MEG Energy Corp.

Road Map of Christina Lake Regional Project - Phase 3

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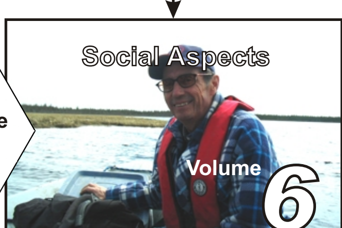

- Traditional Land Use Assessment and Baseline
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1 SOCIAL ASPECTS INTRODUCTION

MEG Energy Corp. (MEG) is a Calgary-based, privately held energy company focused on the development and recovery of bitumen, shallow gas reserves and the generation of power in northeast Alberta. MEG's Christina Lake Regional Project (CLRP) consists of 80 sections of oil sands leases within the Regional Municipality of Wood Buffalo (RMWB), approximately 15 km southeast of Secondary Highway 881 and 20 km northeast of Conklin.

MEG currently has approval to construct and operate the first two phases of the CLRP over 23 sections of land. In addition, MEG is developing a facility expansion (Phase 2B) to increase the production capacity of the Central Plant to 60,000 barrels per day (bpd). The Phase 2B plant will be located immediately adjacent to the existing Phase 1 and 2 processing facilities.

MEG is now proposing a further expansion of the CLRP to fully develop its Christina Lake oil sands leases. The Christina Lake Regional Project – Phase 3 (the Project) is an expansion of the current CLRP development area and will use Steam Assisted Gravity Drainage (SAGD) bitumen recovery technology. The Project will consist of two additional processing facilities (Plants 3A and 3B), 138 SAGD multi-well pads and associated steam generating equipment. Plant 3A will be located in the southeast corner of the lease (Sections 20 and 29-76-4 W4M) and Plant 3B will be located in the northwest end of the lease (Sections 32 and 33-77-6 W4M).

Construction of the Project is proposed to occur in two phases. Phase 3A is anticipated to begin construction in 2010, with initial steam injection in 2012. Phase 3B is anticipated to begin construction in 2012, with initial steam injection in 2014. The operational life of each plant is expected to be 25 years. Total production from the two new plants will produce an incremental 150,000 bpd of bitumen (approximately 23,800 cubic metres per day). It is anticipated that reclamation of the Project will be complete by 2044.

This volume includes assessments of the following components:

- Traditional Land Use (Section 2);
- Resource Use (Section 3);
- Visual Resources (Section 4);
- Historical Resources (Section 5); and
- Socio-Economics (Section 6).

1.1 TRADITIONAL LAND USE

The Traditional Land Use (TLU) section outlines MEG's approach for completing the TLU assessment for the Project. MEG is currently in the process of arranging and conducting interviews with members of the potentially affected First Nations communities.

1.2 RESOURCE USE

The Resource Use section includes an evaluation of the natural resources of an area and how people use them. It considers the capability for use of the resource (e.g., availability and access), the number of non-traditional resource users and the effects of the Project on the baseline setting in consideration of existing and approved conditions and planned developments.

1.3 VISUAL RESOURCES

The Visual Resources section provides a description of the visual landscape under existing and approved conditions, in consideration of the Project and planned developments. Changes caused by the development of the Project are modelled and rendered and the effects are assessed.

1.4 HISTORICAL RESOURCES

The Historical Resources section outlines existing information with respect to historical resources in the Project area and surrounding region. The report details study designs and investigations which define the nature of project-specific impacts to historical resources; and provide evaluations regarding the effects of the Project in combination with existing and planned development in the region.

1.5 SOCIO-ECONOMICS

The Socio-Economics section describes the social and economic effects from the construction and operation of the proposed Project in isolation and in consideration of the cumulative development occurring in the region. The Socio-Economics impact assessment identifies, assesses and recommends mitigation for communities within the regional and local study areas that may be affected by the Project. It also suggests means of enhancing the benefits of the Project for affected communities.

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2 TRADITIONAL LAND USE ASSESSMENT

MEG Energy Corp. (MEG) is a Calgary-based, privately held energy company focused on the development and recovery of bitumen, shallow gas reserves and the generation of power in northeast Alberta. MEG's Christina Lake Regional Project (CLRP) consists of 80 sections of oil sands leases within the Regional Municipality of Wood Buffalo (RMWB), approximately 15 km southeast of Secondary Highway 881 and 20 km northeast of Conklin.

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Construction of the Project is proposed to occur in two phases. Phase 3A is anticipated to begin construction in 2010, with initial steam injection in 2012. Phase 3B is anticipated to begin construction in 2012, with initial steam injection in 2014. The operational life of each plant is expected to be 25 years. Total production from the two new plants will produce an incremental 150,000 bpd of bitumen (approximately 23,800 cubic metres per day). It is anticipated that reclamation of the Project will be complete by 2044.

As part of the Traditional Land Use (TLU) assessment, MEG is currently arranging interviews with the Chipewyan Prairie Dene First Nation (CPDFN), Heart Lake First Nation (HLFN) and the Fort McMurray First Nation (FMFN). Information from these interviews will be used to assess potential effects of the Project within the Regional Study Area (RSA).

In addition to arranging interviews, MEG is currently working with local representatives to finalize the traditional land use information as follows:

- **Fort McMurray First Nation**
  - The FMMFN completed their TLU study in 2006 (Fort McMurray #468 First Nation 2006). MEG is currently consulting with FMMFN for permission to use the information in this study for the TLU assessment of the Project. MEG will incorporate information from the FMMFN TLU study in the assessment of the Project once permission is granted.
- **Heart Lake First Nation**
  - The HLFN are currently working on their TLU study. MEG is arranging to assist HLFN with the study and, once it becomes available, will incorporate relevant information in the assessment of the Project.
- **Chipewyan Prairie Dene First Nation**
  - MEG has received a copy of study, *Kai'Kos' Dehseh Dene: The Red Willow River (Christina River) People. A Traditional Land Use Study of the Chipewyan Prairie First Nation* (CPDFN 2007) from the CPDFN, and has permission to use it in the assessment of the Project (Carnew 2007, Pers. Comm). MEG is currently working with the band to supplement TLU information through further project-specfic studies.
- **Chard Métis Local (214)**
  - MEG is currently working with the Chad Métis Local to arrange elders interviews. MEG will incorporate relevant information into the assessment when it becomes available.
- **Conklin Métis Local #193 (CML #193)**
  - The CML #193 are currently working on their TLU study. MEG is arranging to assist HLFN with the study and, once it becomes available, will consider relevant information in the assessment of the Project.
- **Beaver Lake First Nation (BLFN)**
  - MEG has recently received a copy of the BLFN TLU study and has permission to use it in the assessment of the Project. MEG will incorporate the relevant information in a subsequent update of the TLU assessment.

At the time of this submission, MEG recently received permission to use the information contained in the CPDFN TLU study and has completed interviews with three trappers and is arranging interviews with the remaining three trappers within the LSA. This information, as well as all other permitted sources, will be included in the TLU assessment of the Project which will be submitted as an update to this Application.

MEG is currently arranging interviews with the HLFN, CPDFN, FMFN, as well as with the Métis groups in Conklin and Chard. Interviews and mapping sessions will be conducted with elders from each of the aboriginal groups to gather baseline data, such as locations for hunting, trapping, plant harvesting, fishing, as well as locations of cabins, burial sites and other ceremonial or culturally important sites. In addition to the interviews and mapping sessions, elders will have the opportunity for a site visit, during which time groundtruthing will be conducted and additional information may be collected. Information from the interviews will be recorded. Once this baseline information is collected, it will be included in the analysis of potential impacts on the traditional land uses of the respective aboriginal group.

2.1 REFERENCES

CPDFN (Chipewyan Prairie Dene First Nation). 2007. Kai'Kos' Dehseh Dene: The Red Willow River (Christina River) People. A Traditional Land Use Study of the Chipewyan Prairie First Nation. Nicomacian Press. Calgary, AB.

Fort McMurray #468 First Nation (FMFN). 2006. Nistawaya, "Where the Three Rivers Meet": Fort McMurray #468 First Nation Traditional Land Use Study. Calgary: Nicomacian Press.

PERSONAL COMMUNICATIONS

Carnew, Fred. 2007. Director of Consultation and Community Relations, MEG Energy Corp. Personal communication. Meeting: December 13, 2007.

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3 RESOURCE USE ASSESSMENT

3.1 INTRODUCTION

MEG Energy Corp. (MEG) is a Calgary-based, privately held energy company focused on the development and recovery of bitumen, shallow gas reserves and the generation of power in northeast Alberta. MEG's Christina Lake Regional Project (CLRP) consists of 80 sections of oil sands leases within the Regional Municipality of Wood Buffalo (RMWB), approximately 15 km southeast of Secondary Highway 881 and 20 km northeast of Conklin.

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Construction of the Project is proposed to occur in two phases. Phase 3A is anticipated to begin construction in 2010, with initial steam injection in 2012. Phase 3B is anticipated to begin construction in 2012, with initial steam injection in 2014. The operational life of each plant is expected to be 25 years. Total production from the two new plants will produce an incremental 150,000 bpd of bitumen (approximately 23,800 cubic metres per day). It is anticipated that reclamation of the Project will be complete by 2044.

The Resource Use Assessment is intended to address the Terms of Reference (TOR) established by Alberta Environment (AENV) for the Environmental Impact Assessment (EIA) (AENV 2008) for the Project. A Resource Use Baseline Report (Appendix 6-II) was also completed to address the TOR.

The resource use component includes an evaluation of the natural resources of an area and how people use them. It considers the capability for use of the resource (e.g., availability and access) and the number of non-traditional resource users.

The Project will be located in an area where a number of other resource uses occur. The assessment was conducted to analyze the effects of the Project on resource use, and the ways in which the Project will comply with local and regional resource use regulations and guidelines.

The Project will consist of two processing facilities (Plants 3A and 3B), 138 SAGD wellpads and associated steam generating equipment. Plant 3A will be located in the southeast corner of the lease (Sections 20 and 29-76-4 W4M); while Plant 3B will be located in the northwestern area of the lease (Sections 32 and 33-77-6 W4M).

3.1.1 Terms of Reference

This assessment was completed to meet the relevant TOR (AENV 2008) for the Project (Table 3.1-1) which state the following:

Table 3.1-1 Terms of Reference Concordance Table

TOR Section	Environmental Assessment or Topic	Location TOR Addressed
3.6 **Land Management**	[C] identify any access restrictions and, where appropriate, measures taken to control access to Project Areas while ensuring continued access to adjacent wildland areas.	[C] Volume 6, Section 3.5.2 Effects on Environmentally Important Areas
4.6. Aquatic Ecology		
4.6.1 ***Baseline Information***	[B] Describe and map, as appropriate, the fish habitat and aquatic resources of the lakes, rivers and other waters and identify: (c) current and potential use of the fish resources by Aboriginal, sport or commercial fisheries	(c) Volume 6, Appendix 6-II Resource Use Baseline
4.11 Land Use		
4.11.1 ***Baseline Information***	[A] Identify the current land uses, including oil and gas development, agriculture, forestry, tourism, cultural use, food collection, trapping, fishing, hunting and other outdoor recreational activities.	[A] Volume 6, Appendix 6-II Resource Use Baseline, Section 2.2 Land Use Disposition; Section 2.3 Existing and Applied Development; Section 2.4 Existing Conditions
	[C] Identify and map unique sites or special features such as Natural Areas, Environmentally Significant Areas, and Heritage Rivers.	[C] Volume 6, Appendix 6-II Resource Use Baseline, Section 2.4.3 Environmentally Important Areas
	[D] Identify any land use policies and resource management initiatives that pertain to the Project, and discuss how the Project will be consistent with these initiatives.	[D] Volume 6, Appendix 6-II Resource Use Baseline, Section 2.1 Resource Use Plans and Zoning

Table 3.1-1 Terms of Reference Concordance Table (continued)

TOR Section	Environmental Assessment or Topic	Location TOR Addressed
4.11.2 Impact Assessment	[A] Identify the potential impact of the Project on these land uses, including: (a) impacts to unique sites or special features	(a) Volume 6, Section 3.5.2 Effects on Environmentally Important Areas
	(b) anticipated impacts related to changes in public access;	(b) Volume 6, Sections 3.5.2 Effects on Environmentally Important Areas and 3.5.3 Effects on Resource Use and Users
	(c) secondary effects, such as increased hunter, angler and other recreational access and facilitated predator movement, that may result from linear development;	(c) Volume 6, Section 3.5.3 Effects on Resource Use and Users and Volume 5, Section 6.3.2
	(d) the implications of relevant land use policies and resource management initiatives for the Project, including any constraints to development;	(d) Volume 6, Section 3.3.1 Resource Use Plans and Zoning
	(e) potential impacts to aggregate reserves that may be located on land under MEG's control and reserves in the region;	(e) Volume 6, Section 3.5.3 Effects on Resource Use and Users
	(f) the impact of development and reclamation on commercial forest harvesting in the Project Area. Include opportunities for timber salvage, revegetation, reforestation and harvest for the reduction of fuel hazard;	(f) Volume 6, Sections 3.5.2.3 Effects on Environmentally Important Areas and 3.5.3.3 Effects on Resource Use and Users
	(g) the amount of commercial and non-commercial forest land base that will be disturbed by the Project. Compare the pre-disturbance and reclaimed percentages and distribution of all forested communities in the Project Area;	(g) Volume 6, Section 3.5.3 Effects on Resource Use and Users and Table 3.5-5
	(h) how the Project disturbance impacts Annual Allowable Cuts and quotas within the Forest Management Area;	(h) Volume 6, Section 3.5.3 Effects on Resource Use and Users
	(i) the potential impact on existing land uses of anticipated changes (type and extent) to the pre- disturbance topography, elevation and drainage pattern within the Project Area resulting from disturbance during construction, operation and reclamation activities; and	(i) Volume 6, Section 3.5.3.1 Linkage Analysis; and Volume 6, Section 3.5.3.3 Effects Analysis
	(j) implications of the Project on regional recreational activities, public access and other land uses during and after development activities.	(j) Volume 6, Section 3.5.3.Effects on Resource Use and Users

Table 3.1-1 Terms of Reference Concordance Table (continued)

TOR Section	Environmental Assessment or Topic	Location TOR Addressed
4.11.2 Impact Assessment (continued)	[B] Discuss possible mitigative strategies to address: (a) access management during and after Project operations;	(a) Volume 6, Section 3.5.3 Effects on Resource Use and Users
	(b) the needs of other users in the Local Study Area;	(b) Volume 6, Section 3.5.3 Effects on Resource Use and Users
	(c) measures to mitigate impacts on land use created by the Project; and	(c) Volume 6, Section 3.5.3 Effects on Resource Use and Users
	(d) how potentially-affected aggregate reserves will be salvaged and stockpiled with input provided by Alberta Infrastructure and Transportation and Alberta Sustainable Resource Development.	(d) Volume 6, Section 3.5.3 Effects on Resource Use and Users
	[C] Describe the residual effects of the Project on land use and MEG's plans to manage those effects.	[C] Volume 6, Section 3.5.3 Effects on Resource Use and Users
4.11.3 Monitoring	[A] Describe the monitoring programs proposed to measure land use impacts resulting form the Project and the effectiveness of mitigation measures.	[A] Volume 6, Section 3.5.3 Effects on Resource Use and Users
8.0 SOCIO-ECONOMIC ASSESSMENT		
8.2 Impact Assessment	[A] Describe the socio-economic effects of construction and operation of the Project, including: (a) impacts related to: vii) trapping, hunting and fishing,	vii) Volume 6, Section 3.5.3 Effects on Resource Use and Resource Users

3.1.2 Key Issues and Questions

Key issues raised by stakeholders and identified in existing studies regarding potential effects on non-traditional resource use are:

- Potential effects on environmentally important areas that contain unique or representative landforms, rare or endangered vegetation, or significant or important wildlife habitat. Environmentally important areas are defined to include both protected areas and Environmentally Significant Areas (ESAs).
- Potential change to access as a result of development. Roads may be constructed, improved or have restricted access resulting in a change in the type and level of resource use.
- Potential effects on some surface and subsurface dispositions. Mineral and surface material (e.g., gravel) extraction may be affected by changes in the amount of area available for extraction.

- Changes to opportunities for consumptive use, such as hunting, trapping, fishing and berry-picking within the Local Study Area (LSA) by local residents.
- Changes to forestry activities in the region. This issue focuses on whether gain, loss or alteration of vegetation or soils will lead to a change in forest productivity.
- Changes to non-consumptive recreational activities (e.g., canoeing, camping, hiking, snowmobiling) by local residents and non-residents.
- Potential effects on aggregate resources.

Four key questions were established to address the issues raised in the TOR, as follows:

RUPC-1: What effects could existing and approved developments and the Project have on environmentally important areas?

RUPC-2: What effects could existing and approved developments and the Project have on natural resources and non-traditional resource users?

RUPDC-1: What effects could existing and approved developments, the Project, and planned developments have on environmentally important areas?

RUPDC-2: What effects could existing and approved developments, the Project, and planned developments have on natural resources and non-traditional resource users?

The key questions above guide the assessment of magnitude and consequence of the effects on resource use. Information about these key issues is presented in the Resource Use Baseline Report (Appendix 6-II).

3.2 ASSESSMENT APPROACH

This assessment will:

- determine the potential effects of construction and operation of the Project on resource use;
- develop appropriate mitigation measures; and
- evaluate potential effects.

In the context of this assessment section, the focus is on non-traditional (non-aboriginal) land and resource use. Traditional land use is addressed in Section 2. The evaluation of the potential effects of the Project on resource use include consideration of linkages between:

- site clearing and effects on environmentally important areas and natural resource use and users;
- facility and infrastructure development and effects on environmentally important areas and natural resource use and users; and
- changes in workforce and population and effects on environmentally important areas and natural resource use and users.

3.2.1 Temporal and Spatial Considerations

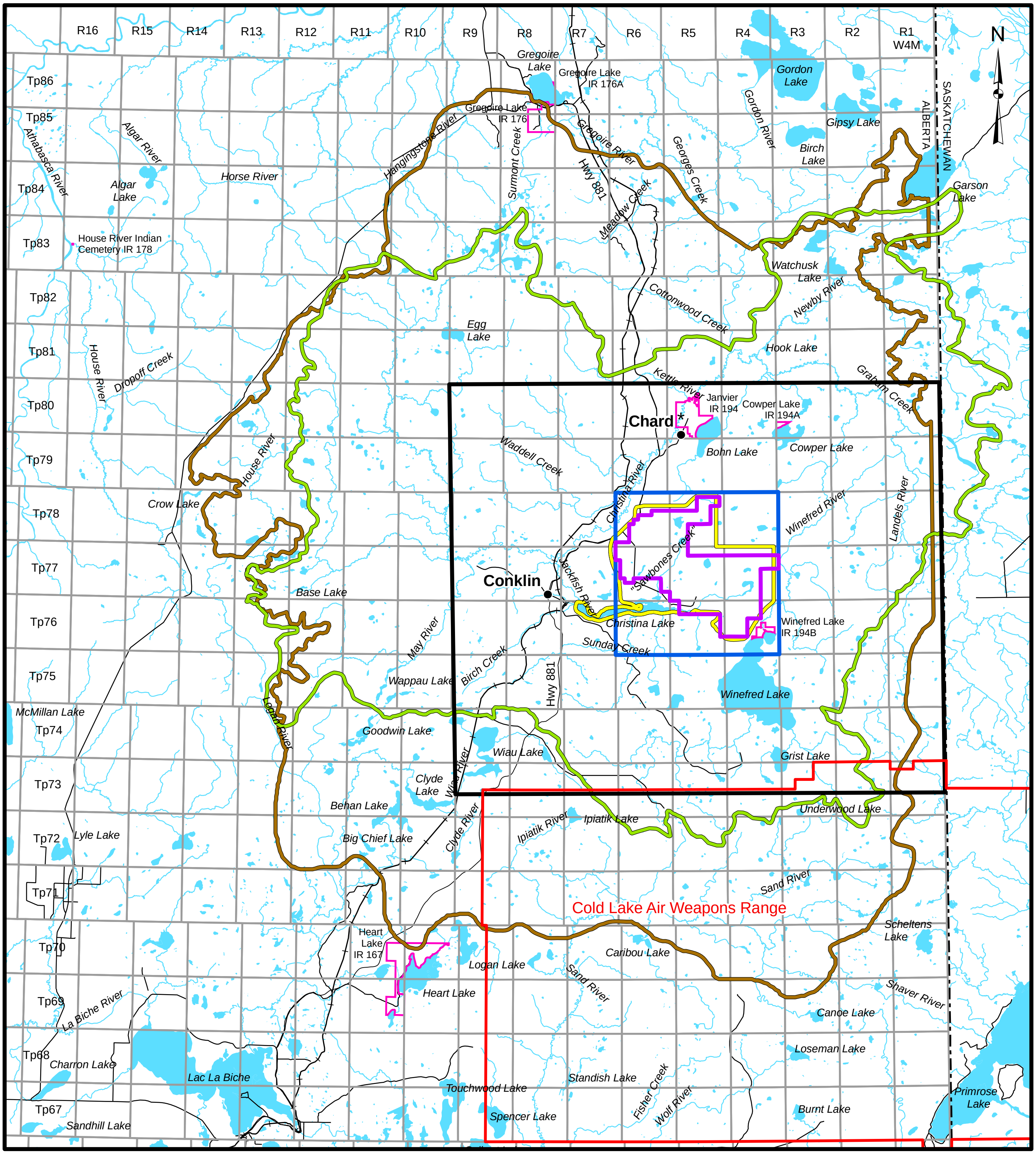
The Project will be constructed in two phases. Phase 3A is scheduled to begin construction in 2010, with initial steam injection in 2012. Phase 3B is expected to begin construction in 2012, with initial steam injection in 2014. The duration of the Project from initiation to construction in 2010 through to final reclamation in 2044 is 34 years.

Two areas have been delineated to facilitate data collection and presentation; a Regional Study Area (RSA) and a Local Study Area (LSA). The RSA encompasses resources that are potentially affected by the Project both directly and indirectly. The LSA encompasses resources that are potentially directly affected by the Project. For this assessment, the Resource Use LSA has been determined to be the same boundary as the Terrestrial Resources LSA. In total, the LSA encompasses 34,362 ha.

Where applicable, study areas from other components were used to facilitate the transfer of data for environmental setting and analysis purposes. The study areas used for the Resource Use assessment are summarized in Table 3.1-2 and depicted in Figure 3.1-1.

Table 3.1-2 Study Areas Used in the Resource Use Assessment

Resources	Local Study Area	Regional Study Area
aggregate resources	resource use	resource use
agriculture	resource use	resource use
berry picking	resource use	terrestrial resources
forestry	resource use	terrestrial resources
fishing	aquatic resources	aquatic resources
hunting and trapping	resource use	terrestrial resources
non-consumptive recreation	resource use	resource use
protected areas and ESAs	resource use	resource use



LEGEND

- TERRESTRIAL RESOURCES REGIONAL STUDY AREA
- RESOURCE USE REGIONAL STUDY AREA
- LSAS SEARCH (AUGUST 24, 2007)
- RESOURCE USE LOCAL STUDY AREA
- AQUATIC RESOURCES REGIONAL STUDY AREA
- AQUATIC RESOURCES LOCAL STUDY AREA
- INDIAN RESERVE
- AIR WEAPONS RANGE
- OPEN WATER
- RIVER OR STREAM
- ROADWAY
- RAILWAY
- COMMUNITY

NOTE

Unnamed watercourse locally known as "Sawbones Creek"
*Also known as the Hamlet of Janvier

REFERENCE

Alberta digital data obtained from Geomatics Canada (August 2001), AltaLIS Ltd. (September 2004), Veritas DGC Inc. (July 2004), Alberta Pacific Ltd. (April 2004), Desktop Mapping Technologies Inc., used under license.
Saskatchewan digital data obtained from Information Services Corp. (September 2004), used under license.
Projection: UTM Zone 12 Datum: NAD 83

20 0 20

SCALE 1:1,000,000 KILOMETRES

PROJECT

CHRISTINA LAKE REGIONAL PROJECT - PHASE 3

TITLE

RESOURCE USE LOCAL
AND REGIONAL STUDY AREAS

MEG ENERGY CORP.

PROJECT No. 07-1346-0009.9120			SCALE AS SHOWN	REV. 0
DESIGN	BB	27 Sep. 2007	FIGURE: 3.1-1	
GIS	ZB	10 Mar. 2008		
CHECK	BB	10 Mar. 2008		
REVIEW	IGG	14 Mar. 2008		

Project: I:\CLIENTS\MEG\07-1346-0009\mapping\mxd\resource_use\resuse_rsa_lsa_eia.mxd

3.2.2 Methods

3.2.2.1 Information Sources

Information used to complete this assessment was acquired from government statistics, physical and digital maps of key resources, resource management plans and the results of studies within the vegetation, forestry, wildlife, aquatic resources, traditional land use and socio-economic sections of the EIA. This assessment utilizes information from previous applications for oil sands developments in the area and as presented in the Resource Use baseline report (Appendix 6-II).

3.2.2.2 Analysis of Potential Effects

The assessment involved identifying and comparing possible interactions between resource use and the Project. Key issues were identified to develop key questions and a linkage diagram that details potential effects of the Project on resource use. Linkages between Project activities and environmental changes were assessed as to their validity. In general, conclusions were based on the literature, residual impact calculations and professional judgment. Project construction and operation details were evaluated to determine potential effects. Following this, mitigation strategies were developed for each valid linkage.

Effects are assessed with regard to six criteria for determining the residual impact of the Project: direction, magnitude, geographic extent, duration, reversibility and frequency. Environmental consequences to resource use were determined by summing predetermined numerical scores for each of these six criteria to arrive at an overall environmental consequence rating.

The purpose of assigning an environmental consequence rating is to provide a transparent process that consolidates the results of the criteria into one rating. The consolidation allows the effects from different components to be compared using a common rating so that areas of greatest potential concern can be identified.

Although a numerical system has been developed, the numbers are not an end in themselves. The intention is to use these numbers to provide a rating system that facilitates discussion and decision-making for the Project. Table 3.2-1 outlines the screening system used to estimate an environmental consequence for residual impacts. The screening system details a numerical score for each of the parameters considered in evaluating an impact.

The total is then used as a guide to assign environmental consequence of residual impacts as follows:

- negligible 0 to 5;
- low 6 to 10;
- moderate 11 to 15; and
- high greater than 15.

It should be noted that some components of the resource use evaluation (e.g., access) are viewed differently in this section as compared with other sections of the EIA. An increase in access is viewed as positive when assessing effects on resource users. Access is often achieved via linear disturbance, both the effects of increased access and linear disturbance are assessed in other EIA sections such as wildlife and biodiversity (Volume 5).

3.2.2.3 Assessment Cases

The development cases used for the assessment include an Existing and Approved Case (EAC), a Project Case and a Planned Development Case (PDC). The EAC includes those developments that already exist and those that have been approved but are not yet built. The Project Case includes existing and approved developments and the Project. The PDC considers all of the developments in the Project Case plus those that have been publicly disclosed during the time period up to six months prior to the submission of this Application. The developments considered for each case are listed in Volume 2, Section 5.

Table 3.2-1 Residual Impact Description Definitions for Resource Use

Category	Direction[(a)]	Magnitude[(b)]	Geographic Extent[(c)]	Duration[(d)]	Reversibility[(e)]	Frequency[(f)]
Access	positive is an increase in road, trail, cutlines and railway areas; negative is a decrease in road, trail, cutlines and railway area	negligible (0): <1% change in access; low (+5): 1 to 5% change in access; moderate (+10): 5 to 15% change in access; high (+15): >15% change in access	local (0): effect restricted to LSA; regional (+1): effect extends beyond the LSA into the RSA; beyond region (+2): effect extends beyond the RSA	short-term (0): Project construction; medium-term (+1): Project Life; long-term (+2): After reclamation of the Project is complete	reversible (-3) or irreversible (+3)	low (0): occurs once; moderate (+1): occurs more than once; high (+2): occurs continuously
Aggregates and Minerals	positive is resource being more available for use; negative is resource being unavailable for use or reduced in quantity	Negligible (0): <1% change; low (+5): <10% change; moderate (+10): 10 to 20% change; high (+15): >20% change	local (0): effect restricted to LSA; regional (+1): effect extends beyond the LSA into the RSA ; beyond regional (+2): effect extends beyond the RSA	short-term (0): Project construction; medium-term (+1): Project Life; long-term (+2): After reclamation of the Project is complete	reversible (-3) or irreversible (+3)	low (0): occurs once; moderate (+1): occurs more than once; high (+2): occurs continuously
Vegetation (berry habitat, forestry and agriculture), wildlife (hunting and trapping), aquatic resources (fishing) and population increase	positive, negative or neutral for the measurement endpoints (e.g., increase in area of potential berry habitat is positive, decrease in wildlife populations would be negative)	negligible (0): no measurable effect; low (+5): <10% change in measurement endpoint; moderate (+10): 10 to 20% change in measurement endpoint; high (+15): >20% change in measurement endpoint	local (0): effect restricted to LSA; regional (+1): effect extends beyond the LSA into the RSA ; beyond regional (+2): effect extends beyond the RSA	short-term (0): Project construction; medium-term (+1): Project Life; long-term (+2): After reclamation of the Project is complete	reversible (-3) or irreversible (+3)	low (0): occurs once; moderate (+1): occurs more than once; high (+2): occurs continuously
Environmentally Important Areas – change in area	positive is an increase in area; negative is a decrease in area	negligible (0): <1% change in area; low (+5): <1 to 5% change in area; moderate (+10): 5 to 10% change in area; high (+15): >10% change in area	local (0): effect restricted to LSA; regional (+1): effect extends beyond the LSA into the RSA ; beyond regional (+2): effect extends beyond the RSA	short-term (0): Project construction; medium-term (+1): Project Life; long-term (+2): After reclamation of the Project is complete	reversible (-3) or irreversible (+3)	low (0): occurs once; moderate (+1): occurs more than once; high (+2): occurs continuously
Environmentally Important Areas – change in use for environmentally important areas designated primarily for recreation	positive is an increase in use of areas designated for recreational use; negative is a decrease in use of areas designated for recreational use	negligible (0): <1% change in use; low (+5): <1 to 5% change in use; moderate (+10): 5 to 10% change in use; high (+15): >10% change in use	local (0): effect restricted to LSA; regional (+1): effect extends beyond the LSA into the RSA ; beyond regional (+2): effect extends beyond the RSA	short-term (0): Project construction; medium-term (+1): Project Life; long-term (+2): After reclamation of the Project is complete	reversible (-3) or irreversible (+3)	low (0): occurs once; moderate (+1): occurs more than once; high (+2): occurs continuously
Environmentally Important Areas – change in use for environmentally important areas designated primarily for preservation of natural features	positive is a decrease in use; negative is an increase in use	negligible (0): <1% change in use; low (+5): <1 to 5% change in use; moderate (+10): 5 to 10% change in use; high (+15): >10% change in use	local (0): effect restricted to LSA; regional (+1): effect extends beyond the LSA into the RSA ; beyond regional (+2): effect extends beyond the RSA	short-term (0): Project construction; medium-term (+1): Project Life; long-term (+2): After reclamation of the Project is complete	reversible (-3) or irreversible (+3)	low (0): occurs once; moderate (+1): occurs more than once; high (+2): occurs continuously

[(a)] Direction: positive or negative effect for measurement endpoints, as defined for the specific component.
[(b)] Magnitude: degree of change to analysis endpoint.
[(c)] Geographic Extent: area affected by the impact.
[(d)] Duration: length of time over which the environmental effect occurs.
[(e)] Reversibility: effect on the resource (or resource capability) can or cannot be reversed.
[(f)] Frequency: how often the environmental effect occurs.

3.3 BASELINE SUMMARY

The Resource Use Baseline Report describes the existing resource uses in the RSA and LSA potentially affected by the Project both directly and indirectly. The report includes descriptions of resource management, land use policies and guidelines, existing industrial activities and dispositions, and commercial and recreational pursuits.

Land Use Planning within the LSA includes the Christina Lake Management Plan, which aims to ensure that petroleum, natural gas and oil sands exploration and development are carried out in an environmentally sensitive manner and are integrated with other uses.

There are numerous companies with existing land interests in the RSA, including energy companies, pipeline and forestry companies. While oil and gas development is not as intense as in the areas around Fort McMurray or Lac La Biche, it is increasing in the area, with five existing and approved or planned oil sands developments and numerous existing pipelines, wellsites and related infrastructure in the RSA.

Access within the LSA is high at 11.3 km of access per square kilometre of land. The RSA as a whole has 1.63 km of access route per square kilometre of land. The most common types of access in the LSA are cutlines and trails. Secondary Highway 881 is the most important access route to the RSA.

There are no protected areas in the RSA or the LSA. There are seven environmentally significant areas in the RSA: Christina Lake Caribou Area, Christina Lake/Jackfish River, Winefred River, Winefred/Grist Watershed, Grist Lake, Winefred Lake and the Egg Lake-Algar Lake Diversity Area. Parts of both the Christina Lake Caribou Area and the Christina Lake/Jackfish River overlap with the LSA.

There are five surface material leases for aggregate extraction within and near the LSA. Overall, aggregates have been in moderately poor supply in the areas north and south of Fort McMurray and east and west of the Athabasca River. However, new discoveries since 2002 have helped to increase aggregate supply for developments in northeastern Alberta.

The Project is located in the Green Area of the province and as such agriculture operations are minimal. Agricultural activity near the LSA is limited to one wild rice operation and two grazing leases.

Land in the LSA and RSA supports forestry. Timber rights are held by Alberta-Pacific Forest Industries Inc. (Al-Pac). The LSA contains approximately 7,439 ha of productive forests.

Berry picking habitat (areas with potential for blueberries, raspberries, strawberries and cranberries) exists in the LSA and RSA, but these areas are not of high importance to non-traditional resource users due to the distance of the study areas to major centres such as Lac La Biche and Fort McMurray.

The LSA is within Wildlife Management Unit (WMU) 517. Moose, mule deer, white-tailed deer and black bear are hunted in this WMU. Forty-five guide/outfitter operations hold hunting allocations in the Terrestrial RSA, five of which operate in the LSA.

Registered Fur Management Areas (RFMAs) 615, 933, 1326, 1544, 1595 and 2313 overlap the LSA. Species most commonly trapped in these areas include beaver, muskrat and coyote. Trapping activities and revenues have been steadily declining over the past decade.

Fishing is popular in the RSA and is based mainly in Christina, Grist and Winefred lakes; fishing lodges are located close to each. Christina Lake is located in the LSA.

Recreation in the RSA also includes All-Terrain Vehicle (ATV) and snowmobile riding, horseback riding, boating and bird watching. However, limited access, combined with the distance from major population centres has resulted in relatively low use of the area for recreational activities.

3.4 EXISTING AND APPROVED CASE

The additional effects of approved projects will result in changes from baseline (2007) conditions (Appendix 6-11), as follows:

- Increased use of existing access routes and the construction of new access for each new project will increase access to consumptive and non-consumptive use of resources in the area.
- Workforce and population increases, over time, will lead to increasing resource use by the public, such as recreation, hunting and fishing.
- Aggregate resources in the area will be used, as materials are needed for infrastructure and development for new projects. New discoveries of aggregates will mitigate this impact.

- Forestry resources in the areas of each approved project will also be impacted by site clearing of merchantable timber, but timber salvage and the reclamation of forest communities will mitigate this impact.

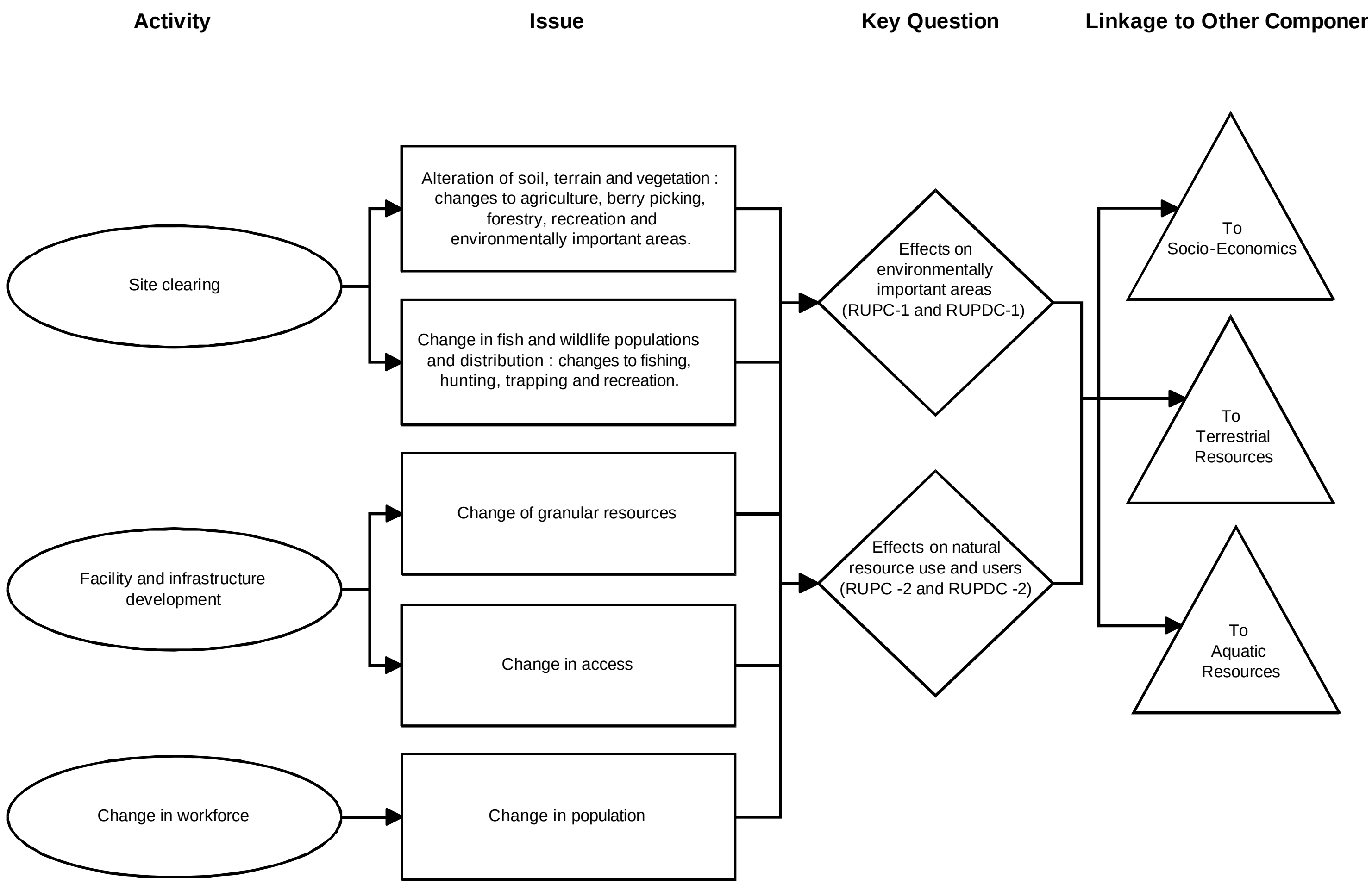
3.5 PROJECT CASE

3.5.1 Introduction

This Project Case assessment predicts the effects of those developments in the RSA that already exist, those that have been approved and the Project using two of the four key questions: RUPC-1 and RUPC-2. The key questions are addressed by using the following methodology:

- establishing the validity of linkages between natural resources and project activities;
- describing the mitigation measures that will be implemented to minimize the impact to resource use;
- describing the resource use effects analysis results;
- classifying effects; and
- describing proposed monitoring programs.

The results of the assessment are presented in the following sections. Potential linkages between Project activities and resource use are illustrated in Figure 3.5-1.



PROJECT

CHRISTINA LAKE REGIONAL PROJECT - PHASE 3

TITLE

RESOURCE USE LINKAGE DIAGRAM

MEG ENERGY CORP.

PROJECT	07.1346.0009.8500	
DESIGN	AG	01/02/08
CADD	TRE	12/03/08
CHECK	BB	12/03/08
REVIEW	IGG	14/03/08

FILE No. RU–Linkage Diagram

SCALE AS SHOWN REV. 0

FIGURE: 3.5-1

3.5.2 Effects on Environmentally Important Areas

Environmentally important areas include both officially protected areas, and ESAs, which have been recognized in the literature but are often not given formal protection. The following key question is addressed in this section:

RUPC-1: What effects could existing and approved developments and the Project have on environmentally important areas?

3.5.2.1 Linkage Analysis

The Project has the potential to affect environmentally important areas either directly, through clearing of vegetation, or indirectly, as the Project workforce and spin-off populations may impact other environmentally important areas in the RSA. Several linkages were analyzed with reference to these areas (Figure 3.5-1):

- linkages between site clearing activities and ESAs;
- linkages between changes in access due to facility infrastructure development and ESAs; and
- linkages between change in workforce and potential impacts to ESAs in the RSA.

The validity of these linkages for key question RUPC-1 is summarized in Table 3.5-1 and explained below.

Table 3.5-1 Validity of Linkages for Environmentally Significant Areas Overlapping the Local Study Area

Key Question	Linkage	ESA	Valid Linkage
RUPC-1	site clearing and environmentally important areas	Christina Lake Caribou Area	yes
		Christina Lake/Jackfish River	yes
		Winefred River	no
		Egg Lake-Algar Lake Diversity Area	no
		Grist Lake	no
		Winefred Lake	no
		Winefred/Grist Watershed	yes
	facility and infrastructure development (including changes in access) and environmentally important areas	Christina Lake Caribou Area	yes
		Christina Lake/Jackfish River	yes
		Winefred River	no
		Egg Lake-Algar Lake Diversity Area	no
		Grist Lake	no
		Winefred Lake	no
		Winefred/Grist Watershed	yes
	change in workforce and environmentally important areas	all ESAs in the RSA	yes

Site Clearing and Facility and Infrastructure Development Linkages

Valid Linkages

Areas of the Christina Lake Caribou Area, Christina Lake/Jackfish River and the Winefred/Grist Watershed will be cleared for facility and infrastructure development. New access into these areas will be created as a result of the Project, therefore the linkage is valid.

Invalid Linkages

No land within the Winefred River, Egg Lake-Algar Lake Diversity Area, Grist Lake and Winefred Lake ESAs will be cleared for facility and infrastructure development. New access into these areas will not be created as a result of the Project, therefore the linkage is invalid.

Change in Workforce Linkage

A new workforce population for the construction and operation of the Project will lead to increases in the population within (e.g., Conklin) and outside the RSA (e.g., Lac La Biche and Fort McMurray) (Volume 6, Section 6.5.1 for the results of a detailed population impact analysis). An increasing workforce will also increase the shadow population of the socio-economic study areas (Section 6). Use of the ESAs in the RSA will increase as a result of workforce population increases due to the Project, therefore the linkage is valid.

3.5.2.2 Mitigation

Mitigation for site clearing in the Christina Lake Caribou Area and around Christina Lake and Jackfish River can be accomplished by minimizing the area cleared. In particular, Westworth and Associates (1990) emphasizes maintaining unfragmented natural habitats for caribou and the maintenance of buffers to control siltation and prevent loss of streambank cover.

Effects due to facility and infrastructure development (most importantly, roads that may provide access to the Christina Lake Caribou Area and Christina Lake/Jackfish River in the LSA) can be mitigated in a variety of ways. New access routes will not be located near or block access to lakes or rivers used for sport fishing, including Christina Lake. To deter non-Project traffic, MEG will use signage on the main access road and at the start of the access roads to the Project and utility corridors. Gates will be installed at the Central Plant. New access will not be developed into the main recreational areas (i.e., Christina, Winefred and Grist lakes). With regard to wildlife habitat enhancement, access management and revegetation may occur on some existing linear disturbances in an effort to enhance habitat for moose and caribou. Any access management decisions made by MEG for the purposes of wildlife enhancement will be made in consultation with AENV and ASRD.

Mitigation for increased use of ESAs in the region may include shift arrangements that deter workers from engaging in recreational activities or by educating workers about the responsible use of existing recreational facilities on Christina, Winefred and Grist lakes.

3.5.2.3 Effects Analysis

Site Clearing Effects

Site clearing activities within environmentally important areas will occur in the Christina Lake Caribou Area, the Christina Lake/Jackfish River ESA and to a lesser extent in the Winefred/Grist Watershed. In addition to existing disturbances of 310 ha, a total of 1,718 ha will be cleared for the Project, making the total disturbance are area in the LSA 2,028 ha. Table 3.5-2 summarizes the area of each ESA that will be cleared by the Project.

Table 3.5-2 Site Clearing of Environmentally Significant Areas

ESA	Area of ESA [ha]	Area Cleared [ha]	% of ESA	% of Footprint Area	% of LSA
Christina Lake Caribou Area	101,502	1,010	1.0	49.8	2.9
Christina Lake/Jackfish River	11,893	150	1.3	7.4	<1
Winefred/Grist Watershed	92,548	20	<1	1.0	<1

Site clearing will negatively affect wildlife and vegetation (e.g., forests and berry habitat). The magnitude of the effect on ESAs will be negligible and the effect will be on a local scale until after Project operation and reclamation is complete. For the purpose of assessing the frequency of effects on ESAs, it was assumed that site clearing effects are reversible through reclamation and that site clearing activities will occur twice in the Christina Lake Caribou Area; once for Phase 3A and once for Phase 3B. Site clearing will occur once in the Christina Lake/Jackfish River ESA and once in the Winefred/Grist Watershed.

Facility and Infrastructure Development Effects

Effects from increased access due to facility and infrastructure development will increase the use of the ESAs in the LSA. The effect of increased access to ESAs depends on the type of area involved. Environmentally Significant Areas that are designated primarily for recreation are assumed to benefit from increased use (i.e., more effective use of the resource). However, ESAs that are intended primarily for the protection of sensitive environmental features are assumed to experience negative effects as a result of increased use (i.e., damage to the resource).

The Christina Lake Caribou Area, Christina Lake/Jackfish River and the Winefred/Grist Watershed are areas intended for the protection of sensitive environmental features (e.g., caribou, waterfowl, river otter, walleye and lake trout habitats). The effects on these areas, as a result of improved access, are considered negative. However, aside from the Caribou Area, these areas are also deemed significant because they are, or support, important sport fisheries. Increasing access for resource users (i.e., anglers) will be positive. Although considered positive for resource users from an access perspective, an increase in access and in resource users could be negative from the perspective of maintenance of species and habitat.

The effect will be generally negative for the Christina Lake Caribou Area and Christina Lake/Jackfish River. The effect will be neutral for the Winefred/Grist Watershed given the small area of the ESA affected by Project development. The magnitude of the effect to the Christina Lake ESAs will be negligible and will affect the ESAs on a local scale until after reclamation is complete.

Increased Population Effects

The effect of a larger population of resource users living in camps (shadow populations) with access to the LSA may be negative for ESAs whose principal function is to provide protection for important natural features, for the same reason that improved access may be harmful. The Project will result in no measurable change to the population of the RSA and less than a 10% increase in populations beyond the RSA. Population increases can lead to increased use of ESAs and this effect is generally negative as protection of important natural features is a principal function of ESAs in the RSA. The magnitude of the effect will be negligible and will affect ESAs on a regional scale for the life of the Project. Resource use will be continuous during the construction and operation of the Project. Effects are reversible if resource use decreases following reclamation.

3.5.2.4 Residual Impact Classification

Resource use occurs as an interaction between people (resource users) and natural resources. Both people and resources must be considered to evaluate effects on resource use due to the Project. The principal effects of the Project on ESAs will occur due to site clearing in the Christina Lake Caribou Area and due to potential increased use of this area as a result of better access. All of these effects are expected to be negligible (Table 3.5-3).

Table 3.5-3 Residual Impact Classification for Environmentally Significant Areas

Category	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Environmental Consequences
Site Clearing Effects							
Christina Lake Caribou Area	negative	low (+5)	local (0)	long-term (+2)	moderate (+1)	reversible (-3)	negligible (+5)
Christina Lake/Jackfish River	negative	low (+5)	local (0)	long-term (+2)	low (0)	reversible (-3)	negligible (+4)
Winefred/Grist Watershed	neutral	negligible (0)	local (0)	long-term (+2)	low (0)	reversible (-3)	negligible (-1)
Facility and Infrastructure Development Effects							
Christina Lake Caribou Area	negative	low (+5)	local (0)	long-term (+2)	low (0)	reversible (-3)	negligible (+4)
Christina Lake/Jackfish River	negative	low (+5)	local (0)	long-term (+2)	low (0)	reversible (-3)	negligible (+4)
Winefred/Grist Watershed	neutral	negligible (0)	local (0)	long-term (+2)	low (0)	reversible (-3)	negligible (-1)
Population Effects							
ESAs within RSA	negative	negligible (0)	regional (+1)	medium-term (+1)	high (+2)	reversible (-3)	negligible (+1)

3.5.2.5 Monitoring

There is no monitoring planned specifically for environmentally significant areas. However, MEG expects that through its involvement CEMA's Sustainable Ecosystems Working Group (SEWG) that these issues will be dealt with on a regional basis to address issues affecting environmentally significant areas.

MEG will implement a Conservation and Reclamation Plan (Volume 1, Section 6), a Wildlife Monitoring Program (Volume 5, Section 8), and Hydrogeology, Hydrology, Water Quality and Fish and Fish Habitat monitoring programs (Volume 4, Section 7).

3.5.3 Effects on Resource Use and Users

The following Key Question is addressed in this section:

RUPC-2: What effects could existing and approved developments and the Project have on natural resource use and users?

For the purposes of this assessment, natural resource users include people who extract gravel, participate in forestry, pick berries, hunt, trap, fish or otherwise use the natural resources in the LSA. To use natural resources, the resources themselves must be available and users must have access to them.

3.5.3.1 Linkage Analysis

A number of potential linkages were analyzed for the effect of the Project on natural resource use and users (Figure 3.5-1). These are listed in Table 3.5-4. The validity of each linkage is summarized in the table and explained below.

Table 3.5-4 Validity of Linkages for Resource Uses

Key Question	Linkage	Resource or Resource Use Activity	Valid Linkage
RUPC-2	site clearing and resource use	agriculture	no
		forestry	yes
		hunting	yes
		trapping	yes
		fishing	no
		berry picking	yes
		non-consumptive recreation	yes
		aggregate resources	no
	facility and infrastructure development (including change in access and resource use)	agriculture	no
		forestry	no
		hunting	yes
		trapping	yes
		fishing	no
		berry picking	yes
		non-consumptive recreation	yes
		access	yes
		aggregate resources	yes
	changes in population leading to changes in resource use	public resource use (hunting, fishing, berry picking, recreation)	yes
		industrial resource use (agriculture, forestry, aggregates)	no

Site Clearing Linkages

Agriculture

Site clearing resulting in loss or alteration of terrain or soils may make an area unusable for agricultural use. However, since there is no agricultural activity in the LSA, the linkage is invalid.

Forestry

Current five-year harvest plans include the harvesting of forest resources within the LSA. Site clearing due to the Project will disturb 629 ha of productive forest. As well, site clearing will affect timber harvesting since timber will be harvested and salvaged out of the scheduled forest management sequence. Within Al-Pac's Forest-Management Area (FMA 11), future harvesting plans may be affected by the Project. Following reclamation, the forest will not be available for harvesting for between 50 and 80 years. Therefore, the linkage is valid.

Hunting and Trapping

Site clearing can cause wildlife mortality, displace wildlife and restrict movement. The linkage between site clearing and change in wildlife populations and distribution is valid. The effects of site clearing on wildlife are assessed in the wildlife impact assessment (Volume 5, Section 6.3). Hunting and trapping occur in and around the LSA, and the Project will affect those activities. Both linkages are valid.

Fishing

Christina Lake is located within the Aquatic LSA. Sport fishing is popular on Christina Lake and commercial and sport fishing occurs on several lakes in the Aquatic RSA. Site clearing activities are not expected to affect fishing activity as effects due to site disturbances including increased runoff are not expected to have a significant effect on the Jackfish River and effects on the Christina River and Christina Lake can be mitigated by flow detention measures and erosion control measures in local receiving streams as required (Volume 4, Section 5.2.2). The watershed for Winefred and Grist Lakes overlaps the LSA; however, site clearing is not expected to affect fishing on those lakes (Volume 4, Section 4.4), therefore the linkage is invalid.

Berry Picking

Site clearing could impact berry picking opportunities, since some areas of high berry potential are located in the LSA. Therefore, the linkage is valid.

Non-Consumptive Recreation

The linkage for effects on non-consumptive recreational activities due to site clearing is valid, as a variety of recreational activities (e.g., ATV use, snowmobiling and hiking) have the potential to occur in the LSA.

Aggregate Resources

While several surface material dispositions exist near and in the LSA, all of those within the LSA are for clay (Appendix 6-II). There are no known sand or gravel deposits within the LSA; thus aggregate resources will not be compromised due to site clearing and the linkage is invalid.

Facility and Infrastructure Development Linkages

Agriculture

The linkage is invalid as there is no agricultural activity in the LSA.

Forestry

Effects on forestry are limited to site clearing and associated activities. The linkage for effects on forestry due to facility and infrastructure development is invalid.

Hunting and Trapping

Hunting and trapping occur in the LSA, and the development of the Project will affect those activities, therefore both linkages are valid.

Fishing

Fishing was assessed by analyzing effects on fish and fish habitat and access effects. Sport fishing will likely not be affected as a result of the construction and operation of the Project. Access to waterbodies and watercourses in the Aquatic LSA, including Christina Lake, will not increase due to the Project. Therefore, the linkage is invalid.

Berry Picking

Construction of new access in the LSA may increase the opportunities for berry picking: therefore, the linkage is valid.

Non-Consumptive Recreation

Non-consumptive recreational activities such as ATV use, camping, bird watching and boating have been documented near the LSA in the Conklin and Christina Lake area. Increased access to the LSA due to the Project may lead to increased land use for non-consumptive recreational activities: therefore, the linkage is valid.

Access

There will be restriction of access for the Project, which may be reopened after Project closure. Access to source wells, disposal wells and production wellpads will not be restricted, although critical components of this infrastructure will be secured. New access routes will not be located near, or block access to, lakes or rivers used for sport fishing. MEG will use signage on the main access road and at the start of both the access road to the Project and utility corridors to deter non-Project traffic. A security gate will remain in place on MEG's access road to track access into the area. Gates will be installed at the plant sites. New access will not be developed into the main recreational areas (Christina, Winefred and Grist lakes). The linkage is valid due to the development of new unrestricted access to source wells, disposal wells and production wellpad locations.

Aggregate Resources

Facility and infrastructure development will require aggregate resources for construction, therefore the linkage is valid.

Increased Population Linkages

Public Resource Use

The Project will provide employment opportunities that will lead to changes in the workforce population. MEG will provide accommodation for all construction and operations workers in camps within the LSA. Although MEG will use signage and training to deter these activities, there is the potential for these workers to engage in resource use activities including fishing, hunting, berry picking, and non-consumptive recreation during the life of the Project. The linkage is valid.

Industrial Resource Use

The change in the workforce population does not have a direct relationship to resource use by industry. Changes in agriculture, forestry and the use of aggregate resources are not expected to be affected by the workforce population, therefore, the linkage is invalid.

3.5.3.2 Mitigation

Integration With Other Users in the Local Study Area

MEG will operate in an open, transparent and consultative manner. The company will be proactive in communicating plans for exploration and development with the regulatory agencies and other local stakeholders. MEG will strive to comply with other land use regional plans overlapping with the operating area and all regulatory procedures for application and consent.

Al-Pac will be contacted prior to application to co-ordinate MEG's development with Al-Pac's activities in an effort to integrate land use planning.

MEG will also address access management, corridor planning and aesthetic concerns in consultation with stockholders and ASRD.

Forestry

Effects on forestry will be mitigated through discussions and agreements with Al-Pac. The road use agreement between MEG and Al-Pac will improve access for forestry activities and prevent resource use conflicts between the Project and Al-Pac. As well, timber salvage will conducted. Wherever merchantable timber is encountered efforts will be made to locate activities and developments outside of merchantable timber stands. In those areas where site clearing cannot be avoided, salvage operations will be conducted in accordance with the standard FMA salvage criteria. Furthermore, trees will be felled onto existing clearings to avoid adjacent timber damage and tree removal will not occur outside of the approved disposition boundary unless deemed hazardous to both people and equipment. All necessary consent and notification requirements will be confirmed with Al-Pac before activities begin.

To minimize disturbance of the Christina Lake Caribou Area ESA all efforts will be made to have salvage removed by the FMA holder in a location suitable for minimizing additional access through the ESA.

In an effort to integrate development plans with harvesting activities, MEG is committed to working with Al-Pac to co-ordinate efforts when working in similar areas. MEG's timber salvage operations include but are not limited to:

- salvaging timber concurrently with operation activities;
- sharing portions of rights-of-way as much as practical;
- felling all timber on the rights-of-way to avoid damaging vegetation and wildlife habitat;
- removing timber that is a safety concern; and
- using non-salvageable timber for rollback use, where it is applicable.

MEG will be billed by Al-Pac for any merchantable timber loss.

Hunting and Trapping

Effects on hunting and trapping will be mitigated through wildlife monitoring and habitat enhancement. Hunting will not be permitted on the Project site. Alberta Hunting Regulations include prohibiting the discharge of a weapon within 183 m of any occupied building (ASRD 2007). Regulations also prohibit the discharge of a firearm from, or causing a projectile from a firearm to pass along or across, a road that is paved, oiled, graded or regularly maintained (ASRD 2007). These prohibitions will apply to facilities and access on the Project site.

Trappers

Trappers will be identified and compensated based on the type and amount of disturbance to their trapline and may be permitted to continue trapping in areas of their traplines that are undisturbed by the Project.

Fishing

MEG will not block access to lakes and rivers supporting sport fish.

Berry Picking

Effects to potential berry habitat will be mitigated through reclamation. There will be an 89% increase in berry habitat following reclamation.

Access

Roads and increased access by the public is an issue that must be addressed by all developers. Mitigation plans are established at the onset of a project and must be considered in the environmental and social assessment of the Project. The Transportation Subgroup of the Athabasca Regional Issues Working Group (RIWG), which includes Alberta Infrastructure and Transportation, is tasked with analyzing transportation and access issues in the RSA.

Access for non-consumptive recreation and resource use will improve during the Project. Access management and revegetation may occur on some existing linear disturbances in an effort to enhance habitat for moose and caribou. Any access management decisions made by MEG for the purposes of wildlife enhancement will be made in consultation with AENV and ASRD. Roads may remain following the operation phase; such end land use decisions will be determined by ASRD and other stakeholders.

Further details on mitigation for wildlife, fish and habitat are provided in the Wildlife Assessment (Volume 5, Section 6.3) and the Fish and Fish Habitat Assessment (Volume 4, Section 5.4).

Aggregate Resources

MEG will require aggregate resources for facility and infrastructure development. MEG will use one of a number of regional sources of gravel that have emerged in the past couple of years, including one source that is north of the Project (south of Janvier) and another source that is north of Lac La Biche. MEG continues to evaluate other options for gravel, as there are several local contractors working to develop gravel resources in the area. MEG will attempt to source gravel from local suppliers as long as an economic local alternative exists. Aggregates will be salvaged and stockpiled with input provided by Alberta Infrastructure and Transportation and ASRD. MEG will work to reduce the volume of gravel required through recycling, where practical. Recycling could be achieved by removing gravel from decommissioned wellpads and moving it to newly constructed wellpads. This will reduce the amount of off-site granular resources required.

3.5.3.3 Effects Analysis

Site Clearing Effects

Forestry

Forestry was assessed with respect to the effects on merchantable timber. Trees will be lost due to site clearing activities during construction and operations phases. MEG will salvage all merchantable timber unless a waiver has been obtained from ASRD. Forest regeneration to commercial standards will require 50 years for aspen and 80 years for coniferous species. The largest loss of economic forest within the LSA will be in good rated stands (435 ha) (Table 3.5-5). In the Far Future (approximately 80 years), good to fair rated stands will increase by 871 ha (12%).

Site clearing activities will impact Annual Allowable Cuts (AAC) in FMU L11. The spatial AAC for coniferous and deciduous forest is 653,073 m^3/year. Site clearing will decrease the expected yearly growth in FMU L11 by an average of 1,361 m^3/year. This is less than 1% of the total AAC for FMU L11.

Following reclamation, the net change to expected yearly growth will be positive and increase by an average of 433 m^3/year of coniferous fibre and 439 m^3/year of deciduous fibre. The level of productive forest in the development area will improve following reclamation.

Table 3.5-5 Direct Losses/Alterations of Economic Forests in the Local Study Area

Timber Productivity Rating	EAC		Loss/Alteration Due to Project		Far Future[a]		Net Change		
	[ha]	% LSA	[ha]	% LSA	[ha]	[%]	[ha]	% LSA	% Resource
good	3,427	10	435	1	3,700	11	272	1	8
medium	3,158	9	183	1	3,769	11	611	2	19
fair	654	2	12	<1	642	2	-12	-<1	-2
timber productive subtotal (good, medium and fair)	*7,239*	*21*	*629*	*2*	*8,110*	*24*	*871*	*3*	*25*
unproductive	27,123	79	1,399	4	26,252	76	-872	-3	-3
Total	**34,362**	**100**	**2,028**	**6**	**34,362**	**100**	**0**	**0**	**22**

[a] Far Future refers to the landscape following reclamation which is approximately 80 years.

Note: Some numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

The effect to economic forests is considered negative during operations, due to lack of tree growth in the development footprint, and positive following reclamation, due to a net increase in good to fair rated stands and expected yearly growth. The magnitude of the effect will be low and will affect forestry on a local scale until after reclamation (i.e., long-term). The effects of site clearing are reversible through reclamation. Site clearing will occur once for the Project. The overall environmental consequence of site clearing on forestry is negligible.

Hunting and Trapping

The Project will result in a loss of wildlife habitat during, and in some cases extending far past the life of the Project. Direct (i.e., site clearing) and indirect effects (i.e., sensory disturbance and fragmentation) of the Project on wildlife and wildlife habitat are assessed in the Wildlife Assessment (Volume 5, Section 6.3) and are deemed negligible to moderate in the LSA and RSA. Direct and indirect effects on hunted and trapped species (i.e., black bear, moose, beaver, fisher and lynx) were assessed as negligible to high in the LSA and negligible to moderate in the RSA. Direct effects were assessed as moderate for black bears in the LSA and negligible for black bears in the RSA. Indirect effects for black bears in the LSA and RSA are high and moderate respectively. Direct and indirect effects were assessed as negligible for moose, beaver, fisher and lynx in the LSA and RSA.

These effects will have corresponding effects on hunters and trappers. Effects in the RSA are considered a more appropriate metric for hunters as hunters will be able to adjust their hunting areas (out of the LSA) if they are affected by the Project. Effects in the LSA are considered a more appropriate metric for trappers as sometimes large portions of their traplines overlap the LSA. Table 3.5-6 shows the area of WMU 517 and the areas of the RFMAs that will be cleared as a result of the Project.

Table 3.5-6 Site Clearing of Wildlife Management Unit 517 and Registered Fur Management Areas

Management Area	Area [ha]	Total Cleared Area in LSA [ha]	% of WMU/RFMA Cleared
WMU 517	498,072	2,028	0.4
RFMA 615	16,452	380	2.3
RFMA 933	15,074	41	0.3
RFMA 1544	8,898	46	0.5
RFMA 1326	22,110	818	3.7
RFMA 1595	13,253	614	4.6
RFMA 2313 (not including Christina Lake)	12,835	130	1.0

In total, effects on hunting and trapping due to site clearing are expected to be negative. The magnitude of the effect will be low for trappers and negligible for hunters and will affect hunting on a regional scale and trapping on a local scale. The effect is reversible and continuous as effects will occur every hunting season and wherever trapping occurs until after reclamation of the Project. The environmental consequence of site clearing is negligible for hunting and low for trapping.

Berry Picking

The percent of berry habitat in the LSA is lower than that of the RSA. The LSA is distant from communities in the region, including Lac La Biche where much of this activity is centred. Therefore, the LSA is considered to have low importance for berry picking for non-traditional users.

Berry picking was assessed by analyzing the effects to the berry producing plants. Each vegetation type within the LSA that was considered to have berry producing potential was determined, and the effects were evaluated by overlaying Project footprint berry picking areas using Geographic Information Systems (GIS).

The LSA has 4,473 ha of blueberry habitat, 2,453 ha of cranberry habitat, 404 ha of strawberry habitat and 77 ha of raspberry habitat, representing approximately 22% of the LSA. Compared to the RSA as a whole, the LSA has a relatively small proportion of berry picking habitats. Table 3.5-7 summarizes the effects of the Project on potential berry habitat. After reclamation, berry picking habitat is expected to increase by approximately 927 ha.

Table 3.5-7 Effects of the Project on Vegetation Types With Berry Potential

Baseline		Project		After Reclamation		
Berry Habitat	Area [ha]	Loss/Alteration [ha]	% of Baseline Berry Potential	Berry Habitat [ha]	Net Change [ha]	% Change
blueberry	4,473	238	5	5,084	611	14
cranberry	2,453	372	15	2,467	14	1
raspberry	77	1	1	76	-1	-1
strawberry	404	29	7	707	303	75
Total	**7,407**	**640**	**28**	**8,334**	**927**	**89**

The effect of the Project on berry picking habitat will be negative during operations and positive following reclamation. The magnitude of the effect will be negligible due to the low number of resource users affected and will affect berry picking on a local scale only. The effect is reversible. Site clearing will occur once for each site within the Project. The environmental consequence of site clearing on potential berry picking habitat is negligible.

Non-Consumptive Recreation

Site clearing activities will provide new opportunities for non-consumptive recreational activities in the LSA during the Project. The effect of site clearing on recreation is therefore positive. Site clearing will increase disturbance in the LSA from 310 ha to 2,028 ha but the magnitude of the effect is limited by the low population of the local area and because access will be somewhat restricted during construction and operations to deter non-Project traffic on site (Section 3.5.3.1). Site clearing will affect non-consumptive recreation on a local scale for the life of the Project, is reversible and will occur once. The environmental consequence of site clearing on non-consumptive recreation is negligible.

Facility and Infrastructure Development Effects

Access Effects on Hunting, Trapping, Berry Picking and Non-Consumptive Recreation

New roads allow entrance into areas that were inaccessible to the public before development activities. For instance, paving of Secondary Highway 881 was completed in August 2007. This improvement was in response to increasing use of this road, primarily by industry. While hunters and other resource users support the improved access provided by paved roads, Aboriginal people have expressed concerns about increasing entry into traditional use areas; for a more detailed discussion of Aboriginal concerns see the Traditional Land Use Assessment (Section 2). As a result of improved access, areas used by trappers, hunters and anglers are becoming more accessible to a larger user group. Although access improves the capacity of individuals to use resources, it can also increase the demand for those resources, putting them under increased pressure.

Access effects are assessed by comparing the change in area used for roads, trails, cutlines and other linear developments from the EAC to the maximum development condition. During the life of the Project additional linear disturbances (i.e., pipelines, roads and transmission lines) will increase existing disturbance in the LSA (310 ha) by 737 ha. This represents a 132% increase in linear disturbances, providing additional access to the LSA. The density of access in the LSA is greater than in the RSA (1.63 km per km^2) and will increase from 11.31 to 12.41 km per km^2 during the life of the Project.

This change is considered a positive impact for access and resource use, since increasing access will increase the availability of all of the resources along the route and improve access for non-consumptive recreation. While access density will increase in the LSA by 9.7% the likely resource use levels will be low due to the low population of the local area and its distance from larger centres outside the RSA. The magnitude of the impact is therefore low and will affect resource use on a local scale for the life of the Project. Roads may remain following the operations phase but such end land use decisions will be determined by ASRD and other stakeholders. Access can be restricted and reclaimed, therefore the impact is reversible. Roads and cutlines will be built once and thus frequency is low. The environmental consequence of increased access on hunting, trapping, berry picking and non-consumptive recreation is negligible.

Aggregate Resources

According to a survey conducted by the Athabasca Regional Issues Working Group there is a total supply of road base aggregate of 1,009,218 m^3 with an annual demand in the survey region "South of Fort McMurray" of 290,159 m^3 (RIWG 2003). Discoveries made since 2002 are not included in this supply estimate.

Detailed information concerning the annual gravel production or volumes of existing gravel sources in the region is not available and is considered a regional deficiency, however, there is potential for the discovery of additional resources during the Project life. The Project will require a total of approximately 3,239,515 m^3 of gravel and 19,226,933 m^3 of clay. Table 3.5-8 details the aggregate resource needs estimate for Phase 3.

Table 3.5-8 Estimated Aggregate Resource Needs for Phase 3

Assumptions	Volume of Clay [m^3]	Gravel [m^3]	Total Area [ha]
upland wellpads	818,590	175,412	117
wetlands wellpads	6,665,658	1,052,472	351
roads	5,612,583	841,887	281
upland rights-of-way	1,768,978	279,312	93
wetlands rights-of-way	1,955,186	418,968	279
plant and camps (upland)	1,623,968	347,993	232
pump stations, source and disposal wells (wetlands)	781,970	123,469	41
Total requiring aggregate	**19,226,933**	**3,239,513**	**1,394**
Total not requiring aggregate			**634**
Total footprint area			**2,028**

Note: Some numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

MEG is evaluating sources of aggregate, with consideration of one of a number of regional sources of gravel that have emerged in the past couple of years, one source is north of the Project (south of Janvier), while the other source is north of Lac La Biche. MEG will continue to evaluate other options for gravel, as there are several local contractors working to develop area gravel resources.

While Phase 3 requires 10% of known road base aggregate resources in the RMWB the assumption can be made that recent and future discoveries of aggregate resources, or the use of alternatives such as crushed rock, will occur in a market-driven fashion to replace a large proportion of the resource that will be used. Therefore, the magnitude of the impact of facility and infrastructure development on aggregate resources in the RMWB is considered low (refer to Appendix 6-II, Table 8 for detailed aggregate resource statistics). Development will affect aggregate resources on a beyond regional scale as aggregates will likely need to be sourced from reserves outside of the RSA and the RMWB. The duration of the facility and infrastructure development will primarily be medium-term and the effects are irreversible as aggregates are non-renewable resources. MEG will work to reduce the volume of gravel required through recycling, where practical. Recycling could be achieved by removing gravel from decommissioned wellpads and moving it to newly constructed wellpads. This will reduce the amount of off-site granular resources required. Development of each site will occur once. The environmental consequences to aggregate resources are moderate.

Increased Population Effects

Public Resource Use

As described in the Socio-Economics Assessment (Section 6), during construction, although the workforce is forecasted to peak at over 1,000 workers, the population of the socio-economic LSA is not expected to grow as a result of the Project. During operations the Project may result in a population increase of up to 162 people.

Accommodation will be available for all construction and operations workers in on-site camps. For Phases 3A and 3B, preliminary estimates of peak construction workforce is approximately 1,139. From 2014 to 2039 the projected number of operations workers will be approximately 306. The projected limited availability of skilled operations labour in the oil sands industry (Emery 2006) means that most of the positions will likely be filled by people who will be flown or transported by bus into the region from outside the RSA.

It is anticipated that most permanent workers will be based out of large centres outside the RSA including but not limited to Edmonton, Calgary, Medicine Hat, Saskatoon and Victoria (85% of the current operation workforce (CLRP Phase 2) resides in these cities). Other workers will likely be based out of centres closer to but still outside the RSA including but not limited to Lac La Biche, Cold Lake, Bonnyville, Plamondon, St. Paul and Millet (15% of the current operational workforce resides in these communities). During construction and operations phases, workers will be housed at on-site camps wherever possible. Shift, transportation and accommodation arrangements are such that it is unlikely that many workers will permanently relocate to areas closer to the Project.

Many industrial work camps are located transiently in areas around the RSA. Camp residents were surveyed in 2003 by Nichols Applied Management for the RIWG to determine the effects of this population on social, economic and environmental resources in Fort McMurray (Nichols Applied Management and Economic Consultants 2003). Although the results are not specific to the RSA, they can indicate the tendencies of camp users. The survey found that backcountry areas did not appear to be highly utilized by camp residents. Seventy percent of survey respondents indicated that they did not engage in backcountry activities (Nichols Applied Management and Economic Consultants 2003). Survey analysis suggests that this value understates actual backcountry use. Residents in camps further from Fort McMurray (e.g., PTI Lodge) pursued backcountry activities such as fishing, hunting, camping, off-roading and snowmobiling more often than those in camps closer to town. Also, residents who have been in camp for longer than six months were more likely to participate in backcountry activities than newcomers (Nichols Applied Management and Economic Consultants 2003).

The increased workforce is expected to result in increased pressure on hunting and fishing in the areas immediately adjacent to the LSA such as Christina Lake and Winefred Lake. The magnitude of pressure on sport fishing is low due to ASRD's ability to control fishing with quotas. MEG shift arrangements may also mitigate increased pressure as workers may be less likely to engage in outdoor recreational activity while staying in camp due to shift length (i.e., 12 hours). The workforce population changes are also expected to result in increased use of berry habitat.

An increase in use for areas designated primarily for recreation is considered positive. However, if recreational activities were to take place in environmentally important areas designated primarily for preservation of natural features then the effect would be considered negative. Increased access to the ESAs in the RSA is considered negative (see RUPC-1).

Effects on resource use due to an increased population within and in areas beyond the RSA will generally be positive. The magnitude of the effect will range from moderate during peak construction to low during operations and will affect resource use on a primarily regional scale for the life of the Project. The effects are reversible if access is reclaimed. Population changes will occur more than once. The environmental consequence of an increased population to resource use is negligible to low.

