacks was limited to the protection of individual organisms rather than species populations. Therefore, a precautionary approach using the highest standard of setbacks was advisable for the NWA. DND relied upon future recovery strategies and action plans to identify species-specific setbacks best suited for oil and gas developments.

DND also raised concerns about the size of the area that would be surveyed during the PDA process. DND explained that both the area within the well site and the area within the right-of-way would be surveyed during the PDA process for some species at risk, but that problems might arise, for example, if there were a burrowing owl located just outside of the well site, as it might not be detected during the survey. DND believed that without surveying beyond the well and right-of-way sites, rare species might not be protected because the setbacks associated with these species might not be respected.

Environmental Coalition

The Coalition was of the view that many species, including species at risk, would be significantly affected by the project. The Coalition argued that the scientific literature showed

⁹ Linnen, C. 2008, Effects of Oil and Gas Development on Grassland Birds. (prepared for Petroleum Technology Alliance Canada).

that developments such as the project would have an effect on plants, birds, reptiles, amphibians, and mammals due to disturbances and changes to habitat. According to the Coalition, roads and other linear disturbances affected the diversity of birds and their nesting success. Some species would simply avoid such disturbances. Several species at risk and other species of concern were either threatened by industrial activity or they had declined as a result of it. The Coalition submitted that in spite of this evidence, EnCana conducted only limited surveys of its own and did not assess other indices of the health of wildlife populations, such as breeding success and the potential for population sinks. The Coalition was of the view that EnCana failed to adequately assess the impacts on specific species at risk, even though these species were known to be adversely affected by industrial development.

The Coalition felt that field studies conducted by EnCana were not able to detect biologically significant changes in populations or habitat use, particularly as they pertained to grassland birds. It indicated that studies conducted by EnCana used sample sizes that were too small, so they could only detect very large changes and therefore lacked statistical power. Additionally, the Coalition indicated that EnCana was only considering changes that would occur as a result of increasing well density from 8 to 16 wells per section and therefore had not adequately considered changes that might have already occurred.

The Coalition further submitted that EnCana did not assess the potential for increased mortality (direct or indirect) of wildlife such as burrowing owls and Ord's kangaroo rats from increased traffic along roads. In its view, the project did not comply with the existing or proposed recovery plans and strategies for species such as the burrowing owl, Ord's kangaroo rat, or Sprague's pipit.

The Coalition argued that the conclusion reached by EnCana, which characterized all impacts as insignificant, ignored overwhelming credible evidence to the contrary. The Coalition noted that there was a considerable body of science that indicated that there were significant impacts from the existing development and that future impacts were inevitable if the project was allowed to proceed. The Coalition, in a report prepared by Cleve R. Wershler, noted that three listed species—burrowing owl, Sprague's pipit, and Ord's kangaroo rat—particularly stood out as being at risk from the project. The Coalition was of the view that EnCana did not adequately consider these effects.

The Coalition referred to a recent burrowing owl population survey conducted west of the Suffield Base by Stevens and Todd that confirmed a significant downward population trend in this area. In this study, the 2007 numbers of burrowing owls represented a decline of greater than 80 per cent over the last ten years and a 60 per cent decline since 2004. The authors stated that habitat change and cumulative effects from land uses, including oil and gas activities, could be playing a role in the decline by affecting adult survival and nesting success.

The Coalition noted that Sprague's pipits were relatively intolerant of nonnative vegetation and that native habitat loss was considered a major threat for this species. It stated that habitat degradation, including fragmentation, typically reduced the population but could lead to local extirpation if the magnitude, frequency, and duration of these threats were great enough. The Coalition submitted that linear development and stretches of broken land were typically associated with invasion by exotic plants that reduced habitat suitability for Sprague's pipit and contributed to habitat fragmentation. The Coalition further noted that EnCana failed to recognize

the deterioration of the grassland ecosystem in the NWA through cumulative fragmentation, including linear disturbances and the presence of nonnative vegetation in and around the existing gas development. It was noted that infill drilling would increase the amount of anthropogenic edge from the current 3.5 km/km² to 5.0 km/km², which would exceed the threshold of 1.9 km/km² set in the Great Sandhills in Saskatchewan. The Coalition was of the view that this was an ongoing threat to Sprague's pipit and other grassland birds. The Coalition stated that while winter construction would avoid destruction of nests and young, it would not prevent destruction of nesting habitat. The Coalition concluded that EnCana's assessment of residual environmental effects of the project on Sprague's pipits as "insignificant" and "negligible" contradicted the best science available. On the issue of fragmentation, the Coalition was of the view that there was no question that the project would result in fragmentation and edge effects. For the Coalition, the challenge was in measuring those effects.

The Coalition referred to the updated status report for Ord's kangaroo rat, which stated that the trend towards increasing use of anthropogenic habitats, roads, trails, fireguards, and bare ground associated with oil and gas fixtures and the margins of cultivated agricultural lands appeared to be a threat to Ord's kangaroo rat in Canada. The Coalition noted that anthropogenic habitats were low-quality "sink" habitats in which mortality seemed to exceed recruitment.

Regarding sharp-tailed grouse, the Coalition indicated that disturbance on leks appeared to limit reproductive opportunities and might result in regional population declines. According to the Coalition, females seemed to be more susceptible to various kinds of disturbance, and if females were flushed frequently during the early stages of egg laying, this might cause nest abandonment. The Coalition was of the view that excessive disturbance to wintering birds might impair their ability to cope with unfavourable winter conditions. The Coalition referred to a study conducted in Colorado and adjacent states in which oil and gas development had only recently been considered a threat to sharp-tailed grouse as increased oil and gas activity spread into the core of the species range. The Coalition believed that if oil and gas resources in the region were developed to their fullest potential, the outcome could be devastating to populations. The Coalition argued that while the amount of habitat directly affected was relatively small, avoidance and stress to wildlife might extend the influence from well pads, roads, pipelines, power lines, and other facilities to over 1 km in open country, affecting use of habitats that otherwise appeared undisturbed. The Coalition further noted that these impacts could be especially problematic when they occurred in wintering and reproductive areas. The Coalition mentioned that the Colorado standard management practices to reduce impacts associated with oil and gas development on sharp-tailed grouse included no development activity between March 1 and June 30 within 2 km of active lek sites, no development activity in winter habitat between December 1 and March 15, and, no surface occupancy in areas within 0.64 km of any leks. It was noted under examination that extensive winter habitat for sharp-tailed grouse in the NWA was in locations with abundant shrub cover. The Coalition concluded that EnCana's assessment of residual environmental effects from the project on sharp-tailed grouse as "insignificant" and "negligible" was unreasonable and not supported by the best available scientific documentation and management approaches.

The Coalition submitted a report by Dr. M. Winter regarding the impacts on grassland birds. It noted that the extent of native grasslands had greatly declined and grassland birds was the group of birds declining at faster and more consistent rates than any other group of North American birds. The Coalition argued that it was essential to not further alter the few larger native prairie

remnants for the preservation of this ecosystem. It noted that the EnCana assessment did not take into account published research, species recovery plans from Environment Canada, and expert opinions of grassland bird ecologists in both Canada and the United States. The Coalition stated that the potential effects of the project on grassland bird population included

- increased mortality along roads;
- increased abandonment and destruction of nests;
- increased stress level, which decreased survival;
- edge and fragmentation effects of roads, trails, and gas wells, which decreased the available habitat and lowered survival and productivity; and
- introduced plant species, which decreased habitat suitability for some species.

Federation of Alberta Naturalists

The Federation of Alberta Naturalists stated that the intention of having a national wildlife area was to conserve habitat for wildlife, in particular for species at risk. The federation was concerned that the project would have devastating consequences for the species at risk that the NWA was intended to protect. It argued the NWA was one of the last areas where grasslands ecological integrity remained relatively unchanged and where the diversity of species had not declined as dramatically as it had elsewhere in Alberta. The federation questioned whether we should risk the integrity of such a unique area on less than stellar efforts by EnCana. The federation was of the view that no further industrial development should be allowed in the NWA.

Dr. R. Longair

Dr. Longair submitted that the EIS failed to address in any way the potential impact of the project on invertebrate animals, despite the existence of documents and additional data about these organisms. He argued that the EIS did not recognize that the largest part of biodiversity present in the NWA was found among insects. He further noted that the roles of these animals in the ecological processes were often poorly understood and the sizes of their populations was not known. Dr. Longair mentioned that some information was available on arthropods in the NWA and referred in particular to a study on stinging wasps. Dr. Longair noted that the researchers estimated that there were between 6000 and 8000 species of insects on the Suffield Base, that 58 per cent of the species discovered were new records for Alberta, and that 15 per cent of them were new records for Canada. He believed that these numbers were significant and demonstrated the uniqueness of the NWA.

Following his review of the additional information prepared by EnCana on arthropods, Dr. Longair found that it contained relatively small amounts of pertinent information and that the information was general and not particularly useful. He argued that EnCana had no information on over half the animal and plant species present on the site and consequently it could not demonstrate that the project would have no significant effect. He was of the view that there should be no additional resource extraction of any kind in the NWA until such time as sufficient evidence existed to address these shortfalls.

Alberta Lepidopterists' Guild, Entomological Society of Alberta, and Biological Survey of Canada

The Alberta Lepidopterists' Guild was concerned that two species of moths designated federally as "threatened" or "endangered" had not been mentioned in the EIS. The gold-edged gem was known in Canada from only three active and two historic locations and less than ten locations globally. Two of these sites were located within about 30 km of the Suffield Base. The Verna's flower moth was also known from only a handful of grassland sites in Canada, constituting all the sites known for this species globally. Two of the three known Alberta sites (two of the five global sites) were also within 30 km of the Suffield Base.

The guild was of the view that the EIS was deficient and flawed and could not be relied upon to determine the impacts of the project on arthropods, including the species protected under SARA. The guild argued that arthropods were so diverse and poorly known in Canada that the vast majority of species had not been assessed for protection under SARA. The guild relied on the protection afforded by areas such as the NWA to conserve the thousands of species that might be rare, but that were not known well enough to be afforded protection under legislation.

Both the Entomological Society of Alberta and the Biological Survey of Canada added their voice to the concerns raised by the Alberta Lepidopterists and by Dr. Longair. The Entomological Society of Alberta noted that the failure to include information on insects suggested that the EIS was seriously flawed and inadequate to address the requirements of the Panel. Both groups recommended that there should be no further development in the NWA without a thorough and adequate assessment of terrestrial arthropod populations and species.

Dr. D. Hill

Dr. Dorothy Hill, from the Department of Biological Science of the University of Calgary, was of the view that EnCana had not fully explored the causes of the noted decline in Brewer's sparrows and lark buntings and that these trends warranted further investigation. She believed that the project should be rejected on the grounds that the EIS was flawed and incomplete. She also felt that EnCana's estimation of current habitat supply appeared to be inflated such that the project impacts seemed to be less than might actually be the case.

Panel Expert—Dr. T. Whidden

Following his review of the EIS and supplemental information prepared by EnCana, Dr. Whidden first noted that a major concern with requiring EnCana to mitigate impacts to federally listed species and their respective critical habitat was that the federal government had not yet provided the necessary guidance in the form of management and recovery plans for listed species at risk and had failed to provide the required definition for critical habitats and residences.

Dr. Whidden agreed with the Government of Canada (Canada) request for scientifically sound baseline information. He noted that such data were needed to serve as a benchmark to establish reclamation, revegetation, and wildlife recolonization goals. He believed that species at risk had not been dealt with adequately and that Canada's request to provide detailed information on all species listed under Schedule 1 of SARA was justified. On the other hand, Dr. Whidden also noted that EnCana's argument that specific residences or high-quality habitat would be found

and evaluated through PDAs was sensible, since detailed design and scheduling were not yet finalized. He concluded that the conceptual plan provided by EnCana was likely sufficient to assess the generalized impacts, provided that the underlying data and information were sufficiently rigorous.

Dr. Whidden was of the view that EnCana's conclusion that the widths of the project disturbances were insufficient to cause fragmentation was not substantiated. He noted that any fragmentation effects could be felt more by smaller wildlife species, such as amphibians, snakes, and arthropods.

Dr. Whidden raised some specific concerns related to burrowing owls and pronghorn antelope. He noted that burrowing owl surveys would have provided valuable distribution and abundance information. He emphasized the importance of measuring the success of mitigation measures and stated that the documentation did not describe how this would be done. Dr. Whidden mentioned that the NWA was an important winter range for pronghorn antelope and that the proposed winter drilling activities and increased traffic required further review.

Dr. Whidden stated that the breeding bird surveys were not designed to detect how birds might respond to increased traffic from well and pipeline maintenance. He believed that although point count surveys were a well-accepted technique for determining avian presence or absence, they did not necessarily provide any information related to breeding and nesting success, which could be influenced by vehicle traffic along roads and trails.

Dr. Whidden noted that the potential impact of dust from increased traffic did not appear to be discussed in the EIS. He said that potential effects from dust on wildlife could be noticed on habitat and vegetation cover, food sources, animal health, and drinking water. According to him, mitigation should be established to minimize this potential effect.

At the hearing, Dr. Whidden stressed the importance of a formal management plan for the NWA. Without such a plan, he believed it would be difficult to gauge the impact on wildlife.

6.1.3 Panel Conclusions and Recommendations

In order to carry out this project, EnCana would be required to obtain a permit under the *Canada Wildlife Act Wildlife Area Regulations*. The Panel is paying special attention to the condition under which such permits are issued, namely, that the project must not interfere with wildlife conservation. The Panel is of the view that a significant adverse effect on wildlife or on wildlife habitat would be an indicator of interfering with wildlife conservation and thus a reason for recommending that the project in whole or in part not proceed.

The Panel addressed the impacts on all 48 wildlife species or groups of species treated as valued ecosystem components (VECs) by EnCana, as well as on arthropods (invertebrate animals such as insects), a group of species that were raised at the hearing. The species dealt with include

- Ord's kangaroo rat, a SARA-listed endangered species;
- Sprague's pipit, a SARA-listed threatened species;
- snakes, five species;
- amphibians (toads and frogs), three species;

- other species listed on SARA Schedule 1 or threatened or endangered in Alberta, six species;
- other prairie birds, 24 species;
- Pronghorn antelope;
- other species assessed by EnCana, seven species or groups of species; and
- arthropods.

These species and groups of species are explored and the Panel's conclusions and recommendations are provided below. Before commencing the conclusions regarding Ord's kangaroo rat and Sprague's pipit, the Panel first provides some analysis and conclusions about critical habitat for species at risk.

Critical Habitat

There was considerable discussion at the hearing regarding Environment Canada's evidence on the preliminarily assessed critical habitat it had identified and mapped for two animal and three plant species. SARA states that "critical habitat means the habitat that is necessary for the survival or recovery of a listed wildlife species and that is identified as the species' critical habitat in the recovery strategy or in an action plan for the species."

The Panel understands that there are two components to this definition: first, the identification of an area as critical habitat; second, the formalization of that designation as part of an action plan or recovery strategy. The Panel further understands that an important component in the finalization of a recovery strategy and the designation of critical habitat is consultation with parties directly affected by the recovery strategy. Further, there are notice or publication requirements to alert the public of the critical habitat designation. It was Environment Canada's evidence, which the Panel regards as reasonable, that the formal designation of critical habitat for these five species is likely to be finalized within 24 months, having regard for the consultation and notice. From the Panel's perspective, the implication of critical habitat designation is twofold. First, Section 58 of SARA establishes a prohibition on the destruction of critical habitat for any listed endangered or listed threatened species located on federal land. Second, Section 73 of SARA states that a permit is required to engage in an activity that will affect any part of that critical habitat. Section 73 reads in part as follows:

73. (1) The competent minister may enter into an agreement with a person, or issue a permit to a person, authorizing the person to engage in an activity affecting a listed wildlife species, any part of its critical habitat or the residences of its individuals.
- (2) The agreement may be entered into, or the permit issued, only if the competent minister is of the opinion that
- (a) the activity is scientific research relating to the conservation of the species and conducted by qualified persons;
 - (b) the activity benefits the species or is required to enhance its chance of survival in the wild;
 - or
 - (c) affecting the species is incidental to the carrying out of the activity.
- (3) The agreement may be entered into, or the permit issued, only if the competent minister is of the opinion that
- (a) all reasonable alternatives to the activity that would reduce the impact on the species have been considered and the best solution has been adopted;

- (b) all feasible measures will be taken to minimize the impact of the activity on the species or its critical habitat or the residences of its individuals; and
- (c) the activity will not jeopardize the survival or recovery of the species.

The Panel considers that when taken together, the prohibition under Section 58 and the stringent criteria for the issuance of a SARA permit under Section 73 impose an important limitation on activities that destroy or affect critical habitat on federal lands. The Panel notes in this respect the evidence of Environment Canada that not many SARA permits have been issued for industrial activity on federal lands.

Ord's kangaroo rat and Sprague's pipit

EnCana predicted the project effect on Ord's kangaroo rats to involve a small amount of direct habitat loss and alteration, as well as sensory disturbance and indirect habitat loss. This was determined to be adverse but insignificant during construction and operation. As is discussed in Section 6.7, the Panel concludes that there is an existing cumulative effect on the Ord's kangaroo rat. Other human activities have created a very large loss in Ord's kangaroo rat habitat, leading to it being listed as an endangered species. The Panel concludes that in the absence of further mitigation, this adverse cumulative effect would be significant. The project effect is relatively modest, but when added to the existing significant cumulative effect, the cumulative effect would be significant.

The Panel believes that because of an existing significant adverse cumulative effect, there is a need to further reduce the impact of the project on Ord's kangaroo rats, as well as a need to reduce the cumulative effects (reviewed in Section 6.7). Specifically, the Panel concludes that without further mitigation, the project would likely make this endangered species worse off, which in turn implies that there would be interference with wildlife conservation. The nature of the impact on the Ord's kangaroo rat means that the project would disturb Ord's kangaroo rat habitat and cause disturbance to this endangered species.

The Panel heard that Environment Canada was in the process of identifying "critical habitat" for two wildlife species found in the NWA: Ord's kangaroo rats and Sprague's pipits. "Critical habitat," according to SARA, means the habitat that is necessary for the survival or recovery of a listed wildlife species and that is identified as the species' critical habitat in the recovery strategy or in an action plan for the species. Environment Canada submitted "preliminarily assessed critical habitats" for these two species. Under SARA, Environment Canada is obliged to define critical habitats for any species listed as endangered, or threatened on Schedule 1 of SARA. The critical habitats must be developed in accordance with a specified process involving, among other things, consultation with potentially affected parties. As EnCana observed, the concept of "preliminarily assessed critical habitat" is not mentioned in SARA. Environment Canada has merely started the process of developing critical habitats, i.e., it has created the "preliminarily assessed" (Environment Canada's term) critical habitat as a step to defining critical habitat for these species in the NWA. Indeed, the preliminarily assessed critical habitat presented at the hearing was different from that submitted to the Panel a few months earlier, as a result of Environment Canada's consultations with EnCana, a potentially affected party.

EnCana determined that the impact on Sprague's pipits would be adverse but insignificant during construction and operation because of a small amount of direct habitat loss and alteration, sensory disturbance and indirect habitat loss, and direct mortality. Just as for the Ord's kangaroo

rat, as noted in Section 6.7, there is an existing adverse cumulative effect on the Sprague's pipit, which the Panel judges to be significant. Because the existing effects on this threatened species are significant and adverse, the project effects, while not significant themselves, would, in the absence of further mitigation, make this significant cumulative effect slightly worse.

Environment Canada has also developed preliminarily assessed critical habitat for the Sprague's pipit in the NWA. The preliminarily assessed critical habitat for the Sprague's pipit, was more preliminary than for the Ord's kangaroo rat. Environment Canada did not know whether the final critical habitat would be everything that was preliminarily assessed or if it would be some smaller portion. This is especially important for the Sprague's pipit, because that preliminarily assessed critical habitat covers 70 per cent of the NWA.

Given their status as threatened or endangered species (listed on Schedule 1 of SARA) and the commitment by EnCana to monitor these species, the Panel believes that a monitoring program to evaluate the actual impacts on Ord's kangaroo rat and Sprague's pipit and the effectiveness of the mitigation measures is required. This is discussed in more detail in Section 6.7.

The Panel understands that the preliminarily assessed critical habitat identified by Environment Canada for the five species is not critical habitat as that term has been defined in SARA. Section 39(3) of SARA clearly states that, to the extent possible, a recovery strategy (including designation of critical habitat) must be prepared in consultation with persons considered by the competent minister to be directly affected by the strategy. The Panel accepts that EnCana is a party that would be directly affected by the designation of critical habitat and notes that EnCana disagreed with Environment Canada's calculation of preliminarily assessed critical habitat for the five endangered or threatened species.

The question for the Panel then is whether or to what degree it should have regard for the evidence provided by Environment Canada on preliminarily assessed critical habitat. Having carefully reviewed the evidence and taking into account the concerns expressed by EnCana, the Panel finds that while the critical habitat within the NWA for these five species (the two wildlife species discussed in this section and the three plant species discussed in Section 6.2) has not been finalized and its final form would probably differ from that presented at the proceeding, it is likely that critical habitat for each of the five species will be designated within the Suffield NWA. The implication for this project is that habitat necessary for the survival or recovery of any one of these five species would be identified. In the Panel's view, any industrial activity, such as that proposed by EnCana, that takes place within the area identified as critical habitat would have a significant adverse environmental effect upon the subject species and thus interfere with wildlife conservation.

As it relates to the Ord's kangaroo rat and the Sprague's pipit, the mitigation proposed by EnCana is avoidance premised upon information generated by the pre-disturbance assessment process. The Panel questions whether this would be adequate for these species. Given the importance of critical habitat in ensuring the survival or recovery of a listed endangered or listed threatened species, the previously discussed concerns the Panel has respecting these species, the fact that Environment Canada has initiated identification of critical habitat for these species as a signal of particular concern, and the expectation that the critical habitat would be identified within 24 months, the Panel believes that a more effective mitigation measure to reduce the risk of significant adverse effects on these species and their habitat is to finalize the designation of their respective critical habitats.

The Panel recommends that

Recommendation 1 — The critical habitat for the Ord's kangaroo rat and the Sprague's pipit be finalized before the project proceeds.

The Panel recognizes that this recommendation, if accepted, would have considerable consequences for EnCana's immediate plans for its NWA project. The Panel is aware that the limitation contemplated by the recommendation places a greater restriction on EnCana's activities within the NWA than would exist had critical habitat for the five species been established prior to the hearing; in that situation, EnCana could at least seek a SARA permit to allow its activities to go ahead. However, the Panel finds that this recommendation is justified for two reasons. First, the Panel finds that allowing further development to occur prior to the designation of critical habitat is, despite the mitigation measures proposed, likely to alter or destroy at least some critical habitat for one, some, or all of the five species listed. Second, the Panel considers that the consequences would be temporary, given the timelines provided by Environment Canada for the finalization of critical habitat for these five species. The Panel finds that the consequences to EnCana imposed by a temporary delay to the project would be far outweighed by the likely significant adverse environmental effects associated with proceeding prior to the finalization of critical habitat. In the Panel's view, this temporary delay of the project to allow for finalization of critical habitat is necessary for the recovery or survival of the five species and is consistent with Section 4(1)(a) of the *Canadian Environmental Assessment Act*, which states:

4. (1) The purposes of this Act are

- (a) to ensure that projects are considered in a careful and precautionary manner before federal authorities take action in connection with them, in order to ensure that such projects do not cause significant adverse environmental effects;

The Panel also recommends that

Recommendation 2 — Should the project proceed, the pre-disturbance assessment process (the process proposed by EnCana to be carried out shortly before construction to avoid environmentally sensitive features) be modified so that it uses the mapped critical habitat for Ord's kangaroo rat and the Sprague's pipit as exclusion areas (areas where disturbances must not take place), unless otherwise permitted under the *Species at Risk Act*.

If a wildlife area permit is issued after the critical habitat for these species has been identified, there may be situations where EnCana believes it is essential to locate a facility within critical habitat for one or more of the species. In such situations, the Panel assumes that EnCana would apply to Environment Canada for a SARA permit. If a SARA permit were to be issued, the Panel assumes that EnCana would then proceed to apply for the necessary facility approval from the Suffield Base commander and the ERCB.

It is important to note that the above-described process relates to the species for which work has commenced on the identification of critical habitat. If the project goes ahead and critical habitat for other species has been finalized prior to or during the construction phase, the Panel would

expect the critical habitat for these additional species to be treated in the same manner as for the five species.

This recommendation concerning the creation of critical habitat is made based on the evidence given by Environment Canada during the hearing that the work would be completed in less than two years from the time of the hearing. Environment Canada should work diligently to complete the critical habitat determination in a timely manner and should report publicly to the Minister of the Environment annually regarding progress on completing the work.

The Panel also recognizes that the size of the ultimate critical habitat for the Sprague's pipit in particular may pose a very large limitation on the number of wells that could be drilled in the NWA.

Snakes

Five species of snakes in the NWA were treated as valued ecosystem components: the western hognose snake, the bullsnake, the wandering garter snake, the plains garter snake, and the prairie rattlesnake. The major impact identified for snakes is mortality on the roads during snake migration across the NWA. Each year, the snakes migrate from their hibernacula in the east near the South Saskatchewan River west through the NWA and then some (especially the older snakes) into the military training area or the experimental proving ground. Solid evidence for the frequency of snake mortality on roads was not available and, more important, the consequences of this mortality for the species was disputed. EnCana's expert indicated that the snake populations were large enough that this mortality was not significant, but Environment Canada's snake expert concluded otherwise. The Panel judges the difference between the two analyses to be primarily a difference of population estimates.

The mitigation measures proposed by EnCana to reduce snake mortality are as follows: winter drilling (when snakes are not migrating), so that the only vehicle mortality is during operation, not construction; lower speed limits (50 km/h) for vehicles during migration times near snake migration routes; avoidance of drilling near the South Saskatchewan River where the snake hibernacula are found; and avoidance of selected roads during migration times. The effectiveness of these measures was debated during the hearing. It was agreed that winter construction was one of the most important measures to reduce snake road mortality because most of the large-vehicle traffic would be present when snakes (and many other wildlife) are absent. It was also agreed that lower speeds and avoidance of roads being crossed by snakes during the migration are also measures that effectively reduce mortality.

The residual question is whether these mitigation measures are enough. Because of comparisons with a study done in Ontario, where speed limits of 60 km/h were found to be sufficient to allow drivers to avoid snakes, the Panel believes that these measures would likely be sufficient to make the impacts acceptable. However, the debate at the hearing raised questions about the effectiveness of the mitigation measures. Moreover, the Panel observes that several more aggressive mitigation measures are available, should they be needed. Further reduction in speed limits might be used. Fencing could be used to encourage snakes to cross roads through culverts. More road closures or reduced traffic could be used temporarily during snake migration. Indeed, Environment Canada suggested a restrictive access scheme involving five zones with varying timing depending on snake migrations; it could be applied if appropriate.

The Panel recommends that

Recommendation 3 — Should the project proceed, monitoring of the effects of road mortality on the five species of snakes, and if monitoring shows an adverse effect on the population of any snake species, applying further mitigation measures.

This monitoring program should include a determination of snake road kills and a determination of the population of each species.

Amphibians

EnCana predicted that the impacts on the plains spadefoot toad and the great plains toad would be insignificant during construction and operation. It predicted that the impact on the northern leopard frog would be negligible. These species spend some of their time in wetlands, so suitable protection of wetlands would contribute to protecting them. The major mitigation measure is to seek out and avoid the amphibians' breeding ponds, with an emphasis on the great plains toad. The proposed PDA includes an NWA-wide survey for amphibians. The Panel believes that maintaining the appropriate setback distances appears to be effective for these species, with only a very small amount of high-quality habitat affected.

Other Listed Species

The other species listed on SARA Schedule 1 or threatened or endangered in Alberta are the McCown's longspur, the ferruginous hawk, the burrowing owl, the short-eared owl, the long-billed curlew, and the loggerhead shrike. EnCana determined that all of these species would be adversely but insignificantly affected during the construction phase and the same during the operation phase for all but the loggerhead shrike (for which the operation impact would be negligible). The proposed PDA includes an NWA-wide survey for the ferruginous hawk, the burrowing owl, and the loggerhead shrike. (For the shrike, the survey is to be focused only on possible loggerhead shrike habitat.) These are the three species threatened or endangered under SARA or the *Alberta Wildlife Act*. The PDA will also seek out long-billed curlew nests around proposed facility sites but not through an NWA-wide survey. Such a survey may be done for the short-eared owl.

For the McCown's longspur, following the mitigation measures proposed, the project was estimated to result in the loss of 0.1 per cent of its high-quality habitat in the NWA. Other mitigation measures, such as avoidance of activities during the summer breeding period, led EnCana to the conclusion that project effects would not be significant. The Ferruginous hawk, likewise, is predicted to lose 0.2 per cent of its high-quality habitat in the NWA. The burrowing owl is an endangered species for which the loss of suitable nesting and foraging habitat has been identified as the greatest threat. EnCana predicts that 0.2 per cent of the high-quality habitat for this species would be lost in the NWA if the project proceeds. The short-eared owl is predicted to lose 0.2 per cent of its high-quality habitat in the NWA. Mitigation measures include limitations on the timing of vegetation control, as short-eared owls are ground nesters. The long-billed curlew is predicted to lose 0.2 per cent of its high-quality habitat in the NWA. The loggerhead shrike is predicted to lose 0.1 per cent of its high-quality habitat in the NWA. Environment Canada has indicated considerable uncertainty about the long-term impact of the project on

shrikes and uncertainty about how it would react to increased fire frequency within the Middle Sand Hills. In Section 6.7, the Panel makes a recommendation regarding monitoring for these effects related to concerns about cumulative effects.

EnCana has committed to avoiding nests by an appropriate buffer for the ferruginous hawk, the burrowing owl, the short-eared owl, the long-billed curlew, and the loggerhead shrike. For these species, the Panel considers it appropriate to rely on the PDA process to identify and avoid disturbing high-quality habitat and to follow the setbacks that have been established for these species.

Setting and applying setbacks is very important. In Section 8, the Panel recommends a process through which the setback distances for all listed species should be determined. This process should involve all stakeholders and include a review of existing lists of setback distances, as well as the times of the year or other circumstances under which these setbacks should be applied. The review should include those setbacks identified in the evidence: Scobie and Faminow or its successor; the recommendations on species at risk setback distances for the Suffield Base provided by DND; the setback guidelines cited in the Great Sand Hills Regional Environmental Study¹⁰ or the SRD guidelines¹¹. The Panel suggests that the resulting setbacks so determined should be included in a management plan for the NWA to be developed by DND.

For the species listed on Schedule 1 of SARA as endangered or threatened species, SARA requires that a monitoring program be carried out. This would include the burrowing owl, the loggerhead shrike and, because it is listed as endangered in Alberta, the ferruginous hawk. EnCana has proposed such monitoring for these species as well in its draft environmental effects monitoring program. Such a monitoring program should be quite detailed, as noted in Section 6.7.

In the opinion of the Panel, the project impacts on these species will be adequately managed in this manner. For the ferruginous hawk, the burrowing owl, and the loggerhead shrike, the threatened or endangered species, further recommendations are made in Section 6.7.

Prairie Birds

EnCana predicted that there would be negligible or insignificant impacts on the 24 species of grassland birds, aside from those already dealt with. The Coalition and others argued that impacts on grassland birds were greater than EnCana claimed, in part because of the birds' sensitivity to changes in the grasslands. In particular, the Coalition argued that the effective land removed from use by songbirds is not just the size of the trails and roads, but the land within 50 m to 100 m on either side. EnCana argued that the very modest trails to be used would create much smaller disturbances than has been measured elsewhere for larger and more heavily used roads.

Environment Canada stated that the effect on Baird's sparrow was already negative and significant and the project would add to this cumulative effect. Environment Canada's conclusion was based on the fragmentation of habitat by roads, trails, and pipelines. The view

¹⁰ The Great Sand Hills Scientific Advisory Committee, 2007. The Great Sand Hills Regional Environmental Study.

¹¹ Alberta Sustainable Resource Development, 2001. Guidelines for Protection of Selected Wildlife Species and Habitat within Grassland and Parkland Regions of Alberta.

that fragmentation was a cause of wildlife impacts was widely advocated, especially for prairie birds. It was also indicated by the Environmental Coalition that while the fragmentation of habitat was important, measuring fragmentation effects was very difficult. The Panel deals further with fragmentation effects on birds in Section 6.7.

The other species in this group about which much discussion took place at the hearing was the sharp-tailed grouse. That species is especially vulnerable during courtship in the leks (mating areas). EnCana proposes to survey for sharp-tailed grouse leks and avoid them by using suitable buffers. The size of the buffer was disputed by the Environmental Coalition. As noted above, the determination of suitable buffers is recommended in Section 8. With the determination of an appropriate setback distance to apply to the sharp-tailed grouse, the Panel believes that the project impacts on prairie birds is not likely to be significant.

Because the trails and pipelines for the project are used minimally, which reduces traffic fragmentation effects, because reclamation measures would be made effective in a manner recommended in Section 6.2, and because the setbacks would be properly applied, the Panel concludes that impacts on these species are not likely to be significant.

The Panel recommends that

Recommendation 4 — Should the project proceed, for other species listed under the *Species at Risk Act* or that are threatened or endangered in Alberta and for which the determination of critical habitat is not imminent, the setbacks established for these species be followed.

The Panel recognizes the distinction between the treatment of these other listed species as compared to the treatment of the two species referenced in Recommendation 1. The principal reason for this distinction is the inference from Environment Canada that the two wildlife species, as well as three plant species dealt with in Section 6.2, are those listed species that are most at risk because Environment Canada chose to determine critical habitats for them first.

Additionally, the timing of the determination of critical habitat for these other listed species is more uncertain than for the two wildlife and three plant species singled out by Environment Canada. The Panel also notes that the avoidance of the critical habitat for the five species may provide a measure of protection for the other listed species if they happen to have critical habitat similar to that of the five species. Finally the Panel is of the view that, if the project proceeds, and if critical habitat for these other listed species, or any other species, is determined before construction operations have been completed, the critical habitat for the other species would be treated as exclusion areas.

Pronghorn Antelope

EnCana predicted the impacts on antelope would be insignificant and adverse for construction and operation based on modest disturbance and a very small amount of habitat loss (0.2 per cent in the NWA). During the hearing, there were two notable concerns about impacts on the antelope. First, there was discussion about whether antelope would avoid construction areas. Tolerance of antelope to human activity was debated. The Panel understands that, while antelope do tend to avoid humans, this avoidance is generally not long lived. Second, the antelope are

concentrated in the NWA in winter, and during very cold winters they are especially vulnerable, as construction activity could displace them from the winter range they need. At such times, SRD sometimes exerts special controls on human activities in order to avoid adverse effects on pronghorn antelope. At the hearing, EnCana stated a willingness to comply with any such controls by SRD regardless of whether SRD has the jurisdiction to enforce such controls on the Suffield Base. The Panel believes that this commitment is important.

The Panel recommends that

Recommendation 5 — Should the project proceed, the environmental protection plan include a mechanism to communicate with Alberta Sustainable Resource Development and implement its directives respecting work stoppages on winter range for ungulates.

Other Species

Other species assessed as wildlife VECs by EnCana are the western small-footed bat, the olive-backed pocket mouse, the long-tailed weasel, the american badger, the bobcat, the Richardson's ground squirrel, and small mammal prey. Impacts predicted by EnCana were negligible or insignificant. No interveners discussed this conclusion at the hearing.

Arthropods

Several participants in the hearing argued that arthropods were also classified as wildlife and that arthropods should have warranted more attention than they had received. EnCana did a study and determined that arthropods would be protected because they were under the (conceptual) umbrella of the species studied in more detail and by EnCana carrying out the project in such a manner as to protect the other species, arthropods too would suffer no significant impacts. However, the Panel notes that arthropods have traditionally not been a major feature in impact assessments and that they could well have been subject to more study, especially in a national wildlife area. For this reason, the Panel suggests that research respecting impacts on arthropods might be carried out. An important aspect of such future research would be the identification of key arthropod species suitable for use as indicators.

The Panel notes that the gold-edged gem is an endangered species listed on Schedule 1 of SARA and hence requires monitoring. Therefore, the Panel suggests that this element should be added to the environmental effects monitoring plan (EEMP).

Summary

In summary, the Panel concludes that the project would not have significant adverse impacts on wildlife and that adverse effects on wildlife conservation would be avoided if the following is done.

- EnCana complies with all commitments it has made in the environmental impact statement and in its responses to information requests and at the hearing.
- Once the critical habitats are determined for the Ord's kangaroo rat and the Sprague's pipit by Environment Canada, EnCana avoids these critical habitats in carrying out the project,

unless otherwise permitted under the *Species at Risk Act*, and incorporates this matter into Steps 2 and 3 of the pre-disturbance assessment process.

- For the other listed species for which the determination of critical habitat is less imminent, the pre-disturbance assessment process identifies high-quality habitat and facilities are located so as to avoid disturbing that habitat and follow the setbacks established for these species.
- EnCana adopts an adaptive management program for managing the effects of the project on snakes.
- EnCana commits to avoiding any disturbance to the buffers surrounding the nests of ferruginous hawks, burrowing owls burrows, and sharp-tailed grouse leks.
- The environmental effects monitoring program includes monitoring of Ord's kangaroo rats, Sprague's pipits, burrowing owls and the gold-edged gem.
- The environmental effects monitoring program incorporates an adaptive environmental management approach to ensuring mitigation of identified impacts on the five species of snakes.
- The environmental protection plan is revised to include winter shutdowns when SRD indicates this is needed for the protection of pronghorn antelope.

6.2 Vegetation, Soils, and Reclamation

6.2.1 Views of EnCana

To assess the effects of the project on vegetation and soils, EnCana chose valued ecosystem components (VECs) as follows:

- for vegetation: native prairie grassland integrity, uncommon vegetation cover types, and rare plant species and communities; and
- for soils: those that are sensitive to wind erosion, water erosion, salinization, and subsurface contamination.

EnCana recognized that the tiny cryptanthus, slender mouse-ear-cress, and small-flowered sand verbena were present in the Canadian Forces Base Suffield National Wildlife Area (NWA) and were nationally listed species at risk under the *Species at Risk Act* (SARA). However, these species were not selected in the environmental impact statement (EIS) as VECs. EnCana stated that by conducting rare plant surveys during the pre-disturbance assessment (PDA) process and through use of other mitigation measures, it would avoid disturbance of the SARA-listed plant species.

Vegetation

EnCana stated that trenching and ploughing of pipelines and drilling of wells could alter soil structure and chemistry, which in turn could affect plant competition, composition, and succession. EnCana acknowledged that the degree of the effect depended largely on the nature

and extent of the initial disturbance and the reclamation approach used. EnCana acknowledged that poorly sited or planned oil and gas construction and operations without sufficient mitigation could result in the alteration or loss of any one or all of the VECs chosen.

To assess effects on native prairie integrity, EnCana conducted field surveys of the NWA and the local and regional study areas in 2006. EnCana used vegetation triangle sampling (landscape-scale sampling) to determine the incremental effect of increasing well density on several vegetation parameters at the quarter-section scale. For the site-level assessment of the existing conditions of native grassland integrity, EnCana used paired pipeline sampling on and off of existing pipeline rights-of-way. EnCana indicated that results of the paired pipeline sampling program showed that for pipelines constructed in the 1980s there were no statistically significant differences between well or pipeline and control values for the majority of measures of native grassland integrity. EnCana suggested that pipeline construction and reclamation practices conducted in the 1970s used highly invasive grasses, such as crested wheatgrass and Russian wild rye, for pipeline revegetation, a practice not conducive to the recovery of native habitat integrity. However, EnCana determined that since about 1980 there appeared to be a gradient in the level of recovery of native habitat condition since the time of construction. Older pipelines since 1980 showed better recovery and more recent pipelines showed lesser levels of recovery. Based on the data, it concluded that steady recovery of native range appeared to occur as long as crested wheatgrass was not used in the reclamation seed mix. EnCana concluded that based on field studies, a return to near-native conditions would take 20 to 25 years.

EnCana examined the existing state of ground cover in the NWA and then calculated the projected incremental disturbance caused by the project. This is known as the disturbance footprint. It stated that its disturbance footprint had been calculated in a conservative manner that overestimated physical changes to soil or vegetation compared to actual field measurements. In its assessment, EnCana used a maximum pipeline disturbance footprint of 4.5 m for ploughing and 12 m for trenching (including working space). EnCana proposed to use all aboveground wells for this project and confirmed that if the use of caissons were required, the predicted project impacts on soils and vegetation would not change significantly. EnCana stated that it measured the existing disturbance footprint as 1.3 per cent of the north NWA and 2.3 per cent of the south NWA, or an average of 1.9 per cent of the entire NWA. EnCana confirmed that the incremental footprint of the whole project would be less than 0.5 per cent of the NWA (which excluded eventual reclamation, in an attempt to capture the worst-case scenario). After reexamining results of the vegetation triangle sampling plots, EnCana concluded that in disturbed areas affected by oil and gas development, spread of crested wheatgrass and other weedy or invasive species was localized to edge effects, and that other areas of native prairie were relatively unaffected by crested wheatgrass or other invasive plants.

EnCana stated that 28 uncommon vegetation cover types occupied less than 2 per cent of the total land area in the NWA, Koomati, Falcon, and Nishimoto Flats. EnCana indicated that these cover types were patchily distributed and generally associated with wetlands and watercourses, coulee and ravine slopes, and rough broken slopes of the South Saskatchewan River Valley.

EnCana stated that at least 24 rare vascular plant species occurred in the regional and local study areas, with at least 19 of them occurring in the NWA. EnCana indicated that the greatest threat to rare plants from the proposed project during construction was damage or destruction from trenching or ploughing of pipelines, when deep root damage could occur.

Soils

EnCana also examined the project's potential effects on soils. It indicated that the highest risk of wind erosion tended to occur in areas with coarse-textured soils and sparse vegetative cover, which dominated in the northern part of the NWA and were significant components in southern portions of the NWA. EnCana also suggested that soils sensitive to wind erosion included choppy sand hills, where slopes exceeded 15 per cent (considered steep slopes), wetlands, channel crossings, dune crossings, and southwest-and west-facing slopes more prone to aridity. EnCana indicated that frequent fires also greatly increased the risk of wind erosion. EnCana determined the risk of wind erosion to be low in areas dominated by loamy and fine loamy textured soils with moderate to high vegetation cover. EnCana stated that during construction and operations, pipeline and well site tie-in construction and excessive or poorly planned traffic on access routes could cause exposure of bare ground and reduction of protective vegetation cover, resulting in loss of topsoil or underlying soil material due to wind erosion.

EnCana explained that soils sensitive to wind erosion occupied 62.8 per cent of the NWA and 46.5 per cent of the local study area. EnCana noted that 0.47 per cent of soils with extreme risk of erosion was estimated to be directly affected by project construction. During the construction phase, EnCana estimated that the total incremental area of surface disturbance of soils sensitive to wind erosion (including soils rated as high and extreme risk) ranged from 0.33 to 0.82 per cent, depending on the width of surface disturbance from pipelining.

EnCana recognized that compaction caused by excess traffic could increase overland flow, which could promote water erosion in channels or gullies, and that variable settling along pipeline rights-of-way could also result in channelling and water erosion. EnCana further indicated that some steep slopes (e.g., the steep slopes adjacent to the South Saskatchewan River and those immediately south of the Nishimoto Flats) might be most prone to slope failure at times of high rainfall.

EnCana stated that soils sensitive to water erosion occupied 10.7 per cent of the NWA and 9.3 per cent of the local study area. During construction and operations, EnCana stated variable settling along pipeline rights-of-way could cause preferential water flow, resulting in channelling and water erosion of soils. EnCana indicated that the highest risk for water erosion tended to be associated with long or steep slopes, higher clay content, and low vegetation cover.

EnCana indicated that site disturbance during shallow gas activities, particularly when topsoil and subsoil might be mixed, could increase the potential for soil to become saline or for the areal extent of salinization to increase. It further noted that changes to slopes or the hydrologic regime, such as increased traffic-related compaction at access routes or well pads, could increase runoff water or subsurface flow and therefore also increase the potential for soil salinization. EnCana recognized that improper management of surface water and wastewater could provide new or additional sources of salts. It indicated that locations with the highest risk of soil salinization were valley settings with a high water table, including wetlands and concave settings adjacent to wetlands. EnCana stated that soils sensitive to salinization occupied 0.7 per cent of the NWA and 7.1 per cent of the local study area. EnCana noted that salinization was more likely in the southern part of the NWA.

EnCana indicated that the risk of subsurface soil contamination was higher in areas where recharge was promoted by sparse vegetation cover and coarse-textured soils, which would permit

rapid infiltration. It noted that during operations, improperly sited or excessive vehicle traffic could result in compaction of soils, leading to exposure of bare ground and subsequent gully and channellization, which could lead to ponding and provide a pathway for soil contamination. According to EnCana, soils sensitive to subsurface contamination occupied 51.8 per cent of the NWA and 39.8 per cent of the local study area.

Mitigation

EnCana indicated that its approach was to avoid sensitive areas and to minimize the disturbance with appropriate mitigation measures. Disturbed areas would be reclaimed to equivalent land capability.

EnCana stated that it would implement the following measures to minimize ground disturbance:

- select well sites that were well-drained and protected from wind exposure and erosion;
- select pipeline routes that avoided side slopes and cross water bodies perpendicular to the flow;
- select access trails appropriate for the volume and type of traffic, avoiding long flow paths when crossing slopes and avoiding straight sections when exposed to wind;
- confine ground disturbance to the period of dormancy for vegetation; and
- conserve and replace all soil and vegetative resources.

EnCana committed to the following key mitigation measures to minimize soil and vegetation disturbance associated with its project:

- restriction of construction activities to the period from October 1 to April 15;
- a survey for rare plants as part of the PDA process;
- a traffic protocol to minimize the need for new access (access management protocol);
- soil erosion control measures and spill contingency plans; and
- wet weather shutdown (protocol for adverse soil conditions).

EnCana indicated that its key mitigation was planning construction from October 1 to April 15, a time when plants were not actively growing. By constraining activities to frozen soil conditions or very dry, sandy conditions, EnCana indicated that both resistance and resilience to disturbance were substantially increased for rangeland soils. EnCana emphasized the importance of doing construction when vegetation was dormant. This would result in quick recovery unless there was physical damage to the plant structure.

EnCana suggested that the small-flowered sand verbena, tiny cryptanthe, and slender mouse-ear-cress all required, to some extent, disturbance and low ground cover as components of their critical habitat. EnCana stated that monitoring had shown that in an area where no further disturbance occurred, tiny cryptanthe had started to disappear. EnCana also noted that the recovery strategy for tiny cryptanthe acknowledged that this plant appeared to require some element of disturbance. EnCana gave evidence that not all information from SARA species recovery strategies should be taken at face value for the NWA situation and stated that the three SARA-listed plant species were at the edge of their range distributions in Alberta but were

relatively more common in southern locations. EnCana stated that its primary mitigation measure for rare plants would be to locate well sites, pipelines, and access trails away from rare plants and to construct pipelines during dormant conditions to minimize disturbance. During the hearing, EnCana indicated it would rely on a qualified botanist to determine the timing and frequency of rare plant surveys. It also clarified that if it could not avoid rare plants, it could implement other mitigation methods. Two examples of mitigation methods provided by EnCana were placement of filter cloth and soil over top of the rare plants prior to driving over them or attempting a rare plant rescue (transplanting) by gathering plants or seeds, propagating them, and putting them back. This would require a permit from Environment Canada under SARA. EnCana also raised concerns about the concept of preliminarily assessed critical habitat in general. These concerns are summarized in Section 6.1.

With respect to the control of invasive species, EnCana's proposed mitigation measures to prevent plant species from entering and establishing in the NWA involved washing all equipment prior to entry into the NWA. By confining construction activities to the dormant season, construction access would occur after the seeds of undesirable vegetation had already matured and dropped, preventing vehicle transport. EnCana stated that the most effective means of limiting the establishment of invasive and undesirable species originating from source areas was to apply mitigation measures that minimized bare ground. EnCana indicated that where the PDAs identified lands with crested wheatgrass, these could be selected preferentially for disturbance, followed by seeding to native species. EnCana stated that crested wheatgrass would not be used in reclamation. Furthermore, EnCana committed to revegetate disturbed areas using native species rather than relying on natural recovery. EnCana suggested that some exceptional cases might apply where natural recovery would be adopted, and in that case it would follow Alberta Environment's natural recovery guidelines.

EnCana stated that pipeline construction would involve the use of a spyder plow in dormant, unfrozen conditions whenever possible and appropriate, in order to minimize the disturbance of vegetation and soil. It indicated that this ploughing technique did not require stripping of soil and resulted in a narrow disturbance, typically less than 2 m wide; therefore, the potential for soil erosion, weed invasion, and loss of wildlife habitat was limited. EnCana noted that factors precluding this practice included surface and subsurface stones, frozen soil, adverse topography, heavy clay soil and wet conditions, and large-diameter pipelines. It was not prepared to commit to working only in unfrozen conditions and to use only the spyder plow, but noted that it would maximize spyder plow use in the unfrozen period. EnCana recognized that an assessment had not been made to determine the approximate areas where a spyder plow would be applied and stated that this would be determined through the PDA process. It stated that where the use of a spyder plow was not possible and trenching would be required, topsoil salvage might be necessary. EnCana stated that topsoil salvage and proper replacement was the most effective method of restoring rangeland functionality. Where trenching was required, EnCana indicated that the proposed right-of-way width of 15 m was typically sufficient to accommodate the vehicles that operated on the pipeline rights-of-way. However, it noted that in the case of large-diameter loop-lines and pipeline bends, a width up to 30 m might be required.

EnCana indicated that all well sites would be constructed using minimal disturbance techniques to minimize soil and vegetation disturbance, preserve the soil, and maintain the existing seedbed. EnCana stated that full soil stripping and topsoil removal would not be required during drilling, except for the minimal stripping associated with the bellhole, where the wellhead was connected

to the pipeline, and at the point where the pipeline tied into the existing gathering system. EnCana did not confirm that a qualified soil specialist would be on site during soil-handling operations to ensure proper soil salvage and replacement; it instead stated that this responsibility would be assigned to its environmental inspectors or construction inspectors.

EnCana stated that access management for the proposed project would be greatly improved from past operations at Suffield Base. This would be accomplished by the use of EnCana's EPP which contained a traffic control protocol. EnCana had commenced a process for optimizing its use of roads and local trails in the NWA. It would be complete prior to project commencement. EnCana would eliminate redundant trails and maintain or repair access routes. EnCana committed to adhere to authorized trails, as unauthorized trail use had been identified as an issue by DND. Use of geographic positioning systems was suggested for tracking of vehicle movements and adhering to authorized trails. Operation vehicles would be equipped with geographic position systems. Field monitoring of contractors and staff would be conducted by EnCana for EPP compliance. Travel in the NWA would be limited to essential use only.

EnCana stated that pipeline corridors and access routes would be carefully designed to avoid sensitive vegetation and soils and a detailed PDA would be conducted for each location. However, EnCana indicated that it would consider site-level soil information at the constructability assessment stage—the last stage of the PDA process. The proposed PDA process is discussed in Section 9.

EnCana indicated that planning of well sites, pipelines, and access roads would include consideration of soil and topographic conditions to avoid drainage courses, steep slopes, active dunes, wetlands, and other sensitive landscapes. EnCana stated that the PDA process would be used to identify and avoid construction on steep slopes to the extent possible. EnCana recognized that it might not be possible to avoid steep slopes or nonpermanent wetlands for all pipelines and access trails, but indicated that in those situations appropriate mitigation measures would be applied. An example of one such measure for access routes on steep and lengthy slopes was to place gravel in the wheel tracks (referred to as two-track gravel) to prevent further erosion.

EnCana noted that Alberta Sustainable Resource Development commonly used a 100 m setback from slope breaks for developments of this nature in proximity to the South Saskatchewan River. EnCana clarified that if during the PDA process there was evidence of slumping or indications that the slopes were unstable, the 100 m setback would be increased. EnCana noted that according to Alberta Public Lands guidelines, setback limits could be reduced if a plan submitted by a geotechnical engineer offered new information confirming site stability. By avoiding the South Saskatchewan River valley and steep slopes, EnCana noted that it would not be constructing any wells in unstable areas. EnCana believed that its avoidance approach made it unnecessary to investigate active or historical slides, as suggested by Natural Resources Canada. EnCana also argued that it had no knowledge of any incident where drilling led to or was a possible contributor to slumping.

EnCana stated that it would be more accurate to determine when site-specific erosion control measures should be implemented based on soil loss standards, rather than implementing measures in places where there were steep slopes. EnCana proposed to use a soil loss standard of 4 tonnes per hectare per year, and noted that this was the accepted standard of Agriculture Canada, all agricultural departments throughout Canada, and the City of Calgary. EnCana stated

that site-specific mitigation would be created to minimize soil erosion and sedimentation into wetlands and meet the soil loss (erosion) standard.

EnCana confirmed that in the case of site, route, and access trail selection, it would avoid all wetlands, where possible, with a 100 m setback from the well centre or pipeline rights-of-way. This is discussed further in Section 6.3 on wetlands.

EnCana explained that all personnel had a responsibility to recognize and prevent damage to soils and vegetation during wet conditions. In situations with significant precipitation or thawing, EnCana confirmed that shutdown or work modifications would begin immediately and concurrently. EnCana noted that work would be halted during adverse conditions and that it would check weather forecasts regularly to determine shutdown requirements. EnCana noted that compaction, rutting, and erosion potentially occurring as a result of its operations would be mitigated by maximizing the use of frozen or dry ground.

In response to criticism about the disturbance levels associated with the D6-D8 pilot, EnCana clarified that the pilot had not fully adopted minimal disturbance techniques, as drilling had occurred in the summer and vegetation would have been packed down during construction. EnCana suggested that the timing of the disturbance assessment was important. It also stated that trampled vegetation appeared to be disturbance after construction and a number of years later the native prairie would have recovered.

Reclamation

EnCana stated that its reclamation goal was equivalent land capability, which it defined as restoration of the land by virtue of reclamation and conservation measures so that the land would be able to support land uses similar to those that existed before an activity was conducted on the land. EnCana stated that the Suffield Base commander, after recommendation by SEAC, would give final approval for reclamation. EnCana indicated that it had experience with successful reclamation in the NWA and in other native grassland environments, as evidenced by the five sites within the NWA included in Reclamation Certificate 501. EnCana noted that Reclamation Certificate 501 was issued in accordance with Alberta Environment's reclamation guidelines. EnCana stated that the reclamation standards proposed in its application were higher than the current Alberta Environment reclamation standards¹² and higher than the new standard being developed. EnCana indicated that it supported the application of Alberta reclamation standards for use on the Suffield Base and noted that Alberta Environment's "Reclamation Criteria for Wellsites and Associated Facilities—1995 Update" was being evaluated and amended to incorporate the same indicators EnCana was proposing. EnCana indicated it had 10 sites within the NWA that would be ready for application for Reclamation Certificates in the next three to four years.

EnCana submitted a conceptual reclamation plan as part of its environmental impact statement, which provided a suite of reclamation measures and options that could be used in any given site-specific situation. The conceptual reclamation plan and EnCana's proposed rangeland functionality assessment protocol acknowledged that semi-arid rangeland ecosystems were dynamic and variable and, in many aspects, dependent on some level of disturbance in order to maintain unique characteristics. EnCana stated that some impacts on native rangeland were to be

¹² Alberta Environment, 1995, Reclamation criteria for wellsites and associated facilities.

expected from its operations and suggested that its proposed construction methods, operating practices, and environmental mitigation would minimize environmental degradation.

When asked what successful reclamation would look like on the ground, EnCana referred to its rangeland functionality assessment protocol, its vegetation protocols for monitoring seeding rates and establishment and setting targets for establishment, and its ground cover protocols to provide erosion control and the ultimate return of rangeland functionality. EnCana noted that in this situation the return of rangeland functionality was compatible with achieving equivalent land capability. EnCana stated that the rangeland functionality assessment protocol used qualitative measurements of ecosystem functionality as a rapid, cost-effective means of reliably monitoring reclamation throughout the life-cycle of the development, and that benchmark goals at specific times would ensure that restoration of ecosystem functionality was on an expected trajectory and that there was time for adaptive management.

EnCana presented alternative means of measuring reclamation performance in the NWA by use of a rangeland functionality assessment protocol, which was based on other work to assess range functionality. It suggested that three measurement indices of range health included biotic integrity, hydrologic function, and site stability. EnCana indicated that the status of a given reclamation site could be measured against either a reference site or a theoretical site typical of high range health. It requested that the Panel accept the rangeland functionality assessment protocol based on rangeland functionality as the reclamation standard for the proposed project. EnCana stated that it had not applied the rangeland functionality assessment protocol in other grassland environments, but Dr. Walker had conducted some field verification of the protocol on some of EnCana's well sites. EnCana acknowledged that the rangeland functionality assessment protocol was still a work in progress and would require additional work to incorporate measures of habitat that might be important to SARA species.

EnCana indicated that the critical habitat required by the SARA-listed plant species could be incorporated into the rangeland functionality assessment protocol, and it would be a matter of defining and incorporating it into the end land use. It suggested that the evaluation of range health did not include specific wildlife attributes, as various wildlife species had different needs (compared to the vegetation successional stages). EnCana stated that according to literature on range health, there was an assumption that having hydrological function and site stability would lead to a native plant community that would support wildlife communities, not just one species.

Within the conceptual reclamation plan, EnCana described measures for the prevention and management of undesirable plants. It emphasized that a key factor in determining the appropriate reclamation method would be the PDAs. EnCana anticipated that finer textured soils would require more aggressive reclamation. It noted that this would include a combination of assisted natural recovery using both mowing and seeding in an effort to curtail the anticipated high potential for growth of weeds or undesirable vegetation. EnCana noted that it would be best to mow prior to seed drop, but in consideration of ground-nesting birds, mowing would have to be deferred until later to avoid collateral damage during the migratory bird breeding period. It also stated that mowing would occur sometime before winter construction.

EnCana clarified its intention to seed aggressive native species to out-compete and ultimately replace undesirable species. It stated that crested wheatgrass seed bank elimination might be possible with several years of grazing, mowing, burning, or herbicide application. EnCana

admitted that success was expected to be variable and would depend on preexisting site conditions. It expected a low level of stand replacement on sites in large, well-established seeded fields of crested wheatgrass because the seed bank would contain predominantly undesirable species.

EnCana stated that it was not solely its responsibility to remediate past reclamation where crested wheatgrass was used. It also attributed existence of crested wheat grass in the NWA to past agricultural practices (e.g., early homesteaders). EnCana supported the control of undesirable plant species in relation to the proposed development for the NWA. It indicated that control of undesirable plant species in the NWA should involve all parties operating in the NWA. EnCana supported a coordinated approach to vegetation management for the Suffield Base, including the NWA. It also indicated that it would support and cooperate with outside research initiatives to monitor vegetation management for control of undesirable species.

Overall, EnCana predicted residual environmental effects on soils and vegetation to be insignificant after mitigation.

6.2.2 Views and Concerns of Interveners

Government of Canada

DND recommended that EnCana provide specific baseline information on species composition, bare ground, and litter for all vegetation communities that would be affected by the project. DND stated that its studies suggested that the footprint would be much larger, considering changes to vegetative structure, litter, bare ground in excess of the range of natural variability, and species composition.

Vegetation

Species at risk were a major concern for Environment Canada, which identified uncertainties about which species at risk might be affected by the proposed project, since there was a lack of field surveys. DND highlighted the importance of species at risk surveys for implementing protective buffers or setbacks around sensitive environmental features. DND suggested this might not be accomplished with surveys for some species proposed by EnCana, which involved surveying only the physical disturbance area. DND questioned the uncertainty about future production operations of EnCana and how EnCana might comply with species at risk legislation. DND stated that maintenance and abandonment activities would result in disturbance of soil and vegetation and could require SARA permits.

Environment Canada's evidence included the document "Setback Distance Guidelines Prairie Plant Species at Risk." These guidelines were intended for use by recovery teams for plant species at risk in the prairie provinces. Environment Canada was cooperating with DND in the use of these guidelines for establishing setback distances specific to the NWA. DND submitted its working paper "Director General Environment Recommendations on Species at Risk Setback Distances for CFB Suffield." It referenced setback distances for SARA listed plant species. DND recommended that its setback guidelines be adopted for use with the EnCana project.

According to the Government of Canada (Canada), the NWA contained 78 per cent of the known population of the tiny cryptanthe and 49 per cent of the known population of the small-flowered sand verbenas. It stated that the slender mouse-ear-cress was also found in the NWA.

Environment Canada noted that the amendment to the recovery strategy involving the creation of critical habitat for the tiny cryptanthe and the recovery strategies for the slender mouse-ear-cress and the small-flowered sand verbenas had not yet been finalized. Environment Canada noted that this was primarily due to the requirement for consultation, and it expected that within six months it would be in a position to finalize the critical habitat for the three plant species.

Environment Canada stated that the NWA was of national importance to the conservation of wildlife and species at risk. Environment Canada concluded that no additional industrial activities should be allowed to proceed until there was certainty that any proposed industrial activity would not adversely impact any listed species at risk, their residences, their critical habitat, preliminarily assessed critical habitat, or the ecological integrity of the NWA.

DND submitted evidence of ecosystem impacts of historical shallow gas wells within the NWA. It identified proliferation of access routes as one source of fragmentation. The Government of Canada identified fragmentation and the creation of linear features as a concern for the prairie ecosystem. It noted that roads and trails allowed the spread of nonnative species. It stated that EnCana underestimated the distribution and abundance of nonnative invasive plants. Canada noted that its monitoring and research showed that the areas invaded by crested wheatgrass had increased by a factor of 3.2 over the area originally seeded. It also submitted that vehicle traffic continued to spread crested wheatgrass and other invasive plant seeds. Canada stated that areas of increased bare ground and reduced litter and range health were more susceptible to nonnative species invasions. It stated that it had been demonstrated that even minimal disturbance oil and gas development and proper mitigation of problem sites had led to bare ground increases at a rate of 5 per cent per year. Canada concluded that the distribution and spatial extent of exotic and invasive plants were likely to increase as a result of the project. It also noted that nonnative species would continue to be established anywhere that bare ground was created by pipelines, trails, roads, or sumps.

DND indicated that any activity taken in the NWA must allow for continued military training as required. It stated that there was no intent to do large-scale maneuvering in the NWA at this time. DND noted that should the project proceed, it would prefer the installation of caissons (belowground enclosures to protect underground wellheads), rather than aboveground wellheads. DND acknowledged that the use of caissons would result in increased ground disturbance, but suggested that an initial larger disturbance was preferred over installing caissons at a later date, as that would have an even larger environmental impact.

DND noted that since EnCana's proposed PDAs should contribute to understanding the environmental aspects of the proposed project, the PDAs should have been completed and submitted to the Panel as part of the application. It criticized EnCana for not having completed the PDA process, as the information proposed to be collected would have been beneficial at a more detailed planning level. It raised a concern about EnCana's intention to avoid sensitive areas "where possible" and "where feasible," as that increased the uncertainty associated with EnCana's approach.

DND questioned the feasibility of EnCana's proposed timeline. It stated that it was not possible to determine the rate of invasion of nonnative species or the effectiveness of mitigation within a three-year timeframe. DND noted that there was significant risk that the invasion of nonnative species as a result of the project would be irreversible. It also noted that EnCana did not demonstrate that mitigation for invasive species would be effective. DND stated that it believed that there would be insufficient time to identify and determine species at risk residences and critical or essential habitat within the project area. It noted that this was because EnCana deferred the identification of species at risk to PDA surveys, which would take place in the season immediately prior to the construction phase for that site. DND noted that such survey work would take time and must be completed during optimal field season times; it might require surveys over two or more years.

Soils

DND recommended that EnCana map slope gradients at appropriate mapping scales and resolutions (i.e., 1:30 000), indicate the spatial extent of steep slopes (those greater than 15 per cent) within the project area, and develop constraints mapping to indicate areas that would be excluded from development. DND noted that the Middle Sand Hills had slopes that were sensitive to erosion and recommended that EnCana map all steep slopes. DND agreed with the Environmental Coalition that sensitive slopes could be mapped at a fine scale to allow for slope analysis. Natural Resource Canada (NRCan) observed that in its constraints-based siting assessment, EnCana provided constraints maps only for the northern section of the southern part of the NWA, and it recommended that EnCana provide constraints maps for the whole NWA. NRCan suggested that based on these constraints maps, EnCana should identify existing and proposed locations of development, including wells, pipelines, roads, and access trails, and provide an updated assessment of potential adverse environmental effects of the entire project footprint. It also noted that despite constraints mapping principles, the proposed well sites were presently based more on optimal gas recovery than on environmental constraints.

NRCan suggested that EnCana's assessments of the present and future extent of bare ground in choppy sand hills and on sand plains were not presented in relation to existing naturally occurring bare soil. It recommended that EnCana compare the extent of existing natural bare soil with the extent of existing anthropogenic (or man-made) areas of bare soil and assess potential increases in bare soil caused by project activities. Canada submitted that 2.3 to 2.7 per cent of the NWA (1046 to 1246 hectares of native prairie) had been invaded and compromised by agronomic or nonnative weedy species originally seeded on old pipelines. DND provided evidence from EnCana's D6-D8 infill drilling inside the NWA and from Koomati infill drilling projects that disturbed areas had not returned to pre-disturbance conditions and that DND's calculations of surface disturbance exceeded those of EnCana. DND noted that EnCana's footprint of 900 m² for the Koomati well sites did not take into account the working space required during well construction. DND also noted that habitat loss calculated by EnCana for species at risk and other species failed to recognize disturbance from indirect effects and was therefore underestimated.

Canada noted several deficiencies in EnCana's soil assessment and recommended that EnCana provide evidence of the success of historical mitigation, including an evaluation of the success of soil erosion control in the Middle Sand Hills and an evaluation of the success of erosion control on access trails. DND stated that historically EnCana had experienced erosion on pipeline rights-

of-way, access trails, well sites, and steep slopes in the NWA, particularly within erosion-prone landforms in the Middle Sand Hills.

NRCan criticized EnCana's approach to slope stability and setbacks and questioned the validity of adopting a 100 m setback from the South Saskatchewan River. NRCan argued that under the described procedure for establishing setbacks, there were local conditions that should have been considered, which might increase the setback distance.

NRCan addressed the issue of soil slumping in general, but also specifically related to EnCana's drilling operations. It identified several areas with visible slumping associated with EnCana's activities. It took exception to EnCana's view that it did not anticipate slope stability issues, since it had not encountered slope stability problems historically in the NWA. It stated that it was aware of slope instability and slope-associated mass wasting in the regional and local study areas. NRCan recommended that EnCana undertake further work to provide detailed slope descriptions and, among other things, document all historical and active landslides in the regional and local study areas. NRCan also recommended that EnCana provide details in the environmental effects monitoring plan on how slope stability would be monitored in a follow-up program. DND recommended that EnCana also provide historical information related to the success and effectiveness of erosion mitigation from previous development in these areas. NRCan concluded that EnCana provided insufficient information to render an informed decision as to the suitability of its slope practices and potential environmental impacts that may result as a consequence of the proposed development activities.

Mitigation

Canada noted EnCana's use of avoidance as the primary method of mitigation and observed that in cases where avoidance as mitigation could not be implemented, EnCana did not identify the mitigation measures that would be implemented to protect rare plants, species at risk, wetlands, and steep erosive slopes.

Canada submitted that while well drilling during the winter was considered to limit the damage on the minimal disturbance well sites, under frozen conditions pipeline construction could not be accomplished without creating greater damage. It recognized spider ploughing and similar methods of pipelining as causing the least disturbance in constructing pipelines and cautioned that ploughed-in lines might not be possible during frozen conditions. It concluded that instead trenching would be required. Canada noted that trenching was the most damaging pipeline construction option and recommended that EnCana plough in pipelines during warmer months, with the well sites and pipeline tie-ins completed during frozen conditions.

DND wanted EnCana to assess the effectiveness of proposed mitigation, including an assessment of the historical effectiveness of wet weather shutdown protocols. It recommended that EnCana follow the thresholds and criteria determined by DND related to work shutdown.

DND recommended that EnCana specify how it would control weedy and nonnative agronomic species on pipeline rights-of-way and access trails where they were not originally seeded and note any historical successes. It wanted EnCana to clearly mark all access routes from points of entry to well sites and remove all weeds and invasive species from those access routes. DND noted that while vehicle washing prior to entering the base might ensure that no additional seeds

were being brought onto the range from elsewhere, it would not solve the problem of moving seeds around that were already present on the range.

DND recommended that EnCana quantify the differences between the improvements and historical practices related to trail proliferation management. DND also wanted EnCana to provide trail management plans in order to reduce the risk of erosion from duplicate access in sensitive terrain and to manage erosion problems with existing access.

Reclamation

DND questioned the effectiveness of EnCana's proposed reclamation plan. DND questioned whether EnCana's reclamation activities would return areas disturbed as a result of the project to pre-disturbance conditions. It recommended that EnCana document current reclamation practices to manage undesirable vegetation and restore equivalent land capability and specify how its practices had changed. DND recommended that EnCana's reclamation plans be consistent with the objectives identified in the ecological restoration policy identified for protected areas (Canadian Parks Council, 2008, Principles and Guidelines for Ecological Restoration in Canada's Protected Natural Areas). Environment Canada concluded that despite a long history of operating on the Suffield Base, EnCana had not demonstrated that it could effectively reclaim large disturbed areas. It noted that reclamation of native prairie continued to be a complex task with uncertain outcomes. Canada concluded that the base commander had the authority to issue reclamation certificates.

In general, Canada found that the EnCana EIS contained insufficient information regarding project effects on the environment. Canada questioned whether the mitigation measures proposed by EnCana could be effectively implemented. Canada indicated that this contributed uncertainty in determining the likelihood of significant effects. DND did not accept several conclusions of the EIS (e.g., project disturbance footprint of less than 1 per cent, mitigation effectiveness such as winter construction).

Environment Canada maintained that information describing baseline conditions, such as vegetation in the NWA, was inadequate for assessing project impacts, measuring mitigation effectiveness, and determining the need for adaptive management. Overall, Canada stated that EnCana had not substantiated its conclusions regarding the significance of environmental effects.

Environmental Coalition

The Coalition noted that EnCana's EIS took a landscape-level approach in considering the project's effects on soils and vegetation. The Coalition stated that EnCana had not adequately assessed or had completely ignored the significance of the level of disturbance in the area. It noted that a number of studies, including EnCana's own data, showed that there were significant effects from existing developments, especially in areas highly sensitive to erosion, salinization, and contamination.

Vegetation

The Coalition acknowledged that the objective of EnCana's vegetation triangle sampling effort was to measure the effects of different well densities on native prairie grassland integrity and noted that a pre-development baseline was not considered. The Coalition criticized EnCana's

field study design for not being at the appropriate level of detail and noted that there was inadequate information from the vegetation triangle sampling effort to draw conclusions about the significance of the effects of gas well density on native prairie integrity. The Coalition criticized the vegetation triangle sampling for not considering wetlands and other less common vegetation cover types in the NWA. The Coalition stated that the sampling program had been designed for landscape-level analysis and that greater detail was necessary.

The Coalition noted that a shortcoming of the paired pipeline sampling conducted as part of EnCana's EIS was that it was not designed or suitable for measuring the influx of invasive plant species into native prairie. The Coalition stated that the paired pipeline study attempted to test restoration of native plant community on disturbed pipelines. The Coalition noted that the sampling intensity in EnCana's field surveys was not sufficient to detect differences unless they were extremely large and, therefore, smaller differences would not be found to be statistically significant even if they existed. The Coalition suggested that the methods used by EnCana were not suitable for detecting changes in plant communities. Contrary to EnCana's view, the Coalition stated that it had not seen data to suggest that ingress of native prairie into areas seeded to nonnative species was occurring.

The Coalition suggested that EnCana's based its calculations of disturbance on a narrow definition and underestimated the existing disturbance and the project disturbance in the NWA. The Coalition indicated that higher levels of disturbance were attributed to nonnative vegetation from past reclamation and indirect effects adjacent to surface disturbance areas, such as encroachment of nonnative plants. It stated that its analysis resulted in a current direct disturbance calculation of 2.5 per cent and noted that the indirect effects were not included in that calculation. The Coalition noted that other factors contributing to the difference in project disturbance calculations were EnCana's underestimation of access trail disturbance and misidentification from aerial photographs. The Coalition stated that its understanding of the use of subsurface caissons was that they would lead to much greater disturbance of soil and vegetation than would aboveground wells. The Coalition criticized EnCana for not considering disturbance in terms of fragmentation and anthropogenic edge, as these were widely viewed as more meaningful ecological concepts than total disturbance area for considering footprint over space and time. The Coalition recognized that measuring the edge effects and the fragmentation effects associated with the project were a challenge.

The Coalition stated that one of the issues of most concern in the NWA regarding invasive species was the persistence of crested wheatgrass on sites where it was currently established and its invasion into new disturbances and native plant communities. The Coalition noted that one ecological process important to grassland integrity was the expansion of exotic invasive plant species. Based on expansion rates of 0.1 to 0.4 m/yr, it estimated the amount of native prairie grassland area that would be invaded to be 1500 to 5500 hectares. The Coalition stated that its results suggested that as much as 1200 hectares in the NWA had already been lost to invasive plants. It estimated that 2.6 per cent of the NWA might already be occupied by nonnative species spreading from linear disturbances.

The Coalition disagreed with EnCana's approach of using PDAs for vegetation avoidance. The Coalition cited a need for accurate surveying and mapping of endangered plant species prior to project approval. The Coalition suggested that EnCana's protocol for rare plant surveys did not satisfy minimum guidelines of the Alberta Native Plant Council. The Coalition took exception to

statements by EnCana that the three SARA-listed plant species of the NWA would do well by continued disturbance from oil and gas activity. The Coalition noted that the slender mouse-ear-cress did not require disturbed sandy soil and typically required slight disturbance by cattle to do well in native range. It noted that the other two SARA-listed plant species (small-flowered sand verbena and tiny cryptanthe) did well in bare areas. Furthermore, the Coalition stated that the small-flowered sand verbena was a species found in active sand dunes. It also noted that the national recovery plan for the tiny cryptanthe cautioned that the species does occur in human-created disturbance areas but will often disappear from those areas over time.

Soils

The Coalition stated that the nature of many of the soils in the NWA was such that the probability of significant adverse effects was high. The Coalition acknowledged that EnCana proposed to reduce effects on soils by using PDAs to identify sensitive areas and then to try to avoid them. However, the Coalition argued that EnCana was postponing information gathering at a more detailed level and consequently it was difficult to know whether the identification and avoidance of sensitive areas could be achieved.

The Coalition noted that EnCana's maps designated whole portions of the NWA as extreme for soil sensitivity. The Coalition explained that if EnCana combined its maps with the appropriate buffers for VECs, it would be impossible to drill without violating a number of environmental constraints and having adverse effects on soils. The Coalition stated that if the project was determined to be feasible, it would need constraints analysis to protect the steeper slopes. The Coalition criticized EnCana for not looking at the soils and slopes at a fine enough scale, even though pipelines and access routes might be placed on the steep slopes.

Mitigation

The Coalition suggested that although theoretically sound, many mitigation measures were not found to be practically feasible, given the operational realities of the oil and gas industry, and the predicted reduction of adverse effects was not realized. The Coalition argued that past performance by EnCana on the Suffield Base had not demonstrated the desired effect and that the effects of poor mitigation performance were not evaluated in the EIS.

The Coalition stated that minimal disturbance drilling, pipeline construction methods, and natural recovery (no active seeding) had been used extensively for shallow gas development projects since the mid-1990s. It acknowledged that there was evidence that minimal disturbance techniques had reduced environmental impacts. However, the Coalition noted that there also was evidence that good intentions were not always realized.

The Coalition criticized EnCana's characterization of its project as using minimum disturbance techniques. It noted that pipelines would likely be installed over the winter and trenching, rather than the spyder plow, would be used. The Coalition indicated that trenching disturbed soil and in some cases EnCana was not proposing to salvage topsoil or separate topsoil and subsoil and it would be admixed. The Coalition also emphasized the fact that some access trails would require ground disturbance for contouring and construction, and if problems were encountered, they might be gravelled. The Coalition noted its concern that EnCana would not honour all setbacks and that only as a last resort would EnCana move or cancel the proposed development. The Coalition raised an issue about the timing inconsistencies proposed by EnCana. EnCana

proposed to construct pipelines in unfrozen conditions and wells in frozen soil conditions with similar timing.

The Coalition did not agree with EnCana's proposal for winter construction with reliance upon rare plants to germinate from a disturbed seedbed, and noted that such activity was contrary to the national recovery strategy for the tiny cryptanthus in Canada (2006). The Coalition disagreed with EnCana's suggestion that information about horticultural propagation of other members of plant families from the three SARA species implied that plant recoveries would be possible by transplanting or propagating the three SARA species. The Coalition stated that transplanting had not been proven as a mitigation method for any of the three SARA species.

Reclamation

The Coalition disagreed with EnCana's reclamation goal of "equivalent capability." The Coalition stated that a restoration approach to reclamation should be used and should address effects of the proposed project, as well as those of past disturbances. The Coalition recommended a precautionary approach to reclamation and suggested that EnCana should address existing disturbances prior to consideration of new disturbance in the NWA. The Coalition suggested that reclamation success should be measured against a control site that had not experienced anthropogenic disturbances. The Coalition noted that the unclear responsibility for reclamation and the lack of a standard created uncertainty. It recommended a precautionary approach to reclamation and suggested that a federal agency should be responsible for reclamation in the NWA if Alberta Environment did not take responsibility.

The Coalition concluded that there was not enough evidence before the Panel to determine that there would not be any significant adverse effects.

Panel Expert—Mr. J. Woosaree

Mr. Woosaree stated that EnCana's proposed development had the potential to reduce native plant community integrity through loss or reduction of native plant diversity and rare plants, increased soil degradation, increased threat from invasive species, and loss of native habitat.

Vegetation

Mr. Woosaree observed that EnCana completed very little ground-truthing or assessment to determine the accuracy of its digitization and classification methods. He stated that the approach used by EnCana did not produce a quantitative measure of disturbance but rather a qualitative classification process.

He recognized that there were direct and indirect effects of disturbance that could contribute to a footprint calculation. He observed that EnCana had calculated the direct footprint associated with its disturbance and suggested that the indirect effects of the footprint should also be taken into account, including the spread of nonnative species and other weeds.

Mr. Woosaree noted that the paired pipeline sampling method used by EnCana had very low sample sizes for some periods of construction, which Mr. Woosaree concluded limited the validity of the conclusions drawn based on the data. He also noted that there was not a clear

correlation between paired pipelines and native plant community integrity, because many of the pipelines were revegetated using nonnative species.

Mr. Woosaree noted that the vegetation triangle sampling method was accepted among vegetation ecologists. He noted that in EnCana's data collection, the basic questions seemed flawed because there was no comparison of vegetation communities between impacted and nonimpacted areas. Given that the relationship between well presence and native prairie integrity may not be linear, Mr. Woosaree suggested that the effects of wells on landscapes might have been missed, since a reference condition approach was not used. He concluded that if there was a threshold function in terms of how wells affect native range condition (e.g., two wells per section have a great impact but subsequent wells have relatively little impact), it would not have been detected by the triangle sampling method. Mr. Woosaree noted that he had hoped EnCana's ordination analysis would have showed some kind of correlation between well density and native prairie integrity, and he noted that based on the information provided, a clear conclusion could not be made.

He noted that with respect to rare plants in general, there was a great deal of information available on how to reproduce them. He suggested that it might be appropriate for some effort to be put toward reproduction and reintroduction of rare plants.

Mr. Woosaree suggested that all parties would need to be involved in arresting the spread of crested wheatgrass, but eradication would not be feasible. However, he stated that something should be done or it would keep spreading. Mr. Woosaree noted that crested wheatgrass was spread by wildlife and livestock and that oil and gas activities were not solely responsible.

Soils

Mr. Woosaree indicated that soil compaction from traffic would occur in the first two years of operation and would not change much thereafter. He indicated that EnCana could supplement its desktop-based soil information with field verification during the PDA stage, adding that in addition to the desktop data gathered, soils could be easily assessed in the field based on texture. He noted that slope information could also be collected in the field during the PDA process.

Mitigation

While Mr. Woosaree agreed that minimal disturbance techniques could likely reduce recovery times, he was of the view that this type of disturbance must have some degree of impact. Mr. Woosaree suggested that there would be minimal disturbance with a spyder plow, but pipeline trenching could take three or four years for recovery.

Mr. Woosaree recommended that avoidance of wetlands was important, as they were key habitats for wildlife, and EnCana should adhere to setback distances. He also recommended that sensitive areas should be avoided. Mr. Woosaree recommended that alternative routes or sitings should be found or alternatively pipelines be bored in order to avoid habitat loss. He stated that all critical habitats should be identified and noted that there should not be any loss of habitat that was critical to species at risk. Mr. Woosaree stated that habitat loss and fragmentation should be minimized wherever possible and noted that mitigation should take into account the potential for restoration of the land to pre-disturbed conditions.

Mr. Woosaree testified that EnCana provided enough information to properly mitigate future impacts from the project, noting that some mitigation measures would be developed in the future through adaptive management practices. He stated that the PDA was a type of pre-adaptive management and was justifiable. Mr. Woosaree noted that adaptive management did have positive benefits, but cautioned about the use of adaptive management with respect to critical habitat, since thresholds were unknown.

He stated that he would like to see EnCana be more proactive to reduce traffic and its potential impacts on soils. He suggested that clear objectives for trails were needed and that the same rules should apply for all land users.

Reclamation

Mr. Woosaree stated that an objective of the NWA was to maintain or conserve genetic diversity, and therefore a reclamation plan should be aimed at restoration. He indicated that the intentions of the environmental protection plan (EPP), PDA process, and conceptual reclamation plan were acceptable, provided that EnCana fully complied and enforced the mitigation measures.

Mr. Woosaree stated that he believed that many of EnCana's mitigation techniques would work. He also stated that regular monitoring was essential. He noted that all activities of all land users, including the Prairie Farm Rehabilitation Administration, should be monitored, not only that of oil and gas operators.

6.2.3 Panel Conclusions and Recommendations

The NWA is one of the few large blocks of dry mixed-grass prairie remaining in Canada and hosts many species, including three plant species at risk listed under the *Species at Risk Act*. The Panel recognizes that any significant change in soils and vegetation would have a direct effect on other species that depend on them for habitat and food. In this section, the Panel focuses on how the proposed project would affect soil and vegetation and how the land affected by existing and any future gas development might be reclaimed.