3.5.3.4 Residual Impact Classification

The overall environmental consequence to resource use is rated as low (Table 3.5-9). Resource use involves both people and natural resources, therefore both must be considered. Since there will be increased access and changes in the workforce population in construction and operations phases, it is anticipated that more people will use the natural resources. This combined with the negligible to moderate effects to the natural environment will result in negligible to low effects on resource use.

Table 3.5-9 Residual Impact Classification for Natural Resource Use and Users for the Project Case

Category	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Environmental Consequence
Site Clearing Effects							
forestry	negative (operations); positive (closure)	low (+5)	local (0)	long-term (+2)	moderate (+1)	reversible (-3)	negligible (+5)
hunting	negative	negligible (0)	regional (+1)	long-term (+2)	high (+2)	reversible (-3)	negligible (+2)
trapping	negative	low (+5)	local (0)	long-term (+2)	high (+2)	reversible (-3)	low (+6)
berry picking	negative (operations); positive closure)	negligible (0)	local (0)	long-term (+2)	moderate (+1)	reversible (-3)	negligible (0)
non-consumptive recreation	positive	low (+5)	local (0)	medium-term (+1)	moderate (+1)	Reversible (-3)	negligible (+4)
Facility and Infrastructure Development Effects							
aggregate resources	negative	low (+5)	beyond regional (+2)	medium-term (+1)	low (0)	irreversible (+3)	moderate (+11)
access effects on hunting, berry picking, recreation	positive	low (+5)	local (0)	medium-term (+1)	low (0)	Reversible (-3)	negligible (+3)
Increased Population Effects							
change in resource use activities (hunting, berry picking, fishing, recreation)	positive	moderate (+10) during peak construction and negligible (0) during operations	regional (+1)	medium-term (+1)	moderate (+1)	reversible (-3)	negligible (0) to low (+10)

3.5.3.5 Monitoring

Monitoring of resource use by MEG is not required or planned. However, MEG will be involved with the CEMA SEWG and RIWG to ensure that resource and resource use issues are addressed at a regional scale.

MEG will implement a Conservation and Reclamation Plan (Volume 1, Section 6), a Wildlife Monitoring program (Volume 5, Section 8), and Hydrogeology, Hydrology, Water Quality and Fish and Fish Habitat monitoring programs (Volume 4, Section 7).

3.6 PLANNED DEVELOPMENT CASE

3.6.1 Introduction

The PDC assesses developments that have been publicly disclosed during the time period up to six months prior to the submission of the Project Application using two of the four key questions: RUPDC-1 and RUPDC-2.

The results of the assessment are presented in the following sections.

3.6.2 Effects on Environmentally Important Areas

The following key question is addressed in this section:

RUPDC-1: What effects could existing and approved developments, the Project, and planned developments have on environmentally important areas?

All effects identified from the Project as having valid environmental consequences may contribute to additive effects with planned projects in the region. Where linkages are invalid effects are not assessed for the PDC.

The effects from site clearing, facility and infrastructure development and workforce population change on environmentally important areas are all potential contributors to the PDC case, as these were valid for the Project Case.

3.6.2.1 Mitigation

Generally, mitigation will occur on a project by project basis. Mitigation of all projects that affect ESAs directly is expected to include reclamation of affected areas. Over time, market forces will drive operators of recreational facilities in environmentally important areas to increase their capacity.

3.6.2.2 Effects Analysis

Site Clearing and Facility and Infrastructure Development Effects

In addition to the Project, other existing and planned oil sands developments are expected to affect the ESAs in the RSA. This includes additional rights-of-way into the area, increasing access and clearing activities. Conservatively, the magnitude of the effect on the ESAs will increase to low for both site clearing and facility and infrastructure development, if all planned projects are considered. Effects will be regional, affecting areas outside the LSA. Effects for known planned projects will be long-term in duration, extending past the Life of the Project and will be reversible. Three planned projects, in addition to the Project and the four existing and approved projects assessed in the Project Case, will affect the area, resulting in a moderate frequency.

Change in Workforce Population Effects

The Project will act in combination with other planned projects to increase the population of centres outside the RSA, including Lac La Biche and Fort McMurray. This change is expected to increase usage rates of ESAs around the RSA, particularly highly accessible protected areas around Lac La Biche and Fort McMurray. This effect is generally positive, however for a few ESAs which are sensitive to use, it would be negative. Overall effects would remain low in magnitude and will affect ESAs beyond the RSA for the long-term. The effects are reversible with a decline in access into ESAs through reclamation and will occur with moderate frequency.

3.6.2.3 Residual Impact Classification

The overall environmental consequence to the ESAs that are sensitive to degradation with greater human use are considered under the PDC and presented in Table 3.6-1. The overall environmental consequence for these areas is low.

Table 3.6-1 Residual Impact Classification for Environmentally Significant Areas for the Planned Development Case

Category	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Environmental Consequence
site clearing and facility infrastructure effects	negative	low (+5)	regional (+1)	long-term (+2)	moderate (+1)	reversible (-3)	low (+6)
change in population	negative	low (+5)	beyond regional (+2)	long-term (+2)	moderate (+1)	reversible (-3)	low (+7)

3.6.3 Effects on Resource Use and Users

The following key question is addressed in this section:

RUPDC-2: What effects could existing and approved developments, the Project and planned developments have on natural resource use and users?

All effects identified from the Project as having valid environmental linkages may contribute to additive effects with future projects in the region. The PDC effects are assessed where the effects of a development overlap with those of other developments.

Valid, negative environmental linkages were identified in the Project Case for forestry, hunting, trapping, berry picking, and aggregates. Valid positive environmental linkages were identified in the Project case for non-consumptive recreation, access affects on hunting, trapping, berry picking, and recreation, and changes in resource use activities due to population increases. Other effects for the Project Case are invalid so are not assessed for the PDC.

3.6.3.1 Mitigation

Forestry

For each planned development occurring in the RSA, a separate negotiation will occur between project developers and forest rights holders. Historically, the operators of in-situ developments and forestry companies have been able to negotiate reasonable settlements and produce agreements to work together to resolve issues including access and appropriate reclamation techniques. For the PDC, it is expected that this means of mitigation will continue to be effective.

Hunting and Trapping

Hunting and trapping effects will be mitigated primarily through reclamation and other mitigation for wildlife as detailed in Volume 5, Section 3. For each planned development occurring in the RSA, trappers are compensated based on the type and amount of disturbance to their trapline.

Berry Picking

Berry picking effects will be mitigated through reclamation in the long term. Given that berry habitat types in the RSA are abundant, and impacts of projects occur at some distance from major population centres, any non-traditional users that are affected will be able to change their berry picking locations to alternatives that are no farther from their homes.

Aggregate Resources

Cumulative effects on aggregate resources will be mitigated over the long term through exploration and identification of new aggregate sources. Aggregate sources found during the construction and operation of projects will be reported to ASRD and salvaged. Effects on aggregate resources can also be mitigated through recycling during construction and reclamation of wellpads.

Population Effects

The effects of an increased regional population is generally positive, but will increase competition for some resources and could negatively affect existing resource users who are accustomed to present levels. Those likely to be negatively affected are recreationists, anglers and hunters who prefer quiet, remote activities. Generally, these individuals will still be able to find desirable areas for recreation by travelling farther from developed areas and population centres. Regional mitigation from planned projects and from government may include lending support to existing recreational facilities to concentrate new recreation in these areas and limit increased pressure on the landscape.

3.6.3.2 Effects Analysis

Site Clearing and Facility and Infrastructure Development Effects

Forestry

Clearing of land within the RSA under the PDC will be greater than the Project alone, due to planned projects. A decline will occur in land available for forestry until these areas are reclaimed. Forestry companies will generally have reduced annual allowable cuts in the medium term, although in most cases they are expected to be compensated for this. The magnitude of the effect is conservatively estimated to remain low. Effects will be regional in extent, long-term in duration, reversible and will occur with moderate frequency.

Hunting and Trapping

Considering the effects of planned projects on the RSA, the clearing of land will gradually increase, decreasing potential for some backcountry activities, including hunting and trapping. Hunters and trappers will generally be negatively affected, but with some positive effects (e.g., improved access). The magnitude of the effect for both hunting and trapping is conservatively estimated to be low. Effects will be regional in extent, long-term in duration, reversible and will occur with high frequency.

Berry Picking

Clearing of land within the RSA under the PDC will increase due to planned projects. However, berry picking intensity in areas of future planned projects in the RSA is low and increased access to the RSA may increase berry picking opportunities. The magnitude of the effect on berry habitat will be low. The effect will be regional in extent, long-term in duration, moderate in frequency and reversible.

Aggregate Resources

Numerous new projects requiring aggregates are planned in the RSA. However, making the assumption that future discoveries of aggregate resources, or the use of alternatives such as crushed rock, will occur in a market-driven fashion to replace a large proportion of that used, the magnitude of long-term cumulative aggregate extraction effects is expected to be moderate. The effect will be beyond regional, with some gravel being sourced outside the RSA. These effects will be irreversible and will occur with moderate frequency.

Population Effects

The Project will act in combination with other planned projects to increase the population of the Lac La Biche and Fort McMurray area. This change is expected to increase the intensity of activities such as recreation, fishing, and hunting throughout the RSA, as these are activities that the general public engages in. This effect is generally positive, but will increase competition for some resources and could negatively affect existing resource users who are used to present use levels. These negative effects would be low in magnitude, beyond regional in extent, long-term in duration, reversible and moderate in frequency.

3.6.3.3 Residual Impact Classification

The overall environmental consequences to resource uses and users considered under the PDC are presented in Table 3.6-2.

Table 3.6-2 Effects Description Criteria for Natural Resource Use and Users for the Planned Development Case

Category	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Environmental Consequence
Site Clearing and Infrastructure Development (Including Changes In Access) Effects							
forestry	negative (operations); positive (post-reclamation)	low (+5)	regional (+1)	long-term (+2)	moderate (+1)	reversible (-3)	low (+6)
hunting and trapping	negative	low (+5)	regional (+1)	long-term (+2)	high (+2)	reversible (-3)	low (+7)
berry picking	negative (operations); positive (post-reclamation)	low (+5)	regional (+1)	long-term (+2)	moderate (+1)	reversible (-3)	low (+6)
aggregates	negative	moderate (+10)	beyond regional (+2)	long-term (+2)	moderate (+1)	irreversible (+3)	high (+18)
Increased Population Effects							
change in public resource use activities (hunting, berry picking, fishing, recreation)	negative (increased competition)	low (+5)	beyond regional (+2)	long-term (+2)	moderate (+1)	reversible (-3)	low (+7)

3.7 CONCLUSIONS

Several resource uses were considered, spanning both public and industrial resource use to assess effects on resources and resource users, including:

- environmentally important areas;
- access;
- aggregate resources;
- agriculture;
- forestry;
- berry picking;
- hunting;
- trapping;
- fishing; and
- non-consumptive recreation.

Site clearing activities, facility and infrastructure development and increased workforce and population are principal effects from the Project on environmentally significant areas. Effects from site clearing activities and facility and infrastructure development are expected to be negligible. The effects of an increased workforce during construction and operations phases on ESAs are also expected to be negligible.

Agricultural activity will not be affected because there is no agricultural activity occurring within the LSA. Effects on resource use are moderate for aggregate resources and negligible for forestry, berry picking and hunting. Effects are low for trapping. The Project will have positive effects on non-consumptive recreation and on public resource use.

Effects within the PDC are considered for effects on environmentally significant areas. The PDC impacts are expected to be low for site clearing and facility and infrastructure development impacts on the ESAs. The PDC impacts will also be low for population-driven effects on environmentally important areas throughout the RSA.

Site clearing and facility and infrastructure effects within the PDC were considered for forestry, hunting, trapping, berry picking, aggregate resources and non-consumptive recreation. Population-driven effects were also considered on resources that the public will use throughout the RSA (hunting, fishing, berry picking and other recreation). Overall Project Case effects are negligible for ESAs, and negligible to low for resource use and resource users and moderate for aggregate resources. PDC effects for all existing, approved, and planned projects including the Project were determined to be low for ESA, low for public resource use and trapping, and high for aggregate resources.

Effects will be mitigated during reclamation (i.e., for berry habitat, forests and wildlife habitat) and recycling (i.e., for aggregate resources).

The mitigation of effects of planned projects in the RSA will mainly occur on a project by project basis. However, MEG will also address mitigations on a regional scale through participation in multi-stakeholder working groups including CEMA and RIWG. It is expected that projects will reclaim habitats to an equal or greater capability of key resource uses, and that projects will employ standard mitigation practices such as consultation with specific resource users who have interests in project areas, such as FMA holders.

3.8 REFERENCES

Alberta Environment. 2008. Final Terms of Reference. Environmental Impact Assessment Report for the MEG Energy Corporation Christina Lake Regional Project – Phase 3. Issued by Alberta Environment. Edmonton, AB.

ASRD (Alberta Sustainable Resource Development). 2007. 2007 Alberta Guide to Hunting Regulations. Sports Scene Publications Inc.

Emery, J.C. 2006. Alberta's Labour Market Needs to 2015. Institute for Sustainable Energy, Environment and Economy , University of Calgary. Calgary, AB.

Nichols (Nichols Applied Management and Economic Consultants). 2003. Survey of Residents of Construction Camps in the Wood Buffalo Region. Submitted to Regional Issues Working Group. August 2003. Edmonton, AB. 31 pp.

RIWG (Regional Issues Working Group). 2003. Aggregate Survey 2002. Fort McMurray, AB.

Westworth and Associates Ltd. 1990. Significant Natural Features of the Eastern Boreal Forest Region of Alberta. Technical Report. Prepared for Alberta Forestry, Lands and Wildlife. Edmonton, AB. 147 pp.

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4 VISUAL RESOURCES ASSESSMENT

4.1 INTRODUCTION

MEG Energy Corp. (MEG) is a Calgary-based, privately held energy company focused on the development and recovery of bitumen, shallow gas reserves and the generation of power in northeast Alberta. MEG's Christina Lake Regional Project (CLRP) consists of 80 sections of oil sands leases within the Regional Municipality of Wood Buffalo (RMWB), approximately 15 km southeast of Secondary Highway 881 and 20 km northeast of Conklin.

MEG currently has approval to construct and operate the first two phases of the CLRP over 23 sections of land. In addition, MEG is developing a facility expansion (Phase 2B) to increase the production capacity of the Central Plant to 60,000 barrels per day (bpd). The Phase 2B plant will be located immediately adjacent to the existing Phase 1 and 2 processing facilities.

MEG is now proposing a further expansion of the CLRP to fully develop its Christina Lake oil sands leases. The Christina Lake Regional Project – Phase 3 (the Project) is an expansion of the current CLRP development area and will use Steam Assisted Gravity Drainage (SAGD) bitumen recovery technology. The Project will consist of two additional processing facilities (Plants 3A and 3B), 138 SAGD multi-well pads and associated steam generating equipment. Plant 3A will be located in the southeast corner of the lease (Sections 20 and 29-76-4 W4M) and Plant 3B will be located in the northwest end of the lease (Sections 32 and 33-77-6 W4M).

Construction of the Project is proposed to occur in two phases. Phase 3A is anticipated to begin construction in 2010, with initial steam injection in 2012. Phase 3B is anticipated to begin construction in 2012, with initial steam injection in 2014. The operational life of each plant is expected to be 25 years. Total production from the two new plants will produce an incremental 150,000 bpd of bitumen (approximately 23,800 cubic metres per day). It is anticipated that reclamation of the Project will be complete by 2044.

Visual aesthetics is the study of the scenic quality of the landscape and the responses of users to the landscape. All landscapes have scenic quality, which varies according to their elements; however, the perception of the landscape can vary greatly depending on the type of user viewing the landscape. Scenic quality can vary depending on landforms, vegetation, water, colour, adjacent scenery, scarcity and cultural modifications. Responses of users depend on the type of users, amount of use, public interest, adjacent land uses and special areas (USDI 1986a).

The Visual Resources section of the Environmental Impact Assessment (EIA) for the Project provides a description of the existing and approved developments in the visual landscape, as well as an assessment of the potential effects of the Project. Finally, a description of the existing and approved developments, the Project and other planned developments in the visual landscape is provided. Changes caused by the development of the Project are modelled and the effects are assessed to meet the requirements of the Terms of Reference (TOR; AENV 2008). Effects potentially caused by the Project and other planned developments were assessed to a limited extent only, and modelling was not conducted for this case because information was not available.

4.1.1 Terms of Reference

This assessment was completed to meet the relevant TOR (AENV 2008) for the Project (Table 4.1-1) which state the following:

Table 4.1-1 Terms of Reference Concordance Table

TOR Section	Environmental Assessment or Topic	Location TOR Addressed
3.7 **Air Emissions Management**	[A] Provide an emissions profile (type, rate and source) for the Project 's operating emission including point and non-point sources and fugitive emissions, and for construction emissions. Consider both normal and upset conditions. Discuss the following: (a) odorous or visual emissions from the proposed facilities;	(a) Volume 6, Section 4.4 Project Case
3.10 **Conservation and Reclamation**	[A] Provide a conceptual reclamation plan for the Project that considers: (b) pre-development information with respect to land capability, vegetation, commercial forest land base by commercialism class, forest productivity, recreation, wildlife, aquatic resources, aesthetics and land use resources	b) Volume 6, Section 4.3 Existing and Approved Case
4.1.5 ***Modeling***	[A] For each model used in the in the assessment scenarios, provide: (a) a justification for the model used. Air quality modeling should be conducted in accordance with the latest edition of the Air Quality Modeling Guidelines published by Alberta Environment; (b) a documentation of the assumptions used to obtain the modeling predictions; and (c) a discussion of the limitations of the models used and how these limitations were addressed, including sources of error and relative accuracy.	[A] Volume 6, Section 4.2.4 Assessment Methods

Table 4.1-1 Terms of Reference Concordance Table (continued)

TOR Section	Environmental Assessment or Topic	Location TOR Addressed
4.2 Climate, Air Quality and Noise		
4.2.1 Baseline Information	[A] Discuss baseline climatic and air quality conditions in the area including the following: b) appropriate ambient air quality parameters such as SO_2, H_2S, total hydrocarbons (THC), NO_X, VOC, individual hydrocarbons of concern in the THC and VOC mixtures, ground-level ozone (O_3), visibility, representative heavy metals, and particulates (road dust, PM_{10} and $PM_{2.5}$).	(b) Volume 6, Section 4.2.1 Baseline Information
4.2.2 Impact Assessment	[A] Identify components of the Project that will affect local and regional air quality, and (a) describe the potential for reduced air quality (including odours and visibility) resulting from the Project and discuss any implications of the expected air quality for environmental protection and public health;	(a) Volume 6, Section 4.5 Project Case Volume 6, Section 4.2.2 Impact Assessment
4.10 Terrain and Soils		
4.10.2 Impact Assessment	(c) discuss the relevance of any changes for the local and regional landscapes, biodiversity, productivity, ecological integrity, aesthetics and future use resulting from disturbance during the life of the Project;	(c) Volume 6, Section 4.2.2 Impact Assessment

4.2 SCOPE OF ASSESSMENT

4.2.1 Key Issues and Key Questions

The key issues for the Project relate both to the infrastructure and the combined effects with other existing, approved and planned developments in the region. The following key questions have been developed to address the key issues:

Key Question VRPC-1: What effects could existing and approved developments and the Project have on visual resources?

Key Question VRPDC-1: What effects could existing and approved developments, the Project and planned developments have on visual resources?

4.2.2 Assessment Cases

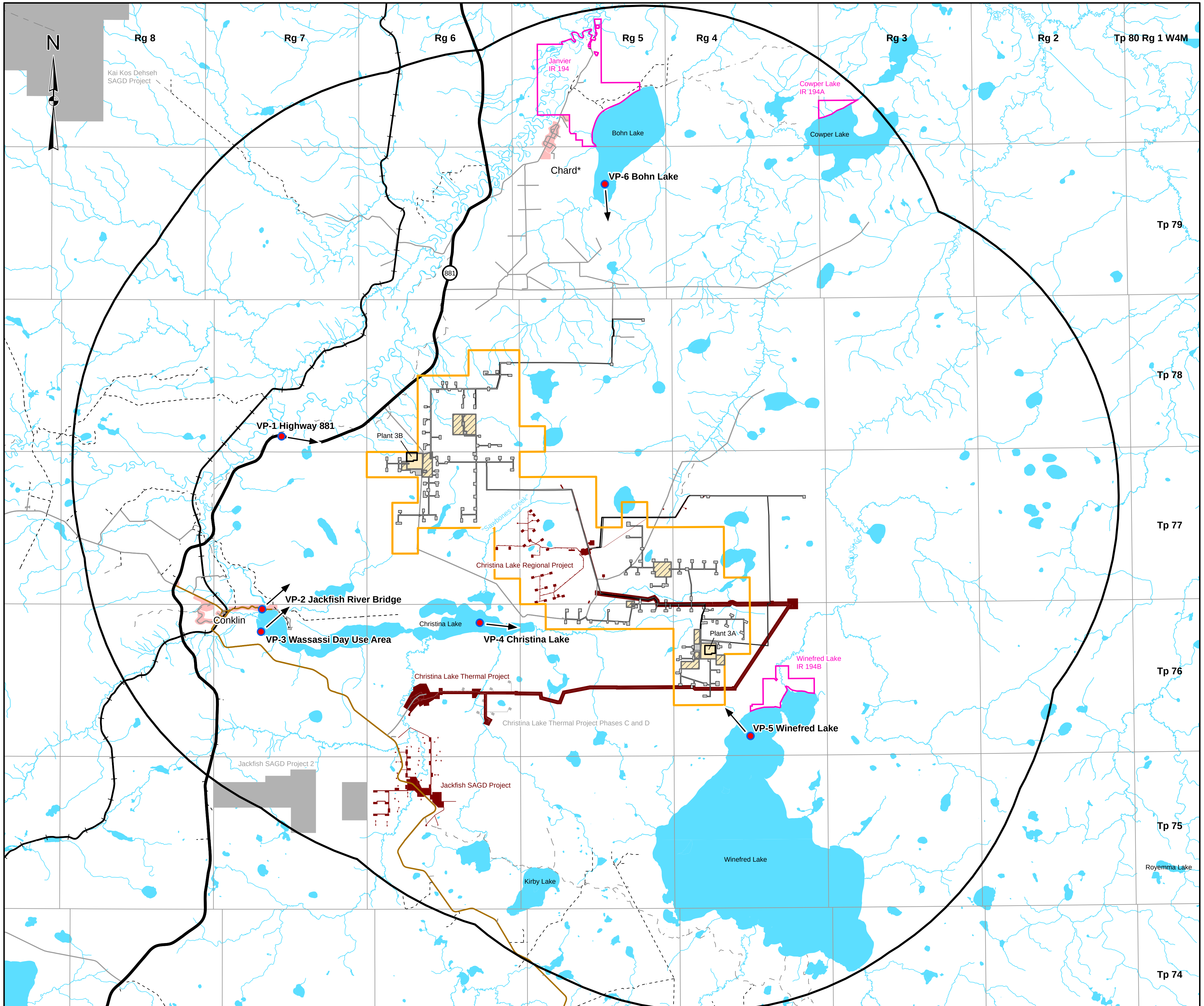
The development cases used for the Visual Resources assessment include an Existing and Approved Case (EAC), a Project Case and a Planned Development Case (PDC). The EAC includes those developments that already exist and those that have been approved but are not yet built. The Project Case includes existing and approved developments and the Project. The PDC considers any development that has been publicly disclosed up to six months prior to the submission of the Project Application.

4.2.3 Temporal and Spatial Considerations

The temporal consideration for the EAC is 2007, with both winter and summer conditions modelled.

One study area, the Visual Resources Regional Study Area (RSA), was identified for the assessment of potential effects on visual resources. The RSA included all areas within 20 km of the Project and is 282,578 ha (Figure 4.2-1). Areas beyond 20 km from the Project are likely to have limited or obstructed views of the Project due to distance, topography, atmospheric conditions and vegetation.

In addition to the Project, the RSA includes MEG's Christina Lake Regional Project, Devon Canada Corporation's (Devon) Jackfish Steam Assisted Gravity Drainage (SAGD) Project and EnCana FCCL Oil Sands Ltd. (EnCana) Christina Lake Thermal Project for the EAC. The RSA also includes Devon's Jackfish 2 SAGD Project, EnCana's Christina Lake Thermal Project Phases C and D, and StatoilHydro's Kai Kos Dehseh SAGD Project for the PDC.



LEGEND

- VIEWPOINT
- PAVED ROAD
- GRAVEL ROAD (2 LANE)
- GRAVEL ROAD (1 LANE)
- UNIMPROVED ROAD
- TRUCK TRAIL
- RAILWAY
- RIVER OR STREAM
- CHRISTINA LAKE PHASE 3 FOOTPRINT
- MEG LEASE BOUNDARY
- INDIAN RESERVE
- VISUAL RESOURCES REGIONAL STUDY AREA
- CHRISTINA LAKE PHASE 3 BORROW AREA
- CHRISTINA LAKE PHASE 3 PLANT FOOTPRINT
- EXISTING AND APPROVED DISTURBANCE
- PLANNED DISTURBANCE
- EXISTING COMMUNITY DEVELOPMENT
- OPEN WATER

NOTE

Unnamed watercourse locally known as "Sawbones Creek"
* Also known as the Hamlet of Janvier

REFERENCE

Digital data provided by AltaLIS Ltd. (June 2004), Veritas DGC Inc. (July 2004), Alberta Pacific Ltd. (April 2004), Pearson Timberline Ltd. (April 2004), used under license.
Projection: UTM Zone 12 Datum: NAD 83

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SCALE 1:250,000 KILOMETRES

PROJECT

CHRISTINA LAKE REGIONAL PROJECT - PHASE 3

TITLE

VISUAL RESOURCES REGIONAL STUDY AREA AND KEY VIEWPOINTS

MEG ENERGY CORP.

PROJECT No. 07-1346-0009.8900			SCALE AS SHOWN	REV. 0
DESIGN	PT	24 Oct. 2007	FIGURE: 4.2-1	
GIS	PT	24 Oct. 2007		
CHECK	PT	05 Mar. 2008		
REVIEW	IGG	05 Mar. 2008		

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4.2.4 Assessment Methods

Information Sources

Information sources used for the assessment include:

- digital elevation data for the study area (from National Topographic Database (NTDB));
- vegetation data (Alberta Vegetation Inventory (AVI) data supplied by Alberta Pacific Forest Industries Inc.);
- vegetation data derived from LANDSAT 5 imagery by Golder Associates Ltd. (Golder);
- data concerning the locations and general characteristics for the projects included in the EAC and PDC;
- data from MEG concerning the locations and dimensions of facilities related to the Project; and
- photos of various georeferenced key viewpoints acquired directly by Golder in spring 2007.

Model results from the Air Quality Assessment (Volume 3, Section 1) were used as a predictive measure of visible plume height for stack emissions as shown in Table 4.2-1. Data from the Resource Use Assessment (Volume 6, Section 3) were used to locate key recreational areas, access routes and locations used by resource users.

Table 4.2-1 Visible Plume Heights for the Project Facilities

Facility	Scenario[a]	Reference Month	Plume Height [m]	Stack Height [m]	Total Height Above Surface [m]
Plant 3A	winter maximum, 100th percentile[b]	December	185	30	215
	summer average[b]	April	9	30	39
Plant 3B	winter maximum, 100th percentile[b]	December	185	30	215
	summer average[b]	April	9	30	39

(a) For both average and maximum plume heights, the month representing the worst case was selected for each season.

(b) Winter was defined as including the months between October and March; summer was defined as including the months between April and September.

Viewshed Modelling

A viewshed displays the area of the landscape that can be seen from one or more source points. Therefore, according to the model, a person standing at any area identified in the viewshed would be able to see at least one of the source points.

Viewshed modelling was performed using ArcGIS v. 9.2 (ESRI 2006), a Geographic Information System (GIS) and the Spatial Analyst extension. Tree canopy heights were combined with the Digital Elevation Model (DEM) to create a surface used in the viewshed model. Heights were taken from the AVI (Al-Pac 2006) data, where available. Where AVI was not available, tree heights were assigned based on a classified LANDSAT image. The vegetation classes derived from the LANDSAT image were defined to have the same heights as the average height of the corresponding vegetation class in the available AVI data. Source points were placed at the top of buildings and stacks within the Project as well as at plume locations using the heights modelled in the Air section (Volume 3, Section 1). Separate viewsheds were modelled for facilities and plumes for the EAC and the Project Case. Because information was not available, modelling was not done for the PDC.

The viewshed models provide a very conservative estimate of the visibility of structures and plumes. The results are conservative because the surface used in modelling incorporates tree heights as a barrier to visibility for land immediately adjacent to a forest stand, but does not consider the viewing conditions at the specific viewing location, such as a viewer standing in a forest. In other words, the viewshed may determine that a location is visible because the top of the trees is being used as the viewshed surface; however, a viewer standing on the ground would likely have their view impeded by the surrounding trees. It is therefore more accurate for cleared areas than for forested areas. Although the viewshed analysis does account for earth curvature, it does not consider atmospheric conditions, distance, size or contrast. As a result of these limitations, viewshed analysis does not always necessarily account for an individual's ability to see features of a project.

Viewshed modelling, as well as observations in the field and subsequent landscape modelling were used to determine whether a line of sight exists between a viewpoint and the Project.

Landscape Modelling

To assess the effects of the Project, a three-dimensional (3-D) computer landscape model of the RSA was created using Visual Nature Studio (VNS) software (VNS 2006). Visual Nature Studio allows GIS and other spatial data to be incorporated into a data-driven 3-D landscape model. With the DEM as the surface, vegetation was added based on AVI attributes, where available. In areas beyond the available AVI, tree heights were assigned based on a classified LANDSAT image. The vegetation classes derived from the image were defined to equal the average height of the corresponding vegetation class in the available AVI data. A uniform vegetation of conifer forest (jackpine and black spruce) was assigned to the areas covered by the LANDSAT data.

In the key viewpoint areas vegetation height was modelled based on the photos taken during the spring 2007 field program. Road and water features were created from base data, while Project features were incorporated based on site plans. Plumes were modelled based on stack locations, with maximum and average heights received from the Air Quality component and added to the VNS landscape model. Cameras (fixed viewpoints for modelling) that corresponded to key viewpoints were created in VNS.

Key Viewpoint Determination

Key viewpoints were selected based on a combination of factors, including locations that have a line of sight to the Project structures or plumes; and ground locations that are used by the region's residents, recreational or Aboriginal users, as identified in the Traditional Land Use Baseline Report and Resource Use Assessment (Section 3).

The communities of Conklin and Janvier are located within the RSA. Secondary Highway 881 is the only major public transportation route in the RSA. The Resource Use Baseline Report (Appendix 6-II) identified Christina Lake, Winefred Lake, Cowper Lake and Bohn Lake as having recreation opportunities. The Traditional Land Use Baseline Report (Appendix 6-I) identified Winefred Lake as having First Nations cabins sites. Viewpoints were generally located to provide both the closest and least obstructed views of the Project. For viewpoints offering lines-of-sight to different Project features that could not be accommodated in a single view, the view was targeted at the closest feature. Six viewpoints were chosen to assess the visual impact of the Project (Table 4.2-2). The viewpoint locations are shown in Figure 4.2-1.

Table 4.2-2 Key Viewpoints

Viewpoint	Description	Rational	Potential Viewers
VP-1 Secondary Highway 881, facing east	eastbound about 12 km north of Conklin	most affected viewpoint on Secondary Highway 881 in RSA	Aboriginal and recreational users, residents of local communities, workers from local oil sands operations
VP-2 Jackfish River Bridge, facing northeast	bridge over the Jackfish River inlet in Conklin	viewpoint with most unobstructed view in Conklin, access to Christina Lake Lodge	recreational users, residents of Conklin
VP-3 Wassassi Day Use Area,	day use recreation	most affected recreation	recreational users,

Table 4.2-2 Key Viewpoints (continued)

Viewpoint	Description	Rational	Potential Viewers
facing northeast	area south of Conklin	area in RSA	residents of Conklin
VP-4 Christina Lake, facing east	on the lake, about 4 km from east end	lake used for fishing (Christina Lake Lodge located on lake)	Aboriginal and recreational users
VP-5 Winefred Lake, facing northwest	on the lake, about 1 km from north shore	lake used for fishing (Winefred Lake Lodge and CPDFN Winefred Reserve cabin sites located on lake)	Aboriginal and recreational users
VP-6 Bohn Lake, facing south	on the lake, about 1 km from south end	lake used for fishing, near Janvier community	Aboriginal and recreational users

Landscape Analysis for Key Viewpoints

The EAC landscape was rated based on scenic quality, user sensitivity and visibility at each key viewpoint. These criteria are combined for an overall landscape rating as shown in the following matrix (Table 4.2-3). Higher rating for scenic quality and user sensitivity contribute to a higher overall rating. Visibility describes the distance of the assessed project from the key viewpoint and can further modify the overall rating.

Table 4.2-3 Landscape Rating Criteria (USDI 1986a)

Criteria		User Sensitivity[(a)]					
		High		Medium		Low	
Scenic Quality[(a)]	**High**	high	high	high	high	high	high
	Medium	high	medium	medium	low	low	low
	Low	medium	low	low	low	low	low
		Fg/Mg	**Bg**	**Fg/Mg**	**Bg**	**Fg/Mg**	**Bg**
		Visibility[(b)]					

(a) As derived in Section 4.4.1.

(b) Foreground/middleground = 0 to 7 km (distance of the Project from viewpoint), background = more than 8 km (USDI 1986a).

Fg/Mg = Foreground/middleground.

Bg = Background.

The contrast of the visible Project disturbances was compared to the EAC. The contrast is rated according to the following elements (USDI 1986b):

- form, which includes the subelements of structures and movement, relates to the shape of disturbances in contrast to the existing landscape shapes;

- line, which relates to the path the eye naturally follows when perceiving differences in landscape shape, colour or texture;
- colour, which relates to the degree that the subelements of hue (e.g., red, blue and green), value (e.g., brightness) and chroma (e.g., saturation) contrast with existing landscape colours;
- texture, which relates to the patterns that exist within larger landscape elements; and
- scale, which relates to the proportional size of the object in relation to the field of view of the camera.

The results of the contrast rating represent the overall contrast between all of the Project's elements and the existing landscape. The overall contrast was compared to the initial landscape rating as shown in Table 4.2-4, resulting in the magnitude of effects of the Project.

Table 4.2-4 Magnitude of Effects Description Criteria

		EAC Landscape Rating[a]		
		Low	**Medium**	**High**
Overall Contrast[b]	**Negligible**	negligible	negligible	negligible
	Slight	low	low	moderate
	Moderate	low	moderate	high
	High	moderate	high	high

(a) As derived in Section 4.4.1.

(b) As derived in Section 4.5.1.2.

The visual models used to assess the contrast were subject to several assumptions concerning conditions that will vary according to different viewers and conditions.

These assumptions include:

- the viewpoint camera was set at a height of 2 m above the modelled ground surface;
- views were generated for summer conditions using the average annual plume height;
- views were generated for winter conditions using the maximum plume height; and
- views were generated using a mostly clear sky and no atmospheric influence on visibility (i.e., no haze or fog).

Effects Description Criteria

The combined effects of the Project were assessed with regard to direction, magnitude, geographic extent, duration, reversibility and frequency as shown in Table 4.2-5 and each given numerical scores. The scoring is discussed in the EIA Introduction (Volume 2, Section 4). Magnitude represents the overall effect of the Project in relation to the rating of the EAC landscape (Table 4.2-5).

Table 4.2-5 Effects Description Criteria Definitions for Visual Resources

Direction[a]	Magnitude[b]	Geographic Extent[c]	Duration[d]	Reversibility[e]	Frequency[f][g]
positive, negative or neutral for the measurement endpoints	**negligible:** negligible visual contrast between Project and existing landscape **low:** combination of slight or moderate contrast with a moderate or low landscape rating **moderate:** combination of slight, moderate or high contrast with a high, medium or low landscape rating **high:** combination of moderate or high contrast with a high or medium landscape rating	**local:** within 5 km of development **regional:** >5 km but <20 km from development **beyond regional:** >20 km from development	**Short-term:** <5 years **medium-term**: 5 to 25 years **long-term:** >25 years	reversible or irreversible	**low:** occurs once per year or very rarely **moderate:** occurs more than once per year **high:** occurs continuously

(a) Direction: positive or negative effect for measurement endpoints, as defined for the specific component.
(b) Magnitude: degree of change to analysis endpoint.
(c) Geographic Extent: area affected by the impact.
(d) Duration: length of time over which the environmental effect occurs.
(e) Reversibility: effect on the resource (or resource capability) can or cannot be reversed.
(f) Frequency: how often the environmental effect occurs.
(g) Season effects are assessed when relevant for a specific component as Spring, Summer, Fall, Winter or Year-Round.

Assumptions and Limitations

Assumptions and limitations include:

- The NTDB DEM has accuracy limitations of ± 10 m (Geomatics Canada 2000).
- Vegetation height, composition and density were derived from AVI data and the average of these parameters was applied to each vegetation polygon. In reality, the location, height and species of individual trees differs from the modelled views.
- Vegetation height in areas where AVI data were unavailable were assigned based on a classified LANDSAT image. In reality, the vegetation height differs from these values.

- The scene was modelled assuming mostly clear conditions and therefore does not include reduced visibility due to atmospheric conditions including haze, fog and reduced contrast due to clouds.
- Generalized 3-D objects that represent the location, size, and height of key facilities were incorporated into the model. In reality, the appearance of facilities will vary.

4.3 MITIGATION

To reduce the effect of the Project on the visual aesthetics, mitigation strategies have been planned for the Project. The potential effects and the corresponding mitigation strategies are summarized in Table 4.3-1.

Table 4.3-1 Mitigation Strategies for Project Effects

Effect Description	Mitigation Strategy
vegetation disturbance	using existing Rights-Of-Way (ROW) and clearings will result in minimized footprint and minimize ROW widths
clearing of land and facilities effect on aesthetics	using and maintaining a vegetated buffer between the Project and potential viewpoints

Regional aesthetic effects will be mitigated in the long-term by the cessation of emissions, decommissioning/removal of facilities and reclamation of developed areas.

4.4 EXISTING AND APPROVED CASE

The Project site is characterized as having gentle relief with nearly level to gently rolling topography. The landscape generally consists of mixedwood forests, wetlands and lakes (Volume 5, Appendices 5-I and 5-II). The forests have tree heights up to 34 m and a mean height of 10 m (Al-Pac 2006). This combination of topographic and vegetation characteristics translates into a landscape with restricted long-range visibility. In addition, the character of the landscape, while remote and scenic, is common to Northern Alberta and possesses no unique vistas.

MEG's CLRP is located northeast of Christina Lake within the Project area. EnCana's Christina Lake Thermal Project and Devon's Jackfish Project are located south of the lake. All existing and approved developments are SAGD operations and include or will include wellpads, central processing plants and other infrastructure such as roads and pipelines. Visible plumes are, or will be, emitted from the projects. The wellpads and facilities of all existing and approved developments are or will be screened from all key viewpoints by vegetation. The plumes of the CLRP will be visible from some key viewpoints. The plumes of other existing and approved projects might be visible from one or more key viewpoints.

4.4.1 Landscape Rating

The EAC landscape was rated based on scenic quality, user sensitivity and visibility (USDI 1986a). These factors were combined to give a landscape aesthetic value rating. The resulting ratings for each key viewpoint are summarized in Table 4.4-1.

Five key viewpoints were used to rate the EAC landscape. Viewpoint 1 is located on Secondary Highway 881, Viewpoints 2 and 3 are located on the shore of Christina Lake near Conklin, Viewpoint 4 is located on Christina Lake about 4 km from the east end and Viewpoints 5 and 6 are located on Winefred and Bohn lakes respectively. Photos documenting the existing conditions at some of the viewpoints can be found in Appendix 6-IV. Detailed tables for the rating of scenic quality and user sensitivity for each group of viewpoints can be found in Appendix 6-V.

Table 4.4-1 Existing and Approved Case Aesthetic Summary

Viewpoint	Scenic Quality	Sensitivity	Visibility[(a)]	Landscape Rating
VP-1 Secondary Highway 881, facing east	low	low	background	low
VP-2 Jackfish River Bridge, facing northeast	low	medium	background	low
VP-3 Wassassi Day Use Area, facing northeast	low	medium	background	low
VP-4 Christina Lake, facing east	low	low	background	low
VP-5 Winefred Lake, facing northwest	low	low	foreground	low
VP-6 Bohn Lake, facing south	low	low	background	low

(a) Foreground/middleground = 0 to 7 km (distance of the Project from viewpoint), background = more than 8 km (USDI 1986a).

4.4.1.1 Existing and Approved Case Viewshed Models

The viewshed models for the EAC facilities and plumes (both summer and winter conditions) are illustrated in Figures 4.4-1 through 4.4-3. The viewsheds are summarized in Table 4.4-2.

Table 4.4-2 Existing and Approved Case Viewshed Summary

Viewshed	EAC Visible Area [ha]	Percentage of RSA [%]
facilities[(a)]	29,737	11
plumes (summer conditions)	52,164	18
plumes (winter conditions)	201,962	71

(a) Heights used to calculate the viewshed correspond to stack heights as shown in Table 4.2-1.

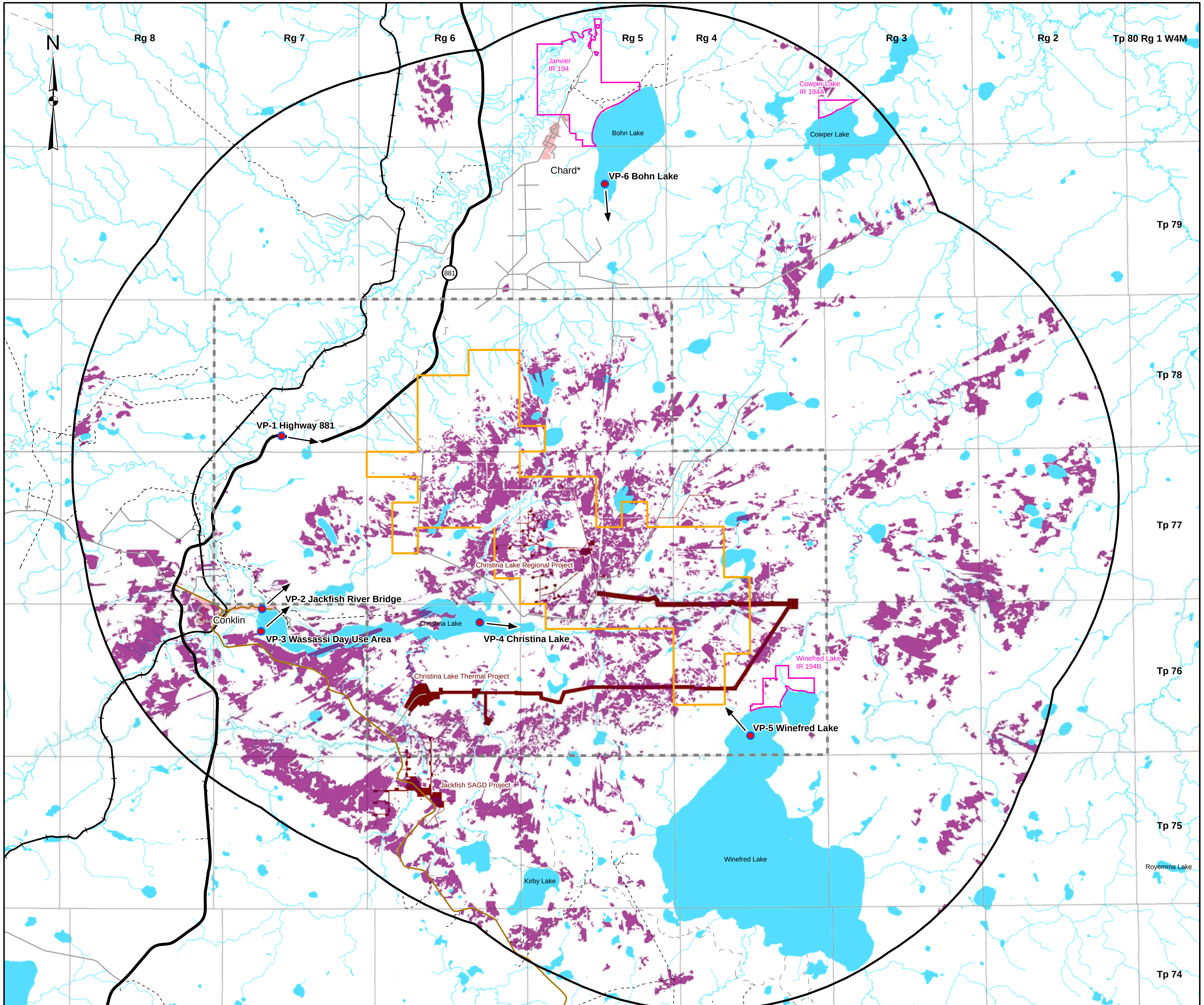
4.4.1.2 Existing and Approved Case Modelled Views

Modelled views were generated that represent the EAC for summer and winter seasons. The modelled views are represented in Figure 4.4-4 through 4.4-15.

4.4.1.3 Landscape Management and Guidelines

The Christina Lake Management Plan (AEP 1991) outlines guidelines for the Christina Lake area. The general management objective relating to mineral resources is to carry out development in an environmentally sensitive manner and integrated with other uses. Guidelines relating specifically to aesthetics considerations for mineral development are outlined below.

No permanent mineral resources facilities, including individual wells, will be constructed and operated within 300 m of the high water mark of the lake. A lesser distance, to a minimum of 100 m, may be permitted provided that the proponent demonstrates that their operations will not negatively impact the attributes making the lake and its surrounding land valuable as a recreational resource. The attributes affected include the beach, water, fisheries, wildlife, recreational facilities and aesthetics (sight, sound and smell) of the lake. (AEP 1991).



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LEGEND

- VIEWPOINT
- PAVED ROAD
- GRAVEL ROAD (2 LANE)
- GRAVEL ROAD (1 LANE)
- UNIMPROVED ROAD
- TRUCK TRAIL
- RAILWAY
- RIVER OR STREAM
- AVI DATA EXTENT
- MEG LEASE BOUNDARY
- INDIAN RESERVE
- VISUAL RESOURCES REGIONAL STUDY AREA
- EXISTING AND APPROVED DISTURBANCE
- EXISTING COMMUNITY DEVELOPMENT
- OPEN WATER

EXISTING AND APPROVED CASE FACILITIES VIEWSHED

- AREAS FROM WHICH FACILITIES ARE NOT VISIBLE
- AREAS FROM WHICH FACILITIES ARE VISIBLE

NOTE

Unnamed watercourse locally known as "Sawbones Creek"
* Also known as the Hamlet of Janvier

REFERENCE

Digital data provided by AltaLIS Ltd. (June 2004), Veritas DGC Inc. (July 2004), Alberta Pacific Ltd. (April 2004), Pearson Timberline Ltd. (April 2004), used under license.
Projection: UTM Zone 12 Datum: NAD 83

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SCALE 1:250,000 KILOMETRES

PROJECT

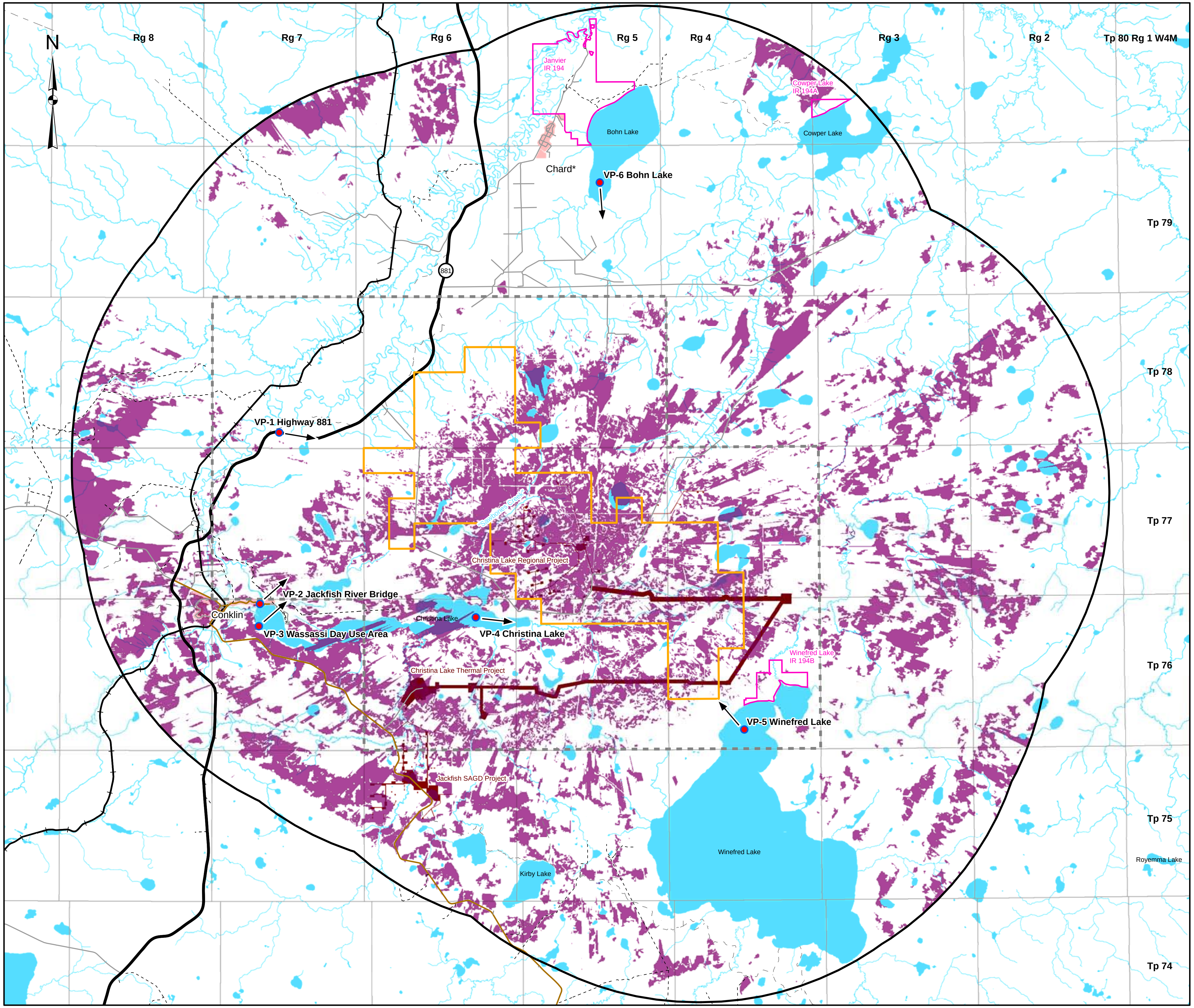
CHRISTINA LAKE REGIONAL PROJECT - PHASE 3

TITLE

EXISTING AND APPROVED CASE FACILITIES VIEWSHED

MEG ENERGY CORP.

PROJECT No. 07-1346-0009.8900			SCALE AS SHOWN	REV. 0
DESIGN	PT	24 Oct. 2007	FIGURE: 4.4-1	
GIS	PT	24 Oct. 2007		
CHECK	PT	05 Mar. 2008		
REVIEW	IGG	05 Mar. 2008		



LEGEND

- VIEWPOINT
- PAVED ROAD
- GRAVEL ROAD (2 LANE)
- GRAVEL ROAD (1 LANE)
- UNIMPROVED ROAD
- TRUCK TRAIL
- RAILWAY
- RIVER OR STREAM
- AVI DATA EXTENT
- MEG LEASE BOUNDARY
- INDIAN RESERVE
- VISUAL RESOURCES REGIONAL STUDY AREA
- EXISTING AND APPROVED DISTURBANCE
- EXISTING COMMUNITY DEVELOPMENT
- OPEN WATER

EXISTING AND APPROVED CASE PLUME VIEWSHED

- AREAS FROM WHICH PLUMES ARE NOT VISIBLE
- AREAS FROM WHICH PLUMES ARE VISIBLE

NOTE

Unnamed watercourse locally known as "Sawbones Creek"
* Also known as the Hamlet of Janvier

REFERENCE

Digital data provided by AltaLIS Ltd. (June 2004), Veritas DGC Inc. (July 2004), Alberta Pacific Ltd. (April 2004), Pearson Timberline Ltd. (April 2004), used under license.
Projection: UTM Zone 12 Datum: NAD 83

10 0 10
SCALE 1:250,000 KILOMETRES

PROJECT
CHRISTINA LAKE REGIONAL PROJECT - PHASE 3

TITLE
EXISTING AND APPROVED CASE
PLUME VIEWSHED SUMMER CONDITIONS

MEG ENERGY CORP.

PROJECT No. 07-1346-0009.8900			SCALE AS SHOWN	REV. 0
DESIGN	PT	24 Oct. 2007	FIGURE: 4.4-2	
GIS	PT	24 Oct. 2007		
CHECK	PT	05 Mar. 2008		
REVIEW	IGG	05 Mar. 2008		

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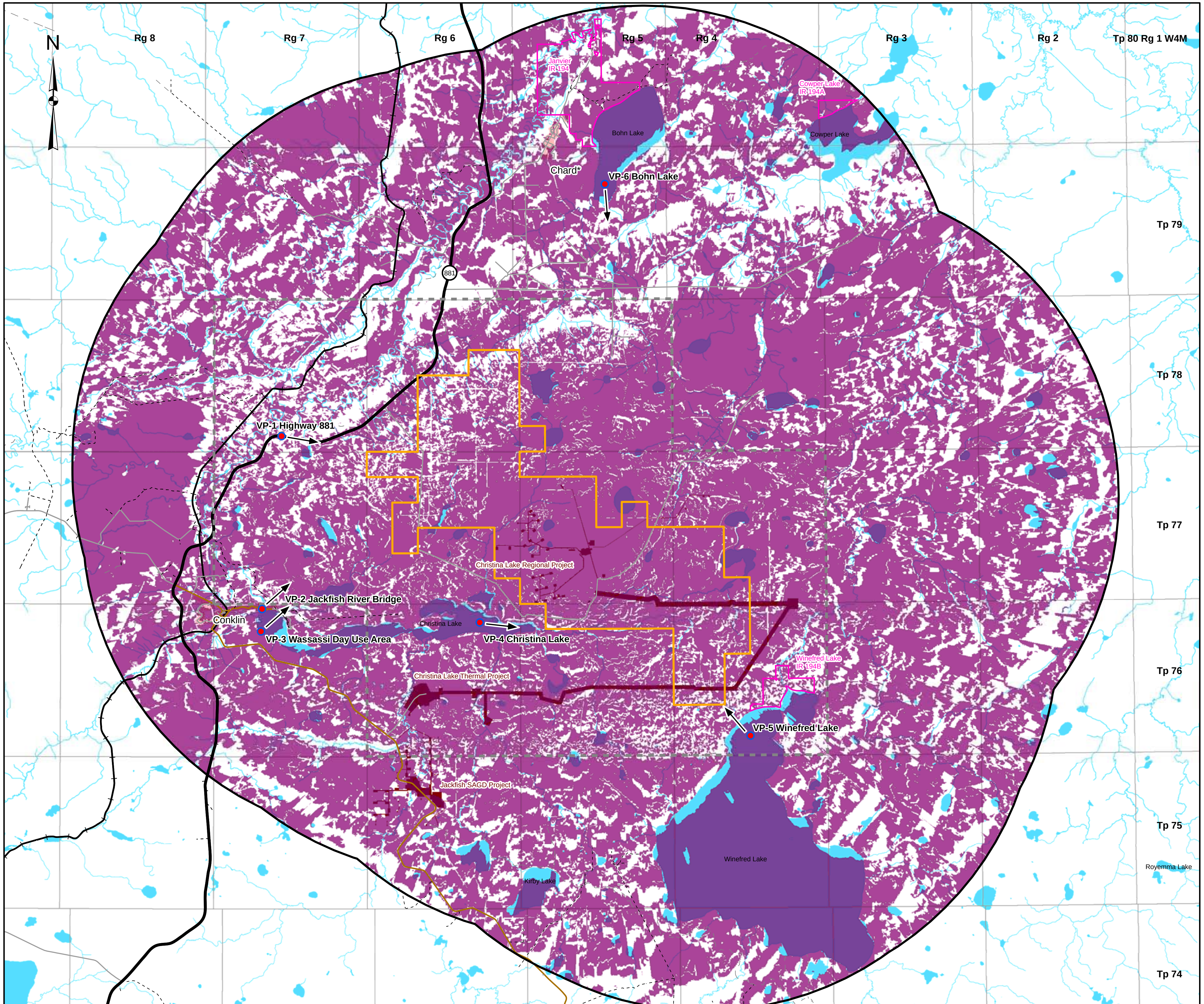

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LEGEND

- VIEWPOINT
- PAVED ROAD
- GRAVEL ROAD (2 LANE)
- GRAVEL ROAD (1 LANE)
- UNIMPROVED ROAD
- TRUCK TRAIL
- RAILWAY
- RIVER OR STREAM
- AVI DATA EXTENT
- MEG LEASE BOUNDARY
- INDIAN RESERVE
- VISUAL RESOURCES REGIONAL STUDY AREA
- EXISTING AND APPROVED DISTURBANCE
- EXISTING COMMUNITY DEVELOPMENT
- OPEN WATER

EXISTING AND APPROVED CASE PLUME VIEWSHED

- AREAS FROM WHICH PLUMES ARE NOT VISIBLE
- AREAS FROM WHICH PLUMES ARE VISIBLE

NOTE

* Also known as the Hamlet of Janvier

REFERENCE

Digital data provided by AltaLIS Ltd. (June 2004), Veritas DGC Inc. (July 2004), Alberta Pacific Ltd. (April 2004), Pearson Timberline Ltd. (April 2004), used under license.
Projection: UTM Zone 12 Datum: NAD 83

10 0 10

SCALE 1:250,000 KILOMETRES

PROJECT

CHRISTINA LAKE REGIONAL PROJECT - PHASE 3

TITLE

EXISTING AND APPROVED CASE
PLUME VIEWSHED WINTER CONDITIONS

MEG ENERGY CORP.

PROJECT No. 07-1346-0009.8900			SCALE AS SHOWN	REV. 0
DESIGN	PT	24 Oct. 2007	FIGURE: 4.4-3	
GIS	PT	24 Oct. 2007		
CHECK	PT	05 Mar. 2008		
REVIEW	IGG	05 Mar. 2008		

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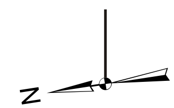

Facing East

PROJECT					
CHRISTINA LAKE REGIONAL PROJECT - PHASE 3					
TITLE					
VIEWPOINT - 1 HIGHWAY 881 EXISTING AND APPROVED CASE SUMMER CONDITIONS					
MEG Energy Corp.	PROJECT		07 - 1346 - 0009	FILE No. VP-1 Existing	
	DESIGN	PT	15/05/07	SCALE N/A	REV. 0
	COREL	PT	31/08/07	FIGURE: 4.4-4	
	CHECK	PT	27/02/08		
	REVIEW	IGG	27/02/08		

R:\Active_2007\1346\07-1346-0009 MEG Christina Lake Regional Expansion\8900 Visual Resources\MapsFigures\Renderings\ExistingConditions\Fig_4.4-5.cdr

N

Facing East

PROJECT

CHRISTINA LAKE REGIONAL PROJECT - PHASE 3

TITLE

VIEWPOINT - 1 HIGHWAY 881
EXISTING AND APPROVED CASE
WINTER CONDITIONS

MEG Energy Corp.

PROJECT		07 - 1346 - 0009
DESIGN	PT	15/05/07
COREL	PT	31/08/07
CHECK	PT	27/02/08
REVIEW	IGG	27/02/08

FILE No. VP-1 ExistingWinter

SCALE N/A REV. 0

FIGURE: 4.4-5

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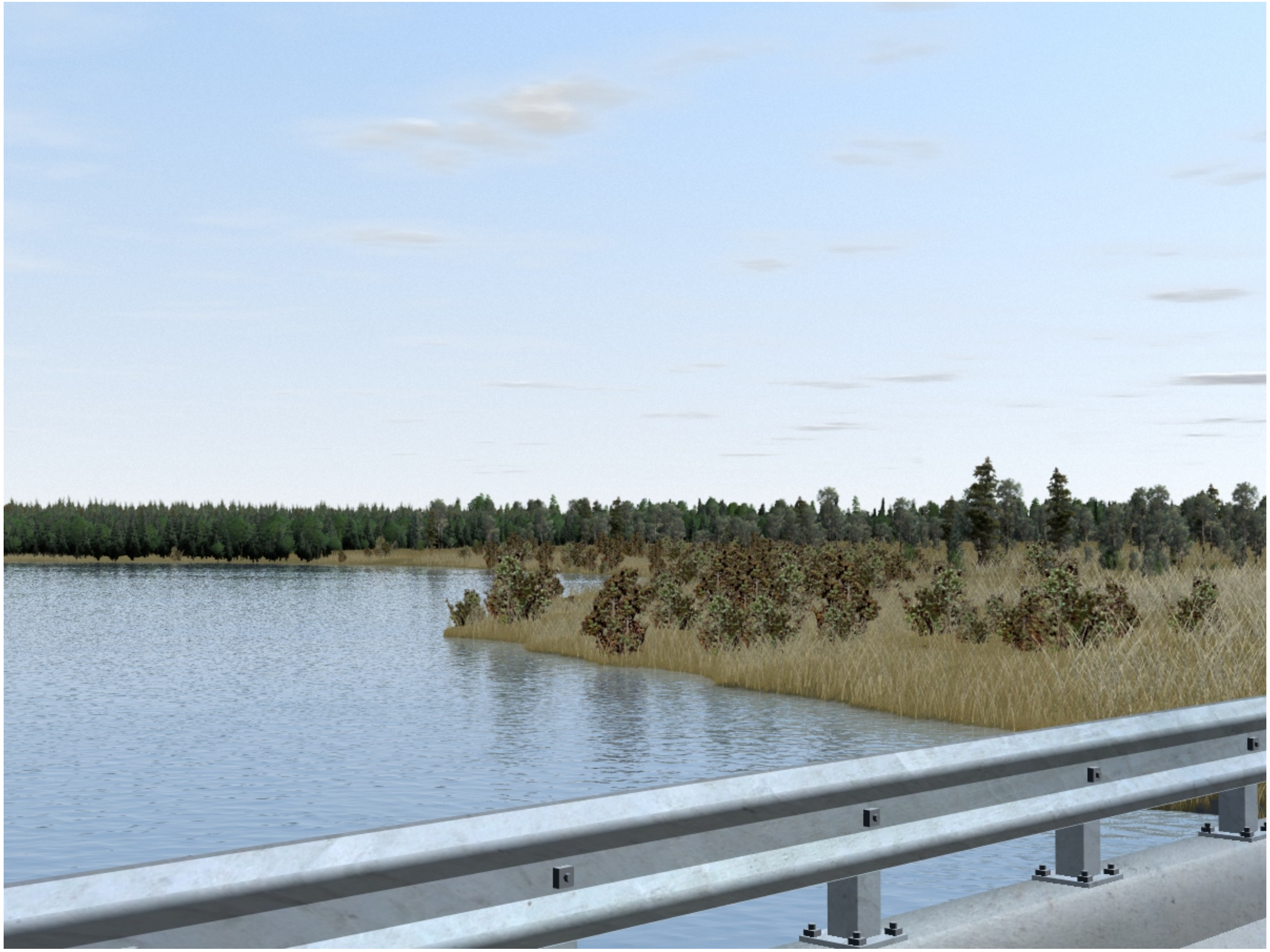

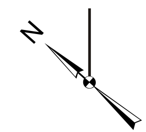

Facing Northeast

PROJECT

CHRISTINA LAKE REGIONAL PROJECT - PHASE 3

TITLE

**VIEWPOINT - 2 JACKFISH RIVER BRIDGE
EXISTING AND APPROVED CASE
SUMMER CONDITIONS**

MEG Energy Corp.

PROJECT		07 - 1346 - 0009	FILE No.	VP-2 Existing
DESIGN	PT	15/05/07	SCALE N/A	REV. 0
COREL	PT	31/08/07	**FIGURE: 4.4-6**	
CHECK	PT	27/02/08		
REVIEW	IGG	27/02/08		

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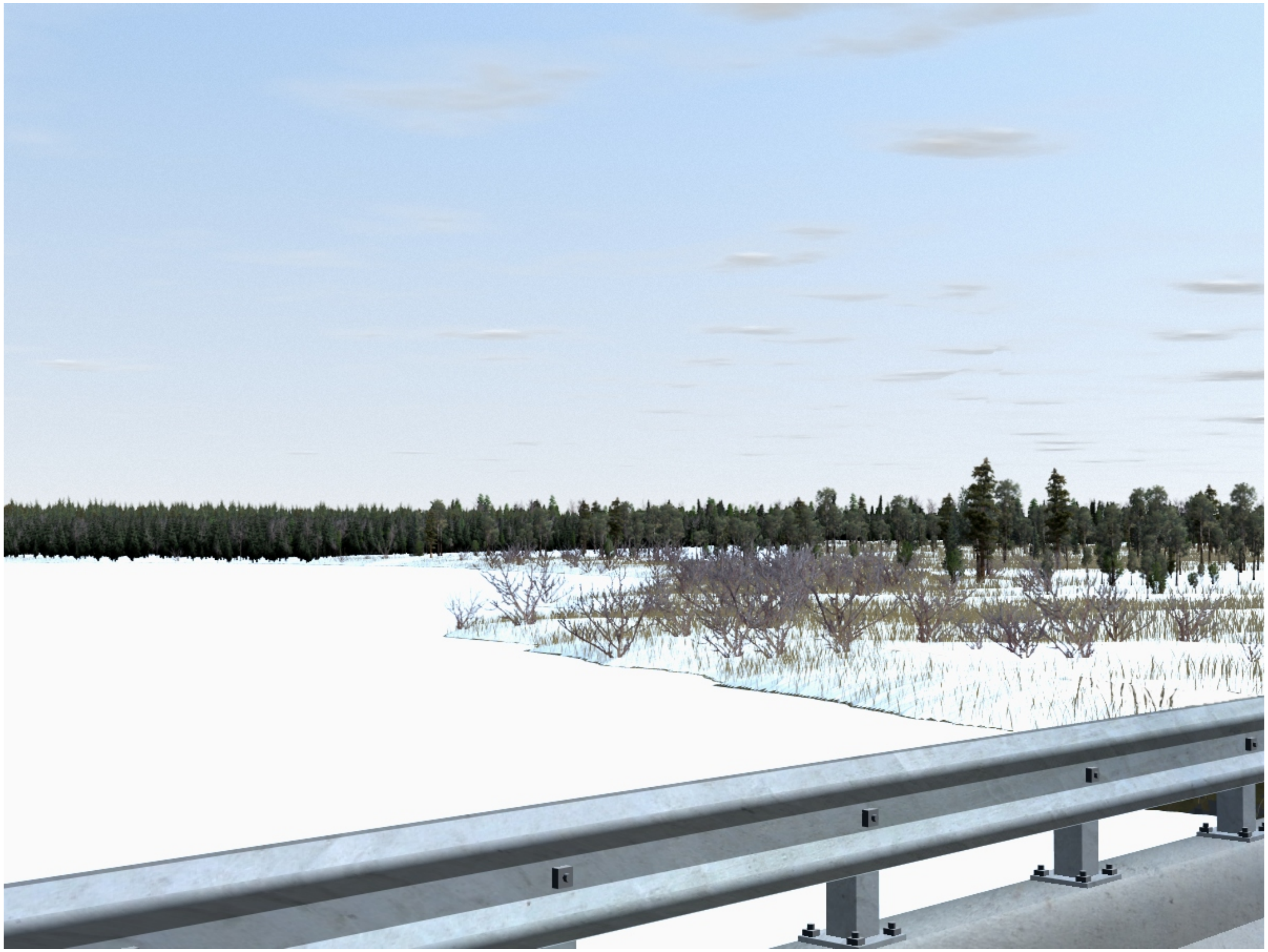

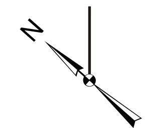

Facing Northeast

PROJECT				
CHRISTINA LAKE REGIONAL PROJECT - PHASE 3				
TITLE: VIEWPOINT - 2 JACKFISH RIVER BRIDGE EXISTING AND APPROVED CASE WINTER CONDITIONS				
MEG Energy Corp.	PROJECT		07 - 1346 - 0009	FILE No. VP-2 ExistingWinter
	DESIGN	PT	15/05/07	SCALE N/A REV. 0
	COREL	PT	31/08/07	FIGURE: 4.4-7
	CHECK	PT	27/02/08	
	REVIEW	IGG	27/02/08	

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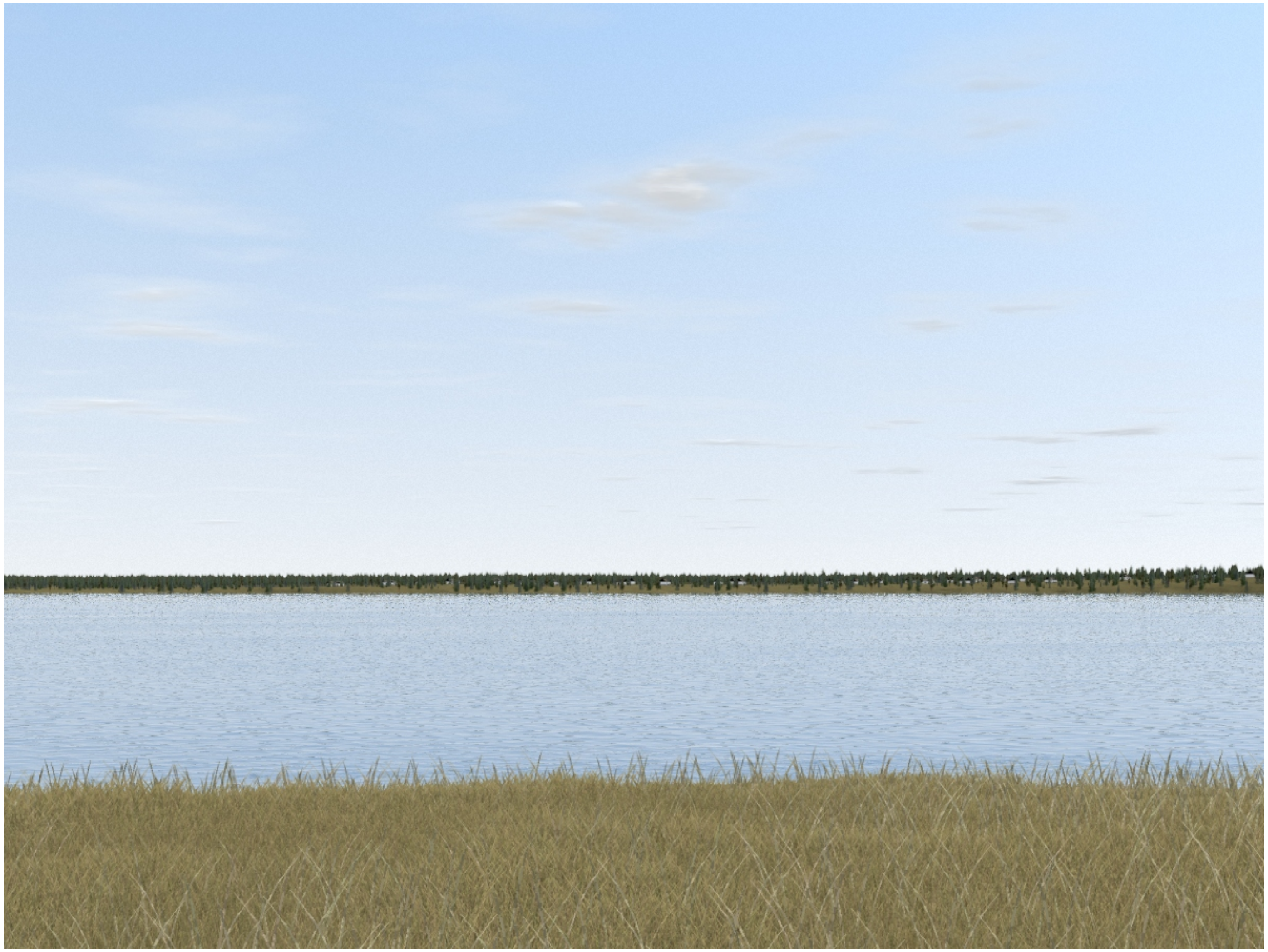

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Facing Northeast

PROJECT

CHRISTINA LAKE REGIONAL PROJECT - PHASE 3

TITLE

VIEWPOINT - 3 WASSASSI DAY USE AREA
EXISTING AND APPROVED CASE
SUMMER CONDITIONS

MEG Energy Corp.