EnCana's strategy to minimize affecting plant species at risk is avoidance. However, as noted in Section 6.7 on cumulative effects, the tiny cryptanthus, the small-flowered sand verbenas, and the slender mouse-ear-cress, by virtue of their status as species listed under SARA, have already experienced significant adverse impacts. The NWA contains 78 per cent of the known population of the tiny cryptanthus and 49 per cent of the known population of the small-flowered sand verbenas. The slender mouse-ear-cress is also found in the NWA. The completion of the recovery strategies is well advanced for all three species. For the tiny cryptanthus, the strategy was finalized in 2006 and for the other two species, the strategies are in draft form.

The Panel notes that DND is developing recommended setbacks for plant species at risk with the assistance of Environment Canada. The Panel encourages the completion of these setbacks so that they can be applied to EnCana's proposed project, should it proceed.

Canada identified preliminarily assessed critical habitat for the three listed plant species and expected that the designation of critical habitat could occur in about six months. Maps of preliminarily assessed critical habitat have been completed in the NWA and are under consultation. Small areas of preliminarily assessed critical habitat have been identified in the northern NWA and a larger area in the southeast section of the southern NWA. In Section 6.1 on

wildlife, the Panel presents its views on its understanding of the definition of critical habitat under the *Species at Risk Act* and concludes that if the proposed project were to take place within the area identified by critical habitat, it would have a significant adverse effect on the five species for which preliminarily assessed critical habitat has been completed.

Therefore, the Panel considers it important that critical habitat be finalized as soon as possible for the tiny cryptanthus, the small-flowered sand verbena, and the slender mouse-ear-cress.

The Panel recommends that

Recommendation 6 — The critical habitat for the tiny cryptanthus, the small-flowered sand verbena, and the slender mouse-ear-cress be finalized before the project proceeds.

Recommendation 7 — Should the project proceed, the pre-disturbance assessment process be modified so that it uses the mapped critical habitat for the tiny cryptanthus, the small-flowered sand verbena, and the slender mouse-ear-cress as exclusion areas, unless otherwise permitted under the *Species at Risk Act*.

If a wildlife permit is issued after the critical habitat has been identified, there may be situations where EnCana believes it is essential to locate a facility within critical habitat for one of these species. In such situations, the Panel assumes that EnCana would apply to Environment Canada for a SARA permit. If a permit were to be issued, the Panel assumes that EnCana would then proceed to apply for the necessary facility approval from the Suffield Base commander and the ERCB. The Panel notes that the constraints imposed by critical habitat identification in the southern NWA could be considerable. This may mean not siting a proposed facility at the proposed location, or it may be possible that other mitigation measures, such as transplanting for species listed under SARA, may be authorized by Environment Canada.

The identification of other rare plants and any of the three endangered and threatened plant species that might also be found outside of their critical habitat would occur during the pre-disturbance assessment (PDA) process. The Panel's recommendations for enhancement of this process are described in more detail in Section 9. Canada and the Coalition expressed concerns about the ability of the PDA process to identify rare plant species in one field season. The Panel agrees with this concern, given that these plants are not always visible from one year to the next. The Panel notes the importance of engaging a botanist to conduct this work and to determine whether plant surveys may need to be carried out over more than one field season.

EnCana has proposed mitigation measures to reduce impacts on soils and vegetation through the use of minimal disturbance techniques outlined in Section 6.2.1. Overall, the Panel considers the proposed minimal disturbance construction techniques proposed by EnCana to be best practices for infill shallow gas drilling in the region. Nevertheless, soils and vegetation would still be affected by construction before reclamation begins. One way to minimize physical impacts on soils and vegetation is to reduce the disturbance footprint to the minimum possible. The use of a spyder plow for pipelining is one such technique. The Panel recognizes that there are limitations

to the use of a spyder plow for large-diameter pipelines and in rocky soil. However, it can be used for the vast majority of the proposed pipelines as long as the ground is unfrozen.

The Panel recommends that

Recommendation 8 — Should the project proceed, every effort be made to install pipelines in unfrozen ground and spyder plowing or other similar minimum disturbance techniques be used.

Any exceptions to the use of a spyder plow, for example, in areas with fine-textured soils or high stone content, would be determined during the proposed PDA process.

EnCana has identified soils that are susceptible to wind and water erosion, salinization, and soil contamination. Its landscape-level mapping would assist in preliminary siting of facilities. It has also shown how it would develop constraints maps at a further level of detail to assist in avoiding these sensitive soils. The constraints maps have not been completed for the whole of the NWA, but it is the Panel's view that further constraints mapping is not needed for the environmental assessment. Instead, it is the Panel's view that soils experts should be involved early in the PDA process so that sensitive soils can be avoided when selecting facility sites and pipeline and access alignments. It is important that sensitive soils be identified prior to any disturbance. Mixing of topsoil and subsoil, for example, can cause degradation of soil quality and increased salinization. It is the Panel's view that well sites can be chosen that avoid sensitive soils, are well drained, and are protected from wind exposure during the PDA process. Pipeline routes and access trails should be able to be selected in most cases to avoid unstable soils, slopes greater than 15 per cent and to minimize exposure to wind.

The Panel recommends that

Recommendation 9 — Should the project proceed, soil experts be involved in the pre-disturbance assessment process to minimize the siting of facilities on sensitive soils.

This should occur during Step 2 of the PDA process (see Section 9), rather than at the constructability stage as proposed by EnCana.

The Panel is of the view that the proposed mitigation measures together with the enhanced PDA process involving soil experts can minimize soil erosion, salinization, and contamination effects of construction and operations.

Drilling and pipeline construction on steep slopes near the South Saskatchewan River or the coulees that connect to it can potentially create soil slumping and landslides. A slope stability assessment has been suggested to better understand the potential risks. However, the Panel notes that there is little evidence to suggest that past practices over 30 years in the area of the NWA have resulted in soil slumping or landslides. EnCana's PDA is intended, among other things, to identify any potential ground instability and to avoid unstable soils. The Panel considers that EnCana's proposed approach to avoid steep slopes and to stay at least 100 m from the slope break to the South Saskatchewan River is consistent with recommended practices. However, the

Panel notes that some areas may require a setback greater than 100 m. The Panel also notes that in some exceptional circumstances, construction may be possible within the 100 m setback, but any such consideration would require the completion of a geotechnical study and occur only after review and approval by the Suffield Base commander on the recommendation of the Suffield Environmental Advisory Committee. The Panel believes that this can be determined on a site-by-site basis through the PDA if the project proceeds.

EnCana has concluded that the construction of pipelines and trails would not have any fragmentation effects. Canada and the Coalition expressed the view that these linear disturbances are affecting wildlife movement, particularly of arthropods, and ultimately lead to habitat loss or degradation for species such as the Sprague's pipit. While construction would create more bare ground and thus affect vegetation, the Panel finds that concerns related to fragmentation are more related to indirect potential habitat loss than direct effects on the loss of native prairie vegetation. This issue is discussed in Sections 6.1 and 6.7.

EnCana used remote-sensing techniques to estimate that about 1.9 per cent of the NWA has been disturbed by past activities. Both DND and the Coalition disputed this calculation and presented evidence to suggest that the existing disturbance was higher. The physical disturbance of the proposed project was estimated by EnCana to result in increased bare ground of about 0.5 per cent. EnCana concluded that this is a very small footprint and within the range of natural variation. This estimate was based on a calculation of the direct disturbance caused by 1275 wells and associated pipeline and trails. Canada's studies indicate that the footprint would be much larger, considering changes to vegetative structure, litter (dead plant material), bare ground in excess of the range of natural variability, and species composition. Its conclusion was reached using estimates following summer construction in the D6-D8 area in the Middle Sand Hills area. However, the Panel is of the view that drilling in frozen conditions, as proposed by EnCana, would result in fewer disturbances than was the case in the D6-D8 area, which was constructed in the summer. Summer construction causes more disturbance to vegetation than winter construction when vegetation is dormant. Hence, EnCana proposed project, in the Panel views, is likely to have less impact on vegetation than the project completed in the D6-D8 area.

To determine the existing status of native prairie integrity and to measure the incremental effect of increasing well density from 8 to 16 wells, EnCana conducted two vegetation sampling programs. The studies examined the amount of bare ground and litter and the presence of native and invasive plant species. EnCana's conclusion was that the project effects would be insignificant or negligible, given its proposed mitigation measures, and that steady recovery was occurring towards native prairie conditions that would be reached in about 20 to 25 years, provided invasive species such as crested wheatgrass were not used in the seed mix and site-specific planning was done. The Coalition contested the results, arguing that the studies were not statistically sound and did not compare a development of 16 wells per section with an undisturbed site. Canada stated that the presence of invasive species is likely to increase with a subsequent decrease in native prairie grassland. The Panel recognizes the disagreement on the extent to which native prairie is recovering from past disturbance and the extent to which invasive species are increasing. Whether the project proceeds or not, the Panel believes vegetation monitoring should be undertaken. This would assist in determining whether future reclamation is meeting reclamation goals and objectives.

Nonnative invasive species have been present in the NWA historically with the seeding in the 1930s of crested wheatgrass, in particular, to control soil erosion. Early pipeline corridors were also seeded with seed mixes containing crested wheatgrass. EnCana has proposed that it would reseed disturbed soil with aggressive native species, which should out-compete and replace undesirable species. Canada and the Coalition were of the view that invasion of undesirable plant species was increasing and that much of this trend was associated with past drilling and pipeline construction and operations. There is also disagreement about whether native species are slowly replacing invasive species in some areas. Various means to prevent invasive species entering the NWA from the proposed infill drilling program have been suggested by EnCana. EnCana has proposed washing vehicles before they arrive on the base, mowing before the plants go to seed, careful selection of weed-free seed, and siting facilities in areas where invasive species are already present. In the Panel's view, even if the mitigation measures following construction are successful, spread of crested wheatgrass is still likely from ongoing operations unless carefully managed. Of the various mitigation measures proposed by EnCana, siting facilities in areas where invasive species exist followed by reseeding with native seed offers potential for successful reclamation of disturbed sites to native prairie. The Panel encourages EnCana's proposed use of sites that are currently infested with invasive species and the location of facilities in such areas to the extent possible.

The Panel considers the presence of nonnative invasive plant species to be an ongoing problem that is not caused solely by the presence of the petroleum industry. Cattle grazing, birds and other wildlife, and visits to the NWA by DND, researchers, and other visitors can contribute to its spread as well. The Panel concludes that control and reduction of nonnative invasive plant species will require effective management by all parties that access the NWA.

The Panel recommends that

Recommendation 10 — The Department of National Defence develop a management strategy for nonnative invasive plant species that would involve and apply to all the users of the National Wildlife Area.

EnCana's proposed reclamation plan is conceptual in nature in that it provides various measures and options that could be used in any given situation. A protocol has been proposed that is based on several existing protocols for range health assessment. It defines reclamation goals and objectives, describes methods to measure reclamation success, and proposes standards and criteria for reclamation success. Presently, the Alberta reclamation standard is under revision. In 2007, the Canadian Parks Council developed restoration objectives for protected areas, including national wildlife areas. Canada has stated that despite a long history of operating in the NWA, EnCana has not demonstrated that it can effectively reclaim large disturbed areas. At the same time, a reclamation plan for the NWA has never been developed by DND and few areas have received a reclamation certificate in the NWA.

The Panel believes reclamation standards should be developed for the NWA. As a first step, the Panel considers it important that DND establish goals and objectives for reclamation in the NWA regardless of whether this project proceeds. The standards should be developed by SEAC, working closely with the Suffield Base, and the reclamation goal should be native prairie grasslands. The need to develop reclamation criteria was identified in the 1975 Agreement and a

role for SEAC was implied in this activity. The 1975 Agreement states that the Suffield Base must be maintained in a condition reasonably equivalent to that existing on the date of occupancy. Given the importance of the native grasslands in the NWA, the Panel notes that a standard of reclamation more rigorous than the standard of “equivalent land capability” proposed by EnCana would be appropriate. This standard would build upon the 1995 Alberta Environment standard as amended, Canadian Parks Council restoration objectives, and EnCana’s proposed rangeland functionality assessment protocol.

In terms of actual reclamation, once existing wells are abandoned, they should be reclaimed as soon as possible. Pipeline rights-of-way should be seeded immediately after construction and the process of recovery to native prairie conditions begin. An exception would be cases where natural recovery methods would be used. The process for future reclamation certification is discussed in Section 9.

The Panel recommends that

Recommendation 11 — The Suffield Environmental Advisory Committee, working closely with the Department of National Defence and in consultation with other parties, develop standards for reclamation for the National Wildlife Area based on the 1995 Alberta standard as amended, Canadian Parks Council’s restoration objectives, and EnCana’s proposed rangeland functionality assessment protocol.

In summary, the Panel’s conclusions are that infill shallow gas development would not have any significant effects on vegetation, soils, and native prairie provided that

- the critical habitat for the tiny cryptanthe, the small-flowered sand verbena, and the slender mouse-ear-cress is finalized before the project proceeds;
- the pre-disturbance assessment process is modified so that in Steps 2 and 3 it uses the mapped critical habitat for the tiny cryptanthe, the small-flowered sand verbena, and the slender mouse-ear-cress as exclusion areas, areas where disturbances must not take place, unless otherwise permitted under the *Species at Risk Act*;
- a botanist is engaged in the pre-disturbance assessment process to identify other rare plants and any of the three endangered and threatened plant species that might also be found outside of their critical habitat and to determine whether surveys may be required over more than one year to complete the identification;
- the setbacks under development by DND for the plant species at risk be finalized and applied;
- EnCana implements its proposed mitigation measures and the use of minimal disturbance techniques;
- pipelines are installed in unfrozen ground using a spyder plow or other similar minimum disturbance technique wherever possible; exceptions to this practice would be determined during the pre-disturbance assessment process;
- soils experts are engaged early in the pre-disturbance assessment to identify and avoid to the extent possible constructing in soils that are sensitive to erosion and salinization;

- pipeline routes and access trails avoid slopes greater than 15 per cent; exceptions to this practice would be determined during the pre-disturbance assessment process;
- wells and pipeline construction do not encroach within 100 m of the slope break near the South Saskatchewan River and coulees that drain into it; in some cases the pre-disturbance assessment may determine that a distance greater than 100 m may be required; any encroachment within the 100 m setback of steep slopes would require a geotechnical study and review and approval by the Suffield Environmental Advisory Committee and the Suffield Base commander;
- vegetation monitoring continues to assist in determining the extent of recovery of native prairie and whether reclamation goals and objectives are being achieved;
- well sites, pipeline corridors and sumps are selected, to the extent possible, in areas currently infested with invasive species; and
- reclamation standards are developed for the National Wildlife Area based on the 1995 Alberta standard as amended, Canadian Parks Council's restoration objectives, and EnCana's proposed rangeland functionality assessment protocol.

6.3 Wetlands

6.3.1 Views of EnCana

EnCana noted that various federal and provincial legislation and policies applied to the Canadian Forces Base Suffield National Wildlife Area (NWA) wetlands. Among them, the Federal Policy on Wetland Conservation required all federal departments to ensure no net loss of wetland functions on federal lands and waters.

EnCana used the Canadian Wildlife Service's wetland mapping as a measure of wetland supply in the NWA and found that the majority of wetlands occurred within the southern portion of the NWA and represented less than 0.5 per cent of the NWA. In classifying and describing existing wetland conditions, EnCana also referred to the Department of National Defence (DND) mapping of wetlands within the local and regional study areas and AXYS constraints mapping of wetlands within the same areas.

To determine potential effects on wetlands, EnCana applied a number of constraints in a geographic information mapping system to minimize effects of wells and pipelines on sensitive environmental attributes. The resulting well site and pipeline layout was overlain onto the Canadian Wildlife Service wetland map to determine the degree to which this preliminary layout would affect wetlands. EnCana noted that its pre-disturbance assessment process would confirm wetland presence and its extent and identify any wetland that had not already been mapped to ensure the inclusion of ephemeral wetlands.

During the hearing, EnCana indicated that as a general rule it would not be encroaching into the basin of a wetland and would honour a 100 m setback around the high-water mark of each wetland, both ephemeral and permanent. In exceptional circumstances where encroachment in the 100 m setback might be considered appropriate, it would refer the matter to the Suffield Environmental Advisory Committee for review and a recommendation to the Suffield Base commander. EnCana noted that exceptional circumstances would involve situations where resource extraction would be severely compromised and effects on the environment would be

more adverse if the buffer was adhered to than if it were not. EnCana noted that 50 to 100 preliminary well sites would fall within the 100 m buffer established around wetlands. EnCana further noted that the preliminary well sites and some pipelines that fell within the buffer would be flagged and closely investigated during pre-disturbance assessments when options for further avoidance or mitigation could be explored. EnCana also indicated that in some cases it might decide to cancel the location entirely.

EnCana concluded that the environmental effects of the project on wetland supply and wetland function would be negligible, assuming implementation of the mitigation measures described in its environmental impact statement.

EnCana acknowledged that a potential effect of the project on wetlands was that groundwater extraction may draw down or drain a wetland if it is fed with groundwater. EnCana referred to the LandWise report¹³, prepared for DND in March 2008, on the issue of connectivity between groundwater and wetlands. It observed that the deeper groundwater in the preglacial sediments was not the dominant water source for the wetlands and that wells such as “Dugway” and “Big Bob” drew water from the deeper aquifer. Consequently, since wetlands in the Dugway and Big Bob area did not seem to be connected to the deep aquifer, the use of the wells was unlikely to draw down the wetlands.

6.3.2 Views and Concerns of Interveners

Government of Canada

DND submitted that permanent and ephemeral wetlands are a valued ecosystem component on the Suffield Base, as they provide the critical moist and semi-aquatic habitats used as breeding and foraging areas for aquatic and terrestrial birds, small mammals, amphibians, aquatic plants, and ungulates. DND indicated that its wetland protection policy for the Suffield Base (excluding the NWA) specified a 100 m buffer between all wetlands and activities or disturbances. DND indicated that this setback guideline was reasonable for general unprotected areas or areas not designated as ecologically significant. DND noted that the development of an NWA-specific wetland policy would be forthcoming and would take into account recommendations brought forward during this environmental review.

DND noted that EnCana stated in many sections of its environmental impact statement that buffers may be reduced in exceptional circumstances where resource extraction would be severely compromised and/or effects on the environment would be more adverse if the buffer was adhered to.

Since the use of buffers was one of EnCana’s primary mitigation measures for reducing risk to species at risk and wetlands, DND was of the view that it was important for EnCana to indicate what specific mitigation measures would be used if buffers were to be compromised. DND noted that without knowing what other mitigation measures were proposed and their effectiveness in reducing environmental effects, it was impossible to determine the significance of effects. DND further submitted that EnCana did not justify or explain how its proposed wetland setbacks would ensure the preservation of the health and function of the wetlands.

¹³ Landwise, 2008. Groundwater, Wetland and Water Source Assessment for CFB Suffield, Final Report. Public Works Canada and Department of National Defence.

DND also recommended that no project-related activity be permitted within a 100 m buffer surrounding all wetlands within the NWA until such time as additional research, monitoring, and evaluation were conducted. DND indicated that it anticipated that no activities would receive its consent if they occurred within the 100 m buffer surrounding all wetlands.

DND noted that groundwater used for drilling and other proposed project activities might result in less water being available for sustaining wetlands. DND was of the view that if water were removed from certain locations within the NWA, that could increase salinity in the downslope areas. DND indicated that water extraction threatened maintenance of surface and groundwater flow patterns, as well as the maintenance of moisture levels in wetland habitats, especially during dry periods and at sites where flow rates were low. DND noted that since the water table was shallow within portions of the NWA, there was a serious potential for water levels in the aquifer to drop, thereby affecting the artesian pressure available to feed wetlands. DND recommended that EnCana demonstrate that future water extraction would have minimal and insignificant impact on groundwater and wetland ecosystems.

Regarding the possible impact of water extraction on wetlands, Natural Resources Canada noted that each water well and wetland should be examined to determine the connectivity of the aquifer with the particular wetland. If the aquifer from which water was being extracted was not connected to the wetland, pumping would not affect the wetland. In cases where the aquifer was connected, the water level of the wetlands might start to decrease and the wetlands might diminish in size and eventually dry out.

During the hearing, the Government of Canada (Canada) referred to the March 2008 LandWise report. Canada noted that the LandWise report observed that when groundwater flow is equivalent to withdrawal, discharge to wetlands is eventually reduced. Therefore, removal of water from surficial and pre-glacial aquifers on the Suffield Base would potentially reduce the amount of water available for discharge to wetlands in the study area. Canada noted that this point contradicted EnCana's evidence.

Environment Canada noted that in 1991, the Federal Policy on Wetland Conservation was adopted by the Government of Canada. This policy promoted the wise use of wetlands and elevated concerns for wetland conservation to a national level. The policy promoted the concepts of cooperative approaches to wetland conservation, the need for linkages between wetland conservation and other related initiatives (e.g., water policy and wildlife conservation), the concept of no net loss of wetland functions for federal lands and the protection of wetlands through adequate consideration of wetland issues in environmental assessments of new development projects.

Environmental Coalition

The Coalition noted that EnCana did not complete mapping of all wetlands and the identification of species found in the wetlands, nor did it assess how wetlands and species would be affected. The Coalition was of the view that construction within 100 m of wetlands should be avoided. The Coalition noted the importance of these habitats for rare plants and amphibians and that the disruption of these wetlands was a contravention of provincial guidelines.

During the hearing, the Coalition noted that in the pre-disturbance assessments for the application for the three wells, EnCana demonstrated that it would apply for a relaxation of

setbacks where avoidance is not possible. The Coalition believed that this would contravene the accepted 100 m setback for all wetlands in Environment Canada and Alberta Fish and Wildlife guidelines and, potentially, the no net loss of wetland function under the federal policy.

Panel Expert—Mr. J. Woosaree

Mr. Woosaree noted that wetlands and buffers around them should be avoided, as they were key habitats for wildlife. He also noted that the consideration of ephemeral wetlands was warranted, as they may play a critical role for different species.

Panel Expert—Dr. T. Whidden

Dr. Whidden noted that the conservation of wetlands was important because of their scarcity in the NWA and their value to wildlife. Dr. Whidden recommended that dugouts or water holes not be allowed within the boundaries of delineated wetlands or in proximity to wetlands where the hydrology of wetlands could be compromised.

6.3.3 Panel Conclusions and Recommendations

Concerns about wetlands relate primarily to the potential for construction within the 100 m buffer zone established to protect wetlands, and the potential drawdown of wetlands as a result of groundwater extraction.

The Panel recognizes the importance of wetlands in the NWA as habitat for rare plants and amphibians and aquatic and terrestrial birds and as foraging areas for small mammals and ungulates. However, there has been some disagreement between DND and EnCana in the past on the identification of wetlands, given that some are ephemeral in nature and consequently are difficult to identify with the untrained eye. Standardization of wetlands classification and mapping would be beneficial.

In the Panel's view, the pre-disturbance assessment process is suitable to identify any unmapped or unclassified wetlands in the NWA. Special care is needed to protect permanent wetlands in particular. The 100 m buffer zone, as a protected area around the wetland, has generally been accepted by all parties as a reasonable standard to achieve.

The Panel recommends that

Recommendation 12 — Should the project proceed, the pre-disturbance assessment process be used to identify all wetlands and no facilities be located within the 100 m buffer zone surrounding **permanent wetlands**.

The Panel also recognizes that the 100 m buffer zone around all permanent and ephemeral wetlands establishes a considerable constraint for the location of pipelines in particular. It recognizes that should the project proceed, some flexibility may be appropriate for facilities that may encroach into the buffer zone around ephemeral wetlands. In the Panel's view, the pre-disturbance assessment process is appropriate for the examination of any exceptions to the general rule of no encroachment into the 100 m buffer zone. In some cases, an encroachment into the buffer zone may be appropriate to avoid affecting other valued ecosystem components.

However, all options should be considered before such a decision is taken by the Suffield Base commander. There should be no net loss of wetland function, and the overall impact of encroaching into the wetland should be less than the alternative of affecting other environmental attributes that may be just outside of the buffer zone.

The Panel recommends that

Recommendation 13 — Should the project proceed, the pre-disturbance assessment process be used to determine whether it is appropriate to allow construction within the 100 m buffer zone surrounding **ephemeral wetlands**. All options for the location of facilities should be examined before any encroachment into the buffer zone for ephemeral wetlands is considered.

The Panel has also examined the concern associated with potential drawdown of wetlands as a result of groundwater extraction in Section 6.4 and concluded that such effects are unlikely and can be avoided through careful monitoring of the aquifer.

The Panel concludes that if EnCana applies its proposed mitigation measures and carefully follows the Panel's recommended 100 m buffer zone around permanent and ephemeral wetlands, the project should not result in significant adverse effects on wetlands.

6.4 Water Resources

6.4.1 Views of EnCana

EnCana noted that the South Saskatchewan River was identified as the most prominent surface water feature in the project area. EnCana indicated that there were approximately 27 mapped drainages, consisting of steep gullies incised into the west valley wall of the South Saskatchewan River, and an additional 17 drainages ending in depressions with no surface outlet. It described the interior basins as very small, with tributary basin areas typically less than 10 km². EnCana indicated that the Canadian Forces Base Suffield National Wildlife Area (NWA) was in the driest part of Alberta. EnCana also noted that in a document entitled *Water Conservation and Allocation Guideline for Oilfield Injection* (Alberta Environment, 2006), the area was identified as water-short—water-short being defined as when the cumulative human demand for water meets or exceeds the average natural capability of the source or area to reasonably supply the present or the future needs of water users and the aquatic environment.

However, EnCana noted that while water would be required for all phases of this project, the majority would be required during the initial well drilling and completion stage. EnCana also indicated that the water that would be used during the construction phase in the NWA was water that would otherwise have been used in drilling wells on the Suffield Base. According to EnCana, the net demand of freshwater for drilling and the completion of each well would be 142.5 m³. With an estimated 1275 wells, it estimated the total water requirement over the life of the project to be 181 687 m³, representing about 60 562 m³ per year (m³/yr) for a construction period of three years.

EnCana indicated that all water for drilling would be sourced locally, from the licensed withdrawal point on the South Saskatchewan River and from existing water wells within the Suffield Base or from the Municipality of Medicine Hat.

During the hearing, EnCana indicated that it was temporarily licensed to withdraw surface water directly from the South Saskatchewan River for up to a maximum of 70 000 m³. EnCana stated that this temporary water licence issued by Alberta Environment in September 2008 was valid until May 2009. EnCana proposed to withdraw about 10 000 m³/yr from the South Saskatchewan River. EnCana also indicated that it had been allocated well licences for five water wells, for a total volume of 128 000 m³/yr (Table 3). EnCana noted that each water licence specifies a maximum withdrawal rate and other conditions that restricted environmental impacts. EnCana confirmed that it would use about 35 000 m³/yr of groundwater annually for construction and would pump this water during the period of net water surplus in the winter. EnCana also confirmed that the two wells it proposed to use primarily for the project were Big Bob and Dugway, which sourced their water from the preglacial buried valley aquifer. According to the annual groundwater reports provided for these two wells, EnCana concluded that the current level of withdrawal at these wells was sustainable. EnCana also referred to the March 2008 LandWise report commissioned by DND. The report assessed the sustainability of water withdrawal at these two wells and noted that over a period of three to five years, these wells showed a good recovery after use and no evidence of a declining water table.

Table 3. Water sources and EnCana's licensed allocation¹

Water source	Licensed allocation ² (m ³ /y)	Projected use of water (m ³ /yr)
Wells		
South Jenner	5 000	
Beveridge	10 000	
Dugway	73 000	
Telfer	20 000	
Big Bob	20 000	
Subtotal	128 000	35 000
South Saskatchewan River	70 000	10 000
Municipality of Medicine Hat	n/a	16 000
Total	198 000	61 000

¹ Adapted from Exhibit 002-138 and information provided during the hearing.

² These licensed allocations cover the entire Suffield Base. The allocation for the Telfer, Beverage, and South Jenner wells are temporary licences.

EnCana noted that it would comply with all the requirements of its water licences. EnCana concluded that the effects of the project would be negligible on groundwater because net water use for the project would not increase significantly beyond the current use of water for the wells being drilled on the Suffield Base.

Regarding groundwater quality, EnCana indicated that the information available to date showed that there had been no contamination of groundwater aquifers from shallow gas wells. EnCana noted that it had operated on the Suffield Base for 30 years without contaminating the aquifers and that it complied with all regulatory requirements, including drilling and cementing practices, which greatly reduced the potential of groundwater contamination. EnCana noted that the Energy

Resources Conservation Board (ERCB) had comprehensive regulations and requirements designed to maximize safety during the exploration and production of oil and gas resources. EnCana specifically discussed its protocol in the event of a loss of circulation while drilling—a very rare occurrence, according to EnCana.

EnCana concluded that the effects of the project on groundwater quality would be negligible because it was unlikely that activities would contaminate groundwater. EnCana indicated that no additional mitigation was required for groundwater quantity or quality beyond current regulatory requirements by Alberta Environment and ERCB.

During the hearing, numerous references were made by parties to the LandWise report dated March 2008. The report provided detailed groundwater information for the Suffield Base and reevaluated the biological communities at selected wetland sites to identify potential changes in biological health since 2000. This report indicated that the estimated amount of groundwater flowing through the main Lethbridge Buried Valley and its three main tributaries on the Suffield Base was slightly lower than the minimum water requirements on the Suffield Base (see Table 4). The report further noted that when groundwater flow was equivalent to withdrawal, discharge to wetlands was eventually reduced. Therefore, removal of water from surficial and preglacial aquifers on the Suffield Base could potentially reduce the amount of water available for discharge to wetlands in the study area. The report indicated that water level records extending back to the early 1980s suggested declines in water levels of 0.5 to 2 m in bedrock (Telfer well) and in preglacial sediments near the Hamlet of Suffield and the Municipality of Medicine Hat. The report stated that pumping from wells installed in preglacial gravels (Dugway and Big Bob water source wells) would cause the lowest amount of drawdown to water levels in the surrounding area. On the issue of groundwater quality, the report indicated that petroleum hydrocarbons were not detected at the two locations where they were tested.

During the hearing, EnCana confirmed that it would implement the following recommendations outlined in the LandWise report:

- monitor groundwater withdrawal each time a pump is turned on and off;
- monitor water levels at well locations immediately before a pump is turned on, immediately before it is turned off, and at additional times during the pumping interval when possible;
- conduct at least one long-term aquifer test at each water source well;
- install new observation wells adjacent to the following wetlands: 1) Beveridge Lake, 2) Bayonet South, and 3) near Dishpan Lake, possibly at Hussar (these are located west of the NWA);
- ensure groundwater withdrawal rates do not exceed 73 000 m³/yr at Dugway and 20 000 m³/yr at Big Bob;
- record water withdrawal from all water sources, including surface water bodies and the river access locations; and
- develop with the stakeholders of the Suffield Base, a management plan for all water-source wetlands and wells, including 1) overall management practices, 2) an indication of how often wetlands and wells should be assessed, and 3) a protocol indicating what factors should be assessed.

EnCana noted that the volume of available groundwater shown in Table 22 of the LandWise report (421 500 m³/yr, see Table 4) was a very conservative estimate with low levels of confidence. EnCana also noted that the “average existing groundwater use for six [water] wells,” a volume of 131 380 m³/yr, was an average estimation based on groundwater use at those wells between 2002 and 2006. It noted that the water used between 2002 and 2006 at these wells had decreased significantly over time from about 200 000 m³/yr to about 43 000 m³/yr and that these wells were mainly used by EnCana for its activities on the entire Suffield Base. EnCana noted that the average groundwater use for the last two years, 2005 and 2006, would be more representative of its future groundwater use—a volume of 55 000 m³/yr. It also noted that if its projected overall future groundwater use of 55 000 m³/yr was considered instead of the LandWise estimate of 131 380 m³/yr, there would be a water surplus of about 40 000 m³/yr instead of a water deficit. EnCana also indicated during the hearing that it was developing a water budget for its groundwater use in the Suffield Base.

Table 4. Flow in the main aquifer compared to water requirements in the study area*

According to	Available groundwater (m ³ /yr)	Potential water requirements in the study area (m ³ /yr)			Difference (m ³ /year)
		Estimated nonindustrial groundwater use in the study area	Average existing groundwater use at six [water] wells	Total estimated water requirements	
LandWise	421 500	326 530	131 380	457 900	-36 400
EnCana	421 500	326 530	55 000	381 530	39 970

*Adapted from LandWise Report, March 2008, and information provided during the hearing.

EnCana examined the issue of water flow in the South Saskatchewan River because of its intention to continue to use the river as one of its water sources. EnCana noted that construction would occur between October and April, a period when the water requirements would be equivalent to a flow rate of about 0.0049 m³/s, which EnCana considered to be negligible in relation to the river flow. EnCana noted that its temporary licence for withdrawals from the South Saskatchewan River was conditioned to divert water only when the river flow was greater than 42.48 m³/s. EnCana indicated that it would abide by any restrictions or conservation requirements issued by Alberta Environment in response to low flow conditions. EnCana predicted that the effects of the project on surface water quantity would be negligible.

EnCana stated that surface water quality had been identified as an issue because the project might result in soil erosion or contaminants being conveyed during runoff periods to wetlands or closed depressions in the NWA as well as in the South Saskatchewan River. According to EnCana, the greatest surface disturbances, and therefore the greatest potential for effects on surface water quality, would occur during the construction phase. EnCana noted that the mitigation measures identified for soil erosion were expected to be sufficient to address potential effects on surface water resources. EnCana concluded that the effects of the project on surface water quality would be negligible.

On the issue of fish and fish habitat, EnCana noted that the only potential project effect on the aquatic ecology was linked to the withdrawal of water from the South Saskatchewan River. The potential effects on fish and their habitat included the potential for temporary sedimentation during water withdrawal, changes in fish habitat due to installation and removal of water intake hoses, and fish entrainment and impingement due to water withdrawal activities.

EnCana stated that it would mitigate these potential environmental effects by

- restricting activity periods to avoid sensitive periods (i.e., spawning, egg incubation, fry emergence, and migration);
- withdrawing water when the river flow at Medicine Hat was greater than 42.48 m³/s;
- reducing soil erosion from the shoreline;
- ensuring that the fish screen on the end of the water intake hose met the *Freshwater Intake End-of-Pipe Fish Screen Guideline* (Fisheries and Oceans Canada, 1995);
- placing of the water hose in the same area each time to avoid continually disrupting sediment; and
- avoiding placing the water hose in areas of prime fish habitat.

EnCana concluded that with the implementation of these mitigation measures, no habitat loss and no direct mortality were expected and the residual environmental effect would be negligible.

6.4.2 Views and Concerns of Intervenors

Government of Canada

The Department of National Defence (DND) stated that it did not believe that sufficient information was presented to determine current and potential impacts on ground and surface water quality and quantity. DND noted that this information was necessary to understand the impact of water withdrawals on contamination spread and to determine reliable values for acceptable groundwater extraction rates. This information was also required to determine how groundwater use might result in less water being available for sustaining wetlands, fire fighting, military training, and cattle. DND made several recommendations, including that EnCana be required to demonstrate that future water extraction would have minimal impact on groundwater and wetland ecosystems and that it develop a monitoring program for dugouts, wetlands, and wells.

In its submission, Natural Resources Canada (NRCan) concluded that notwithstanding the lack of baseline information on groundwater use, the proposed project would likely have relatively small negative environmental impacts on groundwater quantity and quality, since

- the increased groundwater use during installation, operation, and decommissioning phases of the project would be within the existing licence withdrawal rates;
- the anticipated impacts on groundwater quality under normal circumstances seemed minimal; and
- the proposed procedures and EnCana's experience seemed adequate to mitigate unpredictable accidents.

During the hearing, NRCan commented on its recent review of the LandWise report, which was placed on the record after it had provided its hearing submission to the Panel. NRCan noted that the LandWise report showed a significantly different image of groundwater issues on the Suffield Base than did EnCana. It compared the predicted annual water recharge rate of the area with the predicted annual water withdrawal rate and first concluded that the groundwater flow available would not be sufficient to sustain the groundwater use. However, during cross-

examination, it was noted by EnCana that NRCan had based its conclusions on water requirements of 130 000 m³/yr—a volume later corrected by EnCana to a significantly lower rate of 35 000 m³/yr of groundwater. After further review of the revised withdrawal rates, NRCan reiterated its position that based on Table 22 of the LandWise report, the groundwater available was still less than the predicted groundwater use (Table 4).

During the hearing, NRCan noted that its main recommendation was that EnCana establish and implement a water management plan based on existing licensed withdrawal rates, actual water use, and related potentially adverse environmental effects. Several other recommendations were also presented, including recording water usage from all sources and preparing a conceptual groundwater model and a detailed estimated groundwater budget of the regional study area, continuous water level monitoring in aquifers near extraction wells along with long-term pumping tests of those wells, delineating capture zones for groundwater sources, and identifying potential receptors within those capture zones.

In its closing argument, the Government of Canada noted that DND was fully supportive of the LandWise recommendations and recommended that the Panel incorporate in its report both the recommendations made in the LandWise report and by NRCan.

During the hearing, DND indicated that it had recently changed its water supply for the administrative area of the base from the South Saskatchewan River to groundwater. Its estimated yearly usage was 500 000 m³. It noted that this change had occurred after the LandWise report was completed.

On issues related to fish and fish habitat, the Department of Fisheries and Oceans stated that due to the low amounts of annual precipitation and the existence of internal drainage basins in the NWA, only the South Saskatchewan River supported fish populations. The department provided a list of mitigation measures pertaining to the South Saskatchewan River to EnCana and concluded that if these measures were implemented, the project would not likely result in the harmful alteration, disruption, or destruction of fish habitat.

Federation of Alberta Naturalists

The Federation of Alberta Naturalists noted that the EnCana proposal to continue to operate on a temporary water permit was unreasonable, given the current water status of the area. It also questioned the assumption that the Municipality of Medicine Hat would be willing to sell water, which was in very short supply, especially in drought years.

6.4.3 Panel Conclusions and Recommendations

The proposed total water requirements for the project of about 60 000 m³/yr were not in dispute at the hearing. However, concerns were expressed about the withdrawal of even relatively small amounts of water. EnCana is proposing to obtain its water supply from three sources—wells located in or near the NWA, the South Saskatchewan River, and the Municipality of Medicine Hat. EnCana also stated that there would be no net increase in its overall yearly water use, since drilling in the NWA would replace drilling elsewhere on the Suffield Base.

EnCana recently received a temporary water licence from Alberta Environment to withdraw water from the South Saskatchewan River. This licence alone has a water withdrawal allocation

that would fulfill EnCana's entire needs. The Panel also notes that in the event of a drought, water consumption could be curtailed by the restrictions on the temporary permit. The Department of Fisheries and Oceans concluded that impacts on fish and fish habitat on the South Saskatchewan River from water extraction could be mitigated, provided certain measures were followed. The Panel concludes that these mitigation measures should be followed if the project proceeds.

Groundwater is an important resource in the region and there are multiple water users on the Suffield Base and the NWA. Water wells and dugouts are used by cattle, the petroleum industry, and the military on the Suffield Base. The March 2008 LandWise report noted that proposed groundwater withdrawal rates are similar to the estimated available supply (i.e., groundwater recharge). Although these estimates may be conservative, the Panel notes that water usage may also be a conservative estimate, given that it is not monitored accurately. The Panel also notes, however, that withdrawal rates are below the licensed maximum set by Alberta Environment. Given that water usage and available groundwater appear to be similar, the LandWise report recommended, among other measures, that monitoring of the water levels in wells and long-term aquifer testing be undertaken. The report also noted that the Dugway and Big Bob wells, both of which are licensed to EnCana, are the most suitable for groundwater withdrawal, as they would cause the lowest amount of drawdown to water levels in the surrounding area. The report sets maximum withdrawal rates for these two wells by the various users. The LandWise report also concluded, based on limited monitoring, that groundwater quality does not seem to have been adversely affected by past oil and gas drilling in the Suffield military training area and the NWA. In the Panel's view, sampling for hydrocarbons in groundwater should continue.

The Panel observes that EnCana has a number of water sources that have been approved for its use and it could adjust the amount extracted from each source depending on the supply. Given the flexibility available to EnCana in its choice of water sources, the Panel's view is that EnCana's proposed groundwater use can be managed to avoid having an adverse impact on the aquifer or adjacent wetlands. However, this will require careful monitoring of overall water use and groundwater levels and the development of a water management plan. Should monitoring indicate that the well recharge rate is dropping, EnCana should reduce its use of groundwater to maintain the recharge or use water sources other than groundwater.

The Panel also concludes that if mitigation measures proposed by EnCana are followed, groundwater quality will not be adversely affected. However, monitoring for hydrocarbons in groundwater should be undertaken on a regular basis to ensure that there is no groundwater contamination from gas production.

During the hearing, DND indicated that it had recently changed its water source from surface water to groundwater at its administration complex in the southwestern corner of the Suffield Base. This change occurred after the LandWise report had been completed and would increase groundwater extraction by about 500 000 m³/yr. The Panel is uncertain about the location of the DND water well and whether it is a short or long-term source. The Panel suggests that DND consider monitoring the effects of water withdrawal if this water extraction is to continue.

The Panel believes that EnCana has sufficient flexibility in its choice of water sources for the proposed project to enable it to avoid having significant adverse impacts on surface or groundwater quantity and quality provided that

- mitigation measures proposed by EnCana in its environmental protection plan and the mitigation measures specified by the Department of Fisheries and Oceans regarding protection of the South Saskatchewan River are followed;
- EnCana's proposed mitigation measures for groundwater protection and the first seven overall recommendations in the March 2008 LandWise report regarding groundwater use (noted in Section 6.4.1) are followed;
- a water management plan for the project is developed and periodic groundwater monitoring for hydrocarbons is undertaken; and
- EnCana adjusts its water sources as necessary depending on the results obtained from the above mitigation and monitoring measures and in accordance with its water management plan.

6.5 Historical and Palaeontological Resources

6.5.1 Views of EnCana

Historical Resources Assessment

EnCana stated that it assessed the potential project effects on historical resources by developing an archeological resource management model, completing historical overviews, and completing historical resource impact assessments (HRIAs).

EnCana noted that there were 412 known historical resource sites throughout the entire NWA, including 19 new sites found as part of the HRIA. Many of the historical sites had more than one feature, e.g., stone circles, cairns, and stone lines. EnCana submitted a final report detailing the HRIA and the new and three revisited historical resources sites to the Alberta government on October 25, 2006.

EnCana described the potential project effects on historical resource sites as

- disturbance or loss of data,
- loss of cultural objects or sites, and
- changes in interpretative capacity of the region.

EnCana stated that it planned to have an accredited professional archaeologist assess sites for historical resources before well and pipeline construction activities. EnCana explained that if sites were found, the archaeologist would determine the appropriate course of action to avoid or reduce the potential effects on the site. It said that the preferred action was site avoidance accomplished by relocation of the project components. If relocation of project elements was not possible and damage or destruction of historical resources could occur, mitigation would be undertaken according to the requirements set out by the Alberta government. During the hearing, EnCana indicated that it would involve the Siksika Nation in the proposed pre-disturbance assessments to assist in the identification and avoidance of historical and environmental resources of importance to the Siksika Nation.

EnCana stated that if environmental or historical resources of concern not previously identified during the pre-disturbance assessment process were discovered within the project area during

construction, activity in the immediate area would be halted until the environmental inspectors, EnCana, and environmental specialists, if appropriate, were notified. EnCana also stated that project activity would not resume until the appropriate mitigation measures were applied and the regulatory agencies had been notified, as required.

EnCana concluded that taking into account the planned mitigation measures, the residual environmental effects of the project would be insignificant.

Palaeontological Resources Assessment

EnCana stated that a palaeontological historical resource assessment was completed at a conceptual level in accordance with provincial standards and submitted to the Royal Tyrrell Museum of Palaeontology and Alberta Tourism, Parks, Recreation, and Culture. The objective of the assessment was to summarize potential environmental effects of the project on the palaeontological resources and determine if further assessment or mitigation were needed.

Two main areas along the steep walls of the South Saskatchewan River were examined during the palaeontological assessment, given their potential for palaeontological resources. During field investigations, fossils were found at Murphy's Horn. This area was established as having a high palaeontological potential.

EnCana stated that a detailed review of the layout of the well sites and pipelines concluded that most of the developments below the slope break were in areas where field studies have demonstrated that the upper valley slope was made up of unfossiliferous deposits. EnCana indicated that no bedrock would be disturbed in these areas.

EnCana determined that the following mitigation measures would be undertaken in the construction phase:

- If any construction site were located within 50 m of substantial slope break or would be located along any steep wall, the site would require a palaeontologic site assessment to be carried out by a qualified palaeontologist. Any fossils discovered during construction monitoring would be salvaged or excavated by a professional palaeontologist.
- EnCana would educate its workers to not collect fossils.

EnCana noted that if palaeontological resources were identified within the proposed project area, they would be immediately reported to the appropriate authorities, in accordance with the *Alberta Historical Resources Act*. The preferred action would be site avoidance. The residual effects for the construction phase were predicted to be negligible. EnCana indicated that potential adverse environmental effects were not expected to occur during the operation or decommissioning phases of the project.

6.5.2 Views and Concerns of Intervenors

Government of Canada

Parks Canada indicated that it is the designated federal department to provide expert advice on heritage and archaeological matters within the Government of Canada.

Parks Canada acknowledged that the NWA possessed several unique characteristics that contributed to its recognition for designation, including the presence of considerable historical, archaeological, and palaeontological resources. It noted that archaeological and historic sites in the NWA had been identified and recorded during several different projects since the 1970s.

Overall, Parks Canada noted that the key mitigation recommendations proposed by EnCana appeared to be appropriate and in accordance with current practice in the Province of Alberta. It agreed that if EnCana were able to mitigate the potential impact of the project on all historical resources through avoidance, the potential cumulative effects on historical resources would be insignificant. Finally, Parks Canada noted that the follow-up and monitoring recommendation appeared to be appropriate and followed current practice in Alberta.

6.5.3 Panel Conclusions and Recommendations

Historical and palaeontological resources were not major issues at the hearing, and the Panel is generally satisfied with the mitigation measures proposed by EnCana.

If the project proceeds, the Panel believes that the assessment of possible sites for historical resources by a professional archaeologist is an important mitigation measure. Similarly, the Panel endorses the plan to conduct a palaeontological site assessment if any construction is to occur within 50 m of a substantial slope break or along any steep wall. These measures should be included in any pre-disturbance assessment.

The Panel believes that where historical or archaeological resources are found, they should be documented and avoided unless an expert determines that construction can proceed without significant impact. It agrees that use of a spyder plow or chain ditching where necessary should minimize bedrock disturbance and thus the likelihood of negative impacts on palaeontological resources.

In summary, the Panel concludes that if EnCana carefully applies its proposed mitigation measures and includes a review of historical and palaeontological resources in the pre-disturbance assessment process, there would be no significant adverse impact on the NWA.

6.6 Effects of Potential Accidents and Malfunctions

6.6.1 Views of EnCana

In its environmental impact statement (EIS), EnCana identified the possible effects of accidents and malfunctions on wildlife, vegetation, wetlands, soils, biodiversity, groundwater, surface water, and aquatic ecology.

EnCana identified collisions and releases from vehicles, pipeline accidental releases, blowouts and surface casing vent flows, and grassland fires as potential malfunctions and accidental events that may result in environmental effects.

EnCana noted that the EIS illustrated how the project was designed to minimize the likelihood of such events occurring and that the environmental protection plan further reduced the risk by outlining proposed mitigation. EnCana stated that its practices and operational monitoring systems made accidents and malfunctions unlikely to occur. However, in the event that an

accident or a malfunction did occur, EnCana's emergency response plan would minimize the extent of any potential effects. EnCana also noted that training associated with emergency response was mandatory for all employees and all contractors.

At the hearing, reference was made to a recent uncontrolled release of sweet gas from a deep sweet gas well on the Suffield Base. EnCana noted that this was a good example of its emergency response plan in action. EnCana indicated that the plan was activated and worked, regulators were notified and engaged, and the well was shut in in less than a day.

6.6.2 Views and Concerns of Interveners

Government of Canada

In its submission, the Department of National Defence (DND) stated that an increase in heavy vehicle traffic would lead to a corresponding increase in road hazards and accidents due to congestion and dust. It pointed out that the Suffield Base provided first response on all incidents on the base. DND stated that EnCana did not provide a plan to address the potential for additional accidents and incidents within the base. DND said that its personnel were the only authorized accident investigators on the base and would see a reduction in their availability for military tasks as a result of potential vehicle accidents related to this project.

Following its review of the environmental protection plan, DND recommended that EnCana:

- revise its proposed fire response plan such that it would not involve the Suffield Base or local civilian fire departments, and evaluate its effectiveness;
- obtain approval from the Suffield Base for its emergency response plan prior to any project approval;
- assess the current level of fire risk within the Canadian Forces Base Suffield National Wildlife Area (NWA), based on historical fire suppression policies and current fuel loads;
- identify proposed compensation for the loss of concurrent land use (e.g., grazing) and infrastructure (e.g., fencing, signage) as a result of fire caused by the project; and
- identify the environmental impact of historical fires within the NWA resulting from shallow gas development, identify proposed mitigation for the environmental impact of fire caused by the project, and assess the effectiveness of such mitigation.

The Department of Fisheries and Oceans stated that the introduction of deleterious substances into the South Saskatchewan River due to unexpected events or accidents (e.g., fuel spills) had the potential to cause adverse environmental effects on fish and fish habitat. Fisheries and Oceans advised that the following measures would ensure that any potentially adverse effects on fish and fish habitat would be mitigated:

- all materials and equipment used for the project should be clean and free of any debris and leaks prior to entering the work site;
- cleaning, fuelling, and servicing of equipment should be conducted away from any watercourse and appropriate precautions taken to ensure that deleterious substances did not enter any watercourse; and

- a spill contingency plan should be designed and implemented with sufficient resources on site to contain and clean up any spill.

Natural Resources Canada stated that the proposed mitigation procedures and EnCana's experience seemed adequate to deal with potential accidents.

6.6.3 Panel Conclusions and Recommendations

The Panel recognizes that any increase in gas-related activity on the Suffield Base, such as the proposed project, would increase the possibility of accidents and malfunctions. If the project proceeds, vehicle traffic would increase. With greater diligence and care on the part of EnCana and those working for it, this need not increase the frequency or severity of accidents.

In terms of pipeline or casing vent leaks, the Panel believes that sound engineering design, regular maintenance, and regimented inspection routines will minimize the occurrences and impacts of such releases. The same applies to the potential for well blowouts. Regarding spills, EnCana must strive to avoid both routine spillage and related accidents. If EnCana enforces its requirements rigidly, these aspects of the project should not significantly affect the environment.

Regarding possible grassfires, care must be taken by all parties to minimize the negative impacts of fires on all equipment and operations on the Suffield Base and on wildlife and the environment. The Panel does not agree with the inference from the Government of Canada that EnCana should have the sole responsibility for the control and suppression of fires. This requires a joint effort. The Government of Canada also raised the matter of compensation related to grassfires. The Panel believes that such matters should be dealt with in accordance with the 1975 Agreement.

The nature of operations involving shallow sweet gas is such that a site-specific emergency response plan would not typically be required. However, given the importance of the Suffield Base for military purposes and the environmental value of the NWA, the Panel believes that such a plan should be in place. It further believes that consideration should be given to one emergency response plan for the entire Suffield Base and all operations. Alternatively, if separate plans are necessary, they must be consistent and well coordinated to ensure an organized and controlled response to any emergency.

The emergency response plan, either as a single or series of coordinated plans, should deal with all emergencies, such as fires, serious spills, blowouts, and military incidents. All involved parties must be involved in the creation and ongoing review of the emergency response plan(s) to ensure that all emergencies are provided for and that all parties know their roles in the event of an emergency.

In summary, if EnCana follows the mitigation measures outlined in the environmental protection plan, the Panel does not believe that the increased risk of accidents and malfunctions would have a significant impact on the NWA.

6.7 Cumulative Environmental Effects

6.7.1 Views of EnCana

EnCana carried out an assessment of cumulative effects when a significant or insignificant adverse residual project environmental effect on a valued ecosystem component was predicted. EnCana did not conduct a cumulative effects assessment for valued ecosystem components (VECs) predicted to have negligible or positive residual effects.

The spatial boundaries that EnCana selected for the assessment of cumulative effects varied depending on the characteristics of each component. The local and regional study areas for the cumulative effects assessment for terrestrial biophysical VECs extended largely west of the Canadian Forces Base Suffield National Wildlife Area (NWA) on the Suffield Base (see Figure 1). The past temporal boundary was set at 1975, when gas activities began in the NWA, and cumulative effects were assessed up to the year 2050, roughly the end of the proposed project.

The past and existing land uses in the local study area and regional study area considered by EnCana were military activities, livestock grazing, cultivation, shallow gas and oil drilling and operations, and environmental research in the NWA. EnCana used surface disturbance as an indicator of cumulative impact. Within the NWA, EnCana estimated that the total existing footprint covered 1.3 per cent of the northern portion of the NWA and 2.3 per cent of its southern portion. About 90 per cent of this footprint was associated with past shallow gas activities. The remaining 10 per cent was attributed to livestock grazing (dugouts and single-track trails). For the regional study area, EnCana noted that estimates of the magnitude of the total past and existing disturbance footprint ranged from 3.8 per cent to 7.0 per cent, depending on the area.

According to EnCana, the only future project expected within the NWA was its proposed project. Cattle grazing and scientific research were expected to remain at current levels. Within the regional study area, EnCana was proposing to infill drill another 2325 shallow wells on the Suffield Base from 2007 to 2012. This would result in the infill drilling of all sections of land from 8 to 16 wells per section. No further drilling was anticipated to occur on the Suffield Base once the infill drilling was completed. The British Army was proposing to expand its current level of military training activities at the Suffield Base to include formation-level training. According to the environmental assessment report conducted in 2006, the formation-level training would replace one or two battle group exercises with one or two formation-level training exercises. The net result of replacing a battle group exercise with a formation-level training exercise would be an approximate 3 times increase in troops and vehicles operating over a 2.5 times larger area. Live fire exercises would be reduced by one-third.

During the hearing, some interveners asked EnCana why it had not considered as a potential future project an infill program that would bring the well density to 32 wells per section. EnCana responded that it could not foresee such a highly unlikely event happening. EnCana noted that the *Canadian Environmental Assessment Act* only required the consideration of cumulative effects likely to result from the project in combination with other projects or activities that had been or will be carried out.

EnCana noted that the main pressures on prairie wildlife populations and habitat in southeast Alberta outside the study areas it selected for assessing cumulative effects included agricultural

conversions, livestock operations and increased grazing, residential expansion, development of energy resources, military training, and the construction and use of roads and other infrastructure. In response to a recommendation from the Government of Canada (Canada) that the cumulative effects assessment should include an assessment of all of these effects, EnCana replied that a comprehensive cumulative effects assessment such as the one recommended by Canada could be useful for regional planning, but was outside the scope of a project-specific cumulative effects assessment.

On the question of whether a larger study area should have been considered in conducting its cumulative effects assessment, EnCana argued that the vast majority of listed prairie wildlife species are at threat (and listed by regulatory agencies) primarily because of native prairie habitat loss and fragmentation resulting from historical agricultural land conversion. As such, a larger regional cumulative effect assessment (with a long-term back-casting of temporal scope) would naturally show population declines for many species but these declines would largely be attributable to conversion of native prairie, the majority of which took place decades ago under a much different land use regime and would be unrelated to the proposed Project.

EnCana submitted that even if a large regional study area had been considered, the project was unlikely to contribute to a significant adverse effect because the incremental footprint of the project was of negligible magnitude (less than 0.5 per cent) even for the local study area. EnCana noted that the relative magnitude of this incremental footprint would be even smaller within the context of a larger study area.

On the question of whether offset opportunities could compensate for the residual effect of the project, EnCana indicated that managing and assessing cumulative effects at a regional planning level is normally conducted as a cooperative exercise among different stakeholders and land users. EnCana noted that there are opportunities for offsets and it would be ready to participate in discussions regarding such opportunities. EnCana noted that recovery plans could form the basis for these kinds of cooperative discussions.

EnCana argued that the simulations recommended by Dr. Stelfox (outlined below under the Environmental Coalition's views) would not add value or change the environmental impact statement predictions, which were made using local empirical knowledge, analog studies, and expert opinions. EnCana argued that back-casting was a general planning approach that, by Dr. Stelfox's own definition, was potentially rife with uncertainty due to the lack of quantitative comparative information and the arbitrary selection of a timing period. EnCana added that its assessment accounted for natural range of variability and that simulation models were not required for quantifying natural range of recovery and forecasting when real-world data were available.

EnCana stated that it had specifically assessed the cumulative effects of the project on soils, vegetation, and wildlife.

EnCana concluded that the cumulative effects of the project on wildlife would be insignificant largely because the disturbance footprint associated with the project when added to the existing footprint from past land actions would be cumulatively less than 5.0 per cent for all but two cover types in the NWA. EnCana argued that where possible, the two most affected cover types would be avoided through the use of constraints mapping and pre-disturbance assessments (PDAs). It also noted that 2006 field investigations suggested that densities of breeding birds

were not significantly higher in 8 versus 16 wells per section. EnCana indicated that cooperative regional cumulative effects management, planning, mitigation, and monitoring would serve to reduce effects of military and gas development on wildlife.

On the issue of Ord's kangaroo rat habitat, EnCana mentioned that research done by Bender and Gummer in 2005 showed that the amount of sand dune habitat in the Middle Sand Hills had declined substantially since 1948. The report noted that only 8.6 per cent of the sand dunes documented in 1949 still remained in 1998 within their study area. EnCana noted that the decrease in sand dune habitat in the Middle Sand Hills could be attributed to decreased fire frequency (caused by fire suppression), decreased grazing, and natural drought cycles. EnCana concluded that the effects of the project on active sand dunes were not negative, and in fact could be positive if trails and pipeline rights-of-way in sand dunes were not stabilized.

In response to a question about fire management in the NWA, EnCana noted that the northern part of the NWA, the Sand Hills area, had not burned since 1987 and the fuel load had accumulated to an alarming degree, especially during the last three years of above-average moisture. EnCana mentioned that some sort of fire management, including prescribed burns, should be investigated for that area.

EnCana also determined that the cumulative effects of the project on soils would be insignificant. It argued that its footprint calculation overestimated soils effects and therefore the magnitude of cumulative effects on sensitive soils would be negligible to minor. EnCana also argued that effects on soils in the military training area would not accumulate with effects on soil in the NWA. EnCana noted that regional cooperative activities to manage cumulative effects on soils on the Suffield Base included appropriate design of pipeline corridors and access routes and minimization and control of vehicle access. EnCana also mentioned that the 2006 environmental assessment report identified over 20 mitigation measures intended to reduce the effects of formation-level training on soils on the base and, assuming that the Department of National Defence (DND) would implement these measures, EnCana concluded that this, in combination with the mitigation measures it proposed, would reduce the likelihood of cumulative effects on soils.

EnCana explained that it focused the cumulative effects assessment on vegetation on the integrity of native prairie grassland because direct residual negative effects of the project on this valued ecosystem component were likely to occur, notwithstanding mitigation measures. EnCana noted that pipeline and lease construction could result in exposure of bare ground, which would attract weedy species, and that military training outside the NWA could also have the same effect. It said that cattle grazing would increase the potential for weed establishment through ingestion and passing of weed seeds. EnCana concluded that the cumulative effects of the project on native prairie grassland integrity would be insignificant. To support this conclusion, it explained that the cumulative footprint associated with the project and past activities in the NWA was less than 5.0 per cent. It also argued that empirical studies showed that infill drilling from 8 to 16 wells per section did not significantly increase the abundance of introduced and weedy plant species. These same studies showed no substantive changes in native plant community composition or dominant life forms.

In addition to the mitigation measures proposed to minimize project-specific effects on wildlife and to minimize bare ground, EnCana proposed to attempt to

- develop a cooperative cumulative effects mitigation and management plan for the military training area with DND and other oil and gas companies;
- develop a land-use plan in cooperation with DND and oil and gas operators that would minimize effects of infill drilling and pipeline construction in the military training area and NWA;
- work cooperatively with DND and other oil and gas operators to develop a management plan to minimize weed sources in the military training area;
- establish a cooperative working group with the specific task of managing and mitigating the issue of tumbleweed accumulation in coulees; and
- work cooperatively with the Canadian Wildlife Service and DND to understand the additive effect of increased military training on snake mortality and develop a cooperative cumulative mortality management plan.

In the environmental impact statement, EnCana recommended the implementation of the following cooperative monitoring efforts:

- EnCana continue to monitor wildlife mortality due to collisions with vehicles, particularly of snakes, during routine operations from April 15 to October 15. EnCana's effort in this regard could be through hiring a consultant, as was done in 2006, and cooperating with and supporting ongoing studies by Canadian Wildlife Service and University of Calgary researchers and other researchers or institutions, as appropriate.
- Monitor and research Ord's kangaroo rat response to infill drilling using a hypothesis-testing approach. EnCana would attempt to cooperate with University of Calgary researchers and other researchers or institutions, as appropriate.
- Monitor and research pronghorn antelope response to infill drilling using a hypothesis testing approach. EnCana would attempt to cooperate with University of Calgary, Alberta Sustainable Resource Development, and DND researchers and other researchers or institutions, as appropriate.

6.7.2 Views and Concerns of Interveners

Government of Canada

DND was of the view that EnCana had not properly addressed the effects of the current shallow gas development combined with proposed and future shallow gas development, expanded military training and operations, expanded defence research programs, access trails, fragmentation, nonnative species invasion, and grazing. It noted that an environmental assessment of formation-level training concluded that increasing oil and gas development activities was having detrimental effects to the rangeland health. DND submitted that this document and others developed by DND indicated that there were current impacts from gas development on the Suffield Base and the NWA. It recommended that EnCana reassess cumulative effects within the local and regional study areas on all valued ecosystem components.

During the hearing, DND mentioned that the cumulative effects from cattle grazing needed to be better considered. It mentioned that cattle might be expected to rub against aboveground infrastructure, such as the fencing around wells, causing increased amounts of bare ground and

disturbed ground. DND believed that this could impede natural recovery and diminish the effectiveness of any proposed mitigation measures.

Environment Canada was of the view that a key deficiency of the environmental impact statement was the incomplete assessment of cumulative effects, in particular for species at risk. Environment Canada believed that the small size of the regional study area precluded a reasonable assessment of environmental effects on the native grassland ecosystem and populations of species living in the region. During final argument, the Government of Canada noted that without an examination of what was occurring outside the regional study area at least to the species that spent some of their life-cycle outside of the NWA, it was difficult to understand how there could be an adequate assessment of the cumulative effects on these species.

Environment Canada undertook an analysis of the effect of bare ground, habitat fragmentation, alien invasive plants, traffic, and secondary impacts on a short list of valued ecosystem components. The results of this analysis were presented in Appendix H of Environment Canada's hearing submission. Environment Canada concluded that the project would contribute to regional cumulative effects in several important ways, including by

- increasing traffic both on site and across the region, as a greater number of vehicles would be necessary to install and service a greater number of wells;
- increasing bare ground, creating a vector for the growth of weeds and exotic plants; bare ground would continue to increase regionally as a result of other drilling operations and agricultural intensification;
- increasing habitat fragmentation, both by effectively increasing the isolation of existing patches through increased access and use of traffic corridors and by severing existing grassland into smaller fragments through new permanent trails and other linear disturbance; and
- increasing the spatial extent of exotic and invasive plants, a cumulative impact, since other activities would also spread exotic species by transporting them in vehicle undercarriages, on tires, and on equipment.

Environment Canada recommended that

- EnCana reevaluate its cumulative effects assessment to capture regional environmental effects outside the NWA;
- EnCana undertake a thorough analysis of traffic volume and flow to better predict the distribution (spatial and temporal) of traffic in and around the NWA to better understand the project's effect on wildlife; and
- Environment Canada's science be used to develop and implement a plan to reclaim and remediate the current industrial footprint in the NWA before new footprints were considered. This would include removing crested wheatgrass from roads, pipelines, and trails. Other invasive species should be removed and a monitoring program established to detect their arrival.

In response to a question on the potential for offsets, Environment Canada noted that offsets were not considered an option for this project. Environment Canada was of the view that the NWA was intact and was itself offsetting effects occurring in the immediate region around it.

On the issue of fire management, DND noted that for many years it was of the view that no fire was to be permitted in the NWA. DND explained that it understood the need for fire as part of one of the natural processes in the prairie ecosystem and that the base had started revisiting its policies and considering such ideas as the use of controlled burns.

Environmental Coalition

The Coalition noted that EnCana did not assess the cumulative effects on individual environmental components, such as the burrowing owl, or the integrity of the ecosystem.

Regarding the issue of fragmentation, the Coalition argued that a single well may have little effect on the distribution and reproductive success of bird species. However, the cumulative effect of a large number of gas wells, access trails and pipelines over a large area would extensively fragment the existing habitat, decrease the amount of core habitat, and thus would have a negative effect on grassland bird populations in the NWA.

The Coalition was of the view that the statement made by EnCana that “breeding songbirds are resilient to the current cumulative effects” was not supported by any data and was highly unlikely, especially for sensitive species already at risk, such as Sprague’s pipit, sharp-tailed grouse, and burrowing owl. In particular, the Coalition mentioned that Sprague’s pipits appeared to be particularly sensitive to disturbance and had been declining for the past 15 years. The Coalition noted that since the project would disturb native grassland, the cumulative effects of those disturbances would have a negative impact on this species.

The Coalition filed a report by J. Brad Stelfox in which he defined an approach for quantifying cumulative effects of land uses. The report and conclusions were partly based on landscape simulation modelling completed for the NWA. This report outlined five key recommendations to address existing inadequacies of the cumulative effects assessment:

- quantify “range of natural variability” for all key valued ecosystem components;
- conduct back-cast simulations to quantify existing changes to valued ecosystem components relative to the range of natural variability values;
- conduct forecast simulations to quantify predicted changes to valued ecosystem components, given the defined trajectories of the infilling process;
- identify mitigation measures through the adoption of best practices; and
- quantify the existing level of uncertainty and explore consequences of this uncertainty.

The Coalition noted that it made no sense to compare the performance of valued ecosystem components to the proposed infill relative to the current situation. It argued that a proper assessment of cumulative effects must consider the full set of actions and anthropogenic features of the full shallow gas play.

During the hearing, the Coalition repeated that the PDA process would not deal adequately with cumulative effects because it would look at each well one at a time and nowhere would

reviewers get a chance to look at the cumulative effects. The Coalition noted that the level and timing of activities over the life of the project had not been assessed in any cumulative way.

The Coalition also noted that EnCana did not undertake a cumulative effects analysis for wetlands because it concluded that the residual environmental effects on wetlands were “negligible.” The Coalition mentioned the absurdity of this situation, given EnCana's stated option of reducing wetland buffers where it was deemed necessary. The Coalition further noted that water use from sources in the military training area represented a cumulative impact of the project on wetlands.

Independent of the decision made about the project, the Coalition was of the view that the Panel should provide recommendations on how to preserve the NWA and that a regional cumulative effects assessment of the area should be completed and a management plan developed.

Suffield Environmental Advisory Committee

In its submission, the Suffield Environmental Advisory Committee (SEAC) stated that a complete assessment of the cumulative effects of past, present, and proposed development on the base, including the NWA, was a necessary component to governance and oversight on the Suffield Base. In a letter dated August 23, 2004, to the Suffield Base commander, SEAC advised that it did not support further drilling in the NWA until such time as the recommended environmental assessment and monitoring program had been developed and implemented to address the current knowledge gaps. This would provide all parties with a scientific-based understanding of the existing energy development cumulative effects.

6.7.3 Panel Conclusions and Recommendations

The general approach to assessing cumulative effects taken by EnCana is to first determine the project effects on the various valued ecosystem components (VECs). These project effects are classified as negligible, insignificant, or significant. If the project effect is negligible (basically zero effect) or positive, no cumulative effects assessment is carried out for that VEC. The Panel agrees with such an approach. When a project has no effect (or a positive effect) on a VEC, there ought to be no further need to do a cumulative effects assessment for that VEC.

If the project effect is adverse and insignificant or adverse and significant, a cumulative effects assessment is carried out. The cumulative effects assessment was carried out for each such VEC within an identified VEC-specific regional study area selected by EnCana and within a temporal boundary that was requested by the Panel in the environmental impact statement (EIS) guidelines. The temporal boundary commenced in 1975, a time at which little or no gas well development had taken place in the NWA.

While the Panel generally agrees with this approach to cumulative effects assessment, it disagrees with two aspects of EnCana's cumulative effects assessment and has reached conclusions different from EnCana's. The first is related to threatened and endangered wildlife species—specifically the Ord's kangaroo rat, the Sprague's pipit, the burrowing owl, the loggerhead shrike, and the ferruginous hawk—and for threatened and endangered plant species—the tiny cryptanthus, the small-flowered sand verbena, and the slender mouse-ear-cress. The second is for native prairie grassland integrity.

In making its determination regarding cumulative effects, the Panel has examined the cumulative effects on all wildlife species, vegetation, wetlands, and soils, except those VECs for which it concluded the project would have a negligible or positive effect.

For the Ord's kangaroo rat, EnCana described the project effect as insignificant, due to its small extent, but adverse. The major cumulative impact described is the loss of habitat, specifically active sand dunes. This loss of habitat has taken place in the regional study area selected by EnCana—indeed, within the local study area, within the NWA—and much of it within the temporal boundary selected by EnCana. It has been caused by several human activities, as identified in the Ord's kangaroo rat recovery plan: oil and gas development, agricultural expansion, and especially the declines of natural sandy habitats in the Great Sand Hills (Saskatchewan) and the Middle Sand Hills (NWA). These same causes were identified by EnCana. The loss of Ord's kangaroo rat habitat over the last several decades has been over 90 per cent, with the decline having continued throughout the temporal boundary used by EnCana in its cumulative effects assessment. This has resulted in the species being declared endangered both under the *Alberta Wildlife Act* and under the federal *Species at Risk Act*.

The Panel takes this “endangered” listing to be a sound indicator of significance of impact. That is, the cumulative impact of existing human activities is already significant and adverse. The project contribution is modest (insignificant but adverse, in the words of EnCana), but it does make the significant adverse effect (slightly) worse. For this reason, the Panel concludes that unless further mitigation measures are taken, the cumulative effect on Ord's kangaroo rats would be significant and adverse.

For listed wildlife species generally and specifically for threatened and endangered species for which cumulative effects assessments were done, EnCana selected a regional study area that extended barely beyond the NWA. It also presented evidence during the hearing that the main reason for the wildlife species being listed was the agricultural activities outside of the NWA and outside of the regional study area. In short, the regional study area was such that the major contribution to adverse impacts on the species was excluded from the analysis. The Panel notes that for these species and for the native prairie grassland ecosystem, there would appear to be a significant adverse cumulative effect caused by human activities in a larger region. Moreover, since the project frequently had an adverse, although insignificant, effect on these VECs, the cumulative effects on these VECs would have been significant adverse effects had the regional study area been chosen differently. While EnCana defended its choice of regional study area, the Panel concludes that identifying such cumulative consequences of developments is part of what cumulative effects assessment is intended to accomplish. The Panel suggests that in the future, impact assessors should select their cumulative effects study areas so that they are large enough to capture major contributions to the cumulative effects on the VECs for which they are selected. Cumulative effects assessment (even for projects) is intended to be focused on the VEC, not on the project.

For this project, the Panel treats impacts on threatened and endangered wildlife species (the Sprague's pipit, the burrowing owl, the loggerhead shrike, and the ferruginous hawk) as significant adverse effects. As noted above, being a threatened or endangered species is an indication of having experienced a significant adverse effect. This precautionary approach is intended to pay special attention in a national wildlife area to wildlife species at risk and to avoid adverse effects on them.

The next question is what needs to be done to deal with these significant adverse cumulative effects? In this section, we deal first with the case of the Ord's kangaroo rat.

The greatest indicator of adverse cumulative impact on the Ord's kangaroo rat is the sharp decline in sandy habitats, especially active sand dunes. One of the most important reasons for this decline has been fire suppression in the NWA, which in turn has permitted the vegetation to stabilize the active sand dunes, the habitat of the Ord's kangaroo rat (and also of the small-flowered sand verbena, an endangered plant).

One means of dealing with significant adverse cumulative impacts is to reduce the project impact. In the wildlife section (Section 6.1), the Panel recommends that the project should avoid both Ord's kangaroo rats and its critical habitat. Another means of managing significant adverse cumulative impacts is to create "offsets," positive impacts to offset net negative impacts on the species. If the offsets are satisfactory, there will be fewer negative impacts or even a positive effect on the VEC. EnCana proposed several means of offsetting impacts on Ord's kangaroo rat. It expressed a willingness to cooperate with university researchers involved in Ord's kangaroo rat research. This research would generate a better understanding of Ord's kangaroo rat ecology, so that subsequent efforts to protect the species would more likely be on a sound footing. EnCana also noted that in carrying out its PDAs, it would identify locations of this species and thus further understanding, which could be used not only to minimize project impacts but also to contribute to better understanding of the species itself.

In the Panel's view, these commitments are constructive. DND, however, made a much more important commitment at the hearing. It indicated that it was in the process of restoring active sand dunes, Ord's kangaroo rat habitat. It was contemplating controlled burns and disturbing sand dunes to make them active. These measures, if done effectively, could, in the Panel's view, create significantly more Ord's kangaroo rat habitat, thus overcoming decades of losses.

Specifically in terms of fire management in the NWA, the Panel suggests that because DND has indicated a willingness to restore the native grasslands ecosystem in the NWA, it should be restoring the natural fire regime to its historical rate of one fire every five to seven years. This historical value would make the ecosystem more like its historical predecessor and would have a positive effect on species that require active sand dunes. Because of risks to nearby landowners, this should probably be done through controlled burns, the approach recommended for the nearby Great Sand Hills in Saskatchewan and being tried in Grasslands National Park. It should be noted that other species would also benefit from restoring the natural fire regime: the loggerhead shrike, the small-flowered sand verbena, and the tiny cryptanthus.

The Panel recommends that

Recommendation 14 — The Department of National Defence take such measures as are necessary and safe to restore the natural fire regime to the National Wildlife Area.

If the natural fire regime is restored in the NWA and if Ord's kangaroo rats and their critical habitat as finalized are avoided through the PDA process, the Panel is of the view that the impact on the Ord's kangaroo rat would be acceptable. Indeed, if DND effectively restores active sand dunes, the cumulative adverse impact on the Ord's kangaroo rat would be significantly reduced.

This involvement of several organizations (EnCana, DND, academic researchers, and the recovery team responsible for the implementation of the recovery strategy developed in accordance with the *Species at Risk Act*) follows a principle that cumulative effects require cumulative solutions.

For the same reasons, the Panel has concluded that there is a significant adverse cumulative effect on the Sprague's pipit and recommends that the project avoid both Sprague's pipits and Sprague's pipit critical habitat. This would reduce the project impact. Additional activities to reduce the cumulative impact on the Sprague's pipit include the potential for rehabilitation of lands currently disturbed with invasive species (discussed in Section 6.2). This activity would improve the grassland ecosystem generally and would benefit the Sprague's pipit specifically, because it is especially sensitive to disturbance.

It is also appropriate to conduct a monitoring program to determine the effects of the project on the Sprague's pipit. In particular, the question of how much impact is created by the relatively little used trails the project would create was debated during the hearing. Answering this question seems important for designing an effective recovery plan for the Sprague's pipit (a cumulative effects offset), as well as for determining the impact on these birds (managing a project impact).

The Panel recommends that

Recommendation 15 — Should the project proceed, EnCana carry out a monitoring program to evaluate the effect of the project on the Ord's kangaroo rat and Sprague's pipit and provide the results to the Suffield Base commander and to the species at risk recovery teams.

For the burrowing owl, the loggerhead shrike, and the ferruginous hawk, the approach proposed by EnCana is avoidance, based on using the PDAs to determine where these species or their nests are found and then to avoid the species by an agreed-to setback distance. Most of the arguments at the hearing related to what EnCana calls the "nonroutine" situation where EnCana would not respect the setback distance. The Panel is of the view that such exceptions should be extraordinarily rare and, if avoidance is adhered to, the project impacts on the other VECs would be effectively mitigated. As noted earlier, some of the mitigation measures that would help the Ord's kangaroo rat would also help the loggerhead shrike.

It is also appropriate to conduct a monitoring program to evaluate the effects of the project on the burrowing owl, the loggerhead shrike, and the ferruginous hawk.

The Panel recommends that

Recommendation 16 — Should the project proceed, EnCana carry out a monitoring program to evaluate the effect of the project on the burrowing owl, loggerhead shrike, and ferruginous hawk and provide the results to the Suffield Base Commander and to the species at risk recovery teams.

It should be noted that the Panel has chosen not to develop the details of these monitoring programs. While some features seem necessary, such as the need to examine fragmentation effects on the Sprague's pipit and the Baird's sparrow, EnCana has indicated it will create an environmental effects monitoring plan advisory committee, with broad membership (e.g., Environment Canada, Alberta Environment, DND, representation from the Environmental Coalition, and such others as would be helpful) and expertise. This advisory committee should be used to develop the details of the monitoring programs, and its recommendations should be followed closely. This committee should also be involved in reviewing and, where appropriate, improving the environmental effects monitoring plan and the environmental protection plan. In the view of the Panel, this would contribute to an effective environmental effects monitoring plan.

The Panel foresees a variety of benefits from carrying out the cumulative effects monitoring programs. First is the obvious role as a part of the adaptive environmental management process for this project. That is, the results would be used to improve environmental management practices for the project. Second, the same monitoring results could be adopted within the NWA for the other human activities that contribute to the same cumulative impact, which could include the existing gas wells, cattle grazing, and DND activities. Making the study results available to the Suffield Base commander, who is responsible for the NWA, would enable the lessons learned to be applied there and even on the rest of the Suffield Base if the Suffield Base commander so chooses. Third, knowledge of monitoring results may be of value in other places off the Suffield Base. This knowledge could be important to recovery teams in designing other recovery programs affecting the listed species elsewhere.

It should be pointed out that the snake monitoring program required of EnCana in Section 6.2.1 is based on an impact that is truly cumulative. That is, impacts causing snake mortality are being caused by previous gas developments, by use of the NWA for grazing, by the Prairie Farm Rehabilitation Administration, and by DND. The monitoring program is required of EnCana because it would be such an important contribution to the adaptive environmental management approach for the project, should it proceed. However, the Panel's expectation is that DND and the Prairie Farm Rehabilitation Administration would also participate in the monitoring program and, more important, if the program demonstrates a material impact on snakes, DND and the Prairie Farm Rehabilitation Administration would also adapt their use of the Suffield Base (as discussed in Section 6.2.1) in order to reduce the cumulative impact on snakes. Again, cumulative effects require cumulative solutions.

EnCana offered to work cooperatively with the Canadian Wildlife Service and DND to understand the additive effect of increased military training on snake mortality and develop a cooperative cumulative mortality management plan. This would be a good idea in the Panel's view. As the Suffield Base commander has responsibility for the NWA, the Panel recommends that

Recommendation 17 — The Department of National Defence form an advisory committee to provide advice on reducing snake mortality and develop a cooperative cumulative mortality management plan. This advisory committee should include interested stakeholders such as EnCana, Environment Canada, the Environmental Coalition, and others who can offer useful advice.

EnCana's assessment of cumulative effects on other wildlife species focused on mortality and habitat issues. Most of the concerns expressed by other interveners in the hearing focused on the species above. The Panel accepts EnCana's conclusions that for other wildlife species, the cumulative impact on these species would not be significant with the application of the mitigation measures proposed. The habitat issue is dealt with further in the vegetation cumulative effects section immediately following.

EnCana concluded that for rare plant species, the project effect would be insignificant but adverse for all project phases because of avoidance. This leads to a cumulative effects assessment being carried out for these rare plants. The VEC selected by EnCana, native prairie grassland integrity, is discussed shortly. However, it is first necessary to focus on three plant species listed in Schedule 1 of SARA: the tiny cryptanthus, the small-flowered sand verbena, and the slender mouse-ear-cress. The first two are endangered; the third is threatened. The Panel cannot help but note that by virtue of their status as endangered and threatened species listed under SARA, they have already experienced significant adverse impacts. As noted by EnCana, the primary reason for this listing is agricultural expansion into the habitat of these species, but, as with the threatened and endangered wildlife species, the Panel observes that the significant adverse cumulative impacts on these three plant species would be made slightly worse by the project. That is, just as for the wildlife species, further efforts to reduce the cumulative effects on these three plant species would be required. In Section 6.2, further mitigation of project impacts is recommended, in the form of avoiding critical habitat for these species.

For the same reasons as given for the wildlife species, the Panel expects the results of PDAs and monitoring programs to be used to reduce cumulative effects.

The Panel recommends that

Recommendation 18 — Should the project proceed, EnCana carry out a monitoring program to evaluate the effect of the project on the tiny cryptanthus, the small-flowered sand verbena, and the slender mouse-ear-cress and provide the results to the Suffield Base commander and to the species at risk recovery teams.

It should be noted that in its draft environmental effects monitoring plan, EnCana proposes to carry out a monitoring program for these species. The details of this monitoring program should be developed further by the environmental effects monitoring program advisory committee, which, by virtue of its diverse and expert membership, will have the ability to create effective monitoring programs.

EnCana's treatment of vegetation cumulative effects assessment was to focus on native prairie grassland integrity as the VEC. Aside from the above observations concerning the threatened and endangered plant species, the Panel agrees with this choice, both because it is a very important indicator of wildlife habitat and because of its intrinsic value (as indicated, for example, in the Regulatory Impact Analysis Statement for the creation of the NWA).

EnCana concluded that the impact on this VEC would be insignificant because of the small effect on native grasslands and because its studies showed that infill drilling was not contributing to increases in weedy plant species. Other interveners argued that invasive plant species were

being introduced and that cumulative effects from this introduction were having a significant adverse effect on the native prairie grasslands. The Panel observes that native prairie grasslands have largely disappeared from surrounding lands, primarily as a result of agriculture. Again, the Panel concludes that there has been a significant adverse cumulative impact on this VEC to which the project would add a very small amount. For this reason, the Panel recommends that EnCana make special efforts to reduce the project impact and, as well, to contribute to collective efforts to provide offsets for this cumulative impact.

As the Suffield Base commander has responsibility for the NWA, the Panel recommends that

Recommendation 19 — The Department of National Defence form an advisory committee to recommend how best to manage nonnative invasive plant species that have been introduced into the native prairie grassland in the National Wildlife Area. This advisory committee should include interested stakeholders, such as EnCana, Environment Canada, the Environmental Coalition, and others who can offer useful advice.