PROJECT		07 - 1346 - 0009
DESIGN	PT	15/05/07
COREL	PT	31/08/07
CHECK	PT	27/02/08
REVIEW	IGG	27/02/08

FILE No. VP-3 Existing	
SCALE N/A	REV. 0

FIGURE: 4.4-8

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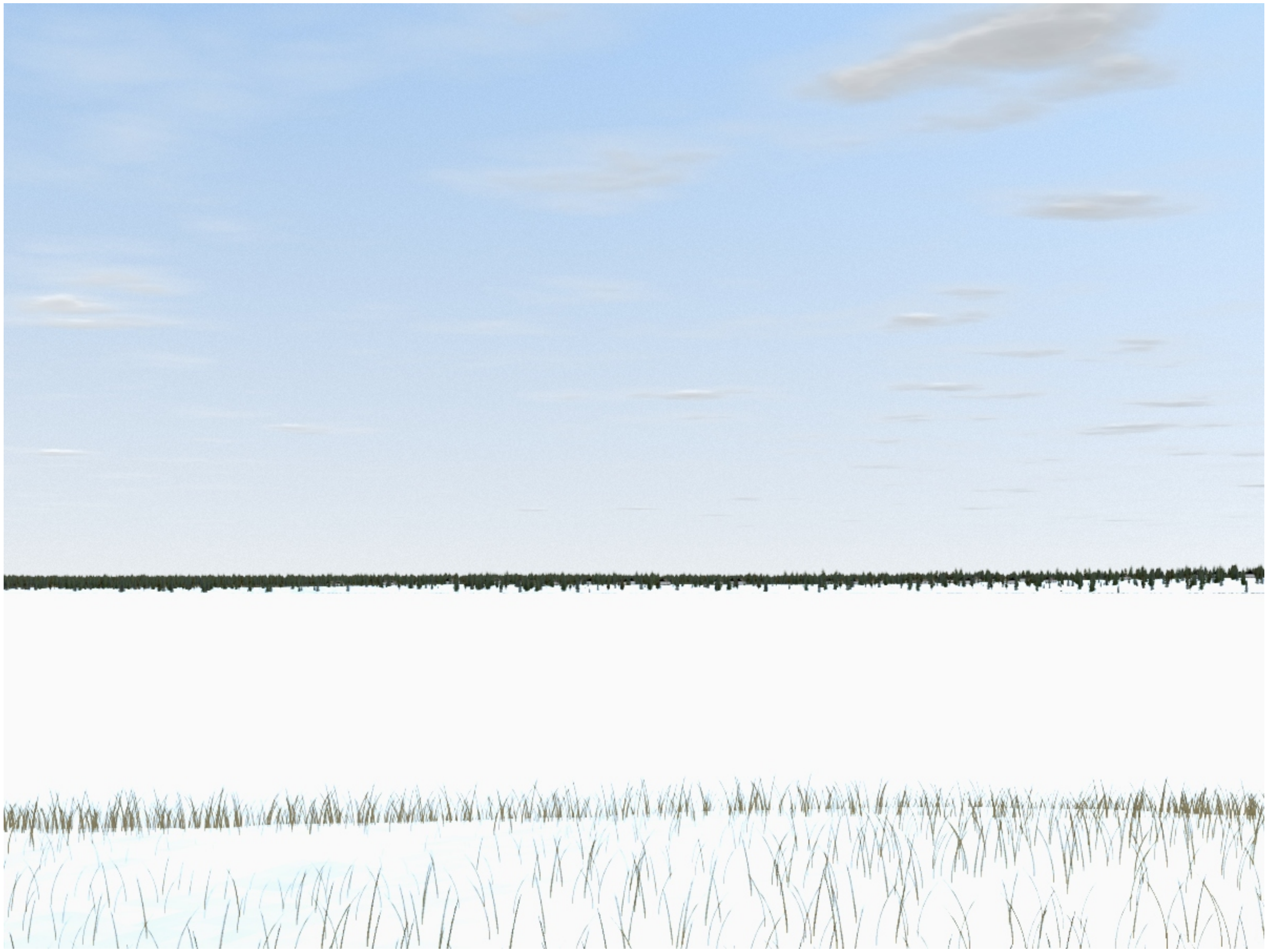
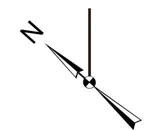
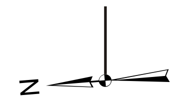




Facing Northeast

PROJECT				
CHRISTINA LAKE REGIONAL PROJECT - PHASE 3				
TITLE				
VIEWPOINT - 3 WASSASSI DAY USE AREA EXISTING AND APPROVED CASE WINTER CONDITIONS				
MEG Energy Corp.	PROJECT	07 - 1346 - 0009		FILE No. VP-3 ExistingWinter
	DESIGN	PT	15/05/07	SCALE N/A REV. 0
	COREL	PT	31/08/07	FIGURE: 4.4-9
	CHECK	PT	27/02/08	
	REVIEW	IGG	27/02/08	



Facing East

PROJECT				
CHRISTINA LAKE REGIONAL PROJECT - PHASE 3				
TITLE: VIEWPOINT - 4 CHRISTINA LAKE EXISTING AND APPROVED CASE SUMMER CONDITIONS				
MEG Energy Corp.	PROJECT	07 - 1346 - 0009		FILE No. VP-4 Existing
	DESIGN	PT	15/05/07	SCALE N/A REV. 0
	COREL	PT	31/08/07	FIGURE: 4.4-10
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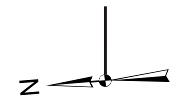
	REVIEW	IGG	27/02/08	



Facing East

PROJECT

CHRISTINA LAKE REGIONAL PROJECT - PHASE 3

TITLE

VIEWPOINT - 4 CHRISTINA LAKE
EXISTING AND APPROVED CASE
WINTER CONDITIONS

MEG Energy Corp.

PROJECT		07 - 1346 - 0009
DESIGN	PT	15/05/07
COREL	PT	31/08/07
CHECK	PT	27/02/08
REVIEW	IGG	27/02/08

FILE No. VP-4 ExistingWinter

SCALE N/A REV. 0

FIGURE: 4.4-11

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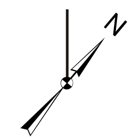


Facing Northwest

PROJECT

CHRISTINA LAKE REGIONAL PROJECT - PHASE 3

TITLE

VIEWPOINT - 5 WINEFRED LAKE
EXISTING AND APPROVED CASE
SUMMER CONDITIONS

MEG Energy Corp.

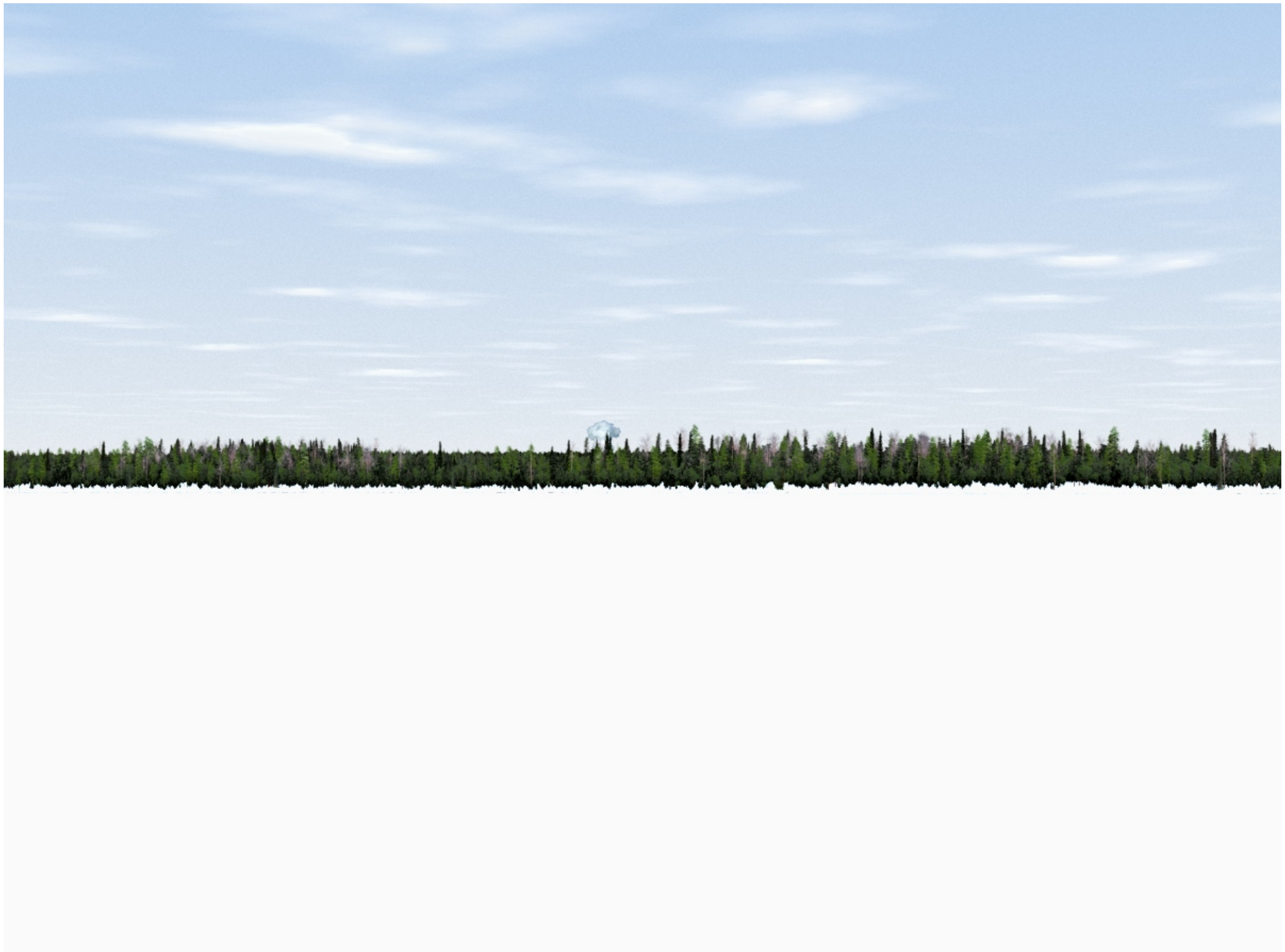
PROJECT		07 - 1346 - 0009
DESIGN	PT	15/05/07
COREL	PT	31/08/07
CHECK	PT	27/02/08
REVIEW	IGG	27/02/08

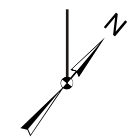
FILE No. VP-5 Existing

SCALE N/A REV. 0

FIGURE: 4.4-12

R:\Active_2007\1346\07-1346-0009 MEG Christina Lake Regional Expansion\8900 Visual Resources\MapsFigures\Renderings\ExistingConditions\Fig_4.4-13.cdr





Facing Northwest

PROJECT

CHRISTINA LAKE REGIONAL PROJECT - PHASE 3

TITLE

VIEWPOINT - 5 WINEFRED LAKE
EXISTING AND APPROVED CASE
WINTER CONDITIONS

MEG Energy Corp.

PROJECT		07 - 1346 - 0009	FILE No. VP-5 ExistingWinter	
DESIGN	PT	15/05/07	SCALE N/A	REV. 0
COREL	PT	31/08/07	**FIGURE: 4.4-13**	
CHECK	PT	27/02/08		
REVIEW	IGG	27/02/08		

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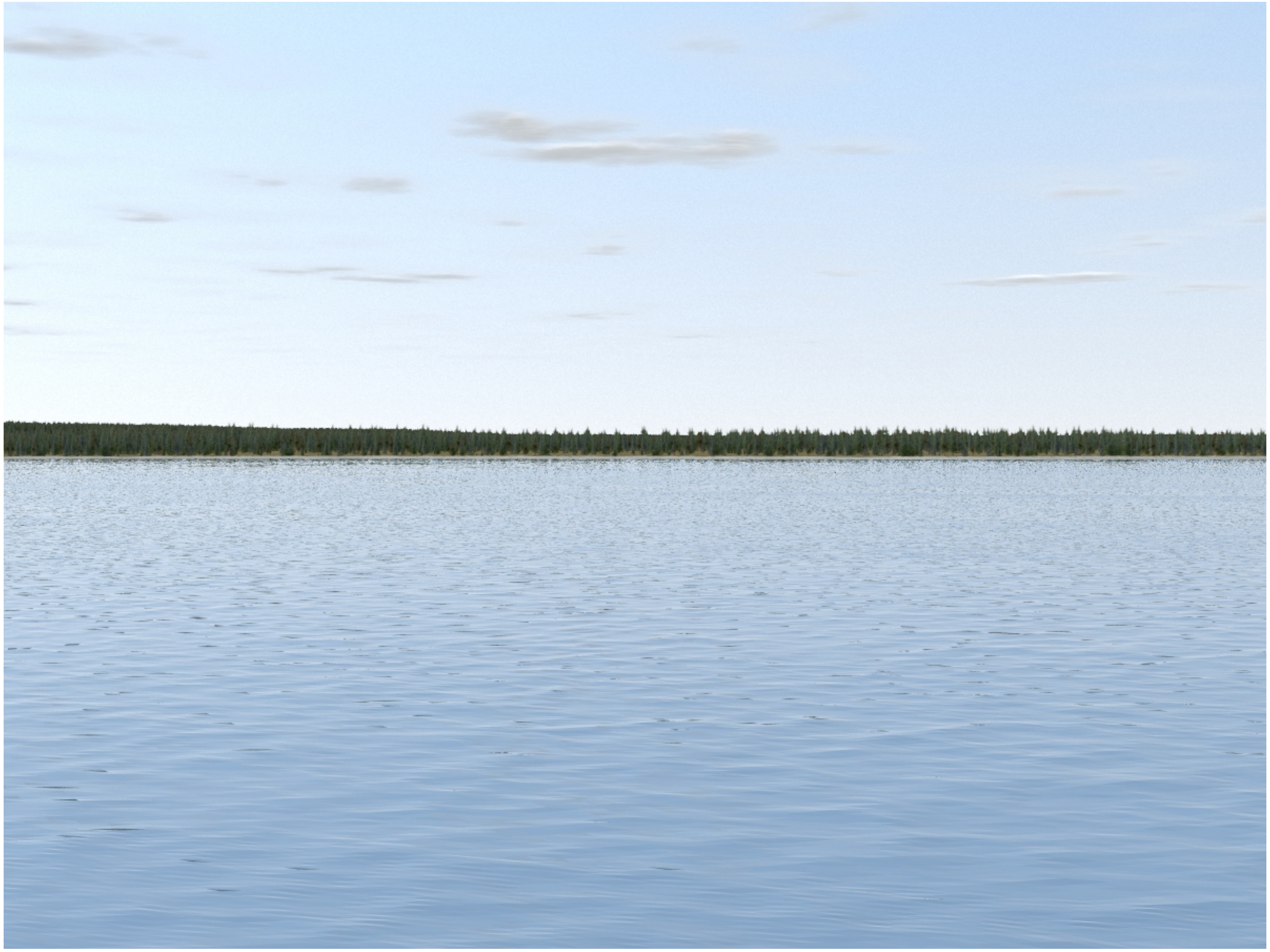

N
Facing South

PROJECT

CHRISTINA LAKE REGIONAL PROJECT - PHASE 3

TITLE

VIEWPOINT - 6 BOHN LAKE
EXISTING AND APPROVED CASE
SUMMER CONDITIONS

MEG Energy Corp.

PROJECT	07 - 1346 - 0009		FILE No. VP-6 Existing
DESIGN	PT	15/05/07	SCALE N/A REV. 0
COREL	PT	31/08/07	**FIGURE: 4.4-14**
CHECK	PT	27/02/08	
REVIEW	IGG	27/02/08	

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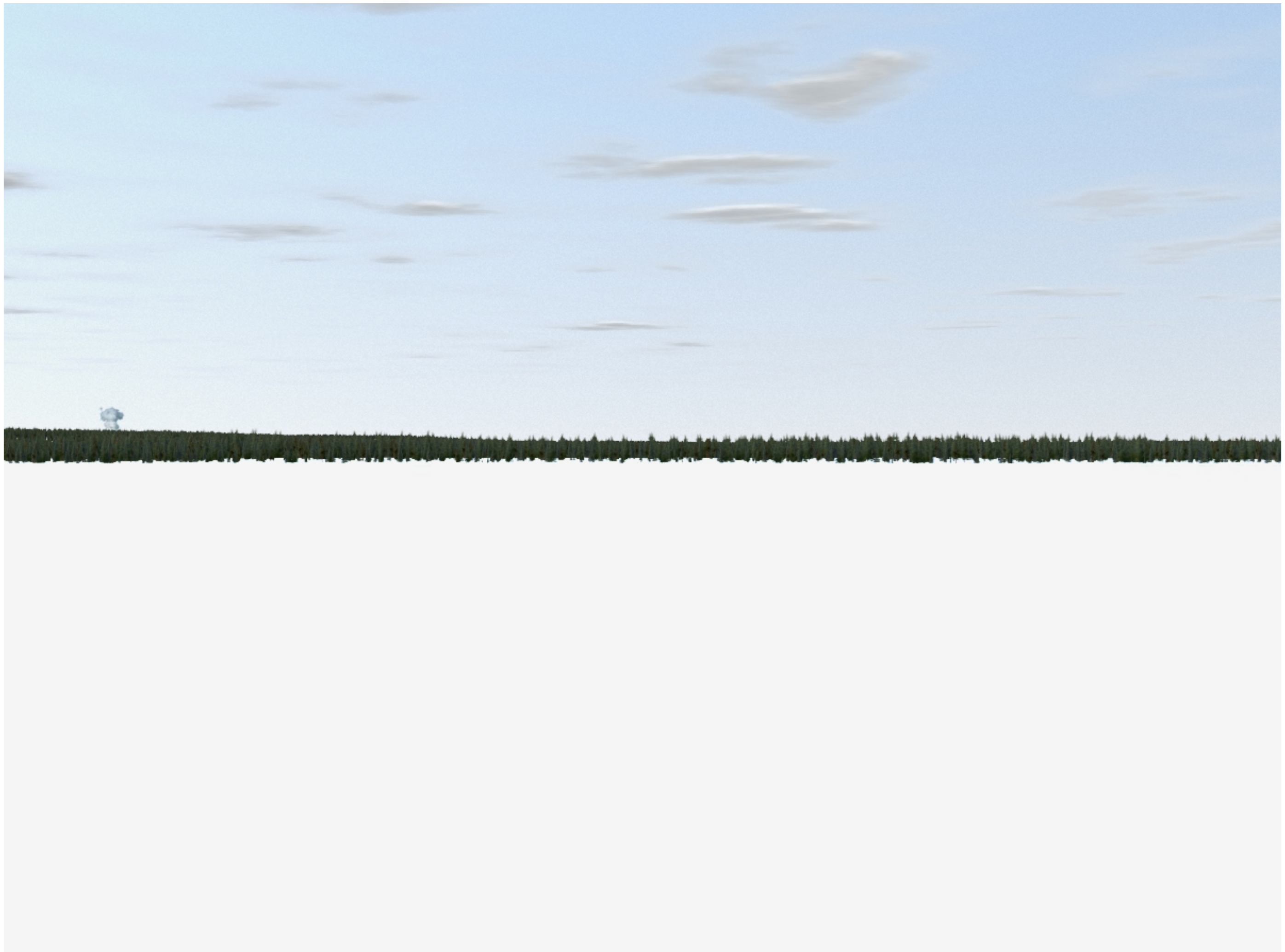


N
Facing South

PROJECT

CHRISTINA LAKE REGIONAL PROJECT - PHASE 3

TITLE

VIEWPOINT - 6 BOHN LAKE
EXISTING AND APPROVED CASE
WINTER CONDITIONS

MEG Energy Corp.

PROJECT		07 - 1346 - 0009	FILE No. VP-6 ExistingWinter	
DESIGN	PT	15/05/07	SCALE N/A	REV. 0
COREL	PT	31/08/07	FIGURE: 4.4-15	
CHECK	PT	27/02/08		
REVIEW	IGG	27/02/08		

4.5 PROJECT CASE

4.5.1 Key Questions and Linkage Analysis

Key Question VRPC-1: What effects could existing and approved developments and the Project have on visual resources?

The Project will require the clearing and recontouring of land to construct facilities and wellpads. Facilities and equipment will be placed on the landscape. Visible plumes will be emitted from the Project. All of these Project elements have the potential to change the visual aesthetics of the area; therefore, the linkage between visual aesthetics and these elements is valid. The effects will, however, vary widely depending on the location of the viewpoint and the time of year. Potential linkages between the Project and visual resources are illustrated in Figure 4.5-1.

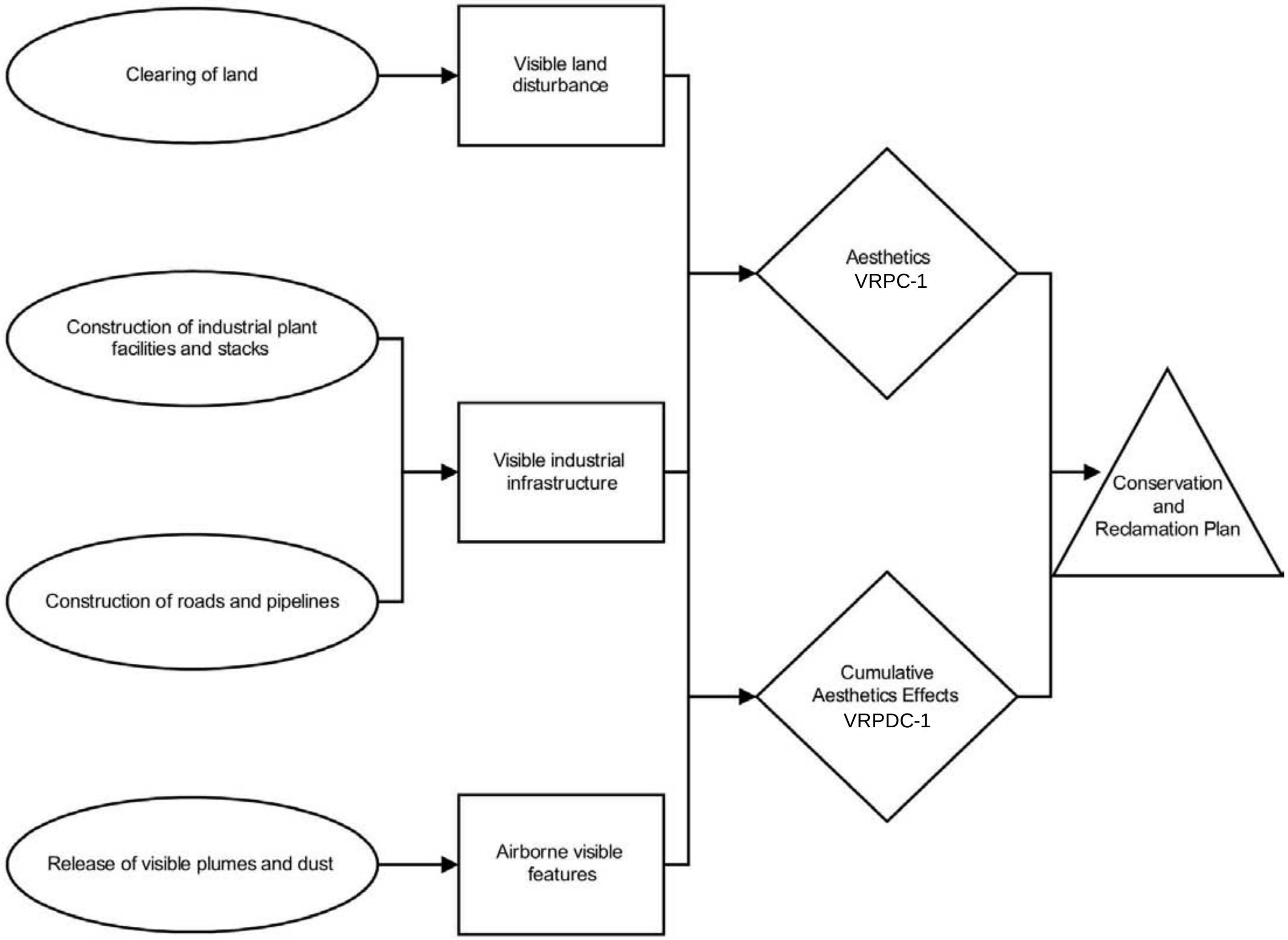
The visual effects of the Project will occur in an environment that is already subject to aesthetic changes and that is likely to experience additional aesthetic changes in the future. Therefore, wherever visual effects above the level of "negligible" environmental consequence are defined, effects must be considered in the context of cumulative effects with other developments, making this linkage valid.

4.5.1.1 Effects Analysis

The Project Case predicts the effect of the Project in combination with other existing and approved developments on visual resources. The effects are addressed by answering Key Question VRPC-1.

The effects of the Project on the visual resources in the RSA were modelled and assessed. Viewshed models were created to evaluate the extent of the potential effects and modelled views were created to evaluate the aesthetic effects at key viewpoints.

L:\2007\1346 Oil Sands\07-1346-0009-MEG EXPANSION\8900\8950\Fig 4.5-1 Visual Resources Linkage Diagram.dwg Mar 20, 2008 - 4:09pm



PROJECT
CHRISTINA LAKE REGIONAL PROJECT - PHASE 3

TITLE
VISUAL RESOURCES LINKAGE DIAGRAM

MEG ENERGY CORP.

PROJ	07-1346-0009.8900		FILE No. VR Linkage diagram
DESIGN	CM	10/12/07	SCALE AS SHOWN REV. 0
CADD	TRE	03/03/08	
CHECK	PT	04/03/08	
REVIEW	IGG	05/03/08	

FIGURE: 4.5-1

Project Case Viewshed Models

The viewshed models for the Project Case facilities and plumes (both summer and winter conditions) are illustrated in Figures 4.5-2 through 4.5-4. The viewsheds are summarized in Table 4.5-1.

Table 4.5-1 Project Case Viewshed Summary

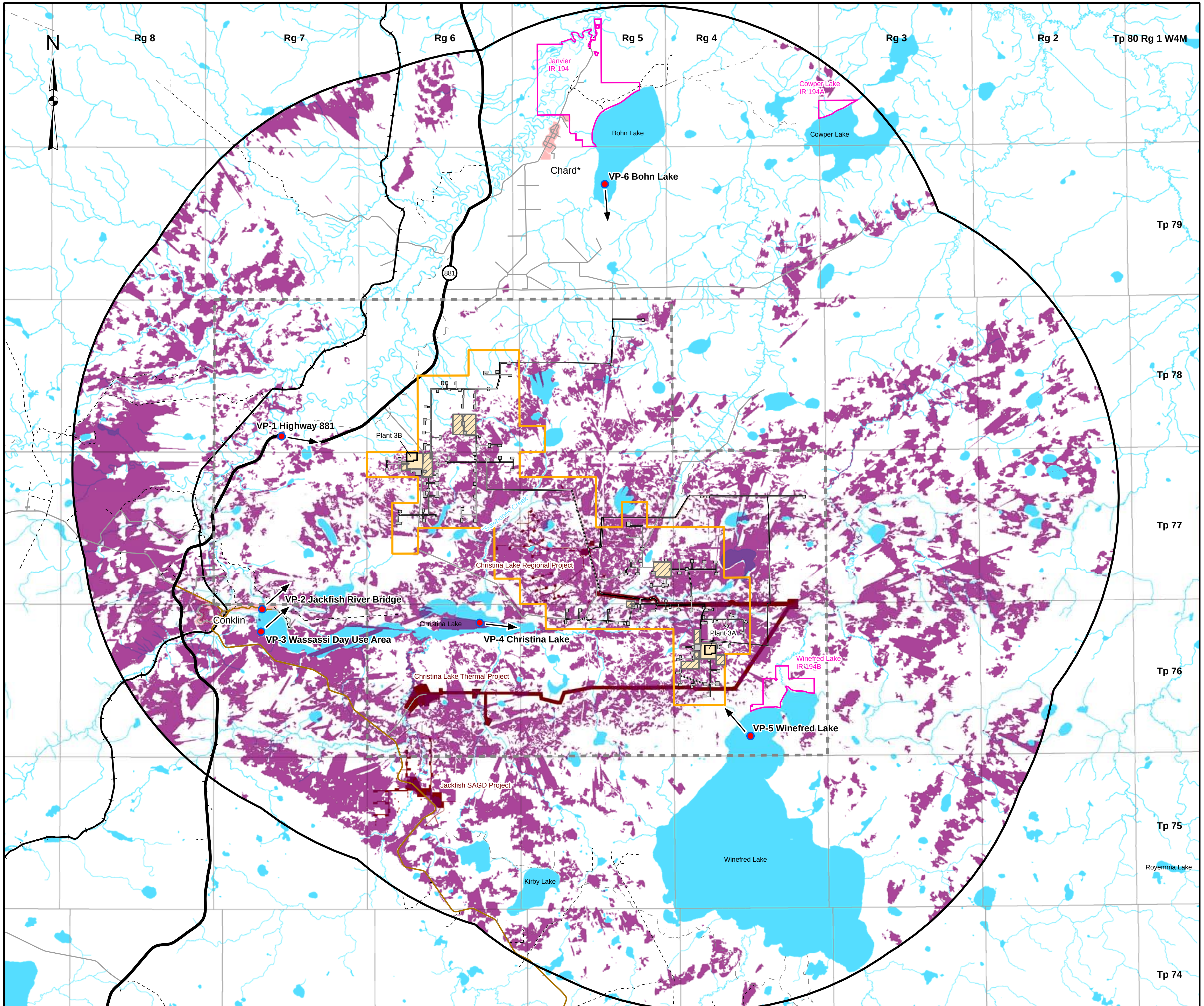
Viewshed	EAC Visible Area [ha]	Percentage of RSA	Project Case Visible Area [ha]	Percentage of RSA	Percentage Increase
facilities[(a)]	29,737	11	61,004	22	11
plumes (summer conditions)	52,164	18	98,010	35	17
plumes (winter conditions)	201,962	71	212,156	75	4

(a) Heights used to calculate the viewshed correspond to stack heights as shown in Table 4.2-1.

The modelled facilities viewshed for the Project Case predicts an increase of 11% of the area within the RSA that has a potential view of the facilities. This is likely to have little effect on users in the RSA, as most of the viewshed does not correspond with potential viewpoint locations as shown in Figure 4.2-1. The plume viewshed model for summer conditions predicts a 17% increase in the area within the RSA that has a potential view of plumes. The plume viewshed model for winter conditions predicts a 4% increase.

Project Case Modelled Views

Modelled views of the Project were created for each key viewpoint. Figures 4.5-5 through 4.5-16 show the Project effects during summer conditions with the average modelled plumes (using the average plume height for August, which has the maximum average plume heights of all summer months) and during winter conditions with the maximum modelled plumes (at the plants' predicted annual maximum emission rate under atmospheric conditions that produce the highest plume). The effects of the Project at each key viewpoint were rated and summarized in Table 4.5-4 and 4.5-5.



LEGEND

- VIEWPOINT
- PAVED ROAD
- GRAVEL ROAD (2 LANE)
- GRAVEL ROAD (1 LANE)
- UNIMPROVED ROAD
- TRUCK TRAIL
- RAILWAY
- RIVER OR STREAM
- AVI DATA EXTENT
- CHRISTINA LAKE PHASE 3 FOOTPRINT
- MEG LEASE BOUNDARY
- INDIAN RESERVE
- VISUAL RESOURCES REGIONAL STUDY AREA
- CHRISTINA LAKE PHASE 3 BORROW AREA
- CHRISTINA LAKE PHASE 3 PLANT FOOTPRINT
- EXISTING AND APPROVED DISTURBANCE
- EXISTING COMMUNITY DEVELOPMENT
- OPEN WATER

PROJECT CASE FACILITIES VIEWSHED

- AREAS FROM WHICH FACILITIES ARE NOT VISIBLE
- AREAS FROM WHICH FACILITIES ARE VISIBLE

NOTE

Unnamed watercourse locally known as "Sawbones Creek"
* Also known as the Hamlet of Janvier

REFERENCE

Digital data provided by AltaLIS Ltd. (June 2004), Veritas DGC Inc. (July 2004), Alberta Pacific Ltd. (April 2004), Pearson Timberline Ltd. (April 2004), used under license.
Projection: UTM Zone 12 Datum: NAD 83

10 0 10
SCALE 1:250,000 KILOMETRES

PROJECT
CHRISTINA LAKE REGIONAL PROJECT - PHASE 3

TITLE
PROJECT CASE
FACILITIES VIEWSHED

MEG ENERGY CORP.

PROJECT No. 07-1346-0009.8900			SCALE AS SHOWN	REV. 0
DESIGN	PT	24 Oct. 2007	FIGURE: 4.5-2	
GIS	PT	24 Oct. 2007		
CHECK	PT	05 Mar. 2008		
REVIEW	IGG	05 Mar. 2008		

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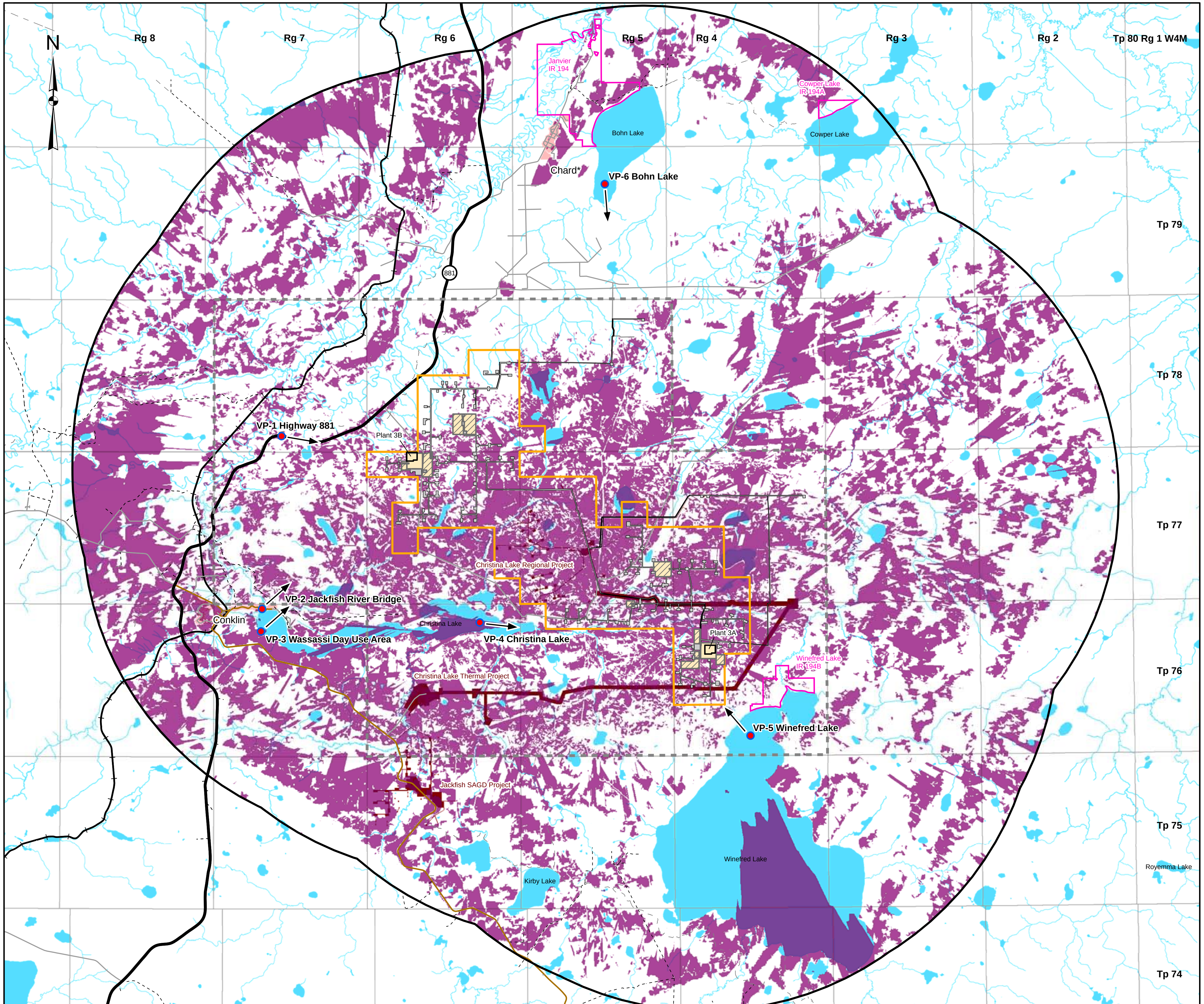

LEGEND

- VIEWPOINT
- PAVED ROAD
- GRAVEL ROAD (2 LANE)
- GRAVEL ROAD (1 LANE)
- UNIMPROVED ROAD
- TRUCK TRAIL
- RAILWAY
- RIVER OR STREAM
- AVI DATA EXTENT
- CHRISTINA LAKE PHASE 3 FOOTPRINT
- MEG LEASE BOUNDARY
- INDIAN RESERVE
- VISUAL RESOURCES REGIONAL STUDY AREA
- CHRISTINA LAKE PHASE 3 BORROW AREA
- CHRISTINA LAKE PHASE 3 PLANT FOOTPRINT
- EXISTING AND APPROVED DISTURBANCE
- EXISTING COMMUNITY DEVELOPMENT
- OPEN WATER

PROJECT CASE PLUME VIEWSHED

- AREAS FROM WHICH PLUMES ARE NOT VISIBLE
- AREAS FROM WHICH PLUMES ARE VISIBLE

NOTE

* Also known as the Hamlet of Janvier

REFERENCE

Digital data provided by AltaLIS Ltd. (June 2004), Veritas DGC Inc. (July 2004), Alberta Pacific Ltd. (April 2004), Pearson Timberline Ltd. (April 2004), used under license.
Projection: UTM Zone 12 Datum: NAD 83

10 0 10

SCALE 1:250,000 KILOMETRES

PROJECT

CHRISTINA LAKE REGIONAL PROJECT - PHASE 3

TITLE

PROJECT CASE
PLUME VIEWSHED SUMMER CONDITIONS

MEG ENERGY CORP.

PROJECT No. 07-1346-0009.8900			SCALE AS SHOWN	REV. 0
DESIGN	PT	24 Oct. 2007	FIGURE: 4.5-3	
GIS	PT	24 Oct. 2007		
CHECK	PT	05 Mar. 2008		
REVIEW	IGG	05 Mar. 2008		

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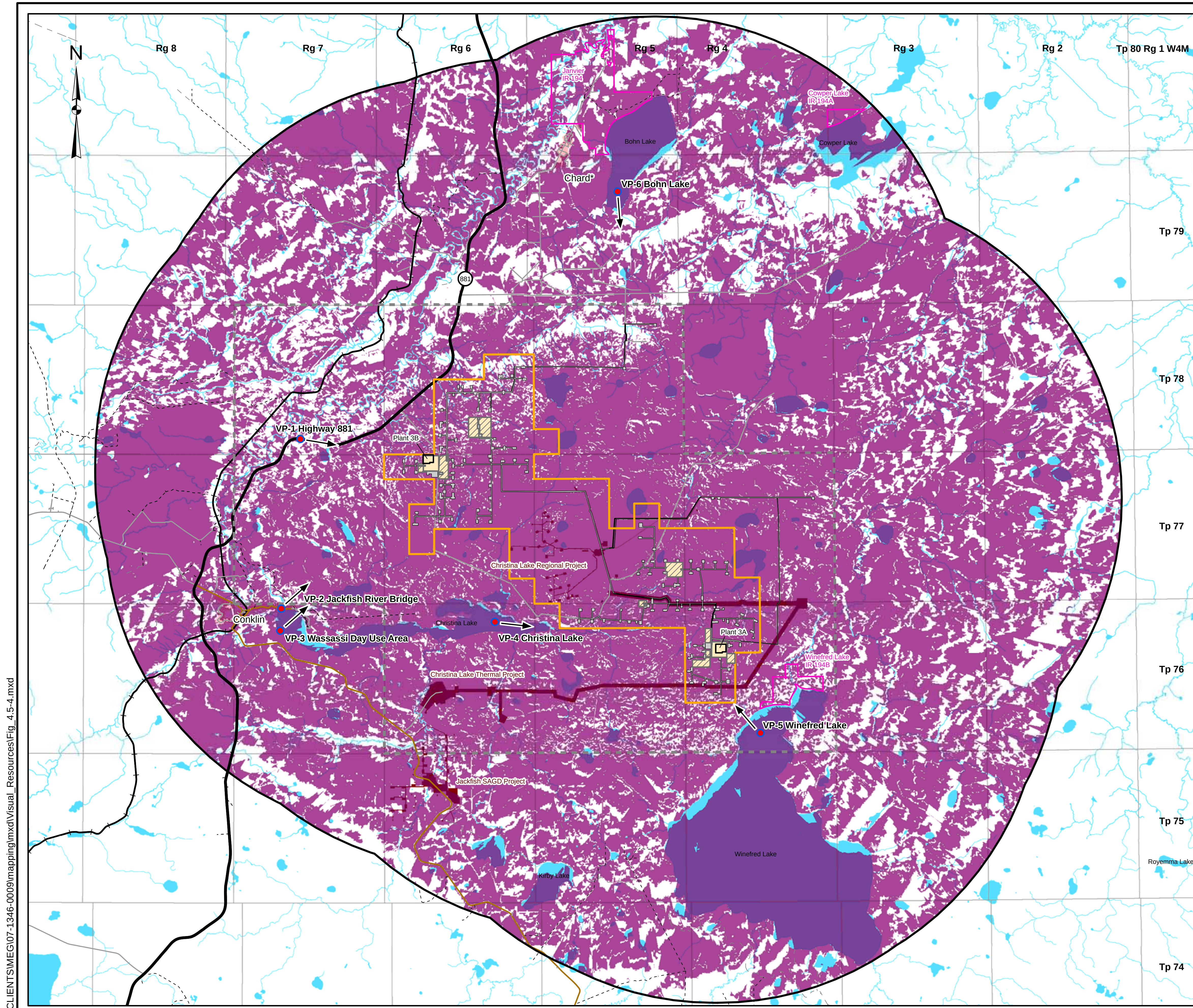

LEGEND

- VIEWPOINT
- PAVED ROAD
- GRAVEL ROAD (2 LANE)
- GRAVEL ROAD (1 LANE)
- UNIMPROVED ROAD
- TRUCK TRAIL
- RAILWAY
- RIVER OR STREAM
- AVI DATA EXTENT
- CHRISTINA LAKE PHASE 3 FOOTPRINT
- MEG LEASE BOUNDARY
- INDIAN RESERVE
- VISUAL RESOURCES REGIONAL STUDY AREA
- CHRISTINA LAKE PHASE 3 BORROW AREA
- CHRISTINA LAKE PHASE 3 PLANT FOOTPRINT
- EXISTING AND APPROVED DISTURBANCE
- EXISTING COMMUNITY DEVELOPMENT
- OPEN WATER

PROJECT CASE PLUME VIEWSHED

- AREAS FROM WHICH PLUMES ARE NOT VISIBLE
- AREAS FROM WHICH PLUMES ARE VISIBLE

NOTE

* Also known as the Hamlet of Janvier

REFERENCE

Digital data provided by AltaLIS Ltd. (June 2004), Veritas DGC Inc. (July 2004), Alberta Pacific Ltd. (April 2004), Pearson Timberline Ltd. (April 2004), used under license.
Projection: UTM Zone 12 Datum: NAD 83

10 0 10
SCALE 1:250,000 KILOMETRES

PROJECT
CHRISTINA LAKE REGIONAL PROJECT - PHASE 3

TITLE
PROJECT CASE
PLUME VIEWSHED WINTER CONDITIONS

MEG ENERGY CORP.

PROJECT No. 07-1346-0009.8900			SCALE AS SHOWN	REV. 0
DESIGN	PT	24 Oct. 2007	FIGURE: 4.5-4	
GIS	PT	24 Oct. 2007		
CHECK	PT	05 Mar. 2008		
REVIEW	IGG	05 Mar. 2008		

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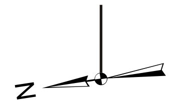

Facing East

PROJECT					
CHRISTINA LAKE REGIONAL PROJECT - PHASE 3					
TITLE					
VIEWPOINT - 1 HIGHWAY 881 PROJECT CASE SUMMER CONDITIONS					
MEG Energy Corp.	PROJECT	07 - 1346 - 0009		FILE No. VP-1 Project	
	DESIGN	PT	15/05/07	SCALE N/A	REV. 0
	COREL	PT	31/08/07	FIGURE: 4.5-5	
	CHECK	PT	27/02/08		
	REVIEW	IGG	27/02/08		

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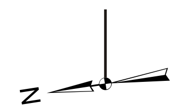

Facing East

PROJECT

CHRISTINA LAKE REGIONAL PROJECT - PHASE 3

TITLE

VIEWPOINT - 1 HIGHWAY 881
PROJECT CASE WINTER CONDITIONS

MEG Energy Corp.

PROJECT		07 - 1346 - 0009
DESIGN	PT	15/05/07
COREL	PT	31/08/07
CHECK	PT	27/02/08
REVIEW	IGG	27/02/08

FILE No. VP-1 ProjectWinter	
SCALE N/A	REV. 0

FIGURE: 4.5-6

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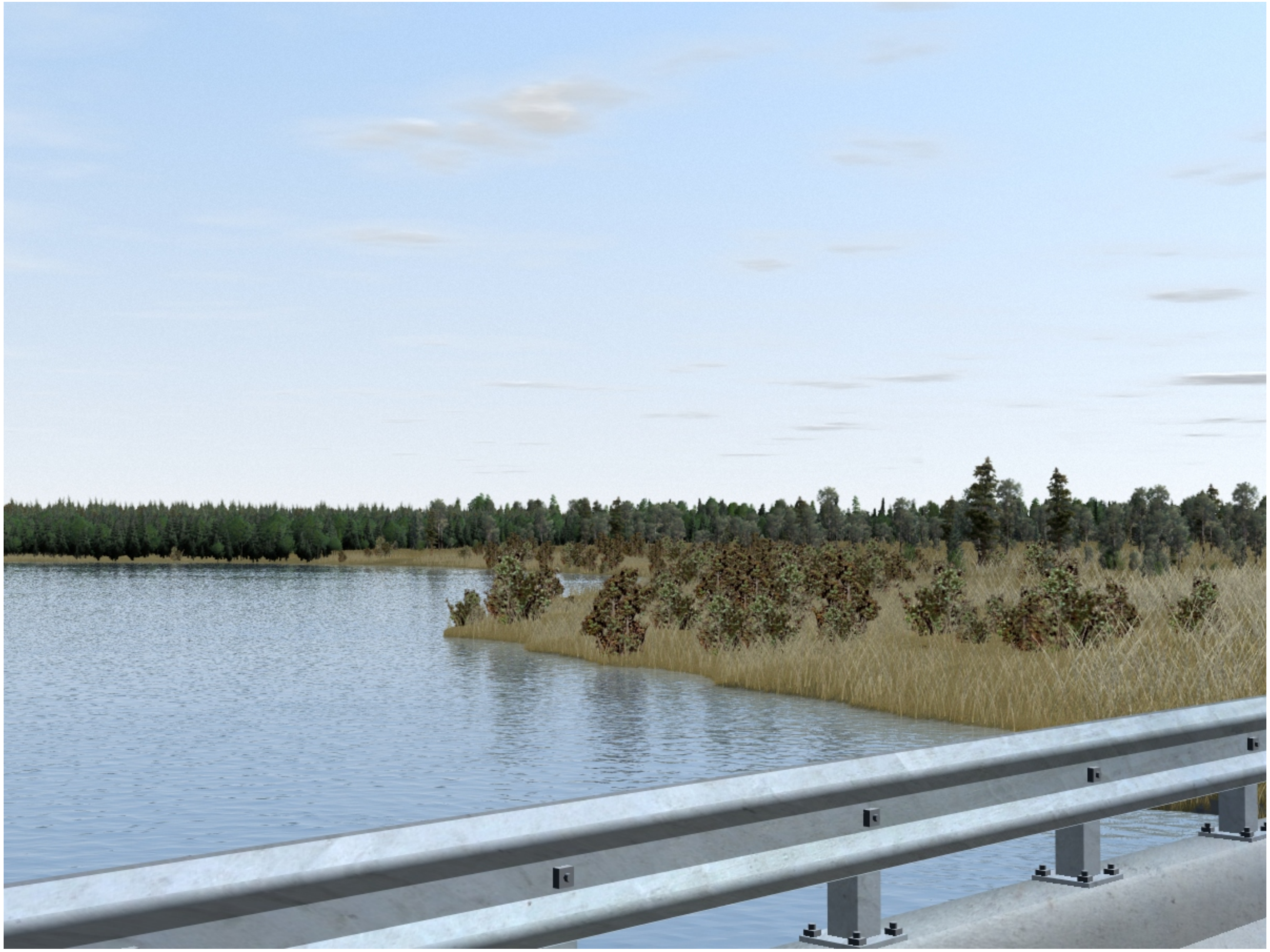

N

Facing Northeast

PROJECT

CHRISTINA LAKE REGIONAL PROJECT - PHASE 3

TITLE

VIEWPOINT - 2 JACKFISH RIVER BRIDGE
PROJECT CASE SUMMER CONDITIONS

MEG Energy Corp.

PROJECT		07 - 1346 - 0009
DESIGN	PT	15/05/07
COREL	PT	31/08/07
CHECK	PT	27/02/08
REVIEW	IGG	27/02/08

FILE No. VP-2 Project

SCALE N/A REV. 0

FIGURE: 4.5-7

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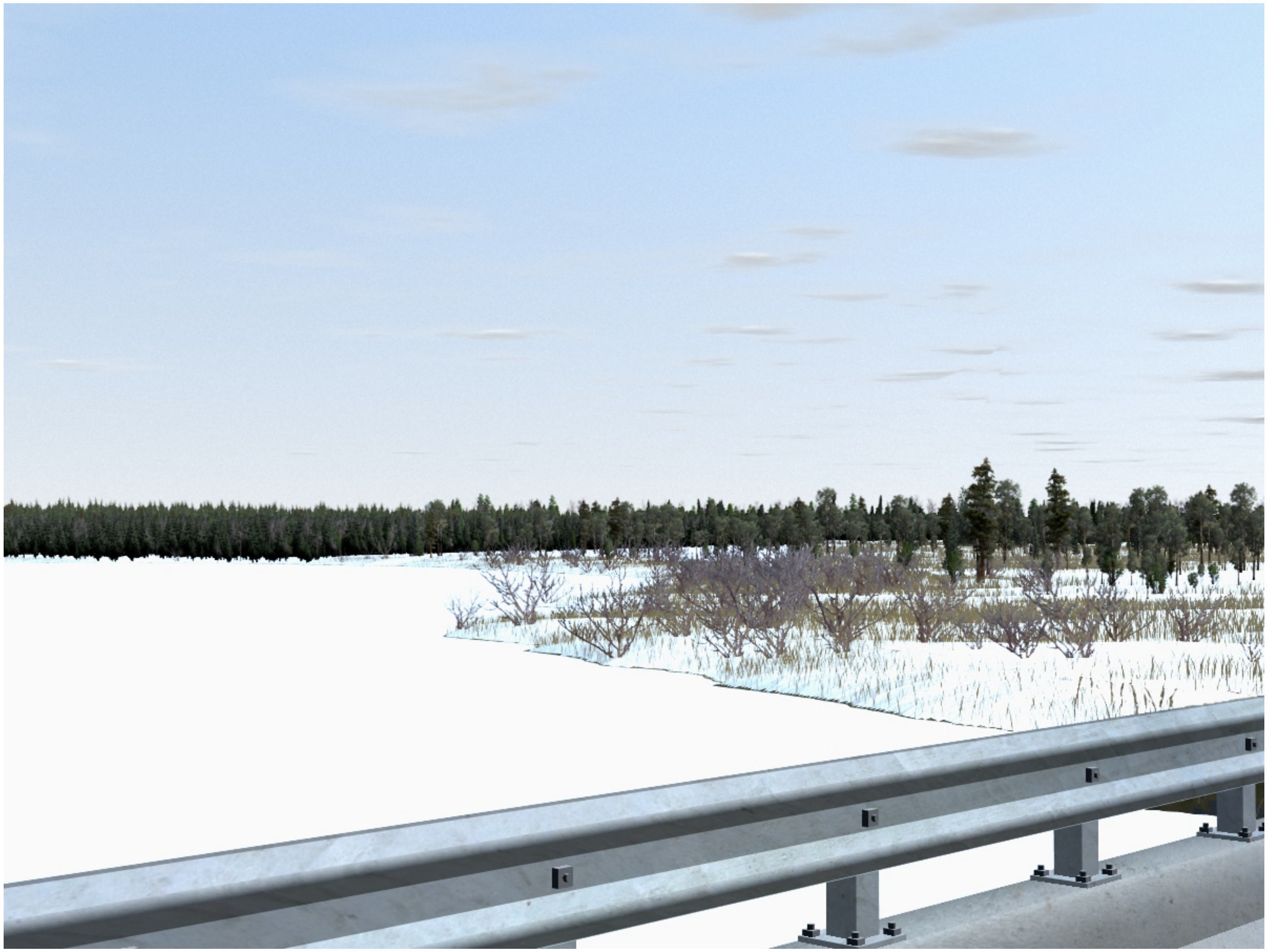

N

Facing Northeast

PROJECT				
CHRISTINA LAKE REGIONAL PROJECT - PHASE 3				
TITLE				
VIEWPOINT - 2 JACKFISH RIVER BRIDGE PROJECT CASE WINTER CONDITIONS				
MEG Energy Corp.	PROJECT	07 - 1346 - 0009		FILE No. VP-2 ProjectWinter
	DESIGN	PT	15/05/07	SCALE N/A REV. 0
	COREL	PT	31/08/07	**FIGURE: 4.5-8**
	CHECK	PT	27/02/08	
	REVIEW	IGG	27/02/08	

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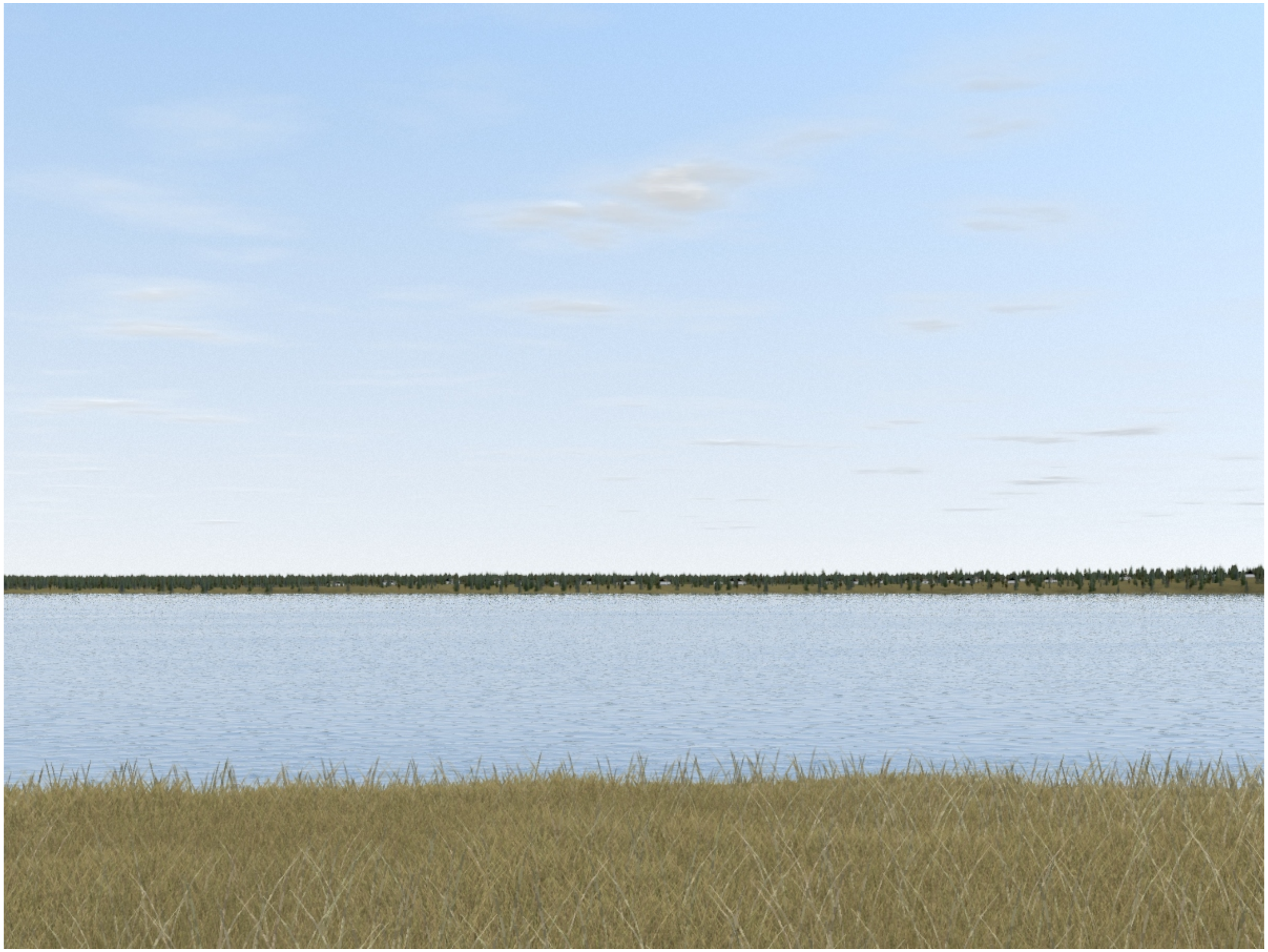

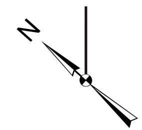

Facing Northeast

PROJECT					
CHRISTINA LAKE REGIONAL PROJECT - PHASE 3					
TITLE					
VIEWPOINT - 3 WASSASSI DAY USE AREA PROJECT CASE SUMMER CONDITIONS					
MEG Energy Corp.	PROJECT		07 - 1346 - 0009	FILE No. VP-3 Project	
	DESIGN	PT	15/05/07	SCALE N/A	REV. 0
	COREL	PT	31/08/07	FIGURE: 4.5-9	
	CHECK	PT	27/02/08		
	REVIEW	IGG	27/02/08		

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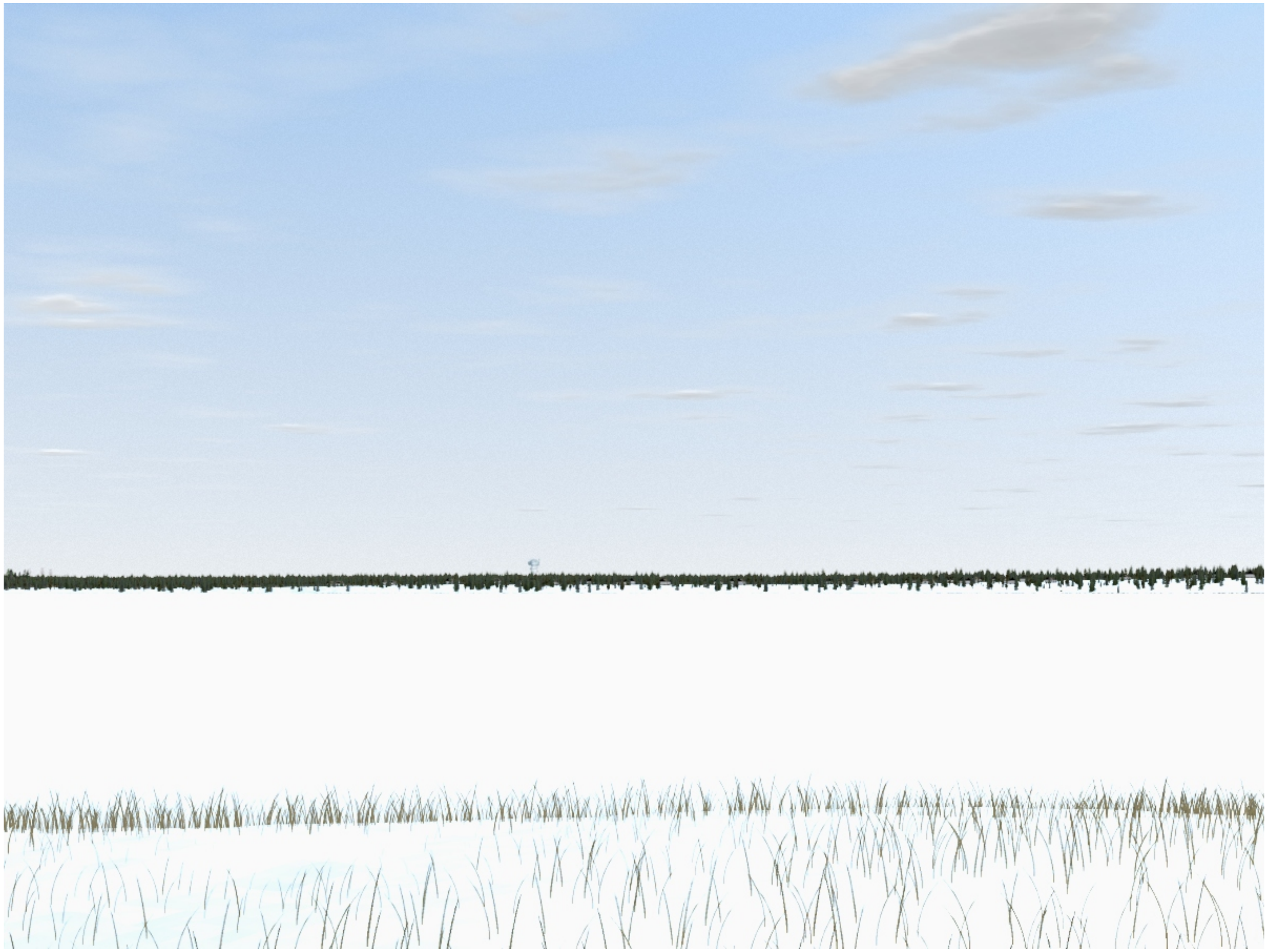

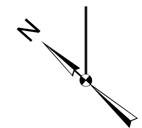

Facing Northeast

PROJECT					
CHRISTINA LAKE REGIONAL PROJECT - PHASE 3					
TITLE					
VIEWPOINT - 3 WASSASSI DAY USE AREA PROJECT CASE WINTER CONDITIONS					
MEG Energy Corp.	PROJECT		07 - 1346 - 0009	FILE No. VP-3 ProjectWinter	
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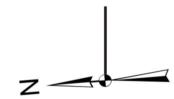

Facing East

PROJECT

CHRISTINA LAKE REGIONAL PROJECT - PHASE 3

TITLE

VIEWPOINT - 4 CHRISTINA LAKE
PROJECT CASE SUMMER CONDITIONS

MEG Energy Corp.

PROJECT		07 - 1346 - 0009
DESIGN	PT	15/05/07
COREL	PT	31/08/07
CHECK	PT	27/02/08
REVIEW	IGG	27/02/08

FILE No. VP-4 Project

SCALE N/A REV. 0

FIGURE:
4.5-11

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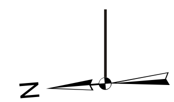

Facing East

PROJECT					
CHRISTINA LAKE REGIONAL PROJECT - PHASE 3					
TITLE					
VIEWPOINT - 4 CHRISTINA LAKE PROJECT CASE WINTER CONDITIONS					
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	REVIEW	IGG	27/02/08		

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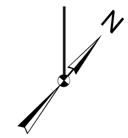

Facing Northwest

PROJECT					
CHRISTINA LAKE REGIONAL PROJECT - PHASE 3					
TITLE					
VIEWPOINT - 5 WINEFRED LAKE PROJECT CASE SUMMER CONDITIONS					
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	COREL	PT	31/08/07	FIGURE: 4.5-13	
	CHECK	PT	27/02/08		
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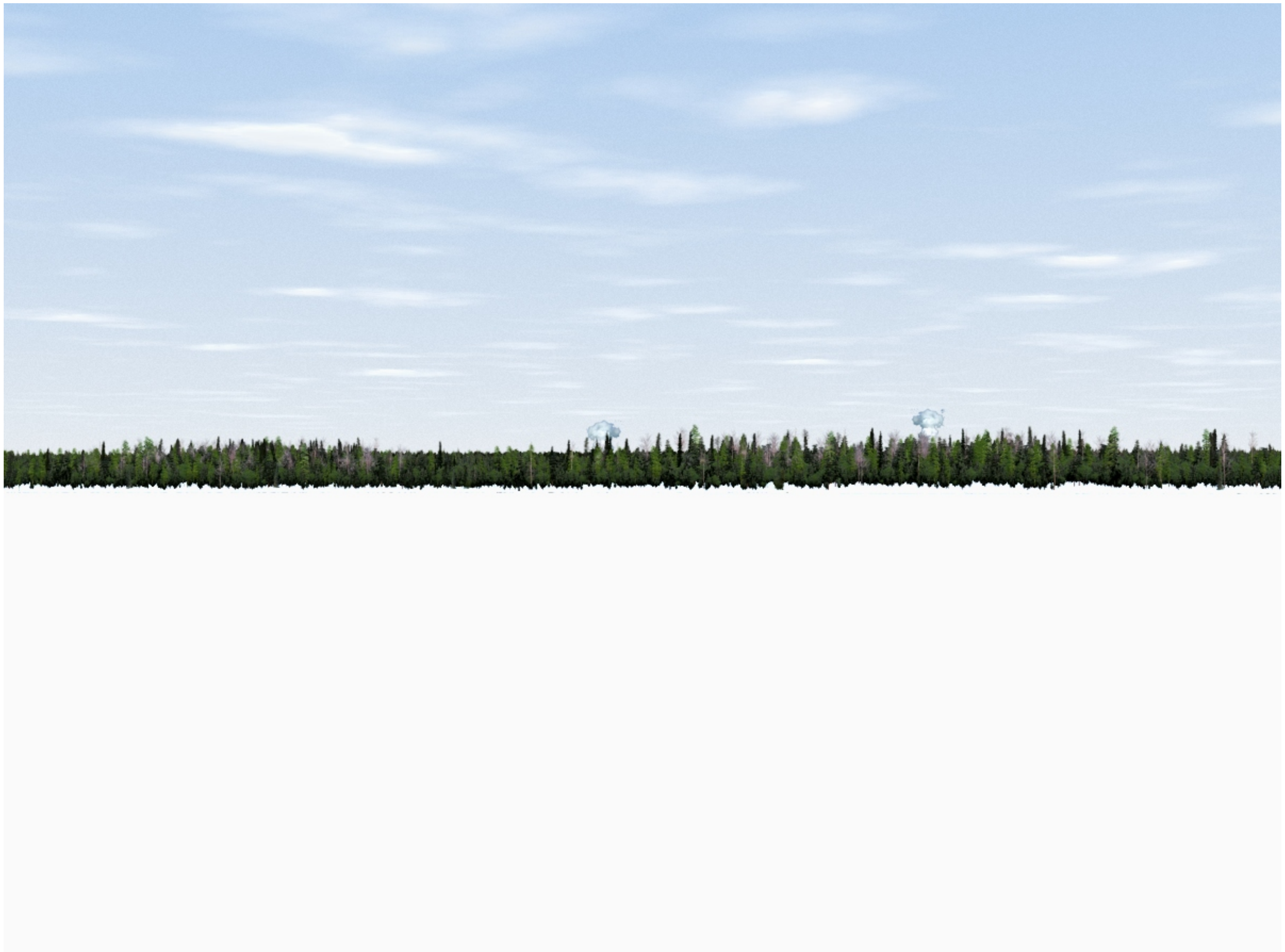

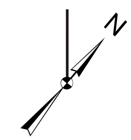

Facing Northwest

PROJECT

CHRISTINA LAKE REGIONAL PROJECT - PHASE 3

TITLE

VIEWPOINT - 5 WINEFRED LAKE
PROJECT CASE WINTER CONDITIONS

MEG Energy Corp.

PROJECT	07 - 1346 - 0009	
DESIGN	PT	15/05/07
COREL	PT	31/08/07
CHECK	PT	27/02/08
REVIEW	IGG	27/02/08

FILE No. VP-5 ProjectWinter

SCALE N/A REV. 0

FIGURE: 4.5-14

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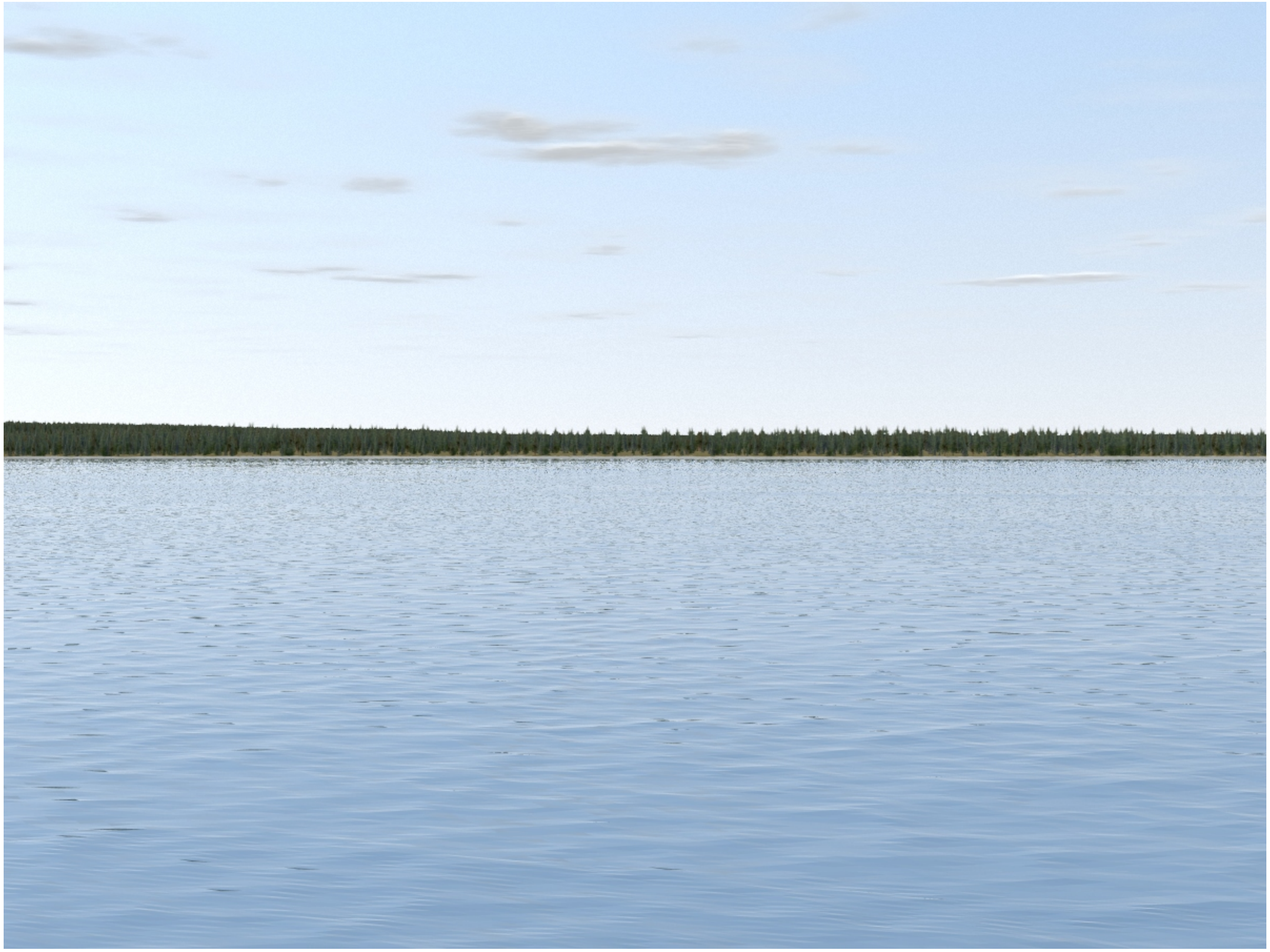

N
Facing South

PROJECT

CHRISTINA LAKE REGIONAL PROJECT - PHASE 3

TITLE

VIEWPOINT - 6 BOHN LAKE
PROJECT CASE SUMMER CONDITIONS

MEG Energy Corp.

PROJECT	07 - 1346 - 0009	
DESIGN	PT	15/05/07
COREL	PT	31/08/07
CHECK	PT	27/02/08
REVIEW	IGG	27/02/08

FILE No. VP-6 Project
SCALE N/A REV. 0

FIGURE: 4.5-15

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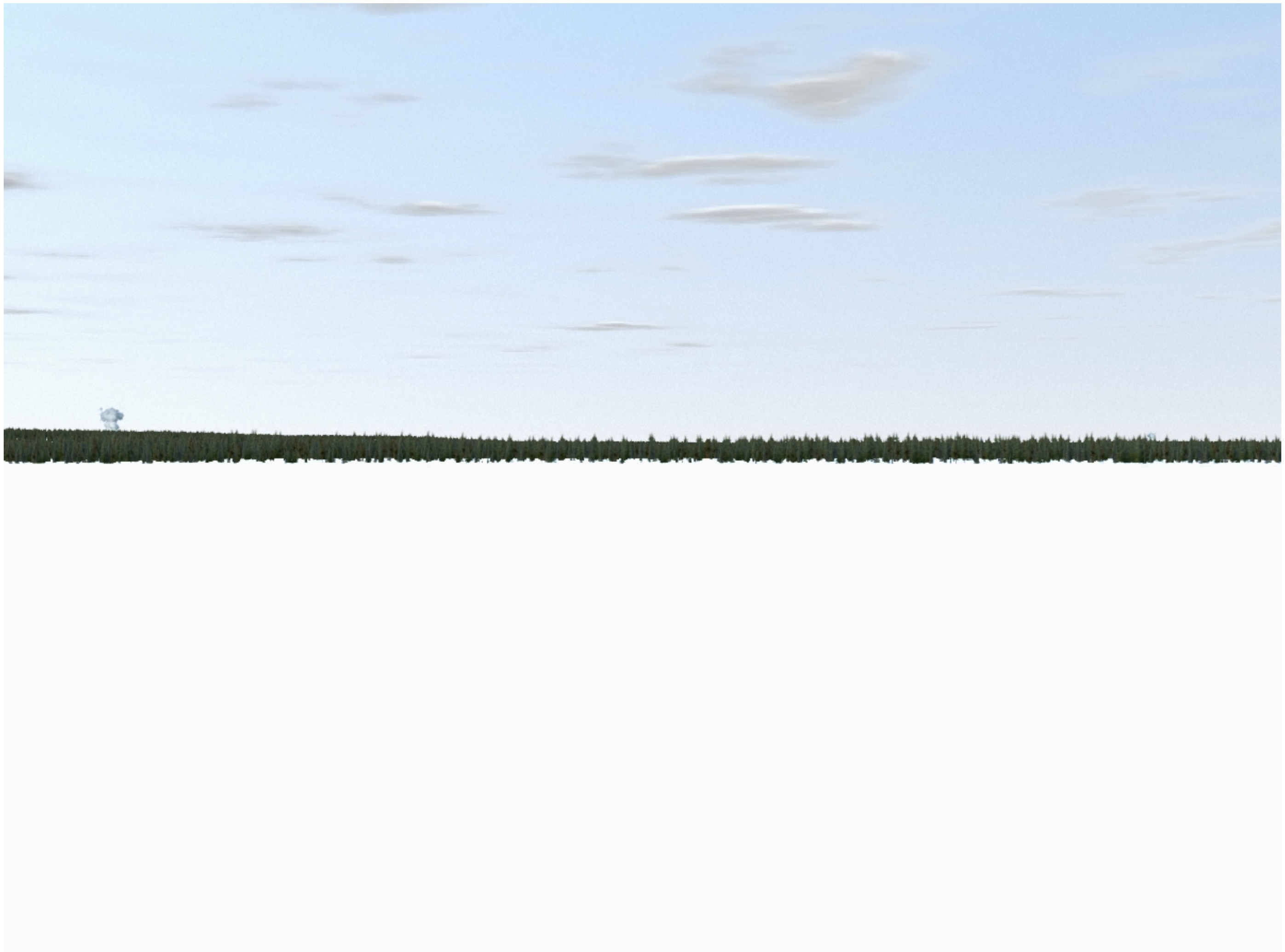

N
Facing South

PROJECT

CHRISTINA LAKE REGIONAL PROJECT - PHASE 3

TITLE

VIEWPOINT - 6 BOHN LAKE
PROJECT CASE WINTER CONDITIONS

MEG Energy Corp.

PROJECT		07 - 1346 - 0009
DESIGN	PT	15/05/07
COREL	PT	31/08/07
CHECK	PT	27/02/08
REVIEW	IGG	27/02/08

FILE No. VP-6 ProjectWinter

SCALE N/A REV. 0

FIGURE: 4.5-16

Project Case Contrast Ratings

The Project Case contrast rating was conducted for winter conditions because the plumes can not be seen from any of the viewpoints under summer conditions. The plumes are the only visible features of the Project from key viewpoints. Table 4.5-2 provides the visual contrast ratings for each contrast element for each of the key viewpoints.

Table 4.5-2 Project Case Contrast Ratings

Viewpoint	Contrast Element	Land/Water	Vegetation	Structures	Plume	Overall
VP-1 Secondary Highway 881, facing east	form	none	none	none	slight	negligible
	line	none	none	none	slight	negligible
	colour	none	none	none	slight	negligible
	texture	none	none	none	slight	negligible
	scale	none	none	none	none	none
	overall contrast for VP-1					**negligible**
VP-2 Jackfish River Bridge, facing northeast	form	none	none	none	slight	negligible
	line	none	none	none	slight	negligible
	colour	none	none	none	slight	negligible
	texture	none	none	none	slight	negligible
	scale	none	none	none	none	none
	overall contrast for VP -2					**negligible**
VP-3 Wassassi Day Use Area, facing northeast	form	none	none	none	slight	negligible
	line	none	none	none	slight	negligible
	colour	none	none	none	slight	negligible
	texture	none	none	none	slight	negligible
	scale	none	none	none	slight	negligible
	overall contrast for VP -3					**negligible**
VP-4 Christina Lake, facing east	form	none	none	none	moderate	slight
	line	none	none	none	strong	moderate
	colour	none	none	none	slight	negligible
	texture	none	none	none	slight	negligible
	scale	none	none	none	slight	negligible
	overall contrast for VP -4					**slight**
VP-5 Winefred Lake, facing northwest	form	none	none	none	moderate	slight
	line	none	none	none	strong	moderate
	colour	none	none	none	slight	negligible
	texture	none	none	none	slight	negligible
	scale	none	none	none	slight	negligible
	overall contrast for VP -5					**slight**
VP-6 Bohn Lake, facing south	form	none	none	none	moderate	slight
	line	none	none	none	strong	moderate
	colour	none	none	none	slight	negligible
	texture	none	none	none	slight	negligible
	scale	none	none	none	slight	negligible
	overall contrast for VP-6					**slight**

The landscape contrast elements of form, line, colour, texture and scale were evaluated for each viewpoint and disturbance type. Disturbances were separated into land/water, vegetation, structures and plume disturbance categories. The degree of contrast of each disturbance type was evaluated separately for each contrast element and an overall contrast rating was also assigned for each viewpoint. The overall contrast rating is generally the average of all applicable contrast ratings; however, if a single element or the cumulative effect of the elements combine in such a way that the view is dominated by the change then the overall rating may be adjusted accordingly.

The possible contrast ratings are none, slight, moderate and high. The contrast rating "none" was assigned where the disturbance type is not visible or barely perceptible in the modelled view. The contrast rating "slight" was assigned where the disturbance type is visible in the view but the level of contrast with the surrounding landscape elements is low. The contrast rating "moderate" was assigned where the disturbance type provides a noticeable contrast to the surrounding landscape but the view is not dominated by that contrast. The contrast rating "high" was assigned where the disturbance type contrasts with the surrounding landscape elements in such a way that it dominates the attention of the viewer. As an overall contrast rating, the rating "negligible" was assigned to contrast elements that have one "slight" rating only.

Based on the contrast ratings in Table 4.5-2, the maximum and overall contrast rating of the Project from each ground viewpoint is summarized in Table 4.5-3.

Table 4.5-3 Project Case Contrast Summary

Viewpoint	Maximum Contrast	Overall Contrast
VP-1 Secondary Highway 881, facing east	slight	negligible
VP-2 Jackfish River Bridge, facing northeast	slight	negligible
VP-3 Wassassi Day Use Area, facing northeast	slight	negligible
VP-4 Christina Lake, facing east	strong	slight
VP-5 Winefred Lake, facing northwest	strong	slight
VP-6 Bohn Lake, facing south	strong	slight

The results of the contrast rating represent the overall contrast between the Project's elements and the existing landscape. The overall contrast was compared to the initial landscape rating for each key viewpoint (Table 4.2-4) to determine the Project's magnitude of effect at every viewpoint.

Table 4.5-4 Magnitude of Effect Rating

Viewpoint	Overall Contrast	Landscape Rating	Magnitude of Effect
VP-1 Secondary Highway 881, facing east	negligible	low	negligible
VP-2 Jackfish River Bridge, facing northeast	negligible	low	negligible
VP-3 Wassassi Day Use Area, facing northeast	negligible	low	negligible
VP-4 Christina Lake, facing east	slight	low	low
VP-5 Winefred Lake, facing northwest	slight	low	low
VP-6 Bohn Lake, facing south	slight	low	low

Note: Based on magnitude of effects classification as shown in Table 4.2-4.

4.5.1.2 Effects Description Criteria

The environmental consequence was examined in the context of the RSA for the Project Case (Table 4.5-5).

Table 4.5-5 Project Case Effects Classification for Visual Resources

Direction	Magnitude	Geographic Extent	Duration	Reversibility	Frequency	Environmental Consequence
negative	low (+5)	regional (+1)	long-term (+2)	yes (-3)	low (0)	negligible (5)

Note: Based on effects classification definitions for visual resources as shown in Table 4.2-5.

Direction was rated as negative due to the visibility of plumes and the negative effects that the Project has on the aesthetics of key viewpoints (Table 4.5-2 and Table 4.5-3). Magnitude was rated as low due to the limited change in aesthetics (visible plumes) at key viewpoints as a result of the Project and a low rating of the existing landscape. Geographic extent was rated as regional because beyond the VSA (more than 20 km distance from Project) the effect of the Project is expected to be non-existent or negligible. Frequency was rated as low because the effects of the Project on aesthetics (plumes tall enough to be seen from the key viewpoints) are expected to occur rarely (about once a year). The overall environmental consequence of visual resources is negligible.

4.6 PLANNED DEVELOPMENT CASE

4.6.1 Key Question and Linkage Analysis

The PDC predicts the effect of the Project in combination with other existing, approved and planned developments on visual aesthetics. The cumulative effects are addressed by answering Key Question VRPDC-1.

Key Question VRPDC-1: What effects could existing and approved developments, the Project and planned developments have on visual resources?

4.6.1.1 Effects Description Criteria

Modelling was not conducted for the PDC because detailed data on the location of facilities and height of plumes of other planned developments were not available. Since all planned development in the RSA are expected to be of a similar nature to the Project, its effects are assumed to be of a similar character and magnitude.

The planned developments located within the RSA and considered in the PDC are Devon's Jackfish 2 Project, EnCana's Christina Lake Thermal Project Phases C and D, and StatoilHydro's Kai Kos Dehseh SAGD Project.

The Jackfish 2 SAGD development will be located adjacent to Devon's Jackfish 1 Project and Phases C and D of the Christina Lake Thermal Project will be located adjacent to EnCana's existing operations. Kai Kos Dehseh will be located northwest of the Project. All planned developments are SAGD operations and will include wellpads, central processing plants and other infrastructure such as roads and pipelines. The wellpads and facilities will likely be screened from all key viewpoints by vegetation. Plumes will likely be emitted from the developments. The plumes might be visible from one or more key viewpoints.

The environmental consequence for the PDC was examined in the context of the RSA (Table 4.6-1).

Table 4.6-1 Effects Description Criteria for Visual Resources

Direction	Magnitude	Geographic Extent	Duration	Reversibility	Frequency	Environmental Consequence
negative	negligible (-5)	regional (+1)	long-term (+2)	yes (-3)	low (0)	negligible (-5)

Note: Based on effects classification definitions for visual resources as shown in Table 4.2-5.

Direction was rated as negative due to the visibility of plumes and the negative effects that the Project and other developments within the RSA will likely have on the aesthetics of key viewpoints. Based on the similar nature of the planned developments to the existing projects, it is assumed that only very limited changes in aesthetics (visible plumes) at key viewpoints will be caused by the planned projects. As a result of this and a low rating of the existing landscape, the magnitude of impact was rated as low. Geographic extent was rated as regional because beyond the VSA (more than 20 km distance from Project) the effects of the developments are expected to be non-existent or negligible. Frequency was rated as low because the effects of the developments on aesthetics (plumes tall enough to be seen from the key viewpoints) are expected to occur rarely. The overall environmental consequence of visual resources is negligible.

4.7 CONCLUSIONS

The effect of an aesthetic disturbance can vary greatly depending on the sensitivity of the existing landscape and the observer. The viewshed model used to determine the visible area of the Project Case provides a very conservative estimate of visibility. The viewshed model is more accurate for cleared areas than it is for forested areas and therefore the visible area calculations are over-represented due to the forested landscape.

At locations where disturbances are visible and sensitive observers are likely to be present, the potential for an effect exists. At key locations along public transportation routes, close to existing communities, and locations with recreational potential, viewpoints were created and modelled. The EAC was evaluated and then compared to modelled views that incorporated the Project disturbances. The Project disturbances included cleared vegetation, new facilities and visible plumes. However, the plumes are the only visible feature of the Project from the key viewpoints, and they are predicted to be visible under rare conditions only.

Due to lack of information, the assessment of the PDC was limited to a determination of the probable effects based on the nature of the other developments and the results of the EAC and Project Case assessments. In this context the environmental consequence of the other developments was determined to be negligible and reversible. The overall combined effects of the Project and other PDC developments on visual aesthetics are expected to be negligible and reversible.

4.8 REFERENCES

AENV (Alberta Environment). 2008. Final Terms of Reference. Environmental Impact Assessment (EIA) for MEG Christina Lake Regional Project – Phase 3 Issued by Alberta Environment. 2007.

AEP (Alberta Environmental Protection). 1991. Christina Lake Management Plan. Final Draft, Alberta.

Al-Pac (Alberta Pacific Forest Industries Inc.). 2006. Alberta Vegetation Inventory. Edmonton, AB.

ESRI (Environmental Systems Research Institute). 2006. ArcGIS and Spatial Analyst Version 9.2. Redlands, CA.

Geomatics Canada. 2000. Standards and Specifications of the National Topographic Data Base. Edition 3.1.

USDI (United States Department of the Interior, Bureau of Land Management). 1986a. Visual Resource Inventory. BLM Manual Handbook H-8410-1, Rel. 8-28. Washington, DC.

USDI. 1986b. Visual Resource Contrast Rating. BLM Manual Handbook H-8431-1, Rel. 8-30. Washington, DC.

VNS. (Visual Nature Studio). Version 2.70. 2006. 3-D Nature LLC. Morrison, CO.

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5 HISTORICAL RESOURCES ASSESSMENT

5.1 INTRODUCTION

This section presents the Historical Resources assessment prepared for the MEG Energy Corporation (MEG) Christina Lake Regional Project - Phase 3 (the Project) Environmental Impact Assessment (EIA). The Historical Resources component is intended to address the Terms of Reference (TOR) established for the EIA (AENV 2008).

The TOR, as provided in Volume 2, Appendix 2-I, require provision of a Historical Resources Impact Assessment (HRIA) to Alberta Tourism, Parks, Recreation and Culture (ATPRC). A HRIA was conducted in compliance with the Alberta *Historical Resources Act* in September 2007, and was submitted to ATPRC in December 2007 (Balls 2007). Review of that document by ATPRC will determine whether there are any remaining historical resources legislative requirements in relation to the Project.

5.1.1 Terms of Reference

This assessment was completed to meet the relevant TOR (AENV 2008) for the Project (Table 5.1-1) which state the following:

Table 5.1-1 Terms of Reference Concordance Table

TOR Section	Environmental Assessment or Topic	Location TOR Addressed
5.0 HISTORICAL RESOURCES		
5.0 HISTORICAL RESOURCES	[A] Describe consultation with Alberta Tourism, Parks, Recreation and Culture (TPRC) and Aboriginal communities concerning the need for Historical Resource Impact Assessment (HRIA) for the Project and: (a) provide a general overview of the results of any previous historical resource studies that have been conducted in the Study Area, including archaeological resources, palaeontological resources, historical period sites, and any other historical resources as defined within the *Historical Resources Act*	(a) Volume 6, Section 5.3.2 Regional Study Area
	(b) summarize the results from the field program performed to assess archaeological, palaeontological and historical significance of the Local Study Area;	(b) Volume 6, Section 5.3 Approved and Existing Conditions
	(c) provide a summary of the results of the HRIA conducted to assess the potential impact of the Project on archaeological, palaeontological and historical resources;	(c) Volume 6, Section 5.3 Approved and Existing Conditions
	(d) provide an outline of the program and schedule of field investigations that TPRC may require MEG to undertake to further assess and mitigate the effects of the Project on historical resources; and	(d) Volume 6, Section 5.6 Planned Development Case

To complete the HRIA, it was necessary to:

- outline existing information with respect to historical resource distribution in the Project area and in the region in which it is planned;
- design and conduct investigations to define the nature of project-specific impacts to historical resources; and
- evaluate the effects of the Project in combination with existing and planned development in the region.

The HRIA report includes the results of the field investigations and a full assessment of Project effects. This section of the EIA provides a summary of that report including a detailed discussion of the effects of the Project both alone and in combination with the regional developments.

5.2 ASSESSMENT APPROACH

5.2.1 Definition of Historical Resources

Historical resources are defined by the Alberta *Historical Resources Act* Alberta Legislature (2000) as *"any work of nature or human that is primarily of value for its palaeontological, archaeological, prehistoric, historic, cultural, natural, scientific or aesthetic interest including, but not limited to, a palaeontological, archaeological prehistoric, historic or natural site, structure or object."*

Consequently, historical resources include the sites where events took place in the past, all of the objects that they contain, and any of the contextual information that may be associated with them and will aid in their interpretation. Contextual information can include, but is not limited to, natural specimens and documents or verbal accounts.

Historical resources are generally divided into three types:

- prehistoric archaeological;
- historic period archaeological and structural; and
- palaeontological.

Natural objects and features have also been occasionally managed under the provisions of the *Historical Resources Act*.

Prehistoric, or precontact archaeological resources in northern North America are the archaeological sites, objects and affiliated materials that represent occupations by Aboriginal peoples prior to the arrival of European goods, people and the historic records that characterize European culture. In northeastern Alberta, these resources consist of the locations and remains of these activities, including stone artifacts and features such as hearths. Generally, associated animal bone and other organic artifacts have been removed by the acid soils of the area. Prehistoric archaeological resources can span the entire 10,000-year period of recognized prehistory in northeastern Alberta.

Historic archaeological and structural resources generally include the sites, artifacts, structures and documents that relate to the Euro-Canadian occupation of the region spanning the last 250 years. These include remains related to the early fur trade conducted in the region as well as those relating to later economic developments such as trapping, forestry and oil sands exploration and production.

Key components of the historic period record are the sites, artifacts and affiliated resources relating to post-contact use of the landscape by Aboriginal people. These include archaeological sites and objects (e.g., standing and collapsed cabins, campsites and graves) and traditional sites and resources (e.g., special places, hunting and plant collecting areas, trap lines and their associated remains, oral traditions and various documents). These latter resources are usually identified through consultation procedures such as Traditional Land Use studies.

Palaeontological resources consist of physical remains representing the evidence of extinct multicellular plants and animals that inhabited the region in prehistoric times as well as related contextual information. These can include fossils, bone deposits, shells and the impressions of these remains. They can occur in both bedrock and unconsolidated glacial and post-glacial sedimentary deposits.

Impacts to historical resources as a result of developments are generally described as falling into two categories: direct and indirect. Direct impacts occur during the construction and operations stages of any project and are an immediate result of activities associated with a project. These can include forest clearings drainage, muskeg removal, road construction, construction of electrical power, natural gas supply and water supply facilities, gravel resource extraction, product transportation and reclamation. Indirect impacts occur as a result of the development but are not directly related to it. They can take place outside direct impact zones. For example, development of an industrial project can result in increased use of surrounding undeveloped regions causing surface disturbance and an increased possibility of vandalism or accidental impact.

5.2.2 Assessment Parameters

Project construction, operation and reclamation each have the potential to contribute unique effects on Historical Resources. The direct physical effects of project development on historical resources usually occur during the construction phase, and immediately within the development footprint. Indirect effects on the surrounding area can potentially occur during the operation phase of the Project, including impacts to unidentified historical resources due to increased industrial or recreational activity as a result of improved access to the Local Study Area (LSA). Reclamation of the Project should not contribute any effects as all direct impacts would have occurred during construction.

The HRIA was designed to assess the LSA (Figure 5.2-1) for historical resources and to recommend mitigation for any sites within the LSA that might be affected by the Project. This includes 72 complete or partial sections of land over an area of 18,384 ha including: Sections 1, 2, 3, 4, 9, 10, 11, 12, 13, 14, 15, 16, 23, and 24-78-6 W4M; Section 6-78-5 W4M; Sections 1, 2, 3, 4, 5, 8, 9, 10, 11, 14, 15, 16, 17, 20, 21, 22, 23, 26, 27, 28, 31, 32, 33, 34 and 35-77-6 W4M; Sections 7, 8, 9, 10, 11, 14, 15, 16, 17, 18, 19, 20, 22, 23, 26, 27, 28, 29, 30, 34, 35 and 30-76-4 W4M; Section 31-76-5 W4M; Sections 34, 35 and 36-76-6 W4M; and Sections 2, 3, 10, 11, 14, and 23-77-4 W4M. The initial configuration of the areas to be examined during the field component was established by MEG and ATPRC in their review of the application for the permit to conduct these studies.

The planned LSA target areas were modified to include areas with historical resource potential based on field observations made by helicopter overflight, foot traverses and vehicle traverses. The assessment of the direct and indirect effects of the Project is based on the results of the field studies conducted within this LSA.

An analysis of the effects of the Project in combination with existing, approved and planned developments within the general region was facilitated through definition of a historical resources Regional Study Area (RSA) (Figure 5.2-2). The RSA covers an area of 1,519,300 ha or 180 townships surrounding the Project. It extends from a western boundary of Range 12 to the eastern edge of Range 3, W4M. The southern boundary of Township 69 forms the southern boundary of the RSA, while the northern boundary of Township 84 forms the northern boundary. The RSA includes all or portions of 89 archaeological national registry (Borden) blocks identified in Alberta. The known distribution of historical resources and their landform associations within this area have been incorporated in a vegetation, hydrology and terrain-based predictive Geographical Information System (GIS) model that derives high, moderate and low historical resource potential. The model predictions are shown in Figure 5.2-2.

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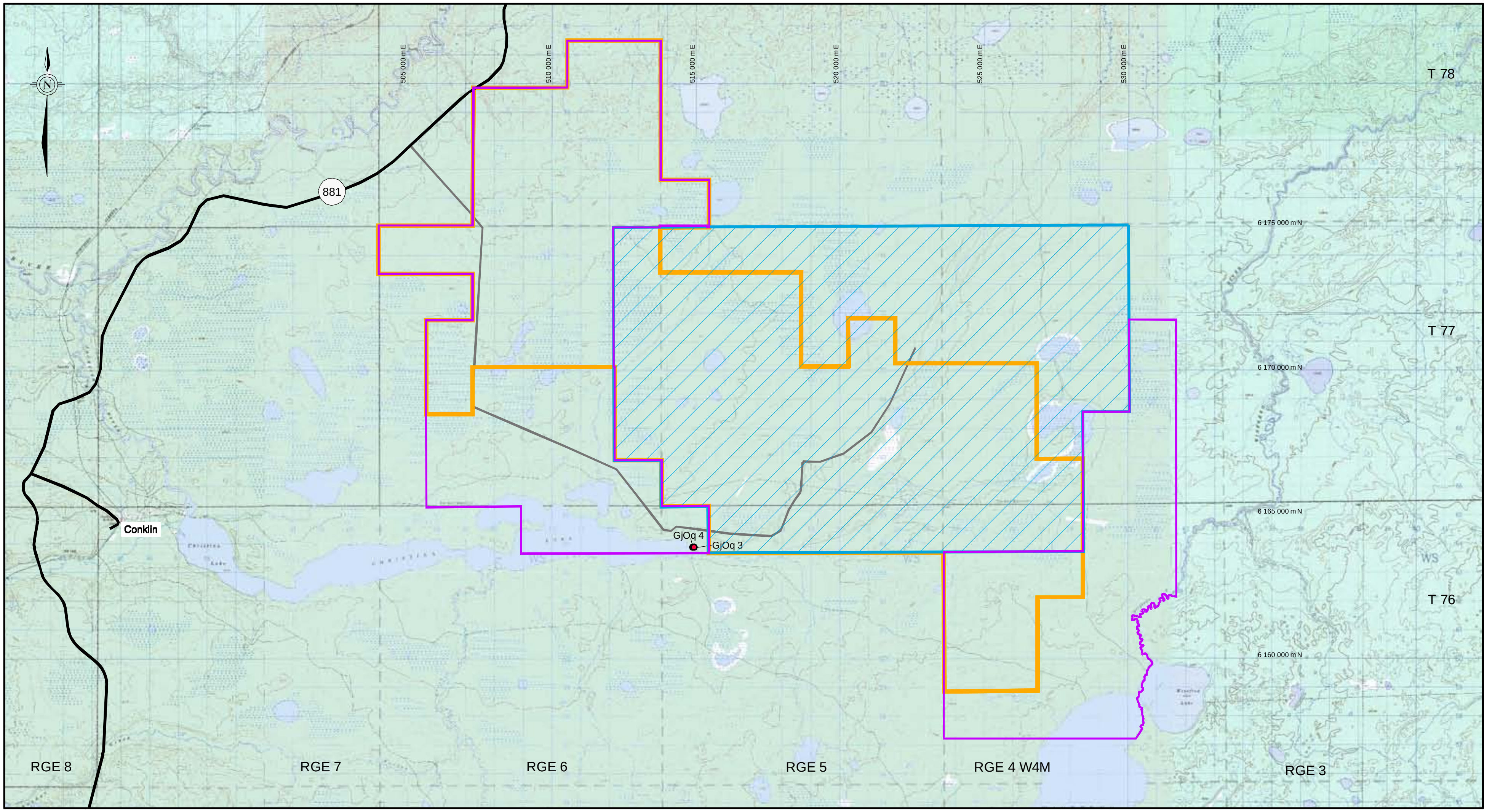

LEGEND

- MEG LEASE BOUNDARY
- EXISTING ACCESS ROAD
- PREVIOUSLY RECORDED HISTORICAL RESOURCE SITE
- 2004 HISTORICAL RESOURCES STUDY AREA
- HISTORICAL RESOURCES LOCAL STUDY AREA

4 0 4

SCALE KILOMETRES

PROJECT

CHRISTINA LAKE REGIONAL PROJECT - PHASE 3

TITLE

LOCAL STUDY AREA AND KNOWN HISTORICAL RESOURCE SITES

MEG ENERGY CORP.

PROJECT	07.1346.0009.8400	
DESIGN	LB	06/11/07
CADD	TRE	27/02/08
CHECK	DB	29/02/08
REVIEW	IGG	04/03/08

FILE No. historical site-LSA

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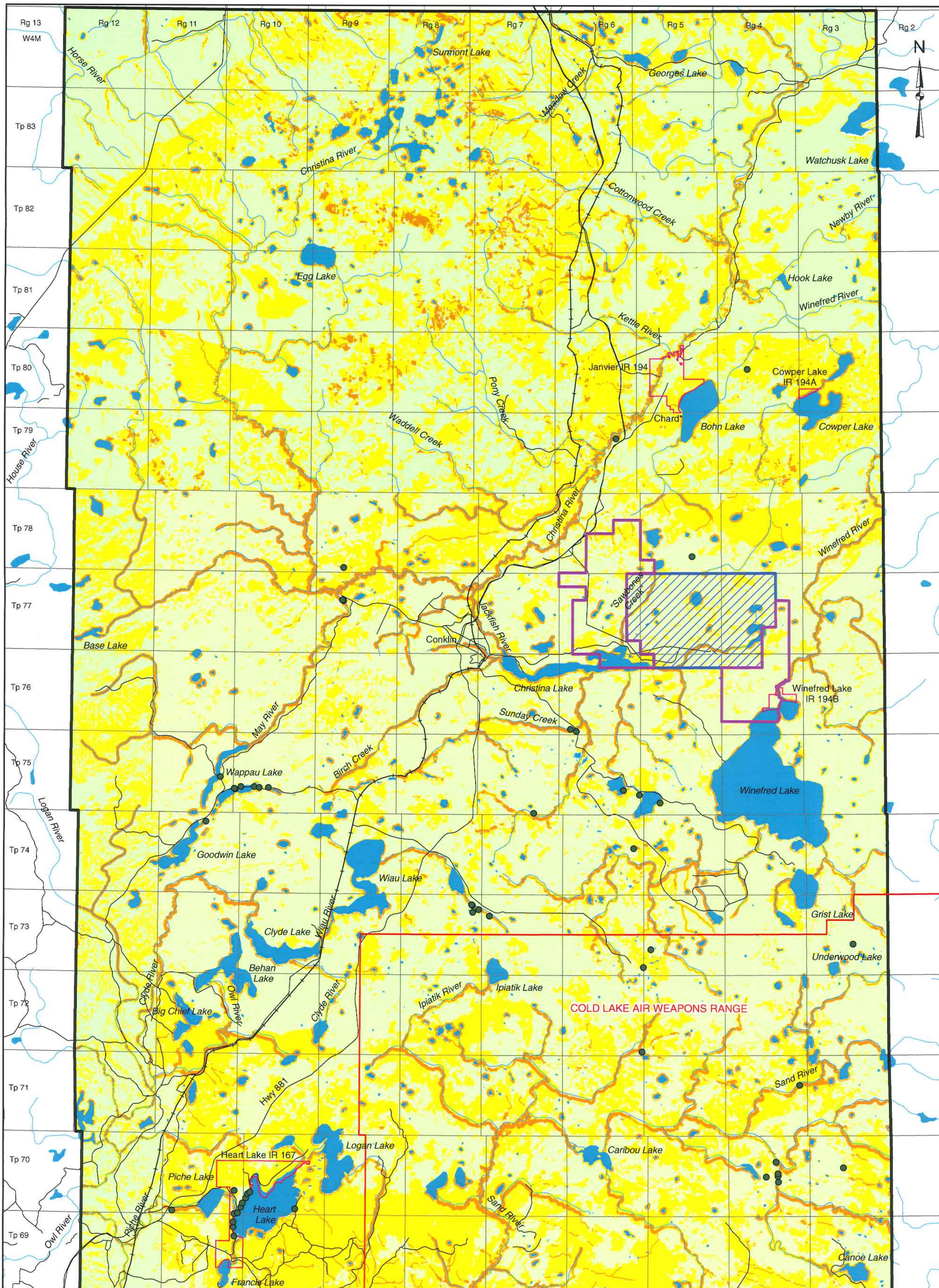
FIGURE: 5.2-1



LEGEND

- HISTORICAL RESOURCES REGIONAL STUDY AREA
- HISTORICAL RESOURCES LOCAL STUDY AREA
- 2004 HISTORICAL RESOURCES STUDY AREA
- AIR WEAPONS RANGE
- INDIAN RESERVE
- OPEN WATER
- RIVER OR STREAM
- ROADWAY
- RAILWAY
- HISTORICAL RESOURCE SITE

HISTORICAL RESOURCE POTENTIAL

- HIGH
- MEDIUM
- LOW
- WATER

NOTE

Unnamed watercourse locally known as "Sawbones Creek"
*Also known as the Hamlet of Janvier

REFERENCE

Digital data obtained from AltaLIS Ltd. (June 2004), used under license. Archaeological Site Inventory Data, Alberta Community Development June 3, 2004.
Projection: UTM Zone 12 Datum: NAD 83

15 0 15
SCALE 1:450,000 KILOMETRES

PROJECT
CHRISTINA LAKE REGIONAL PROJECT - PHASE 3

TITLE
HISTORICAL RESOURCES REGIONAL STUDY AREA SHOWING HISTORICAL RESOURCE POTENTIAL AREAS

MEG ENERGY CORP.

PROJECT No. 07-1346.0009.9150			SCALE AS SHOWN	REV. 0
DESIGN	LB	29 Jun. 2007	**FIGURE: 5.2-2**	
GIS	ZB	27 Feb. 2008		
CHECK	DB	29 Feb. 2008		
REVIEW	IGG	04 Mar. 2008		

I:\CLIENTS\MEG\07-1346-0009\mapping\mxd\Historical_Resources\rsa_bl_archy.mxd

5.2.3 Potential Project Effects

The effects on historical resources that accompany a project of this nature will occur directly within areas scheduled for surface land disturbance. The LSA includes the Project areas that will be directly affected by construction activities and the surrounding areas.

5.2.4 Key Issues and Key Questions

The key issue addressed during the HRIA was the conservation of historical resources. The assessment of effects on historical resources associated with the Project as well as the cumulative effects of the Project in combination with other developments in the Regional Study Area were conducted using the following key questions:

HRPC-1: What effects could existing and approved developments and the Project have on historical resources?

HRPDC-1: What effects could existing and approved developments, the Project and planned developments have on historical resources?

5.2.5 Methods

5.2.5.1 Historical Resources Impact Assessment Process

The historical resource parameters considered in the EIA are a reflection of the information gathered during the HRIA to satisfy requirements of ATPRC. These requirements included the assessment of all defined development areas to identify and record any historical resources that may be affected by the proposed development and to examine selected high potential areas adjacent to these development zones, whether or not direct impacts would occur.

Historical resources field studies must be conducted under an approved Permit to Excavate Historic Resources issued by the Historical Resources Management Branch (HRMB) of ATPRC.

The permit application contains a description of the field program that will be implemented for the Project and provides ATPRC an opportunity to require any specific activity it considers warranted.

An application for a permit to conduct an HRIA for the Project was submitted to ATPRC for review and approval on June 21, 2007. All work was conducted in September 2007 in compliance with the *Guidelines for Archaeological Permit*

Holders in Alberta (Archaeological Survey of Alberta [ASA] 1989). The HRIA was submitted to ATPRC for regulatory review on December 19, 2007.

The HRIA stage of study represents the first of two potential stages of historical resources management that may be implemented under the provisions of the Alberta *Historical Resources Act* administered by ATPRC. Resource avoidance and information recovery represent the two most commonly applied mitigation options. If significant resources are encountered and impacts cannot be avoided by facility relocation, a second stage of study could be required to offset the potential effects of the Project. To undertake successful information recovery programs, it is important to have a clear understanding of project development schedules to ensure sufficient time is allocated to complete studies in advance of surface disturbance.

Full details of the results are presented in the HRIA report (Balls 2007). No additional follow-up studies have been recommended for the Project as a result of the lack of identified historical resources.

5.2.5.2 Objectives and Scope

The goal of the HRIA is to identify and inventory historical resources within the Project area. This goal was met in three stages: pre-field, field assessment and analysis and reporting. The objectives of these stages were to:

- gather and review preliminary data (secondary sources, previous research, general background material);
- identify gaps existing in these data;
- identify past, current and future research problems and orientations;
- study historical resource potential through the use of maps, satellite imagery and aerial photographs;
- plan future research strategies, including the field component for the current project; and
- make recommendations for the impact assessment phase of the Project.

5.2.5.3 Pre-Field Methods

The first step of the HRIA was to complete a site file search of the areas potentially affected by the Project. Files maintained by ATPRC indicate whether there are any known historical resources in the vicinity of a proposed project that might be affected by the development. The distribution of known resources also indicates preferred use areas and therefore can be used to predict areas of historical resource potential. This information, along with the terrain-based potential predictions, was used as a basis for structuring in-field assessments. No previously recorded sites were identified within the study area during this search.

The preliminary steps involved in the pre-field methodology included the following:

- The ATPRC site files were reviewed to determine whether any known resources exist in the study area and to provide an indication of regional site distribution patterns.
- A review of previous historical resource studies completed within the region was conducted, including a review of the results and recommendations included in the 2004 MEG Energy Corp. Christina Lake Regional Project HRIA (Blower 2004).
- An air photo and map based assessment of the historical resources potential of the Project area was conducted as a basis for structuring the field studies for the HRIA.
- A GIS terrain-based model of historical resource sensitivity was developed.
- A permit to conduct an HRIA for the Project was submitted to and approved by ATPRC. The ATPRC reviewed and concurred with the assessment strategy outlined in the permit application submitted for the Project and issued Permit No. 2007-250 to Vincent Balls.

5.2.5.4 Field Assessment Methods

The field component of the HRIA was completed shortly after the permit was issued in July 2007. The final HRIA report was submitted to ATPRC on December 17, 2007 (Balls 2007). The HRIA was submitted in advance of the EIA application to allow the required regulatory and public review process to take place prior to approval of the Project.

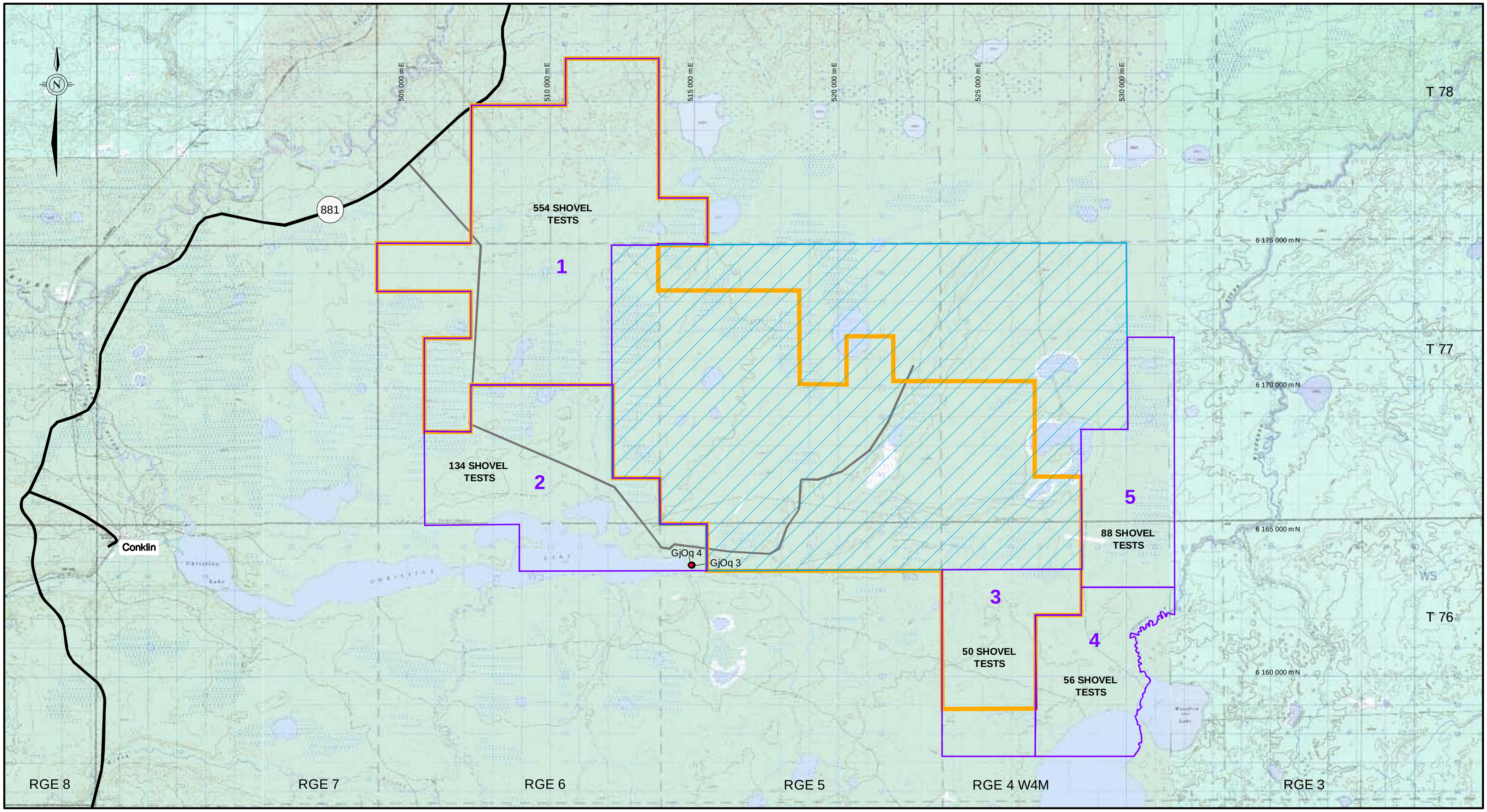
The Field assessment employed similar techniques applied in previous studies completed in the region. This was accomplished by a combination of a helicopter overflight, foot traverse and all-terrain-vehicle survey, visual examination of proposed impact zones and by subsurface shovel testing in areas of historical potential that lacked subsurface exposure. Visual inspection focused on landforms believed to have potential for the presence of archaeological materials with special attention given to natural or man-made exposures.

The LSA is situated in terrain where forest cover varies considerably in density and subsurface exposures are limited. Much of the study area is located in low lying level fens and muskeg areas which in some cases surround small lakes and other high historical resource potential areas. A considerable degree of development activity has previously taken place in the vicinity of the Project. These consist of numerous seismic cutlines, existing pipelines and gas facilities and several winter roads to support previous exploration activities. Several of these existing disturbances correspond with components of the Project examined during the HRIA and typically provided improved subsurface visibility due to their recent origin. In addition, natural disturbances were present in the form of the occasional tree throws.

Where existing exposures were not present, the principal means of exploring potential for heritage resource sites was through the judicious placement of shovel tests in areas considered to have potential. These tests were generally 40 to 50 cm on a side and were excavated to sterile sediments of presumed glacial origin, generally 20 to 40 cm below surface. These depths are considered adequate to identify all significant archaeological sites in the areas examined since most sites recorded to-date in the Regional Study Area have been limited to the upper soil horizons. Sediments excavated in shovel tests were thoroughly searched for the presence of cultural materials, then replaced in the excavation hole.

Areas selected for examination were initially established through a combination of GIS modelling, pre-field map analysis of 1:50,000 topographic maps, air photos and were later modified on the basis of the in-field inspections. Generally, these consisted of elevated areas in peatlands exhibiting sandy soils that support jack pine communities, areas adjacent to lakes and streams in the Project area as well as upland areas in which development components are proposed (Figure 5.2-3). Areas considered to have limited or no archaeological potential include those with slopes greater than 10°; low-lying water saturated terrain; and areas that did not exhibit variation that would serve as a focus for historic or prehistoric use. These latter areas comprised a significant proportion of the landforms within the study area.

L:\2007\1346 Oil Sands\07-1346-0009-MEG EXPANSION\8400\EIA\Fig 5.2-3_Location of target areas.dwg   Mar 04, 2008 - 11:39am



LEGEND

MEG LEASE BOUNDARY

EXISTING ACCESS ROAD

PREVIOUSLY RECORDED HISTORICAL RESOURCE SITE

2004 HISTORICAL RESOURCES STUDY AREA

88 SHOVEL TESTS 2 — FIELD ASSESSMENT AREAS AND NUMBER OF SHOVEL TESTS

4 0 4

SCALE KILOMETRES

PROJECT

CHRISTINA LAKE REGIONAL PROJECT - PHASE 3

TITLE

HISTORICAL RESOURCES FIELD ASSESSMENT AREAS

MEG ENERGY CORP.

PROJECT	07.1346.0009.8400		FILE No.	Target area
DESIGN	LB	06/11/07	SCALE AS SHOWN	REV. 0
CADD	TRE	03/03/08	**FIGURE: 5.2-3**	
CHECK	DB	03/03/08		
REVIEW	IGG	04/03/08		

Areas of moderate and high potential that were investigated in relation to the Project were covered on foot along transects placed 10 to 30 m apart, oriented either by compass bearing or according to the shape of geographical features (e.g., ridges, lakeshores, creeks) or man-made features (e.g., cutlines, roads, trails). Any natural or man-made exposures encountered along transects were examined closely. These include root balls and sediment piles beside and below tree throws, seismic cutlines and wellpad locations. Natural exposures were found throughout the area.

During the in-field assessment of the HRIA, the archaeological team was accompanied by Conan Janvier, a representative of the Chipewyan Prairie Dene First Nation (CPDFN) who assisted in the subsurface testing component of the program.

5.2.5.5 Analysis and Reporting

As no historical resource materials were identified or recovered, no analysis and cataloguing of specimens was required.

Specific effects of the Project on the LSA have been detailed in the HRIA report (Balls 2007), the results of which indicate that none of the Project activities are likely to directly disturb historical resources. Therefore, only indirect project effects are anticipated in the RSA. These are assessed qualitatively in the HRIA.

5.2.6 Key Indicator Resources

Identification of the key indicators of the effects for the HRIA follow the methods described in the EIA Introduction (Volume 2, Section 4). All key indicator resources have been assessed through the completion of the HRIA.

5.2.7 Residual Impact Classification

Historical resources are non-renewable resources that may be located at or near ground-level or may be deeply buried. The impact classification includes resources at or near ground surface.

5.2.7.1 Direction

The direction of impacts can be either negative or positive. Negative impacts occur in association with physical disturbance or destruction of historical resources. Positive effects accrue when HRIAs are conducted in advance of development. In any region, particularly where information on the character and distribution of historical resources is limited, HRIA results can provide valuable information not previously known. It is unlikely that any site identified during an HRIA in a remote area such as this would be on record if it were not for the impact assessment of the development.

5.2.7.2 Magnitude

The potential direct physical impacts to historical resources as a result of development activities within the LSA varies both in terms of negative and positive direction and magnitude. The assessment of magnitude includes consideration of the significance of the resources affected. High magnitude impacts would be expected in areas of high physical impact when resources of high scientific or interpretive value are affected. Moderate magnitude direct impacts are anticipated in areas of moderate or partial physical impact when high or moderate value resources are affected. These depend on the nature of ground disturbance. Low magnitude direct impacts could be anticipated in areas of minimal physical impact, or when few or low value resources are affected, depending on the types of development proposed. Negligible magnitude direct impacts are expected to occur in areas where no physical impact takes place or no sites occur.

Indirect impacts may be expected in areas outside proposed direct impact zones but generally have less severe effects as they are unplanned and cannot be predicted in advance. As such, they can only be discussed in terms of their potential. Like direct impacts, the magnitude of indirect impacts would depend on the significance of the resources that might be affected. Where significant resources occur directly adjacent to proposed development zones, potential for accidental (indirect) impact is high. Where significant resources occur in nearby areas that might be subject to high levels of recreational use, potential for accidental impact of vandalism is comparatively high. Where moderate or lower value sites occur well removed from proposed developments or in areas that are not likely to see increased levels of use, the potential magnitude of indirect impacts is expected to be low or negligible.

High magnitude positive effects can be anticipated if a unique or highly significant site is identified and information is recovered before development occurs. Moderate positive effects are anticipated if sites similar to others in the region are found and information is recovered before development occurs. Low magnitude positive effects will take place if few, low value or even no sites are found.

Indirect, regional effects can be experienced if sites are affected by increased use or demand resulting from activities of individuals who come into an area because of the Project. These types of potential effects are difficult to predict confidently.

5.2.7.3 Geographic Extent

The geographic extent of the impacts of the Project can occur at both local and regional levels. Local effects are experienced at any sites situated in the immediate LSA that are directly affected by development activities. The geographical extent of these impacts is limited to actual physical impact zones within the LSA.

5.2.7.4 Duration

Impact duration can occur at two levels. The physical effects of project development are felt immediately in construction zones. Although each impact occurs immediately at the time of impact, construction impacts will occur over a number of years until the Project is complete. Short-term (less than 4 years), medium-term (4 to 34 years) and long-term (more than 34 years) effects can occur throughout the region.

5.2.7.5 Frequency and Reversibility

Because historical resources are non-renewable, negative impacts are irreversible. Impact frequency is not assessed since it is not applicable to historical resources.

5.2.7.6 Classification Table

The impact criteria for direction, magnitude, geographic extent, duration and reversibility defined above are summarized in Volume 2, Section 4. Table 5.2-1 includes the numerical scores that are added together to rate the overall consequence of the Project impacts to historical resources.

Table 5.2-1 Historical Resources Impact Classification Definitions

Direction	Magnitude	Geographic Extent	Duration	Reversibility	Environmental Consequence
positive: increase in information; negative: loss of resources and/or contextual information	negligible (0): no physical impact occurs or no historical sites are expected to be present; low (+5): minimal impact to valuable resources, or resources are few and of low value; moderate (+10): moderate or partial impact to resources of high to moderate historical value; high (+15): severe physical impact to resources of high historical value	local (0): effect restricted to areas of direct physical disturbance (LSA) regional (+1): effect extends to indirect effects of increased access/use in the region	short-term (0): <4 years medium-term (+1): 4-34 years long-term (+2): >34 years	reversible (-3) or irreversible (+3)	negligible: 0-5 low: 6-10 moderate: 11-15 high: >15

5.3 MITIGATION

The predicted negative direct effects and the potential negative indirect effects of the Project are considered negligible and negligible to low, respectively. While no sites were identified, the increase in negative data provided by the HRIA is considered a positive effect of moderate magnitude that will benefit the region over the long-term.

The results of the HRIA indicate that the potential for impacting historical resources is considered negligible. As a result, if the Project proceeds as proposed, direct development impacts to historical resources are not predicted to occur. Recommendations to this effect have been included in the HRIA report submitted to ATPRC.

Indirect impacts associated with the Project can be avoided by increasing the awareness of Project personnel on historical resources and encouraging avoidance of any identified historical resources locations during development.

5.4 EXISTING AND APPROVED CASE

5.4.1 Local Study Area

The HRIA involved field inspections that were conducted throughout the Project area. Top priority was given to areas within the lease that were identified as having high and moderate potential. These areas were identified based on the current understanding of regional archaeological site location patterns, topographic feature analysis, GIS mapping and information supplied by a community assistant from CPDFN.

The HRIA included assessments on part of the approximate 18, 384 ha Project area, all of which were overviewed by helicopter. These areas included moderate and high potential areas within the Project footprint. Areas of low potential received the lower levels of field investigation, but many of these areas were crossed enroute to higher potential locations.

A total of 882 shovel tests were excavated throughout the lease as part of this HRIA. The areas investigated, and the number of shovel tests completed, are shown in Figure 5.2-3. No historical resources sites were identified within the LSA during the HRIA.

5.4.2 Regional Study Area

A review of the ATPRC site records for this area indicates that 98 historical resources sites were recorded prior to the present study as outlined in Table 5.4-1 representing 71 precontact and 27 historic sites. An additional 31 historic resource sites were identified but due to a lack of specific locational information these sites are not included with the 98 sites used to identify areas of historical resource potential.

The 98 historical resources sites which occur within the RSA were recorded in over 113 separate studies; however only those 38 studies in which newly observed historical resource sites are reported were included in Table 5.4-1. Non-project related studies have included inventories conducted for the Alberta Forest Service (Pollock 1978; Permit No. 77-032), and for the Historic Sites Service (ATPRC site files).

In considering prior study within this area, it should be noted that similar to the current study, an additional 75 project-related studies (under permit numbers 75-014, 76-040, 80-087, 80-147, 80-172, 81-131, 81-157, 81-186, 89-105, 89-113, 90-071, 90-099, 91-043, 91-078, 91-088, 92-013, 92-016, 92-050, 94-111, 95-072, 95-96, 97-036, 97-066, 97-157, 98-174, 98-011, 99-61, 99-137, 00-004, 00-073, 00-133, 01-030, 01-203, 01-221, 01-319, 02-061, 02-114, 02-204, 02-228, 03-171, 03-270, 03-273, 03-285, 03-334, 04-141, 04-257, 04-326, 04-354, 04-364, 04-372, 04-389, 04-429, 04-487, 05-219, 05-320, 05-344, 05-362, 05-376, 05-463, 05-510, 05-541, 05-595, 05-597, 06-172, 06-188, 06-233, 06-251, 06-276, 06-295, 06-296, 06-356, 06-384, 06-412, 06-450, 06-499, 06-569, 06-603, 06-620, 06-642, 06-648 and 06-650) failed to identify any previously unreported historical resources during investigation of proposed energy and related developments in the RSA.

Table 5.4-1 Summary of Archaeological Research Conducted in the Regional Study Area

Permit	Project/Type	Principal Investigator	Sites Recorded
U of A 1969	n/a	n/a	1 precontact
75-023	Lac La Biche survey	McCullough (1975)	13 precontact / 1 historic
77-032	Alberta Forest Service	Pollock (1978)	7 precontact
Non-permit	n/a	McCullough (1975)	1 precontact
78-012	Leismer lateral natural gas pipeline	Wilson (1978)	2 precontact
80-019	HRIA study SW ¼, 19-68-12-W4M	Fromhold, (1980)	1 precontact / 1 historic
81-157	TransAlta transmission line	Pollock (1981)	1 precontact
ASA 1984	n/a	n/a	2 precontact
84-021	1984 highways survey program	Haley (1985)	1 precontact
85-089	Suncor Inc. Burnt Lake thermal project stages 1 to 4	McCullough (1996)	1 precontact
89-096	Caribou Lake Lateral Pipeline	Head (1989)	1 precontact
97-052	Foster Creek In-Situ Oil Sands	Green (1997)	3 precontact / 3 historic
97-075	Husky Midpoint to La Corey Terminal	Kulle (1997)	4 precontact
98-096	Gulf Canada Resources Ltd. Surmont Lease	Fedirchuk (n.d.)	3 precontact
99-057	AEC East Leismer gas development project: 1998/1999 winter program	Green (2004)	4 historic
00-100	Canadian Natural Resources Limited Primrose and Wolf Lake expansion project	Green (2003)	1 historic
00-174	Primrose/Caribou Gas Gathering system	Rollans (2000)	2 precontact
01-137	Christina lake Pipeline	Goldsmith & Head (2002)	1 precontact
01-155	Rio Alto Kirby	Green (2001a)	6 precontact / 1 historic
01-175	AEC Cold Lake AWR SAGD	Gibson (2004)	1 precontact
01-202	Petro-Canada Meadow Creek project	Green (2001b)	5 precontact
01-283	AEC Primrose/Caribou 2001-2002 flow lines in the Cold Lake Air Weapons Range, Alberta	Gibson (2003a)	1 precontact
02-101	Devon Jackfish SAGD	Ramsey (2002)	2 historic
02-163	ConocoPhillips Canada Resources Corp. Surmont in-situ oil sands project phase 1 stage 1	Tischer (2004a)	1 precontact
02-255	Primrose/Caribou Gas Gathering system	Gibson (2003b)	1 precontact
03-145	ConocoPhillips Canada Resources Corp. Surmont in-situ oil sands project	Tischer (2004b)	2 precontact
03-182	Dover to Whitefish transmission line	Tischer (2003)	1 precontact
Non-permit	n/a	Tischer 2003	1 precontact
04-279	Al-Pac 2004-2005 Forestry Operations	Peach (2004)	1 precontact / 1 historic
04-326	Devon Canada Corporation, Jackfish SAGD EIA	Ramsey (n.d)	3 historic
04-367	Petro-Canada Meadow Creek 1.1 project	Bouchet-Bert (2004)	1 precontact
05-263	n/a	n/a	1 precontact
05-458	Alberta-Pacific Forest Industries 2004/2005 AOP summer harvest	Blaikie-Birkigt (n.d.a)	1 precontact
06-233	n/a	Wickhan (2006)	1 historic
06-283	n/a	Blaikie-Birkigt (n.d.b)	1 historic
06-396	Nexen Long Lake South SAGD project, Township 84, Ranges 6 & 7, W4M	Wondrasek (2006)	1 precontact
06-401	Whitesands Summer/Fall 2006 oil sands exploration program	Malasiuk (2006)	1 historic
06-477	EnCana Corporation Cold Lake air weapons range 2005-2006 winter program	Roskowski (2006)	1 precontact

Table 5.4-1 Summary of Archaeological Research Conducted in the Regional Study Area (continued)

Permit	Project/Type	Principal Investigator	Sites Recorded
06-615	n/a	Blaikie-Birkigt (n.d.c)	1 precontact
Non-permit	n/a	Malasiuk (2006)	1 historic
07-186	EnCana Christina Lake Thermal Project	Blower (2007)	1 precontact / 1 historic
Non-permit	AFS Job # L216	Non-permit	1 historic
Non-permit	AFS Job # L215J	Non-permit	1 historic
Non-permit	AFS Job # L217A	Non-permit	1 historic
Non-permit	none	Non-permit	1 historic
Non-permit	none	Non-permit	1 historic

5.4.2.1 Precontact Archaeological Sites

Types

The regional historical resources information base reports 71 precontact archaeological sites. The most common classification of site by type are surface artifact scatters of less than 10 artifacts (n=23), isolated finds of a single artifact (n=20), and campsites (n=16). Other types include large surface scatters of more than 10 artifacts (n=4), scatter/campsites (n=4), lithic workshops (n=2), and campsite/ceremonial/burial features (n=2).

Scatters can occur in buried or surface context and represent the recovery of more than one specimen, usually stone artifacts in a small concentration. Isolated finds represent the recovery of a single artifact, commonly a lithic specimen, in either disturbed or buried contexts. They may indicate a single stop while passing through an area or a short-term activity involving perishable materials. Isolated finds are common in the inventories of most regions of Alberta. The campsite classification is typically used to reflect the recovery of materials that suggest several activities of a more extensive, longer term and diverse nature. However, this classification is often used when there is evidence of the use of fire in conjunction with the presence of lithic artifacts. There is a wide range of size and complexity in this category, and this type of site is common in most regions of the province.

The campsite classification is typical for most regions in the Boreal Forest where sites of a non-domestic nature such as rock art or other ceremonial features are absent. Sites reflecting butchering or trapping of animals or human burial are also absent, likely due to preservation factors. However, the proportions of site types represented are atypical of other Boreal Forest inventories in that the most commonly recorded type is the more complex campsite circumstance. This distribution is considered to be an artifact of the regional archaeological work rather than a reflection of land use patterns. The preponderance of campsites in the sample relates to the locations in which studies have taken place as discussed below.

Topographic Associations

The locations of the sites in the sample reflect as much where archaeological studies have taken place as they do the actual site distributions. While there are biases involved in archaeologist's conceptions about where sites are likely to be, these biases are based on 35 years of work in a wide variety of topographic situations throughout this region. Furthermore, studies in areas that are not typically considered to have high potential for the occurrence of sites tend to validate most of the professional assumptions made about the types of landforms that typically contain these resources. The number of studies conducted where no sites were identified provides significant confirmatory evidence in this regard.

Most sites are directly associated with lakes in this region. This is expected given the understanding of Boreal Forest settlement patterns and information obtained in consultation with local aboriginal community members. Lakes provide perhaps the greatest diversity of resources and would have been the most attractive locations for continued use and revisitation by prehistoric groups. It is these longer-term occupations or repeated visits that have produced the material evidence of use that is discoverable using archaeological inventory techniques. These assumptions have been confirmed by oral testimony provided by aboriginal informants participating in this and other studies in the region. For example, information provided by members of the CPDFN (Golder 2001) indicates that their traditional settlement areas were around Winefred, Grist and Kirby lakes in the central portion of the RSA. None of these lakes have received any concerted effort in terms of archaeological inventory. Even now the areas along the shoreline of Winefred Lake and the banks of Winefred River are recommended for further study as a result of the HRIA based on the moderate potential of the elevated landforms and proximity to a large water source.

Creeks in this region also represent areas of resource diversity and undoubtedly were travel corridors for both hunting/fishing groups and the animal resources on which they subsisted. Although a systematic assessment of distances between these waterbodies and sites has not been undertaken for this study, a cursory review of available map data indicates that most of the sites occur less than 100 m from these waterbodies and all sites occur within 200 m of the waterbodies. The scarcity of riverside associations is unusual but reflects the fact that few of the drainages within the RSA are classified as rivers.

Only three of the prehistoric sites in the RSA sample are not associated with a watercourse or body. All of these sites are limited occurrences, likely reflecting single task activities conducted during movement through the area.

Significance

The significance of historical resources is usually established on the basis of the physical evidence and generally reflects the level of study undertaken. At the inventory stage, limited detailed assessments are typically made. These assessments do not often entail systematic subsurface testing, especially if no direct impacts are anticipated. In addition, many studies undertaken in the 1970s featured more wide-ranging inspection and less detailed assessment. This situation has resulted in a database that contains more subjective information relating to site significance than is desirable for precise analysis. In fact, site significance generally refers to the potential a site has to answer research questions. As research is multi-faceted and, presumably ever-advancing, site significance is intrinsically tied to the research questions and methodologies of the present. Sites with no obvious current research potential may prove highly significant using future techniques.

Nevertheless, existing records provide information that allows determination of some significant trends in the data. Significance information on prehistoric sites in the RSA has been extracted from site forms and reports and indicate that more than 64.8% (n=46) of the prehistoric sites identified in this region can provide no further significant information beyond that collected by recording their location and condition and recovery of all or some of materials present.

At other sites, the physical evidence is more complex or possibly concealed by vegetation or sediments. In many cases, an accurate determination of significance requires more information recovery which may not be warranted at the inventory stage of investigation. These sites have been classified as having unknown significance for regional prehistory. Within the sample considered here, 31% (n=22) fall into this category. In many cases, more detailed assessments are likely to reveal that many of these sites are of no further value although some would likely be considered to be of greater value. Sites of moderate value are those that would warrant conservation measures if impacts were to occur.

In a regional context, sites containing large and complex records of occupation or those that have information of significance for regional prehistory are considered be highly significant. Thus far, only three sites of this nature occur within the RSA. These include GgOv 4, a potentially stratified campsite on Heart Lake, GgOv 6, also a campsite on Heart Lake (McCullough 1975) and GiOv 1, a surface scatter that is probably a campsite locale on Wappau Lake (Pollock 1978). The latter site produced pottery, which is considered evidence of longer-term settlement and is a chronologically and culturally sensitive class of artifact. The Heart Lake sites are approximately 80 to 90 km south of the LSA and the Wappau Lake site is approximately 60 km to the southwest. While this information is important to the regional prehistory context, none of these sites will be impacted by the Project.

5.4.2.2 Historic Sites

Twenty-seven recorded historic period sites occur in the RSA (Table 5.4-2). They are grouped into types that reflect the character of the remains recorded in each location. These include 16 cabins or cabin foundations, a cabin and associated trail, a cabin and a possible burial, a settlement with burials, a fire fighters camp, a possible trading post location, a ranger station, a fire tower, an Indian Reserve, a wagon trail, a hunting camp, and an early industrial site. The types assigned are generally based on existing records and generally reflect the function of the site. However, in many instances it could not be determined whether cabins represent hunting, trapping or both. The ethnic affinity of the former inhabitants of these cabins remains to be determined, however, it can be safely assumed that most reflect the traditional activities of Aboriginal peoples. Hunting also reflects traditional aboriginal use of the landscape.

Table 5.4-2 Summary of Historic Sites in the Regional Study Area

Borden	Project	Site type	HRV	Reference	Permit
GfOq 1	Canadian Natural Resources Limited Primrose and Wolf Lake expansion project	cabin / trail	4	Green (2003)	00-100
GfOu 6	Al-Pac 2004-2005 Forestry Operations	industrial mound	0	Peach (n.d.)	04-279
GfOw 2	HRIA study SW 1/4, 19-68-12-W4M	cabin	4	Fromhold (1980)	80-019
GgOp 4	Foster Creek In-Situ Oil Sands	cabin	4	Green (1997)	97-052
GgOp 5	Foster Creek In-Situ Oil Sands	fire fight camp	0	Green (1997)	97-052
GgOp 6	Foster Creek In-Situ Oil Sands	cabin / burial	4	Green (1997)	97-052
GgOp H1	AEC East Leismer gas development project: 1998/1999 winter program	cabin	4	Green (2004)	99-057
GgOp H2	AEC East Leismer gas development project: 1998/1999 winter program	cabin	4	Green (2004)	99-057
GgOp H3	AEC East Leismer gas development project: 1998/1999 winter program	cabin	4	Green (2004)	99-057
GgOp H4	AEC East Leismer gas development project: 1998/1999 winter program	cabin	4	Green (2004)	99-057
GgOv 1	Lac La Biche survey	trading post.	n/a	McCullough (1975)	75-023

Table 5.4-2 Summary of Historic Sites in the Regional Study Area (continued)

Borden	Project	Site type	HRV	Reference	Permit
GhOv 1	n/a	cabin / foundation	n/a	Blaikie-Birkigt (n.d.b)	06-283
GiOq 4	Devon Jackfish SAGD	cabin	4	Ramsey (2002)	02-101
GjOq 1	Devon Canada Corporation, Jackfish SAGD EIA	cabin	4	Ramsey (n.d.)	04-326
GjOq 3	EnCana Christina Lake Thermal Expansion Project	cabin foundations	4	Blower (2007)	07-186
GjOq 5	Devon Canada Corporation, Jackfish SAGD EIA	cabins	4	Ramsey (n.d.)	04-326
GjOq 6	Devon Canada Corporation, Jackfish SAGD EIA	cabin foundation	4	Ramsey (n.d.)	04-326
GjOr 1	Devon Jackfish SAGD	trail	0	Ramsey (n.d.)	02-101
GkOu 3	Whitesands Summer/Fall 2006 oil sands exploration program	cabin	4	Malasiuk (2006)	06-401
GkOu 4	n/a	cabin	4	Malasiuk (2006)	Non-permit
HbOr 7	n/a	burial / settlement	4	Wickham (2006)	06-233
04-4-068	AFS Job # L216	cabin	n/a	Non-permit	Non-permit
07-4-129	AFS Job # L215J	ranger station	n/a	Non-permit	Non-permit
08-4-094	AFS Job # L217A	Conklin Tower	n/a	Non-permit	Non-permit
10-4-072	none	Indian Reserve	n/a	Non-permit	Non-permit
11-4-107	none	cabin	n/a	Non-permit	Non-permit
HS-1	Rio Alto Kirby	hunting camp	0	Green (2001)	01-155

The potential trading post site on Heart Lake (McCullough 1975) represents the commercial exchange that would have taken place between the Euro-Canadian based Hudson Bay Company and the people of the Heart Lake First Nation. It remains uncertain why an Indian Reserve is listed in the Historic Sites Service files, but this undoubtedly represents significant historical and on-going events in this region of western Canada. The Ranger Station and Conklin Tower represent the administrative activities of the Provincial Government. Firefighters' camps may be present throughout the region but are relatively recent occurrences and also represent provincial government administration of the land.

Topographic Associations

As with prehistoric sites, the locations of historic sites reflect as much about where inventories have taken place as they do the actual site distributions. The site sample is insufficient to draw any major conclusions with regard to the predictive occurrence of some of the site types and many of the records are incomplete with respect to locational information. However, the distribution of some of the sites identified to date provides information that can be used to predict the effects of regional development.

In relation to cabins, the information indicates that while most occur on lakes and creeks within the RSA, these sites can also occur in forest locations that are not associated with waterbodies. However, for those sites that are adjacent to lakes and creeks, most occur within 100 m of the waterbody and all sites occur within 200 m. Perhaps the most significant aspect of these data are that sites reflecting the traditional land use practices of Aboriginal peoples throughout the region can occur in areas that are not easily predictable.

Significance

As with the prehistoric sites, the significance of sites is established on the basis of the physical evidence present and reflects both the level of study and the era in which the study took place. As with the development of new research questions and techniques that alter the significance ratings of precontact resources, attitudes toward the significance of historic structures is changing rapidly. Until relatively recent times, consultation with local communities was not conducted in conjunction with inventory work. With the participation of representatives of local communities, significance assessments have had the benefit of the advice of residents and former or present users of the area. This has been especially valuable for providing a better understanding of traditional land use practices and the value that is assigned to sites reflecting these practices. Awareness of the importance of these sites to local communities is increasing, given the significant on-going social and cultural changes in these communities as a result of regional industrial development. None of these historic sites will be impacted by the Project as they are all located outside the current footprint.

5.4.2.3 Palaeontological Resources

No specific palaeontological studies were required by ATPRC in their review of the development information for the Project. This reflects the fact that bedrock exposures are non-existent in the LSA and the area is rated as having unknown potential in this regard (Royal Tyrrell Museum of Palaeontology 1984). No palaeontological resources have been previously identified within the LSA.

Given the modest potential for significant palaeontological remains in the McMurray Formation, which is the target zone for the steam-based thermal heavy oil production activities, and the limited disturbance proposed for this formation, it is not expected that significant fossils will be recovered during the various stages of Project development.

5.5 LINKAGE ANALYSIS

The results from the HRIA are included in the impact assessment, the objectives of which are to:

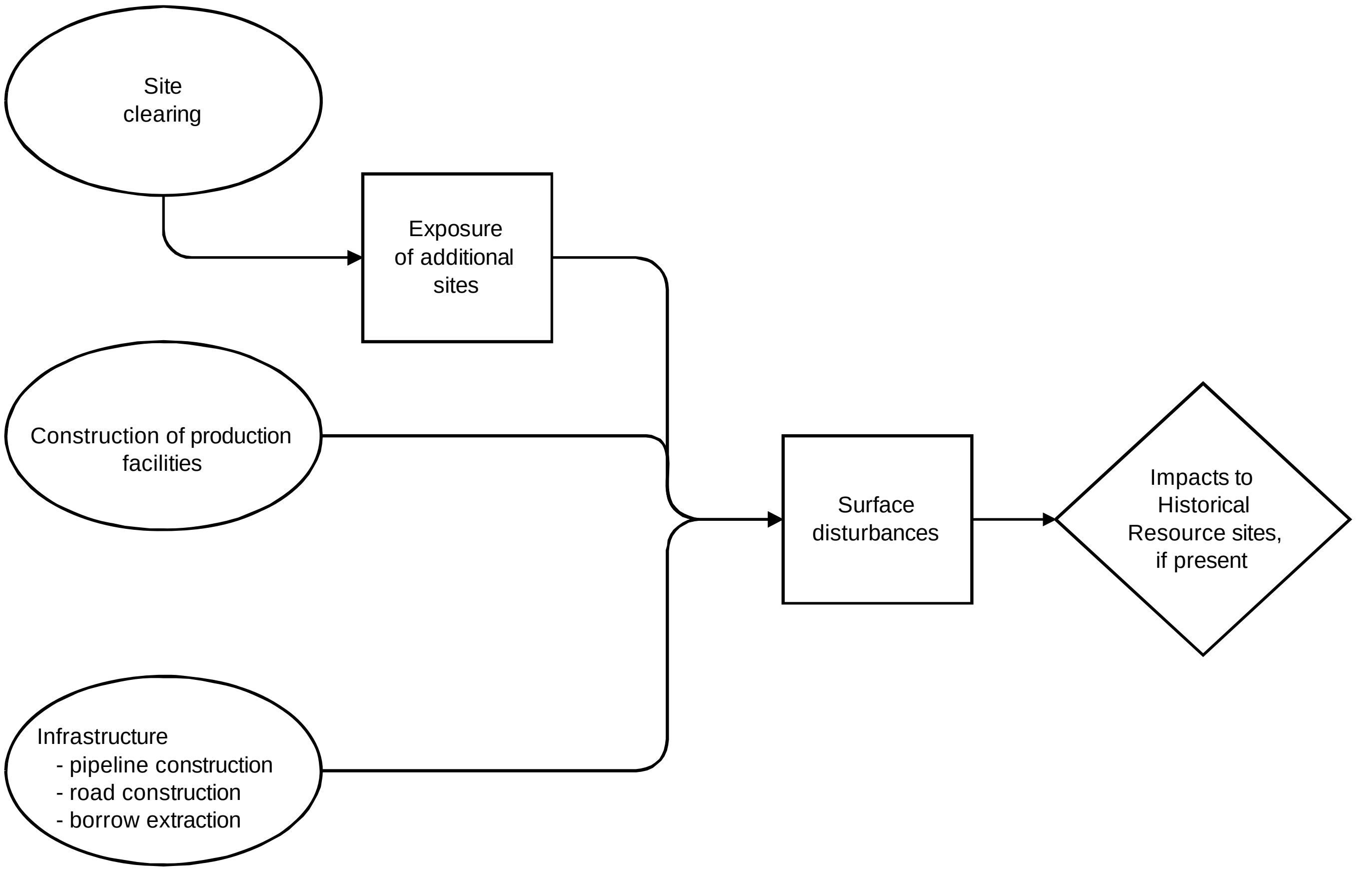
- evaluate the significance of the sites with respect to potential impacts;
- interpret the results of the study within the framework of regional prehistory; and
- make recommendations for effective management and/or mitigation of potential impacts.

The potential impacts of the Project activities on historical resources are identified in a linkage diagram (Figure 5.5-1). Project activities, environmental changes and effects to historical resources are shown as ovals, rectangles and diamonds, respectively. The linkages between the effects of these disturbances and historical resource impacts are direct, indirect and permanent but may not entail complete destruction depending on the depth and severity of the surface disturbances involved.

Based on the “Key Question HRPC-1: What effects could the Project have on historical resources?” the results of the HRIA were assessed and the potential impacts identified. Figure 5.5-1 outlines the potential impacts of the Project on Historical Resources as non-renewable resources that are sensitive to land surface disturbances.

Construction of production facilities and infrastructure will result in complete burial or removal of the upper soil horizons within direct impact zones. The effect of soil removal or burial in the locations of wellpads or the proposed plant site areas has the potential to impact historical resources. Similar activities such as pipeline trenching, road construction and borrow extraction also impact historical resources.

As the Project will involve site clearing, construction of production facilities and construction of infrastructure that will result in surface disturbance, this linkage is valid.



PROJECT

CHRISTINA LAKE REGIONAL PROJECT - PHASE 3

TITLE

HISTORICAL RESOURCES LINKAGE DIAGRAM

MEG ENERGY CORP.

PROJECT	07.1346.0009.8400		FILE No.	H.R. Linkage
DESIGN	VB	02/01/08	SCALE AS SHOWN	REV. 0
CADD	TRE	27/02/08		
CHECK	DB	29/02/08		
REVIEW	IGG	04/03/08		

FIGURE: 5.5-1

5.6 PROJECT CASE

5.6.1 Local Study Area

5.6.1.1 General Setting

The majority of historical resources likely to be present in the local and regional study areas relate to occupation by prehistoric hunting and gathering groups. These groups developed economies that were intimately linked with the landscapes in which they subsisted. The characteristics of these landscapes have varied considerably over the 10,000 years since the retreat of the last glaciation. Several factors have contributed to significant variation in regional landscape conditions over this period. The character of the original landforms left in the wake of receding glacial masses and para-glacial lakes, which formed along their margins, may have been a significant influence on early land use patterns. Portions of the lease exhibit lake basins and glaciolacustrine sediments which may have affected landscape use during early periods. Currently, wetlands organic deposits, which significantly reduce the original terrain variation, fill the abandoned lake basins. These wetlands developed slowly over a 6,000-year period (Halsey et al. 1998) and this development was probably influential in conditioning prehistoric land use patterns.

Changes in the vegetation communities in the region have also been significant during this period. During a period between 8,000 and 4,000 years ago, climate was significantly warmer and drier than it is today (Schweger et al. 1981) and significant reduction in forest cover would be predicted for the Project area during this period. Another major influence is the productivity of the landscape and how it was culturally manipulated by the use of fire by prehistoric groups. These factors are discussed in detail in the HRIA and contributed to the formation of the potential predictions that formed the basis of the HRIA field program.