The Panel's expectation is that EnCana, through its contributions to this advisory committee, will provide an offset that will contribute to reducing the adverse cumulative impact on native prairie grasslands. This action will be consistent with EnCana's having offered to establish a cooperative working group with the specific task of managing and mitigating the issue of tumbleweed accumulation in coulees, which is a small portion of the invasive species problem. Dealing with crested wheat grass was an issue to which a great deal of time was devoted at the hearing and should certainly be dealt with by this committee.

An issue that many interveners discussed extensively at the hearing was the matter of fragmentation effects. This could involve, for example, the spread of nonnative invasive plants (such as crested wheatgrass) from linear features into the surrounding vegetation, from which they are hard to eliminate. There was much debate concerning the magnitude of this effect, and a monitoring program to get more information about this fragmentation would be a beneficial component of the work to be done by the invasive plant species advisory committee. EnCana has proposed a variation of such a monitoring program in its EEMP.

For its cumulative effects assessment of soils, EnCana looked at soils sensitive to wind erosion, water erosion, salinization, and soil contamination. It concluded that erosion, salinization, and contamination of these soils were not caused by actions outside of the NWA and that because of the small area affected, as well as other mitigation measures, the cumulative effect on soils was insignificant. This conclusion regarding cumulative effects was not seriously challenged at the hearing. The Panel agrees that with the mitigation measures committed to by EnCana as described in Section 6.2, there would be no significant cumulative impact on soils.

EnCana predicted that the project impact on wetlands would be negligible for all phases and hence did not undertake a cumulative effects assessment. The Panel believes that with the mitigation measures outlined in Section 6.3.3, project impacts on wetlands would be negligible and the cumulative effects on wetlands would not be significant.

EnCana indicated that cooperative regional cumulative effects management, planning, mitigation, and monitoring would serve to reduce effects of military and gas development on the NWA.

In order to mitigate the observed cumulative effects, the Panel recommends that the following commitments of EnCana, which contribute to offsetting the cumulative effects on the VECs, should be implemented as appropriate. EnCana committed to attempt the following:

- develop a cooperative cumulative effects mitigation and management plan for the military training area with DND and other oil and gas companies; and
- develop a land-use plan in cooperation with DND and smaller oil and gas operators that minimizes effects of infill drilling and pipeline construction in the military training area and NWA.

The Panel concludes that these measures would help reduce adverse cumulative effects and, in combination with the project mitigation measures, would avoid significant adverse cumulative effects. In summary, the Panel concludes that the cumulative effects could be managed and interference with wildlife conservation would be avoided if the following are met:

- EnCana complies with all commitments it has made in the EIS, its responses to the information requests and at the hearing.
- Monitoring programs are carried out to evaluate impacts on threatened and endangered wildlife species: the Ord's kangaroo rat, Sprague's pipit, burrowing owl, loggerhead shrike, and ferruginous hawk. The results of these studies should be used for project adaptive environmental management and should be provided to the Suffield Base commander and the relevant species recovery teams.
- EnCana contributes productively to committees with a mandate to offer advice regarding effective management of snake mortality and nonnative invasive plant species management in the NWA.

6.8 Biodiversity

6.8.1 Views of EnCana

EnCana interpreted biodiversity as defined in the document entitled "Canadian Biodiversity Strategy," which states that biodiversity is "the variety of species and ecosystems on Earth and the ecological processes of which they are a part."

EnCana selected three components—species diversity, habitat diversity, and landscape diversity—to examine the potential project effects on biodiversity. EnCana concluded that genetic diversity was unlikely to be influenced by the project and thus did not consider it further.

EnCana identified the main considerations with regard to biodiversity in relation to the project as being the loss of species and the habitats that support them. EnCana further identified concerns relating to biodiversity, including

- loss of or decrease in abundance of native plant species,
- changes in native plant community structure,

- invasion of the area by weedy species and resultant changes in dominant life forms,
- loss of rare species and communities,
- loss and alteration of high-quality habitat,
- habitat fragmentation and connectivity, and
- direct mortality (including rare species).

EnCana noted that many of the project effects on the above were discussed in the vegetation, wildlife and habitat sections of its environmental impact statement and therefore only the effects associated with biodiversity were included in its analysis of this issue.

Key project-specific effects identified by EnCana that have potential to result in the above include

- physical alteration resulting from construction of gas pipelines and well sites,
- physical alteration resulting from maintenance and operations of wells and pipelines, notably vehicle access, and
- discharge of pollutants causing toxicological effects.

Regarding species diversity, EnCana noted that the conservation of species diversity required that populations be maintained in sizes and distributions that assure long-term population viability. EnCana argued that its assessment of rare plant species and listed vertebrate species concluded that residual environmental effects from the project on rare plants and listed species would be insignificant or negligible. It therefore concluded that environmental effects from the project on species-level biodiversity were also insignificant or negligible.

EnCana noted that the conservation of habitat diversity required that the identity, relative abundance, frequency, and richness of wildlife and plant species groups remain similar (within the range of natural variability) during all phases of the project. EnCana argued that its field studies comparing the relative abundance of different species of plants and vertebrate wildlife in areas with either 8 or 16 wells per section showed that for the vast majority of habitat types, dominant species and total native plant species occurrence, cover, and richness did not vary significantly. EnCana concluded that the effects of the project on habitat diversity would likely be negligible.

EnCana noted that the conservation of landscape diversity required that the identity, distribution, richness, and proportions of vegetation and habitat patch types remain within the natural range of variability. EnCana argued that for the project to exert environmental effects on biodiversity at the landscape-level, it would have to be shown that construction and operations would significantly fragment habitat patches or alter natural succession. EnCana argued that the project footprint would be small, reducing the loss of individual habitat types, that reseeding with native varieties would minimize changes to vegetation structure and composition, and finally that habitat fragmentation effects on sensitive wildlife would not be significant. Based mainly on the above, EnCana concluded that the project's effects on landscape-level biodiversity would likely be negligible.

EnCana described follow-up and monitoring requirements for biodiversity as being the same as required for vegetation, wildlife, and habitat.

6.8.2 Views and Concerns of Interveners

Government of Canada

DND noted that the persistence and invasion of nonnative species has been identified as a major threat to biodiversity and ecological integrity. It noted that EnCana did not identify endemic species and their abundance and distribution, nor had EnCana indicated how losses or declines of endemic species could affect local and regional biodiversity.

Environment Canada noted that the goals of the Canadian Biodiversity Strategy include

- conserving biological biodiversity and sustainable use of biological resources,
- improving understanding of ecosystems and increasing resource management capacity,
- promoting the need to conserve biodiversity and sustainable use of biological resources, and
- developing incentives and legislation that support biodiversity.

During the hearing, Environment Canada noted that one of the specific purposes of the NWA combined with the *Species at Risk Act* (SARA) collectively was to support Canada's international treaty obligations, including the United Nations Convention on Biological Diversity.

Environment Canada concluded that the extent of project effects on biodiversity remained uncertain at best and was likely to be significant. It explained that most species endemic to the grasslands natural region were more common in the NWA than in surrounding areas. Environment Canada noted that the size of the NWA, as well as its topographic and vegetation diversity and the uneven and irregular occurrence of grazing and fires, combined to support a regionally representative bird community.

At the hearing, Environment Canada noted that nonnative invasive species could ultimately displace native species or have some other negative impact on ecosystem function or structure, all of which were components of biodiversity. Environment Canada was of the view that invasive species were a concern because they affected the compositional, structural, and/or functional aspects of native ecosystems.

Environmental Coalition

During the hearing, the Coalition noted that the Canadian Biodiversity Strategy was the central federal policy for biodiversity and that the strategy considered the creation of a network of protected areas as a central management approach to conserving biodiversity. The Coalition argued that the strategy was implemented in domestic law through numerous instruments, including the *Canada Wildlife Act* and the *Wildlife Area Regulations*, the *Species at Risk Act*, the *Migratory Bird Convention Act*, and the *Fisheries Act*. The Coalition mentioned that the provisions of SARA that deal with critical habitat illustrated the government's recognition of the importance of habitat to species diversity and retention. The Coalition noted that if an activity disrupted habitat necessary for recovery of a species, it was also interfering with the conservation of that species. It argued that the decision of the Government of Canada to secure the NWA as a protected area constituted a key step in meeting Canada's international and domestic wildlife

conservation obligations—obligations that include protecting species at risk and their habitats, protecting wetlands, and sustaining biodiversity.

At the hearing, the Coalition stated that a major deficiency of the environmental impact statement was EnCana's failure to recognize and document the overall environmental significance of the NWA and its major role in the conservation of the mixed grass ecosystem. It noted that the Suffield Base, including the NWA, was identified internationally as an environmentally significant area. The Coalition added that the Suffield Base was rated as very high in a selection of grassland priority conservation areas within North America's central grasslands. As an example, it noted that in a World Wildlife Fund Canada study, the Suffield Base was identified as one of six large remaining blocks greater than 5000 km² of native prairie in the Northern Glaciated Plains of North America.

Federation of Alberta Naturalists

The Federation of Alberta Naturalists did not agree with EnCana's conclusion that the effects of the project on biodiversity would be negligible. The federation noted that the stated purpose of a national wildlife area was to prevent any habitat alteration, habitat loss, or future fragmentation and that one must consider the fact that the NWA contained several federally and provincially listed species, which were listed because of declining abundance, mostly due to habitat loss or fragmentation.

Dr. R. Longair

Dr. Longair was concerned that the environmental impact statement did not address the effects of the project on invertebrates when this group represented the vast majority of the biodiversity. He was concerned that EnCana had no information for over half the animal and plant species present in the project area and that it therefore could not demonstrate that the project would not have significant effects. Dr. Longair stated that the approach of focusing only on the things that were big or for which information was more readily available was an inappropriate approach to looking at the effect on biodiversity, especially in a national wildlife area.

Mr. G. Trottier

During the hearing, Mr. Trottier referred to the Alberta Biodiversity Monitoring Institute, which monitored biodiversity across the province. Mr. Trottier noted that the institute's goal was to support natural resource decision-making by providing relevant, timely, and credible scientific knowledge on the state of provincial biodiversity. Mr. Trottier noted that a preliminary understanding from institute monitoring in the Boreal ecozones suggested that biodiversity was correlated with habitat loss and invasive species. While these findings were not related to grassland, Mr. Trottier mentioned that the institute was suggesting a precautionary approach and the need for cumulative effects assessment of the impact of the proliferation of linear disturbance footprints on the grassland landscapes of southern Alberta, particularly in light of some recent studies in the prairies that suggested there were effects.

Panel Expert—Mr. J. Woosaree

Mr. Woosaree agreed with the Government of Canada that crested wheatgrass, due to its aggressive nature, was one of the threats to biodiversity. He noted that it appeared that where

crested wheatgrass had been used on the Suffield Base, it had led to invasion of newly disturbed sites, such as roadside allowances. He indicated that while major soil properties appeared unchanged, cool season mid grasses and forbs abundance were reduced at the community and landscape levels.

6.8.3 Panel Conclusions and Recommendations

The Panel generally agrees with all participants in the hearing that the important biodiversity issues relate to plant species and the prairie grass ecosystem, as well as to wildlife, especially listed wildlife species. The Panel is of the view that the conditions recommended to deal with these matters identified in Sections 6.1, 6.2, 6.3, and 6.7, if implemented carefully, would ensure the protection of biodiversity.

6.9 Sustainability of Renewable Resources

The *Canadian Environmental Assessment Act* (Section 16[2]d) requires that the assessment by a review panel include a consideration of the capacity of renewable resources likely to be significantly affected by the project to meet present and future needs.

6.9.1 Views of EnCana

In its final argument, EnCana submitted that it was committed to ensuring that the project was carried out in a responsible and sustainable manner. With respect to renewable resources, EnCana noted that it had considered the impact of the project throughout the environmental impact statement and had concluded that the project was consistent with the principles of sustainability. EnCana reviewed the impact of the project on wildlife and plants and concluded that taking into account the implementation of the proposed mitigation measures, the project was unlikely to have significant effects on these renewable resources.

6.9.2 Views and Concerns of Interveners

Interveners did not provide comments on this subject.

6.9.3 Panel Conclusions and Recommendations

The Panel generally agrees with EnCana on the subject of renewable resources. Human use of renewable resources on the Suffield Base is essentially precluded by lack of access to the base, with groundwater being the exception. Section 6.4 outlines the conditions under which the Panel concludes that the groundwater resources would be sustainable. Beyond that, the Panel determined that wildlife and plants would not be significantly adversely affected if the various mitigation measures outlined and the Panel's recommendations were effectively implemented. Therefore, taking into account the Panel's recommendations, the Panel concludes that the project is unlikely to have significant effects on these renewable resources.

7 OTHER MATTERS

Other matters covered in this section are effects of the project on other land uses; human health, noise and air quality; effect of climate change, greenhouse gases and weather; and socioeconomic effects.

7.1 Effects of the Project on Other Land Uses

7.1.1 Views of EnCana

Regarding the effects of the project on other land uses, EnCana stated that stringent security and safety protocols were in effect for access to the Canadian Forces Base Suffield (Suffield Base) (including the National Wildlife Area [NWA]) to prevent public access. EnCana stated that within the NWA cattle grazing occurred only between June and October and was limited to the southern portion of the NWA.

At the hearing, EnCana responded to the suggestion that wells in the NWA be constructed underground in caissons, similar to wells outside the NWA on the Suffield Base, in case the Department of National Defence (DND) required the NWA for military purposes in the future. EnCana did not study the possibility of caissons in its environmental impact statement (EIS). However, it stated that caissons would have a greater amount of bare ground and a larger footprint, but these would be a negligible difference compared to the size of the NWA or the size of individual habitat types mapped in the NWA.

7.1.2 Views and Concerns of Interveners

Government of Canada

DND explained that the Suffield Base exists to provide Canada with a world class military training area that prepares the Canadian Forces and its allies for operations that further Canadian and international security and help defend Canada and Canadian interests and values.

DND stated that the lands in the present NWA were placed out of bounds to military ground training in 1971, when Suffield became a Canadian Forces Base. Through discussions with Environment Canada leading to the creation of the Suffield NWA, DND retained ownership and control of the NWA.

During the hearing, DND stated that in the event of a threat to national security, it might need to use the NWA for military purposes and that any current activity must allow for future military training as required. It further stated that above ground infrastructure inherently represented more danger to training troops. DND also noted that from a straightforward military perspective, it would prefer that wells be underground in caissons.

DND acknowledged that EnCana did not assess the impact of caissons in its EIS, but stated that it reserved the right to decide whether the wells should be constructed below ground. DND stated that this decision had not yet been made.

DND noted that the NWA provided a comparative benchmark by which sustainable use of the remainder of the Suffield Base and the surrounding region could be identified through scientific

research. DND stated that any effects on the integrity or the individual ecosystem components of the NWA would directly impact the NWA's ability to serve as a research control for measuring the effects of land-use activities on the native prairie ecosystem, as well as for assessing optimal survivorship and restoration research for species at risk. Furthermore, DND stated that the cumulative effects of the project could impact the sustainability of military training and defence research. It recommended that experimental and control areas for scientific study (as already designated by Suffield Base) be excluded from development, with the setbacks identified by DND.

The Prairie Farm Rehabilitation Administration (PFRA) stated that during the 1970s, agreements were developed with DND for the Community Pasture Program operation on grazing area within the Suffield Base. PFRA stated that it would continue to operate in the NWA at the request of DND and under the approval and guidance of the Suffield Grazing Advisory Committee. This committee was originally established by a memorandum of understanding in 1983 to provide advice to the Suffield Base commander for the purpose of ensuring that the area under the administration of PFRA received range use consistent with the protection of the environmental, ecological, and wildlife aspects of the grazed area.

PFRA stated that providing that EnCana followed the mitigation and level of consultation and cooperation indicated in the EIS and responses to the supplemental information requests, it expected that the project would not have a significant effect on PFRA grazing activities.

Siksika Nation

Concerns were originally provided by the Siksika Nation that the environment and traditional historic and cultural sites within the NWA would be significantly impacted by the project. It stated that the NWA was in the heart of Siksika Nation traditional territory. It submitted that the NWA represented one of the few remaining areas of unoccupied Crown lands in southern Alberta over which Siksika Nation could exercise traditional harvesting and other rights. On November 9, 2007, the Siksika Nation withdrew its opposition to the project, as it had reached an agreement with EnCana.

7.1.3 Panel Conclusions and Recommendations

The Panel notes that few concerns were raised by interveners regarding possible conflicts between EnCana and its proposed project and other land users. The Siksika Nation has apparently reached an agreement with EnCana whereby it would be involved in the pre-disturbance assessment process with respect to identifying traditional historical and cultural sites. Also, evidence suggests that if the project were to proceed, it would not have a significant effect on the part-time grazing use of the NWA.

The Government of Canada raised concerns about possible long-term impacts on military training and research activities. It specifically requested that areas for scientific study be excluded from development if the project proceeds.

The Panel believes the 1975 Agreement is clear in the provision of priority for military training operations on the Suffield Base and the provision of authority, in that respect, to the Suffield Base commander. It agrees with the Government of Canada that areas reasonably required for research should be excluded from developments that would impact negatively on such research.

Whether or not the proposed project proceeds, the Suffield Base commander should work with EnCana to ensure that research needs are met.

At the hearing, DND expressed the view that if the project proceeds, consideration should be given to placing the wellheads underground, as is common in many parts of the Suffield Base, rather than on the surface, as proposed by EnCana for the NWA. DND appeared to base its view on a growing possibility that the NWA might be needed in future for active military training or as a larger template for live-fire training. It recognized that the construction related to caissons would create greater environmental impacts than would use of a surface wellhead. However, it expressed concern that it might be better to have one larger construction impact rather than to put the wellhead on the surface and take the risk of a second impact resulting from the need to install a caisson in the future.

The Panel questions the logic of the DND position. The Panel's view is that unless there is a high likelihood of active training, wellheads on the surface, with fewer environmental impacts, should be preferred over caissons and below-surface wellheads. In any case, the Panel notes that Clause 5(g) of the 1975 Agreement provides the mechanism for requiring the installation of a protective wellhead device, should DND determine it is needed.

The Panel concludes that any effects of the proposed project on other land uses would be relatively minor and would not cause significant adverse impacts on the NWA.

7.2 Human Health, Noise and Air Quality

7.2.1 Views of EnCana

As part of its EIS, EnCana undertook a human health risk assessment to address potential human health effects from the release by the project of chemicals of potential concern. The risk assessment focused on people who may live in the area or access the area for recreational or work purposes, and did not include EnCana construction crews. EnCana stated that potential health risks to its personnel would be addressed under its environmental health and safety plan.

EnCana stated that there was a low likelihood of human health effects associated with the operations, decommissioning, and abandonment phases of the project and that the human health risk assessment addressed potential human health effects associated with emissions from all phases of construction.

EnCana's risk assessment indicated that while the project would contribute to potential short-term human health risks in the immediate vicinity of the wells, there was a low likelihood of these risks resulting in health effects for people who might frequent the area.

EnCana also conducted a baseline noise study and noise impact assessment for the project. It concluded that since there was no human habitation within the NWA, there were no residential receptors that would be affected by the project. EnCana further stated that environmental noise levels from the project during the construction, operations, decommissioning, and abandonment phases would be below the target permissible sound level as detailed in the Alberta Energy and Utilities Board regulations in *Directive 038: Noise Control*.

EnCana further conducted an air quality assessment to provide an understanding of the magnitude and spatial variation of potential air quality changes associated with project emissions. It stated that air quality effects would peak during the construction phase of the project and would be limited to the areas very near to the construction activities. Further, EnCana predicted that air quality effects during construction of the project would be insignificant and would be negligible for the other phases of the project.

7.2.2 Views and Concerns of the Interveners

EnCana's human health risk assessment, noise impact assessment, and air quality assessment were not challenged by interveners.

The Government of Canada stated that an effective emergency response plan had not been presented and further stated that this lack could lead to serious health and safety concerns.

7.2.3 Panel Conclusions and Recommendations

The Panel notes that the effect of the project on human health was not an issue at the hearing. Any such impacts would be minimal and would not result in significant adverse impacts on the NWA. (The matter of an emergency response plan is commented on in Section 6.6.)

7.3 Climate Change, Greenhouse Gases, and Weather

This section deals both with the effects of climate change and weather on the project and with the effects of the project on climate change through the release of greenhouse gases.

7.3.1 View of EnCana

In its environmental impact statement, EnCana stated that the effects of climate change on the project would be minimal. In a response to information request by interveners, EnCana further stated that climate change would not affect the project's construction phase, because this phase would be about three years in duration and would occur in the near term. EnCana stated that a drought resulting from climate change could affect water sourcing during the operations phase and that reclamation could be affected by climate change. EnCana further stated that reclamation plans would be developed with consideration of climate change and other factors.

EnCana stated that the project was expected to result in an increase of the equivalent of about 15 000 tonnes of carbon dioxide (CO₂) per year. To reach this conclusion, EnCana assessed several activities that would be incremental to its current operations, including the increase in production handled by its Koomati compressor station; flaring; drilling, completions, and tie-in of new wells; new well clean-out; and operations activities.

Regarding severe weather (such as blizzards, storms, lightning, heavy precipitation, tornadoes, chinooks, and high winds), EnCana stated that it would suspend construction activity when site and weather conditions were such that soils might be adversely affected, for example by compaction, rutting, remolding, mixing, or erosion. EnCana further stated that it would defer operational site visits and activities when conditions were excessively wet. EnCana also stated that in 30 years of operations in the NWA, there had never been significant damage to a pipeline

or wellhead as a result of extreme weather. (For more information regarding EnCana's wet-weather shutdown protocol, see Section 6.2.)

EnCana acknowledged that weather constraints might affect the anticipated project schedule. If the delays caused by weather were short enough, EnCana stated that the project drilling and construction season might accommodate these schedule interruptions. If these delays were long enough to alter the anticipated work schedule, the subsequent season(s) would be replanned to accommodate the deferred work.

7.3.2 Views and Concerns of Interveners

The Government of Canada concluded that climate change trends were not likely to have a major impact on the project. Other interveners did not challenge EnCana's conclusions regarding climate change, nor did any interveners challenge EnCana's conclusion on greenhouse gas emissions.

Regarding severe weather, the Government of Canada questioned EnCana's ability to complete all project activities in three years if rainfall and wet weather procedures required EnCana to halt or delay activities. The Environmental Coalition questioned whether EnCana's wet-weather shutdown plans could be carried out, due to the unpredictability of weather and logistical realities of the oil and gas industry. The Coalition noted that weather delays would result in activities being deferred but that EnCana still planned to complete its operations in three years. The Coalition questioned EnCana's plan to concentrate significant amounts of activity in very short periods of time and the effects this would have on species at risk and critical habitat.

7.3.3 Panel Conclusions and Recommendations

In the Panel's view, if the project proceeds, climate change may make some of the mitigation measures and proper reclamation more challenging over the long term. However, this would not mean that such matters could not be successfully accomplished.

Regarding the project's impact on climate change, EnCana should endeavour to minimize CO₂ emissions. However, these emissions would amount to only about 0.006 per cent of the greenhouse gas emissions for all of Alberta, and the expected impact would not be significant.

Operations during wet weather would have the potential to impact soils and vegetation. The Panel is generally satisfied with EnCana's plans to ensure that construction operations would be shut down when such conditions exist. (This matter is further addressed in Section 6.2.)

Overall, the Panel does not consider that the effects of weather on the project and the effects of the project on climate change are issues that could cause significant adverse impacts on the NWA.

7.4 Socioeconomic Effects

7.4.1 Views of EnCana

EnCana stated that the project would generate about \$62.5 million per year in 2006 dollars, including \$16.6 million in labour income. EnCana further stated that 70 per cent of ongoing operational spending would be to purchase goods and services from regional, established businesses. EnCana also stated that the project would contribute \$34 million in provincial Crown royalties and 25 per cent of the net revenue would be paid in federal and provincial taxes. EnCana stated the project would generate about 175 person-years of employment activities over the life of the project. EnCana further stated that the Project would provide a long-term source of low-impact employment to local people who could stay in their own towns, services, and business and contribute to the taxes and royalties that support provincial and federal programs.

EnCana also undertook an assessment of potential adverse social and economic impacts as part of its EIS. EnCana stated that adverse project effects were rated as negligible or insignificant for construction, operations, decommissioning, and abandonment.

7.4.2 Views and Concerns of Interveners

Environmental Coalition

Dr. T. Power, on behalf of the Environmental Coalition, argued that the jobs, income, and government revenues generated by the project provided no economic justification for threatening the ecological integrity of the Suffield NWA. Dr. Power stated that there was a broad range of alternative means of obtaining the equivalent energy resources that could come from EnCana's proposed project. He further argued that it would be economically irrational to risk irreversible damage to a unique and valuable area like the NWA for the incremental recovery that could be gained and, further, that leaving some resource in the ground would not waste the resource, but rather demonstrate that the environmental costs were too high relative to the value of the natural gas.

Flint Energy Services

Representatives from Flint Energy Services stated that the project would help generate 50 jobs for its employees and their families and that the money generated would be retained locally and support the local economy.

Cerpro Energy Services

Mr. Marshall, from Cerpro Energy, stated that prior to oil and gas exploration in the region, most young men and women had moved away from the region to find steady employment. Mr. Marshall stated that since exploration and development of oil and gas had expanded throughout the area, the youth of the area had gained opportunities to earn a living in their community. He further stated that the oil and gas industry allowed the area to be more prosperous, not only by providing jobs, but also technical training, safety awareness, and environmental stewardship.

Mr. R. Gardner

Mr. Gardner stated that the local economic impact of wildlife has enormous potential that is not being used. He pointed out that when something positive becomes rare, its price goes up, adding that wildlife is no exception.

7.4.3 Panel Conclusions and Recommendations

Both the Environmental Coalition and Mr. Gardner indicated that the value of the NWA was large and that the demand for such natural landscapes would increase in the future. Accordingly, they argued, the value of the protected NWA would exceed the value of the natural gas to be extracted as a result of this proposed project.

The Panel is of the view that the mitigation measures it has recommended (both those related to project environmental management and those involving cumulative effects management), if effectively implemented, would avoid significant effects to the NWA and thus avoid diminishing its considerable value. For this reason, the Panel concludes that the economic value of natural landscape services provided by the NWA would not diminish as a result of this project.

The Panel accepts EnCana's conclusion that any adverse social and economic effects of the project would be negligible or insignificant. It acknowledges that there would likely be modest positive economic impacts on the region.

8 ENVIRONMENTAL MANAGEMENT

8.1 Views of EnCana

Pre-disturbance Assessment

EnCana proposed various methods to minimize the environmental effects of the project. These included a six-step pre-disturbance assessment (PDA) process to assess environmental and other effects prior to construction. This PDA process would be used for all wells and project infrastructure within the Canadian Forces Base Suffield National Wildlife Area (NWA) as a means of avoiding and mitigating environmental effects. Data gathered during the PDA process would also be used as part of EnCana's environmental protection plan (EPP) to assist in mitigation and in its environmental effects monitoring plan (EEMP) as baseline data. EnCana's PDA proposal included suggestions regarding survey areas, timing, frequency, survey techniques and personnel, and surveys of specific species and their habitat.

Sections 6.1, 6.2, 6.3, and 9 provide further details of EnCana's proposed PDA process and of the Panel's views respecting that process. Section 10 deals with the application of the process to the three wells applied for in EUB Application No. 1435831.

Environmental Protection Plan

EnCana developed an EPP for the proposed project that would be implemented for the life of the project, including during construction, operations, and abandonment. Mitigation measures and contingency plans contained in the EPP would enable EnCana to execute the project, avoid and mitigate disturbances, reduce project effects, and protect the environment. The EPP included an emergency response plan, response measures for accidental releases, and guidelines for the safe storage and handling of wastes and chemicals. The EPP addressed environmental concerns, identified applicable legislative requirements and appropriate protection measures, and provided environmental compliance monitoring procedures. The EPP also defined environmental compliance and monitoring sampling processes, responsibilities, and requirements for training and reporting.

EnCana stated that the project construction schedule was an overarching mitigation to reduce project effects. Drilling activities would be restricted to the period between October 15 and April 15, with most pipeline construction occurring between October 1 and April 15, when vegetation would be dormant. Other mitigation measures would apply to operational and maintenance activities that would occur year round.

Much of the EPP was based on EnCana's lengthy experience at the Suffield Base with native prairie grasslands. Compared to past drilling projects, EnCana expected that the disturbance, duration, and impact of the proposed project would be significantly reduced. In support of the EPP, EnCana committed to using environmental inspectors. Inspectors would have the authority to shut down construction in accordance with the EPP or to address site-specific environmental concerns as they might arise. EnCana further committed to conduct comprehensive environmental training for all employees and contractors working in the NWA. Training would include use of the EPP, wet weather protocols, spill contingency, emergency response, traffic control, and control of erosion and undesirable vegetation. EnCana would maintain a high level of control and supervision over working conditions and EPP implementation.

Coupled with the EPP, EnCana committed to maintain a comprehensive tracking system to monitor progress and ensure that mitigation measures were being implemented for the project. EnCana submitted its draft EPP within the environmental impact statement (EIS) and acknowledged that Panel recommendations for further mitigation could be included in finalizing the EPP. Regular updating of the EPP would occur over the life of the project to address changing needs and site-specific conditions. EnCana stated that EPP revisions would reflect changes that might arise during regulatory approval processes.

EnCana identified reclamation as a primary mitigation of project environmental impacts. It submitted a draft reclamation plan separate from the EPP. EnCana had high confidence that reclamation methods would be successful based on past experience, advanced site-selection methods, reseeding of native species, and project innovations, such as winter construction and spider ploughing.

Environmental Effects Monitoring Plan

EnCana developed a draft EEMP in support of the proposed project. EnCana stated that the EEMP had been built on the principles of transparency, accountability, and collaboration. The EEMP would serve two important functions: 1) to validate the EIS predictions of no significant environmental impacts, and 2) to evaluate the effectiveness of EPP mitigation measures. These functions would be carried out by independent third parties. The EEMP would incorporate an advisory committee of interested stakeholders (e.g., Department of National Defence [DND], Environment Canada, and the Environmental Coalition [which EnCana offered to fund]) to oversee the selection, definition, and implementation of environmental monitoring programs related to project environmental effects. The advisory committee would be established by EnCana as soon as possible upon approval of the project. EnCana expressed a willingness to work collaboratively with other researchers in the NWA on matters of compliance. The EEMP would assist EnCana with tracking of environmental performance and corporate reporting.

EnCana's evidence outlined the process to design and implement the EEMP and the process to review monitoring and follow-up studies. This approach was successfully used in other projects. It was EnCana's view that the EEMP would contribute directly to the adaptive management of the EPP and EEMP. EnCana stated that it did not intend to finalize the EEMP during the environmental assessment process. EnCana viewed the PDA surveys as supplemental to the EEMP, not as a replacement of the EEMP.

EnCana intended to use the EEMP to monitor for broad landscape-scale effects, in addition to site-level effects. Information collected during monitoring would be used by EnCana for adaptive management. EnCana noted that sharing monitoring information from the EEMP would be beneficial for the management of listed species and their habitats. Monitoring information provided by the EEMP would be shared with other stakeholders as much as possible. This information could potentially assist in the development of recovery strategies and action plans for SARA-listed species. EEMP members could include EnCana, DND, nongovernment organizations, First Nations, the governments of Canada and Alberta, and university researchers. Environmental research programs related to project effects could also be conducted by means of the EEMP.

EnCana was questioned about opportunities for public involvement in the EEMP and its advisory committee. EnCana identified its commitment to work with the public and nongovernment

organizations on the project. Some limitations might apply due to closed access to the Suffield Base and the nature of some sensitive information pertaining to SARA-listed species. EnCana noted other opportunities for public engagement through the use of Web sites and corporate responsibility reporting and by means of scientific consultants. It also identified the need for regular reporting of NWA activities to the public by regulators such as DND.

EnCana proposed the use of adaptive management to evaluate and make improvements to mitigation measures and to adjust to unforeseen or changing environmental conditions (e.g., drought). EnCana was confident in its ability to implement mitigation measures and successfully avoid sensitive environmental features. EnCana expected to have low reliance on adaptive management. Nevertheless, EnCana proposed applying adaptive management in the EEMP to use processes similar to continuous improvement programs. EnCana cited its corporate management of environmental health and safety performance as a model for adaptive management within the EEMP. It indicated how adaptive management had been applied following its environmental effects monitoring of the Koomati infill drilling project and the improved mitigation that had resulted. Another example EnCana gave of how it proposed to use adaptive management in the EEMP was landscape-level vegetation monitoring of native prairie biotic integrity. EnCana stated that results of the monitoring would inform its reclamation process.

The EEMP described a review stage for monitoring and follow-up studies, which would enable the monitoring results to be evaluated and the review findings to influence and alter mitigation monitoring practices, resulting in improved environmental performance.

EnCana suggested topics for proposed monitoring programs, leaving the identification and scoping of other monitoring programs to the EEMP advisory committee phase. The proposed monitoring programs were based on an analysis of indicators from the environmental and social impact studies completed by EnCana.

EnCana's proposed monitoring programs included

- monitoring tiny cryptanthus, slender mouse-ear-cress, and small-flowered sand verbenas to evaluate persistence as a function of distance from pipelines,
- assessing ecosystem recovery for pipelines to be constructed between 2008 and 2010 using range health and functionality methodology,
- monitoring wetland function for wells and pipelines approved by SEAC within the 100 m setback distance, and
- monitoring the presence of Ord's kangaroo rat, their winter activity, and their survival in areas of high-quality habitat if setbacks were encroached upon.

EnCana stated that the draft EEMP and its adaptive management approach were likely to benefit from the hearing process, public input, and additional recommendations of the Panel. Therefore, finalization of the EEMP would be subject to project approval.

EnCana recognized that additional research and monitoring might be required to address regional environmental effects that were created by other land users. EnCana maintained that since these were not its sole responsibility, mechanisms other than the EEMP should be used involving

multiple stakeholders. One example discussed in the hearing was the need for a regional task group to address a coordinated approach to vegetation management (e.g., undesirable species).

NWA Management Plan

EnCana stated that environmental management for its proposed project in the NWA would be guided by the EPP and EEMP, which it described in detail during the hearing. EnCana stated that SEAC, if properly resourced and funded, would be critical for environmental management of the NWA. EnCana questioned DND regarding the status of the draft NWA management strategy. EnCana disagreed with DND's decision to exclude all stakeholders except Environment Canada from its consultations on the NWA Management Strategy.

8.2 Views and Concerns of Interveners

Government of Canada

Pre-disturbance Assessment

The Government of Canada (Canada) disagreed with any project approval being granted prior to the completion of PDAs proposed by EnCana. It did not agree that PDAs would be sufficient to protect SARA-listed species. Canada stated that there were uncertainties and expressed a lack of confidence that EnCana's mitigation measures could be effectively implemented using PDAs. Canada submitted evidence that PDAs would limit the assessment of project effects, limit evaluation of mitigation effectiveness, and make it difficult to assess the need for adaptive management actions. PDA surveys by themselves were viewed as an environmental risk that could result in increased disturbance and avoidance behaviours in some species. Timelines to access the NWA and complete PDA surveys could be lengthy. EnCana might be unable to complete all of the recommended PDA surveys and mitigation measures within the proposed timelines due to factors such as weather and access restrictions on the Suffield Base.

Canada submitted evidence that EnCana's PDA surveys would exclude some species at risk and their habitats by focusing on the physical disturbance footprint of the project. Threatened or endangered species and their nests or burrows could be present in close proximity to wells and pipelines and not be detected in the PDA surveys. This could result in subsequent harassment or harm to listed species or disturbance of habitats. Canada further challenged EnCana's approach to avoid sensitive environmental receptors and to adhere to setback distances "where possible." It questioned the ability of the PDA process as a means to protect wildlife and the environment.

Canada commented that the emphasis of PDAs was on pre-construction avoidance. During operations such as maintenance and abandonment, there could be further impacts within the NWA. The PDA mitigation of avoidance might not be possible for post-construction activity. In this case, Canada was uncertain about EnCana's ability to obtain SARA permits for disturbance of species at risk and their habitat. Canada's greatest concern about the PDA process was the demands that would be placed on DND staff and SEAC. DND questioned whether existing staff could absorb the increased workloads that would result from the EnCana project (e.g., reviewing applications and PDAs).

Environmental Protection Plan

Environment Canada and DND disagreed with EnCana concerning proposed mitigation in the EPP and reclamation plan. It was Canada's position that EnCana had not demonstrated that mitigation measures for low-impact disturbance were effective or were substantially different from past mitigation used in the NWA. DND presented findings from environmental audits of EnCana operations that showed environmental impacts had occurred despite low-impact disturbance.

DND disagreed with the flexibility proposed by EnCana to select appropriate mitigation measures according to site conditions, weather, and professional judgement. DND expected mitigation measures to be applied under specific conditions or in cases of actions causing effects. DND recognized that EnCana's goal of optimizing natural gas recovery and using a density of 16 wells per section could limit avoidance or other opportunities for mitigation in the NWA.

Natural Resources Canada (NRCan) noted deficiencies in EnCana's EPP mitigation measures. NRCan made recommendations regarding the need for additional geotechnical, groundwater, and soil mitigation.

Environmental Effects Monitoring Plan

Environment Canada stated that EnCana's EEMP should be developed in a more detailed fashion to address concerns it had identified in the environmental assessment process. The use of the EEMP for adaptive management purposes was a further concern to Environment Canada. It did not support EnCana's use of adaptive management for situations of potential irreversible harm to species at risk. Environment Canada advised a high level of caution if there were risks of harm to species at risk or their critical habitat. Protected areas with species at risk were not suitable candidates for adaptive management. Rather, a precautionary approach was warranted.

At the hearing and in submissions, Environment Canada identified a number of data gaps. Some of these included designation of critical habitats, assessment of fragmentation and edge effects, and footprint delineation. Environment Canada did not identify follow-up activities for inclusion in the EEMP.

DND stated that the development of additional EEMP content by either the Panel or stakeholders was inconsistent with the EIS guidelines. It noted that specific deficiencies in the EEMP included lack of monitoring for species at risk and for project effects on water resources. DND recommended that the EEMP include monitoring for 16 SARA-listed species and 2 unlisted species (common nighthawk and lake sturgeon). It expressed concern about the effectiveness of EnCana's unproven mitigation measures in the EPP and stated that this concern was compounded by an EEMP still to be finalized and by EnCana's reliance upon adaptive management within the short project schedule. DND stated that methods used to test mitigation effectiveness were not identified in the EEMP. It identified one data gap related to environmental thresholds for maintaining a sustainable land base. It did not identify follow-up activities for inclusion in the EEMP or make statements about supporting the EEMP.

NRCan made several recommendations for follow-up activities and monitoring should the EnCana project be approved. Several of those were directed at the installation of groundwater monitoring wells and detailed programs for monitoring flow and water quality. NRCan stated

that the EEMP should demonstrate that groundwater would not be adversely affected by EnCana's development. NRCan also recommended that EnCana's EEMP include greater detail for soil monitoring, including soil compaction and stability. EEMP monitoring should also address risks of slope instability (e.g., landslides and precursors).

NWA Management Plan

DND took the position that its existing management systems for the Suffield Base, including the NWA, were sufficient. DND stated that its draft NWA Management Strategy was before the Minister of National Defence for approval as a policy document for the NWA. The document identified high-level management principles and a vision for the NWA that would help determine desired outcomes on the ground. One principle was for activities not to contribute to net loss of native prairie, including habitat fragmentation or degradation. The strategy was intended as a guidance document for management decisions by the Suffield Base commander. It would provide a vision and goals for the Suffield range and training area management system (RTAMS) and goals for the review of applications for development and other activities affecting the NWA. DND stated that it had consulted with Environment Canada but had not involved outside parties, such as EnCana or other regulators, in developing the draft NWA Management Strategy.

DND noted that it had recently initiated the Suffield Sustainable Management Plan. This plan was directed at establishing a science-based determination of thresholds related to the carrying capacity of the Suffield Base. The plan was expected to be complete by 2009/2010. During the hearing, DND described other management systems in use at the Suffield Base (e.g., RTAMS and range standing orders). Therefore, DND did not intend to develop a separate management system or plan for the NWA.

Environment Canada indicated that it regularly evaluated DND mitigation measures for use in the military training area of the Suffield Base outside of the NWA. It found that the environmental management system of DND was appropriate. Environment Canada did not comment on the status of DND management plans or systems for the NWA. It reiterated that the establishment of the NWA was important for the protection of superior wildlife habitats. Thus, the NWA warranted the highest standard of environmental management compared to the remainder of the Suffield Base.

Environmental Coalition

The Environmental Coalition raised concerns about the effectiveness of the proposed PDAs, the ability to complete them within the timelines, and the integration of the data into the EEMP.

Environmental Protection Plan

The Coalition challenged EnCana's ability to successfully implement low-disturbance mitigation in the EPP. The Coalition noted that improved mitigation measures were necessary for the NWA. One example provided by the Coalition to demonstrate this need was the greater use of disturbed lands by new developments. The Coalition noted that EnCana's commitment to use environmental setbacks "whenever possible" or "wherever practical" was inconsistent with the purpose of the EPP.

Environmental Effects Monitoring Plan

The Coalition stated that it would consider participation should a multistakeholder advisory group be formed by EnCana for implementing the EEMP. The Coalition had experienced difficulties with EnCana in addressing existing problems and was sceptical about multistakeholder discussions with EnCana. Coalition members had advisory committee experience, but with mixed results. In some organizations, the participating members were not always committed to implementing recommendations for management actions. The Coalition expressed further concern that environmental monitoring during EnCana's construction would be rushed by the project schedule. It maintained that the project schedule was too short for monitoring information to be received and management actions adjusted in the EEMP. The Coalition doubted that environmental receptors would demonstrate effects within the three-year project schedule. This raised the question of how the ecological integrity of the NWA would be monitored and managed over time. The Coalition stated that there was a need for long-term monitoring of ecological integrity in the NWA. However, it was unclear about who should have responsibility for monitoring.

The Coalition favoured environmental monitoring programs over multiple years rather than single-event PDAs. One example provided by the Coalition of regional-scale monitoring of species abundance and distribution was from Alberta's Biomonitoring Institute. Similar methods could be adapted for use at the NWA scale. The Coalition emphasized the important role of the NWA for measurement of natural systems and as a biological control or reference condition. The Coalition stated that greater efforts for data collection were required to empirically detect environmental changes.

NWA Management Plan

The Coalition provided evidence of management plans for national wildlife areas in other regions of Canada, including their management objectives. The Coalition recommended that EnCana wait until a management plan was developed for the NWA before proposing new activities. This would enable Canada and the public to identify key management values and establish permissible land uses within a management plan. A regional strategic assessment of cumulative effects was recommended by the Coalition as one method of measuring the success of an NWA management plan. Mapping of critical habitats with constraints analysis was also recommended to accompany an NWA management plan.

Mr. G. Trottier

Environmental Protection Plan

Mr. Trottier expressed concern about EnCana's EPP in the NWA, since EPP implementation, according to EnCana, was proposed to be entirely EnCana's responsibility. He stated that this could be problematic for DND, which needed to retain management authority for the NWA.

NWA Management Plan

Mr. Trottier cited his unique experience in conducting wildlife research at the Suffield Base, his past membership in SEAC, and his contributions to the regulatory impact and analysis statement (RIAS). Mr. Trottier quoted past minutes from SEAC meetings in giving his evidence. He

identified the need for an NWA management plan and other management systems to be written before further proliferation of infill drilling occurred in the NWA. The management plan was needed to establish the vision for the NWA and direct how management would occur. Other management plans that he was aware of and had been recommended by SEAC included

- a petroleum development plan,
- a proliferation management plan, including a cumulative effects assessment, and
- a biological monitoring plan.

Mr. Trottier indicated that in 2006, DND and Environment Canada had begun a joint process to generate an NWA management plan. This process had yielded some preliminary draft material but nothing else to date. Mr. Trottier was fully supportive of changes made by DND as the landowner of the NWA to assume more direct responsibility and apply more resources to the management of oil and gas activity.

Suffield Environmental Advisory Committee

NWA Management Plan

Two current members of SEAC, Dr. O. Jensen and Mr. R. Kennedy, also provided evidence similar to Mr. Trottier's from past minutes of SEAC meetings. They supported past recommendations of SEAC for

- an NWA management plan,
- an area petroleum development plan,
- a proliferation management plan, including a cumulative effects assessment, and
- a biological monitoring plan.

The two SEAC members stated that the four management plans were needed prior to any new development being approved in the NWA.

Panel Expert—Mr. J. Woosaree

NWA Management Plan

Mr. Woosaree advised the Panel that an environmental management plan for the NWA was needed. He referred to DND's NWA Management Strategy but found it to be deficient as a management plan (e.g., regarding preservation of critical habitat). He stated that the management strategy did not specify the means for achieving goals such as protecting the diversity and integrity of the NWA. Mr. Woosaree advised against continuation of existing practices for invasive and nonnative species in the NWA. He also suggested that elements of DND range standing orders could be added to a management plan. He noted that an NWA management plan would facilitate communication since it would contain information in a single document that is currently dispersed. The management plan would also help to reduce conflicts arising among the multiple land users of the NWA.

Panel Expert—Dr. T. Whidden***Environmental Protection Plan***

Dr. Whidden recommended that EnCana's reporting and communications protocol be revised in the EPP to ensure that SEAC would receive all of EnCana's environmental reporting documents. Dr. Whidden expressed concern that due to the number of seasonal mitigation measures, EnCana would experience difficulty in coordinating and implementing environmental mitigation of the EPP with other competing demands of the project. Dr. Whidden also expressed concern that mitigation measures for ungulates in their winter ranges were not provided. Regarding mitigation planning, Dr. Whidden stated that construction of dugouts and water holes should be prohibited in and around wetlands. He further expressed concern about compliance with EPP measures and recommended a third-party inspection and audit process in place of EnCana's internal tracking and reporting of mitigation measures.

Environmental Effects Monitoring Plan

Dr. Whidden recommended a systematic investigation of the impact of roads, trails, and traffic on wildlife in the NWA. He also recommended mapping and classification of all wetlands in the NWA. This would facilitate avoidance and mitigation by all users. Should the project proceed, Dr. Whidden advised that more details were necessary for follow-up activities and monitoring and on the effects of winter oil and gas activities upon ungulates of the NWA.

Dr. Whidden recommended that baseline data sets for wildlife be examined for their statistical power and practical use in future monitoring programs. He identified the need to specify methods by which mitigation effectiveness would be measured and what indicators of ecosystem functions should be used.

NWA Management Plan

Dr. Whidden recommended that a comprehensive management plan be completed for the NWA with immediate implementation. He noted that a formalized management plan was needed to establish goals for wildlife conservation and that conservation goals, objectives, and targets for wildlife and wildlife habitat were necessary for evaluating the EnCana project inside the NWA. This plan, he maintained, was overdue, as the NWA had been established more than five years ago. Related to this recommendation was Dr. Whidden's evidence that DND should define criteria for sustainable ecosystems for all land users within the NWA. To facilitate management of the NWA, Dr. Whidden advised that past, present, and future land disturbances should be quantified.

8.3 Panel Conclusions and Recommendations

The Panel recognizes that good environmental management practices are crucial to ensuring that project effects are minimized.

The Panel has drawn conclusions and makes recommendations on two distinct aspects of environmental management: EnCana's environmental management for the project, and the suggestion made by several interveners urging that DND create a management plan for the NWA.

There are basically three tools proposed by EnCana for environmental management of the project: the pre-disturbance assessments (PDAs), the environmental protection plan (EPP), and the environmental effects monitoring plan (EEMP). The EPP encompasses both the PDA process and the EEMP, but the roles played by these three components are distinct and are treated as such here.

The primary purpose of the PDA process is to avoid environmentally sensitive features. To achieve this, before the final design of wells, pipelines, and trails, environmental features are identified and species-specific setbacks are applied. The PDA process is covered in more detail in Section 9. The process, developed by EnCana, continues to evolve, having changed (been improved) from the environmental impact statement right up to the hearing. The Panel concludes that this process, incorporating the comments of the Panel set out in Section 9, would be an effective means of getting current information with which to plan the details of the project.

The PDAs would not only provide input into the detailed design and siting of wells, pipelines, and trails, but they would also provide useful information on the location of environmentally sensitive features, including habitats for listed species. In this way, the PDAs would provide useful information that others (e.g., Environment Canada, DND, and recovery plan specialists for threatened and endangered species) could use to manage cumulative effects. The same information could, of course, be used to plan the details of the EEMP. For this reason, making the results accessible is important.

EnCana has proposed a comprehensive EPP for its project. It includes a description of the PDA process; construction and implementation aspects, such as environmental reporting, environmental inspection, wet weather shutdown procedures, traffic control, erosion control, undesirable vegetation control, pipeline installation, water use, and cleanup; operations procedures; decommissioning procedures; and a contingency plan. The EPP would be implemented for the life of the project and all phases of development. The EPP is intended to enable EnCana to carry out the project so that EnCana can avoid and mitigate disturbances, reduce project effects, and protect the environment. This plan would be important for carrying out the project in an environmentally acceptable manner. Moreover, it is likely that changes would be needed in the EPP as lessons are learned from the PDAs or the EEMP and from carrying out the project.

EnCana proposed the EEMP for two purposes: determining the impacts of the project and the effectiveness of mitigation measures, and learning from the project to improve environmental performance. The Panel believes these are appropriate objectives for the EEMP. EnCana has further indicated that it is willing to collaborate with others, such as universities and government researchers, in carrying out the monitoring. The Panel believes that such collaboration is a sound approach. As noted earlier, the monitoring results could be useful to others in managing cumulative effects. The detailed monitoring programs should be developed with care by experts to ensure that they obtain the needed project information required for effective cumulative effects management. The monitoring programs would need to consider both project effects and cumulative effects, the latter generally in collaboration with others carrying out research or monitoring programs. EnCana has proposed to create an EEMP advisory committee with broad-based membership from all willing stakeholders. The Panel supports this approach.

As part of its task to advise on a sound set of environmental monitoring programs, the advisory committee could determine indicators of ecological integrity for the prairie grassland ecosystem. This would enable monitoring programs to focus on these indicators.

Many project impacts would take place during the relatively short construction phase of the project. For this reason, should the project proceed, it would be very important to have the EEMP advisory committee to be in place quickly to design the best possible monitoring program. Moreover, if there were to be meaningful adaptive management based on the findings of the monitoring program, it would be very important to have rapid feedback from the program. The Panel believes that the monitoring results should be compiled annually, and made available to the advisory committee, SEAC, DND, Environment Canada, the Environmental Coalition, and other relevant stakeholders. Following this reporting, the EPP, the EEMP, and the PDAs should be revised and updated as appropriate. Because these would be regulatory instruments, their revision should involve approval by the Suffield Base commander, with input from the above-noted stakeholders. The Panel believes this approach to managing environmental effects would prove to be sound.

The Panel recommends that

Recommendation 20 — Should the project proceed, the environmental protection plan and the environmental effects monitoring plan be reviewed annually during the construction phase and regularly after that. The initial plans and revisions should be approved by the Suffield Base commander.

One very important issue that is both a regulatory matter and an environmental management practice is oversight of environmental management during the project, should it proceed. EnCana has clearly proposed that it use environmental inspectors with strong enforcement powers. DND has developed some oversight capability with its Range Sustainability Section, which was recently created to manage the NWA under the authority of the Suffield Base commander. Most important, SEAC has a significant role in independent oversight, as noted in Section 9. The Panel believes that SEAC must play a significantly greater role in overseeing environmental management practices for this project, should it proceed.

Several interveners suggested that DND should develop a management plan for the NWA. DND responded, indicating that it has developed such a strategy and outlining what it has done and how it developed the strategy. The Coalition presented evidence on the content of management plans developed for other national wildlife areas in Canada. These other plans were much more detailed, indicating the objectives to be met for each wildlife area, threshold indicators for when the objectives would be met, specific means of achieving these objectives, and, in some cases, the provision of targets.

The Panel is of the view that such a management plan would be very valuable for the NWA and encourages DND to create one. In doing so, it should consult with Environment Canada, which has developed 40 such plans already, and with other stakeholders (including EnCana and the Environmental Coalition). Such consultation would make for a better and more implementable management plan.

There are several items that would be of direct relevance to this project and that ought, in the view of the Panel, to be included in a management plan for the NWA. One such item is the setback distances to be applied for listed wildlife and plant species and wetlands. At the hearing, it was mentioned that Scobie and Faminow have an accepted list of setbacks to be followed on federal lands and that the Canadian Parks Council has produced a similar list of setbacks applicable to environmentally sensitive federal lands. Simply specifying which list is applicable in a management plan would make for greater certainty. The same could be said about providing a map of wetlands (including ephemeral wetlands) in the management plan to avoid any confusion.

EnCana agreed to share environmental information as part of the EEMP multistakeholder process. It was evident during the environmental assessment process that information exchanges between parties were sometimes problematic and were creating inefficiencies. The Panel urges DND to consider establishing a geographical information system-based data hub for the housing and exchange of environmental data in the NWA. This could be adopted within an overall management system for the NWA, as recommended by the Panel.

At a higher level, the management plan should contain commitments to protecting and, as appropriate, restoring native prairie grasslands. This should include the use of an advisory committee to recommend management practices to deal with invasive species, as noted in Section 6.7. A similar commitment to restoring the natural fire regime should also appear in such a management plan, along with a means of meeting this commitment.

Perhaps of greatest importance would be the practices for surveillance and oversight of activities taking place in the NWA. So far as these activities would apply to natural gas developments, they would need to be developed in concert with EnCana, the Energy Resources Conservation Board (ERCB), and SEAC. The Panel is of the view that a much more rigorous oversight of gas development is needed compared to what has been happening recently. Linking oversight of the project with effective regulation is essential.

The Panel recommends that

Recommendation 21 — The Department of National Defence, building on its existing management strategy and other management systems, create a management plan for the National Wildlife Area.

The following list provides suggestions for features that might productively be included in the management plan for the NWA:

- wildlife conservation goals and objectives
- strategies for dealing with invasive nonnative plant species
- constraint mapping (e.g., critical habitat maps, wetland maps)
- reclamation objectives
- fire management plans
- water management plans

- access management plans
- applicable thresholds, such as those in the Suffield Sustainability Management Plan
- policies for dealing with ungulates (antelope in particular)
- data management plan
- setback distances for wildlife and plant species

In summary, the Panel concludes that effective environmental management of the project would be best achieved if the following were met:

- the pre-disturbance assessment process is implemented as described in Section 9,
- the environmental protection plan and environmental effects monitoring plan are implemented and regularly revised as described,
- the environmental effects monitoring plan advisory committee is created and used as described,
- effective project oversight by SEAC, the ERCB, and DND is achieved, and
- DND develops a management plan for the NWA.

9 REGULATORY MATTERS

9.1 Views of EnCana

EnCana expressed the view that the 1975 Agreement, in conjunction with laws of general application, established a comprehensive regulatory regime for natural gas development on the Suffield Base, including the Canadian Forces Base Suffield National Wildlife Area (NWA). EnCana contended that the 1975 Agreement contemplated and addressed the issue of shared jurisdiction on the Suffield Base by adopting Alberta's regulatory system for energy development on the Suffield Base. EnCana conceded that there had been some changes to the regulatory environment since the 1975 Agreement was signed. However, it stated that the process provided in the 1975 Agreement was robust and provided ample protection of the environment.

EnCana recognized that it had some disagreements with the Department of National Defence (DND) regarding the regulatory process on the Suffield Base and contended that this was because the parties did not fully understand the 1975 Agreement. EnCana disagreed with the assertions of other parties that there were regulatory gaps associated with the regulatory process for oil and gas development on the Suffield Base.

EnCana acknowledged that the 1975 Agreement cited and incorporated specific provisions of the Alberta *Land Surface Conservation and Reclamation Act*, which was repealed and replaced by the *Environmental Protection and Enhancement Act*. EnCana argued that given the repeal of the *Land Surface Conservation and Reclamation Act* and its regulations, a commercially reasonable interpretation of the 1975 Agreement was that the parties should continue to apply the legislation incorporated at the time of the 1975 Agreement as modified by recent guidelines and developments.

EnCana recognized the Suffield Base commander's authority to issue and revoke permits under the *Wildlife Area Regulations* for future development in the NWA. EnCana also acknowledged that the Suffield Base commander had broad authority to issue range standing orders (RSOs) regarding the protection and safety of personnel and equipment to ensure that the military aspects of the Suffield Base use was not compromised by oil and gas development. EnCana confirmed that it would meet the requirements of the Suffield Base commander as they related to military functions on the Suffield Base as long as they were reasonable. However, EnCana argued that the Suffield Base commander's authority to issue RSOs did not extend to matters regarding oil and gas development. In this respect, EnCana stated that it treated RSOs to be a matter of discussion as part of its landowner consultations.

EnCana argued that under Section 12 of the 1975 Agreement, the Suffield Base commander was bound to accept the Suffield Environmental Advisory Committee (SEAC) recommendations regarding applications for development and reclamation approvals. It further noted that while the Suffield Base commander was empowered to issue a stop order if he perceived a breach of environmental legislation, that order would expire after 30 days absent a recommendation from SEAC on the matter.

It was EnCana's position that the 1975 Agreement vested environmental oversight of the Suffield Base for oil and gas operations in SEAC. It argued that this was the appropriate body to fulfill this role, given the organizations that it represented and the knowledge of the individuals

assigned to it. EnCana recognized that its proposed project contemplated an enhanced role for SEAC in terms of the number of applications to be reviewed and the scope of their review. EnCana also acknowledged that the 1975 Agreement did not envision a SEAC role in the proposed pre-disturbance assessment (PDA) process, the environmental protection plan (EPP), or the environmental effects monitoring plan (EEMP). EnCana proposed that the federal and provincial governments should provide the necessary resources for SEAC to fulfill these new duties.

EnCana proposed an application review process for the proposed project that was heavily reliant on its proposed PDA process and on SEAC to advise the Suffield Base commander. A key feature was that it categorized well-site proposals as routine or nonroutine, depending on whether the PDA process revealed any conflicts or constraints that could not be corrected by moving the location of the proposed facility.

Figure 3 was developed by the Panel on the basis of evidence filed by EnCana to generally illustrate the application process as proposed by EnCana.

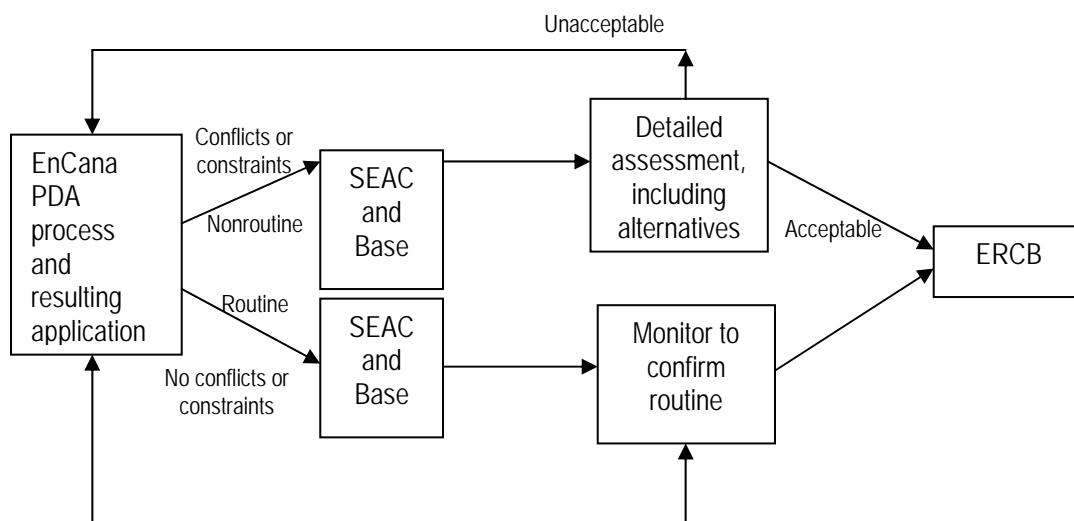


Figure 3. Process chart for EnCana's application process (developed from EnCana's opening statement)

EnCana stated that the Energy Resources Conservation Board (ERCB) was responsible for the regulation of the conservation, development, operations, and abandonment of energy resources and associated facilities. It noted that under the 1975 Agreement, the ERCB was responsible for the issuance of development and reclamation approvals and for the issuance of licences under the *Oil and Gas Conservation Act* and permits under the *Pipeline Act*.

EnCana acknowledged that Alberta Environment's reclamation process did not apply on the Suffield Base. However, it was of the view that the 1975 Agreement provided an appropriate process for the reclamation of wells and pipelines on the Suffield Base. EnCana argued that the drafters of the 1975 Agreement had inherently recognized the special nature of the Suffield Base by designating wells, pipelines, and other facilities on the Suffield Base as regulated surface operations. According to EnCana, this signalled an intention to apply more stringent reclamation requirements on the Suffield Base than would apply elsewhere in Alberta.

EnCana contended that the standard of reclamation specified in the 1975 Agreement was that of equivalent land capability. In terms of the standards of reclamation, EnCana stated that these were established within the terms of each development and reclamation approval as further modified by agreement of the parties. EnCana acknowledged that the reclamation process on the Suffield Base had evolved over time and recognized the need to determine a reclamation process acceptable to all parties. EnCana envisioned that SEAC would work with the Suffield Base commander on reclamation issues but accepted that the Suffield Base commander would have final say on reclamation standards and success.

9.2 Views and Concerns of Interveners

Government of Canada

The Government of Canada (Canada) took the position that while the 1975 Agreement provided a regulatory framework for oil and gas development on the Suffield Base, there were important gaps in the regulatory process. Canada contended that the Suffield Base commander's authority over activities on the base, including oil and gas development, was plenary and was not limited or otherwise constrained by the 1975 Agreement. Canada argued that the 1975 Agreement must be interpreted within the context of the broader regulatory scheme governing the establishment of the Suffield Base and the authority of its commander. Specifically, Canada noted the obligations created and the authority granted to the Suffield Base commander under the *Department of National Defence Act* and the *Queen's Regulations and Orders*.

Canada emphasized that the authority to issue, enforce, and revoke permits under the *Canada Wildlife Act* rested with the Suffield Base commander, pursuant to the delegations under the *Canada Wildlife Act*. In this respect, Canada noted that the Suffield Base commander had several means of monitoring compliance, including inspections by the base's Range Sustainability section.

Canada contended that the issuance of RSOs, even those that had the potential to impact oil and gas operations, was a legitimate exercise of federal authority to issue and enforce wildlife area permits. In this respect, Canada argued that the RSOs were a necessary component of regulating gas exploration on the Suffield Base to ensure that all parties knew what activities were permitted before enforcement could take place.

Canada emphasized that while the 1975 Agreement provided for the dual use of the Suffield Base, the military use of the Suffield Base must be regarded as the primary use. Accordingly, Canada contended that EnCana's right of access to the Suffield Base was limited. In this respect, Canada stated that it was the Suffield Base commander's responsibility to ensure that access was in accordance with the requirements of the Suffield Base to effectively support military training.

Canada stated that the Suffield Base commander relied heavily upon SEAC to manage the environmental effects and impacts of the petroleum industry. However, it was Canada's view that SEAC often ended up in the middle of disputes between DND and EnCana without any clear terms of reference, without any clear authority or enforcement capabilities, and without enough resources. Canada noted that it perceived that SEAC performed two primary functions pursuant to the 1975 Agreement: first, it was a key advisor to the Suffield Base commander on oil and gas activities, and second, it provided valuable input into reclamation standards and decisions.

Canada argued that SEAC, as currently configured, lacked the capacity to bear the heavy workload proposed by EnCana for further development in the NWA.

Canada argued that pursuant to the 1975 Agreement, the ERCB did not exercise the full range of its provincial powers on the Suffield Base. Canada recognized that the ERCB played a role in the enforcement of provincial requirements on the Suffield Base in terms of investigating spills, the venting of gas, and similar matters. However, Canada noted that the ERCB did not consider matters such as cumulative effects, since it examined applications on a well-by-well basis. Canada argued that this, in itself, was evidence of a regulatory gap on the Suffield Base, given federal policies on sustainability.

Regarding applications to site wells and related facilities in the NWA, DND disagreed with EnCana's position that many such applications might be characterized as routine in nature. It stated that all NWA applications would be reviewed in detail, using a process summarized below in Figure 4. The Suffield Base commander stated that he valued the recommendations from SEAC but made it clear that he considered himself responsible for the final decisions respecting NWA applications.

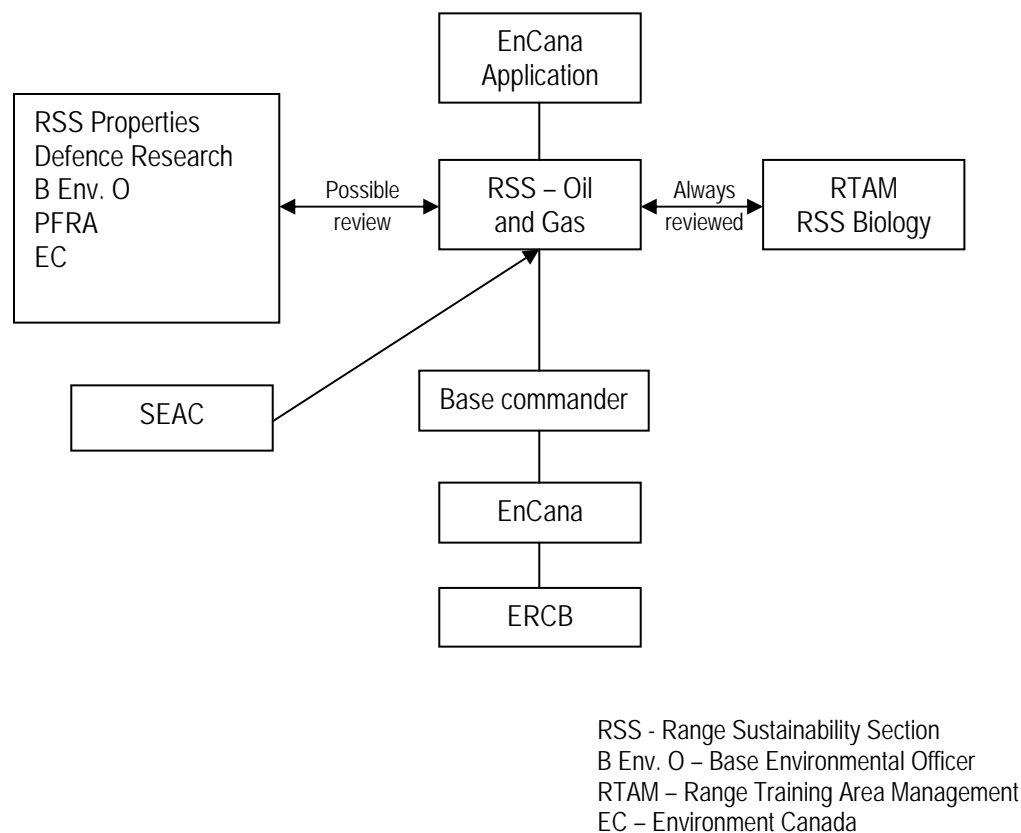


Figure 4. Flowchart for Suffield Base NWA application process (adapted from DND opening statement)

Canada accepted that Alberta Environment had no responsibility regarding reclamation on the Suffield Base and questioned whether it had any authority over any activities on the Suffield Base. Further, Canada argued that Alberta Environment's failure to participate in the proceeding, as a member of SEAC or otherwise, was also indicative of a regulatory gap.

Canada stated that the reclamation process on the Suffield Base continued to be problematic, as after more than 30 years of gas development on the Suffield Base there were still no reclamation standards. While Canada was satisfied that the ERCB did not have authority regarding reclamation on the Suffield Base, it could not conclusively say who had the final say on reclamation. Canada observed that the latest RSOs included reclamation criteria borrowed from Alberta Environment and noted that it was the Suffield Base commander's understanding that Alberta Environment supported the development of a comprehensive reclamation process for the NWA and the Suffield Base. Canada also noted that a multistakeholder process to establish a reclamation process was tentatively scheduled for January 2009.

Environmental Coalition

The Environmental Coalition argued that the fundamental disagreement between EnCana and DND over who had final authority regarding oil and gas development on the Suffield Base was indicative of a flawed regulatory regime. In this respect, the Coalition observed that the Suffield Base commander's ability to enforce noncompliance on the Suffield Base was limited.

The Coalition acknowledged that the ERCB granted approvals for activities on the Suffield Base but argued that the ERCB's role regarding other surface issues was uncertain. In this respect, the Coalition noted that the ERCB conducted minimal inspections on the Suffield Base. The Coalition also pointed to the absence from the hearing of Alberta Environment and Alberta Sustainable Resource Development as an indication that the regulatory system was uncertain and flawed. It brought a motion to compel attendance at the hearing by these departments that it stated would have helped to better understand the regulatory system and the existence of gaps.

The Coalition argued that the role of SEAC under the 1975 Agreement was unclear. It questioned whether SEAC, as currently configured, was qualified to be in charge of the environmental oversight of the NWA. The Coalition noted in this respect that the SEAC members all have other full time jobs and limited resources and thus lack the capacity to fulfill their SEAC obligations for the proposed project.

The Coalition contended that there was considerable uncertainty regarding reclamation standards for the NWA because there was no applicable binding legislation. The Coalition noted that it did not know who was responsible for setting reclamation standards and certifying sites that had been appropriately reclaimed. The Coalition argued that the reclamation standards cited in the 1975 Agreement were no longer relevant and questioned whether the Suffield Base commander was the appropriate authority to be in charge of reclamation.

Suffield Environmental Advisory Committee

SEAC was represented by its members appointed by Environment Canada and the ERCB, but not by Alberta Environment, which declined to participate. The SEAC members testified that SEAC was created in the 1975 Agreement as an oversight and advisory body to the Suffield Base commander on the Suffield Base. The SEAC members stated that while the restricted

development zone (defined under the 1975 Agreement as the Saskatchewan River Bank and the Middle Sand Hills zones; see Figure 5) was its primary geographic area of responsibility, it also provides advice with respect to activities on the remainder of the Suffield Base. The SEAC members observed that its most important responsibility is to consider applications with respect to environmental factors and make recommendations to the Suffield Base commander on whether a specific project should be approved. The SEAC members noted that an additional responsibility was to cause inspections to be made on the Suffield Base by way of an annual field reconnaissance.

The SEAC members contended that they perceived a lack of clarity regarding the following:

- the role of SEAC—i.e., how its environmental oversight role should be implemented;
- the geographic area of SEAC's responsibility;
- the reporting structure or responsibility of SEAC;
- the authority of SEAC;
- the lack of enforcement powers provided to SEAC if it implemented requirements;
- environmental standards and related expectations of SEAC; and
- the regulatory processes for the consideration and issuance of development and reclamation (D&R) approvals, reclamation, and requests for review of SEAC decisions.

The SEAC members observed that the existing approval, enforcement, and reclamation processes on the Suffield Base had been derived by distilling years of minutes of SEAC meetings. They argued that this gave rise to considerable uncertainty and that the process should be recorded in a single document agreed to by parties.

The SEAC members questioned whether the committee as currently set up could fulfill the role envisioned by EnCana for SEAC for the proposed project. The SEAC members noted that they each have other full-time duties and limited time and capacity to devote to the significant obligations of SEAC. The SEAC members recommended that in the future each member of SEAC should be a full-time appointment with the ability to use other resources within their respective organizations.

The SEAC members argued that there was an immediate need to determine what standards would apply for reclamation. They noted that there was a perceived expectation from other parties that SEAC would be involved in reclamation, but SEAC was unsure whether it had the capacity or expertise to fulfill this expectation.

Although not currently a member of SEAC, Mr. G. Trottier, a former SEAC member, appeared at the hearing. He cited the important past role SEAC had played at the Suffield Base and indicated that it could do so in future if it were properly resourced.

9.3 Panel Conclusions and Recommendations

As an introduction to its views on regulatory matters, the Panel believes a brief summary of the Panel's understanding of the existing regulatory requirements in the NWA would be useful. The regulatory process is more complex than it would be for shallow gas elsewhere in Alberta

because of the 1975 Agreement, the existence of the NWA, and the applicability of federal wildlife legislation.

To drill a well in the NWA, a proponent would need

- a development and reclamation (D&R) approval,
- an NWA permit, and
- a well licence.

The D&R approval is required by the 1975 Agreement and is issued by the Energy Resources Conservation Board (ERCB), typically for a group of wells within a prescribed area. The NWA permit would be issued by the Suffield Base commander under Section 4 of the *Wildlife Area Regulations*. The well licence would be issued by the ERCB. Should there be an effect on endangered species, a permit under the *Species at Risk Act* would also be required from Environment Canada.

Regarding inspections of operations and enforcement of requirements, the 1975 Agreement mandates SEAC to conduct inspections to ensure compliance with the environmental objectives and regulations set out in the 1975 Agreement. The ERCB has broad authority under Alberta legislation regarding inspections and enforcement. Under the *Canada Wildlife Act*, the Suffield Base commander may appoint wildlife officers and, through them, enforce the *Wildlife Area Regulations*.

The Suffield Base commander has authority under the 1975 Agreement regarding access to the Suffield Base and the locations of wells and details of their operations for the purpose of protection and safety of personnel and equipment on the Suffield Base. Regarding environmental matters, subsection 12(9) of the 1975 Agreement provides that the Suffield Base commander may issue stop or other orders; however, such an order must be supported by a recommendation from SEAC within 30 days of it being issued.

Only four wells in the NWA have been reclaimed, so there is little firsthand experience as to how the approval of reclamation would work. The 1975 Agreement is not overly clear in this respect. When it was signed, reclamation certificates were issued by the Land Conservation and Reclamation Council, which was established by the *Land Surface Conservation Act*. That act was repealed and replaced by the *Environmental Protection and Enhancement Act (EPEA)*. Reclamation certificates are now issued by Alberta Environment, but Section 134(f) of *EPEA* makes it clear that the conservation and reclamation provisions of *EPEA* do not apply to federal lands, including the Suffield Base.

The reclamation process contemplated in the 1975 Agreement appears to have two parts. First, EnCana must create a reclamation plan as part of its development and reclamation application, which then must be reviewed by SEAC and ultimately approved by the ERCB. Second, EnCana must prepare a reclamation report including the information deemed necessary by SEAC. This suggests to the Panel that SEAC is responsible for establishing reclamation criteria.

The Panel believes that the existence of an effective and efficient regulatory system would be of paramount importance in the consideration of the EnCana proposal. Indeed, in the view of the Panel, such a system is very important with respect to the existing shallow gas operations in the

NWA and the remainder of the Suffield Base. Unfortunately, on the basis of evidence put forward by the various parties, it is not clear to the Panel that the existing regulatory system is functioning as it should. For this reason, the Panel comments first on regulatory matters as they relate to the Suffield Base as a whole. It then turns its attention to the proposed project to be located in the NWA.

9.3.1 Canadian Forces Base Suffield

There appears to be considerable uncertainty regarding the roles and responsibilities of various participants in the shallow gas development on the Suffield Base, as well as differences in the interpretation of the 1975 Agreement. The 1975 Agreement was put in place more than 30 years ago, and much has changed since then. These changes and the passage of time have undoubtedly contributed to the uncertainties and differences.

As examples of the differences, EnCana takes the position that SEAC is the body identified in the 1975 Agreement to assist in the resolution of environmental issues. It suggested that the Suffield Base commander may refuse consent with respect to particular activities only upon the recommendation of SEAC. EnCana questioned whether the intent of the 1975 Agreement is to make it and other industry operators on the base subject to Range Standing Orders (RSOs) specifically drafted to address the environmental impacts of oil and gas development. Canada takes the position that all activities on the Suffield Base require approval from the Suffield Base commander and that EnCana must adhere to all RSOs. It goes so far as to suggest that EnCana may currently be in violation of federal legislation and that should the project be approved, new environmental legislation and regulations should be enacted.

At the hearing, SEAC members questioned whether the 1975 Agreement was sufficient to address governance and regulation in the current context, citing the area of reclamation as one that required redefinition. The SEAC members made it clear that from their perspective, SEAC does not have the resources to carry out its responsibilities. All participants in the proceeding, including EnCana and Canada, agreed that SEAC is not adequately resourced.

Further, the 1975 Agreement refers to certain legislation and regulations that were repealed long ago, including the *Land Surface Conservation and Reclamation Act* and the *Department of the Environment Act*. The 1975 Agreement is silent on the issue of amendment or repeal of any of the statutes incorporated into its terms.

One interpretation of the 1975 Agreement could result in the conclusion that in 1975 the Land Conservation and Reclamation Council was to be responsible for the issuance of reclamation certificates on the Suffield Base when final reclamation is judged to be satisfactory. The *Land Surface Conservation and Reclamation Act* has since been repealed and Alberta Environment is now responsible for certifying reclamation. However, the reference to reclamation in the relevant legislation specifically excludes federal lands.

These uncertainties and differences regarding regulatory roles have negatively affected the relationship between the Suffield Base and EnCana, a relationship that is fundamental to accomplishing the intent of the 1975 Agreement. Additionally, certain oversight activities intended in the 1975 Agreement do not appear to be fully functioning. The end result could be negative impacts on the environment.

The Panel recognizes that the regulatory system on the Suffield Base as a whole is outside its mandate. However, its concerns regarding uncertainties in the regulatory system lead it to recommend that

Recommendation 22 — The 1975 Agreement be reviewed by the parties to the 1975 Agreement in an effort to clarify its intent respecting the regulatory roles and responsibilities of the Suffield Base commander, the Suffield Environmental Advisory Committee, the Energy Resources Conservation Board, and Alberta Environment.

The Panel is not recommending that the 1975 Agreement be reopened and altered. Rather, the Panel believes it should be reviewed by the parties to the 1975 Agreement at the most senior levels. The review should address the concerns of the various stakeholders and take the necessary steps to clarify the intended regulatory system. This review should be made whether or not the proposed project proceeds.

9.3.2 Proposed Project in the NWA

The uncertainties referred to above are less problematic in the NWA because the *Canada Wildlife Act* and regulations apply to that area, in addition to the 1975 Agreement, and clarify certain roles. For this reason and because the proposed project is totally within the NWA, the Panel believes there is less uncertainty in the regulatory system as it relates to the EnCana proposal.

The Panel recognizes that the delegation of ministerial authority under the *Canada Wildlife Act* and the *Wildlife Area Regulations* to the Base Commander has introduced changes to the regulatory framework for the NWA. Pursuant to Section 12(7) of the 1975 Agreement the Suffield Base commander is required to make decisions on development and reclamation applications based upon recommendations by SEAC. However, in his role as the Minister's delegate, the Base commander is mandated to ensure the conservation of wildlife and its habitat in the NWA. He is ultimately responsible for the issuance or revocation of permits allowing industrial activity in that area and has been granted broad discretion to achieve the statutorily entrenched conservation goals.

In the Panel's view, it is clear that the Suffield Base commander's authority, as the Minister's delegate, is paramount in the NWA. The practical result is that the Base commander has the authority to effectively deny an application for a well, pipeline or related facilities, if he is of the view that its construction or operation would interfere with the conservation of wildlife. In the Panel's view, such a decision would be final and determinative.

The Panel is of the view that implementation of its recommendations would be necessary to effectively and appropriately mitigate the environmental effects of the project. The Panel considers that an effective and efficient "regulatory system" would be essential to ensure that the Panel's recommendations were being satisfied and the mitigation measures proposed by EnCana were achieving their stated goals. The Panel therefore sees the need to assess the adequacy of the regulatory system.

The project as proposed would involve the drilling and production of some 1275 wells in the NWA. The specific location of the individual wells and related infrastructure was not included in

the EnCana proposal. In assessing the adequacy of the regulatory system, the Panel has assumed that if a project or a revision to it receives a permit under the *Wildlife Area Regulations*, each application for specific wells, access trails, and pipelines would still require an approval from the Suffield Base commander who would ensure consistency with the overall permit.

The 1975 Agreement put in place a regulatory system for the entire Suffield Base and in particular for the areas that make up the NWA. The declaration of the NWA and the application of the *Canada Wildlife Act* and regulations, the *Species at Risk Act*, and the *Canadian Environmental Assessment Act* have added to that regulatory system.

The overall approach of the Panel in assessing the adequacy of the regulatory system was to look at the roles of the various involved parties for the relevant functions and determine whether the resulting oversight for each of the functions would be effective and efficient. This would require that they are adequate to allow the project to proceed in such a manner as to make the impacts acceptable and to prevent interference with wildlife conservation. If the Panel concluded that the regulatory system would not be adequate, it then considered whether modifications to the system could and should be made.

The functions that the Panel has looked at are

- planning,
- applications and approvals for specific wells, pipelines, and trails,
- ongoing operations, including inspections and enforcement, and
- abandonment of the wells and restoration of the surface.

A number of parties have responsibilities related to these functions. In carrying out its assessment, the Panel has focused its attention on

- EnCana, as the assignee under the 1975 Agreement (EnCana's role is not regulatory in nature but is of importance in this assessment),
- Suffield Base commander,
- Suffield Environmental Advisory Committee,
- Energy Resources Conservation Board,
- Environment Canada,
- Alberta Environment, and
- Alberta Sustainable Resource Development.

Suffield Industry Range Control Ltd. (SIRC) was created by the 1999 Partial Assignment Agreement among Canada, Alberta, and EnCana. Its role is primarily to coordinate matters between the parties. It also controls access and movement on the Suffield Base in accordance with direction from the Suffield Base commander. The Panel does not consider SIRC to have regulatory responsibilities specific to the gas production operations and does not include it in this assessment.

It is important to note that although the *Canada Wildlife Act* applies uniformly across the entire NWA, this is not the case for the 1975 Agreement. The 1975 Agreement recognized certain areas

on the Suffield Base with particular environmental value, but those areas do not coincide with the NWA boundaries. The NWA includes lands defined in the 1975 Agreement as the restrictive development zone: most of the South Saskatchewan River Bank Zone and most of the Middle Sand Hills Zone. The NWA also includes part of the mixed grassland area, as shown on Figure 5, which was not specifically referred to in the 1975 Agreement.

Planning

The 1975 Agreement provides for the Suffield Base commander and EnCana to meet annually to review and discuss long-range plans and preliminary development plans for the coming year. The Panel considers this an important activity. It received no evidence respecting related problems and assumes this function is working reasonably well.