It is generally recognized that, to a great extent, environmental factors condition man’s behavioral and cultural adaptations both prehistorically and in the recent past. These include patterns of settlement, resource exploitation, seasonal movement, travel routes and so forth. The material evidence of these use patterns constitutes the historical resource record of northeastern Alberta. The boreal forest environment also influences the character of this record of use and its accessibility to discovery as well as influencing prehistoric and historic subsistence and settlement. The dense forest cover of the region typically conceals even near-surface buried historical resources, making site discovery the result of a well designed subsurface testing program. The acidic nature of the soils in the area effectively removes the organic materials (e.g., wood, bone, hide, basketry and so forth) that would have been part of the archaeological record of the area. As well as restricting inferences about subsistence practices and other activities, this makes dating historical resources in the Boreal Forest difficult.

Despite these difficulties, the prehistoric and historic record of the Oil Sands Region is rich and emerging as one of the most significant records in Canada's north.

5.6.1.2 Information Sources

A file search of the Archaeological Site Inventory maintained by the Heritage Resource Management Branch located in Old St. Stephens College indicated that no historical resources sites had been previously recorded within the MEG lease. The HRIA MEG Energy Corp. Christina Lake Regional Project Final Report (Blower 2004) and other local HRIA reports (Blower 2007; Clarke 1997; Webster 2005) were also reviewed.

5.6.2 Residual Impact Classification

The Project will entail in-situ recovery processes that are unlikely to pose a significant threat to fossil remains that might be contained in this formation. Therefore, the impact classification will focus on resources at or near ground surface and will be limited to the historical resources LSA for the Project (Table 5.6-1).

Table 5.6-1 Residual Impact Classification for Key Questions HRPC-1

Resource	Direction	Magnitude	Geographic Extent	Duration	Reversibility	Environmental Consequence
historical resource: direct	negative	negligible	local	short-term	irreversible	negligible (+3)
historical resource: indirect	negative	negligible	regional	Medium to long-term	irreversible	negligible to low (+5 to 6)

Note: Frequency is omitted since it is not applicable to historical resources. Numerical score for ranking of environmental consequence (shown in brackets) is based on scores shown in Table 5.2-1.

The results of the HRIA indicate that no historical resources are likely to be encountered during development or operations stages of the MEG Project. Consequently, direct project impacts are expected to have negligible magnitude.

While some visitation to the area may occur for hunting purposes, adverse impacts to unidentified historical resources are not expected. Given these considerations, it is predicted that the potential for indirect impact to identified historical resources is negligible.

Indirect effects in association with the comparatively small Project work force, the relatively low recreational potential in the vicinity of the Project and the availability of alternate sources of recreation within the region are predicted to be low.

5.7 PLANNED DEVELOPMENT CASE

The Project would contribute to cumulative effects to a resource if it was identified to have an impact on the resource. The Planned Development Case considered the following to determine if the Project contributed to cumulative effects within the RSA:

- establish baseline conditions for historical resources in the RSA;
- determine the Project's impacts to historical resources; and
- determine if the Project's historical impacts contributed to unacceptable cumulative effects in the RSA.

Based on the "Key Question HRPDC-1: What effects could the Project and the planned developments have on historical resources?" the results of the HRIA were assessed in combination with existing, approved and planned developments in the RSA. As no new historical resources sites were identified for the Project LSA and the potential for the identification of historical resources is considered low, the Project will not contribute to cumulative effects of the development of the RSA.

No direct negative effects on historical resources have been identified for the Project. Indirect negative effects related to the Project are predicted to be negligible to low. As no historical resources were identified during the Project, it is recommended that no mitigation with respect to cumulative effects be required.

5.8 CONCLUSIONS

The Project HRIA was completed under Historical Resources Permit No. 2007-250, issued by ATPRC to Vincent Balls. Predicted areas of high and moderate potential were identified for field investigations based on development plans, topographic feature analysis and regional archaeological site distribution patterns. Areas to be assessed were further refined based on observations made during field investigations.

No new historical resource sites were identified in the Project LSA as a result of the current study. The HRIA included recommendations to ATPRC that *Historical Resources Act* clearance should be issued for the Project. Any development that occur outside the assessed HRIA footprint may require further assessment, as determined by ATPRC.

A qualitative and quantitative assessment has been conducted of the effects of the Project in combination with existing, approved and planned regional developments. This assessment was based on the predictive model, which incorporates both known resources in the region and a structured, GIS-based consideration of regional landform potential.

The distribution of historical resources within the RSA established for the Project reflects more than 35 years of inventory conducted within this region. Most of these investigations have been completed in connection with proposed oil sands (mining and in-situ) developments, pipelines, transmission utility corridors, provincial campgrounds surveys, as well as a large scale regional survey based out of the Lac La Biche area. At present, 129 precontact historical resources have been previously recorded in the RSA. However, a sample size of 98 precontact historical sites was used for the impact assessment due to a lack of recorded information on 31 of the sites.

It should be noted that in the case of both prehistoric and historic sites in the RSA, none of the sites are located within the boundaries of the Project, and as such, do not require further study. No impacts to any of the archaeological or historical sites will occur due to development of the Project.

Although the combined effects of regional development on historical resources are seen as potentially important, the developments of the Project, as proposed, will contribute no predicted additional effects.

5.9 FOLLOW-UP PRIOR TO CONSTRUCTION

Together, the GIS model of historical resource potential, the results of previous studies in the RSA, and the current HRIA support the identification of the LSA as an area of low potential for the presence of historical resources sites. As a result, no follow-up historical resources studies are recommended prior to construction activities within the current LSA. Should pre-construction activity result in the identification of historical resources MEG will follow the procedures and requirements as defined by ATPRC.

5.10 REFERENCES

AENV (Alberta Environment). 2008. Final Terms of Reference Environmental Impact Assessment Report for the MEG Energy Corp. Christina Lake Regional Project - Phase 3. Issued by Alberta Environment. Edmonton, AB.

Alberta Legislature. 2000. Historical Resources Act (RSA 2000). Queen's Printer. Edmonton, AB.

ASA (Archaeological Survey of Alberta). 1989. Guidelines for Archaeological Permit Holders in Alberta. Historical Resources Division, Alberta Culture and Multiculturalism. Edmonton, AB.

Balls, V. 2007. Historical Resources Impact Assessment for the MEG Christina Lake Regional Project – Phase 3. Submitted to Alberta Tourism, Parks, Recreation and Culture.

Blaikie-Birkigt, K.A. n.d.a Historical Resources Impact Assessment Alberta-Pacific Forest Industries 2004 / 2005 AOP summer harvest: Final Report (Permit 05-458), unpublished consultants report. On file, Archaeological Survey, Provincial Museum of Alberta. Edmonton, AB.

Blaikie-Birkigt, K.A. n.d.b Historical Resources Impact Assessment, Final Report (Permit 06-283), unpublished consultants report. On file, Archaeological Survey, Provincial Museum of Alberta. Edmonton, AB.

Blaikie-Birkigt, K.A. n.d.c Historical Resources Impact Assessment, Final Report (Permit 06-615), unpublished consultants report. On file, Archaeological Survey, Provincial Museum of Alberta. Edmonton, AB.

Blower, D. 2004. Historical Resources Impact Assessment for MEG Energy Corp. Christina Lake Regional Project, Permit No. 2004-364. On file, Archaeological Survey, Royal Alberta Museum. Edmonton, AB.

Blower, D. 2007. Historical Resources Impact Assessment: EnCana Christina Lake Regional Thermal Expansion Project (Permit 07-186). On file, Archaeological Survey, Provincial Museum of Alberta. Edmonton, AB.

Bouchet-Bert, L. 2004. Historical Resources Impact Assessment Petro-Canada Meadow Creek 1.1 Project: Final Report (Permit 04-367), unpublished consultants report. On file, Archaeological Survey, Provincial Museum of Alberta. Edmonton, AB.

Clarke, G. 1997. Historical Resources Impact Assessment for AEC Christina Lake SAGD Project, Final Report (Permit 97-157). On file, Archaeological Survey, Provincial Museum of Alberta. Edmonton, AB.

Fedirchuk, G.J. n.d. Historical Resources Impact Assessment Gulf Canada Resources Ltd. Surmount Lease: Final Report (Permit 98-096), unpublished consultants report. On file, Archaeological Survey, Provincial Museum of Alberta. Edmonton, AB.

Fromhold, J. 1980. Historical Resources Impact Assessment Study SW ¼, 19-68-12-W4M (Permit 80-019).

Gibson, T.H. 2003a. Historical Resources Impact Assessment of Proposed AEC Primrose/Caribou 2001-2002 Flowlines in the Cold Lake Air Weapons Range, Alberta: Final Report (Permit 01-283). On file Archaeological Survey, Provincial Museum of Alberta. Edmonton, AB.

Gibson, T.H. 2003b. Historical Resources Impact Assessment of Proposed EnCana Primrose/Caribou 2002-2003 Flowlines (amendment for App. 002-153930) in the Cold Lake Air Weapons Range, Alberta: Final Report (Permit 02-255). On file Archaeological Survey, Provincial Museum of Alberta. Edmonton, AB.

Gibson, T.H. 2004. Historical Resources Overview and Impact Assessment of Proposed AEC SAGD Phase II and Phase III developments in the Cold Lake Air Weapons Range, Alberta: Final Report (01-175). On file Archaeological Survey, Provincial Museum of Alberta. Edmonton, AB.

Golder (Golder Associates Ltd.). 2001. Rio Alto Kirby Project Environmental Impact Assessment, Volume 3 Terrestrial Resources, Part G Traditional Land Use. Submitted to the Alberta Energy and Utilities Board.

Goldsmith, A.S. and T.H. Head. 2002. Historical Resources Impact Assessment Christina Lake pipeline and the Kirby Lake Batch Accumulation Facility Enbridge Pipelines (Athabasca) Inc. Twp. 74 - 76, Rge. 5 - 6, W4M: Final Report (ASA Permit Number 01-137), unpublished consultants report on file with the Archaeological Survey of Alberta.

Green, D.C. 1997. Historical Resources Impact Assessment: Foster Creek In-Situ Oil Sands (Permit 97-052). On file, Archaeological Survey, Provincial Museum of Alberta. Edmonton, AB.

Green, D.C. 2001a. Historical Resources Impact Assessment Rio Alto Kirby. (Permit 01-155). On file, Archaeological Survey, Provincial Museum of Alberta. Edmonton, AB.

Green, D.C. 2001b. Historical Resources Impact Assessment Petro-Canada Meadow creek Project: final report (ASA Permit Number 01-202), unpublished consultants report on file with the Archaeological Survey of Alberta.

Green, D.C. 2003. Historical Resources Impact Assessment Canadian Natural Resources Limited Primrose and Wolf Lake expansion project : final report (ASA Permit Number 00-100), unpublished consultants report on file with the Archaeological Survey of Alberta.

Green, D.C. 2004. Post-construction Historical Resources Impact Assessment AEC East Leismer gas development project: 1998/1999 winter program: final report (Vol 1); Post-construction historical resources impact assessment AEC East Primrose project Cold Lake Air Weapons Range: final report (Vol 2) (ASA Permit Number 99-057), unpublished consultants report on file with the Archaeological Survey of Alberta.

Haley, S.D. 1985. Historical Resources Impact Assessment 1984 highways survey programme: final report (ASA Permit Number 84-021), unpublished consultants report on file with the Archaeological Survey of Alberta.

Halsey, L., D. Vitt and I. Bauer. 1998. Peatland Initiation During the Holocene in Continental Western Canada. Climatic Change 40: 315-342.

Head, T. H. 1989. Historical Resources Impact Assessment Caribou Lake Lateral (Permit 89-096). On file, Archaeological Survey, Provincial Museum of Alberta. Edmonton, AB.

Kulle, B.J. 1997. Historical Resources Impact Assessment AEC Pipelines Ltd. AEC Lakeland Pipeline Project (Permit 97-075). On file, Archaeological Survey, Provincial Museum of Alberta. Edmonton, AB.

Malasiuk, J.A. 2006. Historical Resources Impact Assessment Whitesands Summer/Fall 2006 Oil Sands Exploration Program: final report (ASA Permit Number 06-401), unpublished consultants report on file with the Archaeological Survey of Alberta.

McCullough, E.J. 1975. Lac La Biche Archaeological Survey, (Permit 75-023). On file, Archaeological Survey, Provincial Museum of Alberta. Edmonton, AB.

McCullough, E.J. 1996. Historical Resources Impact Assessment Suncor Inc. Burnt Lake thermal project stages 1 to 4 (ASA Permit Number 85-089), unpublished consultants report on file with the Archaeological Survey of Alberta.

Peach, K. 2004. Historical Resources Impact Assessment Al-Pac 2004-2005 Forestry Operations: final report (ASA Permit Number 04-279), unpublished consultants report on file with the Archaeological Survey of Alberta.

Pollock, J. 1978. Prehistoric and Historic Impact Assessments for Alberta Forest Service: Campgrounds in Central and Northern Alberta (Permit 77-32). On file Alberta Community Development. Edmonton, AB.

Pollock, J.W. 1981. Historical Resources Impact Assessment Lac La Biche to Conklin (Winefred) 138 kV Transmission Line 788L: Final Report (Permit 81-157). On file Archaeological Survey, Provincial Museum of Alberta. Edmonton, AB.

Ramsey, C.L. 2002. Jackfish SAGD EIA Historical Resources Impact Assessment Conklin, Alberta: Final Report (Permit 02-101). On file Archaeological Survey, Provincial Museum of Alberta. Edmonton, AB.

Rollans, M. 2000. Historical Resources Impact Assessment of AEC oil and Gas Company Ltd. Projects in the Cold Lake Air Weapons Range and Vicinity 2000: Final Report (Permit 00-174). On file, Archaeological Survey, Provincial Museum of Alberta. Edmonton, AB.

Roskowski, L.A. 2006. Historical resources impact assessment EnCana Corporation Cold Lake Air Weapons Range 2005-2006 winter program: final report (ASA Permit Number 06-477), unpublished consultants report on file with the Archaeological Survey of Alberta.

Royal Tyrrell Museum of Palaeontology. 1984. Palaeontological Sensitivity Zones. Alberta Culture. Edmonton, AB. 1:1,000,000 Scale Map.

Schweger, C.E., T. Hapgood and M. Hickman. 1981. Late Glacial-Holocene Climatic Changes in Alberta. The Record from Lake Sediment Studies. In, The Impact of Climatic Fluctuations in Alberta's Resources and Environment. Proceedings of Workshop and Annual Meeting, Alberta Climatic Association, Feb. 1981, edited by K. R. Leggat and J. T. Kotylak. pp 47-59. Atmospheric Environment Service, Western Region, Environment Canada, Report No. WAES-1-81: 47-59. Edmonton, AB.

Tischer, J.C. 2003. Historical Resources Impact Assessment ATCO Electric Ltd. Dover to Whitefish Transmission Line Project: Final Report (Permit 03-182). On file Archaeological Survey, Provincial Museum of Alberta. Edmonton, AB.

Tischer, J.C. 2004a. Historical resources impact assessment ConocoPhillips Canada Resources Corp. Surmont in-situ oil sands project phase 1 stage 1: final report (ASA Permit Number 02-163), unpublished consultants report on file with the Archaeological Survey of Alberta.

Tischer, J.C. 2004b. Historical resources impact assessment ConocoPhillips Canada Resources Corp. Surmont in-situ oil sands project: final report (ASA Permit Number 03-145), unpublished consultants report on file with the Archaeological Survey of Alberta.

Webster, S. 2005. Historical Resources Impact Assessment for EnCana Corporation Christina Lake SAGD Phase 1B Expansion Project, Final Report (Permit 05-344). On file, Archaeological Survey, Provincial Museum of Alberta. Edmonton, AB.

Wickham, M. 2006. Historical resources impact assessment EXH Engineering Services Ltd. La Loche road investigation project: Final Report (Permit 06-233). On file Archaeological Survey, Provincial Museum of Alberta. Edmonton, AB.

Wilson, I.R. 1978. Historical Resources Impact Assessment Leismer Lateral Natural Gas Pipeline (Permit 78-012). On file, Archaeological Survey, Provincial Museum of Alberta. Edmonton, AB.

Wondrasek, R.J. 2006. Historical resources impact assessment Nexen Long Lake South SAGD project, Township 84, Ranges 6& 7, W4M: final report (ASA Permit Number 06-396), unpublished consultants report on file with the Archaeological Survey of Alberta.

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6 SOCIO-ECONOMICS ASSESSMENT

6.1 INTRODUCTION

MEG Energy Corp. (MEG) is a Calgary-based, privately held energy company focused on the development and recovery of bitumen, shallow gas reserves and the generation of power in northeast Alberta. MEG's Christina Lake Regional Project (CLRP) consists of 80 sections of oil sands leases within the Regional Municipality of Wood Buffalo (RMWB), approximately 15 km southeast of Secondary Highway 881 and 20 km northeast of Conklin.

MEG currently has approval to construct and operate the first two phases of the CLRP over 23 sections of land. In addition, MEG is developing a facility expansion (Phase 2B) to increase the production capacity of the Central Plant to 60,000 barrels per day (bpd). The Phase 2B plant will be located immediately adjacent to the existing Phase 1 and 2 processing facilities.

MEG is now proposing a further expansion of the CLRP to fully develop its Christina Lake oil sands leases. The Christina Lake Regional Project – Phase 3 (the Project) is an expansion of the current CLRP development area and will use Steam Assisted Gravity Drainage (SAGD) bitumen recovery technology. The Project will consist of two additional processing facilities (Plants 3A and 3B), 138 SAGD multi-wellpads and associated steam generating equipment. Plant 3A will be located in the southeast corner of the lease (Sections 20 and 29-76-4 W4M) and Plant 3B will be located in the northwest end of the lease (Sections 32 and 33-77-6 W4M).

Construction of the Project is proposed to occur in two phases. Phase 3A is anticipated to begin construction in 2010, with initial steam injection in 2012. Phase 3B is anticipated to begin construction in 2012, with initial steam injection in 2014. The operational life of each plant is expected to be 25 years. Total production from the two new plants will produce an incremental 150,000 bpd of bitumen (approximately 23,800 cubic metres per day). It is anticipated that reclamation of the Project will be complete by 2044.

6.1.1 Terms of Reference

This assessment was completed to meet the relevant TOR (Alberta Environment (AENV) 2008) for the Project (Table 6.1-1) which states the following:

Table 6.1-1 Socio-Economics Terms of Reference Concordance Table

TOR Section	Environmental Assessment or Topic	Location TOR Addressed
3.0 PROJECT DESCRIPTION		
3.4 Project Process and Facilities	[C] Discuss planned accommodation for the workforce during the construction and operations stages.	[C] Volume 6, Section 6.5.2 Project Case for Housing
3.5 Transportation Infrastructure	[B] Provide a summary of any Traffic Impact Assessment (TIA) carried out for the Project, or where no TIA has been prepared: (a) describe the anticipated changes to traffic (e.g., type and volume) on highways during the life of the Project. Consider other existing and planned uses of the same highways; and (b) identify needs to upgrade existing roads or construct new roads.	[B] Volume 6, Section 6.5.3 Traffic
7.0 PUBLIC HEALTH AND SAFETY ASSESSMENT	[B] Describe those aspects of the Project that may have implications for public safety. Determine whether there may be implications for public safety arising from the Project. Specifically: (e) describe the potential safety impacts due to higher regional traffic volumes; and	(e) Volume 6, Section 6.5.3 Traffic
	(f) discuss mitigation plans to ensure workforce and public safety during the life of the Project. Include prevention and safety measures for wildfire occurrences, water saturated plume from the cooling towers, icy roads in the winter months, accidental release or spill of chemicals to the environment and failures of structures retaining water or fluid wastes.	(f) Volume 6, Section 6.3.1 Traffic
8.0 SOCIO-ECONOMIC ASSESSMENT		
8.1 Baseline Information	[A] Describe the existing socio-economic conditions for communities in the region and for the region as a whole	[A] Volume 6, Appendix 6-III; Section 2.1 Study Areas Overview, Section 2.2 Demographics, Section 2.3 Economic Setting, and Section 2.4 Social Setting
	[B] Describe the factors that may affect existing socio-economic conditions including: (a) population changes;	[B] (a) Volume 6, Appendix 6-III, Section 2.2. Population
	(b) MEG's policies and programs regarding the use of regional and Alberta goods and services;	(b) Volume 6, Section 6.3.4 Local Opportunities, and Section 6.4.2 Project Case for Economic Effects
	(d) workforce requirements for the Project including a description of when peak activity periods will occur; and	(d) Volume 6, Section 6.4.2 Project Case for Economic Effects
	(e) planned accommodations for the workforce.	(e) Volume 6, Section 6.5.2 Project Case for Housing
8.2 Impact Assessment	[A] Describe the socio-economic effects of construction and operation of the Project, including: (a) impacts related to:	(a) Volume 6, Section 6.4 Economic Effects, and Section 6.5 Social Effects
	i) local employment opportunities,	i) Volume 6, Section 6.4.2 Project Case for Economic Effects
	ii) local business opportunities,	ii) Volume 6, Section 6.3.4 Local Opportunities
	iii) regional and provincial economic benefits;	ii) Volume 6, Section 6.4.2 Project Case for Economic Effects
	iv) housing,	iv) Volume 6, Section 6.5.2 Housing

Table 6.1-1 Socio-Economics Terms of Reference Concordance Table (continued)

TOR Section	Environmental Assessment or Topic	Location TOR Addressed
8.2 Impact Assessment (continued)	v) construction camps,	v) Volume 6, Section 6.5.2, Project Case for Housing; Section 6.5.3 Project Case for Traffic, Section 6.5.5 Project Case for Health Services, Section 6.5.6 Project Case for Social Services, Section 6.5.7 Project Case for Emergency and Protective Services, Section 6.5.8 Project Case for Municipal Services and Infrastructure, Section 6.5.9 Project Case for Recreation, and Volume 1, Section 3.2.3.1 Camps
	vi) recreational activities,	vi) Volume 6, Section 6.5.9 Project Case for Recreation
	(b) estimated total Project cost including a breakdown for engineering and Project management, equipment and materials, and labour for both construction and operations stages. Indicate the percentage of expenditures expected to occur in the region, Canada outside Alberta, and outside Canada;	(b) Volume 6, Section 6.4.2 Project Case for Economic Effects
	(c) impacts of the Project on the availability of affordable housing and the quality of health care services. Provide a summary of any discussions that have taken place with the local municipalities and the Regional Health Authority concerning housing availability and health care services respectively;	(c) Volume 6, Section 6.5.2 Project Case for Housing, Section 6.5.5 Project Case for Health Services, Section 6.3.2 Health Services, Volume 6, Appendix 6-III Socio-Economic Baseline, Section 2.4.2 Housing, and Section 2.4.4 Health Services
	(d) any effects expected on primary and secondary highway systems and other regional roads caused by anticipated traffic changes;	(d) Volume 6, Section 6.5.3 Traffic
	(f) the impact on local and regional infrastructure and community services, including consideration of municipal “hard services”, education/training services, social services, urban and regional recreation services, law enforcement and emergency services.	(f) Volume 6, Section 6.5.8 Project Case for Municipal Services and Infrastructure, Section 6.6 Planned Development Case, Section 6.5.3 Traffic, Section 6.3.1 Traffic, Section 6.3.3 Education and Training, Section 6.5.4 Project Case for Education, Section 6.5.6 Project Case for Social Services, Section 6.5.9 Project Case for Recreation, and Section 6.5.7 Project Case for Emergency and Protective Services
	[B] Discuss options for mitigating impacts including: (a) MEG’s policies and programs regarding the use of regional and Alberta goods and services;	(a) Volume 6, Section 6.3.3 Education and Training, Section 6.3.4 Local Opportunities
	(b) plans to work with First Nation and Metis communities and other local residents and businesses with regards to employment, training needs, and other economic development opportunities arising from the Project;	(b) Volume 6, Section 6.3.3 Education and Training, and Section 6.3.4, Local Opportunities

Table 6.1-1 Socio-Economics Terms of Reference Concordance Table (continued)

TOR Section	Environmental Assessment or Topic	Location TOR Addressed
8.2 Impact Assessment (continued)	(c) steps that have been undertaken by industry, the municipality, provincial government or through regional and cooperative initiatives to address socio-economic issues and impacts to local and regional infrastructure;	(c) Volume 6, Section 6.3 Mitigation and Benefit Enhancement
	(d) the potential to overlap with other projects that are reasonably anticipated during the life of the Project;	(d) Volume 6, Section 6.6 Planned Development Case
	(e) mitigation plans that will be undertaken to address issues related to the availability of affordable housing and the quality of health care services; and	(e) Volume 6, Section 6.3.2 Health Services, and Section 6.5.2 Project Case for Housing
	(f) strategies to mitigate socio-economic concerns raised by the local municipality and other stakeholders in the region.	(f) Volume 6, Section 6.3 Mitigation and Benefit Enhancement;
	[C] Describe the significance of any residual effects of the Project on socio-economic conditions and MEG's plans to manage those effects.	[C] Volume 6, Section 6.4 Economic Effects, and Section 6.5 Social Effects
8.3 Monitoring	[A] Discuss monitoring plans proposed to measure the success of mitigation activities.	[A] Volume 6, Section 6.7 Monitoring

6.2 SCOPE OF ASSESSMENT

6.2.1 Summary of Issues and Key Questions

Key issues raised by stakeholders and identified in existing studies regarding potential socio-economic effects and benefits include:

- employment and contracting opportunities for Local Study Area (LSA) and Regional Study Area (RSA) communities and Aboriginal populations;
- training opportunities for Aboriginal people in the Project area;
- housing availability in the LSA communities; and
- increases in traffic and traffic safety issues, specifically in the LSA along Secondary Highway 881.

The three key questions that address the issues raised in the TOR are:

Key Question SEPC-1: What effects could existing and approved developments and the Project have on the local and provincial economies?

Key Question SEPC-2: What effects could existing and approved developments and the Project have on population, services and infrastructure?

Key Question SEPDC-1: What effects could existing and approved developments, the Project and planned developments have on socio-economics in the Study Areas?

6.2.2 Assessment Cases

The development cases used for the assessment include an Existing and Approved Case (EAC), a Project Case and a Planned Development Case (PDC). The EAC includes those developments that already exist as well as those that have been approved, but are not yet built. The Project Case includes existing and approved developments and the Project. The PDC considers developments that have been publicly disclosed during the time period up to six months prior to the submission of the Application. The developments considered for each case are listed in Volume 2, Section 5. All developments that are being considered in the assessments cases are shown in Volume 2, Section 5, Figure 5-1 and discussed in greater detail in Volume 2, Appendix 2-IV.

6.2.3 Temporal Considerations

The temporal considerations for the EIA are based on the Project Description (Volume 1, Section 4) and include unique conditions that may affect environmental components differently. The schedule for the Project is detailed in Volume 1, Section 1.2.7.

Construction of the Project is proposed to occur in two phases. Phase 3A is anticipated to begin construction in 2010, with initial steam injection in 2012. Phase 3B is anticipated to begin construction in 2012, with initial steam injection in 2014. The operational life of each plant is expected to be 25 years. Total production from the two new plants will produce an incremental 150,000 bpd of bitumen (approximately 23,800 cubic metres per day). It is anticipated that reclamation of the Project will be complete by 2044.

6.2.4 Spatial Considerations

The socio-economic RSA is the geographic area within which the Project could potentially have socio-economic effects. The RSA for this Socio-Economic Assessment is made up of the following administrative units:

- Rural Municipality of Wood Buffalo (RMWB);
- Lakeland Country (now called Lac La Biche County);
- the Beaver Lake First Nation’s Beaver Lake reserve;

- the Fort McMurray First Nation's (FMFN) reserves 176 and 176a (reported as Gregoire Lake IR 176 and Gregoire Lake IR 176a by Statistics Canada);
- the town of Bonnyville; and
- the city of Cold Lake.

The socio-economic LSA is made up of those communities nearest to the Project, which are likely to experience more and/or stronger effects than will be seen more broadly across the RSA. The communities nearest to the Project are:

- the hamlet of Conklin;
- the hamlet of Chard (also known as the Hamlet of Janvier);
- Chipewyan Prairie Dene First Nation (CPDFN) reserve (reported as Janvier IR 194, by statistics Canada);
- the town of Lac La Biche; and
- two of the three Heart Lake First Nation (HLFN) reserves (Heart Lake IR 167 and Heart Lake IR 167A). While these two reserves have been included in the LSA for completeness, the assessment of potential Project effects has been constrained by a lack of published data on these communities.

6.2.5 Assessment Methods

The Socio-Economic Assessment considers current baseline conditions and conditions for the EAC, in the year 2010. The assessment then considers potential effects of the Project during each of its construction and operation phases (the Project Case). Finally, the assessment considers the effects of the Project in combination with planned developments (the PDC).

The assessment examines two periods: the construction period from 2010 to 2014, which captures the extent of expected construction effects, and the first year that the Project will be in full production, in 2015. Most of the operations effects will first be experienced in this year, and can be expected to continue over the 27 year operations phase. Where changes in operations effects are expected over time, these are also noted in the assessment.

Socio-economic effects are both positive and negative, with positive impacts resulting in benefits from a project (e.g., employment and tax revenue). Because the socio-economic status of different communities, subpopulations and individuals may vary, a socio-economic effect may have both positive and negative aspects.

The determination of socio-economic effects and their consequences share some of the methods used for assessing environmental effects, as described in Volume 2, Section 4. However, there are a number of challenges in assessing socio-economic impacts, including:

- Socio-economic effects of a specific project are difficult to isolate from an ongoing process of interdependent social, cultural and economic change. For example, evolving social trends, government policy and programming decisions, individual choice and/or other drivers all have effects that will be concurrent with potential Project effects.
- Socio-economic change typically cannot be reversed to return to one or all of the pre-project development conditions. Since it is presumed a development will only be permitted if it brings a net benefit to affected populations, a return to pre-project conditions may not be desirable. Reversibility is therefore not a generally useful attribute to assess consequence although there are isolated exceptions (for example, construction-phase traffic levels).
- As noted above, there is high variability in affected populations, thus the net direction of a socio-economic effect can be inherently difficult to predict. For example, increased employment is likely to bring increased income, which can have both negative and positive effects and the resulting net effect on a community can be difficult to predict.
- Socio-economic effects result from the interrelationship between project activities, mitigation and/or enhancement measures, as well as decisions made by individuals and communities with regard to events and situations unrelated to the Project. These dynamics further contribute to the complexity of predicting socio-economic effects.

Evaluating the consequence of potential socio-economic effects, therefore, includes:

- quantitative analyses (where possible) to determine the degree of socio-economic change the Project has the potential to produce;
- qualitative analyses based on material gathered during consultations (with potentially affected people and their representatives);
- expert opinion as gathered during key informant interviews; and
- professional experience and judgement.

6.2.5.1 Information Sources

Information sources for the Socio-Economic Assessment included:

- the Project description (Volume 1, Section 3);
- results from Alberta Finance's input-output model, used to estimate the Project's direct, indirect and induced effects in Alberta;
- information provided through interviews with municipal authorities and providers in the LSA and RSA (key informant interviews);
- recent environmental assessments for other projects in the southern part of the RMWB;
- baseline socio-economic information (Appendix 6-III); and
- review of recent experiences with oil sands development in northeastern Alberta.

It is noted that comparable information is not always available for RSA and LSA populations or administrative units as defined for this assessment. For example, Statistics Canada 2006 census data are not available for all communities at the time of writing and even when all data are released, releases will exclude data for some categories for small communities, often for reasons of confidentiality (e.g., Chard). Depending on the parameter and the agency responsible for its tracking, different administrative units are used, for example, much of the quantitative economic data for northeastern Alberta are reported by the Alberta government for the Wood Buffalo-Cold Lake Economic Region, which is larger than the RSA.

6.3 MITIGATION AND BENEFIT ENHANCEMENT

MEG currently supports the efforts of public and civil society agencies and organizations to meet the needs of Alberta residents through the taxes and royalties generated by its projects. MEG also directly supports communities near its projects in northeastern Alberta through its community investment and donation programs and its education and training activities. Finally, MEG is a participant in various regional initiatives established to address regional socio-economic issues associated with oil sands development, including:

- Regional Infrastructure Working Group (RIWG);
- South Athabasca Oil Sands Producers (SAOP);
- Willow Lake Traffic Working Group; and
- Lac La Biche Industry Committee.

MEG intends to continue its involvement with these groups during the construction and operation of the Project.

MEG will implement the following measures to mitigate potential negative effects and enhance Project benefits.

6.3.1 Traffic

MEG recognizes that the Project, especially during its construction phase, will result in traffic increases on Secondary Highway 881. MEG will co-operate with the Royal Canadian Mounted Police (RCMP) and other provincial and local traffic authorities (including Alberta Infrastructure and Transportation) to ensure the potential negative effects of Project traffic increases are minimized. MEG will use a combination of some or all of:

- fly-in fly-out (on rotational employment schedules for out-of-area workers);
- van- and/or bus-based daily transport from nearby communities (where it is practical and preferred for workers to commute daily); and
- privately owned transportation (as practical and/or required) to move construction and operations workers to site.

Final construction and operations phase workforce rotational and transportation arrangements will be developed as human resource planning and implementation are advanced, with the aim of minimizing traffic to the extent possible.

In response to traffic concerns in the LSA, the Willow Lake Traffic Working Group was created to address highway safety, traffic movement and general highway conditions on Secondary Highway 881. This working group (which now includes MEG, OPTI Canada Inc./Nexen Canada Ltd., ConocoPhillips Canada, Devon Canada Corporation and Orion Oil Canada Ltd./Petrobank Energy and Resources) has support from Alberta Infrastructure and Transportation and the Fort McMurray RCMP. The group keeps area residents informed of movements (including oversized loads and the timing of shift changes) on Secondary Highway 881 and any delays that might be expected as a result (Long Lake Project 2007, Website).

6.3.2 Health and Emergency Services

The Project will follow the Alberta Occupational Health and Safety Code for High Hazard Isolated Sites (Government of Alberta 2006) with regards to staffing. It is anticipated that the majority of medical problems arising on site will be dealt with by these staff. The Project also has an existing agreement with medivac services for air transport of very serious cases and a registration with STARS Emergency Link Centre to assist with emergency response.

MEG is committed to ensuring a healthy and safe workplace for its employees. Workplace programs intended to enhance the health and safety of its employees include:

- safety orientations and ongoing job-specific training;
- hazard identification and non-conformance processes; and
- an Occupational Health and Safety Standard (OHSAS 18001) compatible health and safety management system.

6.3.3 Education and Training

MEG supports education and training initiatives designed to enhance the uptake of employment and other career opportunities for people in the LSA specifically, but also in the RSA. MEG has been working closely with its stakeholders to encourage their members to undertake training that will qualify them for both construction and operations jobs with the Project. MEG supports the training presented through the Trades in Motion program in both Conklin and Chard. MEG is also working with the appropriate agencies and training institutions to facilitate apprenticeship training in trades on the Project. MEG has financially supported training for people in the LSA to obtain certificates needed for employment in winter projects. MEG is engaged with Portage College through the President’s Aboriginal and Resource-Based Industry Advisory Committee to identify training equipment for industry and facilitate training through the industry. MEG maintains regular and ongoing contact with Keyano College to ensure that institution is aware of training needs related to employment opportunities with the Project.

MEG continues to support education within the schools in the local communities through Stay in School initiatives, financially assisting special events and offering to engage in in-class activities with students.

6.3.4 Local Opportunities

MEG is committed to providing employment and business opportunities for people within both the LSA and RSA with emphasis on First Nations and Métis people. Opportunities do, however, have requirements related to qualifications, quality, cost, availability (schedule) and demonstrated interest. MEG's practice with respect to local opportunities is to:

- provide opportunities in cooperation with other developers in the area;
- encourage job skills training and education; and
- ensure all interested persons have access to employment opportunities with MEG.

To ensure access to employment opportunities is realized, MEG has established a system in cooperation with local community agencies through which employment opportunities are advertised and information is made available. Arrangements have been made whereby interested people can drop off resumes at a location in each community. MEG visits these locations on a regular basis to pick up deposited resumes. These are then provided by MEG to contractors engaged in the Project to ensure they are aware of people available for employment. MEG maintains ongoing communications with contractors to follow up on local hiring practices. MEG requires each contractor to demonstrate efforts to hire local people whenever possible.

MEG is a signatory to the CPDFN-Industrial Relations Corporation (IRC) agreement. This agreement formalizes a process by which MEG and the IRC work together during the development of the Project and addresses employment and contracting opportunities with MEG for local people and businesses.

MEG has a system established with HLFN, Beaver Lake First Nation, FMFN and Métis locals in Conklin and Chard to ensure members review information on MEG's employment and contracting opportunities. MEG provides this information on a regular basis to the Métis Nation of Alberta Region One in Lac La Biche. MEG participates on the Lac La Biche Industry Committee to address employment and business opportunities with the Project. MEG holds information sessions in local communities to provide information on current and future employment and contracting opportunities.

MEG is a signatory to the Athabasca Tribal Council (ATC) All Parties Agreement which has, as one of its objectives, the enhancement of First Nations' opportunities for participation in the oil and gas sector.

MEG reached agreement with the FMFN-IRC to become an Associate Member effective April 1, 2005.

MEG has signed a Consultation Agreement with HLFN to provide ongoing consultation relating to the Project, including employment area business opportunities.

MEG has reached agreement with Beaver Lake Cree Nation to provide ongoing consultation including employment and business opportunities.

MEG has established consultation agreements with the Conklin Resource Development Advisory Committee (CRDAC). This committee is a joint initiative between Conklin Métis Local 193 and the Conklin Community Association. In addition to ongoing consultations, the CRDAC provides a focus for addressing local employment and contracting.

MEG will use an open bid process for most of its contracts. Sole sourcing will be considered only for very specialized goods and services. MEG has established an ongoing consultation process with each of its stakeholder groups to ensure that interested workers and businesses in the study areas are kept informed about and considered for economic opportunities. Through these consultations, MEG has established a database on each local business which details the nature of goods and services provided and the capacity of the businesses to provide services. Each business is invited to pre-qualify as a potential contractor. When contract opportunities arise, appropriately qualified local businesses are provided with Request for Proposals and follow-up is maintained during the proposal process.

MEG discusses future Project planning with each stakeholder group to ensure they are aware of the goods and services that will be needed as the Project develops its various phases. This is intended to assist stakeholder groups to consider new businesses they may want to develop to meet MEG's business needs.

MEG has signed business agreements with some of its stakeholders to ensure a process for conducting ongoing business relationships. Information sessions are held periodically in each community to ensure interested local businesses have an opportunity to discuss their opportunities with MEG representatives and to get information on upcoming business and employment opportunities.

Work placement will be offered to power engineering students from local colleges to assist them in acquiring work experience credits they require to be certified.

MEG monitors progress in developing business and employment opportunities by maintaining a database and requiring contractors to report regularly on the number of LSA, RSA and Aboriginal workers hired and businesses contracted.

6.4 ECONOMIC EFFECTS

The key question for assessing the potential economic effects of the Project is:

Key Question SEPC-1: What effects could existing and approved developments and the Project have on the local and provincial economies?

To determine the Project's potential economic effects on the provincial economy, Alberta Finance ran their input-output model for the construction phase (2010 to 2014) and for the first year of operations (2015) at full capacity.

Economic effects specific to the LSA and RSA are more challenging to quantify with any degree of confidence, although qualitative conclusions can be reached. There are no economic models, analyses or projections specific to either the LSA or the RSA for the Project. Nevertheless, provincial-level statistics can be adjusted and adapted, on the basis of professional judgement and recent experience in northeastern Alberta, to estimate potential effects.

6.4.1 Existing and Approved Case for Economic Effects

6.4.1.1 Economies of the Local and Regional Study Areas

The economy of the RSA is diversified (although increasingly dependent on the oil and gas sector), including a range of industries, businesses and occupations.

The industries with the highest year-over-year increases in employment between 2005 and 2006 in the Wood Buffalo-Cold Lake Economic Region (defined to include not only the RSA, but also the Municipal District (M.D.) of Bonnyville and St. Paul County) were: forestry, fishing, mining and oil and gas at 1,900 positions gained; trade, 1,100 positions; and health care and social assistance, 300 positions. Those industries with the largest decreases in employment were: transportation and warehousing, at 600 positions lost; agriculture, 300 positions; and public administration, 200 positions (AEII 2006).

The regional economy continues to rely heavily on forestry. Alberta-Pacific Forest Industries Inc. (Al-Pac) operates the world's largest single line kraft pulp mill at a site approximately 65 km northwest of Lac La Biche (in the RSA), producing 560,000 tonnes of pulp annually. Over 30 smaller forestry related companies operate in the RSA, producing rough and planed lumber, chips shavings and sawdust. The forestry sector employs 1,700 people directly, with indirect and induced employment estimated at an additional 3,200 in the Athabasca-Fort McMurray Forestry Region, which extends from the RMWB to include Lac La Biche County (Alberta Forest Products Association and ASRD 2005). Total economic output from the forestry sector in the Athabasca-Fort McMurray Forest Region in 2003 was $1.36 billion, with corporate, personal and property taxes amounting to $59.8 million (Alberta Forest Products Association and ASRD 2005).

There are 387 farming operations, averaging 996 acres in size, in Lakeland County, where most agricultural activity in the RSA is concentrated. Most farms (64.3%) are cattle operations (Statistics Canada 2007a). Based on total gross farm receipts, average farm outputs in Lakeland County are slightly below provincial averages. Agriculture in Lakeland County, as elsewhere in Alberta, has been negatively affected by US export restrictions after the Bovine Spongiform Encephalopathy (BSE) incident in 2005. Even before the BSE crisis, many farmers and farm workers supplemented their incomes by taking jobs off the farm, typically in seasonal positions with oil and gas companies (AFRD 2001a, 2001b).

Within the RMWB, a total of 37 oil, gas and oil sands projects are near completion or were scheduled to begin construction in 2007, with a total value of $64 billion (AlbertaFirst 2007, Website). The RSA includes two major oil sands producing areas: Fort McMurray and Cold Lake. EnCana FCCL Oil Sands Ltd.'s (EnCana's) Christina Lake Thermal Project, MEG's CLRP, Devon Jackfish, Petrobank Whitesands Pilot are all essentially from a third area between Fort McMurray and Cold Lake, serviced primarily from Lac La Biche. It is expected that the Project will also be serviced from Lac La Biche, although specialized services will continue to be provided from Fort McMurray, at least in the earlier years. Drilling, seismic and pipeline construction have promoted growth in servicing the oil and gas sectors in Lac La Biche, and as this oil sands production expands, it is expected that capacity to deliver services in the Lac La Biche region will also grow.

In the LSA, Lac La Biche is the regional hub for many provincial government services, several of which have satellite offices in surrounding smaller communities. Eighteen percent of Lakeland County's labour force and 34% of Lac La Biche's labour force had experience working in health and education in the year up to the 2001 census date (Statistics Canada 2002).

Aside from government services, forestry and agriculture have, until recently, been the most important economic sectors in the LSA. Lac La Biche is strategically located as the gateway to a significant portion of Al-Pac's Forest Management Agreement area (AlbertaFirst 2007, Website). Al-Pac is therefore a significant employer in the LSA.

The oil and gas sector is relatively new in the LSA, but a growing driver for the economy. Ongoing drilling and seismic and pipeline construction activities have promoted growth in local businesses servicing these activities. Several other oil sands extraction developments are either under construction, or are proposed in the southern RMWB/Lac La Biche region. These developments will add to the demand for local workers and for goods and services from local businesses.

6.4.1.2 Labour Force

Table 6.4-1 presents data on the experienced labour force by industry for 2001, the most recent year for which Statistics Canada reports data, in the LSA and RSA. The experienced labour force in the RSA in 2001 was almost 40,000, with only 1,415 of these in the LSA.

Based on 2001 census data, the industries employing the largest percentage of the RSA labour force are:

- agriculture and other resource-based industries (24%);
- other services, including tourism and government services other than health and education (22%);
- health and education (13%); and
- wholesale and retail trade (13%).

Table 6.4-1 Experienced Labour Force by Industry in the Regional Study Area and Local Study Area (2001)

Industry	LSA	RSA	% of Total RSA	Alberta	% of Total Alberta
agriculture and other resource-based industries	140	9,514	23.9	184,105	10.9
manufacturing and construction	85	5,041	12.7	264,940	15.8
wholesale and retail trade	134	5,244	13.2	258,740	15.4
finance and real estate	56	1,285	3.2	84,335	5.0
health and education	475	5,278	13.2	259,050	15.4
business services	175	4,747	11.9	316,265	18.8
other services	350	8,726	21.9	314,545	18.7
All Industries	**1,415**	**39,835**	**100**	**1,681,980**	**100**

Source: Statistics Canada (2002).

There has been a growing predominance of employment in the oil and gas sector, over the recent past and this trend is expected to continue, taking into account projects that are planned to go into construction and operation phases between now and 2010. New projects will be associated with some population growth. Thus by 2010, both the relative percentages of the labour force working in specific industries and the size of the total labour force are expected to demonstrate changes over 2001.

Participation rates represent the percentage of population aged 15 and over (the labour force) who have, or are actively trying to find, work. Unemployment rates represent the number of unemployed people as a percentage of the labour force. Table 6.4-2 summarizes the participation and unemployment rates in the RSA and LSA in 2001. Statistics Canada data are not available for Conklin or Chard; however, the RMWB estimates that the unemployment rate for Conklin is about 5% (Wendy Tremblay, Pers. Comm.).

Table 6.4-2 Labour Force Participation and Unemployment (2001)

Location	Labour Force Participation		Unemployment	
	Number	Rate	Number	Rate
Regional Study Area	**39,093**	**80.3**	**1,971**	**5.0**
RMWB	26,311	82.3	1,184	4.5
Lakeland County	2,672	73.7	120	4.5
Town of Bonnyville	3,123	71.3	228	7.3
City of Cold Lake	6,747	80.9	364	5.4
FMFN Reserve 176	37	57.1	14	37.5
FMFN Reserve 176a	58	61.1	16	27.3
Beaver Lake Reserve	145	64.4	45	31
Local Study Area	**1,511**	**66.5**	**152**	**10.1**
CPDFN Reserve	93	54.3	39	42.1
Heart Lake Reserve 167	23	35.7	n/a	n/a
Lac La Biche	1,395	68.6	113	7.5
Regional and Local Study Areas	**40,604**	**79.7**	**2,123**	**5.2**
Alberta	**1,722,270**	**73.1**	**89,558**	**5.2**

Source: Statistics Canada (2002).
n/a = Not available.

In the RSA, unemployment rates were lowest in the RMWB, Lakeland County and Cold Lake, but were very high in the Aboriginal communities for which data are available. Overall, the RSA had an unemployment rate slightly lower than Alberta. Participation rates were high in the larger communities in the RSA, reflecting a young population and good employment prospects, but lower in Aboriginal communities.

While the employment data are very limited in the LSA, there have been considerable changes within the area, related to oil sands development. In 2001, unemployment was very high on the CPDFN reserve and above the provincial average in Lac La Biche. Participation rates were lower than in the RSA. Participation and 2006 unemployment figures have not yet been released, however oil sands development in the LSA is accelerating, and there is some evidence of labour shortages (Emory 2006) which in turn drive up wages. Unemployment rates should continue to fall and participation rates (in response to good employment opportunities) continue to rise, at least through 2007. In addition, given concerted efforts on the part of government, educational institutions and the private sector to ensure that Aboriginal people see economic benefits from development, the capacity of local populations to participate in upcoming developments should increase over the short term to 2010.

This expectation is supported by the recent experience of Conklin, with a current estimated 5% unemployment rate, and more recent data for the Wood Buffalo-Cold Lake Economic Region, which may be more representative of current and near-term conditions than the 2001 census data. In 2006, the unemployment and participation rates in the Wood Buffalo-Cold Lake Economic Region were 4.4 and 75.2% respectively (AEII 2006). However, unemployment statistics can be difficult to interpret, particularly in areas such as the RSA and LSA where seasonal employment is an established pattern. In 2005 and 2006, for example, unemployment rates in the region were lower in the winter months increased in spring, declined again in summer and increased once more in fall (AEII 2006). This pattern is likely related to the seasonal nature of employment in the resource-based economic sectors. No other economic region in the province followed such a distinct seasonal employment pattern.

6.4.1.3 Traditional Economy

In addition to the wage economy, the region supports a traditional Aboriginal economy of hunting, fishing and trapping. Many people in these communities rely, at least partially, on hunting, fishing and trapping to complement other income and/or livelihood resources, including full-time or seasonal wage employment and government transfers. First Nations also hold some commercial fishing licences.

In addition to their economic contribution to households, traditional pursuits such as hunting, fishing and trapping also have high cultural significance. A discussion of existing and historic First Nation and Métis land use near the Project, as well as potential effects on this, are presented in the Traditional Land Use Assessment (Section 2).

6.4.1.4 Outlook

The economic outlook for the LSA and RSA is positive, especially due to expansion of the oil and gas sector. The total value of oil sands developments under construction in the RSA is approximately $40 billion. Table 6.4-3 provides an Alberta Employment Immigration and Industry (AEII) overview of developments under construction as of November 2007.

Table 6.4-3 Major Oil Sands Developments in the Regional Study Area

Company	Project	Location	Cost $Million	Construction Schedule
Albian Sands Energy Ltd. (Royal Dutch Shell/Chevron Canada/Marathon Oil Corp.	Muskeg River Mine Expansion (part of Alberta Oil Sands Project (AOSP))	RMWB	$5,000	2007 to 2010
Albian Sands Energy Ltd. (Royal Dutch Shell/Chevron Canada/Marathon Oil Corp.	'Jackpine' Mine Mining and Extraction Facility Phase 1	near Fort McKay	$2,000	2007
Canadian Natural Resources Ltd.	'Project Horizon' Mining and Drilling Project Phase 1	RMWB	$7,750	2005 to 2008
Canadian Natural Resources Ltd.	'Primrose East' Cyclic Steam Stimulation (CSS) Project	Lac La Biche County	$600	2007 to 2008
EnCana Corp.	SAGD Bitumen Production	Christina Lake	$575	2000 to 2009
Fort Hills Energy Corp.	'Fort Hills' Oil Sands Project and Upgrader[a]	RMWB/Sturgeon County	$15,200	2007 to 2012
OPTI Canada/Nexen Inc.	'Long Lake' SAGD Heavy Oil Project Phase 1	near Anzac	$6,100	2004 to 2008
Suncor Energy Inc.	Upgrader Expansion	RMWB	$2,100	2006 to 2008
Suncor Energy Inc.	'Firebag' Oil Sands Project Stage 3	RMWB	$1,000	2006 to 2008
Suncor Energy Services	'Voyageur Village' Administration and Support Buildings	RMWB	$160	2007 to 2009
Total			**$40,485**	**2000 to 2012**

[a] The mine is under construction and the upgrader is proposed for 2008 to 2011.

Notes: Project names in this table are cited as presented by AEII and may differ from Project names as cited by other sources.

Major Project is defined as a project involving capital expenditures of at least $5 million.

Source: AEII (2007a).

In the Christina Lake area alone, when developments currently under construction reach full production sometime around 2013, oil sands production is expected to exceed 300,000 bbl/d.

6.4.2 Project Case for Economic Effects

To estimate the economic effects of the Project on Alberta, input-output simulations were run by Alberta Finance, using MEG's most recent estimates of construction phase capital costs (for construction effects) and the annual operating cost for 2015 (for operations effects). The input-output models project the direct, indirect and induced economic benefits of "shocks" (in this case, each of the construction and operation phases of the Project). Benefits include increases to gross domestic product, total labour income, employment and government revenues.

Direct effects are those created by employment and business opportunities offered by the Project. Indirect effects are those created as businesses contracted to supply the Project hire new employees and purchase goods and services from their sub-supplying businesses. Induced economic effects occur as employees and businesses (whether directly or indirectly affected) use their new disposable income to spend more on consumer goods and services, inducing yet more employment and business opportunities as people organize to provide the consumer goods and services in response to this new demand.

There are some important limitations to the Alberta Finance models (Poole 1999; G. Howe 2008, Pers. Comm.). For example, it does not address the capability of the economy to respond to increases in economic activity in the very short term. Until enough time passes to permit economic adjustment, shocks that are large relative to a given economy can strain limited resources, cause changes in prices, and make economic impacts difficult to predict. This is, in effect, what has recently been occurring in northeastern Alberta.

The models are for Alberta as a whole, and do not disaggregate results below the level of the province, the models cannot for example be used to estimate economic effects for the RSA or LSA. For this reason, local economic effects described in the following sections are based on a more qualitative approach, as indicated in Section 6.2.5 above.

Although the Alberta Finance models report government fiscal effects for both Alberta and Canada as a whole, they do not present economic effects outside of Alberta, unlike the Statistics Canada models. There will be economic effects elsewhere in Canada, as a result of some Project goods and services being sourced outside Alberta. For this impact assessment, the Alberta Finance models were used in preference to Statistics Canada models (upon which they are based) because the Alberta Finance models include induced effects, whereas the Statistics Canada models do not. This inclusion of induced effects results in a more accurate reporting of total provincial economic effects.

In addition, the models do not capture externalities such as pollution or the building of labour force capacity over time. The models are static (results do not adjust over time), and do not capture the increased capacity (and increasing economic benefit of the Project) that the local population hopes to achieve as training and job experience is gained.

Nevertheless, the models do provide some quantitative information on potential total economic impacts. Using the models also provides a standardized, replicable method for determining potential provincial economic impacts which also, if used to analyze different shocks to the economy, permits comparisons between different projects.

While the construction phase model calculates and reports results for the entire construction phase (2010 to 2014), the operations phase model was run only for the year 2015, the first full year of production. Whereas it is possible to run the model for additional, or indeed all, years through the 25-year operations phase, both the assumptions (for example, on economic fundamentals such as labour force characteristics) and the model itself will change over time and results become more and more speculative. Tables 6.4-4 and 6.4-5 present summaries of the Alberta Finance model runs for construction and operations respectively.

Table 6.4-4 Summary of Project Construction Phase Effects, 2010 to 2014

Summary of Effects [$000's]	Gross Production [$]	Gross Domestic Product [$]	Labour Income [$]	Employment (Person-Years)
direct	4,300,000	1,391,901	1,223,676	16,140
indirect	3,860,574	1,774,180	1,179,564	18,586
Total Open (direct and indirect)	**8,160,574**	**3,166,081**	**2,403,240**	**34,726**
induced	2,165,250	1,245,075	706,005	14,796
Total Closed (direct, indirect and induced)	**10,325,824**	**4,411,156**	**3,109,245**	**49,522**

Source: Alberta Finance (2007).

Including direct, indirect and induced effects, the $4.3 billion construction expenditure is calculated to result in a $4.4 billion increase in Alberta's gross domestic product over five years, a $3.1 billion increase in labour income and over 49,000 additional person years of employment (or about an additional 10,000 jobs per year).

Table 6.4-5 Summary of Project Operations Phase Effects, 2015

Summary of Effects [$000's]	Gross Production	GDP at Basic Prices	Labour Income	Employment Jobs
direct	850,000	49,080	20,959	258
indirect	1,078,618	666,842	150,008	2,207
Total Open (direct and indirect)	**1,928,618**	**715,922**	**170,967**	**2,465**
Induced	154,037	88,575	50,226	1,053
Total Closed (direct, indirect and induced)	**2,082,655**	**804,497**	**221,193**	**3,518**

Source: Alberta Finance (2007).

Including direct, indirect and induced effects, the $850 million/year operations expenditure is calculated to result annually in an $804 million increase in Alberta's gross domestic product, a $221 million increase in labour income and over 3,500 additional person years of employment.

More detailed descriptions of these economic effects follows.

6.4.2.1 Gross Domestic Product and Labour Income Effects

Construction

Table 6.4-4 provides estimates of the direct, indirect and the induced effects of construction phase of the Project on Alberta's Gross Domestic Product (GDP) and labour income (GDP of an economy is equal to the value of total output, minus the values of intermediate inputs purchased domestically or internationally).

The Project is expected to increase GDP in Alberta by $4.4 billion and labour income by $3.1 billion over a five-year period, for averages of $0.9 and $0.6 billion per year, respectively. In this regard, construction expenditures and associated economic effects will not in fact be evenly spread across each of the five years, but peak in 2011 and 2013. It is noted that not all the $4.3 billion in construction expenditures will be spent in Alberta (it is estimated that approximately 20% will be spent elsewhere in Canada and internationally) thus the multiplier effect is larger than it appears to be from the numbers in the table (Table 6.4-4).

Operations in 2015

Table 6.4-5 provides estimates of the annual direct, indirect and induced effects of the operations phase on Alberta's GDP and labour income.

The Project is expected to increase GDP in Alberta by $804 million and labour income by $221 million in 2015. Contributions to Alberta's economy of this order of magnitude would be expected to continue over the 27 year operating life of the Project.

6.4.2.2 Construction and Operations Fiscal Effects

The results of Alberta Finance's analysis (Alberta Finance 2007) of local, provincial and federal fiscal effects of the Project are provided in Tables 6.4-6 and 6.4-7 below, for the construction and operations phases respectively. Provincial fiscal effects include personal and corporate taxes, royalties, fees and permits, property taxes, fuel taxes and sales taxes (including liquor and tobacco). Local government fiscal effects include licenses, fees and permits, property taxes and business taxes. “Local” revenues are defined as all revenues accruing to government levels below the provincial level, including towns, cities, counties and regional municipalities as appropriate.

Table 6.4-6 Project Construction Phase Government Revenues, 2010 to 2014

Summary of Taxes and Royalties [$000's]	Gross Tax Revenues [$000's]				
	Direct	**Indirect**	**Open**	**Induced**	**Total**
federal	94,027	70,873	164,900	47,141	212,041
provincial	49,750	58,014	107,764	36,942	144,706
direct taxes and royalties - business	*143,776*	*128,887*	*272,663*	*84,084*	*356,747*
federal	190,838	179,495	370,333	70,667	441,000
provincial	89,541	83,454	172,994	32,796	205,790
contributions to social insurance plans	1,194	1,647	2,841	1,759	4,600
direct taxes - persons	*281,572*	*264,596*	*546,168*	*105,222*	*651,390*
other transfers to government from persons	*19,365*	*19,587*	*38,953*	*10,898*	*49,851*
federal	51,776	52,276	104,052	34,148	138,200
provincial	67,156	54,347	121,503	54,727	176,230
local	34,549	17,036	51,585	41,268	92,853
indirect taxes	*153,482*	*123,659*	*277,140*	*130,143*	*407,283*
Total Taxes, Transfers and Royalties	**598,196**	**536,729**	**1,134,924**	**330,346**	**1,465,271**
Total Federal [(a)]	**337,878**	**304,198**	**642,076**	**153,414**	**795,216**
Total Provincial	**224,420**	**214,061**	**438,481**	**134,560**	**573,042**
Total Local	**35,897**	**18,335**	**54,233**	**42,045**	**96,278**
Total Personal Sector	**300,308**	**283,313**	**583,621**	**115,190**	**698,811**
Total Business Sector	**297,888**	**253,416**	**551,303**	**215,157**	**766,460**

[(a)] Includes Canada Pension Plan and Employment Insurance Contributions.

Source: Alberta Finance (2007).

Total gross tax revenues accruing to all levels of government as a result of the construction phase are $1,464 million over the five-year period, or an average of $293 million per year (again noting that construction expenditures will not be evenly spread across each of the five years). Most of these tax revenues go to the federal and provincial levels.

Table 6.4-7 Project Operations Phase Government Revenues, 2015

Summary of Taxes and Royalties [$000's]	Gross Tax Revenues [$000's]				
	Direct	**Indirect**	**Open**	**Induced**	**Total**
federal	34,042	17,969	52,011	3,354	55,365
provincial	18,011	125,741	143,752	2,628	146,380
direct taxes and royalties - business	*52,053*	*143,710*	*195,763*	*5,982*	*201,745*
federal	3,557	23,883	27,440	5,027	32,467
provincial	1,612	10,863	12,475	2,333	14,808
contributions to social insurance plans	17	198	214	125	339
direct taxes - persons	*5,186*	*34,943*	*40,129*	*7,486*	*47,615*

Table 6.4-7 Project Operations Phase Government Revenues, 2015 (continued)

Summary of Taxes and Royalties [$000's]	Gross Tax Revenues [$000's]				
	Direct	Indirect	Open	Induced	Total
other transfers to government from persons	*321*	*2,356*	*2,676*	*775*	*3,452*
federal	796	7,103	7,900	2,429	10,329
provincial	1,574	10,233	11,807	3,893	15,700
local	1,293	6,581	7,874	2,936	10,810
indirect taxes	*3,663*	*23,917*	*27,580*	*9,258*	*36,838*
Total Taxes, Transfers and Royalties	**61,223**	**204,926**	**266,149**	**23,501**	**289,650**
Total Federal [a]	**38,413**	**49,106**	**87,519**	**10,914**	**98,422**
Total Provincial	**21,494**	**149,022**	**170,516**	**9,573**	**180,089**
Total Local	**1,316**	**6,746**	**8,062**	**2,991**	**11,053**
Total Personal Sector	**5,498**	**37,195**	**42,692**	**8,195**	**50,887**
Total Business Sector	**55,725**	**167,731**	**223,456**	**15,306**	**238,763**

[a] Includes Canada Pension Plan and Employment Insurance Contributions.

Source: Alberta Finance (2007).

Total gross tax revenues accruing to all levels of government as a result of the operations phase are $239 million annually. Over 75% of these tax revenues go to the provincial government.

6.4.2.3 Construction and Operations Employment Effects

Construction

The on-site construction workforce is expected to vary between lows as Project construction is first mobilized and then demobilized and peaks of 1,139 persons in the first quarter of 2011 (Phase 3A) and again in the first quarter of 2013 (Phase 3B). Preliminary estimates from MEG suggest that the trade and craft construction workforce will total approximately 3,068 person years over the construction phase, with an average construction workforce of 614 person years of employment annually. The variety in levels of construction activity and of trades, and the short-term requirements for many of those trades, mean that this average figure will not reflect the workforce on site at any one time.

Total direct employment was calculated for the Project by Alberta Finance at 16,140 person years, a figure much higher than the 3,068 person years of on-site construction workers estimated by MEG. Part of this is explained by different units of analysis, on-site construction workers and staff as estimated by MEG versus total employment that includes many on- and off-site professional and support staff including full time consulting services, such as services provided by engineering companies, that the model includes in direct employment. Part of this may also be explained by model assumptions for construction inputs and outputs, which are based on more typical, and less capital intensive, construction projects across Canada. It is therefore considered likely that while total direct employment may not reach the numbers calculated by Alberta Finance, they will certainly be higher than 3,068 person years.

It is difficult to predict the number of on-site construction workers that can be recruited from people resident in the LSA and RSA. The extent of local and regional recruitment depends on many factors including Project timing, available skills, unemployment rates, participation rates and competing demands for trades and labourers once construction begins. Other projects in the region will require similar types of employees.

In addition, the size of particularly the LSA workforce is relatively small; in 2001 the unemployed numbered only 152 people and the size of the manufacturing and construction experienced workforce was only 85 people. As noted previously, the workforce characteristics in 2010 are likely to be substantially different, with more employment opportunities driving up participation rates (increasing the size of the workforce), with population growth (increasing the size of the workforce) and with gained education, training and job experience (increasing the skill base). However, Alberta's tight labour market, which is expected to continue through 2015 (Emery 2006), may mean that many potentially employable LSA and RSA residents from this growing pool will already be employed.

Given these competing forces, up to 10% of construction jobs can be filled by workers in the LSA and RSA. Some of these may be workers who had previously left to work in other parts of Alberta or elsewhere, but would now considered returning to their homes to take advantage of more local employment opportunities.

The Project will also create work for off-site construction workers in fabrication yards, mostly in the Edmonton region. Modular/equipment units will be fabricated in off-site yards, trucked to site, and erected and connected on-site. The total off-site construction work is estimated at about 300 positions. Most of this work will occur during the second quarter of 2010 to the third quarter of 2013.

Operations

MEG estimates that the total workforce during operations will be about 300 jobs (results calculated by the Alberta Finance model show a total workforce at 258 persons once the Project becomes fully operational in 2015, which, given the accuracy of the model, is a good approximation). This level of employment will continue throughout the 25-year operations phase of the Project. This includes ongoing contracting opportunities in the area of plant maintenance, wellpad and pipeline construction and well drilling.

There will also be some off-site employment created by the ongoing wellpad construction, drilling and well completions. This work includes the fabrication of equipment in production facilities in the greater Edmonton area. This employment is estimated at an average of about 40 person years of employment annually over the operational life of the Project.

Operations employment will consist of field and plant operators, maintenance trades, contractors and millwrights as well as management, office and technical support positions. Ongoing wellpad and pipeline construction will require equipment operators and metal trades, such as welders. Ongoing drilling will require drill rig workers, including roughnecks, motormen and drillers.

As with the construction phase, it is difficult to predict the extent of on-site operations work that will be filled locally. The prospects of long-term, comparatively well-paid jobs close to home may encourage the return of residents, and will likely encourage the relocation into the area of some out-of-area employees (who in effect become local employees, contributing to the tax base of local communities, spending disposable income locally). Given uncertainty about the workforce characteristics in 2015 and an expectation that as the Project moves through its operational phase over a 27-year period, the percentage of its employees that are local will increase with gained education, training and job experience, it is very provisionally estimated that on average about to 20% of the operational staff will be hired from within the LSA.

6.5 SOCIAL EFFECTS

The key question for assessing the potential social effects of the Project is:

Key Question SEPC-2: What effects could existing and approved developments and the Project have on population, services and infrastructure?

Most potential effects associated with services and infrastructure are driven by projected population growth. Initially some limited population growth may be associated with the construction phase of a project. However, population effects during construction, for projects that have on-site accommodation camps to house workers on-site, are typically small. Construction jobs are inherently short term, as trades cycle through a construction project as they are needed. Construction workers are therefore considered unlikely to move in response to any single short-term job offer. Experience with other recent developments in the area suggests out-of-area construction workers in fact do not relocate to the area (MEG 2005) in large numbers. However, even without a permanent population effect during construction, workers at the site can have short-term effects on local services and infrastructure because site-accommodated workers may leave camp to use community health, recreation and other services.

Following the construction phase, there is normally a population effect from the long-term, full-time positions created by the operations phase of a development. Some of these long-term employees may already reside in the area, and some of these will choose to move, bringing with them family members and other dependents. This change in population is usually more permanent and has a greater potential to affect services and infrastructure, however the numbers in a typical in-situ oil sands project tend to be small, given comparatively low operational workforce requirements. On-site accommodation will be provided during operations, thereby reducing the likelihood that workers will choose to relocate permanently to the LSA.

The assessment of social effects will focus on the potential changes to the LSA population during Project construction and operations and how these changes affect the level and quality of services and infrastructure offered. Although most of the population effects are expected in the LSA, the RSA is also expected to see some effects, this is noted. Effects focus on:

- population growth using trend analysis of key population growth drivers;
- traffic flows and safety;
- services including health, education and social services; and
- infrastructure including housing and municipal services.

6.5.1 Population

Existing and Approved Case for Population

The population of the RSA (excluding the LSA) was approximately 76,000 in 2006, which represents an overall population increase of 18% over the 2001 census population (Table 6.5-1). Populations grew fastest in the RMWB and Lakeland Country (now known as Lac La Biche County), which had population increases of 24.3 and 20.0% between 2001 and 2006, respectively. These growth rates were significantly higher than for Alberta as a whole, where the population rose by 10.6% during the same period. Much of the population increase in Lakeland County (as compared to Lac La Biche) has been accommodated by the recent development of rural subdivisions that are within a 20-minute drive of

Lac La Biche. In 2006, Lakeland County was considered to be the fastest growing municipality in the province, after the RMWB. Much of the population increase in the RMWB is due to increased oil sands development and the resulting demand for labour.

Table 6.5-1 Population of the Regional and Local Study Areas

Communities	Population 2001	Population 2006	Population Change [%]
RSA (excluding the LSA)			
RMWB	41,445	51,496	24.3
Lakeland County	5,306	6,365	20.0
Bonnyville	5,709	5,832	2.2
Cold Lake	11,520	11,991	4.1
Beaver Lake Reserve	390	379	-2.8
Fort McMurray First Nation Reserves	238	202	-15.1
Total RSA	**64,608**	**76,265**	**18.0**
LSA			
CPDFN Reserve	252	271	7.5
Chard	143	218	52.4
Conklin	213	338	58.7
Heart Lake Reserve 167	124	165	33.1
Lac La Biche	2,776	2,758	-0.6
Total LSA	**3,508**	**3,750**	**6.9**

Source: Statistics Canada (2002, 2007b); RMWB (2006).

Table 6.5-1 also shows very high population growth rates in three Aboriginal communities in the LSA. These communities, however, are very small (large percentage increases do not represent very large numbers of people) and have seasonally mobile populations. In addition, the RMWB census (Chard and Conklin) uses a different methodology than Statistics Canada, thus the 2001 and 2006 data are not completely comparable for these two communities. However, it is also likely that Aboriginal populations have increased in communities closest to the Christina Lake area projects over the recent past, in response to improved employment opportunities.

Alberta Employment, Immigration and Industry (AEII 2007b) has produced a population forecast for the period 2007 to 2012 for the Wood Buffalo-Cold Lake Economic Region. According to this forecast, the 2007 population of the region is 133,022. The Alberta government predicts that the population of this region will reach 159,047 by 2010, (when construction of the Project is scheduled to begin) an increase of 6.14% annually (AEII 2007).

Based on the AEII conclusions, as well as on the current and expected pace of development in the Christina Lake area, it is expected that growth rates for the RSA and LSA will exceed the current growth rates of 3.37 and 1.34% a year (2001 to 2006), respectively. On the basis of these low percentages, the population of the RSA would be in 2010 at least 87,077 and the population of the LSA at least 3,955. If, however, a higher population growth rate of 6.14% is used, the RSA population could reach 96,792 people and the LSA could reach 4,832.

Project Case for Population

Construction

The on-site workforce required for the Project, as discussed in Section 6.4.2.3, is expected to peak at about 1,139 persons in the first quarter of 2011 and again in the first quarter of 2013. For the construction workforce, it is estimated on the basis of current experience with the CLRP Pilot and Phases 2 and 2b, that about 90% of construction workers will be from outside of RSA and flown in to work rotational schedules. From within the RSA and the LSA, it is expected that workers will be bused in, or drive themselves, depending on how close they live to the work site and what their work schedules are.

Because most workers will either be accommodated at camp or will already be resident of nearby communities, and because construction jobs are generally short term, it is not expected that many construction phase workers would relocate with their families to the LSA. However, as indicated previously, large new developments do encourage people to return to their home communities in the hope of accessing new employment and other economic opportunities.

Local indirect and induced economic effects of construction are likely to include some stimulus to the local economy (for example, the hospitality and oil and gas supply industries may see increased demand). To the extent that this in turn increases demand for labour, some associated population growth may occur.

Operations

The operations phase of the Project will create ongoing employment for an estimated 300 people including on-site operations, maintenance, drilling, office and technical staff. If 20% of this new employment is of out-of-area people who relocate to the LSA, an additional 60 workers, with families, would be expected. This is considered a conservative estimate for several reasons. Out-of-area staff will not all choose to relocate to the LSA. By 2014, between training programs underway and job experience gained in the interim, more LSA residents will be enabled to join the workforce and find employment than is currently the case.

Continuing limited availability of skilled oil and gas sector operations labour in Alberta until at least 2015 (Emery 2006) is likely to result in yet more out-of-province recruitment, of people who may be even less likely to relocate, than previous experience suggests.

The average household size in Alberta is variously reported at between 2.6 and 2.9 people depending on the calculation method. Using a figure of 2.7, 60 out-of-area workers would bring a further 102 family members with them as they relocate to the LSA. The total population effect of Project operations can be estimated at about 162 persons in 2015. This population effect, specifically attributable to the Project direct employment, would be largely a one-time effect as workforce requirements will not vary significantly over the 27 years of operations.

6.5.2 Housing

Existing and Approved Case for Housing

House Ownership

Housing remains an important issue in Conklin, Chard and on the CPDFN reserve. Extended families or more than one family are often living in one house (W. Tremblay 2007, Pers. Comm.). The condition and maintenance of housing in Chard and on the CPDFN reserve have also been noted as issues by residents. Housing availability on the CPDFN reserve is particularly limited and overcrowding brings significant social costs, as adequate federal funds have not been made available to build needed new homes or to expand existing homes.

Housing demand is directly related to population growth, but is also associated with rising disposable incomes. Improved transportation infrastructure in the LSA (i.e., the paving of Secondary Highway 881) may also encourage people to relocate or return to home communities to take advantage of economic opportunities while avoiding the stresses of rotational employment on families. Increased housing demand on reserves will be particularly problematical should it in fact occur.

There are also other sources of increased housing demand in Lac La Biche County. In recent years Lac La Biche County has seen an increase in the demand for rural residential properties (J. Palmer 2007, Pers. Comm.) and this is thought to be related to an increasing number of retirees moving to the area. Developers are targeting this retiree market and building luxury condominiums around Lac la Biche Lake. People from Edmonton and Fort McMurray are also buying lake-front vacation properties around Lac la Biche.

In general, housing demand is strong in both the RSA and the LSA. Realtors have suggested that a shortage of trades people to build new housing is starting to constrain the planning of new developments (K. Ulrich 2007, Pers. Comm.).

In the Wood Buffalo Census Agglomeration (CA) housing construction is expected to slow down in 2008 (Table 6.5-2).

Table 6.5-2 Wood Buffalo Census Agglomeration Housing – New Construction

Type of Housing	2006 (actual)	2007 (forecast)	% Change 2006/2007	2008 (forecast)	% Change 2007/2008
single-detached	642	925	44.1	975	5.4
multiple	908	1,175	29.4	1,225	4.3
Total	**1,550**	**2,100**	**35.5**	**2,200**	**4.8**

Note: The CMHC uses the Census Agglomeration (CA) as its forecasting unit, which includes reserve populations, unlike Statistics Canada's data for the RMWB.