Applications and Approvals

The *Canada Wildlife Act* and the *Wildlife Area Regulations* apply to the NWA. Sections 3, 4 and 7 of the *Wildlife Area Regulations* are of particular importance in this process and to the Panel. They read in part as follows:

3. (1) Subject to subsection (2), no person shall, in any wildlife area ...
 - (d) damage, destroy or remove a plant, ...
 - (i) destroy or molest animals or carcasses, nests or eggs thereof, ...
 - (k) carry on any commercial or industrial activity, ...
 - (l) disturb or remove any soil, sand, gravel or other material, or
 - (m) dump or deposit any rubbish, waste material or substance that would degrade or alter the quality of the environment,unless he does so under and in accordance with a permit issued by the Minister pursuant to Section 4.
4. The Minister may, on application, issue a permit to any person authorizing that person to carry on an activity described in Section 3 in any wildlife area where that activity will not interfere with the conservation of wildlife.
7. The Minister may cancel or suspend a permit where it is necessary to do so for the conservation of wildlife or wildlife habitat in a wildlife area.

According to the submission of the Government of Canada, the Minister of the Environment delegated “most of his powers, duties and functions conferred on him under the *Canada Wildlife Act*” to the Minister of National Defence. They were then delegated to the Suffield Base commander.

As a result, the Suffield Base commander has the delegated authority to issue permits for the NWA if the activity proposed will not interfere with the conservation of wildlife. Conversely, the Suffield Base commander has the authority to revoke such a permit where necessary.

The Suffield Base commander may also take steps to promote conservation of wildlife on the Suffield Base. By way of the enforcement function, the Suffield Base commander may appoint wildlife officers, and those wildlife officers or the Suffield Base commander may commence prosecutions for contravention of the *Wildlife Area Regulations*.

Additional powers provided to the minister (and presumably to the Suffield Base commander) through the *Canada Wildlife Act* include the power to

- undertake programs for wildlife research and investigation [Section 3(c)];
- establish advisory committees and appoint the members of those committees[Section 3(d)];
- coordinate and implement wildlife policies and programs in cooperation with the government of any province having an interest therein [Section 3(e)];
- subject to the regulations, carry out measures for the conservation of wildlife on those lands [Section 4(2)(c)]; and
- designate any person or class of persons to act as wildlife officers for the purposes of this Act and the regulations [Section 11(1)].

Section 13 of the *Canada Wildlife Act* describes offences and penalties under the act. An example of a relevant contravention would be the performance of any of the activities described in the regulations without a permit. The maximum fine for a corporation would be \$250 000 for a first offence and \$500 000 for subsequent offences.

The Panel understands that there is a continuing disagreement between the Suffield Base and EnCana respecting the need for a permit to allow activities related to ongoing operations at wells in the NWA that existed at the time the NWA was created. It further understands that EnCana has accepted such a permit without agreeing to its need. The Panel takes no position on the legal question of the need for a permit respecting operations at wells that existed prior to the existence of the NWA. Clearly, there are now wells in the NWA. A good proportion of the wells are in areas identified as a restrictive development zone in the 1975 Agreement, where special care of the environment was provided for. In keeping with the spirit of that agreement, as well as the intent of the NWA, care for wildlife and the environment needs to be a primary goal in ongoing operations.

In the view of the Panel, there is no question that the proposed project requires a permit or multiple permits from the Suffield Base commander. The project proposal includes an environmental impact statement, which is being reviewed and reported on by this Panel. The Panel's recommendations will go to the Governor in Council, which will issue a decision.

As indicated earlier, if a permit is issued, it should be conditioned to require further review by the Suffield Base commander respecting the locations of individual wells, pipelines, and access trails. The manner of handling these approvals would, in the opinion of the Panel, be of utmost importance.

The Suffield Base commander presented a flowchart for permit applications, which is summarized in Figure 4. It dealt primarily with the internal review by Suffield Base officials and environmental specialists, but did provide for advice from and communication with SEAC. The Panel generally agrees with the process, subject to further detailed comments it will make, particularly respecting the PDA process, the role of SEAC, and applications to the ERCB.

EnCana also proposed an approach for the approval of individual wells and related pipelines and trails. That approach is generally illustrated in Figure 3. It included SEAC as a key advisor, and the PDA process played a central role. A feature of the EnCana proposal is that those well locations that involved a conflict with a constraint or setback would be classified as nonroutine and would attract special attention from SEAC and the Suffield Base. All other locations, estimated to be some 80 per cent, would be classified as routine. These would not receive

detailed treatment by SEAC and the Suffield Base, but would be subject to a monitoring system. The Suffield Base commander made it clear that it would consider all wells proposed for the NWA as nonroutine and make a detailed assessment of them.

The Panel believes the appropriate approval process is a combination of those proposed by the Suffield Base and by EnCana. It further believes that SEAC, as an advisory body created by the 1975 Agreement and representing Canada and Alberta, should play a major role in the process.

In the Panel's view, it is essential that all applications within the NWA be subject to the same approval process. However, because the 1975 Agreement was signed long before the NWA was created, the development and reclamation approval process prescribed by the 1975 Agreement does not establish a consistent approval process for the NWA. Figure 5 illustrates this issue: the NWA includes those lands described in the 1975 Agreement as the Middle Sand Hills Zone and (most of) the South Saskatchewan River Bank Zone and lands described in other documents as the Mixed Grassland area. Section 8 of the Suffield Oil and Gas Environmental Protection Regulation (Appendix 3 of the 1975 Agreement) states that SEAC is required to review all development and reclamation (D&R) applications for the Middle Sand Hills Zone and the South Saskatchewan River Bank Zone. However, there is no such mandatory review requirement for those lands within the NWA that are outside of those two zones.

To ensure that all applications within the NWA are subject to the same approval process, the Panel believes that it is appropriate that SEAC review all applications within the NWA. The Panel understands that the Suffield Base commander may request SEAC to review any application pursuant to Section 12(7) and notes that the Suffield Base commander testified that he intended to have SEAC review all applications within the NWA.

To remove any doubt about the role of SEAC and to ensure a consistent regulatory process for the NWA, the Panel recommends that

Recommendation 23 — Should the project proceed, the Suffield Base commander request the Suffield Environmental Advisory Committee to review all National Wildlife Area development and reclamation applications, including the review of locations of wells, pipelines, and access trails.

This recommendation is subject to SEAC being adequately resourced to meet its responsibilities at Suffield (to be addressed later in this section of the report).

The Panel believes that the EnCana PDA process, with significant modifications, would represent an important part of the well site approval process. It is a means of identifying and avoiding environmental constraints and consists of a series of six steps that would be carried out by EnCana, the results of which would be provided to the Suffield Base and to SEAC. Suffield Base officials and specialists would review the submitted information, as would SEAC on an independent basis. SEAC would then present its recommendations to the Suffield Base commander, who would have regard for that advice and the advice of the Suffield Base staff in making the final decision regarding its conformity with the conditions of the overall NWA permit. If wells and related facilities were approved by the Suffield Base commander, they would then go to the ERCB for the well licences and pipeline approvals required by Alberta legislation

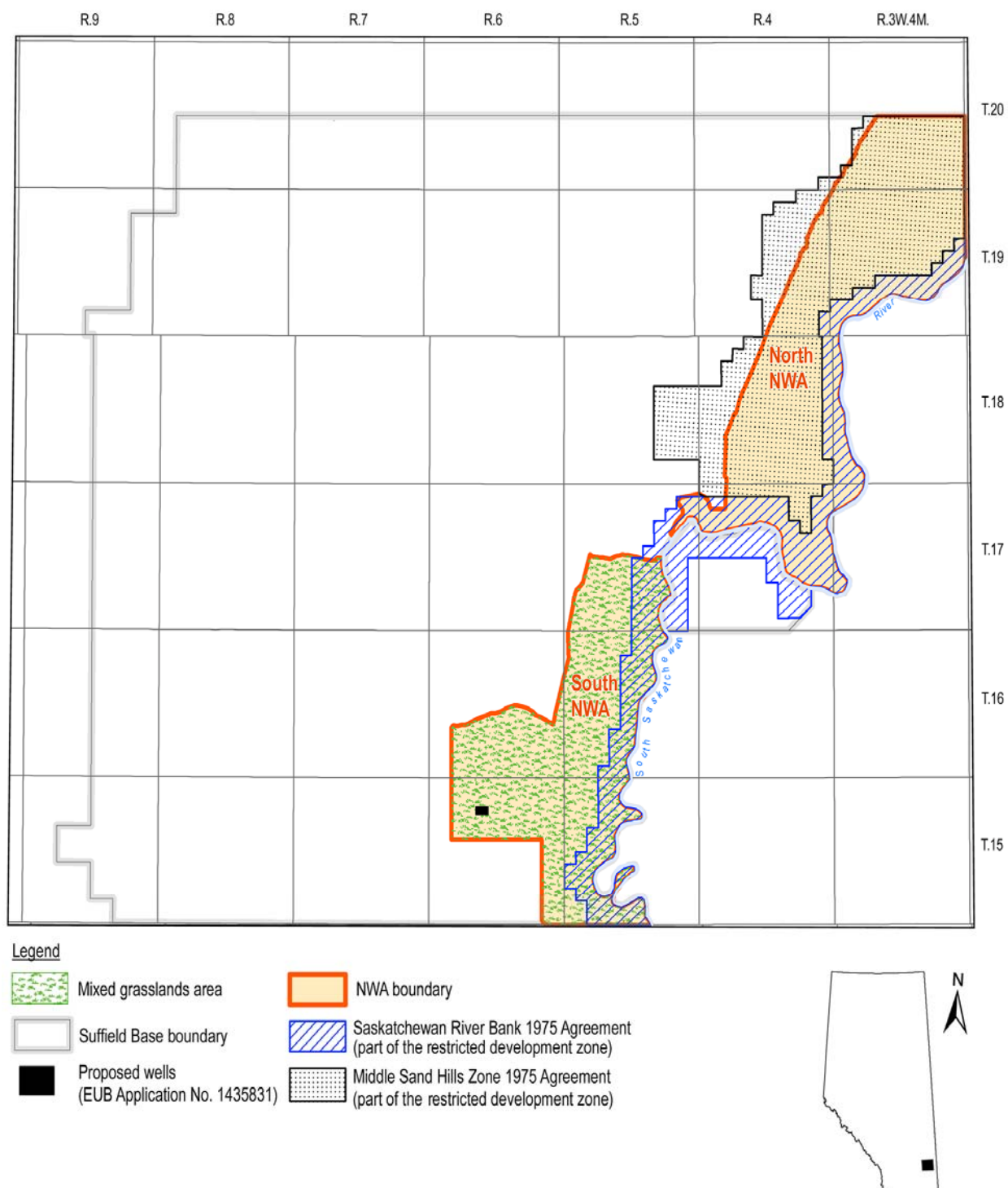


Figure 5. Map showing areas applicable to the 1975 Agreement and NWA

and for the D&R approval required by the 1975 Agreement. This process is generally consistent with that proposed by the Suffield Base commander.

The details of the PDA process are commented on in earlier parts of this report dealing with environmental effects. For the convenience of the reader, the Panel has decided to include in this section a brief description of the six-step process proposed by EnCana, along with a summary of the Panel's comments. In preparing its comments, it is important to note that the Panel would see the PDA process as an important source of information to be used in the environmental effects monitoring plan (EEMP) and other environmental plans. (This matter is further discussed in Section 8.)

The Panel has a number of comments and suggested modifications respecting the EnCana PDA process. In the following, each step is presented as described by EnCana, with the Panel's comments following.

Step 1: An office-based initial well site selection with a goal of optimizing resource recovery within the constraints of existing infrastructure and inter-well spacing requirements.

Panel Comments: The underlying philosophy and starting point should not simply be eight additional wells per section equidistance from existing wells within the appropriate legal subdivisions. Rather, the pattern of existing wells and the quality of the reservoir (based on production performance of existing wells) should be considered in an effort to site the lowest number of infill wells that would recover most, if not all, of the potential incremental recovery. The Panel recognizes that in many situations this would result in eight infill wells.

Step 2: Field surveys to be conducted across the entire project area. The surveys would be in accordance with accepted scientific methodologies, by qualified environmental specialists, and would allow EnCana to identify the location of specific species of wildlife across the NWA. The results of the surveys would be used for the next stage of infrastructure siting, Step 3, and would be provided to regulators and researchers to improve the management of the NWA and listed species.

Panel Comments: In Sections 6.1 and 6.2, the Panel recommends that the project not proceed until the final determination of critical habitat has been completed for five species. For these species, the critical habitat would define the constraint area. This would also be the case for other species for which critical habitat may be determined at some future date. The field surveys would be for the other relevant species, and the specific species requiring surveys could change with time.

Broad surveys would also be needed with respect to soils and terrain to identify sensitive soils and steep slopes and with respect to vegetation, in particular to determine where invasive species exist and whether rare species are present that need to be protected. Similarly, the locations of wetlands and other relevant features of the terrain would need to be surveyed. Specialists would have to be appropriately involved.

The Panel believes it important that the broad picture with respect to constraints be understood early in the PDA process. All the surveys would have to be conducted at the appropriate time of year, be of adequate frequency, and cover sufficient area to ensure up-to-date knowledge. They should also include historical and archaeological resources, as

appropriate. The entire NWA would have to be covered, area by area, in a sequence tied to the scheduling of areas for development. Also, depending on the results of certain surveys and their timing relative to the actual time of construction, certain surveys might have to be repeated. (These matters are dealt with further in Sections 6.1, 6.2, and 6.3.)

Step 3: The location of well sites and rights-of-way would be adjusted to accommodate setbacks based on the results of the above surveys, operational considerations, and environmental constraints, such as wetlands and terrain. EnCana would utilize various tools and techniques to assist in the desktop siting, including GIS mapping products and aerial photographs.

Panel Comments: The identified constraints and setbacks would be respected by moving the proposed well site, directional drilling, or not drilling the well. EnCana stated that the constraints would be adhered to where possible. Where not possible, it suggested other avenues, such as obtaining a SARA permit. The Panel's interpretation of SARA is that such permits would not be easily obtained. Where the constraint relates to critical habitat, the Panel believes it should be an absolute exclusion unless a SARA permit has been obtained. For other constraints, such as wetlands or soils, the Panel believes that they should be adhered to in all but extraordinary situations where SEAC is satisfied that there are no viable alternatives and recommends approval, and the Suffield Base commander is satisfied that the particular facility would not interfere with the conservation of wildlife.

Step 4: Conduct vegetation and wildlife surveys specific to each well site and right-of-way. The vegetation surveys would locate rare plants, while the wildlife surveys would focus on Ord's kangaroo rats and snake hibernacula (if not already located during the Step 2 survey).

Panel Comments: These surveys would have to cover all relevant species and be conducted at the right time of year, and even though they are intended for a specific site, they would have to cover an area sufficient in size to ensure adequate current knowledge. Specialists would have to be appropriately involved and these site-specific surveys would have to be well coordinated with the surveys identified in Step 2. Sites currently infested with invasive species should also be identified. (These matters are addressed further in Sections 6.1, 6.2 and 6.3.)

Step 5: The survey results from Step 4 would guide the relocation of the proposed wells and infrastructure to avoid identified vegetation and wildlife on each lease.

Panel Comments: As with respect to Step 3, the results of the site-specific surveys would result in setbacks that would have to be adhered to in all but extraordinary situations by relocation of the well site, directional drilling, or not drilling the well. Where possible, facilities would be sited in areas already infested by nonnative invasive plant species.

Step 6: A constructability assessment would be undertaken to finalize the well site and right-of-way locations. All locations would be field-checked to identify and adjust to site-specific construction issues. At this stage, additional measures would be identified from the environmental protection plan to mitigate any potential erosion issues.

Panel Comments: Constructability issues should not be allowed to override wildlife and other environmental concerns.

In addition to the specific comments on the component steps of the PDA process, the Panel has a number of additional concerns and comments.

EnCana proposed that the PDA data would be provided to the Suffield Base and SEAC following each of the six steps. Step 1 would occur early in the spring and the process would continue through to the fall. It would result in approvals being issued before October, so that the drilling and related construction could begin by early October, thus accommodating a winter construction period through to early April. The data would be available and submitted for a number or a group of wells on a “batch” basis. The proposal is to deal with some 425 wells in each year of a three-year construction period. EnCana recognized that this would result in a heavy load for SEAC and the Suffield Base, but took the position that only nonroutine wells would require detailed review.

The Panel very much agrees with the EnCana suggestion to conduct the PDAs and submit the data and applications for a group of wells, but the grouping should not be arbitrary. Rather, the groupings should be chosen for regions that reflect some similarities, so that a regional overview would result. Also, they must be limited in size, so that the process remains workable.

The Panel generally agrees with the concept of making the data and results of each step available to SEAC and the Suffield Base, but it believes that such details of the PDA process should not be finalized until EnCana, the Suffield Base commander, and SEAC have an opportunity to work together to determine the details of the approach that would work most efficiently. Whatever the approach might be, the Panel agrees with several of the participants in the proceeding that the workload could be unmanageable. The Panel recognizes that over time those wells not within constraints or in sensitive environmental areas likely would be handled in a more routine fashion than would other wells. However, it would not support the routine/nonroutine classification system proposed by EnCana, particularly in the early stages of development.

Given the massive amount of information related to the PDA process and the importance of the process in protecting the environment, the Panel recommends that

Recommendation 24 — Should the project proceed, the construction and drilling of wells be spread over a minimum five-year period, rather than the three years proposed by EnCana.

The Panel recommends earlier in the report that the project not proceed until the final definition of critical habitat for certain species has been completed. This would likely cause a delay in the project start-up date. If this occurs, the Panel believes it would provide an opportunity to test the PDA process.

Given the importance and the complexity of the process, the Panel recommends that

Recommendation 25 — Should the project proceed, the pre-disturbance assessment process be tested on a trial basis on the Suffield Base, but in an area outside the National Wildlife Area, and that the process be used for the siting of wells and related facilities.

The Panel recognizes that SEAC is not mandated to review wells or pipelines that do not meet the criteria stipulated in Section 8 of the Suffield Oil and Gas Environmental Protection

Regulations and is cognizant of the blanket D&R approval issued by the ERCB for an area outside of the NWA. Notwithstanding this, the Panel notes that the Base Commander may request SEAC to review any application pursuant to Section 12(7) of the agreement. To facilitate SEAC's involvement in the test, the Panel suggests that the Suffield Base commander request SEAC review PDA information generated for the test project.

The test would allow all parties to better understand the process and the resources required for its operation. It would test the various roles for different parties, whether the planned timelines are realistic, and whether the scheduling of surveys and information flow are manageable. It would also allow changes to be made on the basis of actual experience to ensure that the process is effective and efficient. In particular, the Panel believes that the test must demonstrate that the PDA process is effective in protecting the environment. To do this, the test must validate the timing and frequency of surveys to ensure that the presence of relevant species is not missed. It also must demonstrate that the process can be fully accomplished, including review by SEAC and the Suffield Base, in a reasonable timeframe.

Where the process requires changes, they should be agreed to by all of the participants. Recognizing that this may not be possible, the Panel believes it would be appropriate to designate a party that would be responsible for "endorsement" of the PDA process details. As SEAC is charged with determining the information requirements for development and reclamation approvals pursuant to Section 5(2) of the Suffield Oil and Gas Environmental Protection Regulations and given its independent role and make-up of members appointed by Canada and Alberta, the Panel believes SEAC would be the appropriate party.

Further respecting the PDA process, the Panel has generally endorsed the EnCana proposal and provided comments. However, it believes that if the project proceeds, the ongoing review of the performance of the PDA process and its improvement should continue through the entire construction period.

The process for filing applications, including the data available at each of the six PDA steps, would be complex. It would be done on a batch basis for a battery or an area. It would be important that the area being covered by a particular application be identified at Step 1 and that all of the data for the identical area be filed at each subsequent step. A sketch of how the Panel views the process and how it might function is shown in Figure 6.

Figure 6 shows the gathered information and applications flowing to SEAC and the Suffield Base on an area basis as the steps of the PDA are completed. It illustrates how the Suffield Base commander would be responsible for the NWA approvals, and where approval is granted, the onward flow of the application to the ERCB.

It is clear to the Panel and essentially all participants, including SEAC, that SEAC does not have the resources to carry out its current responsibilities, never mind the expanded role it would have if the NWA project proceeds. The 1975 Agreement intended that SEAC play a key environmental advisory role on the Suffield Base. The Panel is of the view that such a body representing Canada and Alberta would be essential for any further development in the NWA.

The Panel therefore recommends that

Recommendation 26 — Alberta and Canada, with input from other involved parties, review the resources that would be required by the Suffield Environmental Advisory Committee to properly fulfill its role and that Alberta and Canada ensure that such resources are available.

SEAC is made up of one member from each of Environment Canada, Alberta Environment, and the ERCB. Each of these organizations has considerable staff with training and expertise in areas of importance to the SEAC role. One method of providing some of the resources required by SEAC would be the secondment of appropriate staff to SEAC for appropriate time periods.

In terms of the role of others in the NWA approval process, those wells, pipelines, and trails approved by the Suffield Base commander, following a recommendation from SEAC, would go to the ERCB for the necessary well licences, pipeline permits, and D&R approvals. In the rare instances when a SARA permit might be required, the application would go to Environment Canada prior to going to the ERCB. The ERCB and Alberta Environment would also be involved through their membership in SEAC.

In summary, respecting the application and approval process for well sites, pipelines, and trails, the Panel is satisfied that the process can work effectively provided care is taken and resources are available. A proper PDA process would be needed, and SEAC and the Suffield Base would have important roles to play. To adequately fill these roles, the pace of development must be such that adequate time is available. Finally, on the basis of the evidence, particularly from the Environmental Coalition, there appears to be a lack of information available to the public regarding developments on the Suffield Base and particularly in the NWA. The Panel appreciates the sensitivity of data related to military and defence matters. However, it believes that this concern needs to be addressed.

The Panel recommends that

Recommendation 27 — The Suffield Base commander, EnCana, and the Suffield Environmental Advisory Committee work with other interested parties to determine and implement practical ways of making the approval system more transparent and ensuring that more information regarding gas developments on the Suffield Base is available to the public.

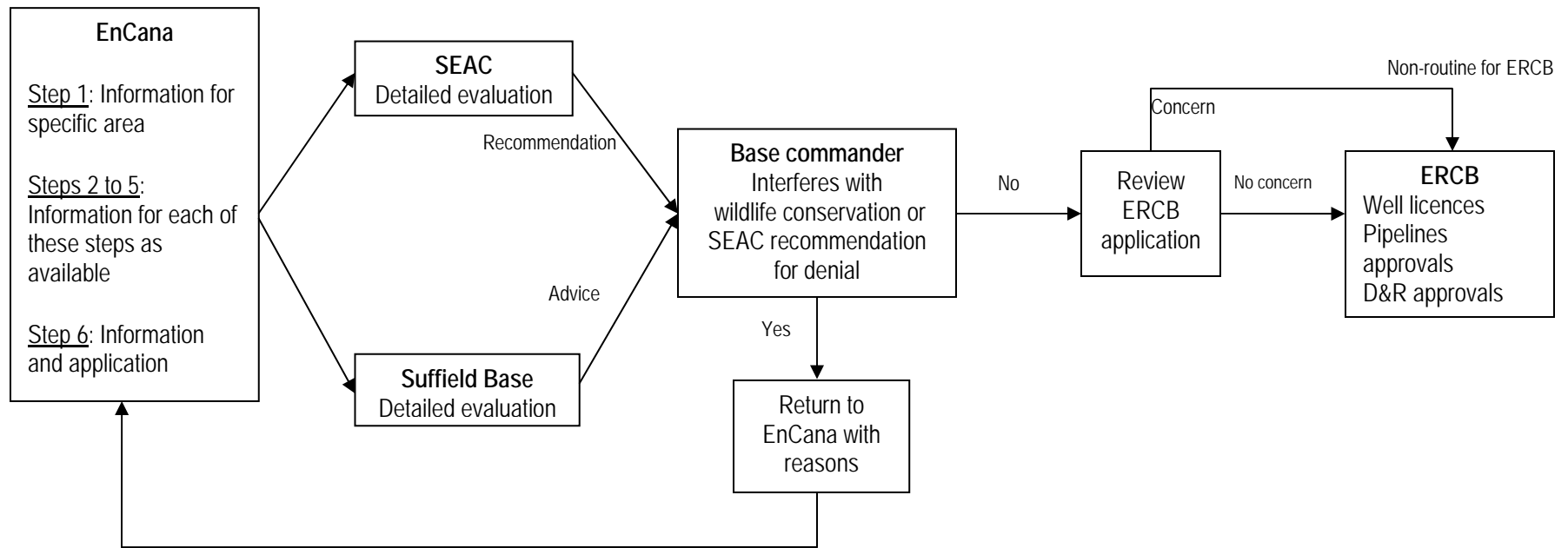


Figure 6. Flowchart of recommended approval process

Ongoing Operations, Inspections, and Enforcement

The Suffield Base commander has authority under the *Canada Wildlife Act* to appoint wildlife officers to ensure compliance with the permits issued. Also, Suffield Base personnel travel on the base and are able to observe the impact of ongoing operations. The Suffield Base would also be responsible for enforcing relevant wildlife requirements, for example, Alberta Sustainable Resource Department directions and restrictions respecting Pronghorn antelope in severe winters. While these mechanisms are effective, they do not provide all of the regulatory oversight required for a large gas operation in the NWA.

The ERCB is responsible for the regulation of oil and gas operations throughout Alberta. These regulatory responsibilities are extensive and include requirements related to inspections of wells during drilling and producing operations, drilling and completion or repair of wells and the tools and equipment used, prevention of fires or blowouts, conditions of leases and equipment, and measures to control pollution. The “compliance with all applicable laws” clause in the 1975 Agreement makes it clear that the ERCB’s jurisdiction for these matters extends to the Suffield Base.

Part of the ERCB’s role includes the first response to accidental spills or releases. Alberta Environment is informed of such spills and releases and may become involved, depending on the severity of the spill or release and the resulting consequences. The Panel sees nothing in the 1975 Agreement or the relevant legislation that would alter either the ERCB or Alberta Environment roles as they relate to the Suffield Base and the NWA.

In the Panel’s view, the primary role for inspections and enforcement on the NWA should rest with SEAC, the ERCB, and the Suffield Base. The Suffield Base would be responsible for the enforcement of wildlife requirements, and the ERCB is best equipped for the role as it relates to oil and gas operations. The frequency of inspections and the requirements to be enforced must, however, recognize the uniqueness and value of the NWA. Establishing the appropriate schedule would require close coordination among the Suffield Base, SEAC, and the ERCB, but the frequency and detail of inspections should be greater than for similar wells outside of the NWA.

Based on the preceding review, the Panel is satisfied that adequate jurisdictional oversight exists to establish a proper inspection and enforcement system should the project go ahead. In Section 8 of this report, the Panel recommends the completion of an environmental effects monitoring plan (EEMP). The preparation of the plan would involve the Suffield Base, Environment Canada, EnCana, SEAC, ERCB, Alberta Environment, Alberta Sustainable Resource Development, and other parties. That plan must deal in detail with the issue of inspection and enforcement of requirements for ongoing operations. It should clearly spell out the roles of parties in this respect and the standards to be enforced.

Abandonment and Reclamation

The ERCB is responsible, and should remain responsible, for the downhole and pipeline abandonment standards on the Suffield Base, including the NWA. The situation regarding the restoration of the surface is not so clear. Alberta Environment is responsible for certifying reclamation of lands in Alberta, but federal lands are excluded by the legislation.

In Section 6.2, the Panel expresses the view that reclamation standards to be applied in the NWA should be designed with a goal of reclamation to native prairie grasslands. The details of these standards should be developed by SEAC, working closely with the Suffield Base and other involved parties. The D&R applications filed by EnCana should cite such standards and provide assurance that they will be satisfied.

In terms of certifying reclamation, the Panel observes that the administrative body originally charged with this task under the 1975 Agreement, no longer exists. In its absence, the Panel recommends that reclamation certification should be issued by the Suffield Base commander but only upon the recommendation of SEAC. The Panel considers this to be an appropriate solution for the following reasons. First, it is consistent with the roles of SEAC and the Suffield Base commander for applications and operations as specified in subsections 12(7) and 12(9) of the 1975 Agreement. Second, the 1975 Agreement charges SEAC with the development of reclamation information requirements and the Panel considers this to be an extension of that role. Finally, SEAC is an independent body including representation from Canada and Alberta, and one of the SEAC members is from Alberta Environment (the Alberta department with the relevant expertise). The Panel would expect that the reclamation standards and any other reclamation requirements would be recommended by SEAC during the review process and be reflected in the D&R approval(s) issued by the ERCB.

10 ALBERTA ENERGY AND UTILITIES BOARD APPLICATION NO. 1435831

10.1 Views of EnCana

EnCana submitted that the three vertical wells proposed at surface locations in Legal Subdivision (LSD) 11, Section 28, Township 15, Range 6, West of the 4th Meridian (11-28 well), LSD 13-28-15-6W4M (13-28 well), and LSD 15-28-15-6W4M (15-28 well) would be for the purposes of gas production from the Milk River, Medicine Hat, and Second White Speckled Shale Formations. EnCana explained that Application No. 1435831 was the first application for wells that would be part of the proposed project.

At the request of the joint review Panel, EnCana submitted pre-disturbance assessments (PDAs) for the three applied-for wells. EnCana stated that the purpose of the assessment report was to address site-specific issues through appropriate routing, siting, and environmental mitigation measures that would be used during the construction and post-construction reclamation phases. EnCana indicated that the report would form part of any agreements entered into between EnCana and external contractors that might work on these sites.

EnCana stated that the assessment surveys were conducted on October 11 and 17, 2007. EnCana indicated that subsequent surveys for amphibians and rare plants would be required, as the timing of the surveys was not suitable for these. In addition, EnCana noted that the surveys would be out of date in 2008 and further surveying would be required at appropriate times.

Since the project would involve staged drilling and infrastructure development, EnCana requested that the well licences for the three applied-for wells be granted, following successful completion of the federal environmental review process, for a three-year term rather than the normal one-year term.

EnCana stated that independent environmental consultants conducted a historical resources overview of the proposed well sites and noted that there were known historical sites in the vicinity. However, after a detailed survey, it was determined that there were no archaeological concerns. Additionally, representatives of the Siksika Nation conducted a survey of the proposed development and noted that there were no traditional use sites in the vicinity.

EnCana submitted that the 11-28 well location had a Class I and Class II wetland in proximity to the pipeline and access route. EnCana proposed mitigation for this site that included reseeded with an appropriate seed mix based on the soil type. EnCana indicated that it did not anticipate requiring erosion controls in addition to reseeded. The site would be monitored after the first growing season to ensure that seedling density was at least 10 seedlings/m². EnCana stated that spill plans and procedures would be in place at all three proposed wells. It indicated that the siting of the 11-28 well site was relocated 15 m south and 20 m east from the original proposed well location. In addition, an alternative pipeline/access route was identified that would maintain the 100 m setback from the Class II wetland.

No major issues were noted for the 13-28 well location. EnCana indicated that mitigation measures for this location would include reseeded with an appropriate seed mix based on the soil type and taking appropriate follow-up steps. EnCana stated that the 13-28 well site was moved 40 m south from the original proposed location to create an on-lease tie-in.

Regarding the 15-28 well location, EnCana noted that a Class II wetland was within 60 m of the access route and pipeline. EnCana stated that mitigation measures for this location would include reseedling with an appropriate seed mix based on the soil type, follow-up with field inspections, and reseedling if needed.

In closing arguments, EnCana indicated that the 15-28 and 11-28 well locations were sited within wetland buffers in order to minimize the effects of wind erosion in areas with sensitive soils. EnCana further indicated that the 11-28 well was proposed within 20 m of a Class 1 ephemeral wetland so that the distance from the wetland with the higher level of classification could be maximized. EnCana indicated that constructing completely outside the wetland buffer would have been an inferior route and would have added about 20 per cent of length to the pipeline. EnCana concluded that the purpose of the PDA process was to make informed decisions and to balance possible environmental constraints.

In the opening statement and in closing arguments, EnCana asked the Panel to approve the three well applications, pursuant to the *Oil and Gas Conservation Regulations*, as being in the public interest, subject to the conditions proposed by EnCana and any other conditions the Panel might recommend. EnCana reiterated that it was not asking the Panel to approve the specific location of each individual component; rather it was asking the Panel to approve the PDA process itself.

In closing arguments, EnCana stated that if the Panel approved the three wells applied for, EnCana was committed to conduct a new PDA for these well locations to ensure compliance with any conditions of the approval. EnCana specifically identified the condition that the PDA be conducted for the three wells in the season prior to construction and in accordance with EnCana's proposal. EnCana further indicated that if the three well applications did not receive approval from the Suffield Environmental Advisory Committee (SEAC), EnCana would withdraw those licences or otherwise allow them to expire.

In examination by the Panel, EnCana recognized that the PDAs conducted for the three wells were incomplete and that some portions would expire; therefore, EnCana committed to redo the entire PDAs as condition of approval for those three locations. When questioned by the Panel about the possibility that these revised PDAs might identify environmental impacts not previously identified, EnCana indicated that there was a small potential for this, but it fully expected a condition of the approval would most likely be to redo the PDAs. In fact, EnCana stated that it expected to redo the PDAs, which included referral to SEAC and the Suffield Base commander for final approval. EnCana further indicated that if SEAC recommended relocation of the wells, EnCana would either amend the licence or reapply for a new licence. EnCana pointed out that approval from SEAC and the Suffield Base commander was inherent in the process, but if the Panel wished to explicitly condition the licence to require an approval from SEAC and the Suffield Base, it would not be adverse to that.

In closing arguments, EnCana stated that the reason for applying only for three wells and not all 1275 wells was that it wanted the full extent of its plans for drilling in the NWA to be considered and, therefore, the entire project to be evaluated by the appropriate authorities. EnCana also indicated that this approach illustrated responsibility and transparency from EnCana's part in putting forward its entire plans so there could be a fair and full discussion of the issues.

EnCana noted that if the Panel acting as the Energy and Utilities Board (EUB) believed that the three wells applied for were in the public interest, the Panel might attach conditions on the

approval of those three wells that come within the ambit of the EUB's jurisdiction. EnCana stated that if, however, the EUB decided that the three wells were not in the public interest, the EUB must provide reasons to EnCana about why this was so. EnCana concluded that it believed that the evidence put forward to the Panel clearly demonstrated that these three well applications met the purposes of the *Oil and Gas Conservation Act* and the *Energy Resources Conservation Act*.

In response to the Coalition's concern that two of the three proposed wells were to be located within a wetland buffer, EnCana stated that the PDAs presented this fact in a fair and transparent manner. EnCana further indicated that the two wells might either be relocated if the project were approved and the PDA process were a condition of that approval or EnCana would apply to SEAC for approval.

10.2 Views and Concerns of Interveners

Government of Canada

The Department of National Defence (DND) stated that although the three site-specific PDAs were completed at this time, they failed to examine any potential impacts on a landscape scale. DND explained that, as an example, the PDAs only referred to a few individual roads and trails. DND argued that by sectioning the infill project into 1275 individual pieces, the protection of landscape features by things such as fragmentation, loss of prairie cover, and increase in bare ground could not be fully appreciated. Overall, DND concluded that PDAs were not sufficient to determine what species and valued ecosystem components were in the project area and to determine what appropriate mitigation measures were required.

In final argument, the Government of Canada (Canada) stated that the Panel should deny the project and the three-well application and recommend that the NWA be preserved, that a cumulative effects assessment of the area be completed, and that a management plan for the NWA be developed.

Canada identified the dual function of the Panel as first to make a decision with respect to the application for three well licences and, second, to prepare a final report with conclusions and recommendations with respect to the environmental assessment of the proposed project.

In final argument, Canada argued that separating the three-well application from the final report regarding the whole project and making a direct application to a provincial tribunal was project-splitting and ought to be declined. Furthermore, Canada indicated that if, as EnCana submitted, the strict terms of the 1975 Agreement were to be followed, the two wells proposed within wetland buffers should be referred to SEAC and the Suffield Base commander for approval prior to the EUB application.

Canada indicated that for the three wells, the species at risk and their residences had not been located yet and therefore there was not sufficient information to determine whether well licences should be issued in the public interest with respect to the full project. Canada also stated that it was unclear how the permitting process under SARA might affect the project.

Environmental Coalition

The Coalition stated that the hearing should only deal with the environmental assessment of the total project and no approval for specific wells should be considered. At the hearing, the Coalition questioned the Panel's jurisdiction to consider the three-well application and come to a conclusion about the project at the same time.

In closing arguments, the Coalition stated that the Panel should recommend that the three-well application be denied due to lack of evidence to confirm that there would be no significant adverse effects associated with the proposed project. The Coalition countered EnCana's statement that setback relaxation would be rare, indicating that the three-well application was a perfect confirmation that EnCana did not meet its own criteria proposed in the environmental impact statement. Furthermore, the Coalition pointed out that EnCana did not follow the process for the three-well application that it outlined in the proposed PDA: that is, the three-well application was not submitted to SEAC and it did not go to the Suffield Base commander prior to submission to the EUB. Therefore, the Coalition concluded that the PDAs proposed by EnCana were a complete failure and that the Panel should deny the three-well application with prejudice to EnCana's right to reapply.

Mr. G. Trottier

Mr. Trottier stated that the application to the EUB should not be decided by the Panel, as this would be inconsistent with the agreed-upon protocols in the Government of Canada-Province of Alberta access agreements for petroleum development on the Suffield Base. Furthermore, Mr. Trottier said that the review process was triggered because DND wanted a holistic approach to review further drilling in the NWA, rather than a site-specific approach that did not allow for the understanding of cumulative effects of the development, the biological significance of those effects, environmental sustainability, and capacity of the environment to sustain human use.

In his presentation to the Panel, Mr. Trottier questioned the absence of the provincial representative at the hearing, stating that the signatory to the 1975 Agreement on behalf of the citizens of Alberta was nowhere to be seen when it came to living up to the commitments of these original agreements. Mr. Trottier further indicated that there was confusion over the way ahead, and unless the 1975 Agreement was disposed of and renegotiated, the job of recommending the right way ahead would be impossible. He stated that there were values to Canadians and commitments on behalf of Canadians that were out of the ordinary and must be upheld. Mr. Trottier warned the Panel that this review would set precedents and that the challenges to the Canadian Environmental Assessment review process and the Panel were out of the ordinary.

Suffield Environmental Advisory Committee

SEAC stated that it had not received any requests from DND to review the three-well application. Further, SEAC noted that assessment of oil and gas operations on the Suffield Base needed to be considered on a project-by-project basis, as opposed to a well-by-well basis.

10.3 Panel Conclusions and Decision

As indicated in earlier sections of this report, any permit that may be issued for the proposed project would be subject to a number of requirements. One such requirement would result in a detailed PDA for applications for individual wells, pipelines, and access trails. This PDA would be reviewed by SEAC and by the Suffield Base commander. If judged acceptable, the application would then be forwarded to the ERCB.

Section 3 of the Energy Resources Conservation Act states as follows:

Where by any other enactment the Board is charged with the conduct of a hearing, inquiry or other investigation in respect of a proposed energy resources project, it shall, in addition to any other matters it may or must consider in conducting the hearing, inquiry or investigation, give consideration to whether the project is in the public interest, having regard to the social and economic effects of the project and the effects of the project on the environment.

The Panel is of the view that without completed and current PDAs for the three wells, it is unable to properly assess the effects of the project on the environment.

In addition to being incomplete, the PDAs for the three wells did not meet the PDA standards recommended by the Panel. Also, they were not reviewed by SEAC or the Suffield Base commander. Thus, they would not meet the potential NWA permit requirements cited previously.

For these reasons, the Panel is not prepared to approve the three-well application put forward by EnCana. This denial is without prejudice to any application related to the three wells that may be filed in future.

11 OVERALL CONCLUSIONS

The Panel's overall conclusion regarding EnCana's proposed project to infill up to 1275 shallow gas wells in the Canadian Forces Base Suffield National Wildlife Area is that it should not proceed at this time.

Given the importance of the National Wildlife Area for the conservation of wildlife, the Panel recommends several key requirements that must be met before the project proceeds.

- 1) **Critical habitat for two wildlife species at risk, the Ord's kangaroo rat and the Sprague's pipit, as well as three plant species at risk, the tiny cryptanthus, the small-flowered sand verbena, and the slender mouse-ear-cress, must be finalized.**
- 2) **Once critical habitat is finalized, the proposed project facilities should not be located in the defined critical habitat for these five species, unless otherwise permitted under the *Species at Risk Act*.**
- 3) **The Suffield Environmental Advisory Committee, established under the 1975 Agreement allowing gas production in the present-day Suffield National Wildlife Area, is not able to oversee a development of this magnitude at present. Its role must be clarified and it must be resourced adequately by the governments of Canada and Alberta to be able to ensure proper regulatory oversight of the proposed project.**

Failure to address the above requirements would likely result in significant adverse effects on certain species at risk and consequently interfere with the conservation of wildlife. Once these conditions are met, it may be possible to proceed with the project or part of it.

Each application for a well, pipeline, or associated facility should be reviewed by the Suffield Base commander to ensure that it would not interfere with wildlife conservation and that it is in compliance with any permit issued under the *Wildlife Area Regulations*. With respect to the application to the Alberta Energy and Utilities Board to drill three wells in the National Wildlife Area, the Panel finds that the application lacks complete and up-to-date pre-disturbance assessments for the proposed drilling sites. Given this shortcoming, the Panel finds that it is unable to fully assess the potential environmental impacts of the three proposed wells, as required by Section 3 of the *Energy Resources Conservation Act*.

Accordingly, the Panel finds that it is not in the public interest to approve the three-well application at this time. This decision is without prejudice to any future application that may be made for the three wells once the above requirements are met for the overall project.

Dated in Calgary, Alberta, on January 27, 2009.