Source: CMHC (2007a).

Average house prices in the Wood Buffalo CA have more than doubled, rising from $166,000 in 2001 to $372,000 in 2006.

The value of residential building permits in Lac La Biche between 2005 and 2006 increased from over $1.7 million to almost $7.0 million, an increase of over 300%, although it is noted that the figures are for total value of permits and therefore include rising costs, in addition to rising numbers of permits. In what was then Lakeland County, during the same period, the value of residential building permits tripled from $10.6 to $33.6 million (Lac La Biche Regional Community Development Corporation 2007, Website).

In addition to housing availability, cost is of concern. Rapidly rising housing prices benefit those who may already own houses, but represent an obstacle to house ownership, particularly to those who are less able to benefit from new economic opportunities.

House prices have also gone up in the LSA. In Lac La Biche, the average house price was $99,000 in 2001 whereas the average new house price was $320,000 to $430,000 in 2007. While the prices for total housing stock and for new housing stock are not strictly comparable, a three to four fold increase in new home prices over this timeframe is not reflective of a stable housing market. Rapid recent price increases in Lac La Biche likely reflect rising costs in northeastern Alberta generally, increasing demand, the willingness of in-migrating families to pay higher prices for houses, and likely the capability of both in-migrants and current residents to pay higher prices as more and more well paid jobs are available in the area.

Increased cost of home purchase is probably pushing at least some lower income residents into rental accommodations. In Chard and Conklin there are 25 families on the Wood Buffalo Housing and Development Corporation's (WBHDC) waiting list for affordable housing. In 2005, 17 low cost housing units were built, both for sale and rental by the WBHDC in Chard and Conklin, and had a sale price of $105,000. Newly planned low cost developments are expected to cost an average of $120,000 due to rising construction, land development and servicing costs (Jessica Daymond, Pers. Comm.).

Rental Housing

Tables 6.5-3 and 6.5-4 present apartment vacancy rates and average apartment rents in the RSA. Comparing vacancy rates in the Wood Buffalo and Cold Lake CAs with other centres in the province, the total apartment vacancy rates are exceptionally low. The average rent for a two-bedroom apartment in October 2007 ranged from $902 a month in the Cold Lake CA to $2,085 a month in the Wood Buffalo CA, a difference which reflects the accelerated development of the oil sands in Wood Buffalo as compared to Cold Lake.

Table 6.5-3 Apartment Vacancy Rates in the Regional Study Area

Census Agglomeration	Bachelor		1 Bedroom		2 Bedroom		3 Bedroom		Total	
	October 2006	October 2007	October 2006	October 2007	October 2006	October 2007	October 2006	October 2007	October 2006	October 2007
Wood Buffalo	0.0	0.0	0.2	0.2	0.1	0.2	1.4	1.4	0.2	0.3
Cold Lake	11.1	0.0	5.0	0.5	3.1	2.1	0.0	0.0	3.9	1.3

Source: CMHC (2007b).

Table 6.5-4 Average Apartment Rents in the Regional Study Area

Census Agglomeration	Bachelor		1 Bedroom		2 Bedroom		3+ Bedroom		Total	
	October 2006	October 2007	October 2006	October 2007	October 2006	October 2007	October 2006	October 2007	October 2006	October 2007
Wood Buffalo	1,030	1,263	1,393	1,724	1,717	2,085	1,713	2,263	1,605	1,968
Cold Lake	548	657	702	800	758	902	789	905	732	855

Source: CMHC (2007b).

In the LSA, the overall vacancy rate has decreased from 20.4% in 1998 to 4.3% in 2007, and was less than 3% over the period 2000 to 2002 (Alberta Municipal Affairs and Housing 2007). The low rates during this period motivated local government in Lac La Biche to develop a municipal shelter plan, the implementation of which appears to have alleviated the short-term rental housing problem. In 2007, the vacancy rate in Lac La Biche was low, but was still manageable. Residential building permits in 2006 and 2007, as well as advanced planning for municipal services such as sewage and water to service new developments, suggest that local government is managing increased housing demand well.

Rental costs in Lac La Biche have increased steadily since 1998, with a particularly noticeable jump, in the order of 15 to 25% depending on the size of the property, between 2006 and 2007 (Alberta Municipal Affairs and Housing 2007). These recent price increases in Lac La Biche are likely attributable to the same forces that house prices are responding to, but may be of more concern as rentals are more used by lower income populations.

Project Case for Housing

Construction

Most Project construction workers will be housed in worker accommodation on-site and will, therefore, place little or no pressure on the housing market in the LSA. However, there may be some population movement into the area if people choose to return to home communities in response to economic opportunities due to construction and subsequent operations of the Project. To the extent that populations increase even by small margins in Aboriginal communities, housing pressures and consequent social costs can be important. In non Aboriginal communities in the LSA, essentially the Lac La Biche area, increased housing demand has been well managed by a combination of public and private sector planning and this would be expected to continue. As a result, Project construction is not expected to unduly affect housing.

Operations

During operations, the Project will increase the demand for housing in keeping with its population effect. The maximum population effect associated with the operations phase is not expected to exceed 162 persons in 60 households. Virtually all of this would occur in LSA communities and would be expected to occur early in the Project operations phase (2015 and 2016).

An increase in housing demand in the LSA of 60 units in 2015 is not large, comparatively. In 2005 alone, the latest year for which data are available, there were 60 housing starts in Lakeland County. Some relocating employees may seek out rural residential properties closer to the Project site than Lac La Biche, and some relocating employees may return to Aboriginal communities, including reserves. Nevertheless, there could be a spike in housing demand starting in 2015 as a result of the.

6.5.3 Traffic

Existing and Approved Case for Traffic

Secondary Highway 881 leads north from Lac La Biche and through Conklin, just west of the Project, providing an alternate route to Highway 63 between Lac La Biche and Fort McMurray.

Traffic travelling to the other major existing or proposed oil sands projects in the area must also travel along this section of Secondary Highway 881.

Traffic Levels

Table 6.5-5 presents the Average Annual Daily Traffic (AADT) for 2001 to 2006 for selected points along Secondary Highway 881 between Lac La Biche and Chard. Traffic volumes in the Conklin area likely increased between 2005 and 2006 as a result of the ConocoPhillips Surmont and OPTI/Nexen Long Lake Projects.

Table 6.5-5 Average Annual Daily Traffic at Selected Points on Secondary Highway 881

Location	2001	2002	2003	2004	2005	2006	% Change between 2005 and 2006
North of Alpac “K” Road	360	360	360	360	470	820	74.5
South of Conklin	220	220	220	220	240	630	162.5
North of Conklin	260	260	260	260	270	720	166.7
South of Janvier	360	360	360	360	360	640	77.8

Note: AADT values represent trips in two directions.
Source: Alberta Infrastructure and Transportation, 2007.

Current traffic volumes are expected to be higher than 2006 levels in certain stretches of the highway because road conditions have improved and oil sands projects are increasingly active. Work shift changes have created periodic high volume delays on Secondary Highway 881 north of Conklin. Increases in industry-related traffic in the area led to improvements and paving of Secondary Highway 881 north from Lac La Biche to the junction of Highway 63 in Anzac. Paving was completed in August 2006 and has improved year-round access to the LSA. Secondary Highway 881 is also now a viable alternative to Highway 63 to reach Fort McMurray.

There is concern in Conklin, Chard and the CPDFN reserve that higher traffic volumes may lead to more collisions. Between October and December 2007 there have been three traffic fatalities near the community of Chard and unreported accidents (e.g., vehicles running off the road into the ditch) occur on a regular basis (D. Cardinal 2007, Pers. Comm.). While highways with higher traffic volumes generally have lower collision rates (B. Kenny, Pers. Comm.) the absolute numbers of collisions may increase. There is also concern that some oil and gas workers leaving dry camps to patronize the bar in Conklin and then driving back to camp, will increase the possibility of alcohol-related collisions (W. Tremblay 2007, Pers. Comm.).

Growing economic activity in the area, including oil sands developments, will result in population increases. Traffic increases in the area as a whole can therefore reasonably be expected to occur. However, traffic on particular sections of roadway can vary substantially from year-to-year in response to local factors and workforce management practices of individual oil sands project developers. Oil Sands developers, including MEG, participate with local communities through the Willow Lake Traffic Working Group to identify and address traffic issues.

Project Case for Traffic

Access to the Project site for both MEG's construction and operations activities and for workers commuting from within the LSA and RSA, will be via Secondary Highway 881 from Lac La Biche to the southwest and from Highway 63 to the north.

Construction Phase

The calculation of traffic increases associated with the Project construction phase is based on the following estimates, derived from MEG experiences with earlier phases of the Project:

- 10% of construction workers will be flown to the site;
- 20% of workers will drive to the site; and
- 70% of workers will be bussed to the site.

The largest construction-phase traffic increases associated with the Project will occur on Secondary Highway 881 north of Lac La Biche in 2010 with mobilization for construction, and in the peak employment quarters in 2011 and 2013. These will be temporary. Using the estimates of 70% of construction workers travelling to and from the Project site in 25-seat buses, and a further 20% in passenger vehicles, the peak construction worker traffic effect associated with the Project is expected to total about 260 vehicle movements per day each way. In addition, heavy-haul trucks are estimated at 20 vehicle movements per day each way. Total incremental traffic count will be a maximum of 280 vehicles, that is, 560 trips. Peak travel periods are expected from 6:00 to 8:00 a.m. and 4:00 to 6:00 p.m.

In its two busiest peak activity quarters and at peak traffic times in the mornings and evenings, Project related traffic will increase along Secondary Highway 881 as compared to 2006. Total additional trips are 560 at a maximum, and 2006 trips at various points along the highway ranged from 630 to 820 in 2006. Even considering that some as yet undetermined number of trips will be made from the north (turning off at Conklin) and the balance will be made from the south (also turning off at Conklin), increases in traffic are estimated to be in the order of 20 to 40% greater at peak construction times.

The percentage increase would be less than that for the rest of the construction phase and at non rush hour times of day. Even a modest presumed increase between 2006 and 2010 would mean that the Project-related traffic increases at peak times will prove much lower than the range estimated and not all Project traffic will be on the road at the same time, or even daily. However, this does not materially affect the conclusion that traffic volume and safety concerns of communities will need to be continually addressed by MEG and other oil sands project developers, with affected communities.

Operations Phase

The largest traffic increases associated with the operations phase of the Project will occur on Secondary Highway 881 north of Lac La Biche and will be generated by passenger vehicles used by operations workers and contractors for travel to and from the Project site and trucks used by contractors and others to service Project facilities.

To estimate the impact of operations traffic, if up to 25% of operations workers drive to work (e.g., from Fort McMurray or Lac La Biche) while the balance are flown, increased worker traffic would represent an addition of approximately 75 one-way trips on Secondary Highway 881.

6.5.4 Education

Existing and Approved Case for Education

Primary and Secondary Schools

The public school system within Lac La Biche County is administered through the Northern Lights School Division (NLSD) No. 69, which has one of its three division offices in Lac La Biche. The Northland School Division (NSD) No. 61 services the public schools in Conklin and Chard. In addition, there is a francophone school, École Beausejour in Plamondon, which is administered by the East Central Francophone Education Region No. 3. Education needs of the CPDFN reserve are serviced by the Father R. Perin School (ECS-9) in Chard and by a high school administered through the CPDFN on the reserve.

Enrolment and capacity levels for schools in the LSA are provided in Table 6.5-6. Utilization rates are generally higher in Lac La Biche than in the smaller LSA communities.

Table 6.5-6 Primary and Secondary Education System

Location	School Name	Grades	Student Count				Capacity
			00/01	05/06	06/07	07/08	
Northern Lights School Division #69 (Public)							
Lac La Biche	Vera M. Welsh Elementary	ECS-3	498	458	454	450	526
	Central Elementary	4 to 5	225	236	229	250	344
	Dr. Swift Middle School	6 to 8	420	423	408	415	470
	Lac La Biche Off Campus	7 to 12	34	37	37	-	50
	Youth Assessment Centre	7 to 12	12	10	10	-	-
	J.A Williams High School	9 to 12	551	571	588	575	650
Plamondon	École Plamondon	ECS to 12	444	418	382	460	548
		subtotal	*2,184*	*2,153*	*2,108*	*2,150*	*2,658*
Northland School Division #61 (Public)							
Anzac	Anzac Community School	ECS to 6	-	115	115	95	120
Conklin	Conklin Community School	ECS to 9	45	33	33	38	100
Chard	Father R. Perin School	ECS to 9	-	95	95	88	140
		subtotal	*45*	*243*	*243*	*221*	*360*
East Central Francophone Ed Reg #3 (Public)							
Plamondon	École Beausejour	ECS to 10	128	128	158	-	-
		subtotal	*128*	*128*	*158*	-	-
First Nation Schools (Federal)							
Beaver Lake Reserve	Amisk School	ECS to 9	97	-	-	100	150
CPDFN Reserve	Chipewyan Prairie Dene High School	10 to 12	30	37	30	38	60
Heart Lake Reserve 167	Kohls School	1 to 10	49	40	40	30	50
		subtotal	*176*	*77*	*70*	*168*	*228*
Total			**`2,533**	**2,601**	**2,579**	**2,539**	**3,208**

Sources: Alberta Learning (2001, 2006, 2007); MEG (2005); NLSD (2007); R. Chernipeski (2007), Pers. Comm.; G. Hum (2007), Pers. Comm.; E. Gladieu (2007), Pers. Comm.; P. Eddy (2007), Pers. Comm.; A. Malo (2007) Pers. Comm.; E. Walsh (2007), Pers. Comm.

The Study Area schools for which capacity and utilization data are available currently have 79% utilization. Total student capacity for these schools is 3,208 and schools were operating with 2,539 enrolments.

Post Secondary

Keyano College

Keyano College believes their greatest challenge is the tremendous skill shortage of the region, province and country (Keyano College 2006). To that end, the college plans to build the Oil Sands Trades and Technology Centre, a $100 million expansion of the Clearwater Campus in Fort McMurray. In September and October 2007 Keyano College received $6.7 million for additional trades training spaces, online course spaces and faculty retention funding (D. Farkouh 2007, Pers. Comm.).

The college has focused on engaging the Aboriginal workforce through programs such as the Aboriginal Financial Management program and the Aboriginal Skills Employment Partnership. On the CPDFN reserve, the Preparation for Academic and Career Education (PACE) program was combined with the Northern Alberta Institute of Technology (NAIT) Trades in Motion program in 2006. The PACE program was delivered in the community with graduating students moving into the Trades in Motion program. The PACE component includes three months compressed training in math, English, critical reading and writing. It also covers safety training, conflict and stress management, study habits test taking and other essential skills (Keyano College 2006).

Keyano College offers courses for university accreditation, employment in the oil and gas sector, business and computer technology, health and human services, visual and performing arts and personal growth. Partnering with industry has generated expansion to three campuses, two in Fort McMurray and one in Fort Chipewyan, as well as learning centres in Fort McKay, Gregoire Lake, Conklin and CPDFN reserve. These facilities served more than 3,000 full and part-time students in 2005/06. During the same academic year, there were 1,291 Full Load Equivalent (FLE) students; this was a 2.28% decrease in enrolment over the previous year. About 34% of students were enrolled in the Trades and Heavy Industrial Division (Keyano College 2006).

Portage College

Portage College has its main campus in Lac La Biche and offers a range of programs aimed at facilitating employment in the oil and gas sector. The College is developing customized industry training to enhance the skills of the local workforce (Portage College 2006). Programs range from health and safety training (e.g., first aid, H_2S Alive, Confined Space Entry) and certificate programs in environmental monitoring and culinary arts to trades such as welding, power engineering, pipefitting and carpentry.

Portage College is currently working with industry to develop an oil and gas worker program that will have multiple exit points (e.g., labourer, worker and specialist) each with a level of certification. The Program is meant to address the recruitment and retention needs of the industry.

At the time of writing, there were over 1,000 students a year registered in Community and Industry Training programs in Portage College regional centres in Lac La Biche, Cold Lake, St. Paul and eight smaller community campuses

(K. Wahl 2007, Pers. Comm.). The college is also expanding in Cold Lake and planning to open in Bonnyville.

During the 2005/2006 academic year, Portage College had 1,044 FLEs. In addition to core programming, 988 individuals completed customized training programs or courses (Portage College 2006).

Project Case for Education

Construction

During the construction phase, the Project will not result in an important increase in the demand for education services in the LSA. Out-of-area workers will be on rotation, without families.

Operations

On the same logic as described above for the EAC, the Project's maximum population impact of 162 persons would be expected to bring no more than 50 school-aged children into school systems in the LSA in the first year of operations. As shown in Table 6.5-6, the overall system and the individual schools have surplus capacity. Nor do the colleges report current capacity constraints. The available capacity is sufficient to accommodate the increases implied in the Project Case.

6.5.5 Health Services

Existing and Approved Case for Health Services

Health services in the LSA and RSA are administered by the Northern Lights Regional Health Authority (NLRHA) and the Aspen Regional Health Authority (ARHA).

Within the NLRHA, Conklin had been served by the Margaret A. Quintel Health Centre. In the summer of 2006, however, the building was condemned. Current health services are provided by a community health nurse who visits once a week and works out of an office in an alternative building in Conklin. Patients requiring more than basic care are referred to hospitals in Lac La Biche or Fort McMurray.

The CPDFN and Chard are serviced by the Janvier Health Centre on the reserve, which is run by the First Nations and Inuit Health Branch of Health Canada. The Centre is staffed by two nurses who come from Fort McMurray every day and one doctor who comes every second Thursday. The centre operates from

8:30 a.m. to 4:30 p.m. and is open Monday to Friday. Dental care is also available three times per month. The centre is well used by Aboriginal and non-Aboriginal members of the nearby communities.

For other medical services, residents in these communities are referred to Lac La Biche or Fort McMurray, while emergency cases can be transported by ambulance or air ambulance to emergency rooms in Edmonton or Fort McMurray.

The ARHA provides services to Lac La Biche County through the William J. Cadzow Lac La Biche Healthcare Centre and two clinics; the Association Medical Clinic and the Lindsay Medical Clinic. Together the healthcare centre and clinics offer 24-hour emergency care, drugs, general care and specialized surgery. The William J. Cadzow Lac La Biche Healthcare Centre was designed to service a population twice the size of Lac La Biche County (MEG 2005) and has 23 active treatment beds and a 41 bed continuing care facility, with one respite bed. In May 2007, there were eight individuals in acute beds awaiting placement in the continuing care facility. Long-term care beds are very much needed and plans are underway to address this issue, however, implementation is several years away (G. Moerhle 2007, Pers. Comm.).

The most pressing issue in the ARHA is the low staffing levels and shortage of nurses. Portage College recently developed a diploma program in Practical Nursing, aimed primarily at students who wish to pursue a health services career locally. This initiative may help to address shortages.

In addition to the William J. Cadzow Lac La Biche Health Centre, the Lacalta Lodge provides seniors care and rehabilitation services as well as acts as an outpatient facility for the W.W. Cross Cancer Institute in Edmonton. Health services are also provided by Lac La Biche Community Health Services, which offers a variety of services including home care, mental health, occupational health and seniors programs. Although health service usage levels are below capacity, Lac La Biche County does have a higher than average injury rate as compared to the rest of the province (MEG 2005).

Project Case for Health Services

Construction

Out of area construction workers residing temporarily in the camp can potentially have a short-term and small effect on health services in the LSA. MEG will meet most health needs of its staff, with only serious medical emergencies being referred to health services in Lac La Biche or Fort McMurray if this is judged to be the most appropriate response.

MEG will provide complete first aid supplies and facilities for the Project as required by the Alberta Occupational Health and Safety Code for High Hazard Isolated Sites. Project supervisors will ensure compliance with provincial requirements and will ensure that camps and workplaces are equipped with supplies, facilities, first aid workers and services ensuring obligations are met to promptly provide first aid to workers if they suffer an injury at camp or work and to transport injured workers to medical treatment.

Operations

The operations phase of the Project is expected to bring approximately 162 additional persons to the LSA by 2015. Most of this population increase is expected to occur in Lac La Biche and health services there will see increased demand, which will be challenging particularly if staffing issues continue. Health officials in the LSA are anticipating and planning for increased demand due to current population growth.

6.5.6 Social Services

Existing and Approved Case for Social Services

Social services are provided to residents in the LSA through several mechanisms.

Many of Conklin's social services are provided not only by professionals but also by community volunteers in offices housed in the Nakewin Centre (operated by the Conklin Community Association), including the Conklin Community Resource Centre and the Community Support Office.

Under the Region 9 Northeast Alberta Child and Family Services Authority (CFSA) Community Support Services 2006 to 2009 Business Plan (CFSA 2006), strategic priorities include enhancing community capacity in Chard and Conklin. The plan explains:

> "*The provision of services for the people who reside in the smaller communities needs improvement. A priority of the CFSA is to improve access to [services that address family violence and bullying] and to help facilitate the development of accommodation options for the hard to house and the homeless.*"

Access to services to address family violence and bullying is now provided through the Community Support Office which is open 25 hours a week (P. Beaudry 2007, Pers. Comm.).

The Community Resource Centre offers a wide range of services including referrals for addictions counselling and family services, community programs, advocacy services and events for the people of Conklin, and works closely with the Conklin Community Association and the Conklin Métis Local #193. Programs such as the Senior Enhancement Program (i.e., Home Care, Meals on Wheels and Monthly Senior's Day) and National Addictions Awareness Week are co-ordinated by the Centre as well as Christmas events, the Terry Fox Run and the Annual Talent Show. Usage levels at the Community Resource Centre are high and the delivery of services depends on volunteers and continual government and industry funding to expand programs and meet the growing needs of the Conklin community (P. Beaudry 2007, Pers. Comm.). The Zone 1 Métis Nation of Alberta provides social and career services to members.

Chard is serviced through the Janvier Community Resources Centre in Chard. This Centre is also part of the Region 9 CFSA. The Centre works closely with the local community association assisting them in the implementation of programs and services such as outreach programs for youth and recreation programs.

As with the Resource Centre in Conklin, the Janvier Community Resources Centre, provides a wide variety of services to the community including a summer employment program for youth, a mother and child drop-in program and a women's wellness group. Chard and the CPDFN reserve work collaboratively on drug prevention and drug addiction programs, including an "annual roundup" for all CPDFN members and other local residents to promote a sober lifestyle. Industry has partially funded this event in the past. The vast majority of programs, events and services are delivered as a result of volunteer efforts. Both Chard and CPDFN reserve have drug counselling available from a psychologist that visits once a month and elders provide informal counselling to those that request it.

Child and Family Services in Lac La Biche are provided by the Region 7 North Central Alberta Child and Family Services Authority. This Authority operates a regional office out of Lac La Biche and manages the provision of services to children, families and other community members in the ARHA. Lac La Biche also receives funds from the Provincial Family and Community Support Services (FCSS) program. The FCSS is an 80/20 funding partnership between the Government of Alberta and local government. Through FCSS, communities design and deliver programs that are preventative in nature and enhance well-being for children, seniors and families. Priority setting and resource allocation is the responsibility of the local community.

There is an Alberta Works Contact Centre in Lac La Biche. This centre provides information and referrals for many Provincial programs including income supports, health benefits, child support services, student funding, labour market information and career development and training programs.

The Heart Lake reserve 167 is the site of a sub-office of Tribal Chiefs Child and Family Services, where child protection services are provided to Heart Lake First Nation members. Other social services are Band administered as well, including career development and income assistance programs. Beaver Lake reserve 131 also provides critical social services and a detoxification and treatment facility for drug and alcohol addiction.

Other social services in the LSA (e.g., food banks, supportive counselling, literacy programs) are offered by churches, service clubs and non-profit organizations.

Project Case for Social Services

Construction

As discussed previously for health services, some construction workers will likely already be living in the LSA and should therefore not increase the demand for social services. There may however be concern in some communities about a link between enhanced employment opportunities and substance abuse. A net increase in substance abuse would increase demand on many social services, demand over and above demand that some Aboriginal communities are currently struggling to meet. Those out of area living temporarily in camps are not expected to have an effect on social service delivery in the LSA.

Operations

In general, social service providers in Lac La Biche have managed to meet the service demands associated with population increases since 2001 and are expected to be able to meet the increases in demand for services associated with the Project during the operations period. In Chard, Conklin and the CPDFN reserve, social service delivery is more dependent on volunteer efforts, and social services are currently heavily used and struggle to obtain the sustained funding needed for medium-term planning and implementation of service delivery.

6.5.7 Emergency and Protective Service

Existing and Approved Case for Emergency and Protective Services

Fire Protection

Fire protection services in the LSA north of Lac La Biche are delivered by the volunteer fire department in Conklin, with co-ordination and additional support from the Fort McMurray Fire Department. The 911 emergency call centre in Fort McMurray dispatches the local volunteer department. Fire service calls from Conklin and Chard increased from 5 to 14 between 2003 and 2004 (RMWB 2004). The Chard volunteer fire department is currently inactive and the CPDFN reserve, currently in the process of starting up a volunteer fire department, receives support from Conklin (T. Klein 2007, Pers. Comm.). The Conklin department has 12 volunteers with equipment including a rescue truck, a tanker and a pumper truck.

Lac La Biche has a volunteer fire department that services the rural areas of Lac La Biche County in co-operation with four other volunteer fire departments in the county. Lac La Biche's volunteer fire department has 25 trained firefighters A total of 1,120 volunteers have various skill sets and certifications respond to calls from the six fire districts surrounding Lac La Biche (Austrom Consulting 2007). The town fire department has emergency response equipment, including the Jaws of Life, required to respond to motor vehicle accidents, and access to eight pumper trucks, one wildland fire truck, five water tenders, three rescue units and three command units.

Volunteer fire departments in the LSA and the Fort McMurray Fire Department will not respond to industrial fires on in-situ project sites; companies are therefore responsible for their own fire protection.

As discussed throughout this section, the population forecast is driven by the ongoing and expected construction and operation of new oil sands facilities coming into production. It would appear that staffing and service levels in the region have been keeping pace with population growth and industry expansion.

Emergency Services

Ambulance service to Conklin and Chard is from Fort McMurray. The local volunteer fire departments will also transport patients and meet an ambulance en route to Fort McMurray but due to the considerable distance, response times are over an hour. Emergency Medical Service (EMS) calls from Conklin increased from 21 to 25 between 2002 and 2003, while in Chard they declined from 17 to

14 for this same period (RMWB 2004). These patterns are not correlated with population changes and are unlikely to reflect any trends.

In Lac La Biche County emergency transport is provided by Medical Ambulance Services Inc. Lac La Biche currently has 14 EMS staff including one full-time paramedic (plus three casual paramedics) and 13 Emergency Medical Technicians (EMTs). The town has four ambulances with Advance Life Support capabilities. Air ambulance to Edmonton, in 30 minutes, is available. About 70% of call volume is related to emergencies in homes or buildings, while about 30% is related to motor vehicle accidents (F. House 2007, Pers. Comm.).

Due to high call volumes to Fort McMurray, ambulance service from Lac La Biche is often provided to in-situ projects in the LSA including the CLRP determination of whether an ambulance will be dispatched from Fort McMurray or Lac La Biche is made by the EMS operator. In 2007, the EMS operator saw an 18% increase in call volumes from these projects over the previous year (F. House 2007, Pers. Comm.). The ambulance from Lac La Biche or Fort McMurray arranges to meet the company mobile treatment units that respond directly to industrial accidents on Secondary Highway 881 to transport patients to the hospital.

The largest challenge facing EMS in Lac La Biche as a result of oil and gas activity is the county's competition with oil and gas companies for staff (F. House, Pers. Comm.). For example, oil and gas companies will pay EMTs $25 to $250 more a day than the county is able to. Oil and gas companies will share staff with the town, however EMS staff that work full time for companies are only permitted to work on a casual basis for the town. Forty-five percent of county EMS staff work for oil and gas companies on their days off (F. House 2007, Pers. Comm.).

Police Services

The RCMP detachment in Fort McMurray has a rural division that provides policing services to Conklin, Chard and the CPDFN reserve. The division has a patrol cabin in Chard that serves as a base for activities in the area. While the cabin is not staffed at all times, RCMP members use it on shift. Community police presence is low in Conklin as RCMP respond only as needed (W. Tremblay 2007, Pers. Comm.). As of 2004, the rural division had one sergeant, two corporals and 12 constables, who focused much of their efforts on the far southern portion of the RMWB (MEG 2005). At that time, most of the calls handled by the rural detachment related to property damage or break and enters. In Chard and on the CPDFN reserve, police presence has improved in recent years as the current CPDFN Chief and Council have been working with the RCMP for the benefit of the community (D. Cardinal 2007, Pers. Comm.).

Policing services for Lac La Biche County are administered out of the Lac La Biche detachment. In 2005 the detachment had one staff sergeant, two corporals and 13 constables (MEG 2005). In response to high call volumes and case loads, the detachment hired an additional five officers and it is expected that staffing needs will continue to increase in the future (R. Cunningham 2007, Pers. Comm.). Most calls handled by the detachment are related to liquor-related disturbances including assault and vandalism. About 6,000 calls per year are handled by the detachment, making it one of the busiest in the province. The Lac La Biche RCMP has indicated that they are seldom involved with workers of oil sands projects when their employers have effective workforce management policies (Cpl. Jackson 2007, Pers. Comm.; MEG 2005).

Both RCMP detachments servicing the LSA offer a variety of public awareness programs on issues ranging from workforce management policies to traffic safety and seat belt use. Some of these programs are offered in collaboration with industry operations (MEG 2005). In Lac La Biche there are also ongoing discussions (between oil and gas companies and police) regarding initiatives to prevent family violence (R. Cunningham 2007, Pers. Comm.).

Project Case for Emergency and Protective Services

Construction

Out-of-area workers residing temporarily in camps will have a short-term and limited effect on the services in the LSA. Construction workers will create some additional work for emergency and police services, most likely related to the use of alcohol and drugs.

Operations

In general, emergency, fire protection and policing service providers in the region have been meeting the service demands associated with population increases since 2001 and they are planning for the expected increases in demand for services associated with projected increased oils sands development. Increasing competition for human resources in the LSA is likely to continue in the near to medium term.

6.5.8 Municipal Services and Infrastructure

Existing and Approved Case for Municipal Services and Infrastructure

The provision of municipal infrastructure and services such as water and sewage varies among the communities in the LSA.

Conklin has electrical, telephone, natural gas services and a separate water treatment facility that makes potable water available to the community. The RMWB approved an expansion of this facility to meet increased demand in the area and construction is expected to begin in early 2008. Wastewater is collected from individual holding systems in the community and treated at the wastewater sewage lagoon. Conklin residents are competing with industry for septic service; the cost for a septic pump-out has more than doubled in the last year as a result of growing demand from oil and gas companies operating in the area (W. Tremblay 2007, Pers. Comm.). Solid waste is disposed of in Conklin's Class 2 landfill. The current level of infrastructure has limited the capacity for housing development in both Conklin and the CPDFN reserve (J. Daymond 2007, Pers. Comm.).

Chard and the CPDFN reserve have access to electricity, telephone and natural gas services. A water treatment facility was constructed in 1997 and pipes potable water to residents in Chard as well as within the reserve. Although this system has met demand, concern has been raised that as additional housing is built on the reserve to meet current demand (e.g., the Janvier Drive development; Appendix 6-III, Section 2.4.2) the system would not have sufficient capacity (MEG 2005).

A small sewage treatment facility is located in Chard and serves residents as well as some homes on the reserve.

Lac La Biche County have a complete range of municipal infrastructure including electricity, telephone, natural gas, treated water, sewage systems and solid waster collection and disposal.

The community of Plamondon in Lac La Biche County and various subdivisions around the town of Lac La Biche have been connected to water and sewage lines. The sewage treatment facility has capacity for 7,000 residents and in 2005 served about 3,000 (MEG 2005). The connection of subdivisions and Plamondon to the sewage system has increased the number of users but there is still unused capacity. An expansion to the drinking water treatment plant was completed in

August 2004 and can service 8,000 residents in the town. The town's wastewater is pumped to a facility at Field Lake. The initial license issued by Alberta Environment to operate the facility will need to be renewed in 2008. To protect Lac la Biche Lake, the Field Lake lagoon system will have to be replaced or upgraded (Austrom Consulting 2007). A major capital investment will be required for both options and the current rates charged by the town for water and wastewater service will not cover the cost, which is estimated to be between \$22 and \$50 million (Austrom Consulting 2007). A feasibility study is currently underway.

Lac La Biche County leases the land for the Beaver Lake Modified Class II Landfill and Lac La Biche acts as operator. The Lakeland Regional Waste Management Services Commission was created to secure and develop a site for a regional landfill to replace all six landfills in Lac La Biche County. Alberta Environment will provide some level of funding for the development of the regional landfill and transfer stations; however, there are some costs that will have to be covered locally (Austrom Consulting 2007).

In 2005, the RMWB submitted a business case to the provincial government to provide a comprehensive overview of what the region had identified as urgent public infrastructure needs. The document was meant to justify provincial funding of \$1.2 billion in capital infrastructure projects including water, waste water, road and recreation facilities (\$353 million). The Athabasca Regional Issues Working Group has tracked provincial funding that has been allocated to the RMWB since the submission of the business case. As of October 2007, a total of \$239 million in provincial funding has been announced for water and waste water treatment.

Project Case for Municipal Services and Infrastructure

Construction

Construction activities are not expected to affect municipal services in the LSA. The construction activity itself will not depend on municipal services. MEG's on-site facilities will include services and infrastructure to meet the construction activity needs such as water and power supply, sewage treatment etc.

Operations

No direct impacts to municipal services are expected during the Project's operations phase. As for construction, MEG facilities will include services and infrastructure to meet Project needs. The operations phase of the Project is expected to bring a maximum of 162 persons to the LSA by 2015. In general, municipalities and service providers in the LSA have been meeting the demands associated with population increases since 2001 and they are expected to be able to meet the increases in demand for services associated future population growth. With the identification of priority areas for future municipal service capacity, the amalgamated municipality of Lac La Biche County is expected to develop excess capacity in most of its municipal services.

Effects on municipal services are expected to be similar to the effects experienced in recent years from sustained population growth, effects which are generally being met by municipalities. Lac La Biche County has identified priority areas for future municipal service capacity, including a regional landfill, and upgraded storm and wastewater systems.

6.5.9 Recreation

Existing and Approved Case for Recreation

There are a variety of recreational opportunities in the LSA, including hunting, fishing, camping, All-Terrain Vehicle (ATV) use, snowmobiling, hiking and boating on and near the many lakes in the LSA including Christina Lake, Winefred Lake, Grist Lake and Lac la Biche. Christina Lake, Winefred Lake and Grist Lake all have lodges and are the major recreational destinations closest to the Project. Hunting and fishing also provides employment for local guides and outfitters. An assessment of impacts on resource use (i.e., hunting, trapping, non-consumptive recreation) is presented in Section 3. In Conklin there is the Christina Lake day use area, a public baseball diamond and gymnasium space in the Nakewin Centre.

Lac La Biche owns and operates an arena, a community hall and sport fields located in the town. Lac La Biche County provides a community facilities co-ordinator who is responsible for planning leisure and cultural services within county boundaries. Within Lac La Biche County there are numerous recreational groups and the county and the town have a history of working together to support these groups with funding for operating facilities or for capital projects. The town and county are working with the Lakeland Interpretive Centre and Regional Leisure Complex Society to develop a facility that will provide interpretive and education programs, community services, social and leisure space, indoor sports and retail services. With high rural residential development throughout the county, there is recognition that the need for recreational opportunities is increasing. In 2003, a Recreation Service Delivery Strategy was completed and the county is developing an “Open Space Master Plan”.

There is ample opportunity for outdoor recreation near Lac La Biche. Activities include camping at Lakeland Provincial Park and Sir Winston Churchill Provincial Park, hiking, fishing, bird watching, cross-country skiing and golf.

Project Case for Recreation

Construction

There may be some increase in recreational facility usage during construction, however, effects would be temporary and limited by the remoteness of the Project and its proposed rotational schedules since most workers will work 12 hours every day during their on rotation.

Operations

The operational workforce expected to move to the area are not anticipated to put a strain on facilities, particularly in consideration of plans for a regional recreation complex in Lac La Biche.

6.6 PLANNED DEVELOPMENT CASE

The key question for assessing the potential effects of planned developments is:

Key Question SEPDC-1: What effects could existing and approved developments, the Project and planned developments have on socio-economics in the Study Areas?

The PDC includes developments that are proposed, but not yet approved in the RMWB and Lac La Biche County. These projects would likely draw from the communities within Lac La Biche County and would rely on the same pool of workers, supplies and services as the Project.

The total estimated capital costs of identified PDC developments is $152 billion. Available information on PDC developments are presented in Table 6.7-1.

Table 6.7-1 Major Projects in the Socio-Economic Study Areas

Type of Project	Number of Projects		Total Cost [$Millions]		Range of Proposed Construction Schedules	
	RSA	LSA	RSA	LSA	RSA	LSA
infrastructure	12	1	1,523.8	12.1	2006 to 2013	2006 to 2007
institutional	9	0	244.3	0	2006 to 2009	n/a
mining	3	0	185.6	0	-	n/a
oil sands	31	3	79,082.0	2,025.0	2000 to 2012	2000 to 2009
pipelines	11	0[a]	67,868.0	0	2006 to 2010	n/a
residential	18	1	937.6	5.7	2006 to 2008	n/a
recreation	3	0	212.0	0	2006 to 2008	-
Total	**87**	**5**	**150,053.3**	**2,042.8**	**2006 to 2013**	**2000 to 2009**

[a] Pipelines may pass through the LSA.

n/a = Not applicable.

- = Information not provided.

Source: Alberta Employment Immigration and Industry, Inventory of Major Alberta Projects, November 2007.

Major projects in the LSA are:

- completion of paving of Secondary Highway 881 north and south of Conklin ($12.1 million);
- Devon Canada Corp. Jackfish SAGD Oil Sands Project Phase 2 (construction planned to begin in the third quarter of 2008) ($600.0 million);
- EnCana Corp. Christina Lake Thermal Project under construction until 2009 ($575.0 million);
- the proposed StatoilHydro Canada Kai Kos Dehseh SAGD Project near Conklin ($850.0 million); and
- proposed affordable housing unit development in Conklin and Chard by the Wood Buffalo Housing and Development Corporation ($5.7 million however this figure also includes development in Anzac and Fort Chipewyan as well).

Additionally, as listed in Volume 2, Section 5, there are many other developments in the RSA that have been publicly disclosed.

Many of the potential socio-economic effects identified in this assessment have necessarily been discussed in general terms. Extending this assessment to cover effects of the PDC must also be a fairly theoretical exercise. The following description of potential PDC effects is therefore constrained in scope to relatively broad observations.

Potential cumulative socio-economic effects from the PDC will be both negative and positive. The creation of well paid construction and operations related employment, some of which will go to LSA and RSA workers and some of which may encourage departed people to return to their home communities is a benefit overall, to individuals and to their families. In addition, increased population, higher disposable incomes and increased opportunities for developing businesses to supply the oil sands sector will all contribute to economic growth and diversification in the LSA as a whole.

With time, there should be increased synergies among oil sands developers with regard to planning and implementing education, training and employment programs with local education authorities, stimulating diversification and growth of local businesses and co-ordination on such issues as traffic. This represents efficiencies in achieving the objective of enhancing economic benefits common to oil sands projects, particularly for Aboriginal populations. As experience with meeting requirements for the Project and others in the LSA and the RSA grow, capacity of workers and businesses to access and realize economic benefits will be further enhanced. It is noted that increased capacity can be put to use in other parts of the economy as well.

There will be increased property taxes payable as a result of the planned developments, including as a result of indirect and induced effects on employment and businesses. In addition, there will be incremental provincial revenues from the planned developments and their employees. Increased government revenues can be used to respond to expected increases in population and wealth, and government services for all improved.

Finally, in general, economic development in the oil sands is increasingly being planned in a context of improved understanding of effects, respect for Aboriginal culture, community self determination, sharing of industry learning and resources and improvement of government services – the capacity to ensure that non-renewable resource extraction benefits local communities increases with every project proposed and developed.

There is also potential for negative cumulative effects. There is, in the longer term, a limit to how much land can be released to development, how much population can increases in response and how many alternative economic activities can become available without effects on traditional resources, activities and values.

As population and incomes increase, so will demands on municipal services and infrastructure as new residents move to the LSA. Although property taxes will pay for services and current planning is adequate to meet forecast needs over the medium term, the study area populations will continue to grow comparatively quickly.

There will be increasing demand for housing as new residents move to LSA. To date, the private and public sector responses have been adequate; however, there is a growing concern regarding affordable housing and some evidence that the tight labour market is constraining building;

Traffic volumes can be with expected to continue to grow, creating delay and more importantly safety concerns, particularly on Secondary Highway 881, which has recently been improved and projected traffic flows well within increased capacity,

In the LSA and RSA, and the province as a whole, PDC developments can be expected to create additional demand for construction workers and supplies. This will contribute to current and anticipated labour shortages, potential increases in construction costs and possible delays not only to developments themselves, but to all other sectors of the economy.

6.7 MONITORING

Socio-economic monitoring is necessary to establish trends in community wellness so that problems that may be related to the Project, or those the Project can effectively address, can be identified. The primary objectives of socio-economic monitoring are:

- Record the uptake of employment, business, education and training opportunities over time and to analyze the trends in this uptake in relation to expectations.
- Monitor the implementation of education, training, traffic and other mitigation and benefit enhancement initiatives.
- Monitoring will generate the information MEG, government and the affected people will need to adjust implementation as socio-economic mitigation and enhancement proceeds. Regular monitoring allows problems and successes to be identified, and this information can then be used to improve implementation of agreed initiatives.
- MEG's community relations and other management staff will informally monitor the day-to-day implementation of socio-economic mitigation and benefit enhancement measures in the course of management and administration of their relationship with the Project workforce, the affected people and their leadership and partner organizations. By

giving the workforce and the affected people access to MEG's management, concerns can be identified as they evolve. In addition, more formal monitoring systems (including consultation events), and documenting of results, are also required.

- MEG's operations will provide monitoring data on the initiatives described in this document. Such operational records will include human resource activities and patterns of Project expenditures. In this regard, MEG undertakes to:
  - maintain, where practicable, full human resource records in a form that will permit an annual roll-up of selection, employment, promotion, training and exit statistics on the workforce by residence, ethnicity, gender, level and field as a percentage of the total workforce;
  - maintain procurement records in a form that will permit an annual roll-up of the number, value and general content of contracts for goods and services by supplier location and ownership as a percentage of total procurement;
  - request major contractors and subcontractors to provide annual reports documenting employment and business information;
  - maintain health and safety, accident, workforce behaviour and other relevant records pertaining to events that occur in direct relation to Project operations;
  - maintain records on all formal consultations, meetings and grievance and dispute events with the public, leadership, partner organizations, the Project workforce, contractors and advisory bodies to the Project, noting attendance, issues raised and resolutions;
  - undertake periodic review of the results of the above to identify any systematic successes or failures; and
  - maintain records on all funding and other inputs provided to community and/or partner organizations.

Ongoing consultation throughout the life of the Project serves multiple purposes, but is also in large part a monitoring mechanism. Consultation provides qualitative information necessary to understand effects that may be, at the Project outset, difficult to identify with any certainty. MEG has planned consultation and information disclosure to provide people with the information needed to participate in project related discussions from an informed position. Intended mechanisms include:

- public meetings with the affected community stakeholders twice annually, and at additional times as requested;

- meetings with population subgroups as appropriate, for example with elders or women to address issues that may be of particular interest;
- participation in local and regional initiatives and organizations with mandates to manage potential effects of oil sands developments in the region;
- distribution of information on Project progress and events of interest, as well as dissemination of other Project information through various media;
- provision of training to all relevant management and supervisory staff on communication with employees and communities, such that they are able to constructively engage people they meet on a day to day basis; and
- fostering of a workplace environment that facilitates employee input without fear of misunderstanding or retribution, including having comment boxes and/or worker feedback meetings for example.

MEG intends to communicate the results of this monitoring internally to management and to the workforce as appropriate, such that the information can be used to adjust policies, procedures, mitigation and enhancement measures and behaviours where deemed necessary. Results will also be discussed with nearby populations, as part of ongoing consultation and information exchange on the Project.

6.8 CONCLUSIONS

The Project will contribute to economic growth in Alberta, including to the GDP, employment, income and government revenues. The construction phase effects are greater, but temporary, while the operations phase effects will endure for 27 years. MEG's initiatives are intended to encourage and facilitate the participation of Aboriginal populations in the LSA, including in Conklin, Chard, the CPDFN reserve and the Heart Lake reserve, as well as Aboriginals living elsewhere in the LSA and RSA. These initiatives should enable these populations to see Project benefits as well. There are, however, at least short-term constraints as a result of generally poorer educational levels, little job experience among the currently unemployed and community and individual social challenges among Aboriginal populations that will take some time to overcome. Further, the LSA currently has a small population relative to workforce requirements of large projects, thus it must be expected that Project benefits will leak into the RSA, the rest of the Alberta economy and beyond for lack of local capacity to meet demands for labour, goods and services.

The anticipated population growth resulting from the Project is comparatively small relative to both the EAC and the PDC, but has some potential to put pressure on selected elements of social and physical infrastructure and services, particularly in the smaller communities such as Chard, Conklin and the CPDFN reserve if economic growth encourages in migration. Affordable housing, traffic volumes and safety and competition for labour and services will likely prove challenging over the near to medium term.

6.9 REFERENCES

AFRD (Alberta Agriculture, Food and Rural Development). 2001a. 2001 Agricultural Profile Lakeland County. Edmonton, AB.

AFRD. 2001b. 2001 Agricultural Profile North East Region. Edmonton, AB.

AEII (Alberta Employment, Immigration and Industry). 2006. 2006 Annual Alberta Regional Labour Market Review. Edmonton, AB.

AEII. 2007a. Inventory of Major Alberta Projects, November 2007. Alberta Employment, Immigration and Industry, Strategic Services and Information Division. Edmonton, AB.

AEII. 2007b. Alberta Regional Population Outlook 2007-2012. Edmonton, AB.

AENV. 2008. Final Terms of Reference Environmental Impact Assessment (EIA) Report for the MEG Energy Corp. Christina Lake Regional Lake Project – Phase 3. Alberta. Issued by Alberta Environment.

Alberta Finance. 2007. Special Tabulation. Edmonton, AB.

Alberta Forest Products Association and Alberta Sustainable Resources Development (ASRD). 2005. Economic Impact of the Alberta Forest Industry. ASRD. Edmonton, AB.

Alberta Infrastructure and Transportation. 2007. Alberta Highways 1 to 986 traffic Volume History 1997-2006. Alberta Infrastructure and Transportation, Program Management Branch. Edmonton, AB.

Alberta Infrastructure. 2000. School Facility Evaluation Project. Alberta Infrastructure School Facilities Branch. Edmonton, AB.

Alberta Learning. 2001. Student Population by Grade, School and Authority 2000/01. Alberta Learning. Edmonton, AB.

Alberta Learning. 2006. Student Population by Grade, School and Authority 2005/06. Alberta Learning. Edmonton, AB.

Alberta Learning. 2007. Student Population by Grade, School and Authority 2006/07. Alberta Learning. Edmonton, AB.

Alberta Municipal Affairs and Housing. 2007. Alberta Apartment Vacancy and Rental Cost Survey 2007. Edmonton, AB.

Alberta Seniors and Community Supports. 2007. 2006 Apartment Vacancy and Rental Cost Survey. Alberta Seniors and Community Supports, Housing Services Division. Edmonton, AB.

Austrom Consulting Ltd. 2007. Town of Lac La Biche and Lakeland County Amalgamation Study. Austrom Consulting. Bawlf, AB.

CFSA (Region 9 Northeast Alberta Child and Family Services Authority). 2006. 2006-2009 Business Plan. Fort McMurray, AB.

CMHC (Canadian Mortgage and Housing Corporation). 2007a. Housing Market Outlook Prairie Region Highlights Fourth Quarter 2007. Ottawa, ON.

CMHC. 2007b. Rental Market Report Alberta Highlights Fall 2007. Ottawa, ON.

Emery, J.C. Herbert. 2006. Alberta's Labour Market Needs to 2015. Institute for Sustainable Energy, Environment and Economy (ISEEE), University of Calgary. Calgary, AB.

Government of Alberta. 2006. Occupational Health and Safety Act, Occupational Health and Safety Code. Government of Alberta Human Resources and Employment. Edmonton, AB.

Keyano College. 2006. Keyano College Annual Report 2006. Fort McMurray, AB.

MEG (MEG Energy Corp.). 2005. Application for the Approval of the Christina Lake Regional Project, Vol. 5, Human Environment. MEG Energy Corp. Calgary, AB.

NLSD (Northern Lights School Division #69). 2007. Area Capacity and Utilization Report. Bonnyville, AB.

Poole, E. 1999. A Guide to Using the Input-Output Model of Statistics Canada, Statistics Canada offprint, no. 58-E.

Portage College. 2006. 2006 Portage College Annual Report. Lac La Biche, AB.

RMWB (Rural Municipality of Wood Buffalo). 2004. RMWB Fire/EMS Statistical Report 2002/2003/2004.

RMWB. 2006. Planning and Development Department, Census 2006, Fort McMurray. 58 pp.

Statistics Canada. 2002. 2001 Community Profiles. Released June 27, 2002. Last modified: 2005-11-30. Statistics Canada Catalogue no. 93F0053XIE. Ottawa, ON.

Statistics Canada. 2007a. 2006 Census of Agriculture Farm Data and Farm Operator Data. Last Modified 2007-05-16. Ottawa, ON.

Statistics Canada. 2007b. 2006 Community Profiles. 2006 Census, released March 13, 2007. Statistics Canada Catalogue no. 92-591-XWE. Ottawa, ON.

6.9.1 Personal Communications

Alberta Office of Traffic Safety. 2007. Email and telephone communications with Bethany Beale (Golder) on December 14 and 17, 2007.

Beaudry, Peggy (Conklin Community Resources Centre). 2007. Telephone communication with Bethany Beale (Golder) on November 23, 2007.

Cardinal, Delores (Community Resource Worker, Janvier Community Resource Centre). Telephone communication with Bethany Beale (Golder) on December 20, 2007.

Chernipeski, Randy (Principal of Father R. Perin School). 2007. Telephone communication with Santiago Olmos (Golder) on November 27, 2007.

Cunningham, Rob (Lac La Biche RCMP Detachment). 2007. Telephone communication with Santiago Olmos (Golder) on November 28, 2007.

Daymond, Jessica (Wood Buffalo Housing and Development Corporation. 2007. Telephone communication with Bethany Beale (Golder) on November 22, 2007.

Eddy, Paul (Principal of Anzac Community School). 2007. Telephone communication with Santiago Olmos (Golder) on November 28, 2007.

Farkouh, Dianne (Athabasca Regional Issues Working Group). 2007. Email and telephone communications with Bethany Beale (Golder) on November 21 and 23, 2007.

Gladieu, Elvina (Administrator at Amisk Community School). 2007. Telephone communication with Santiago Olmos (Golder) on November 23, 2007.

House, Floyd (EMS Operator). 2007. Telephone communication with Bethany Beale (Golder) on July 11, 2007 and December 19, 2007.

Howe, Gary (Alberta Finance Statistics). 2008. Telephone communication with Susan Ross (Golder) on December 19, 2007 and January 21, 2008.

Hum, Gordon (Principal of Chipewyan Prairie Dene High School). 2007. Telephone communication with Santiago Olmos (Golder) on November 27, 2007.

Jackson, Cpl. (Lac La Biche RCMP). 2007. Telephone communication with Linda Havers (Golder) on April 11, 2007.

Kenny, Bill (Geometrics Standards Specialist, Alberta Infrastructure and Transportation). 2007. Telephone communication with Bethany Beale (Golder) on December 18, 2007.

Klein, Tom (Rural Coordinator, Fort McMurray Fire Department). 2007. Telephone communication with Bethany Beale on December 19, 2007.

Malo, Aurele (Principal of J.A. Williams High School). 2007. Telephone communication with Santiago Olmos (Golder) on November 22, 2007.

Moehrle, Gisland (William J. Cadzoe Health Centre, Lac La Biche). 2007. Personal communication with Bethany Beale (Golder) on July 17, 2007.

Palmer, Jane. 2007. Telephone conversation with Bethany Beale (Golder) on November 21, 2007.

Tremblay, Wendy (RMWB office, Conklin). 2007. Telephone communication with Bethany Beale (Golder) on November 20, 2007.

Ulrich, Kerry (Remax Agent, Lac La Biche). 2007. Personal Communication with Linda Havers (Golder Associates). Initially contacted April 11, 2007.

Wahl, Kevin (Dean, Community and Industry Training Initiative, Portage College). 2007. Email communication with Santiago Olmos (Golder) on December 7, 2007.

Walsh, Ernest (Principal of Conklin Community School). 2007. Telephone communication with Santiago Olmos (Golder) on November 26, 2007.

6.9.2 Internet Sources

AlbertaFirst. 2007. Community Profile of Regional Municipality of Wood Buffalo. Available at http://www.albertafirst.com/profiles/statspack/20699.html. Accessed December 2007.

Lac La Biche Regional Community Development Corporation. 2007. Building Permits. Available at http://www.laclabicheregion.ab.ca/index.php?id=84. Accessed December 2007.

Long Lake Project. 2007. Highway 881 Traffic Report June to December 2007. Available at: http://www.longlake.ca/traffic/traffic3.asp. Accessed December 2007.

GLOSSARY

3D Seismic	A remote sensing tool that uses sound waves to image the subsurface.
Abiotic	Non-living factors that influence an ecosystem, such as climate, geology and soil characteristics.
Aboriginal People	The descendents of the original inhabitants of Canada. Pursuant to the Canadian Constitution Act, 1982, and Schedule B of the Canada Act, 1982, (Chapter 11, Section 35) Aboriginal peoples includes the Indian, Inuit and Métis peoples of Canada. The Constitution does not define membership in individual groups.
Abscission	The separation of part of a plant from the main plant body - most commonly, the falling of leaves or the dropping of fruit.
Acid Cation	Hydrogen ion or metal ion that can hydrolyse water to produce hydrogen ions (e.g., ionic forms of aluminum, manganese and iron).
Acid Neutralizing Capacity (ANC)	The equivalent capacity of a solution to neutralize strong acids. Acid Neutralizing Capacity can be calculated as the difference between non-marine base cations and strong anions.
Acid Pulse	Acid pulse (or episodic acidification) refers to a rapid drop in pH in surface waters over a short period.
Acidification	The decrease of acid neutralizing capacity in water, or base saturation in soil, caused by natural or anthropogenic processes. Acidification is exhibited as the lowering of pH.
Acidophillic	Acid loving, as in a plant which prefers acidic soils
Admixing	The dilution of topsoil with subsoil, spoil or waste material, with the result that topsoil quality is reduced. Admixing can result in adverse changes in topsoil texture, poor soil aggregation and structure, loss of organic matter and decrease in friability.
Aeolian	Sedimentary deposits arranged by wind, such as sand, silt and other loose substrates in dunes.
Air Shed	The geographic area requiring unified management to achieve air pollution control.

Albedo The ratio of reflected solar radiation to the total incoming solar radiation received at the surface.

Alberta Ambient Air Quality Guidelines A document established under Section 14 of the Environmental Protection and Enhancement Act (EPEA). The guidelines are part of the Alberta air quality management system.

Alberta Ambient Air Quality Objective (AAAQO) Alberta Ambient Air Quality Objectives are guidelines established for release of air compounds. The AAAQOs form an integral part of the management of air quality in the province and are used for reporting the state of the environment, establishing approval conditions, evaluating proposed facilities with air emissions, assessing compliance near major air emission sources and guiding monitoring programs.

Alberta Energy and Utilities Board (EUB) An independent, quasi-judicial agency of the Government of Alberta, the EUB was created in February 1995 by the amalgamation of the Energy Resources Conservation Board and the Public Utilities Board. The purpose of the EUB is to ensure that the discovery, development, and delivery of Alberta's resources take place in a manner that is fair, responsible and in the public interest.

Effective January 1, 2008, the Alberta Energy and Utilities Board (EUB) has been realigned into two separate regulatory bodies:

- the Energy Resources Conservation Board (ERCB), which regulates the oil and gas industry, and
- the Alberta Utilities Commission (AUC), which regulates the utilities industry.

Alberta Environment (AENV) Provincial ministry that looks after the following: establishes policies, legislation, plans, guidelines and standards for environmental management and protection; allocates resources through approvals, dispositions and licenses and enforces those decisions; ensure water infrastructure and equipment are maintained and operated effectively; and prevents, reduces and mitigates floods, droughts, emergency spills and other pollution-related incidents.

Alberta Surface Water Quality Objectives (ASWQO) Numerical concentrations or narrative statements established to support and protect the designated uses of water. These are minimum levels of quality, developed for Alberta watersheds, below which no waterbody is permitted to deteriorate.

Alberta Sustainable Resource Development (ASRD)	Alberta Ministry responsible for administering the development of Alberta's forests, public lands, and fish and wildlife resources.
Alberta Vegetation Inventory (AVI) (AEO 1991)	A GIS mapping system and digital forest inventory. It includes tree species, height, canopy closure, stand age, site conditions. and non-commercial vegetated and nonvegetated cover types.
Alberta Wetlands Inventory (AWI)	A digital wetlands inventory and GIS mapping system that includes wetlands class, amount of vegetation cover, presence or absence of permafrost, presence or absence of internal lawns, and internal lawn and vegetation cover type.
Alkalinity	A measure of water's capacity to neutralize an acid, expressed as an equivalent of calcium carbonate It indicates the presence of carbonates, bicarbonates and hydroxides and less significantly, borates, silicates, phosphates and organic substances.
Alleles/Allelic Diversity	One member of a pair or series of genes that occupy a specific position on a specific chromosome/the variety, distribution and abundance of different alleles within a population.
Alluvial	Soil or earth material which has been deposited by running water, as in a riverbed, floodplain, or delta.
Ambient Noise	The pre-existing sound environment of a location, before the introduction of, or in absence of, noise from a specific source which also affects the sound environment of that location.
Ambient Sound Level	Background sound level: the sound level that is present in the acoustic environment of a defined area. Ambient sound can include sources from transportation equipment, animals and nature.
Anchor Ice	A sheet of ice that adheres on the bottom of streams or channels when water flows on top of it.
Anion	A negatively charged ion.
Anthropogenic	Pertaining to the influence of human activities.
Aquiclude	An impermeable stratum or material that acts as a barrier to the flow of groundwater.

Aquifer	A body of rock or soil that contains sufficient amounts of saturated permeable material to yield economic quantities of water to wells or springs.
Aquitard	A material of very low permeability between aquifers.
ArcGIS	An integrated collection of Geographic Information System (GIS) software products for building a complete GIS. ArcGIS enables users to deploy GIS functionality wherever it is needed in desktops, servers, or custom applications; over the Web; or in the field.
Argillaceous	Applied to rocks or substances composed of clay minerals, or having a notable proportion of clay in their composition.
Artesian	A condition in a confined aquifer when the water level of a well that penetrates the unit is above the ground surface. A well drilled into such a unit would flow without requiring a pump.
Aspect	Aspect is the orientation of a slope by compass points and indicates if a slope is exposed to the north, south, east or west or any point between.
At Risk	Any species known to be 'At Risk' after formal detailed status assessment and designation as 'Endangered' or 'Threatened' in Alberta.
Attenuation (Noise)	The process by which a compound is reduced in concentration over time, through adsorption, degradation, dilution and/or transformation. A reduction or diminishing of noise level.
B Horizon	A subsoil horizon characterized by one of: (1) an enrichment of clay, iron and aluminum, or humus (Bt or Bf); (2) a prismatic or columnar structure that exhibits pronounced coatings or stainings associated with significant amounts exchangeable sodium (Bn or Bnt); (3) an alteration by hydrolysis, reduction or oxidation to give a change of colour or structure from the horizons above or below, or both (Bm).
Background	An area not influenced by chemicals released from the site under evaluation.
Bankfull Depth	The maximum depth of a channel within a riffle segment when flowing at a bank-full discharge.

Bankfull Width The width of the stream, measured at the water surface elevation corresponding to the bankfull discharge. For undisturbed streams with a wide floodplain, this is equivalent to channel width.

Basal Water Sands A water-saturated sand unit occurring at the lowest portion of a stratigraphic unit.

Base Cation An alkali or alkaline earth metal cation (Ca2+, Mg2+, K+, Na+).

Baseline A surveyed or predicted condition that serves as a reference point to which later surveys are coordinated or correlated.

Basic Sound Level The allowable sound level at a residential location, as defined by the current Alberta Energy and Utilities Board (EUB) Directive 038 with the inclusion of industrial presence based upon dwelling unit density and proximity to transportation noise sources.

Basin A geographic area drained by a single major stream; consists of a drainage system comprised of streams and often natural or man-made lakes.

Bed Slope The inclination of the river channel bottom.

Bedrock The body of rock that underlies gravel, soil or other surficial material.

Benthic Invertebrates Invertebrate organisms living at, in or in association with the bottom (benthic) substrate of lakes, ponds and streams.

Berm Containment wall or barrier, usually constructed from clay, but can also be cement or other man-made, impermeable material (also called dikes).

Bins Sub-divisions of wildlife Resource Selection Function (RSF) model output values.

Bioconcentration A process where there is a net accumulation of a chemical directly from an exposure medium into an organism.

Biodiversity The variety of plant and animal life in a particular habitat (e.g., plant community or a country). It includes all levels of organization, from genes to landscapes, and the ecological processes through which these levels are connected.

Biodiversity Ranking	The relative contribution of an ecosite phase/wetlands type to the overall biological diversity of an area.
Biotic	The living organisms in an ecosystem.
Bioturbation	The disruption and mixing of sand and mud by animals such as worms, that live at or near the sediment water interface. Bioturbation is sometimes an indicator of the salinity of the water body that the sediment was deposited in.
Bitumen	A highly viscous, tarry, black hydrocarbon material having an API gravity of about 9 (specific gravity about 1.0). It is a complex mixture of organic compounds. Carbon accounts for 80 to 85% of the elemental composition of bitumen, hydrogen 10%, sulphur 5% and nitrogen, oxygen and trace elements form the remainder.
Bog	Sphagnum or forest peat materials formed in an ombrotrophic environment due to the slightly elevated nature of the bog, which tends to disassociate it from the nutrient-rich groundwater or surrounding mineral soils. Characterized by a level, raised or sloping peat surface with hollows and hummocks. Mineral-poor, acidic and peat-forming wetlands that receives water only from precipitation.
Borden Block	Map units of 10' latitude by 10' longitude used to facilitate site designation.
Boreal Forest	The northern hemisphere, circumpolar, tundra forest type consisting primarily of black spruce and white spruce with balsam fir, birch and aspen.
Boreholes	A hole advanced into the ground by means of a drilling rig.
Borrow Pit	A bank or pit from which sand or clay is taken for use in filling or embanking. Often used in the construction of roads.
Bowen Ratio	The ratio of sensible heat flux to latent heat flux.
Brackish Water	See Saline Water.
Brine	Water that contains high concentrations of soluble salts with a mineralization greater than 100,000 mg/L total dissolved solids.

Brown-Water System	Freshwaters with elevated colour and dissolved organic carbon concentrations.
Brunisolic Soil	An order of soils whose horizons are developed sufficiently to exclude the soils from the Regosolic order, but that lack the degrees or kinds of horizon development specified for soils of the other orders. These soils, which occur under a wide variety of climatic and vegetative conditions, all have Bm or Btj horizons.
Bryophyte	A member of the plant order Bryophyta, including the mosses, liverworts, and hornworts.
Buffer	A transition zone between areas managed for different objectives.
Buffer Zone	The area of land between the project footprint and Local Study Area boundaries.
Buffering Capacity	The ability of a system to accept acids without the pH changing appreciably.
Calendar-day	Stream-day multiplied by a service factor for planned and unplanned downtime. Production rate based on operating 365 day per year.
CALPUFF	A non-steady Lagrangian Gaussian Puff Model containing modules for complex terrain effects, overwater transport interaction effects, building downwash, wet and dry removal, and simple chemical transformation.
Canopy	An overhanging cover, shelter or shade. The tallest layer of vegetation in an area.
Canopy Disturbance	An opening in the forest canopy, from natural or unnatural causes.
Capability (land)	An evaluation of land performance that focuses on the degree and nature of limitation imposed by the physical characteristics of the land unit on a certain use, assuming a management system.
Carbonaceous Biochcemical Oxygen Demand (CBOD)	Carbonaceous biochemical oxygen demand is a measure of the quantity of oxygen consumed by microorganisms during the breakdown of organic molecules such a cellulose and sugars into carbon dioxide and water.
Carcinogen	An agent that is reactive or toxic enough to act directly to cause cancer.

Carnivore	Any order of mammals that feed chiefly on flesh or other animal matter rather than plants.
Catchment Area	The area of land from which water finds its way into a particular watercourse, lake or reservoir (Also termed “catch basin” or “watershed.”
Cation	A positively charged ion.
Channel	The bed of a stream or river.
Channel Regime	The morphological characteristics, including cross-section, longitudal slope and sinuosity, of a watercourse that is in long-term equilibrium.
Chi-Square Analysis	A statistical test to determine if the patterns exhibited by data could have been produced by chance.
Chlorophyll a	A green photo-sensitive pigment that is essential for the conversion of inorganic carbon (e.g., carbon dioxide) and water into organic carbon (e.g., sugar).
Chlorosis	A yellowing of leaf tissue due to a lack of chlorophyll, generally caused by poor drainage, damaged roots, compacted roots, high alkalinity or nutrient deficiencies in the plant.
Class Area	The area of a particular habitat quality class within the study area.
Closed Canopy	Assemblages of trees with tops sufficiently close to each other that there is very little visible sky from the position of the forest floor.
Closure	The point after shutdown of operations when regulatory certification is received and the area is returned to the Crown.
Coefficient of Variation	Standardized index of the variability of a value relative to the mean value.
Colluvial	A heterogeneous mixture of material that as a result of gravitational action has moved down a slope and settled at its base.
Community	Plant or animal species living in close association or interacting as a unit.
Complex Structure	A stand of trees with a high variation in heights but with no distinct tree layers.

Concentration	Quantifiable amount of a substance in environmental media.
Concordance Table	A table that serves as a cross-reference between regulated requirements and location of documented compliance.
Conductivity	A measure of the capacity of water to conduct an electrical current.
Configuration	The location and arrangement of landscape elements.
Coniferous	These are cone-bearing trees with no true flower (e.g., white spruce, black spruce, balsam fir, jack pine and tamarack).
Connectivity	A measure of how connected or spatially continuous a corridor or matrix is.
Consolidated Frequency Analysis (CFA)	A computer program for deriving flood flow frequencies.
Contaminants	A general term referring to any chemical compound added to a receiving environment in excess of natural concentrations. The term includes chemicals or effects not generally regarded as "toxic", such as nutrients, colour and salts.
Contouring	Process of shaping the land surface to fit the form of the surrounding land.
Corridor	A travel route allowing animals to migrate from one faunal region to another.
Criteria (water quality)	The standards against which water quality is measured.
Critical Load	A quantitative estimate of an exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur.
Cross Stratification	Inclined sedimentary beds that form in sand dunes.
Crown Closure	The ground cover area covered by a vertical projection of the tree crowns onto the ground for each identified storey.
Crust Lichen	Lichen with a hard upper surface and attached closely to the substrate.

Cumulative Effects	The effects of one project with consideration of current conditions, other existing projects, other approved projects and typically, other planned projects.
Cumulative Environmental Management Association (CEMA)	An association of oil sands industry, other industry, regional community representatives, regulatory agencies and other stakeholders designed to develop systems to manage cumulative effects associated with developments in the Oil Sands Region.
Cutblock	Previously forested area that has been harvested for timber and is presently regenerating at various stages of regrowth.
Cutline	A cleared right-of-way, often used in forestry or seismic work.
dBA	A decibel value which has been A-weighted, or filtered to match the response of the human ear.
dBC	A decibel value which has been C-weighted, or filtered to highlight low frequency content.
Decibel (dB)	A decibel value which has been A-weighted, or filtered to match the response of the human ear.
Deciduous	Tree species that lose their leaves at the end of the growing season.
Decommissioning	The act of taking a processing plant or facility out of service and isolating equipment to prepare for routine maintenance work, suspending or abandoning.
Department of Fisheries and Oceans (DFO) (now Fisheries and Oceans Canada)	Federal department responsible for policies and programs in support of Canada's economic, ecological and scientific interests in oceans and inland waters; for the conservation and sustainable utilization of Canada's fisheries resources in marine and inland waters.
Deposit	Material left in a new position by a natural transporting agent such as water, wind, ice or gravity, or by the activity of man.
Depressurization	The process of reducing the pressure in geological formation.
Detection Limit	The lowest concentration that can be reported by an analytical laboratory with a specified confidence level.
Detrended Correspondence Analysis (DCA)	An ordination technique used to visually determine species and site relationships.

Development Area Any area altered to an unnatural state. This represents all land and water areas included within activities associated with the development of oil sands leases.

Diameter at Breast Height (DBH) The diameter of a tree 1.37 m above the ground surface.

Dilbit Diluted bitumen created by adding lighter fraction hydrocarbons to bitumen.

Diluent A light liquid hydrocarbon added to bitumen to lower viscosity and density. The thinning agent is used by the oil sands to make heavy oil more fluid so it can be transported.

Discharge In a stream or river, the volume of water that flows past a given point in a unit of time (i.e., m^3/s).

Dispersion Model A set of mathematical relationships used to describe the rise and subsequent dispersion of a plume as it is transported by the wind. These relationships are given coded names (e.g., SCREEN3 and CALPUFF) and are computer modeled.

Dissolved Organic Carbon (DOC) The dissolved portion of organic carbon water; made up of humic substances and partly degraded plant and animal materials.

Dissolved Oxygen (DO) Measurement of the concentration of dissolved (gaseous) oxygen in the water, usually expressed in milligrams per litre (mg/L).

Disturbance An event that causes a sudden change from the existing pattern, structure and/or composition in an ecological system or habitat.

Diversity The variety, distribution and abundance of different plant and animal communities and species within an area.

Dose A measure of integral exposure. Examples include: (1) the amount of chemical ingested; (2) the amount of a chemical taken up; and (3) the product of ambient exposure concentration and the duration of exposure.

Dose Response The quantitative relationship between exposure of an organism to a chemical and the extent of the adverse effect resulting from that exposure.

Drake A male duck.

Drawdown	A reduction in the height of the water table.
Drill Core	A cylinder of rock taken by a specialized drill bit similar to a hole saw, that can be analysed for various rock and fluid properties.
Echolocation	High frequency sounds (25 to 120 kHz) produced by bats that are beyond the range of human hearing (20 Hz to 25 kHz). These sounds are produced with great intensity. Echoes resulting from sound returning from objects in the bat's environment provide information to the bat.
Ecodistrict	A broad subdivision of the landscape based on differences in landscape pattern, topography and dominant soils.
Ecological Area	As part of the hierarchical classification system outlined in the Field Guide to Ecosites of Northern Alberta, a broad climatic region within the green zone of Alberta.
Ecological Land Classification (ELC)	A means of classifying landscapes by integrating landforms, soils and vegetation components in a hierarchical manner.
Ecosite	Ecosite is a functional unit defined by the moisture and nutrient regime. It is not tied to specific landforms or plant communities, but is based on the combined interaction of biophysical factors that together dictate the availability of moisture and nutrients for plant growth.
Ecosite Phase	A subdivision of the ecosite based on the dominant tree species in the canopy. On some sites where the tree canopy is lacking, the tallest structural vegetation layer determines the ecosite phase.
Ecosystem	An integrated and stable association of living and non-living resources functioning within a defined physical location. For the purposes of assessment, the ecosystem must be defined according to a particular unit and scale.
Edaphic	Referring to the soil. The influence of the soil on plant growth is referred to as an edaphic factor.
Edge	Where different plant communities meet in space on a landscape; and where plant communities meet a disturbance. An outer band of a plant community that usually has an environment significantly different from the interior of the plant community.

Effluent	Stream of water discharging from a source.
Electrical Conductivity	The capability of a solution to transmit an electrical current. A capability closely related to the concentration of salts in soils.
Electrofishing	A 'live' fish capture technique in which negative (anode) and positive (cathode) electrodes are placed in the water and an electrical current is passed between the electrodes. Fish are attracted (galvano-taxis) to the anode and become stunned (galvano-narcosis) by the current, allowing fish to be collected, measured and released.
Energy Resources Conservation Board (ERCB)	An independent, quasi-judicial agency of the Government of Alberta. The purpose of the ERCB is to ensure that the discovery, development, and delivery of Alberta's resources take place in a manner that is fair, responsible and in the public interest.
Endangered	A species facing immediate extinction or extirpation.
Entrenchment Ratio	The ratio of the width of the flood-prone area to the surface width of the bankfull channel, which is used to describe the degree of vertical containment of a river channel.
Environmental Effect	Any change that may cause positive or negative effects to land, air, water, living organisms (including people), cultural, historical or archeological resources.
Environmental Impact	The net change, positive or negative, to land, air, water, living organisms (including people), cultural, historical or archeological resources.
Environmental Impact Assessment (EIA)	A review of the effects that a proposed development will have on the local and regional environment.
***Environmental Protection and Enhancement Act* (EPEA) (Alberta)**	Provincial act created to support and promote the protection, enhancement and wise use of the environment.
Environmental Setting	A surveyed or predicted condition that serves as a reference point to which later surveys are coordinated or correlated.
Eolian	A designation of rocks and soils whose constituents have been carried and laid down by wind.