**ENERGY RESOURCES CONSERVATION BOARD
CANADIAN ENVIRONMENTAL ASSESSMENT AGENCY**

“Original signed by”

Robert G. Connelly, P.Eng.
Panel Chair

“Original signed by”

Bill Ross, Ph.D.
Panel Member

“Original signed by”

G. J. (Gerry) DeSorcy, P.Eng.
Panel Member

APPENDIX 1 LIST OF RECOMMENDATIONS

The Panel recommends that

- Recommendation 1**—The critical habitat for the Ord’s kangaroo rat and the Sprague’s pipit be finalized before the project proceeds. 57
- Recommendation 2**—Should the project proceed, the pre-disturbance assessment process (the process proposed by EnCana to be carried out shortly before construction to avoid environmentally sensitive features) be modified so that it uses the mapped critical habitat for Ord’s kangaroo rat and the Sprague’s pipit as exclusion areas (areas where disturbances must not take place), unless otherwise permitted under the *Species at Risk Act*. 57
- Recommendation 3**—Should the project proceed, monitoring of the effects of road mortality on the five species of snakes, and if monitoring shows an adverse effect on the population of any snake species, applying further mitigation measures. 59
- Recommendation 4**—Should the project proceed, for other species listed under the *Species at Risk Act* or that are threatened or endangered in Alberta and for which the determination of critical habitat is not imminent, the setbacks established for these species be followed. 61
- Recommendation 5**—Should the project proceed, the environmental protection plan include a mechanism to communicate with Alberta Sustainable Resource Development and implement its directives respecting work stoppages on winter range for ungulates. 62
- Recommendation 6**—The critical habitat for the tiny cryptanthe, the small-flowered sand verbena, and the slender mouse-ear-cress be finalized before the project proceeds. 81
- Recommendation 7**—Should the project proceed, the pre-disturbance assessment process be modified so that it uses the mapped critical habitat for the tiny cryptanthe, the small-flowered sand verbena, and the slender mouse-ear-cress as exclusion areas, unless otherwise permitted under the *Species at Risk Act*. 81
- Recommendation 8**—Should the project proceed, every effort be made to install pipelines in unfrozen ground and spider plowing or other similar minimum disturbance techniques be used. 82
- Recommendation 9**—Should the project proceed, soil experts be involved in the pre-disturbance assessment process to minimize the siting of facilities on sensitive soils. 82
- Recommendation 10**—The Department of National Defence develop a management strategy for nonnative invasive plant species that would involve and apply to all the users of the National Wildlife Area. 84

- Recommendation 11**—The Suffield Environmental Advisory Committee, working closely with the Department of National Defence and in consultation with other parties, develop standards for reclamation for the National Wildlife Area based on the 1995 Alberta standard as amended, Canadian Parks Council’s restoration objectives, and EnCana’s proposed rangeland functionality assessment protocol. 85
- Recommendation 12**—Should the project proceed, the pre-disturbance assessment process be used to identify all wetlands and no facilities be located within the 100 m buffer zone surrounding **permanent wetlands**. 89
- Recommendation 13**—Should the project proceed, the pre-disturbance assessment process be used to determine whether it is appropriate to allow construction within the 100 m buffer zone surrounding **ephemeral wetlands**. All options for the location of facilities should be examined before any encroachment into the buffer zone for ephemeral wetlands is considered. 90
- Recommendation 14**—The Department of National Defence take such measures as are necessary and safe to restore the natural fire regime to the National Wildlife Area. 110
- Recommendation 15**—Should the project proceed, EnCana carry out a monitoring program to evaluate the effect of the project on the Ord’s kangaroo rat and Sprague’s pipit and provide the results to the Suffield Base commander and to the species at risk recovery teams. 111
- Recommendation 16**—Should the project proceed, EnCana carry out a monitoring program to evaluate the effect of the project on the burrowing owl, loggerhead shrike, and ferruginous hawk and provide the results to the Suffield Base Commander and to the species at risk recovery teams. 111
- Recommendation 17**—The Department of National Defence form an advisory committee to provide advice on reducing snake mortality and develop a cooperative cumulative mortality management plan. This advisory committee should include interested stakeholders such as EnCana, Environment Canada, the Environmental Coalition, and others who can offer useful advice. 112
- Recommendation 18**—Should the project proceed, EnCana carry out a monitoring program to evaluate the effect of the project on the tiny cryptanthus, the small-flowered sand verbena, and the slender mouse-ear-cress and provide the results to the Suffield Base commander and to the species at risk recovery teams. 113
- Recommendation 19**—The Department of National Defence form an advisory committee to recommend how best to manage nonnative invasive plant species that have been introduced into the native prairie grassland in the National Wildlife Area. This advisory committee should include interested stakeholders, such as EnCana, Environment Canada, the Environmental Coalition, and others who can offer useful advice. 114

- Recommendation 20**—Should the project proceed, the environmental protection plan and the environmental effects monitoring plan be reviewed annually during the construction phase and regularly after that. The initial plans and revisions should be approved by the Suffield Base commander. 139
- Recommendation 21**—The Department of National Defence, building on its existing management strategy and other management systems, create a management plan for the National Wildlife Area..... 140
- Recommendation 22**—The 1975 Agreement be reviewed by the parties to the 1975 Agreement in an effort to clarify its intent respecting the regulatory roles and responsibilities of the Suffield Base commander, the Suffield Environmental Advisory Committee, the Energy Resources Conservation Board, and Alberta Environment. 151
- Recommendation 23**—Should the project proceed, the Suffield Base commander request the Suffield Environmental Advisory Committee to review all National Wildlife Area development and reclamation applications, including the review of locations of wells, pipelines, and access trails. 155
- Recommendation 24**—Should the project proceed, the construction and drilling of wells be spread over a minimum five-year period, rather than the three years proposed by EnCana. 159
- Recommendation 25**—Should the project proceed, the pre-disturbance assessment process be tested on a trial basis on the Suffield Base, but in an area outside the National Wildlife Area, and that the process be used for the siting of wells and related facilities. 159
- Recommendation 26**—Alberta and Canada, with input from other involved parties, review the resources that would be required by the Suffield Environmental Advisory Committee to properly fulfill its role and that Alberta and Canada ensure that such resources are available.161
- Recommendation 27**—The Suffield Base commander, EnCana, and the Suffield Environmental Advisory Committee work with other interested parties to determine and implement practical ways of making the approval system more transparent and ensuring that more information regarding gas developments on the Suffield Base is available to the public. 161

APPENDIX 2 GLOSSARY OF TERMS, ACRONYMS, AND ABBREVIATIONS AS USED IN THIS REPORT

Abandonment rate	The production rate at which it is no longer economic to continue producing a well or a collection of wells.
AENV	Alberta Environment
Battery	A production and measurement facility for a group of wells.
Bcf	Billion cubic feet
Bioturbated	The mixing and displacement of sediment particles by animals or plants that acts to alter the physical structure, as well as the chemical nature, of the sediment.
Canada	Government of Canada
Caisson	A belowground enclosure to protect the wellhead.
Clastic	Consisting of fragments of pre-existing rocks.
CO ₂	Carbon dioxide
Coalition	Environmental Coalition
Commingling	The production of hydrocarbons from two or more formations without segregation in the wellbore.
Completion	The process by which a well is enabled to produce hydrocarbons. The process may involve perforating the casing (making small holes in the casing to allow the flow of oil or gas into the well), fracturing the formation, and installing wellbore equipment, such as downhole pumps and packers, to allow for optimal hydrocarbon recovery.
D&R approval	Development and reclamation approval
DND	Department of National Defence
EEMP	Environmental effects monitoring plan
EIS	Environmental impact statement
EnCana	EnCana Corporation
Endemic	A species native to or restricted to a locality or region.
EPEA	Environmental Protection and Enhancement Act

EPP	Environmental protection plan
ERCB	Energy Resources Conservation Board
EUB	Alberta Energy and Utilities Board
Fracturing (or fracing)	The practice of pumping special fluids down a well under high pressure to crack open the rock, creating passages for the reservoir fluids to flow more easily into the wellbore.
HRIA	Historical resource impact assessment
HSI	Habitat suitability index
Interbedded	Lying between two layers of a different rock type.
Interlaminated	Multiple, thin, discrete layers of rock that are in turn layered with multiple, thin, discrete layers of other rock types.
LSCRA	Land Surface Conservation and Reclamation Act
km	Kilometre
km/h	Kilometres per hour
km ²	Square kilometre
kPa	Kilopascal
Loopline	A secondary pipeline that branches from the main pipeline and then rejoins it at another point.
LSD	Legal Subdivision
m	Metre
MMcf	Million cubic feet
MOA	Memoranda of agreement
Net gas pay	The sum of the thicknesses of all intervals within a formation that contribute to gas recovery from that formation.
1975 Agreement	1975 Suffield Master Gas Access Agreement
NRCan	Natural Resources Canada
NWA	Canadian Forces Base Suffield National Wildlife Area
PDA	Pre-disturbance assessment

PFRA	Prairie Farm Rehabilitation Administration
Pig	A device inserted into a pipeline to perform any number of functions, such as cleaning the inner walls of the pipe and monitoring for critical conditions that could compromise pipeline integrity or operational efficiency (e.g., cracks, corrosion, or pipe deformations).
Pig launcher	A piping structure that allows pigs to be inserted into a pipeline without stopping flow.
Pigging facility	A facility positioned within a pipeline network to launch and recover pigs.
RIAS	Regulatory impact analysis statement
RSO	Range standing order
RTAMS	Range and training area management system
SARA	Species at Risk Act
SCADA	Supervisory control and data acquisition
SEAC	Suffield Environmental Advisory Committee
SGAC	Suffield Grazing Advisory Committee
Stringers	Relatively thin layers of rock that generally only extend over a limited area.
SIRC	Suffield Industry Range Control
SRD	Alberta Sustainable Resource Development
Suffield Base	Canadian Forces Base Suffield
Sumps	Pits constructed to hold fluids on a temporary basis
Swabbing	The process of periodically removing liquids from the production casing or tubing of a well.
Transgressive	The movement of the sea over a large area of land in a relatively short period of geologic time.
VEC	Valued ecosystem component

APPENDIX 3 PANEL MEMBERS—BIOGRAPHICAL NOTES

Robert G. Connelly, P.Eng. (Panel Chair)

Mr. Connelly is a consultant who has worked in the field of environmental assessment for much of his career. He graduated from the University of Waterloo in 1970 as a civil engineer.

Mr. Connelly retired from public service in 2005. He worked for the federal government and the United Nations, including 27 years with the Canadian Environmental Assessment Agency and its predecessor, the Federal Environmental Assessment and Review Office (FEARO). In 2003, he was appointed as Acting President of the Canadian Environmental Assessment Agency and served in this capacity for 17 months before his retirement. Prior to this, Mr. Connelly served as Vice-President, Policy Development, for 10 years and was responsible for policy and regulation development under the *Canadian Environmental Assessment Act*, research and development, intergovernmental affairs, and relations with aboriginal organizations, as well as international programs. During his years with FEARO and the Canadian Environmental Assessment Agency, he was also involved with many environmental assessment Panel reviews both as a Panel manager and as chair of several panels.

G. J. (Gerry) DeSorcy, P.Eng.

Mr. DeSorcy is a regulatory consultant with 53 years experience at technical and administrative levels. He spent 38 years with the Alberta Energy Resources Conservation Board (ERCB) and was extensively involved in policy development and the application of policies regarding technical, conservation, business, and environmental issues and sustainable development. He worked at many levels throughout the ERCB dealing with all aspects of regulation and was Chairman and Chief Executive Officer at the time of his retirement. He was also the initial Chairman of the Natural Resources Conservation Board.

Since his retirement from the EUB, Mr. DeSorcy has consulted on a variety of general, legal, policy, and technical energy- and environment-related regulatory matters for governments and private companies in Canada and elsewhere. In this capacity, he has provided advice on the development of a number of regulatory systems and chaired a number of reviews of public policy issues. He has also served as an arbitrator and as an expert witness on a variety of energy-related matters.

Dr. Bill Ross, Ph.D.

Dr. Ross has a Bachelor's degree from the University of Manitoba (1964) and a Ph.D. degree from Stanford University in Physics (1970).

Since 1973, Dr. Ross has been working at the University of Calgary in the Faculty of Environmental Design, where he has focused most of his research on the professional practice of impact assessment. He has taught environmental impact assessment at the postgraduate level in Ecuador, Thailand, and Calgary. He has also developed and offered training in environmental impact assessment in the Philippines, the Middle East, and Vietnam. Mr. Ross has been a member of several environmental assessment panels, including the Twinning of the Trans Canada Highway in Banff National Park and the Chair of the Oldman River Dam Panel. He

currently chairs the Independent Environmental Monitoring Agency, which oversees environmental management at the Ekati Diamond Mine in the Northwest Territories.

Dr. Ross is the author and co-author of several publications in the environmental assessment field. He has extensive expertise on the subject of cumulative effects assessment. He is the founding president of the Western and Northern Canada Affiliate of the International Association for Impact Assessment and the principal organizer of the 2004 annual conference of the International Association of Impact Assessment in Vancouver.

APPENDIX 4 AGREEMENT TO ESTABLISH A JOINT PANEL

**AGREEMENT
To Establish a Joint Panel
for the EnCana Shallow Gas Infill Development Project in the Suffield
National Wildlife Area**

**Between
The Minister of the Environment, Canada**

- and -

The Alberta Energy and Utilities Board

PREAMBLE

WHEREAS the Alberta Energy and Utilities Board (the EUB) has statutory responsibilities pursuant to the *Alberta Energy and Utilities Board Act*, the *Oil and Gas Conservation Act* and the *Energy Resources Conservation Act*; and

WHEREAS the Minister of the Environment, Canada (the Federal Minister of the Environment) has statutory responsibilities pursuant to the *Canadian Environmental Assessment Act*; and

WHEREAS the EnCana Shallow Gas Development Project in the Suffield National Wildlife Area (the Project) requires a public hearing and approvals from the EUB pursuant to the *Alberta Energy and Utilities Board Act*, the *Oil and Gas Conservation Act* and the *Energy Resources Conservation Act* and is subject to an assessment under the *Canadian Environmental Assessment Act*; and

WHEREAS the Minister of National Defence has recommended, in accordance with paragraph 21 (2) (b) of the *Canadian Environmental Assessment Act*, that the Federal Minister of the Environment refer the Project to a review Panel; and

WHEREAS the Federal Minister of the Environment has referred the Project to a review Panel in accordance with paragraph 21.1 (1) (b) and section 29 of the *Canadian Environmental Assessment Act*; and

WHEREAS the EUB and the Federal Minister of the Environment have determined that a Joint Panel review of the Project will ensure that the Project is evaluated according to the spirit and requirements of their respective authorities while avoiding unnecessary duplication, delays and confusion that could arise from individual reviews by each government or the EUB; and

WHEREAS the Federal Minister of the Environment has determined that a Joint Panel should be established pursuant to subsection 40(2) of the *Canadian Environmental Assessment Act* to consider the Project;

THEREFORE, the EUB and the Federal Minister of the Environment hereby establish a Joint Panel for the Project in accordance with the provisions of this Agreement and the Terms of Reference attached as an Appendix to this Agreement.

1. Definitions

For the purpose of this Agreement and of the Appendix attached to it,

"Agency" means the Canadian Environmental Assessment Agency established by the *Canadian Environmental Assessment Act*.

"EIS" means an environmental impact statement prepared in accordance with the guidelines issued for the Project by the Canadian Environmental Assessment Agency.

"Environment" means the components of the Earth, and includes

- a. land, water and air, including all layers of the atmosphere;
- b. all organic and inorganic matter and living organisms; and
- c. the interacting natural systems that include components referred to in (a) and (b).

"Environmental Effect" means, in respect of the Project,

- a. any change that the Project may cause in the environment, including any change it may cause to a listed wildlife species, its critical habitat or the residence of individuals of that species, as those terms are defined in subsection 2(1) of the *Species at Risk Act*,
- b. any effect of any change referred to in paragraph (a) on
 - i. health and socio-economic conditions
 - ii. physical and cultural heritage
 - iii. the current use of lands and resources for traditional purposes by aboriginal persons, or
 - iv. any structure, site or thing that is of historical, archaeological, paleontological or architectural significance, or
- c. any change to the Project that may be caused by the environment,

whether any such change or effect occurs within or outside Canada.

"Federal Authority" refers to such an authority as defined in the *Canadian Environmental Assessment Act*.

"Final Report" means the document produced by the Joint Panel, which contains decisions pursuant to the *Alberta Energy and Utilities Board Act*, the *Energy Resources Conservation Act* and the *Oil and Gas Conservation Act* and the Joint Panel's conclusions and recommendations pursuant to the *Canadian Environmental Assessment Act* with respect to the environmental assessment of the Project.

"Follow-up Program" means a program for

- a. verifying the accuracy of the environmental assessment of the Project, and
- b. determining the effectiveness of any measures taken to mitigate the adverse environmental effects of the Project.

"Joint Panel" refers to the review Panel established jointly by the EUB and the Federal Minister of the Environment through this Agreement.

"Mitigation" means, in respect of the Project, 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.

"Parties" means the signatories to this Agreement.

"Project" means the Project described in the Appendix to this Agreement.

"Responsible Authority" refers to such an authority as defined in the *Canadian Environmental Assessment Act*.

2. Establishment of the Panel

2.1. A process is hereby established to create a Joint Panel, pursuant to section 22 of the *Energy Resources Conservation Act* with the authorization of the Lieutenant Governor in Council of Alberta, and sections 40, 41 and 42 of the *Canadian Environmental Assessment Act*, for the purposes of the review of the Project.

2.2. The EUB and the Agency will make arrangements to coordinate the announcements of a joint review of the Project by both Alberta and Canada.

3. Constitution of the Panel

3.1. The Joint Panel will consist of three members. Two members, including the Joint Panel Chair (the "Federal Members"), will be appointed by the Federal Minister of the Environment in accordance with article 3.2 of this Agreement. The third Joint Panel member (the "Provincial Member") will be appointed by the Chair of the EUB with the approval of the Federal Minister of the Environment.

3.2. The Federal Minister of the Environment will select two Joint Panel members and recommend the selected candidates as individuals who may serve as potential acting members of the EUB. If acceptable to the Lieutenant Governor in Council of Alberta and the Chairman of the EUB, the Lieutenant Governor in Council of Alberta will nominate these candidates to serve as acting members of the EUB and the Chairman of the EUB will appoint these candidates as members of the Joint Panel. The selected candidates will then be appointed by the Federal Minister of the Environment as members of the Joint Panel.

3.3. The Joint Panel members shall be unbiased and free from any conflict of interest relative to the Project and are to have knowledge or experience relevant to the anticipated environmental effects of the Project.

4. Conduct of Assessment by the Panel

4.1. The Joint Panel shall conduct its review in a manner that discharges the responsibilities of the EUB under the *Alberta Energy and Utilities Board Act* and the *Energy Resources Conservation Act*.

4.2. The Joint Panel shall conduct its review in a manner that discharges the requirements set out in the *Canadian Environmental Assessment Act* and in the Terms of Reference attached as an Appendix to this Agreement and that were fixed and approved by the Federal Minister of the Environment.

4.3. All Joint Panel hearings shall be public and the review will provide opportunities for timely and meaningful public participation.

4.4. The Joint Panel shall have all the powers and immunities of a Panel described in section 35 of the *Canadian Environmental Assessment Act* and of a division of the EUB described in section 10 of the *Alberta Energy and Utilities Board Act*.

4.5. The Joint Panel shall conduct its public hearings in accordance with the EUB Rules of Practice.

5. Secretariat

5.1. Administrative, technical, and procedural support requested by the Joint Panel shall be provided by a Secretariat, which shall be the joint responsibility of the EUB and the Agency.

5.2. The Secretariat will report to the Joint Panel and will be structured so as to allow the Joint Panel to conduct its review in an efficient and cost-effective manner.

5.3. The EUB will provide its offices for the conduct of the activities of the Joint Panel and the Secretariat.

6. Record of Joint Review and Final Report

6.1. A public registry will be maintained by the Secretariat during the course of the review in a manner that provides for convenient public access, and for the purposes of compliance with sections 55 and 55.4 of the *Canadian Environmental Assessment Act*. This registry will be located in the offices of the EUB.

6.2 Subject to subsections 35(4) and 35(4.1) and section 55.1 of the *Canadian Environmental Assessment Act*, the public registry will include all submissions, correspondence, hearing transcripts, exhibits and other information received by the Joint Panel and all public information produced by the Joint Panel relating to the review of the Project.

6.3 The responsible authority under the *Canadian Environmental Assessment Act* will make necessary arrangements with the Agency for the maintenance of the Internet site component of the federal public registry, when the Joint Panel is announced. The Internet site component of the registry will be maintained by the Agency during the course of the joint Panel review in a manner that provides for convenient public access, and for the purposes of compliance with

sections 55 to 55.5 of the *Canadian Environmental Assessment Act*. The Agency's co-responsibility for the Secretariat will include the Agency's obligation to maintain the internet site.

6.4. On completion of the assessment of the Project, the Joint Panel will prepare a Final Report that will be published.

6.5. Once completed, the Final Report will be conveyed in both official languages by the Joint Panel to the Federal Minister of the Environment and will be made available to the public.

6.6. Once the Final Report is submitted, the responsibility for the maintenance of the public registry will be transferred to the responsible authority. The EUB will continue to maintain records of the proceedings and the Final Report, as per the EUB Rules of Practice.

6.7. The Agency will be responsible for the translation of key documents prepared by the Joint Panel, including public notifications and releases and the Final Report, into both of the official languages of Canada. The Agency will use all reasonable efforts to expedite the translation of the Final Report in an effort to meet the EUB's ninety day timeframe for the release of EUB decisions.

6.8. The Parties agree to coordinate, to the extent possible, the timing of decisions on the Project and announcements on decisions pertaining to the Project.

7. Other Government Departments

7.1. At the request of the Joint Panel, federal authorities and provincial authorities having specialist information or knowledge with respect to the Project shall make available that information or knowledge in a manner acceptable to the Joint Panel.

7.2. Nothing in this Agreement will restrict the participation by way of submission to the Joint Panel by other federal or provincial government departments or bodies, subject to article 7.1, above, subsection 12(3) of the *Canadian Environmental Assessment Act* and the EUB Rules of Practice.

8. Participant Funding

8.1. Decisions regarding participant funding by the Agency under the federal Participant Funding Program, and decisions on intervener funding by the EUB as provided for in the *Energy Resources Conservation Act*, EUB Rules of Practice and the EUB Guidelines for Energy Cost Claims (Guide 31A) will, to the extent practicable, take into account decisions of the other party.

9. Cost Sharing

9.1. The Agency, as lead party, will develop a budget estimate of expenses agreeable to both parties prior to initiation of the Joint Panel activities.

9.2. The costs of the review will be apportioned between the EUB and the Agency in the manner set out in articles 9.3, 9.4 and 9.5.

9.3. The EUB will be solely responsible for the following costs:

- salaries and benefits of the provincial Panel member; and
- salaries and benefits of EUB staff involved in the joint review.

9.4. The Agency will be solely responsible for the following costs:

- per diems of the federal Panel members;
- salaries and benefits of Agency staff involved in the joint review;
- all costs associated with the federal Participant Funding Program;
- translation of records and documents into the official languages of Canada other than translation required as outlined in article 9.5 of this Agreement; and
- costs associated with the public registry established pursuant to section 55 of the CEEA.

9.5. The EUB and the Agency agree to share equally all those costs listed below, incurred as part of the joint Panel review from the signing of this Agreement to the date the Final Report is issued by the Joint Panel. The shareable costs are as follow:

- travel-related expenses associated with the review incurred by Joint Panel members and Panel secretariat staff;
- per diems and associated expenses of independent/non-government expert consultants, analysts and communications specialists retained by the Secretariat;
- language translation and interpretation services and facilities related to the evidence of applicants, participants and local interveners as required by the Joint Panel, but not including translation service referred to in article 6.7 of this Agreement;
- printing of any reports and documents distributed by the Joint Panel necessary for the Panel's work;
- the publication of notices and releases;
- photocopying, including the reproduction of documents contained in the public registry, and postage related to the review;
- court reporting and transcripts as required by the Joint Panel;
- rental of hearing, public meeting and public information office facilities and equipment;
- audio and audio-visual services at the hearing and public meetings; and
- miscellaneous expenditures up to a maximum of five percent (5%) of the total budget for the review.

9.6. The Agency may only be responsible for contributing to shareable costs within the allowable limits of Treasury Board Secretariat directives.

9.7. Shareable costs of the joint review as detailed in article 9.5 will be incurred at the sole discretion of the Joint Panel with due regard to economy and efficiency.

9.8. All expenses not listed above will need prior approval of both parties if they are to be equally shared.

10.0 Invoicing

10.1 The Agency will be responsible for advancing funds for the payment of the shareable costs and will invoice the EUB for the amounts owed under this Agreement, except for travel-related expenses of EUB's staff which will be advanced by the EUB. In the event that the EUB is

required to advance shareable funds directly, it will advance funds for payment and will invoice the Agency as determined under this Agreement.

10.2 The invoicing will be done either at the end of each month or quarterly at the discretion of the Agency. The invoice will cover all shareable costs paid by the Agency.

10.3 Each invoice will be accompanied by a summary description of the shareable costs actually incurred and paid for the period covered by the invoice, in a form satisfactory to both Parties and will be certified by an official acceptable to both Parties. Detailed information about incurred costs will be retained and made available to either Party upon request.

10.4 Subject to compliance with the above requirements the EUB will pay to the Agency the amount stated as being owed to it in the invoice within sixty (60) days of having received such invoice.

10.5 With respect to invoices covering the last period of any fiscal year (ending March 31), and the last invoice to be produced for the joint Panel review, each Party may review and deduct from the invoice, any incurred shareable costs that have not been previously recovered, so as to determine a net transfer of shared costs from one Party to another. The payment will be made within thirty (30) days of having received such invoice. An accounting of the shared expenses incurred by the EUB will be sent with the year-end and final payments, or earlier as may be requested by the Agency.

11.0 Audit

11.1 Subject to this Agreement, both Parties will keep open to audit and inspection by the Agency or the EUB, or their duly authorized representative, all invoices, receipts, vouchers and documents of any nature or kind whatsoever that have been relied on by either of the two Parties to calculate the shared cost of conducting the public review.

11.2 The Party exercising its option to audit will be responsible for the cost of the audit.

11.3 Where an audit conducted by either Party in connection with this Agreement reveals discrepancies regarding the amount billed to the Agency or the EUB, and where prompt resolution between the Parties is unattainable, an independent auditor acceptable to both Parties will resolve the issue.

12. Amending this Agreement

12.1. The terms and provisions of this Agreement may be amended by written memorandum executed by both the Federal Minister of the Environment and the Chairman of the EUB. Subject to section 27 of the *Canadian Environmental Assessment Act*, upon completion of the joint review, this Agreement may be terminated at any time by an exchange of letters signed by both parties.

13. Signatures

WHEREAS the parties hereto have put their signatures

«Original Signed by»

The Honourable Rona Ambrose
Minister of the Environment

October 17, 2006

Date

«Original Signed by»

Neil McCrank, Q.C.
Chairman
Alberta Energy and Utilities Board

November 14, 2006

Date

Appendix Terms of Reference

Part I – Scope of the Project

The Project includes the construction, operation, decommissioning and abandonment 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.

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 will be connected into existing and new natural gas gathering infrastructure for delivery of the produced natural gas to market. The Project will add approximately 220 km of additional pipeline and will double the number of wells, currently in the Suffield NWA. The gas will be transported to existing compressor stations located on the perimeter of the Suffield NWA.

The Project components include:

- up to 1275 new infill wells located throughout the Suffield NWA;
- approximately 180 kilometres of two (2) inch high-density plastic pipe to tie the wells into an existing pipeline;
- approximately 40 kilometres 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.

Part II - Scope of the Environmental Assessment

1. The Joint Panel will conduct an assessment of the Environmental Effects of the Project based on the Project Description (Part I).
2. The assessment will include a consideration of the factors listed in paragraphs 16(1)(a) to (d) and subsection 16(2) of the *Canadian Environmental Assessment Act*, namely:
 - a. the environmental effects of the Project, including the environmental effects of malfunctions or accidents that may occur in connection with the Project and any cumulative environmental effects that are likely to result from the Project in combination with other Projects or activities that have been or will be carried out;
 - b. the significance of the effects referred to in paragraph a);
 - c. comments from the public that are received during the review;
 - d. measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the Project;
 - e. the purpose of the Project;
 - f. alternative means of carrying out the Project that are technically and economically feasible and the environmental effects of any such alternative means;
 - g. the need for, and the requirements of, any follow-up program in respect of the Project; and
 - h. the capacity of renewable resources that are likely to be significantly affected by the Project to meet the needs of the present and those of the future.
3. Pursuant to paragraph 16(1)(e) of the *Canadian Environmental Assessment Act*, the assessment by the Joint Panel will also include a consideration of the additional following matters:
 - a. the need for the Project;
 - b. alternatives to the Project; and
 - c. measures to enhance any beneficial environmental effects.
4. The Review will consider the environmental effects of the proposed Project within spatial and temporal boundaries which encompass the periods and areas during and within which the Project may potentially interact with, and have an effect on, components of the environment. These boundaries may vary with the issues and factors considered, and with the different phases in the life cycle of the Project. The boundaries will reflect:
 - the natural variation of a population or ecological component;
 - the timing of sensitive life cycle phases in relation to the scheduling of the Project;
 - the time required for an effect to become evident;
 - the time required for a population or ecological component to recover from an effect and return to a pre-effect condition, including the estimated degree of recovery;
 - the area affected by the Project; and
 - the area within which a population or ecological component functions and within which a Project effect may be felt.

Part III – Review Process

The main steps of the joint review by the Panel will be as follows:

Preparation of Guidelines

1. The Canadian Environmental Assessment Agency shall prepare draft Guidelines for the preparation of the Environmental Impact Statement (EIS).
2. The public shall be provided 30 days to review the draft Guidelines and provide comments to the Joint Panel.
3. After taking into account the comments received from the public, the Joint Panel shall finalize and issue the Guidelines as soon as possible following the Joint Panel's appointment. The Joint Panel will forward the Guidelines to the Proponent and, at the same time, the Guidelines will be made available on the public registry.

Preparation and Review of the Environmental Impact Statement

4. The Joint Panel will require the Proponent to prepare the Environmental Impact Statement (EIS) in accordance with the Guidelines issued by the Joint Panel, and submit the EIS to the Joint Panel. The Joint Panel shall require the Proponent to make the EIS available to the public.
5. Within five working days of receipt of the EIS, the Joint Panel will initiate a 60-day comment period on the EIS. The public will be able to review the document and provide comments on whether the EIS adequately addresses the requirements of the Guidelines.
6. Comments received during the comment period, shall be immediately made available to the public through the public registry.
7. The Joint Panel will determine the need, timing and location of any public meetings required for clarification of technical information.
8. The Joint Panel shall determine whether it has adequate information to proceed to hearings. In so doing, the Joint Panel shall consider its own detailed review of the documentation, the written comments of the public, government departments, other governments and technical experts, written exchanges between the interested parties, and the discussions held during information assessment meetings.
9. Should the Joint Panel identify deficiencies after reviewing the EIS and in consideration of any comments received from the public, the Joint Panel may require additional information from the Proponent. Any request for additional information shall be issued by the Joint Panel within 30 days following the close of the comment period.

Determination of Adequacy of Additional Information

10. Upon receipt of the additional information, the Joint Panel will ensure that it is made available to the public for review and comment.
11. If after reviewing the additional information and written submissions from interested parties the Joint Panel concludes that it has adequate information to proceed to hearings, it shall announce the hearings within 45 days of receipt of the additional information, providing a minimum of 45 days prior to the commencement of the hearings.
12. If after reviewing the additional information and written submissions from interested parties the Joint Panel is still of the view that it does not have adequate information to proceed to hearings, it shall inform the President of the Agency of the need to extend the overall time period for the review. Upon receipt of an approval for an extension, the Joint Panel shall inform the proponent of outstanding information requirements, and indicate that the hearings will not be scheduled until that information is submitted.
13. If after reviewing the additional information and written submissions from interested parties the Joint Panel is of the view that the lack of information is minor in nature and the Joint Panel receives a commitment from the proponent to provide the outstanding information within 30 days of the second request for additional information, the Joint Panel may proceed to hearings within 45 days of receipt of the response to the first request for additional information.

Public Hearings

14. Forty-five days notice will be provided to the public prior to the start of the hearings.
15. The Joint Panel will hold hearings in locations determined by the Joint Panel within the area likely to be affected by the Project, or in any area reasonably close to where the Project is proposed to be carried out, to provide convenient access for the potentially affected public.

Panel Report

16. The Joint Panel will deliver its final report to the Federal Minister of the Environment, in both official languages, within 90 days following the close of the hearings. The report will take into account and reflect the views of all Panel members.

APPENDIX 5 HEARING PARTICIPANTS

Hearing Participants (Formal)

Principals and Representatives (Abbreviations used in report)	Witnesses
EnCana Corporation (EnCana) S. Dendstedt T.-L. Oleniuk	G. Protti F. L'Henaff J. Heese S. Fudge D. Collister J. Kansas D. Walker R. McNeil I. Simpson Moss S. Cox
Environmental Coalition (Coalition) J. Klimek H. Binder	T. Powers, Ph.D. N. Sedgwick H. Binder J. Unger B. Stelfox, Ph.D. C. Bradley C. Wershler C. Wallis
Government of Canada (Canada) K. Lambrecht J. Shaw R. Drummond	Col. C. Lamarre, DND LCol. M. Bruce, DND J. Rowland, DND, Ph.D. B. Smith, DND D. Boyd, DND K. Guenther, DND F. Martins, DND M. Norton, Environment Canada D. Instrup, Environment Canada D. Duncan, Environment Canada, Ph.D. A. Didiuk, Environment Canada P. Grégoire, Environment Canada B. Dale, Environment Canada D. Henderson, Environment Canada, Ph.D. O. Jensen, Environment Canada, Ph.D. J. Coulson, NRCan T. Hamblin, NRCan, Ph.D. F. Schellekens, NRCan, Ph.D. M. Nastev, NRCan, Ph.D.

Principals and Representatives
(Abbreviations used in report)**Witnesses**

Suffield Environmental Advisory Committee
(SEAC)
J. McDougall

O. Jensen, Ph.D.
R. Kennedy

Suffield Industry Range Control (SIRC)
K. Miller

S. Moffat
R. Baron

Panel Experts

J. Woosaree
T. Whidden, Ph.D.

Joint Review Panel (Panel) staff

J. P. Mousseau, Panel Counsel
M. Lacasse, Panel Counsel
M. Alboiu
T. Byrnes
D. Barter
S. Cartwright
B. Curran
J. Davis
K. Engler
J. FitzGerald
B. Greenfield
P. Hunt
L. Jamault
J. Smith
M.-F. Therrien
S. Thomas

Hearing Participants (Informal)

Interveners	Representing
D. Hutton	Living World Nature Trust
M. Kettenbach	Individual
S. Foss	Federation of Alberta Naturalists
G. Semenchuk	
Dr. R. Longair	Personal capacity as a scientist and on behalf of the Entomological Society of Alberta
G. Trottier	Individual
G. Cocquyt	Flint Energy
D. Brauer	
K. McCutchen	
D. Dickinson	Society of Grasslands Naturalists
R. Marshall	Cerpro Energy
R. Gardner	Individual
Dr. B. Gjetvaj	Canadian Parks & Wilderness Society and Nature Saskatchewan
D. Hagen	Individual
J. Ernst	Individual

APPENDIX 6 RULING ON MOTION TO COMPEL ALBERTA ENVIRONMENT AND ALBERTA SUSTAINABLE RESOURCE DEVELOPMENT

Background

On October 6, 2008 the Coalition brought a preliminary motion pursuant to Section 39 of the EUB's Rules of Practice seeking to compel the attendance of witnesses from Alberta Environment and Alberta Sustainable Resource Development (SRD).

The Coalition provided four grounds in support of its motion; namely that:

- First of all, SRD should attend to speak to its knowledge of the area, in particular the species at risk and their recovery, and its jurisdiction over these projects;
- Secondly, as Alberta Environment will be issuing water licences associated with the project, it should attend to describe what and how such application will be considered;
- Thirdly, likewise, Alberta Environment should attend because it regulates reclamation in Alberta and;
- Fourthly, that Alberta Environment should attend as one of its employees as a member of SEAC.

The Panel wrote to SRD and Alberta Environment and requested a reply to the Coalition motion. On October 9th, 2008, Alberta Justice responded on behalf of the two departments and its reply is marked as Exhibit 001-051. EnCana, the Government of Canada, and the two members of SEAC took no position with respect to the motion.

The Coalition responded to Alberta Justice's reply yesterday and emphasized the importance of SEAC in the approval process proposed for the project in a necessity to understand Alberta Environment's role in that capacity. It also stressed the need to better understand the jurisdiction of these two departments over activities in the NWA as it relates to reclamation, spills and releases, and environmental enforcement.

In Decision 94-2, the ERCB set out the factors it will consider when considering a request to compel the attendance of a witness. *"For the Board to consider compelling the attendance of a witness, it must be convinced that the evidence which would be adduced is critical for the Board to understand the issues it is charged to address. Further, it must be clear that there is no other no other reasonable way to obtain this evidence. As a result, compelling and substantive reasons are needed for the Board to take such an action."* The Panel is satisfied that the criteria described in Decision 94-2 are reasonable and should be applied in consideration of this motion.

The Panel understands that the Coalition seeks to compel the attendance of witnesses from SRD and Alberta Environment to adduce evidence on the following issues:

What is SEAC's role in the approval process, both currently and under the process proposed by EnCana?

What is the Alberta Environment jurisdiction with respect to activities on the Suffield Base, including matters of reclamation, spills or releases, and the issuance of water licences or permits related to the proposed project.

What role does SRD play in the protection of listed or endangered species that may be affected by the proposed project.

Decision

For the reasons that follow, the Panel is not satisfied that it is necessary to compel the witnesses from Alberta Environment or SRD to address the issues described.

First of all, with respect to SEAC, the Panel agrees that understanding the role of SEAC in the approval process for applications in the NWA is an important issue in this proceeding. However, the Panel finds that this evidence can be adduced through the two members of SEAC who have filed a submission in this proceeding and will be giving evidence next week. The Panel is satisfied that the two witnesses can effectively speak to the role of SEAC currently and its continuing capacity to perform its obligations under the 1975 Agreement. The Panel further notes that the role of SEAC is also a matter of legal interpretation of the 1975 Agreement, a question of law that may be addressed by Ms. Klimek and others in argument.

With respect to the jurisdiction of Alberta Environment on the Suffield Base, while the Panel accepts that the issues relating to regulatory responsibility for reclamation and spills within the NWA are also important in this proceeding, it finds that there are questions of law that are best addressed by the parties in argument. Alberta Justice specifically addressed this issue in its reply in the following statement, and I quote from that: "*The Environmental Assessment and Enhancement Act, the EPEA, conservation and reclamation requirements do not apply to land owned by the Crown in right of Canada.*" And it says: "*See EPEA sections 137 and 134F. Alberta Environment is not the reclamation regulator on the project lands.*"

Having carefully reviewed the reply filed by Justice or Alberta Justice on October 9th, the Panel is satisfied that Alberta Environment's position with respect to its jurisdiction over matters in the NWA has been clearly articulated. The Panel is not convinced that compelling a witness from Alberta Environment would provide any further clarity in this respect. Regarding Alberta Environment's process for issuing water licences for the various water sources that may be used by EnCana in association with the proposed project, the Panel is not convinced that the evidence that may be adduced from Alberta Environment in this respect is critical to its understanding of the environmental effects of the project as they relate to water use. This is in part because the Panel finds that both EnCana and the Government of Canada have presented evidence or will present evidence regarding the impacts of the project's water use and the Panel is not convinced that the evidence adduced by Alberta Environment would materially add to its understanding of the issue.

With respect to protecting and promoting the recovery of species at risk, the Panel recognizes that the project's effects on species at risk and other species of concern and programs for the recovery are central issues to their, to this proceeding. However, the Panel does not accept that evidence that might be adduced by SRD regarding its role under SARA is critical to understanding the project's effect on species at risk and related recovery plans.

First, the Panel notes that EnCana, the Coalition, and the Government of Canada have all tendered witnesses who can speak to the project's impact on species at risk and the recovery plans and, the Panel finds that the participation of a witness from SRD would not materially add to this discussion. Second, the Panel observes that SARA is a federal legislation and that the development and implementation of national recovery strategies and action plans are the statutory responsibility of federal ministries. Third, SRD's jurisdiction and its engagement in the preparation of any relevant recovery strategies and action plans is a matter of public record.

While the Panel is disappointed that these two Alberta departments chose not to voluntarily participate in this proceeding, it finds that the Coalition has not established that the evidence that might be adduced by witnesses from Alberta Environment and SRD meet the criteria established in Decision 94-2.

In that respect, the Panel finds that evidence regarding the role of SEAC, Alberta Environment and SRD may reasonably be obtained through the witnesses already in attendance at the proceedings. Further, the Panel notes that questions relating to the roles and jurisdiction of Alberta Environment and SRD are questions of law and can be addressed by way of argument, as can the role of SEAC as described in the 1975 Agreement.

Finally, the Panel considers it unlikely that the evidence provided by Alberta Environment would be materially different from what is expressed in its October 9th, 2008 reply to the Coalition's motion.