Ephemeral	A phenomenon or feature that lasts only a short time (e.g., an ephemeral stream is only present for short periods during the year).
Epilimnetic	Localized in the surface layer of a waterbody.
Epilimnion	A freshwater zone of relatively warm water in which mixing occurs as a result of wind action and convection currents.
Epiphyte	A plant that grows upon another plant, but is neither parasitic on it nor rooted in the ground.
Equivalent Land Capability	The ability of land to support various land uses after reclamation is similar to the ability that existed prior to any activity on the land, but the ability to support individual land uses will not necessarily be equal after reclamation.
Ericaceous	Plant species belonging to the heath family (Ericaceae) and typically prefer acid soil.
Erosion	The process by which material, such as rock or soil, is worn away or removed by wind or water.
Escarpment	A cliff or steep slope at the edge of an upland area. The steep face of a river valley.
Estuarine	Formed or deposited in an estuary; estuarine muds: or growing in, inhabiting, or found in an estuary; an estuarine fauna.
Euphotic	The upper surface layer of a body of water where sufficient light penetrates to allow photosynthesis to occur.
Eutrophic	The nutrient-rich status (amount of nitrogen, phosphorus and potassium) of an ecosystem.
Eutrophication	Excessive growth of algae or other primary producers in a stream, lake or wetlands as a result of large amounts of nutrient ions, especially phosphate or nitrate
Evaporation	The process by which water is changed from a liquid to a vapour.
Evaporation, Potential	The maximum amount of water that can be evaporated from a surface (e.g., ground, vegetation) if surface moisture is not limited.
Evaporite	A sediment that is deposited from aqueous solution as a result of extensive or total evaporation.

Evapotranspiration	The process by which water is transmitted as a vapor to the atmosphere as the result of evaporation from any surface and transpiration from plants.
Existing and Approved Case	The Environmental Impact Assessment case that includes existing environmental conditions as well as existing and approved projects or activities.
Facies	A distinctive group of characteristics that distinguish one group from another within a stratigraphic unit; e.g. contrasting river-channel facies and overbank-flood-plain facies in alluvial valley fills.
Fauna	An association of animals living in a particular place or at a particular time.
Fen	A peat-forming wetland. Fens are defined from other peat wetlands by the source of water, which is contributed primarily by flowing surface or underground spring water versus solely from rain (such as bogs). As such, they tend to be more mineral rich than other peat wetlands. Fens can be dominated by grasses, shrubs or trees.
Field Facilities	The surface equipment and pipelines required to deliver steam to the wells and transport fluids to the central plant.
Fish Habitat (*Fisheries Act*)	Spawning grounds and nursery, rearing, food supply and migration areas on which fish depend directly or indirectly to carry out their life processes.
Flark	Wet and sparsely vegetated parts of patterned fens.
Fluvial	Relating to a stream or river.
Fluvial Sediment	Sediment generally consisting of gravel and sand with a minor fraction of silt and rarely clay. The gravels are typically rounded and contain interstitial sand.
Foliose	Having a leaf-like thallus loosely attached to a surface, as certain lichens.
Footprint	The proposed development area that directly affects the soil and vegetation components of the landscape.
Forage Fish	Small fish that provide food for larger fish (e.g., longnose sucker, fathead minnow).

Forb	A broad-leaved herb that is not a grass.
Forest	A growth of trees and underbrush covering a tract of land.
Forest Cover Type	Primary stand groupings based on the percent composition of coniferous or deciduous species. Forest cover type can be deciduous, coniferous or mixedwood. Also, regenerating and selective harvest stands are included as a forest cover type.
Forest Fragmentation	The change in the forest landscape, from extensive and continuous forests.
Forest Productivity	A measure of forest growth based on the volume of wood fibre added to the landbase annually (i.e., mean annual increment) or the rate at which trees grow in height over a given period of time as defined by a timber productivity rating or site index value.
Forest Succession	see Succession.
Formation	A geologic unit of distinct rock types that is large enough in scale to allow its mapping over a region.
Fossiliferous	Contains fossils or the remains of plants and animals.
Fragmentation	The process of reducing size and connectivity of stands of trees that compose a forest.
FRAGSTATS	A spatial pattern analysis software program used to quantify the areal extent and spatial configuration of patches within a landscape. The analysis is done using categorical spatial data (e.g., plant communities).
Frequency Analysis	A statistical procedure involved in interpreting the past record of a hydrometeorological event to occurrences of that event in the future.
Freshet	A flood resulting from a spring thaw resulting from snow and ice melts in rivers.
Fry	The early stage of development for the fish from hatching until it is one year old.
Fuel Gas	Gas used as fuel for the various pieces of equipment. Fuel gas can be purchased gas or a mixture of purchased gas and treated produced gas.

Fugitive Emissions	Substances emitted from any source except those from stacks and vents. Typical sources include gaseous leakage from valves, flanges, drains, volatilization from ponds and lagoons, and open doors and windows. Typical particulate sources include bulk storage areas, open conveyors, construction areas or plant roads.
Furbearer	Mammals that have traditionally been trapped or hunted for their fur.
G Test	A statistical test which tests for a significant difference between sampled and expected frequencies of occurrence. Otherwise known as a likelihood ratio test.
Gathering System	The pipelines and other equipment needed to transport oil, gas or both from wells to a central point.
Genetic Diversity	The range of possible genetic characteristics found within a species and amongst different species (e.g., variations in hair colour, eye colour and height in humans).
Geographic Information System (GIS)	Computer software designed to develop, manage, analyze and display spatially referenced data.
Geomorphic	The natural evolution of surface soils and landscape over long periods.
Geomorphology	The science of surface landforms and their interpretation on the basis of geology and climate. That branch of science which deals with the form of the earth, the general configurations of its surface and the changes that take place in the evolution of landforms.
Glacial Till	Unsorted and unstratified heterogeneous mixture of clay, silt, sand, gravel and boulders deposited directly by a glacier without subsequent reworking by water from the glacier.
Glaciofluvial	Sediments or landforms produced by melt waters originating from glaciers or ice sheets. Glaciofluvial deposits commonly contain rounded cobbles arranged in bedded layers.
Glacolacustrine	Relating to the lakes that formed at the edge of glaciers as the glaciers receded. Glaciolacustrine sediments are commonly laminar deposits of fine sand, silt and clay.
Gleysolic Soil	A great group of soils in the Gleysolic order. A Gleysol has a thin (less than 8 cm) Ah horizon underlain by mottled grey or brownish grey material, or it has no Ah horizon.

Graminoid	Grasses and grass-like plants such as sedges and rushes.
Graupel	Precipitation that forms when supercooled droplets of water condense on a snowflake.
Groundtruth	Visiting locations in the field to confirm or correct information produced from remote sources such as interpreted aerial photographs or classified satellite imagery.
Groundwater	That part of the subsurface water that occurs beneath the water table, in soils and geologic formations that are fully saturated.
Groundwater Level	The level below which the rock and subsoil, to unknown depths, are saturated.
Groundwater Mounding	An area of a groundwater system featuring an increased groundwater surface elevation above the baseline condition for that area.
Groundwater Recharge	Water that enters the saturated zone by a downward movement through soil and contributes to the overall volume of groundwater.
Groundwater Velocity	The speed at which groundwater advances through the ground; the average linear velocity of the groundwater.
Guild	A set of co-existing species that share a common resource.
Habitat	The place or environment where a plant or animal naturally or normally lives or occurs.
Habitat Fragmentation	Reduction of extensive, continuous tracts of habitat into smaller, more isolated patches.
Habitat Generalist	Wildlife species that can survive and reproduce in a variety of habitat types (e.g., red-backed vole).
Hardness	Measure of the calcium and magnesium concentrations in water.
Hazard	A condition with the potential for causing an undesirable consequence.
Hazardous Waste	Any waste material that presents a potential for unwanted consequences to people, property and the environment.

Head	The energy, either kinetic or potential, possessed by each unit weight of a liquid; expressed as the vertical height through which a unit weight would have to fall to release the average energy possessed.
Herb	A vascular plant (forb or graminoid) without a woody stem.
Heterogeneity	Consisting of parts that are unlike each other. For example, the variety and abundance of ecological units (e.g., ecosite phases and wetlands types) comprising a landscape mosaic.
Historical Resources Impact Assessment (HRIA)	A review of the effects that a proposed development will have on the local and regional historic and prehistoric heritage of an area.
Home Range	The area that an animal traverses as part of its annual travel patterns.
Hydraulic Conductivity	Is a measure of how easy water can flow through a porous material.
Hydraulic Head	The elevation, with respect to a specified reference level, at which water stands in a piezometer (a pipe in the ground used to measure water elevations/or a small diameter observation well) connected to the point in question in the soil. Its definition can be extended to soil above the water table if the piezometer is replaced by a tensiometer (instrument used to measure moisture content of soil). The hydraulic head in systems under atmospheric pressure may be identified with a potential expressed in terms of the height of a water column. More specifically, it can be identified with the sum of gravitational and capillary potentials, and may be termed the hydraulic potential.
Hydric	Soil moisture conditions where water is removed so slowly that the water table is at or above the soil surface all year.
Hydrogeology	The study of the factors that deal with subsurface water (groundwater) and the related geologic interactions with surface water.
Hydrology	The science of waters of the earth, their occurrence, distribution, and circulation; their physical and chemical properties; and their reaction with the environment, including living beings.
Hydrometric Station	A station where measurement of hydrological parameters is performed.

Hydrostratigraphic Unit	A formation, part of a formation, or group of formations in which there are similar hydrologic characteristics allowing for grouping into aquifers or confining layers.
Hygric	Soil moisture conditions where water is removed slowly enough to keep the soil wet for most of the growing season. Permanent seepage and mottling are present and possibly weak gleying.
Hypereutrophic	Trophic state classification for lakes characterized by very high productivity and nutrient inputs (particularly total phosphorus).
Hypolimnion	The deep, cold layer of a lake lying below the metalimnion (thermocline) during the time a lake is normally stratified.
Inclined Heterolithic Stratification	Inclined beds of alternating mud and sand that are deposited on the sides of channel bars.
Infaunal	Animals living within the sediment.
In-Situ	Latin for "in place". As used here, refers to methods of extracting deep deposits of oil sands using wells to recover the resources with less impact to the land, air and water than for oil sands mining.
Interbedded Sand and Mud	Alternating beds of sand and mud deposited during times of strong water flow and negligble water flow.
Internal Lawn	Wet depresssional areas within bog or fen wetlands types that are absent of trees and contain species adapted to wetter conditions than the surrounding treed habitat.
Invasive Species	A species that has moved into an ecosystem and reproduced so successfully that it has displaced the original structure of the community.
Isopach Map	A geological map of subsurface strata showing the various thicknesses of a given formation underlying an area.
Isopleth	A line on a map connecting places sharing the same parameter (e.g., ground-level concentration)
Key Indicator Resources (KIRs)	Environmental attributes or components identified as a result of a social scoping exercise as having legal, scientific, cultural, economic or aesthetic value.

Keystone Species	A species that is of particular importance to community integrity and function, without which significant changes to the community would occur.
Lacustrine	Sediment that have been transported or deposited by water or wave action. Generally consisting of stratified sand, silt or clay deposited on a lake bed or moderately well sorted and stratified sand and coarser material.
Land Capability	The ability of the land to support a given land use, based on an evaluation of the physical, chemical and biological characteristics of the land, including topography, drainage, hydrology, soils and vegetation.
Land Capability Class	A land capability class assigned to an area according to the criteria outlined in Land Capability Classification System for Forest Ecosystems in the Oil Sands, 3rd Edition, as amended.
Land Classification	The classification of specific bodies of land according to their characteristics or their capabilities of use.
Land Cover Class	A vegetated or non-vegetated map unit defined here at the regional study area level and classified from LANDSAT 5 satellite imagery.
Land Status Automated System (LSAS)	An online government database containing Alberta Surface Public Land and Crown Mineral dispositions and activities. Includes information about land restrictions and reservations.
LANDSAT 5	A specific satellite or series of satellites used for earth resource remote sensing. Satellite data can be converted to visual images for resource analysis and planning.
Landscape	A heterogeneous land area with interacting ecosystems that are repeated in similar form throughout. From a wildlife perspective, a landscape is an area of land containing a mosaic of habitat patches within which a particular “focal” or “target” habitat patch is embedded.
Landscape Structure	The spatial relations among a landscape’s component parts including composition; the presence and amount of each patch type without being spatially explicit; and landscape configuration, the physical distribution or spatial character of patches within a landscape.
Leaf Area Index (LAI)	The ratio of leaf area to soil surface area.

Leakance — A property of a leaky layer. Expressed as K' divided by b', where K' refers to the hydraulic conductivity of the leaky layer confirming an aquifer in units of length/time and b' refers to the thickness of the leaky layer in units of length.

Lichen — Any complex organism of the group Lichenes, composed of a fungus in symbiotic union with an alga and having a greenish, gray, yellow, brown, or blackish thallus that grows in leaflike, crustlike, or branching forms on rocks, trees, etc.

Lift Gas — Gas injected into the reservoir to help it flow from the well.

Lignin — A complex polymer occurring in plant cell walls making the plant rigid.

Linear Corridor — Roads, seismic lines, pipelines and electrical transmission lines, or other long, narrow disturbances.

Listed Species — Species that are provincially or federally identified as potential species of concern.

Lithic — Consolidated bedrock within the control section below a depth of 10 cm. The upper surface of a lithic layer is a lithic contact.

Lithofacies — A rock or sediment with specific lithologic or textural characteristics.

Littoral Zone — The zone in a lake that is closest to the shore. It includes the part of the lake bottom, and its overlying water, between the highest water level and the depth where there is enough light (about 1% of the surface light) for rooted aquatic plants and algae to colonize the bottom sediments.

Local Study Area (LSA) — Defines the spatial extent directly or indirectly affected by the project.

Lognormal — Of, relating to, or being a logarithmic function with a normal distribution.

Long Range Sustained Yield Average (LRSYA) — The sums of Mean Annual Increment (MAI) for all forest cover types in a study area. LRSYA is an estimate for the sustained yield or expected annual growth of the coniferous and deciduous fibre in a study area.

Low Frequency Noise (LFN)	Where a clear tone is present below and inclusive of 250 Hz. Low frequency noise can be determined by subtracting the overall C-weighted from the overall A-weighted sound level, or as the overall C-weighted sound level by itself.
Lowest Observed Adverse Effect Level (LOAEL)	In toxicity testing, it is the lowest concentration at which adverse effects on the measurement end point are observed.
Lowland Areas	Areas with ground slopes of less than 0.5% and typically poorly drained.
Luvisol	An order of soils that have eluvial (Ae) horizons, and illuvial (Bt) horizons in which silicate clay is the main accumulation product. The soils developed under forest or forest-grassland transition in a moderafe to cool climate.
Macrophytes	Plants large enough to be seen by the unaided eye. Aquatic macrophytes are plants that live in or in close proximity to water.
Main Canopy	A well-defined, uppermost layer of trees within a forest.
Make-Up Water	The water required to supplement recycled produced water for steam production.
Marsh	A non-peat-forming, nutrient-rich wetlands characterized by frequent flooding and fluctuating water levels.
Mature Forest	A forest with a multi-layered, multi-species canopy dominated by large overstorey trees and accumulations of downed woody debris.
May be at Risk	Any species that ‘May be at Risk’ of extinction or extirpation and is therefore a candidate for detailed risk assessment.
Mean Patch Size	The average size of habitat patches within the study area.
Meander	A randomized search pattern used in rare plant surveys to cover the range in micro-habitat variation within a larger ecosystem unit.
Media	The physical form of the environmental sample under study (e.g., soil, water, air).
Merchantable Timber	A forest area with potential to be harvested for production of lumber/timber or wood pulp. Forests with a timber productivity rating of moderate to good.

Mesic	A moderate soil moisture regime value whereby water is removed somewhat slowly in relation to supply. Available soil water reflects climatic inputs.
Mesotrophic	Trophic state classification for lakes characterized by moderate productivity and nutrient inputs (particularly total phosphorus).
Meteoric Water	That which occurs in or is derived from the atmosphere.
Micro-Habitat	A small-scale surface in the landscape that has its own unique surface properties different from surrounding surfaces.
Mineral Soil	Soils containing low levels of organic matter. Soils that have evolved on fluvial, glaciofluvial, lacustrine and morainal parent material.
Mitigation	The elimination, reduction or control of the adverse environmental effects of the project.
Mitigative Measures	Procedural, locational and timing constraints and methods employed to address project-related impacts.
Mixedwood	A terrestrial forest type that is an assemblage of both deciduous and coniferous tree species.
Mixing Height	The depth of surface layer in which atmospheric mixing of emissions occurs.
Modelling	A simplified representation of a relationship or system of relationships. Modelling involves calculation techniques used to make quantitative estimates of an output parameter based on its relationship to input parameters.
Moisture Regime	The relative moisture supply at a site available for plant growth.
Monitoring	Repetitive measurement of specific environmental phenomena to document change primarily for the purpose of: a) testing impact hypotheses and predictions and b) testing mitigative measures.
Moraine	Sediment generally consisting of well compacted material that is nonstratified and contains a heterogeneous mixture of particle sizes, often in a mixture of sand, silt, and clay that has been transported beneath, beside, on, within and in front of a glacier and not modified by any intermediate agent.

Multistorey	Forest stands where two or three storeys exist and each storey is significant, clearly observable and evenly distributed.
Muskeg	A soil type comprised primarily of organic matter. Also known as bog peat prevalent in northern Canada.
Native Plant	Plant species that naturally occur in a given area.
Native Species	Species that are known to be historically present in a given area.
Natural Region	The highest level in Alberta's ecological classification hierarchy; defined broadly on the basis of climate, topography, landforms and soil.
Natural Subregion	A division of the natural regions of Alberta. Areas within a natural subregion have a similar climatic regime, which is characterized by modal vegetation distinct for that subregion.
Necrosis	Death of cells and living tissue.
Nitrophillic	Nitrogen-loving plant species.
No Observed Adverse Effect Level (NOAEL)	In toxicity testing, it is the highest concentration at which no adverse effects on the measurement end point are observed.
Non-Condensable Gas	A substance that exists in a gaseous form under reservoir pressure and temperature.
Non-Native Plant	An introduced plant that has been brought over from another ecosystem by man and has established itself within its new environment.
Non-Sport Fish	Large fish which is not caught for food or sport (e.g., longnose sucker, white sucker).
Non-Vascular Plant	Plants that do not possess conductive tissues (e.g., veins) for the transport of water and food.
NO_x	A measure of the oxides of nitrogen comprised of nitric oxide (NO) and nitrogen dioxide (NO_2).
Nutrient Regime	The relative supply of nutrients available for plant growth at a given site.

Nutrients	Substances (elements or compounds), such as nitrogen or phosphorus, that are necessary for the growth and development of plants and animals.
Oil Sands	A sand deposit containing a heavy hydrocarbon (bitumen) in the intergranular pore space of sands and fine grained particles.
Oil Sands Region	The Oil Sands Region includes the Fort McMurray – Athabasca Oil Sands Subregional Integrated Resource Plan (IRP), the Lakeland Subregional IRP and the Cold Lake – Beaver River Subregional IRP.
Old Growth Forest	An ecosystem distinguished by old trees and related structural attributes. Old growth encompasses the later stages of stand development that typically differ from earlier stages in a variety of characteristics which may include tree size, accumulations of large dead woody material, number of canopy layers, species, composition, and ecosystem function. Old growth forests are those forested areas where the annual growth equals annual losses. Mean annual increment of timber volume equals zero. They can be defined as those stands that are self-regenerating (i.e., having a specific structure that is maintained).
Oligotrophic	Trophic state classification for lakes characterized by low productivity and low nutrient inputs (particularly total phosphorus).
Ombrogeneous Bog	A mineral-poor, acid, peat-forming plant community that derives all its water and dissolved nutrients, from rainfall.
Ombrotrophic	Wetlands which receive all water and nutrients from direct precipitation.
Organic Soil	Soils containing high percentages of organic matter (fibric and humic inclusions).
Organics	Organic compounds (organics) include chemicals consisting of chains or rings of carbon atoms, such as hydrocarbons, phenols, PAHs and naphthenic acids.
Orthophoto	A digital image of an aerial photograph.
Outlier	A data point that falls outside of the statistical distribution defined by the mean and standard deviation.

Outwash	A glaciofluvial sediment that is deposited by meltwater streams emanating from a glacier.
Overburden	Material below the soil profile and above the bituminous sand.
Overstorey	Those trees that form the upper canopy in a multi-layered forest.
Overwintering Habitat	Habitat used during the winter as a refuge and for feeding.
Ozone (O_3)	Ozone is a gas that occurs both in the Earth's upper atmosphere and at ground level. Ozone in the upper atmosphere protects living organisms by preventing damaging ultraviolet light from reaching the Earth's surface. Ground-level ozone is an air pollutant with harmful effects on the respiratory systems of animals.
Parasequence	a series of related layers of sediment bounded by shales that were deposited in deeper water.
Patch	An area that is different from the area around it (e.g., vegetation types, non-forested areas). This term is used to recognize that most ecosystems are not homogeneous, but rather exist as a group of patches or ecological islands.
Patterned Fen	Peatlands that display a distinctive pattern due to alterations between open wet areas (flarks) and drier shrubby to wooded areas (strings).
Peat	A material composed almost entirely of organic matter from the partial decomposition of plants growing in wet conditions.
Peatland Complex	Within a given area, a mixture of bog and fen wetlands types have formed usually as a result of variation in groundwater flow regimes.
Peatlands	Areas where there is an accumulation of peat material at least 40 cm thick. These are represented by bog and fen wetlands types.
Permafrost	Permanently frozen ground (subsoil).
Permeability	The capacity of porous rock, sediment, soil or a medium for transmitting a fluid, generally measured in Darcy [D] or millidarcy [mD].
Permissible Sound Level	The allowable overall A-weighted sound level of noise from energy industry sources, as specified by the EUB Directive 038, which may contribute to the sound environment of a residential location.

Petrophysical Well Logs	Charts produced by measuring various physical properties of rocks or sediments in a well bore.
pH	The degree of acidity (or alkalinity) of soil or solution. The pH scale is generally presented from 1 (most acidic) to 14 (most alkaline). A difference of one pH unit represents a ten-fold change in hydrogen ion concentration.
Phosphorus	The key nutrient influencing plant growth in lakes; total phosphorus includes the amount of phosphorus in solution (reactive) and in particulate form.
Photochemistry	The reaction that proceeds with the absorption of light.
Phytotoxic	Toxic or poisonous to plants or plant tissue.
Phytotoxic Metals	Metals in concentrations toxic to plants.
Piezometer	A pipe in the ground in which the elevation of water levels can be measured, or a small diameter observation well.
Pixel	The basic unit of digital imagery data. Shortened from "picture element". The intensity of each pixel corresponds to the average "brightness" measured electronically by the sensor.
Planned Development Case (PDC)	The Planned Development Case includes the Project Case components and planned developments that have been publicly disclosed at least six months prior to submission of the Environmental Impact Assessment.
Plant Community	A group of interacting plant species that exist within a defined space and time.
Plant Community Type	As part of the hierarchical classification system outlined in the Field Guide to Ecosites of Northern Alberta, this ecological unit represents the lowest level taxonomic unit of the ecosite classification system. These units are subdivisions of an ecosite phase based on differences in understorey species composition.
PM_{10}	Airborne particulate matter with a mean diameter less than 10 µm (microns) in diameter. This represents the fraction of airborne particles that can be inhaled into the upper respiratory tract.

$PM_{2.5}$ Airborne particulate matter with a mean diameter less than 2.5 µm (microns) in diameter. This represents the fraction of airborne particles that can be inhaled deeply into the pulmonary tissue.

Polycyclic Aromatic Hydrocarbon (PAH) A chemical by-product of petroleum-related industry. Aromatics are considered to be highly toxic components of petroleum products. PAHs, many of which are potential carcinogens, are composed of at least two fused benzene rings. Toxicity increases along with molecular size and degree of alkylation of the aromatic nucleus.

Polygon The spatial area delineated on a map to define one feature unit (e.g., one type of ecosite phase).

Population A collection of individuals of the same species that potentially interbreed.

Population Sink A habitat within which reproductive and mortality rates should result in population declines. However, populations may be maintained in such habitat by immigration from nearby habitats that are more productive. The term was introduced by Pulliam (1988).

Pore The void space between sediment particles.

Porewater Water filling the void space between sediment particles.

Porosity The percentage of the bulk volume of a rock or soil that is occupied by pores, whether isolated or connected.

Potential Acid Input (PAI) A composite measure of acidification determined from the relative quantities of deposition from background and industrial emissions of sulphur, nitrogen and base cations.

Produced Gas Gas co-produced with the bitumen.

Productive Forest Forests on lands with a capability rating of equal to or greater than three and stocked with enough trees to meet the standards of a merchantable forest.

Progradation When a shoreline moves seaward as the result in increased sediment supply or a drop in sea level.

Project Case The EIA case including the project that is the subject of the application, existing environmental conditions, and existing and approved projects or activities.

Puff Splitting	As the effluent puff is carried away from the source by the wind, it will disperse and break apart into smaller puffs, which in turn will break apart into even smaller puffs.
Rare Plant Community	Plant communities that are described as unusual, uncommon, of limited extent or encountered infrequently.
Rare Plant Potential	A ranking system used to determine and map the likelihood of finding rare plants or the relative abundance of rare plant species among different vegetation types or land cover classes within the landscape.
Rare Plants	A native plant species found in restricted areas, at the edge of its range or in low numbers within a province, state, territory or country.
Raster	A graphic structure where the data is divided into cells on a grid. An example would be a computer screen where an image is represented by horizontal lines of coloured pixels. Shapes are represented by cells of the same colour or content adjacent to each other.
Rating Curve	In hydrology, it typically refers to a curve showing the relation between the discharge of a river or stream and the water level in the stream.
Recharge /Discharge Area	Areas that either contribute (recharge) or take away (discharge) to/from the overall volume of groundwater in an aquifer.
Reclamation	The restoration of disturbed land or wasteland to a state of useful capability. Reclamation is the initiation of the process that leads to a sustainable landscape, including the construction of stable landforms, drainage systems, wetlands, soil reconstruction and addition of nutrients. This provides the basis for natural succession to mature ecosystems suitable for a variety of end uses.
Reclamation Certificate	A certificate issued by an Alberta Environment, Conservation and Reclamation Inspector, signifying that the terms and conditions of a conservation and reclamation approval have been complied with.

Reference Concentration (RfC)	For a specific chemical that is conceptually equivalent to an air quality objective, and is expressed in µg/m^3. It is an exposure limit that is established for chemicals which are locally acting (e.g., irritant chemicals), whose toxicity is dependent solely on the air concentration and not on the total internal dose received via multiple exposure pathways.
Regional Aquatics Monitoring Program (RAMP)	The RAMP was established to determine, evaluate and communicate the state of the aquatic environment in the Athabasca Oil Sands Region.
Regional Issues Working Group (RIWG)	A group that works to promote the responsible, sustainable development of resources within the Regional Municipality of Wood Buffalo.
Regional Study Area (RSA)	Defines the spatial extent related to the cumulative effects resulting from the project and other regional developments.
Regional Sustainable Development Strategy (RSDS)	A regulatory framework for balancing development of Alberta's oil sands resources with protection of the environment.
Regosol	The only great group in the Regosolic order. The soils in the group have insufficient horizon development to meet the requirements of the other orders.
Relative Abundance	The proportional representation of a species in a sample or a community.
Remediation	The process of planning for, investigating and potentially managing or removing the effects of chemical substances on the environment, including soil or groundwater effects.
Replicate	Duplicate analyses of an individual sample. Replicate analyses are used for measuring precision in quality control.
Resistivity	A measure of how much a material resists the flow of electricity.
Richness	The number of species in a biological community (e.g., habitat).
Rights-of-way	The strip of land over which a power line, railway line, road, etc., extends
Riparian	Refers to terrain, vegetation or simply a position next to or associated with a stream, floodplain or standing waterbody.

Risk	The possibility of injury, loss or environmental incident created by a hazard. The significance of the risk is determined by the probability on an unwanted incident and the severity of the consequences.
Rough Broken	An area having steep slopes and many intermittent drainage channels, but usually covered with vegetation.
Runoff	The portion of water from rain and snow that does not infiltrate into the ground, or evaporate.
Saline Water	Water with total dissolved solids between 1,000 and 10,000 mg/L.
Scale	Level of spatial resolution.
Scavenging	Removal of a pollutant from the air through chemical or physical processes such as dry deposition or washout by precipitation
Secondary Canopy	A well-defined, layer of trees beneath the main canopy within a forest.
Secure	A species that is not ‘At Risk’, ‘May be at Risk’, or ‘Sensitive’.
Sedge	Any plant of the genus Carex, perennial herbs, often growing in dense tufts in marshy places. They have triangular jointless stems, a spiked inflorescence and long grass-like leaves which are usually rough on the margins and midrib. There are several hundred species.
Sediment	Solid material that is transported by, suspended in, or deposited from water.
Sediment Yield	The amount of sediment transported by a stream system that may be measurable at a particular location. Usually expressed in volume or weight per unit of time.
Sedimentation	The process of the deposition of suspended particles carried by water, wastewater or other liquids, by gravity. It usually occurs through a reduction in the velocity of the liquid below the point which it can transport the suspended material.
Sensitive	Any species that is not at risk of extinction or extirpation but may require special attention or protection to prevent it from becoming at risk.

Sensory Disturbance	Visual, auditory, or olfactory stimulus which creates a negative response in wildlife species.
Sentinel Species	Species that can be used as an indicator of environmental conditions.
Shadow Population	The people who live in work camps, campgrounds or hotels in the Athabasca Oil Sands Region.
Shannon's Evenness Index (SHEI)	Distribution of area among or within patch types in the landscape.
Shoreface	The portion of the ocean or lake bottom that affected by wave action.
Shredder Insect	A herbivorous or detritivorous aquatic insect that chews or gorges vascular plants, decaying plant material or woody material as a food source.
Sink Habitat	A habitat within which reproductive and mortality rates should result in population declines. However, populations may be maintained in such habitat by immigration from nearby habitats that are more productive. The term was introduced by Pulliam (1988).
Sinuosity	The ratio of the thalweg length (i.e., the line connecting the deepest points along a stream) to valley length, for a specific reach of a river or stream system. This is, in essence, a ratio of the stream's actual "running" length to its down-gradient length.
Site Index	The average height of undamaged, dominant and co-dominant trees in a stand at a standard (reference) age that have been free-growing since reaching breast height.
Snag	A naturally occurring, standing dead or dying tree often missing a top or most of the smaller branches.
Soil Heat Flux	The soil heat flux constant is a function of the surface properties and is used to compute the flux of heat into the soil.
Soil Horizon	A layer of mineral or organic soil material approximately parallel to the land surface that has characteristics altered by processes of soil formation. A soil mineral horizon is a horizon with 17% or less total organic carbon by weight. A soil organic horizon is a horizon with more than 17% organic carbon by weight.

Soil Nutrient	A chemical element or compound found in the soil that is essential for plant growth.
Soil Series	The basic unit of soil classification in the Canadian System of Soil Classification and consists of soils that are essentially alike in all major profile characteristics except the texture at the surface.
Solar Radiation	The principal portion of the solar spectrum that spans from approximately 300 nanometres (nm) to 4,000 nm in the electromagnetic spectrum. It is measured in W/m2, which is radiation energy per second per unit area.
Sound Power	The rate of acoustic energy flow across a specified surface, or emitted by a specified sound source. Units W (Watt).
Spawning	The reproductive stage of adult fish which includes fertilization and deposition of eggs.
Special Concern (Vulnerable)	A species is of special concern because of characteristics that make it particularly sensitive to human activities or natural events.
Special Plant Community	Communities that are suspected to be rare or unique but are differentiated from known rare plant communities in that there is less information known about them, and currently, are not included on ANHIC's Preliminary Ecological Community Tracking and Watch List.
Species	A taxonomic grouping of genetically and morphologically similar individuals that actually or potentially interbreed and are reproductively isolated from all other such groups.
Species Abundance	The number of individuals of a particular species within a biological community (e.g., habitat).
Species Composition	The number and abundance of species found within a biological community.
Species Distribution	Where the various species in an ecosystem are found at any given time. Species distribution varies with season.
Species Diversity	A description of a biological community that includes both the number of different species and their relative abundance. Provides a measure of the variation in number of species in a region.
Species Richness	The number of different species occupying a given area.

Spectral Signature	The unique characteristics in solar reflectance of a particular land classification unit based upon multi-spectral satellite imagery.
Sphagnum	A genus of peat-forming moss.
Sport Fish	Large fish caught for food or sport (e.g., northern pike, Arctic grayling).
Stand	A group of trees occupying a specific area and sufficiently uniform in composition, age, arrangement and condition so that it is distinguished from trees in adjoining areas.
Stand Age	The number of years since a forest has been affected by a stand-replacing disturbance event (e.g., fire or logging) and has since been regenerating.
Stand Density	The relative closure of a forest canopy.
Stand Structure	The various horizontal and vertical physical elements of the forest. The physical appearance of canopy and subcanopy trees and snags, shrub and herbaceous layers and downed woody material.
Standard Deviation (SD)	A measure of the variability or spread of the measurements about the mean. It is calculated as the positive square root of the variance.
Steam Assisted Gravity Drainage (SAGD)	An in-situ oil sands recovery technique that involves the use of two horizontal wells, one to inject steam and a second to produce the bitumen.
Stomata	Microscopic pores found on the under side of leaves.
Stomatal Closure	The movement of stomata guard cells to slow or prevent gas exchange between the plant and its environment.
Storativity	The volume of water an aquifer releases from or takes into storage due to pressure change.
Stratify	Layering of lakes into two or more non-mixing layers; in summer, typically a layer of warmer, less dense water lies on a cooler, denser layer; in winter, typically a layer of very cold (<4°C), less dense water overlies warmer, denser water (approximately 4°C).
Stratigraphy (Historical)	The succession and age of strata of rock and unconsolidated material. Also concerns the form, distribution, lithologic composition, fossil content and other properties of the strata.

Stream Flow The movement of surface water in a stream channel, usually measured in cubic metres per second (m^3/s).

Stream-Day Maximum daily production rate (design capacity) for equipment. Takes into account non-operational time due to plant turnarounds, and/or emergencies. Calculated based on 93% plant availability.

Study Area The geographic limits within which an impact to a key indicator resource or social component is likely to be significant.

Subhydric Soil moisture conditions where water is removed slowly enough to keep the water table at or near the surface for most of the year; organic and gleyed mineral soils are present as well as permanent seepage less than 30 cm below the surface.

Subhygric Soil moisture conditions where water is removed slowly enough to keep the soil wet for a significant part of the growing season. There is some temporary seepage and possible mottling below 20 cm.

Submesic Soil moisture conditions where water is removed readily in relation to supply. Water is available for moderately short periods following precipitation.

Subsoil The stratum of weathered material that underlies the surface soil, including one or more of the following:

(i) that portion of the B horizon left after salvage of upland surface soil;

(ii) the C horizon of an upland soil;

(iii) underlying parent material at an upland location that is rated good, fair or poor; and

(iv) mineral material below an organic layer at a location other than upland, that is rated good, fair or poor.

Subxeric Soil moisture conditions where water is removed rapidly in relation to supply. Soil is moist for short periods following precipitation.

Succession A series of dynamic changes by which one group of organisms succeeds another through stages leading to a climax community.

Supernatant The liquidor clear fluid above a precipitate or sediment

Synthetic Crude Oil A mixture of hydrocarbons, similar to crude oil, derived from upgrading bitumen from oil sands.

Taxa	A group of organisms of any taxonomic rank (e.g., family, genus, or species).
Thallus	A simple vegetative body undifferentiated into true leaves, stem and root, ranging from an aggregation of filaments to a complex plantlike form.
Thalweg	A line extending longitudinally along a watercourse following the deepest portion of the channel.
Threatened	A species likely to become endangered if limiting factors are not reversed.
Threshold Chemicals	Chemicals that act via a threshold mechanism of action require a minimal concentration level to produce adverse effects. Below this specific threshold level, there is no potential for adverse effects to occur.
Threshold Limit Value (TLV)	The air concentration of a chemical below which workers may be repeatedly exposed day after day, without any occurrence of health effects. Threshold limit values are recommended occupational exposure limits designed to control potential adverse effects associated with workplace exposure.
Till	Sediments laid down by glacial ice.
Topsoil	Ae, Ah, Ahe, Ahj and gleyed and weakly gleyed versions of these horizons are usually considered to be part of the topsoil.
Total Dissolved Solids (TDS)	The total concentration of all dissolved compounds solids found in a water sample.
Total Recoverable Hydrocarbons	A term that refers to total petroleum hydrocarbons recovered using a solvent-specific extraction procedure.
Total Reduced Sulphur (TRS)	A term used to collectively describe hydrogen sulphide and mercaptans.
Total Suspended Solids (TSS)	The amount of suspended substances in a water sample.
Toxic	A substance, dose or concentration that is harmful to a living organism.

Toxicity	The inherent potential or capacity of a material to cause adverse effects in a living organism.
Toxicity Reference Value (TRV)	The maximum acceptable dose (per unit body weight and unit of time) of a chemical to which a specified receptor can be exposed. Also referred to as exposure limit.
Traditional Ecological Knowledge (TEK)	Knowledge and understanding of traditional resource and land use, harvesting and special places.
Traditional Land Use (TLU)	Activities involving the harvest of traditional resources such as hunting and trapping, fishing, gathering medicinal plants and travelling to engage in these activities.
Traditional Plant Potential	A ranking system used to determine and map the relative abundance of traditional use plant species among different vegetation types or land cover classes within the landscape.
Traditional Resources	Plants, animals and mineral resources that are traditionally used by indigenous populations.
Traditional Use Plants	Plants used by aboriginal people of a region as part of their traditional lifestyle for food, ceremonial, medicinal and other purposes.
Training Site	A group of selected satellite imagery pixels used to define the spectral signature of a particular map unit for land classification purposes.
Transmissivity	The product of the average coefficient of hydraulic conductivity (or permeability) and the thickness of the aquifer. Consequently, transmissivity is the rate of flow under a hydraulic gradient equal to unity through a cross-section of unit width over the whole thickness of the aquifer.
Transpiration	The transfer of water from soil and plant surfaces to the air.
Treater	A vessel in which oil is treated for the removal of sediment and water using heat, chemicals and/or electricity.
Trophic	Pertaining to part of a food chain, for example, the primary producers are a trophic level just as tertiary consumers are another trophic level.

Turbidity	An indirect measure of suspended particles, such as silt, clay, organic matter, plankton and microscopic organisms, in water.
Understorey	Trees or other vegetation in a forest that exist below the main canopy level.
Ungulate	Belonging to the former order Ungulata, now divided into the orders Perissodactyla and Artiodactyla, and composed of the hoofed mammals such as horses, cattle, deer, swine and elephants.
Upland	Areas that have typical ground slopes of 1 to 3% and are better-drainage.
Upset Conditions	An acute time period within which usual conditions become highly unfavourable; severity and duration may vary.
Vascular Plant	Plants possessing conductive tissues (e.g., veins) for the transport of water and food.
Volatile Organic Compounds (VOC)	Volatile Organic Compounds include aldehydes and all of the hydrocarbons except for ethane and methane. VOCs represent the airborne organic compounds likely to undergo or have a role in the chemical transformation of pollutants in the atmosphere.
Water Sand	A water-saturated sand unit occurring within a geological formation.
Water Table	The shallowest saturated ground below ground level – technically, that surface of a body of unconfined groundwater in which the pressure is equal to atmospheric pressure.
Water Yield	Runoff, including groundwater outflow that appears in the stream, plus groundwater outflow that leaves the basin underground. Water yield is the precipitation minus the evapotranspiration.
Waterbody	A standing body of water such as a lake or pond.
Watercourse	A flowing body of water such as a river, stream or creek.
Watershed	The entire surface drainage area that contributes water to a lake or river.
Weeds	Plants that are defined as controlled weeds, nuisance weeds, or noxious weeds by the Weed Control Act, as amended.
Wellbore	Also borehole. The hole drilled by the bit (can be cased or open).

Wetlands	Wetlands are land where the water table is at, near or above the surface or which is saturated for a long enough period to promote such features as wet-altered soils and water tolerant vegetation. Wetlands include organic wetlands or "peatlands," and mineral wetlands or mineral soil areas that are influenced by excess water but produce little or no peat.
Wind Shear	A difference in wind speed and/or direction over a relatively short distance in the atmosphere.
Windrose	Graphic pie-type representation of frequencies of wind directions and speeds over a period of time (e.g., one year) for a meteorological station.
Xeric	Soil moisture conditions where water is removed very rapidly in relation to supply. Soil is only moist for a very short time following precipitation.
Young of the Year (YOY)	Fish at age 0, within the first year after hatching.

ABBREVIATIONS

°	Degree
°C	Temperature in degrees Celsius
%	Percent
%OM	Percent Organic Matter
≥	More than or equal to
<	Less than
>	More than
±	Plus or minus
≤	Less than or equal to
2-D	Two dimensional
3-D	Three dimensional
AAAQO	Alberta Ambient Air Quality Objectives
AAC	Annual Allowable Cut
AADT	Annual Average Daily Traffic Counts
AAFRD	Alberta Agriculture, Food And Rural Development
ACGIH	American Conference of Governmental Industrial Hygienists
AEII	Alberta Employment, Immigration and Industry
AENV	Alberta Environment
AEP	Alberta Environmental Protection
AGL	Above Ground Level
AHW	Alberta Health and Wellness
AICc	Akaike's Information Criterion
Al	Aluminum
Albian Sands	Albian Sands Energy Inc. (Muskeg River Mine)
Al-Pac	Alberta-Pacific Forest Industries Inc.
AMAH	Alberta Municipal Affairs and Housing
ANC	Acid Neutralizing Capacity
$\mathbf{ANC_{lim}}$	Critical value for acid neutralizing capacity
$\mathbf{ANC_{org}}$	Weak Organic Acids
ANHIC	Alberta Natural Heritage Information Centre
ANOVA	Analysis of Variance
ANPC	Alberta Native Plant Council
AOSERP	Alberta Oil Sands Environmental Research Program
AOSP	Athabasca Oil Sands Project
AP	Aquifer Productivity

AQS	Air Quality Monitoring Station
ARC	Alberta Research Council
AREA_CV	Patch Size Coefficient of Variation
AREA_MD	Patch Size Median
AREA_MN	Patch Size Mean
AREA_SD	Patch Size Standard Deviation
ARHA	Aspen Regional Health Authority
ASIR	Age-Standardized Incidence Rates
ASMR	Age-Standardized Mortality Rates
ASRD	Alberta Sustainable Resource Development
ATC	Athabasca Tribal Council
ATC-APCA	Athabasca Tribal Council - All Parties Core Agreement
atm	Atmosphere
ATPRC	Alberta Tourism, Parks, Recreation and Culture
ATSDR	Agency for Toxic Substances and Disease Registry
ATV	All-terrain vehicle
AVI	Alberta Vegetation Inventory
Aw	Aspen (Populus Tremuloides)
AWI	Alberta Wetlands Inventory
B	Bog
BC	Base Cation
BC MWLAP	British Columbia Ministry of Water, Land and Air Protection
BC/Al	Base Cation/Aluminum
BC/H	Base Cation/Hydrogen
BCF	Bioconcentration Factors
BFW	Boiler Feedwater
Bhp	Brake-horsepower
BLFN	Beaver Lake First Nation
BMC	Benchmark Concentration
BMD_{05}	Benchmark Dose
$BMDL_{05}$	Benchmark Dose Confidence Limit
BMI	Body Mass Index
bpcd	Barrels per calendar day
bpd	Barrels per day
Bs	Shallow Bog
BS&W	Basic Sediment and Water
BSE	Bovine Spongiform Encephalopathy

BSL	Basic sound level
BSOD	Biological Species Observation Database
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
BU	Burn/Partial Burn
Bw	White Birch (Betula Papyrifera)
bw/d	Body weight per day
C	Coniferous
C&R	Conservation And Reclamation
C,C&R	Closure, Conservation And Reclamation
C_1	Methane
C_2	Ethane
C_3+	Hydrocarbon molecules with more than three carbon atoms
C_7	Heptane
Ca	Calcium
CA	Class Area
Ca^{2+}	Calcium base cation (particle)
$CaCO_3$	Calcium carbonate
CadnaA	Computer Aided Noise Attenuation
CAI_AM	Core Area Index Area Weighted Mean
Cal/Kg·˚C	Calories per Kilogram degrees Celcius
Cal/m·sec·˚C	Calories per metres seconds degrees Celcius
CAPP	Canadian Association of Petroleum Producers
CARB	California Air Resources Board
CASA	Clean Air Strategic Alliance
CBOD	Carbonaceous Biochemical Oxygen Demand
CC	Clearcut Modifier
CCA	Conklin Community Association
CCIS	Canadian Climate Impact Scenarios
CCME	Canadian Council of Ministers of the Environment
CEA	Cumulative Effects Assessment
CEAA	*Canadian Environmental Assessment Act*
CEC	Cation Exchange Capacity
CEMA	Cumulative Environmental Management Association
CEPA	*Canadian Environmental Protection Act*
CFSA	Child and Family Services Authority
CGCM2	Canadian Global Coupled Model – Version 2
CH_4	Methane

CHA	Cardiovascular Hospital Admissions
CHTD	Canadian Historical Temperature Database
CICS	Canadian Institute for Climate Studies
Cl	Chloride
CL	Clearing
CLI	Canada Land Inventory
CLRP	Christina Lake Regional Project
cm	Centimetre
cm^2	Square centimetre
CNIT	Core Needs Income Threshold
CNS	Central Nervous System
CO	Carbon monoxide
CO_2	Carbon dioxide
CONRAD	Canadian Oil Sands Network for Research and Development
COPC	Chemicals of Potential Concern
COPD	Chronic Obstructive Pulmonary Disease
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CPDFN	Chipewyan Prairie Dene First Nation
CST	Central Standard Time
CWS	Canada-Wide Standards
d	Day
D	Deciduous
DAWS	De-Aromatized White Spirit Vapours
dB	Decibel, a measure of sound power
dBA	A-weighted decibels
dBC	C-Weighted decibels
dbh	Diameter at Breast Height
DCA	Detrended Correspondence Analysis
DEM	Digital Elevation Model
Devon	Devon Canada Corporation
df	Degrees of Freedom
DFO	Fisheries and Oceans Canada (Note: formerly Department of Fisheries and Oceans Canada)
dis	Disturbed
DO	Dissolved Oxygen
DOC	Dissolved Organic Carbon
DOE	Department of the Environment
DOW	Dangerous Oilfield Waste

DQRA	Detailed Quantitative Risk Assessment
DST	Drill Stem Test
DW	Drinking Water
E	East
E	Eolian
e.g.	For example
EAC	Existing and Approved Case
EC	Effect Concentration
EC	Electrical Conductivity
Eco-SSLs	Ecological Soil Screening Levels
ECS	Early Childhood Services (Education)
EDI	Estimated daily intake
EHS	Environmental Health and Safety
EIA	Environmental Impact Assessment
EIFAC	European Inland Fisheries Advisory Commission
ELC	Ecological Land Classification
EMS	Emergency Medical Services
EnCana	EnCana Corporation
ENN_CV	Euclidean Nearest Neighbour Median
ENN_MD	Euclidean Nearest Neighbour Coefficient of Variation
ENN_MN	Euclidian Nearest Neighbour Distance
ENN_SD	Euclidean Nearest Neighbour Standard Deviation
EPCM	Engineering, Procurement and Construction Management
EPEA	Alberta *Environmental Protection and Enhancement Act*
ERA	Ecological Risk Assessment
ERCB	Energy Resources Conservation Board
ERP	Emergency Response Plan
ESA	Environmentally Significant Area
ESAR	East Sise of the Athabasca River Caribou Range
ESD	Emergency Shut Down
ESL	Effects Screening Level
ESP	Exchangeable Sodium Percentage
ESR	Environmental Setting Report
ESRI	Environmental Systems Research Institute
EST	Eastern Standard Time
et al.	Group of authors
EUB	Alberta Energy and Utilities Board

F	Fluvial
F	Statistical Test Using F Distribution To Determine If Significant Differences Between 2 Means
Fb	Balsam Fir (Abies Balsamea)
FB	Fractional bias
FCSS	Family and Community Support Services
Fg	Glaciofluvial
FLE	Full Load Equivalent
FMA	Forest Management Agreement
FMES	Fort McKay Environmental Services Ltd.
FMFN	Fort McMurray First Nation
FMFN-IRC	Fort McMurray First Nation – Industrial Relations Corporation
FMU	Forestry Management Unit
FPAC	Forest Products Association of Canada
FPTCCCEA	Federal-Provincial-Territorial Committee on Climate Change and Environmental Assessment
FRAC_MN	Mean Patch Fractal Dimension
FWKO	Free Water Knock Out
FWMIS	Fish and Wildlife Management Information System
g	Grams
g/bhp-hr	Grams per brake horsepower-hour
g/d	Grams per day
g/L	Grams per litre
$g/m^2/d$	Grams per square metres per day
g/s	Grams per second
GCM	Global Climate Models
GCM	General Circulation Model
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GIC	Groundwater Information Center
GIS	Geographic Information System
Golder	Golder Associates Ltd.
GPS	Global Positioning System
GSA	Geological Study Area
H:V	Ratio of Horizontal Length (H) to Vertical Length (V) for a Specific Slope
H^+	Hydrogen Ions
H_2O	Water
H_2S	Hydrogen sulphide

H_2SO_4	Sulfuric acid
ha	Hectare
HC	Health Canada
HCO_3	Bicarbonate
HEC	Human Equivalent Concentration
HEMP	Human Exposure Monitoring Program
HHRA	Human Health Risk Assessment
HLFN	Heart Lake First Nation
HLS	Hot Lime Softener
HMW	High Molecular Weight
HNO_3	Nitric acid (gas)
HQ	Hazard Quotient
HRSG	Heat Recovery Steam Generator
HS	Habitat Suitability
HS&E	Health, Safety and Environment
HSDB	National Library of Medicine's Hazardous Substances Data Bank
HSI	Habitat Suitability Index
Husky	Husky Energy
Hwy	Highway
Hz	Hertz
i.e.	That is
ID	Improvement District
ID	Interim Directive
IJI	Interspersion/Juxtaposition
ILCR	Incremental Lifetime Cancer Risk
Imperial Oil	Imperial Oil Resources Ventures Limited
INAC	Indian and Northern Affairs Canada
IPCC	Intergovernmental Panel on Climate Change
IPCS	International Programme on Chemical Safety
IPM	Individual PAH Method
IR	Indian Reserve
IR	Ingestion Rate
IRC	Industry Relations Corporation
IRIS	Integrated Risk Information System
IRP	Integrated Resource Plan
ISC3	Industrial Source Complex Model, Version 3
ISO	International Organization for Standardization

ISQG	Interim Sediment Quality Guidelines
JEMA	Jackpine Expansion Mining Area
K	Carrying Capacity
K	Degrees Kelvin
K	Potassium
keq	Kiloequivalent – equal to 1 kmol of hydrogen ion (H^+)
keq N/ha/yr	Kiloequivalent of nitrogen per hectares per year
keq/ha/yr	Kiloequivalent per hectares per year
kg	Kilogram
kg-ww	Kilogram in wet weight
kHz	Kilohertz
KIRs	Key Indicator Resources
km	Kilometre
km/hr	Kilometre per hour
km^2	Square kilometre
kmol	Kilomole
K_{ow}	Octanol-water partition coefficient
kPa	Kilopascals
kW	Kilowatt
L	Litre
L/d	Litre per day
L/ha/yr	Litre per hectare per year
L/kg	Litres per kilogram
LAI	Leaf Area Index
LC50	Lethal Concentration 50
LCR	Lifetime Cancer Risk
LEC	Lowest Effective Concentration
L_{eq}	Equivalent continuous sound level
LFg/M	Glaciofluvial and Glaciolacustrine Over Moraine
LFH	Litter, Fibric and Humic
LFN	Low Frequency Noise
Lg	Glaciolacustrine
LGP	Low Ground Pressure
LICA	Lakeland Industry and Community Association
LMW	Low Molecular Weight
LOAEL	Lowest Observed Adverse Effect Level
Log	Base 10 logarithm

-log	Negative logarithm
Log K_{ow}	Logarithmic octanol-water partition coefficient
LP	Low Pressure
LRSYA	Long Run Sustained Yield Average
LSA	Local Study Area
LSD	Legal Subdivision
Lt	Tamarack (Larix Laricina)
LZA	Linkage Zone Analysis
m	Metre
M	Moraine
M.D.	Municipal District
m/s	Metres per second
M1	Morainal – Fine Textured
M2	Morainal – Coarse Textured
m^2	Square metres
m^3	Cubic Metre
m^3/cd	Cubic metres per calendar day
m^3/d	Cubic metre per day
m^3/ha	Cubic metres per hectare
m^3/min	Cubic metres per minute
m^3/mol	Cubic metres per mole
m^3/s	Cubic metres per second
m^3/sd	Cubic meters per stream day
m^3/y	Cubic metres per year
M^4/s^3	SI unit for Buoyancy Flux
MA DEP	Massachusetts Department of Environmental Protection
MAC	Maximum Accepatable Concentration
MAI	Mean Annual Increment
masl	Metres above sea level
max.	Maximum
mb	Millibar
mbgs	Meters below ground surface
mbKB	Meters below Kelly Bushing
mbsl	Meters below seal level
mbtc	Meters below top of casing
MCC	Motor Control Centre
MDL	Method detection limit
MEG	MEG Energy Corp.

meq/L	Millequivalent per litre
Mg	Magnesium
mg	Milligrams
mg/kg	Milligrams per kilogram
mg/kg BW/day	Milligrams per kilogram body weight per day
mg/kg/ww	Milligrams per kilogram in wet weight
mg/L	Milligrams per litre
mg/m^2/yr	Milligram per square metre per year
Mg/m^3	Milligrams per cubic metre
Min	Minimum
MJ/m^3	Megajoules per cubic metre
MJ/s	Megajoules per second
mKB	Meters from the Kelly bushing
mm	Millimetre
MM	Mesoscale Model
mm/yr	Millimetre per year
MMBTU/hr	Million British Thermal Units per hour
mmHG	Millimetres of mercury
MN	Mean Patch Size
MNA	Métis Nation of Alberta
mod1	Alberta Vegetation Inventory (AVI) Data Field for Codes Representing Conditions or Treatments Providing Additional Information About the Origin or Condition of the Cover Type
MOU	Memorandum of Understanding
MPOI	Maximum Points of Impingement
MPRL	Maximum Permissible Risk Level
MPS	Mean Patch Size
MRL	Minimum Risk Level
MSC	Meteorological Service of Canada
MSDS	Material Safety Data Sheet
MSI	Municipal Sustainability Initiative
MST	Mountain Standard Time
MW	Megawatt
N	North
N	Fen
N	Nitrogen
n	Number of samples
N/A and n/a	Not applicable

n/d	No data
N_2	Nitrogen Gas
N_2O	Nitrous Oxide
Na	Sodium
NAD	North American Datum
NAIT	Northern Alberta Institute of Technology
NCAR	National Center of Atmospheric Research
NCG	Non-Condensable Gas
ng/g	Nanograms per gram
Ng/m^3	Nanograms per cubic metre
NH_4	Ammonia
NHA	Nunee Health Authority
Ni	Nickel
NLHR	Northern Lights Health Region
NLRHA	Northern Lights Regional Health Authority
NLSD	Northern Lights School Division
NO	Nitric oxide (gas)
NO_2	Nitrogen dioxide (gas)
NO_3^-	Nitrate (particle)
NOAEC	No Observable Adverse Effect Concentration
NOAEL	No Observed Adverse Effect Level
NOEL	No Observed Effect Level
NO_X	Oxides of nitrogen (NO, NO_2) (gas), or all nitrogen species (e.g., NO_X, N_2O, NO_3)
NP	Number of Patches
NPV	Net Present Value
Ns	Shallow Fen
NSD	Northland School Division
NSMWG	NO_x/SO_x Management Working Group
NTP	National Toxicity Program Chemical Repository
NTS	National Topographic Survey
NWT	Northwest Territories
O_2	Oxygen (gas)
O_3	Ozone
OEHHA	Office of Environmental; Health Hazard Assessment
OLDCON	Old Coniferous
OMOE	Ontario Ministry of the Environment
ORF	Oil Removal Filter

ORP	Oxidation Reduction Potential
OSCA	*Oil Sands Conservation Act*
OSE	Oil Sands Exploration
OSHA	Alberta Occupational Safety and Health Act
OSVRC	Oil Sands Vegetation Reclamation Committee
OSWWG	Oil Sands Wetlands Working Group
OTSG	Once Through Steam Generator
P	Phosphorous
Pa	Pascal
PACE	Preparation for Academic and Career Education
PAH	Polycyclic Aromatic Hydrocarbon
PAI	Potential Acid Input
PDA	Project Development Area
PDC	Planned Development Case
PDD	Public Disclosure Document
PDF	Probability Density Function
PEL	Probable Effects Level
Pers. Comm.	Personal Communication
PG	Pasquill-Gifford
PHC	Petroleum Hydrocarbon
PID	Pressure Induced Drawdown
Pj	Jack Pine (Pinus Banksiana)
PM	Particulate matter
PM_{10}	Particulate matter with nominally smaller than 10 μm in diameter
$PM_{2.5}$	Particulate matter with nominally smaller than 2.5 μm in diameter
POI	Point of Impingement
ppb	Parts per billion
PPC	Plume Path Coefficient
ppm	Parts per million
ppmv	Parts per million by volume
ppmw	Parts per million by weight
PQRA	Preliminary Quantitative Risk Assessment
PR	Patch Richness
PRMA	Pierre River Mining Area
PSL	Permissible Sound Level
PST	Pacific Standard Time
PSU	Pennsylvania State University

Pt	Platinum
pTDI	provisional Total Daily Intake
PVA	Population Viability Analysis
P-value	The Probability of Quantifying the Strength of the Evidence Against a Null Hypothesis
Q	Quarter (i.e., three months of a year)
QA/QC	Quality Assurance/Quality Control
RAMP	Regional Aquatics Monitoring Program
REL	Reference Exposure Level
RELAD	Regional Lagrangian Acid Deposition Model
RfC	Reference Concentration
RfD	Reference Dose
RFMA	Registered Fur Management Areas
Rge, Rg or R	Range
RHA	Respiratory Hospital Admissions
RIC	Resources Inventory Commitee
RIVAD/ARM3	Regional Impact in Visibility and Acid Deposition/Acid Rain Mountain Mesoscale Model
RIVM	Netherlands National Institute of Public Health and the Environment
RIWG	Regional Issues Working Group
RMWB	Regional Municipality of Wood Buffalo
ROC	Receiver Operating Characteristic
ROW	Rights-of-Way
RQ	Risk Quotients
RSA	Regional Study Area
RsC	Risk-specific concentration
RsD	Risk Specific Dose
RSDS	Regional Sustainable Development Strategy for the Athabasca Oil Sands
RSF	Resource Selection Function
RV	Recreational Vehicle
RWG	Reclamation Working Group
S	South
S	Sulphur
s/cm	Light soaking time in seconds (s) per 1 centimetre
SAC	Strong Acid Cation
SAF	Slurry-at-face
SAGD	Steam Assisted Gravity Drainage
SAGP	Steam Assisted Gravity Push

SA_{org}	Strong Organic Acids
SAR	Sodium Adsorption Ratio
SARA	*Species At Risk Act*
SAS	Statistical Analysis System
Sb	Black Spruce (Picea Mariana)
SCA	Soil Correlation Area
Sd	Standard Deviation
SDI	Simpsons' Diversity Index
SE	Standard Error
SEIA	Socio-Economic Impact Assessment
SETG	Socio-Economic Task Group
SEWG	Sustainable Ecosystems Working Group of CEMA
SF	Slope Factor
SHEI	Shannon's Evenness Index
Shell	Shell Canada Limited
SI	Suitability Index
SK	Saskatchewan
SLERA	Screening-Level Ecological Risk Assessment
SLWRA	Screening-Level Wildlife Risk Assessment
Sm^3	standard cubic metre
SO_2	Sulphur dioxide
SO_4	Sulphate
SO_4^{2-}	Sulphate (particle)
SOPs	Standard Operating Procedures
sp.	Unknown Species (Singular)
spp	Multiple Species
spp.	Unknown Species (Plural)
Sq. Ft.	Square feet
SQG	Soil Quality Guidelines
SRES	Special Report on Emissions Scenarios, by the Intergovernmental Panel on Climate Change
SRU	Sulphur Recovery Unit
ssp.	Subspecies
SSWC	Steady-State Water Chemistry
Statoil	StatoilHydro Canada Ltd.
STEL	Short-term Exposure Limit

Suncor	Suncor Energy Inc. (Lease 86/17, Steepbank, Millennium, Voyageur, Firebag)
Sw	White Spruce (Picea Glauca)
SWWG	Surface Water Working Group of CEMA
Synenco	Synenco Energy Inc.
t/cd	Tonnes per calendar day
t/d	Tonnes per day
t/sd	Tonnes per stream day
TASA	Terrestrial Air Study Area
TC_{05}	Tumourigenic Concentration
TCA	Tolerable Concentration in Air
TCEQ	Texas Commission on Environmental Quality
TCU	True Colour Unit
TD_{05}	Tolerable Dose
TDGR	Transportation of Dangerous Goods Regulations
TDI	Tolerable Daily Intake
TDS	Total Dissolved Solids
TE	Total Edge
TEEM	Terrestrial Environmental Effects Monitoring Program of WBEA
TEF	Toxic Equivalency Factor
TEK	Traditional Ecological Knowledge
Temp.	Temperature
The Project	Christina Lake Regional Project – Phase 3
TK	Traditional Knowledge
TKN	Total Kjeldahl nitrogen
TLU	Traditional Land Use
TLV	Threshold Limit Values
TN	Total Nitrogen
TOC	Total Organic Carbon
TOR	Terms of Reference
TOXLINE	National Library of Medicine's Toxicology Literature Online
TP	Total Phosphorus
TPR	Timber Productivity Rating
TRS	Total Reduced Sulphur
TRV	Toxicity Reference Value
TSS	Total Suspended Solids
TWA	Time Weighted Average
TWINSPAN	Two-Way Indicator Species Analysis

Twp. Or Tp	Township
U.S.	United States
U.S. EPA	United States Environmental Protection Agency
UCLM	Upper Confidence Limits of the Mean
UL	Tolerable Upper Intake Levels
URE	Unit Risk Estimates
USGS	United States Geological Survey
UTF	Underground Test Facility
UTM	Universal Transverse Mercator
V	Vanadium
VEC	Valued Ecosystem Component
VOC	Volatile Organic Compound
VRU	Vapour Recovery Unit
vs.	Versus
W	West
W/m^2	Watts per square metre
W4M	West of the Fourth Meridian
WAC	Weak Acid Cation
WBEA	Wood Buffalo Environmental Association
WBNP	Wood Buffalo National Park
WDS	Water Data System
WF	Windfall
WHO	World Health Organization
WMU	Wildlife Management Unit
WRS	Western Resource Solutions
wt	Weight
wt%	Weight Percentage
yr	Year
z_0	Roughness Length
λ	Rate of increase
µg/d	Micrograms per day
µg/kg	Micrograms per kilogram
µg/kg/d	Micrograms per kilogram per day
µeq/L	Microequivalent per litre
µg/g	Micrograms per gram
µg/kg bw/d	Micrograms per kilogram body weight per day
µg/L	Micrograms per litre

μg/m³	Micrograms per cubic metre
μg/m³/yr	Micrograms per cubic metre per year
μm	Micron or Micrometre
μPa	Micropascal
μS/cm	Microsiemens per centimetre

APPENDIX 6-I

TRADITIONAL LAND USE BASELINE REPORT

EXECUTIVE SUMMARY

MEG Energy Corp. (MEG) is proposing an expansion to its Christina Lake Regional Project (CLRP), in order to further develop its oil sands leases in the area. The Christina Lake Regional Project – Phase 3 (the Project) is an expansion of the existing development area and will use Steam Assisted Gravity Drainage (SAGD) bitumen recovery technology. The Project will consist of two new plants and 138 new wellpads. Construction of the Project is anticipated to begin in 2010. The operational life of each plant is expected to be 25 years. Total production from the two new plants will produce an incremental increase of 150,000 barrels per day (bpd) of bitumen. It is anticipated that reclamation of the Project will be complete by 2044.

Currently, MEG is undertaking project, environmental and engineering studies in preparation for a development application which is proposed to be filed in Q2 2008. MEG's public consultation process is designed to include local stakeholders in project planning and implementation and to obtain ideas and feedback. This Baseline Report complements and extends information collected for MEG's Christina Lake Regional Project (MEG 2005) and provides information required to prepare the EIA for the Phase 3 Project.

Information for this Report was gathered through a literature review of existing Traditional Land Use (TLU) assessments commissioned by industry, and a review of existing TLU studies undertaken by First Nations. Interviews and mapping sessions were held with trappers on Registered Fur Management Areas potentially affected by the Project.

Literature reviews and interviews indicated that the Project location is situated in a region in which traditional land use activities have occurred in the past, and continue to occur. Regarding resource development in the region, First Nations are concerned about the loss and fragmentation of wildlife habitat, as well as their ability to continue traditional hunting and harvesting activities on the land. Water quantity and quality within the region is an important concern for First Nations. As such, they indicated further concerns about the potential for contaminants to enter water sources or the food chain through air emissions, waste water discharge from the Project, or potential defoliants used to maintain rights-of-way. Issues for trappers include a perceived increase in human activity due to development, which in turn affects animal populations and movement. Additionally, trappers are concerned about the future of trapping as a result of increased resource development in the region. MEG is currently arranging interviews with the Chipewyan Prairie Dene First Nation, Fort McMurray First Nation, Heart Lake First Nation, Beaver Lake First Nation, Métis in Conklin and Chard, as well as with other potentially affected trappers, in order to determine their traditional knowledge and traditional land uses within the Regional Study Area.

ACKNOWLEDGEMENTS

This Traditional Land Use Baseline Report was prepared for MEG Energy Corp. (MEG) by Golder Associates Ltd. (Golder) in support of the Christina Lake Regional Project – Phase 3 Environmental Impact Assessment.

The core management team for the Project included: Tod Collard (Senior Advisor), Ian Gilchrist (Project Director), Robin Cockell (Project Manager) and Cathryn Moffett (Project Coordinator).

Paul St. Rose served as Senior Drafting Advisor and Thanh-Van Nguyen acted as the Senior Geographic Information System Advisor. The report was prepared by Helen Evans (Traditional Studies Facilitator) and Mitchell Goodjohn (Traditional Land Use Component Lead), and reviewed by Robin Cockell and Ian Gilchrist.

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1 INTRODUCTION

MEG Energy Corp. (MEG) is a Calgary-based, privately held energy company focused on the development and recovery of bitumen, shallow gas reserves and the generation of power in northeast Alberta. MEG's Christina Lake Regional Project (CLRP) consists of 80 sections of oil sands leases within the Regional Municipality of Wood Buffalo (RMWB), approximately 15 km southeast of Secondary Highway 881 and 20 km northeast of Conklin.

MEG currently has approval to construct and operate the first two phases of the CLRP over 23 sections of land. In addition, MEG is developing a facility expansion (Phase 2B) to increase the production capacity of the Central Plant to 60,000 barrels per day (bpd). The Phase 2B plant will be located immediately adjacent to the existing Phase 1 and 2 processing facilities.

MEG is now proposing a further expansion of the CLRP to fully develop its Christina Lake oil sands leases. The Christina Lake Regional Project – Phase 3 (the Project) is an expansion of the current CLRP development area and will use Steam Assisted Gravity Drainage (SAGD) bitumen recovery technology. The Project will consist of two additional processing facilities (Plants 3A and 3B), 138 SAGD multi-well pads and associated steam generating equipment. Plant 3A will be located in the southeast corner of the lease (Sections 20 and 29-76-4 W4M) and Plant 3B will be located in the northwest end of the lease (Sections 32 and 33-77-6 W4M).

Construction of the Project is proposed to occur in two phases. Phase 3A is anticipated to begin construction in 2010, with initial steam injection in 2012. Phase 3B is anticipated to begin construction in 2012, with initial steam injection in 2014. The operational life of each plant is expected to be 25 years. Total production from the two new plants will produce an incremental 150,000 bpd of bitumen (approximately 23,800 cubic metres per day). It is anticipated that reclamation of the Project will be complete by 2044.

The Project will be located on lands traditionally used by members of the Chipewyan Prairie Dene First Nation (CPDFN), the Fort McMurray First Nation (FMFN), the Heart Lake First Nation (HLFN), and the Beaver Lake First Nation (BLFN). It will directly affect Registered Fur Management Areas (RFMAs) #1326, registered to Gary York; #2313, registered to Don Thom; #1595, registered to Connie Down-Cicoria; #1544, registered to Fred Black; #615, registered to Stuart Janvier; and #933, registered to Harry Janvier. The latter three are members of the CPDFN. Interviews are currently being arranged with the CPDFN, FMFN and HLFN. Information from these interviews, when it becomes available, will be incorporated into an updated baseline report.

MEG is completing baseline environmental studies in the Project area and is continuing with the preparation of an Environmental Impact Assessment (EIA) Application as part of the Energy Resources Conservation Board (ERCB) and Alberta Environment (AENV) requirements to amend the current CLRP approval. This report focuses on historical and current Traditional Land Use (TLU) within the Project area. Information for this report was collected by Mitchell Goodjohn (Golder Associates Ltd.) and Helen Evans (Golder Associates Ltd.), who conducted interviews with Connie Down-Cicoria and Gary York in 2007, and Don Thom in 2008. This information complements and extends information collected for the CLRP (MEG 2005) and provides information required to prepare the EIA for the Project.

2 OWNERSHIP OF INFORMATION

Rights to the use of the information provided by traditional land users for this report reside with those individuals. The traditional land users interviewed provided the information to MEG for its use in the EIA associated with the Project. Any other use, or quotation of the statements made in this report, is not permitted without specific authorization by the traditional land users who provided the information.

3 STUDY AREAS

For the purposes of this TLU report, two study areas were defined: a Regional Study Area (RSA) and a Local Study Area (LSA). The boundaries and rationale for each area are described below.

3.1 REGIONAL STUDY AREA

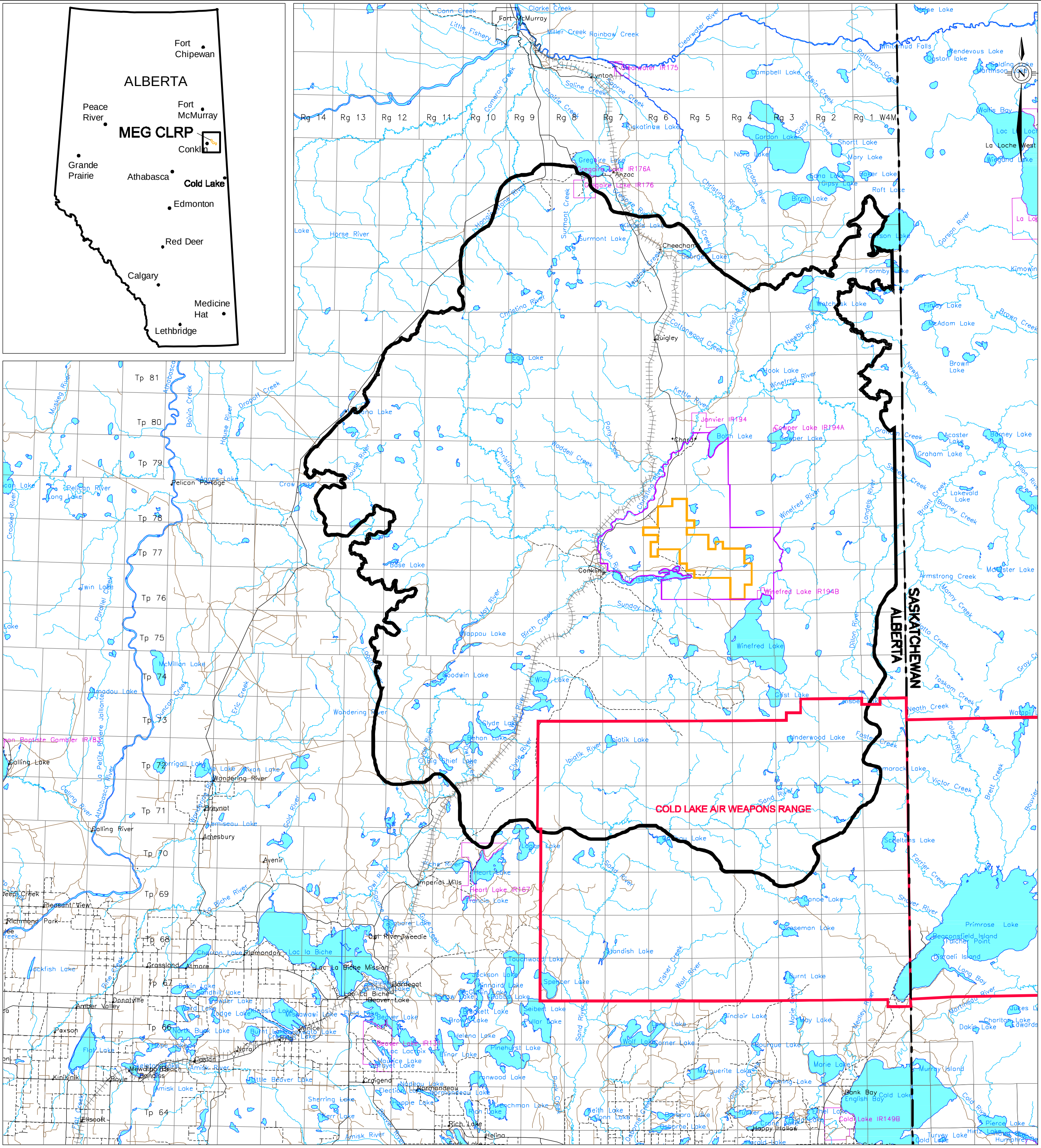
The TLU RSA is based on the Terrestrial Resources RSA and is shown in Figure 1. Traditional Land Use areas primarily include land that is used to collect traditional resources including hunted game and harvested berries or medicinal plants. It also includes areas of spiritual or historical significance based on oral tradition. The Terrestrial Resources RSA considers potential effects on wildlife and vegetation which are important components of TLU activities.

3.2 LOCAL STUDY AREA

The LSA includes the six RFMAs (also referred to as "traplines") that may be affected by the Project (Figure 2). The six RFMAs include:

- RFMA #1326, registered to Gary York;
- RFMA #1595, registered to Connie Down-Cicoria;
- RFMA #2313, registered to Don Thom;
- RFMA #1544, registered to Fred Black;
- RFMA #615, registered to Stuart Janvier; and
- RFMA #933, registered to Harry Janvier.

From the perspective of evaluation of TLU for this baseline report, RFMAs provide an appropriate basis for defining a LSA, since many traditional activities in this area are carried out within RFMAs.



L:\2007\1346\07-1346-0009-MEG EXPANSION\8600\8690\Fig 1 Traditional Land Use - Regional Study Area.dwg Apr 12, 2008 - 1:59pm

LEGEND

- ROAD
- RAILWAY
- RIVER
- OPEN WATER
- INDIAN RESERVE
- COLD LAKE AIR WEAPONS RANGE
- MEG LEASE BOUNDARY
- TRADITIONAL LAND USE REGIONAL STUDY AREA
- TRADITIONAL LAND USE LOCAL STUDY AREA

25 0 25
SCALE KILOMETRES

NOTE

* Also known as the Hamlet of Janvier

REFERENCE

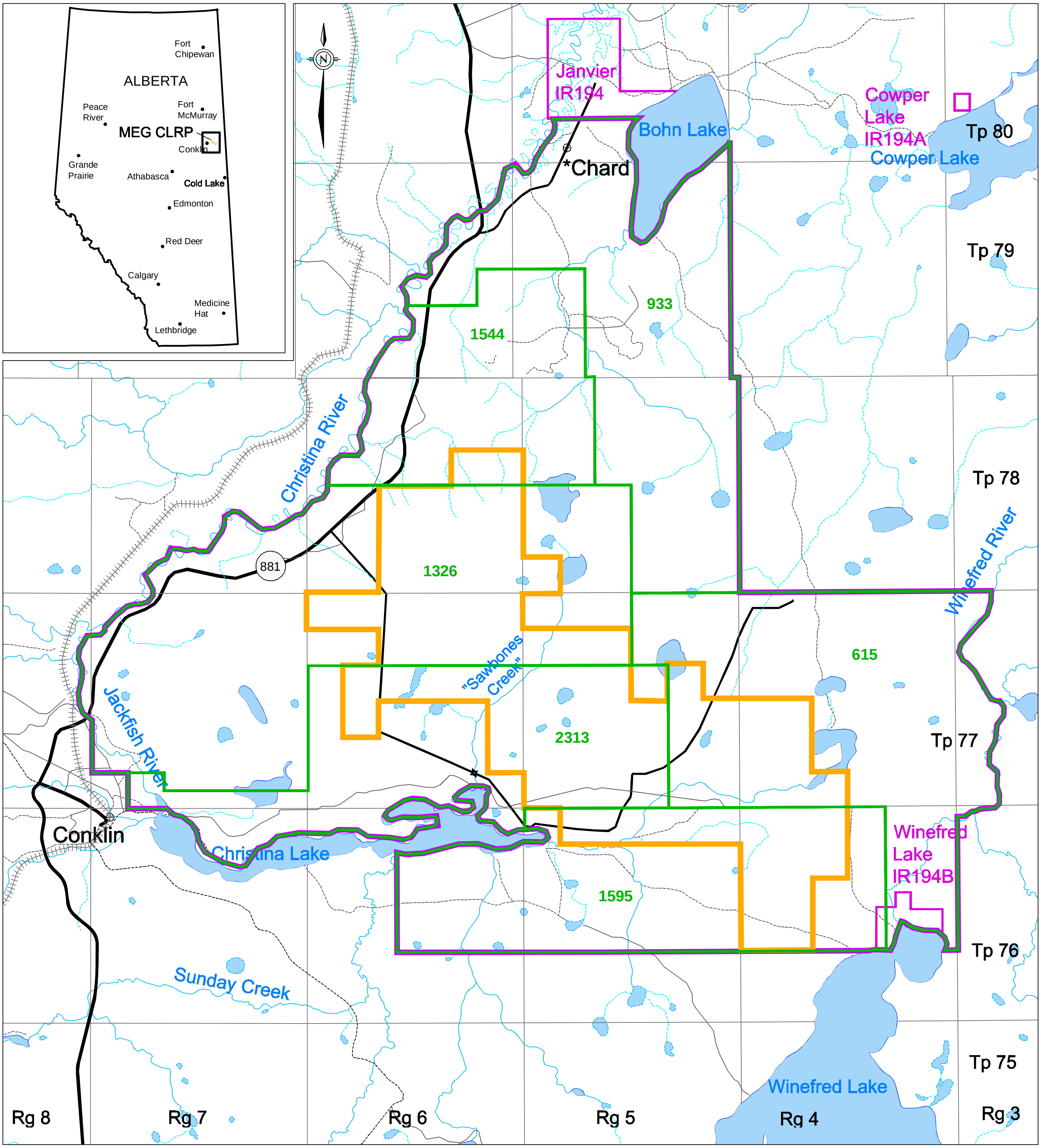
ALBERTA NTDB DIGITAL DATA OBTAINED FROM GEOMATICS CANADA, AUGUST 2001. DATUM: NAD 83 PROJECTION: UTM ZONE 12

PROJECT
CHRISTINA LAKE REGIONAL PROJECT - PHASE 3

TITLE
TRADITIONAL LAND USE REGIONAL STUDY AREA

MEG ENERGY CORP.

PROJ	07.1346.0009.8600		FILE No. TLU-RSA
DESIGN	HE	01/02/08	SCALE AS SHOWN REV. 0
CADD	TRE	12/03/08	
CHECK	MG	08/04/08	FIGURE: 1
REVIEW	IGG	08/04/08	



LEGEND

ROAD
RAILWAY
RIVER
OPEN WATER
INDIAN RESERVE
MEG LEASE BOUNDARY
TRADITIONAL LAND USE LOCAL STUDY AREA
1326 REGISTERED FUR MANAGEMENT AREA

5 0 5
SCALE KILOMETRES

NOTE

* Also known as the Hamlet of Janvier
Unnamed waterbody locally known as "Sawbones Creek"

PROJECT

CHRISTINA LAKE REGIONAL PROJECT - PHASE 3

TITLE

TRADITIONAL LAND USE LOCAL STUDY AREA AND REGISTERED FUR MANAGEMENT AREAS

MEG ENERGY CORP.

PROJ	07.1346.0009.8600		FILE No.	TLU–FMA
DESIGN	HE	21/01/08	SCALE AS SHOWN	REV. 0
CADD	TRE	12/02/08		
CHECK	MG	12/02/08	FIGURE: 2	
REVIEW	IGG	08/04/08		

L:\2007\1346 Oil Sands\07–1346–0009–MEG EXPANSION\8600\8690\Fig 2_Traditional Land Use and Registered Fur Management Areas.dwg Apr 10, 2008 – 10:26am

4 METHODS

4.1 REGIONAL STUDY AREA

4.1.1 Objectives

The objective of the TLU baseline study for the RSA was to summarize the historical and current use by the CPDFN, HLFN, FMFN, BLFN, and Métis Communities within the RSA.

4.1.2 Information Sources

MEG is in the process of arranging interviews with CPDFN, FMFN, HLFN in order to determine their specific traditional knowledge and terrestrial land use within the RSA. MEG will incorporate the results of the interviews into the planning for the Project as it becomes available.

Industry-commissioned Traditional Land Use documents were prepared for the following impact assessments within the study region:

- Canadian Natural Resources Limited Kirby In-Situ Oil Sands Project (Canadian Natural 2007);
- Devon Canada Corporation Jackfish SAGD Project 2 (Devon 2006);
- OPTI Canada Inc./Nexen Canada Ltd. (OPTI/Nexen) Long Lake South Project (Nexen 2006);
- MEG Christina Lake Regional Project (MEG 2005);
- Devon Canada Corporation Jackfish SAGD Project (Devon 2003);
- Rio Alto Exploration Ltd. Kirby Pilot Project (Rio Alto 2002);
- Petro-Canada Meadow Creek In-Situ (Petro-Canada 2001);
- OPTI Canada inc. Long Lake Project (AXYS 2000);
- ConocoPhillips Canada Surmont - Pilot and Commercial SAGD (AXYS 1999); and
- EnCana Christina Lake Thermal Project (PanCanadian Resources 1998).

Permission to incorporate traditional land use studies into MEG's development plan is in various stages of completion:

- MEG received permission from CPDFN to use information contained in their TLU study. Much of the CPDFN traditional land use information documented in this report is based on traditional knowledge documented in their study, *Kai'Kos' Dehseh Dene: The Red Willow River People* (CPDFN 2007).
- The FMFN recently released its TLU study entitled, *NISTAWAYAW: "Where Three Rivers Meet" Fort McMurray #468 First Nation Traditional Land Use Study* (FMFN 2006). MEG is in the process of consulting with the FMFN and will incorporate information from this study into the Project planning process as permission becomes available.
- The HLFN is in the process of completing their TLU study. MEG is supporting the Project, and consulting with the HLFN in order to incorporate their knowledge and land use information into the Project planning when it becomes available.
- Conklin Métis # 193 is currently completing their TLU study. MEG is supporting the Project and will incorporate their knowledge and land use information into the Project planning when it becomes available.
- MEG has recently purchased a copy of the Beaver Lake First Nation TLU study, and will incorporate information from it this study into the Project planning project.

4.2 LOCAL STUDY AREA AND LOCAL REGISTERED FUR MANAGEMENT AREAS

4.2.1 Objectives

The objectives of the TLU baseline report for the LSA were to:

- document historical and current land use of the Project area and surrounding areas by local trappers and their families;
- determine if specific traditional use areas will be affected by the Project; and
- collect traditional ecological knowledge about wildlife, fisheries and traditional plants within the Project area to support other components of the EIA.

4.2.2 Information Sources

Registered Fur Management Area holders within the Project area were interviewed as follows:

- Gary York was interviewed by Helen Evans (Golder Associates Ltd.) on November 28, 2007 to obtain information for RFMA #1326 and #1595.
- Connie Down-Cicoria was interviewed by Mitchell Goodjohn (Golder Associates Ltd.) on November 29, 2007 to obtain information for RFMA #1595.
- Don Thom was interviewed by Helen Evans (Golder Associates Ltd.) on February 11, 2008 to obtain information for RFMA #2313.
- Interviews are currently being arranged with the remaining three RFMA holders: Fred Black (RFMA #1544), Stuart Janvier (RFMA #615) and Harry Janvier (RFMA #933). Their information will be incorporated into Project planning as it becomes available.

The interviews included a standardized set of questions designed to elicit information on the following:

- plant harvesting;
- fishing;
- hunting and trapping;
- cabins, trails and access routes;
- burials, and cultural or historic sites;
- plant and animal health;
- changes in water and climate;
- past, current and planned future use of RFMAs; and
- issues and concerns related to previous and proposed development.

5 TRADITIONAL KNOWLEDGE AND LAND USE WITHIN THE REGIONAL STUDY AREA

5.1 STUDIES COMMISSIONED BY MEG ENERGY CORP.

5.1.1 MEG Christina Lake Regional Project

In 2005, MEG commissioned traditional knowledge and land use studies for the CLRP (MEG 2005). The study identified a list of traditional plants that were used for medicine or food. While the list was not exhaustive, it did indicate species important to the Conklin community (MEG 2005). Table 1 lists traditional plant species important for food or medicine.

Table 1 Traditional Plants Identified by Conklin Métis

Common Name	Latin Name	Use
pitcher plant (frog pants)	*Sarracenia purpurea*	medicine
valerian	*Valeriana dioica*	medicine
mountain ash	*Sorbus scopulina*	medicine
mint	*Mentha arvenesis*	medicine
miniature bog cranberry	*Oxycoccus microcarpus*	medicine
diamond willow fungus	*Trametes suaveolens*	medicine
chokecherry	*Prunus virginiana*	medicine and food
cattail	*Typha latfolia*	medicine
black poplar	*Populus balsamifera*	medicine
wild rose	*Rosa acicularis*	medicine
strawberry	*Fragaria virginiana*	medicine and food
kinnikinnik (bear berry)	*Arctostaphylos uva-ursi*	medicine
coltsfoot (moose ears)	*Petasites frigidus*	medicine
bunchberry	*Cornus Canadensis*	medicine
wild hazelnut	*Corylus cornuta*	medicine
Labrador tea	*Ledum groenlandicum*	medicine
red willow	*Salix laevigata*	medcine
yarrow	*Achillea millefolium*	medicine
white spruce	*Picea glauca*	medicine
balsam fir	*Abies balsamea*	medicine
sweet flag (rat root)	*Acorus americanus*	medicine
hare bells (blue bells)	*Campanula rotundifolia*	medicine
king root	unknown	medicine
saskatoon	*Amelanchier alnifolia*	food
raspberry	*Rubus idaeus*	food
pin cherry	*Prunus pensylvanica*	food
high bush cranberry	*Virburnum opulus*	food
blueberry	*Vaccinium myrtilloides*	food
bog cranberry	*Vaccimun vitis-idea*	food
low bush cranberry (moose berries)	*Viburnum edule*	food
ostrich fern (fronds, fiddleheads)	*Matteuccia struthiopteris*	food
dandelion	*Taraxacum officinale*	food

Source: MEG (2005).

In addition to summarizing the traditional knowledge and traditional land uses, the report also presented the concerns of the traditional land users. Generally communities believe the large-scale development in the Oil Sands Region have far reaching social and cultural implications for Aboriginal communities. They further believe that existing developments are already precluding some traditional practices and resource use. The report presented additional areas of concern that may still be relevant to the Project.

Water

- Brackish water may enter the underground aquifers and contaminate fresh water supplies.
- Contamination may find its way into Sawbones Creek and Sawbones Bay, which will in turn contaminate Christina Lake, the community's water supply.
- Project use of water may affect the level of Christina Lake.
- Contamination from projects may enter Christina Lake.

Air

- The community is concerned about air quality and has observed "yellow scum" on standing bodies of water and coatings on vehicles.

Vegetation

- There are concerns about the introduction of non-native plant species, as well as the effects of pesticides and chemicals (used on rights-of-way) on existing vegetation.
- There is a concern about Project effects resulting in plant mutations as well as the disappearance of medicinal plants.
- Interviews identified that berries, meat and fish do not taste as good as they used to, and that there are concerns about toxins from the Project entering the food chain.

Wildlife Movement

- There are concerns about changes in the movement of animals due to existing projects and habitat removal.
- The communities want to be involved in wildlife protection and monitoring activities and receive information from any wildlife studies.

Land Access, Preservation of Cultural Values and Sacredness

- Traditional land users feel that they have seen their traditional hunting and gathering territories diminished and removed from the "ecological reserve" through development, which in turn has a negative effect on continuing traditional practices.
- There are concerns about noise levels and intrusion from non-resident personnel detracting from the sacredness and meditative aspects of the land.
- There are concerns about garbage and litter being left behind during development.

Health, Well-Being and Livelihood

- Communities expressed concerns over a variety of health and social-related problems, which they believe to be partially the fault of a loss of traditional lifestyle. Communities want developers to be partners in supporting communities.
- Communities want to participate in projects economically and have meaningful employment opportunities during a project's operating phase.

5.2 STUDIES COMMISSIONED BY OTHER OIL SANDS OPERATORS

5.2.1 Canadian Natural Kirby Project

Canadian Natural Resources Limited (Canadian Natural) commissioned traditional knowledge and TLU studies to support its application for Kirby In-Situ Oil Sands Project (Canadian Natural 2007). The main points from the studies indicate that:

- traditional land use is still occurring within the region;
- Elders are concerned about toxins from air and water emissions entering into the food chain and contaminating their country foods;
- Elders believe that resource development in the region is partially responsible for a decrease in water levels and also believe that the surface water is no longer safe to drink;
- community members perceive an increase in health problems, especially lung problems, skin irritations and stomach problems within the their communities; and

- communities also believe that the potential cumulative effects of a particular development are not adequately considered.

5.2.2 Devon Jackfish 2 Project

Devon Canada Corporation (Devon) commissioned traditional knowledge and traditional land use studies as part of the Jackfish 2 Project. In addition to providing extensive lists and rankings for traditional use plants and traditional wildlife, the studies identified the following general concerns regarding the Project developments:

- Aboriginal communities are concerned about the protection of potable water, the control and use of subsurface water, as well as concerns about the quality of water in general;
- there are concerns about perceived declines in fish populations and fish quality;
- communities are concerned that animal movement is impaired by above-ground pipelines that are not high enough for animals to travel under;
- communities indicated that there should be better communication between developers and trappers; and
- traditional knowledge is necessary to maintain a sense of belonging to the land, as well as maintaining a sense of pride.

5.2.3 Devon Jackfish Project

Devon commissioned traditional knowledge and TLU studies as part of its application for the Jackfish SAGD Project (Devon 2003). In addition to conducting interviews with directly affected trappers, interviews were also conducted with members of CPDFN.

The Devon studies found that:

- Traditional Land Use activities are still being conducted within the region;
- project developments have the potential to affect the ability of communities to maintain the traditional lifeways; and
- Aboriginal communities want to have open communication to minimize the potential effects of projects on traditional resources such as wildlife, vegetation and habitat.

5.2.4 Other Listed Studies

Other listed studies identified concerns that are consistent with the concerns identified in the above studies.

5.3 TRADITIONAL LAND USE STUDY COMMISSIONED BY CHIPEWYAN PRAIRIE DENE FIRST NATION

The CPDFN traditional knowledge and land use information is documented in their TLU study, Kai'Kos' Dehseh Dene: The Red Willow River People (CPDFN 2007). The CPDFN is comprised of three reserves (IR) in the RSA. These include Janvier IR 194, Cowper Lake IR 194a and Winefred Lake IR 194b. A map of the CPDFN territory can be found in their traditional land use study CPDFN (2007).

The traditional territory of the CPDFN, as defined in their TLU study, is located in the provinces of Alberta and Saskatchewan. The boundary runs along the west shore of Lawrence Lake and extends north of the reserves Namur River IR 174A and Poplar Point IR 201G. The boundary continues east into the province of Saskatchewan, along the east side of Wasekarnio Lake, Peter Pond Lake and Lester Creek in the Cold Lake Air Weapons Range. The territory boundary extends back into Alberta, southeast of Frog Lake Reserve on the south side of the North Saskatchewan River.

Trails

Ridged terrain or high ground was once used to travel between communities. Trail systems are extensive throughout the CPDFN territory, originating as far south as Cold Lake to connect with Lac la Biche, Primrose Lake, Peter Pond Lake and Gordon Lake. The trail system extends north into the Birch Mountains and toward Richardson River (CPDFN 2007). Within the LSA, trails run south from Sand River to Winefred Lake, north past Janvier, and along the Winefred and Christina rivers, close to the MEG lease boundary.

Cabins and Cultural Sites

The location of cabins extends north from the west side of Winefred Lake to Richardson River. Cabins are clustered on the north and west shores of Winefred Lake, including Winefred Lake IR 194B, and west toward the east side of Christina Lake (CPDFN 2007).

There are numerous cultural sites that are sacred to the CPDFN. These are generally situated around lakes and rivers south of Winefred Lake that head north to Gipsy Lake. Several sites are situated along Winefred Lake and Winefred River, and Christina Lake and Christina River. Most of these mapped sites are situated on the northern quarter of Winefred Lake outside the MEG lease area. These include spawning sites, fish camps and grave sites. One gravesite is situated along the shores of Christina Lake. Its precise location is undetermined (CPDFN 2007). Cultural sites are clustered around the north shore of Winefred Lake and extend north to the south shore of Garson Lake. Cabins are situated on the north shore of Winefred Lake, extend north to Janvier and Bohn Lake, and up the Christina River as far north as Watchusk Lake. For further discussion of historical and cultural sites please see the Historical Resources Assessment (Volume 6, Section 5).

Trapping

Historic trapping routes extend from Primrose Lake and extend north to Richardson River. Trapped species include: badger, beaver, fisher, fox, lynx, marten, mink, muskrat, otter, porcupine, rabbit, squirrel, weasel and wolf (CPDFN 2007). Close to the MEG lease area, traditional trapping routes once extended around the perimeter of Winefred Lake, the south shore of Christina Lake, and the area east of Christina Lake, as far north as Clearwater River. Trapping took place around the shores of Winefred Lake and extended north to Janvier, Bohn Lake and Winefred River, as well as along the Christina River to the RSA northern boundary. Today, three CPDFN members currently hold RFMAs within the LSA.

Hunting

Big game hunting extends south of Sand River and north to Gordon Lake. Hunted species include black bear, cougar, elk, moose, mule deer, whitetail deer, and woodland caribou. Bear, moose and deer are found between Winefred and Christina lakes, with moose being the main hunted species in the MEG lease area. A salt lick situated on the northwest side of Winefred Lake is an aggregation spot for many animals and is important for the health of large game (CPDFN 2007). Within the RSA, hunting occurs as far south as Sand River and extends north to Winefred, Christina and Bohn lakes, as well as along Christina and Winfred Rivers north to the RSA boundary.

The CPDFN hunt Canada goose, crane, crow, curlew, duck, grouse, loon, ptarmigan and “seagull”. The birds are caught mainly between Bohn and Gipsy lakes. Situated near the MEG lease area, ducks and loons are taken on Winefred Lake, but no waterfowl are hunted at Christina Lake (CPDFN 2007). Within the

RSA, waterfowl are hunted mainly around Bohn Lake and along the Winefred and Christina rivers, with fewer birds hunted around Winefred Lake.

Fishing

Historically, the CPDFN fished in Winefred Lake and in waterbodies situated as far north as the Clearwater River. The majority of fish are caught in Winefred and Bohn lakes and the CPDFN do not fish at Christina Lake. Caught species include grayling, jackfish, pickerel, sucker, trout and whitefish (CPDFN 2007). Within the RSA, fishing occurs in Winefred Lake, Bohn Lake, around Janvier, and north along the Winefred and Christina rivers.

Berries and Plants

Edible and medicinal plants are harvested within the traditional territory. Blueberries and cranberries are the most commonly collected plants and supplemented with chokecherries, raspberries, strawberries, saskatoons and rosehips. Most traditional plant harvesting occurs between Bohn and Gypsy lakes and along the Christina and Winefred rivers located north of the MEG lease area. Within the RSA, plant harvesting occurs mainly around Bohn Lake and Janvier, with some berries collected south along Winefred River and north along the Christina River. Edible and medicinal plants are harvested in these areas because of diverse habitats situated around lakes and rivers (CPDFN).

5.4 OTHER FIRST NATIONS

5.4.1 Fort McMurray First Nation

The FMFN is comprised of four reserves. These include the Clearwater IR 175 located at the junction of Clearwater and Christina rivers and Gregoire Lake IRs 176, 176A and 176B, each situated on the south, west, and east sides of Gregoire Lake, respectively. Most members of the First Nation supplement their traditional lifestyles of hunting, trapping and fishing with non-traditional jobs (AXYS 1999, 2000).

The RSA is situated within the traditional lands of the FMFN. The FMFN completed their TLU study (2006) and MEG is negotiating permission to incorporate this data into the Project planning. MEG is also in the process of arranging interviews with the FMFN and will include the information as it becomes available.

5.4.2 Heart Lake First Nation

The RSA is situated within the lands of the Heart Lake First Nation. The HLFN has two reserves that include Heart Lake IR 167 and IR 167a. The HLFN are currently undertaking their TLU study and MEG is arranging interviews as well. MEG will incorporate this information as it becomes available.

5.4.3 Chard and Conklin Métis

MEG is currently consulting with its other Aboriginal stakeholder communities to document their traditional knowledge and Traditional Land Use information within the LSA. Conklin Métis # 193 is currently undertaking their TLU study and MEG is working with Chard Metis Local #214 to arrange elder interviews. When complete, this information will be incorporated into an updated baseline report.

6 TRADITIONAL KNOWLEDGE AND LAND USE WITHIN THE LOCAL STUDY AREA

Figure 3 shows areas of traditional knowledge and land use within the LSA. For reasons of confidentiality, only those activities within or close to MEG's lease area are shown.

6.1 REGISTERED FUR MANAGEMENT AREA #1326

Registered Fur Management Area #1326 is held by a Métis trapper. The information summarized in this section was obtained from an interview conducted with the holder on November 28, 2007.

6.1.1 Historical Use and Current Use

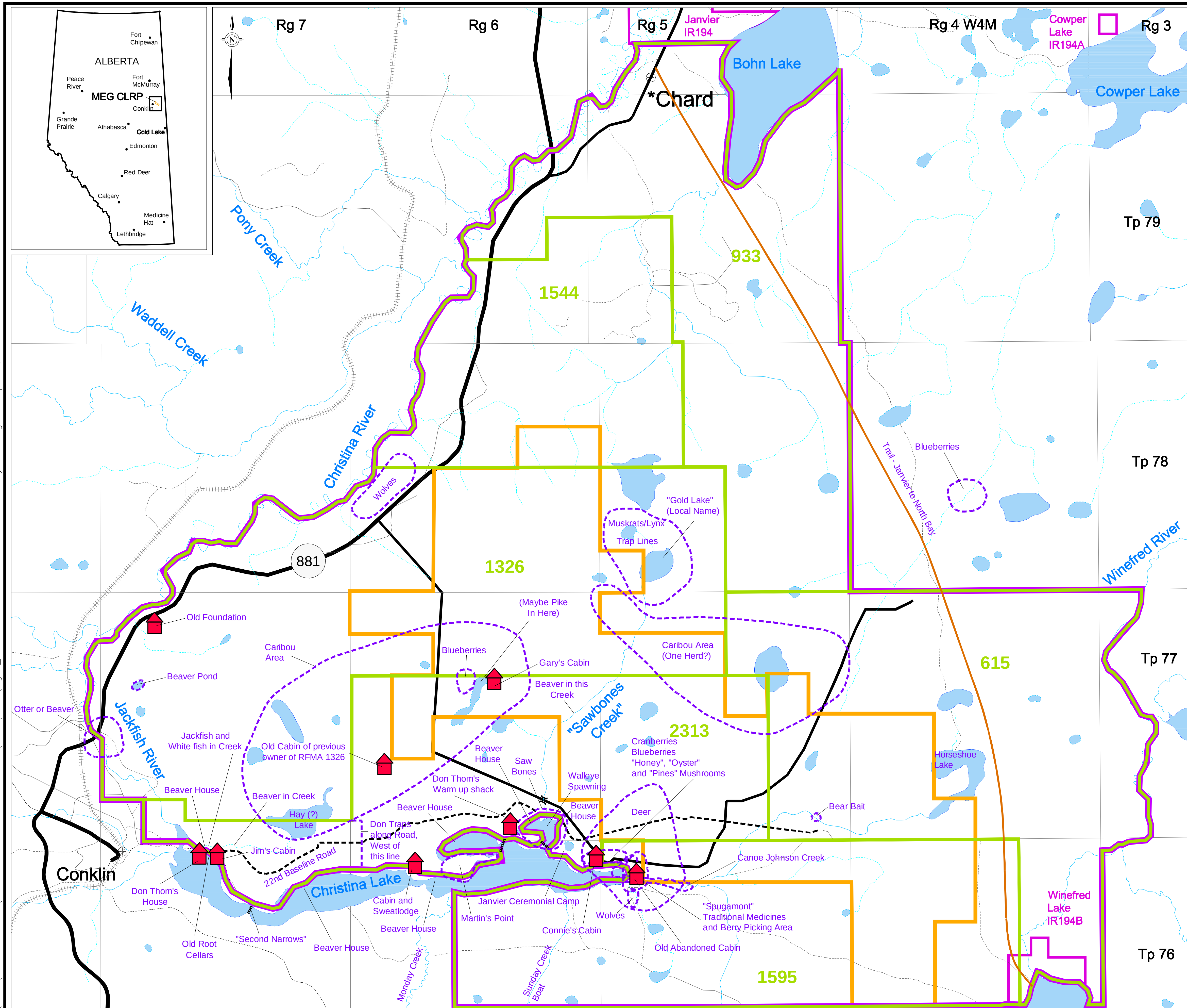
The holder of RFMA #1326 has held the trapline for about 15 years, having taken it over from a trapper in Conklin. The holder's nephew has been his junior partner for the past three years. Previously, the holder had various junior trappers who wanted to learn to trap.

The holder indicated he is also the junior partner for the registered holder of RFMA #1595. The holder of RFMA #1326 uses both his trapline and RFMA #1595 interchangeably and accesses both by road.

The holder uses the traplines not only to hunt and trap, but also as places for relaxation. During the summer, his father visits the trapline. His mother does not visit due to her age. The holder used to hunt and trap with his mother on her trapline south of Conklin. When she sold her trapline, the holder acquired his current trapline which was located closer to where he lived and had easy access. Friends and family also visit the trapline, especially after there has been a snowfall. When the holder is at the trapline, he is busy with upkeep such as cabin maintenance, trail cutting and wood cutting.

6.1.2 Plant Harvesting

The holder indicated that he picks blueberries and low bush cranberries on this trapline in areas situated in pine groves or in cutblocks. One of the creeks on his trapline is also a good berry picking area, as is an area on the northwest side of an unnamed lake on the southern boundary of his trapline. The holder indicated that he does not pick saskatoon berries or raspberries, although they are found on this trapline.



LEGEND

- ROAD
- RAILWAY
- OPEN WATER
- INDIAN RESERVE
- MEG LEASE BOUNDARY
- REGISTERED FUR MANAGEMENT AREA
- TRADITIONAL LAND USE LOCAL STUDY AREA
- CABIN
- AREAS OF TRADITIONAL LAND USE ACTIVITIES
- TRAIL
- ANIMAL CROSSING

NOTE

* Also known as the Hamlet of Janvier
Unnamed waterbody locally known as "Sawbones Creek"

3 0 3
SCALE KILOMETRES

PROJECT
CHRISTINA LAKE REGIONAL PROJECT - PHASE 3

TITLE
TRADITIONAL LAND USE WITHIN THE LOCAL STUDY AREA

MEG ENERGY CORP.

PROJECT	07.1346.0009.8600	FILE No.	TLU – LSA
DESIGN	HE	20/11/07	SCALE AS SHOWN	REV. 0
CADD	TRE	11/03/08	
CHECK	MG	08/04/08	
REVIEW	IGG	08/04/08	

FIGURE: 3

L:\2007\1346 Oil Sands\07-1346-0009-MEG EXPANSION\8600\8690\Fig 3_ Traditional Land Use in the Local Study Area.dwg Apr 10, 2008 - 10:35am

He also collects berries outside his trapline and west of the Project area. The holder further indicated that people go to pick berries near Cowper Lake, but he prefers to pick berries in the area of his trapline.

The holder said he enjoys picking mushrooms and collects them mainly at the northeast end of Christina Lake, on RFMA #1595. He harvests "honey" mushrooms, "oyster" mushrooms and "pine" mushrooms, picking as many as possible to dry and store through the winter.

The holder explained that there were not very many blueberries this year and he was only able to pick a few cups to eat on the spot. In other years there are lots of blueberries and he collects a few pails to preserve for the winter. The holder indicated that he picks berries because he enjoys eating them and does not collect berries or other plants for medicinal purposes.

In addition to harvesting berries on his own trapline, the holder also harvests berries on RFMA #1595.

6.1.3 Fishing

RFMA #1326 has several small lakes on it. The holder explained that even though there have been studies indicating the presence of fish, he has not been successful at catching any. For example, he is certain that pike live in the unnamed lake on the southern boundary of his trapline, but has not had any fishing success there. The holder noted a creek that leads from the west side of Christina Lake to Hay Lake where jackfish spawn. As fishing is not permitted there, he catches grayling in the Jackfish River.

The holder explained that there used to be a commercial fishery at Christina Lake until about four or five years ago. Studies were conducted and it was determined that walleye was a collapsed fishery, resulting in closure of the commercial fishery. The holder further indicated that he does fish in Christina Lake, but follows the catch and release policy with walleye.

6.1.4 Hunting and Trapping

The holder of RFMA #1326 hunts moose, bear and deer throughout a large area. He traps wolves, coyotes, fisher, fox, beaver, squirrels, weasels and a few muskrats on his trapline as well as on RFMA #1595. He further indicated that he traps the same numbers of animals on each trapline. Approximately 50 to 60 chickens (spruce grouse) are caught each year and they are usually taken by the side of the road.

The holder traps along Secondary Highway 881 on the west portion of his trapline. There was one place where he preferred to access the Christina River, but someone went on the road a few years ago and left very deep ruts. As a result, he can no longer access the river at that location. The holder also sets traps at various locations off of Secondary Highway 881. There are a few other locations where he often accesses the river. The holder traps many beaver and otter on three or four ponds situated close to the Jackfish River. He indicated that the past year was particularly good for catching otter, although the price for otter pelts was very low.

The holder believes that some of the wildlife population fluctuations in the area are part of the natural cycle rather than a result of industry. For example, he indicated that lynx populations are coming back slowly after crashing from a high population six years ago. Last year he caught eight lynx and anticipates getting ten to twelve this year. Rabbit populations are also making a small recovery after a decline over the past several years. In contrast, the holder indicated that fisher populations have remained fairly constant. Also, he said that although he had never previously seen a marten on his trapline, he caught one this year and saw another. Additionally, he has never seen a cougar in his trapline area. Wolves are hunted on the northwest side of his trapline, in an area situated between the Christina River and Secondary Highway 881. Within the area, the holder hunts bear both on and off his trapline. He baits bear along the road on his own trapline.

Pelts are sold at fur auctions, such as the North American Fur Auction. The holder indicated that there is a fur depot in Westlock and that the prices vary markedly from year to year. He further explained that although he traps for the enjoyment, he was disappointed this spring when his batch of 78 furs got an average price of 17 dollars.

The holder said that he kills one moose a year because that is all his family can manage to eat at home. He pointed out that moose are easy to find, but one needs to know where to look. He believes the moose population has decreased in the last 10 years. Currently, moose are seldom seen along the roads and he further indicated that he had not seen one as of November 2007. He believes that increased road access has led to unnecessary animal killings by local people, citing an example of five moose killed for sport at the same time. The holder also stated there is unnecessary and opportunistic hunting in March and April when moose are carrying young. He believes that increased development has opened up more access, especially in the winter, making moose easier prey. Additionally, when Winefred Lake freezes, there is access to the other side, which in turn has resulted in a decrease in the moose population on the east side of the lake.

The holder explained that a herd of thirteen caribou roams through the southeast corner of his trapline and added that although he is entitled to hunt them, he leaves the animals alone because of their population difficulties. He pointed out that people from Janvier will sometimes take a caribou. The holder is aware of another caribou herd that travels along kilometre 128 of Secondary Highway 881, just south of the MEG lease. He sees quite a few in his travels and stated that when the animals are in rut the meat tastes poor. He believes it is possible that open cut lines may enable wolves to chase caribou more easily.

6.1.5 Cabins, Trails and Access Routes

The holder uses an all-terrain-vehicle or truck to access his traplines. He enters from Secondary Highway 881 and has trails all over the RFMA which take him as far as the unnamed lake on the north boundary of the trapline. When everything freezes he can drive right to the lake with a pickup because he knows all the cutlines. The larger lake south of the unnamed lake is known locally as 'Gold Lake'. The holder explained that each year he tries to beat other trappers to this lake to trap muskrats. Although the lake is on his trapline he does not mind if other people get there before him and lets them trap there if they get there first. There is another small lake in between 'Gold Lake' and the unnamed lake, which he describes as a good lake and a nice area to trap lynx and muskrat.

In the winter, access to the trapline is by snowmobile. Sometimes when the road is clear the holder is able to check the line with his truck which he finds easier and more efficient for checking traps. The holder indicated that weather patterns have remained constant, with normal fluctuations, and added that early snow in the past two years made it harder for the ground to freeze. The holder's cabin is situated on the northeast edge of the unnamed lake on the south boundary of his trapline. He has not used this cabin for several years and currently uses the cabin on RFMA #1595.

The holder showed the location of several other cabins situated in, or close to the MEG lease area. An old abandoned cabin is situated next to the creek on the east side of Christina Lake. The holder is uncertain how old the cabin is but indicated that the roof has collapsed and only a few logs remain upright. He added that the shed is still standing. There is an older cabin situated on the north side of Christina Lake, on RFMA #2313, as well as a cabin and sweat lodge by the narrows on the north side of Christina Lake. The holder further indicated that there is an old cabin foundation along Secondary Highway 881, near the Nexen camps, that had associated china fragments. He said he recovered an old English china cup with an ornate pink and white pattern and was further surprised it was all in one piece with only a tiny crack. The holder has heard from neighbours that there is an old cabin by the Christina River. While he hasn't verified this, the holder does believe there may be one there.

6.1.6 Burial and Cultural/Historical Sites

The holder stated that people from Janvier (IR 194) currently like to camp on the north side of Christina Lake and have occasional ceremonial activities in which items such as cloth are hung from trees. He added that people from Janvier have been going to the camp since long before he arrived in the area, but is uncertain how long the site has been in use. Apparently, the trail has been around for a long period of time.

The holder has heard of burial sites situated by North Bay on Winefred Lake. He has never seen the burials but suspects they are situated on the reserve (IR 194B). As indicated earlier, there is a sweat lodge next to the cabin in the woods on the north side of Christina Lake, by the narrows.

He is also aware of an old trapping trail that cuts across country from the reserve (IR 194B) at the north end of Winefred Lake to Janvier and Chard. He indicated that the trail crosses his north road and believes it continues along the west side of Bohn Lake.

6.1.7 Proposed Future Use

The holder of RFMA #1326 does not know what is going to happen in the future with the trapline. He says there is quite a bit of development from various companies and a lot of work occurs along Secondary Highway 881. He further described the area as getting "chopped up." He would be interested in passing the trapline down through his family but he does not know what will happen. He is not sure what to make of rumours that companies would like to close down all the traplines because trappers are too much of a problem for oil companies. He believes that he does not have much say in the future use of his trapline due to the difference in power between trappers and energy companies.

The holder does not trap as much as he would like to, and would like to do more. He indicated that he finds it difficult to trap as he is busy with work, seems to be rushing around and finds it hard "to get everything done". He pointed out that while he likes the idea of retiring on his trapline and doing what he enjoys, he reiterated that he does not know what will happen in the future.

The holder also uses his trapline for educational purposes. For example, he showed a woman from Conklin how to set and check traps because she was interested in getting her own trapline. He also knows a woman from Heart Lake who wants to bring several children out to the line to learn how to trap. He plans to take them out in the spring, as he is sure to catch a few animals at that time of year. He also takes furs to various schools to show to the children. With regard to hunting, the holder guided two bear hunters on his trapline. He also has guided for white tailed deer, but does not do this activity on his trapline.

6.1.8 Changes Due to Development

The holder believes that increased access has increased the number of people in the area, resulting in a decrease in the moose population. He further indicated that he used to trap mainly close to the road, but has found it harder in the past five years with increased traffic and congestion associated with energy and oil sands development in the region.

He explained that when there was only one company in the area, there were fewer people and the increased access enabled him to travel extensively to set traps. He still believes that the increased access allows him easier travel to various parts of his trapline, but only to a certain point. For example, because of the increase in traffic, he now finds that it is not feasible to trap many of the areas that he previously did. He further explained that 3-D seismic activities create many closely spaced lines and much activity in the area.

The holder also explained that he had to quit trapping at beaver ponds situated along Secondary Highway 881 when Alberta Transportation became upset with his trapping activities. Nexen has a couple of big camps situated along one of the big trails leading to the river. They have a winter drill camp and this past year they built another smaller camp. The holder stated there are some very nice trapping places along the river but he does not want to set traps too close to the camps.

There are a few people that access the trapline to hunt, but this is generally not a problem for the holder. He explained that hunters usually are local and from Janvier. They used to drive up and down the roads to hunt moose but this has slowed down over the last few years. Instead, people from Janvier prefer to go to their main spot at Winefred Lake when the water freezes. The holder indicated that a few trucks tried to make it there in early November 2007, but it was too early in the season. Apparently, the water had not yet frozen and one of the trucks broke through and was stuck in the muskeg.

Last year was the first time the holder experienced theft on his trapline. One lynx was stolen from its snare and one fisher was also taken, along with the traps.

Previous to this experience, the holder had one timberwolf taken from a trap along Secondary Highway 881. In that instance, the holder believes someone had followed him and managed to take the wolf first. He had noticed human tracks and could see where someone had untied the snare from the tree. He described that experience as “maddening.”

The holder stated there has been no vandalism associated with his cabin but knows many people who have experienced such difficulties. He did have a canoe taken but managed to get it back. He suspected that someone needed the canoe to recover a moose that was further down the creek. He stated he was lucky that someone flying overhead saw the canoe in the bush which resulted in him retrieving it. In spite of the foregoing, the holder believes the incidence of theft is minimal and for the most part he gets along well with the local people.

The holder stated that several areas that were once good for collecting berries have since been cleared for cutblocks. He also pointed out that clearing cutblocks ruins the small shrub and lichen habitats that attract the caribou. He further explained that moose are attracted to cutblocks and noted that 28 moose were drawn to a set of cutblocks near Winefred Lake, at which time they were killed at one time for sport. He said that eight to 10 years ago (before the cutblocks were made), one would see about 15 moose annually near Winefred Lake.

As a result of the forest harvesting activities, he would like to see the stands of large spruce along the Christina River (north of the Nexen camp) protected. He believes that because the trees are close to the river, they likely will not be harmed. However, he described the area as “truly beautiful” and would like assurance that the area around the spruce remains undeveloped. The holder also described a huge rock situated on the Christina River that contains fossils. He said he has recovered some beautiful pieces from this rock and further described some as fossilized shell that he has not previously seen in the area. The holder did not show the location of this rock.

The holder said it is good for the companies to keep trappers informed about their plans for future development. He stated that good communication is important and believes that MEG is the only company that has discussed their plans in a public forum before development.

6.2 REGISTERED FUR MANAGEMENT AREA #1595

The information summarized in this section was obtained from an interview conducted on November 28, 2007 with the holder and her junior partner.

6.2.1 Historical and Current Use

The RFMA #1595 is currently held by a non-Aboriginal, who lives in Calgary. The RFMA holder indicated that she took over the trapline 10 years ago. She has a junior partner who actively traps this trapline, as well as his own RFMA #1326.

6.2.2 Hunting and Trapping

Although the RFMA holder does not hunt, she said she has noticed an increase in the number of caribou over the last four or five years. Her junior partner hunts within a large area that includes both RFMA #1595 and his own RFMA #1326. He hunts moose on the southern portion of RFMA #1595, in a wide area around a small unnamed lake. He finds it a good place to see moose and he has killed several from that area. He usually travels by quad and states it is fairly easy to find the animals using the bull call. The junior partner also indicated that he baits bear frequently close to Christina Lake. He used to have one bait trap on the north shore of Christina Lake, near a make-shift camp used by hunters from Janvier (IR 194), but has since removed it because of the number of people that frequent the area. He indicated that he now baits north of the camp on the north side of a small lake. On RFMA #1595, the junior partner places baits on Johnson Creek about midway between Horseshoe Lake and Christina River.

The junior partner indicated that deer may be found throughout the area. He tends to hunt them around the main cabin and out toward the southeast end of Christina Lake. He further explained that the deer stay until late December after which they head for areas of large pine and spruce trees, which are sources of food. Every fall the junior partner typically catches a couple of deer and hangs them at the cabin for fresh meat. He says it is a nice way to spend the fall months. Although he typically stays at a camp, he would prefer to stay at the cabin more.

The junior partner indicated that this is the first year that he has observed marten on this trapline. To date, the RFMA holder has not seen cougar on her trapline. She indicated that species trapped on her trapline include fisher, beaver, lynx, wolf, bear, coyote, fox, marten, weasel (ermine), and otter. Most of the trapping is conducted by the junior partner. As indicated previously, the junior partner uses RFMA #1595 and #1326 interchangeably and traps the same numbers of animals on each trapline. He indicated that he catches about 50 to 60 chickens (spruce grouse) a year and they are usually taken by the side of the road. On RFMA #1595, the junior partner said he catches fisher by the cabin on the northeast side of Christina Lake. In the same area, he also traps 15 to 20 coyotes each year. He added that he also catches a silver fox from time to time, which he described as not unusual. Wolves are trapped on the southeast side of Christina Lake.

The junior partner uses either a boat or canoe on Christina Lake and associated creeks on RFMA #1595. If the water level in the creeks is too low for a boat, he will use a canoe, but he prefers to use a motor boat for setting and checking traps, as he can cover a larger area. He traps beaver on Johnson Creek situated on the east side of Christina Lake and also traps on Sunday Creek and the top portion of Monday Creek, both of which flow south, out of Christina Lake.

6.2.3 Plant and Berry Harvesting

The RFMA holder does not collect vegetation on her trapline, but her junior partner does. Cranberries are picked mainly in the pines on the trapline, between the cabin and the shore of Christina Lake. Blueberry patches are also found in the same area. As indicated earlier, her junior partner harvests “honey” mushrooms, “oyster” mushrooms and “pine” mushrooms on her trapline, in the NE area of Christina Lake.

6.2.4 Fishing

The RFMA holder fishes on Christina Lake. She catches walleye (catch and release) and jackfish. The holder indicated that she has not noticed any changes in fish quality. The junior partner mainly fishes on Christina Lake. He believes the water quality in the Christina River is fine and that there has not been any change in quality. The junior partner indicated that the fish in the river are healthy and plentiful, especially the walleye which, he reported, weigh between five and six pounds. He also understands that some people caught fish weighing as much as nine pounds this past summer. Over the summer he said he caught an estimated 40 to 50 walleye (all released), but at other times he has caught more. He added that he catches pike and the occasional perch, but very few of them.

The junior partner usually sets nets on Christina Lake twice a year to catch whitefish and jackfish. He said that he usually keeps about a dozen jackfish and whitefish, but often catches more. The most he has caught is 90 fish. He had not set a net yet in 2007, but planned to do so in December. He added that he will typically catch about half a dozen fish weighing six to seven pounds each.

He has not fished in any of the other lakes this past year. He explained that he has been as far as Winefred Lake because RFMA #1595 extends that far, but he has not fished there.

6.2.5 Cabin Sites

The main cabin is located close to the north shore of Christina Lake, at the east end of the lake. Year-round access is via the MEG road on the north side of the lake, which runs close to the cabin.

6.2.6 Concerns About Increased Access

The holder believes that the Project will increase access into the area, with a resulting increase in human population in the area. She has noticed an increase in people from various workcamps as well as the general public that will cause the animals to move away, and indicated that she has noticed this already.

The holder further indicated that she has had some minor disturbance to her cabin. Additionally, she said her junior partner lost traps containing lynx and a fisher due to theft and vandalism. She reported this to MEG. The holder believes that the road security has helped and has resulted in a decrease in outside hunters coming into the area.

6.3 REGISTERED FUR MANAGEMENT AREA #2313

Registered Fur Management Area #2313 is currently held by a Métis trapper. The information summarized in this section was obtained from an interview conducted with the holder on February 11, 2008.

6.3.1 Historical Use and Current Use

The holder of RFMA #2313 took over the line in 1986 and has recently taken on a junior partner. The holder's son is currently taking a trapping course and hopes to take over the line in the future.

The holder's house is situated on his trapline where he lives year round. He also uses the line to hunt, trap and fish. The holder continues to use the same sets a previous owner made and placed along the old road named the 22nd Baseline. Throughout the years the holder has also been involved in nearby seismic work and feels very connected to the area.

6.3.2 Plant Harvesting

The holder does not pick berries but states there are many good areas to harvest plants along the trapline. Martin's Point, Sawbones Bay and the east end of

Christina Lake are good areas to collect blueberries, cranberries, and sometimes strawberries. The holder's ex-wife used to pick berries in these areas. The holder's friend, who was present for the interview, stated her grandmother used to pick traditional medicines near her old cabin located at the east end of Christina Lake. This area is known locally to the Aboriginal people as 'Spugamont', and is still used as a medicine gathering area.

6.3.3 Fishing

The holder fishes in different locations along the Christina River at different times of year. Sawbones Bay is a great spot to fish because it is a good walleye spawning area. The holder describes Sawbones Creek and Sawbones Bay as the most sensitive areas because they are large spawning grounds that should be protected. Spawning also occurs along all the creeks entering Christina Lake. For example, a creek located on the west end of Christina Lake is a well known location for the spawning of jackfish and whitefish.

The holder fishes along the entire northern shore of Christina Lake and described the second narrows as a great place to catch fish. The holder said he varies his location for fishing based on the time of year. At the start of the year, spawning occurs on the east side of the lake and as the summer progresses, the holder fishes closer to his house.

The holder has seen a decrease in fish populations and stated the catch and release policy for walleye has helped the populations rejuvenate. He stated this has been an inconvenience for him, but it is of little consequence to the oil companies who added to the situation. For example, the holder described the problem created when Trans West put in a road that leads to Sawbones Bay. This allowed native people easy access to net at this sensitive spawning location. The holder has not noticed changes in the quality of water or fish, but stated it is not his responsibility to monitor these changes.

6.3.4 Hunting and Trapping

The holder used to use an old road called the 22nd Baseline as his trapline. He would put his sets right along the road and worked the area for years. Many of the sets he uses today were built by a previous owner. He states it used to be great because all the traps were out there and it was a great set-up, but recently the oil companies have started to knock them over. He would like to pull his line and put it by the lake or move it, so the oil companies cannot damage it; but added it is a lot of work to cut trails. When the holder first acquired the trapline he would leave the eastern portion of the 22nd Baseline Road alone as a reserve area. He stated that currently, MEG is in there all the time and it is no longer worth the effort to trap there.

The holder stated that animals congregate by the water, depending on the season. During the winter when it gets cold on the lake, the animals pull back from the lake. Therefore he believes his trapline is situated in a good location.

The holder traps beaver, mink, fisher, wolf, and coyote. He further indicated that lynx, otter and fisher populations were down but they are making a come-back. The holder stated there was a limited quota on all three for a while, but the quota has now been raised. In general, animal populations are maintained. The same is true for wolves and coyotes.

The holder states he was never very good at getting wolves because they are quite smart and that he only manages to catch a few every year; but finds coyotes easier to catch. The number of animals he catches varies depending on the amount of time he is able to put into trapping. The holder explained that currently, trapping is like a hobby, because he works 12-14 hour days. When his kids were younger he had more time to trap, because his wife would work, and he would stay home with the kids. When she returned from work he would go out to trap. For the past 12 years the holder has been able to trap when he has had a day off, and now, it has become a recreational activity for him. He would like to trap more if he had the time. His oldest son lives in Fort McMurray and is taking a trapping course. He wants the holder to keep the line so he can visit and use it.

The holder traps beaver along the Christina Lake. There are numerous beaver lodges the holder revisits every year. The holder indicated that once houses become vacant, they are generally reoccupied by other beavers. There are six lodges the holder revisits regularly along the creeks that enter Christina Lake and along the north shore of the lake. The holder mapped the ones he revisits but stated almost all the creeks will have beaver because their populations have been steady.

The holder sometimes ships his furs for auction, but he prefers to tan them and sell them privately to someone who will “appreciate them.” The furs must be tanned before they are sold. The holder pays to ship the furs to the tannery and the government obtains royalties from the furs. He said he has always wanted to know how to tan the traditional way but has never formally learned. He knows the basic premise but stated it is easier to ship them.

The holder indicated that all of Christina Lake is good for hunting. There are a lot of animals that cross at the second narrows where the water narrows to about 60 feet across. It is a bit of a swim but moose cross it regularly and the holder believes deer may cross there too. There are two additional animal crossings by Martin's Point and Sawbones Bay that are good for hunting. Christina Lake is narrow enough that if a wolf is chasing an animal they will cross anywhere. The holder stated the widest spot on this lake is less than two miles. `

The holder does not hunt bear. He stated he has taken down five or six in his entire career, but they are usually problem animals. He claims humans are usually the problem – not the bear. The holder has not seen any cougars in the area but he has heard stories that they are around.

The holder stated that while he used to hunt mainly near the shore line of Christina Lake, with all the new access roads, he now finds it easier to hunt further away. He sometimes hunts by Winefred Lake but stated he does not hunt that much any more. He indicated that with the new access roads and additional people in the area he is afraid of being shot. He feels safe hunting on his trapline but kills few animals. He mainly kills moose because it is his choice meat. He seldom kills deer.

The holder stated that woodland caribou are protected in the area, so he leaves them alone. He said the populations are good and he has seen them travel along the northwest section of his trapline. He believes they travel further northeast toward RFMA #1326. They gather wherever there is muskeg and he also identified a woodland caribou zone. The holder is not aware of people hunting woodland caribou, but stated that although rare, a few have been harvested over the last 20 years.

6.3.5 Cabins, Trails and Access Routes

The holder stated that back in the "old days", the 22nd Baseline Road was a main road that extended all the way to Saskatchewan. Today, the holder mainly traps along the 22nd Baseline. While he also has several trails along the trapline, he mainly uses cutlines and roads made by oil companies. He travels by truck, skidoo and ATV, depending on the season.

The holder lives year round in his house situated on the northwest side of Christina Lake. He states that there is an old cabin in the campsite right next to the creek, and it is still standing. The holder sometimes has people stay there, but he does not use it much. It is used primarily as storage space. The holder also owns a “warm-up shack” near Sawbones Bay. The cabin is available in the event someone falls through the ice.

The holder also described another old cabin located by Sawbones Bay that was occupied by a doctor some time ago. He added that the cabin would have been built before 1906 – or the time of the railroad.

The holder also described an old cabin on the east side of Christina Lake in the area known as ‘Spugamont’. Additionally, the previous owner of trapline #1326 owned a cabin on the northern border of the holder’s trapline. Although the two traplines are situated close together, the location of this cabin annoyed the holder.

6.3.6 Burial and Cultural/Historical Sites

The holder stated there is a lot of history associated with Martin’s Point. He added that today, many people use it for camping because the area is so beautiful. Apparently, there used to be an old mink ranch situated there before the railroad was built. The holder explained that before the era of the railroad, all of Conklin used to be located down by Christina Lake. When the railroad was built they moved the town site.

The holder stated that there is a campsite by Christina Lake Lodge, and that it is possible to see the old foundations of root cellars in the area. When the holder helped build the campsite he ensured the root cellars were not destroyed.

Apparently, people from Janvier often come to the northern side of Christina Lake at a location on the holder’s trapline, which he has found a bit upsetting. He said he has told “Fish and Game” and he believes they may have discussed the privacy issues with the people. The holder has not seen much action there last summer, so he is not sure whether the issue is resolved. He added that he hasn’t pushed the matter too much.

The holder is not aware of burial sites in the area, but given the history of the area he believes there may be some out there. The holder stated the previous trapline holders told him of a burial situated at Christina Lake Lodge. Apparently, when the lodge was being constructed, they avoided a burial which is believed to be that of the original owner’s wife. According to the holder, the burial was not disturbed and it is well known. Local people protect the burial. The holder did all of the dirt work over for the lodge and left it alone.

6.3.7 Changes Due to Development

The holder stated there have been numerous changes to his trapline over the years. He stated trees continue to be cleared near the MEG plant and EnCana has placed many new access roads to well sites. As a result, the holder no longer traps on the east side of his trapline along the 22nd Baseline Road. There are too many disturbances. The holder would like both oil companies to speak with trappers in August or September regarding their proposed winter programs as this would give trappers the opportunity to adjust trapping behaviours. This past year many of his sets placed along the 22nd Baseline were disturbed. He stated it is problematic to set traps and then move them to a different location. He described it as a “waste of time.”

The holder described how he has watched as Nexen developed in the area, with the majority of disturbance focussed on RFMA #1326. Devon had also placed roads leading to a compressor station related to gas. The latter company is now focused on oil development and it seems all oil companies are encroaching on the area. The holder stated that the lights from Devon and EnCana across the lake have also “destroyed” his view at night.

The holder stated that trappers and local communities should be informed when industrial accidents that impact the environment occur. He referred specifically to the incident of MEG’s pipeline rupture. The holder was angry that he had to learn about the incident through local people. He would like companies to be more forthright in communicating with trappers and local communities. He also expressed concern about the location of EnCana’s activities near Sunday River. The holder stated that if a similar incident happened with EnCana, there would be environmental consequences to Christina Lake.

The holder has noticed no change to the quality of water in Christina Lake. He continues to draw his drinking water directly from the lake and uses a coarse filter to strain out seaweed. The holder would like assurance that the water quality is continually being monitored and that it is safe to drink.

The holder wanted to see the spawning grounds at Sawbones Bay protected from future development and pollution. The holder wanted to ensure Christina Lake is protected from pollutants. He stated he is worried about the water the plants use and if development requires water from the lake, the process should be heavily monitored. He stated that companies are currently taking water from Sawbones Creek and only last year the local people stopped them from putting in an ice bridge. The holder believes large companies are beginning to become aware of environmental concerns but this should be a strong focus. He stated he would like restrictions on the access road to Sawbones Bay. This would reduce local traffic to the area and reduce local netting practices.

The holder was pleased with the buffer zone protection around Christina Lake. He would be happier if the size of the buffer zone was increased. He described Christina Lake as a provincial treasure and as one of the few lakes in Northern Alberta that has not been impacted by development and it is still a tourist attraction. The holder described the lake as clean and deep with great fishing. The only recent development entailed the construction of Christina Lake Lodge.

The holder stated he experienced a few problems with people stealing from his sets. He was not sure if they are local people or people from the camps. It is not a big problem but it happens once in a while. The holder has noticed no problems with littering or garbage disposal from the local worksites.

The holder stated that noise is a problem in the winter. For example, this past year MEG and EnCana placed seismic tests every 100 metres. He stated that eventually they will be gone but there is currently no point in him going out on his trap set. He added that whenever he is unable to set traps, “Fish and Game” give him a hard time for not catching fur. The holder does not want to continually move his traps around the trapline and therefore focuses his trapping activity on the west portion of the 22nd Baseline Road. He stated that with EnCana and MEG activity there is no point in trapping on the east side of his line. He stated he could still trap there, but with the level of activity in the area, it is not worth his time.

The holder stated that animal health remains unchanged. However, animals are getting used to human activity and development. Coyotes will follow caterpillar tractors around, and wherever people dispose of their sandwiches, the animals are there to collect. They are getting used to development and easy feeding. The holder has heard stories of people shooting wolves because they are less afraid of people and development.

6.3.8 Proposed Future Use

The holder wants to retire on the trapline and intends to remain in his house as long as possible. He stated that he wants to trap, fish and hunt when he retires. He is also considering organizing boat and fish tours on the lake as a tourist attraction. The holder’s son and family are interested in taking over the house and trapline in the future.

6.4 ADDITIONAL REGISTERED FUR MANAGEMENT AREAS

Interviews are currently being arranged with the remaining three RFMA holders – Fred Black (RFMA #1544), Stuart Janvier (RFMA #615) and Harry Janvier (RFMA #933). Their information will be incorporated into Project planning as it becomes available.

7 CONCLUSIONS

Aboriginal communities and trappers have used, and continue to use, areas of the RSA for traditional activities. A review of the CPDFN's traditional land use study shows that areas within the RSA have been used for hunting, fishing, trapping, and plant harvesting. Previous studies identified concerns that Aboriginal communities have about development in the region. The concerns include the gradual diminishment of wildlife habitat, which affects not only wildlife populations, but also the ability to maintain traditional harvesting activities. Other identified concerns related to potential effects on water quantity or quality, air quality (including noise emissions) and increased access, which communities believe results in increased hunting pressure from outside hunters, as well as vandalism. Communities are concerned about the use of pesticides used in maintaining rights-of-way. Aboriginal communities also identified issues related to project designs, which in turn can negatively affect wildlife movement. They also believe that the long-term and cumulative effects of development in the region are inadequately studied.

Within the LSA, RFMA (trapline) holders continue to conduct traditional activities. Through interviews and mapping sessions, areas for hunting, trapping, fishing, and plant harvesting, as well as cabin locations. During interviews, trappers identified the following issues:

- trappers desire to pass their trapline on to family members, but are uncertain about the future of trapping, due to development in the region;
- the region, including wildlife habitat, is getting fragmented;
- there are perceptions that trappers have "very little power" against industry;
- an increase in the number of people in the region has resulted in a decrease in the moose population;
- trappers would like to see road access to Sawbones Bay restricted;
- trappers have experienced an increase in vandalism;
- forest clearing has diminished berry picking areas;
- trappers would like more communication and information-sharing from resource developers regarding projects;
- trappers are concerned about potential effects of projects on water quality, especially in Christina Lake; and
- trappers want assurance that fish spawning areas in Sawbones Bay are protected.

MEG is currently arranging interviews with the CPDFN, FMFN, HLFN, Métis groups in Conklin and Chard, and with the remaining trappers within the LSA. Information from these interviews will be incorporated into a baseline update.

8 REFERENCES

AXYS (AXYS Environmental Consulting Ltd.). 1999. Surmont Commercial Oil Sands Project, Environmental Project Case. Traditional Land Use Study. Prepared for Gulf Canada Resources Ltd.

AXYS. 2000. OPTI Canada Long Lake SAGD Project Traditional Land Use Study. Prepared for OPTI Canada Inc. Calgary, AB. 48 pp. + Appendix.

Canadian Natural (Canadian Natural Resources Limited). 2007. Application for the approval of the Kirby In-Situ Oil Sands Project. Submitted to the Alberta Energy and Utilities Board and to Alberta Environment. Volume 6 – Social Aspects.

CPDFN (Chipewyan Prairie Dene First Nation). 2007. Kai'Kos' Dehseh Dene: The Red Willow River (Christina River) People. A Traditional Land Use Study of the Chipewyan Prairie First Nation. Nicomacian Press. Calgary, AB.

Devon (Devon Canada Corporation.). 2003. Application for Approval of the Devon Jackfish Project. Submitted to the Alberta Energy and Utilities Board and to Alberta Environment. Volume 2 – Environmental Impact Assessment. Prepared by Devon Canada Corporation. Calgary, AB.

Devon. 2006. Application for Approval of the Jackfish 2 Project. Submitted to the Alberta Energy and Utilities Board and to Alberta Environment. Volume 2 – Environmental Impact Assessment. Prepared by Devon Canada Corporation. Calgary, AB.

Nexen (Nexen Inc. and OPTI Canada Inc.). 2006. Application for Approval of the Long Lake South Project. Submitted to the Alberta Energy and Utilities Board and to Alberta Environment. Volume 5 – Human. Prepared by Nexen Inc. and OPTI Canada Inc. Calgary, AB.

PanCanadian Resources. 1998. Application for Approval of the Christina Lake Thermal Project. Submitted to the Alberta Energy and Utilities Board and to Alberta Environment. Volume 3 – Supplemental Environmental Impact Assessment. Prepared by PanCanadian Resources. Calgary, AB.

FMMFN (Fort McMurray First Nation). 2006. NISTAWAYAW: "Where Three Rivers Meet" Fort McMurray #468 First Nation Traditional Land Use Study. Nicomacian Press. Calgary, AB.

Golder (Golder Associates Ltd.). 2002. Traditional Land Use by Chipewyan Prairie Dene First Nation. Prepared for Rio Alto Exploration Ltd. Calgary, AB.

MEG. (MEG Energy Corp.). 2005. Application for Approval of the Christina Lake Regional Project. Submitted to the Alberta Energy and Utilities Board and to Alberta Environment. Volume 5: Human Environment. Prepared by Golder Associates Ltd. Calgary, AB.

Petro-Canada. 2001. Commercial Application for Approval of the Meadow Creek Project. Volume 3. Environmental Impact Assessment. Prepared by Petro-Canada Limited. November 2001. Calgary, AB.

Rio Alto (Rio Alto Exploration Ltd.). 2002. Kirby Project Application for Approval to Alberta Energy and Utilities Board and to Alberta Energy and Utilities Board and to Alberta Environment. Volume 3. Prepared by Golder Associates Ltd. Calgary, AB.

APPENDIX 6-II

RESOURCE USE BASELINE REPORT

EXECUTIVE SUMMARY

MEG Energy Corp. (MEG) is proposing an expansion to its Christina Lake Regional Project (CLRP), in order to further develop its oil sands leases in the area. The Christina Lake Regional Project – Phase 3 (the Project) is an expansion of the existing development area and will use Steam Assisted Gravity Drainage (SAGD) bitumen recovery technology. The Project will consist of two new plants and 138 new wellpads. Construction of the Project is anticipated to begin in 2010. The operational life of each plant is expected to be 25 years. Total production from the two new plants will produce an incremental increase of 150,000 barrels per day (bpd) of bitumen. It is anticipated that reclamation of the Project will be complete by 2044.

This report describes the existing resource uses in the Regional and Local Study Areas (RSA and LSA) potentially affected by the Project both directly and indirectly. The report includes descriptions of resource management, land use policies and guidelines, existing industrial activities and dispositions, and commercial and recreational pursuits.

Land Use Planning within the LSA includes the Christina Lake Management Plan, which aims to ensure that petroleum, natural gas and oil sands exploration and development are carried out in an environmentally sensitive manner and are integrated with other uses.

There are numerous companies with existing land interests in the RSA, including energy companies, pipeline and forestry companies. While oil and gas development is not as intense as in the areas around Fort McMurray or Lac La Biche, it is increasing in the area, with five existing and approved or planned oil sands developments and numerous existing pipelines, wellsites and related infrastructure in the RSA.

Access within the LSA is high at 11.3 km of access per square kilometre of land. The RSA as a whole has 1.63 km of access route per square kilometre of land. The most common types of access in the LSA are cutlines and trails. Secondary Highway 881 is the most important access route to the RSA.

There are no protected areas in the RSA or the LSA. There are seven environmentally significant areas in the RSA: Christina Lake Caribou Area, Christina Lake/Jackfish River, Winefred River, Winefred/Grist Watershed, Grist Lake, Winefred Lake and the Egg Lake-Algar Lake Diversity Area. Parts of both the Christina Lake Caribou Area and the Christina Lake/Jackfish River overlap with the LSA.

There are five surface material leases for aggregate extraction within and near the LSA. Overall, aggregates have been in moderately poor supply in the areas north and south of Fort McMurray and east and west of the Athabasca River. However, new discoveries since 2002 have helped to increase aggregate supply for developments in northeastern Alberta.

The Project is located in the Green Area of the province and as such agriculture operations are minimal. Agricultural activity near the LSA is limited to one wild rice operation and two grazing leases.

Land in the LSA and RSA supports forestry. Timber rights are held by Alberta-Pacific Forest Industries Inc. (Al-Pac). The LSA contains approximately 7,439 ha of productive forests.

Berry picking habitat (areas with potential for blueberries, raspberries, strawberries and cranberries) exists in the LSA and RSA, but these areas are not of high importance to non-traditional resource users due to the distance of the study areas to major centres such as Lac La Biche and Fort McMurray.

The LSA is within Wildlife Management Unit (WMU) 517. Moose, mule deer, white-tailed deer and black bear are hunted in this WMU. Forty-five guide/outfitter operations hold hunting allocations in the Terrestrial RSA, five of which operate in the LSA.

Registered Fur Management Areas (RFMAs) 615, 933, 1326, 1544, 1595 and 2313 overlap the LSA. Species most commonly trapped in these areas include beaver, muskrat and coyote. Trapping activities and revenues have been steadily declining over the past decade.

Fishing is popular in the RSA and is based mainly in Christina, Grist and Winefred lakes; fishing lodges are located close to each. Christina Lake is located in the LSA.

Recreation in the RSA also includes All-Terrain Vehicle (ATV) and snowmobile riding, horseback riding, boating and bird watching. However, limited access, combined with the distance from major population centres has resulted in relatively low use of the area for recreational activities.

ACKNOWLEDGEMENTS

This Resource Use Baseline Report was prepared for MEG Energy Corp. (MEG) by Golder Associates Ltd. (Golder) in support of the Christina Lake Regional Project – Phase 3 Environmental Impact Assessment.

The core management team for the Project included: Tod Collard (Senior Advisor), Ian Gilchrist (Project Director), Robin Cockell (Project Manager) and Cathryn Moffett (Project Coordinator).

Paul St. Rose served as senior drafting advisor and Thanh-Van Nguyen acted as the senior Geographic Information System advisor. The report was prepared by Bethany Beale (Resource Use Component Lead) and reviewed by Mitchell Goodjohn (Senior Advisor), Greg Jones (Senior Advisor), Robin Cockell and Ian Gilchrist.

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1 INTRODUCTION

MEG Energy Corp. (MEG) is a Calgary-based, privately held energy company focused on the development and recovery of bitumen, shallow gas reserves and the generation of power in northeast Alberta. MEG's Christina Lake Regional Project (CLRP) consists of 80 sections of oil sands leases within the Regional Municipality of Wood Buffalo (RMWB) in northeastern Alberta, approximately 15 km southeast of Secondary Highway 881 and 20 km northeast of Conklin.

MEG currently has approval to construct and operate the first two phases of the CLRP over 23 sections of land. In addition, MEG is developing a facility expansion (Phase 2B) to increase the production capacity of the Central Plant to 60,000 barrels per day (bpd). The Phase 2B plant will be located immediately adjacent to the existing Phase 1 and 2 processing facilities.

MEG is now proposing a further expansion of the CLRP to fully develop its Christina Lake oil sands leases. The Christina Lake Regional Project – Phase 3 (the Project) is an expansion of the current CLRP development area and will use Steam Assisted Gravity Drainage (SAGD) bitumen recovery technology. The Project will consist of two additional processing facilities (Plants 3A and 3B), 138 SAGD multi-wellpads and associated steam generating equipment. Plant 3A will be located in the southeast corner of the lease (Sections 20 and 29-76-4 W4M); and Plant 3B will be located in the northwest end of the lease (Sections 32 and 33-77-6 W4M).

Construction of the Project is proposed to occur in two phases. Phase 3A is anticipated to begin construction in 2010, with initial steam injection in 2012. Phase 3B is anticipated to begin construction in 2012, with initial steam injection in 2014. The operational life of each plant is expected to be 25 years. Total production from the two new plants will produce an incremental 150,000 bpd of bitumen (approximately 23,800 cubic metres per day). It is anticipated that reclamation of the Project will be complete by 2044.

The Resource Use Baseline Report describes various land and resource uses within the Project area and the surrounding region. There are multiple land uses within the region, including industrial developments, commercial activities, protected areas, recreational pursuits, population centres, transportation infrastructure and traditional use.

Resource Use, Traditional Land Use (TLU) and Traditional Knowledge (TK) are closely related. Some of the components discussed throughout this baseline report, such as trapping and berry picking, are tied directly to Aboriginal use of the land.

1.1 STUDY OBJECTIVES

Increasing industrial development in northeastern Alberta and the associated increase in population has implications for resources and resource users. This report is intended to provide detailed information concerning the current state of resources in the Project area and supports the Resource Use Assessment (Volume 6, Section 3) and addresses requirements of the Environmental Impact Assessment (EIA) Terms of Reference (TOR) (Volume 2, Appendix 2-I) in relation to land use (TOR Section 4.11). Some overlap of information exists for traditional land users, but specific information on traditional land use is provided separately in the Traditional Land Use component (Volume 6, Section 2).

For the purposes of this report, natural resource users include both commercial and domestic users (companies that extract gravel, recreational users, berry pickers, hunters, trappers and fishermen or otherwise use the natural resources). The following key components are considered in the assessment of the potential effects of the Project on resource use:

- existing developments (including industrial and urban developments);
- environmentally important areas;
- aggregate resources;
- agriculture;
- forestry;
- berry picking;
- hunting;
- trapping;
- fishing; and
- non-consumptive recreation.

The objectives of the Resource Use Baseline Report are to:

- identify existing resource uses and resource users in the region;
- establish resource and resource use trends and, where possible, indicate possible future uses; and
- summarize the regulatory and policy framework in which resources are to be developed.

For resource use to occur, the resources themselves must be accessible to users. Access is a critical component that is considered when evaluating the availability of resources for use.

1.2 METHODS

The goal of baseline data collection is to provide sufficient information on which to base an EIA.

Two areas have been delineated to facilitate data collection and presentation. These include a Regional Study Area (RSA), which encompasses the resources potentially affected directly and indirectly by the Project and a Local Study Area (LSA), which encompasses resources directly affected. For the resource use assessment, the Resource Use LSA is the same as the Terrestrial Resources LSA. The extent of this LSA was defined on the basis of the Project footprint plus a buffer zone of at least 500 m, including all areas within the lease. In cases where the buffer boundary transected a waterbody, the boundary was adjusted to include the entire waterbody as part of the LSA. In total, the LSA encompasses 34,362 ha.

In addition to the data collected for the study areas, results of the 2001 Resource User Telephone Questionnaire (RUQ) (Golder 2001) were also considered. The RUQ surveyed resource users in the RMWB n 2001. A total of 452 surveys were completed among residents of Fort McMurray, Anzac and Lac La Biche. About 1% of the people in each community participated in the survey. Results of the RUQ that pertain to specific resource uses are presented in Sections 2.4.8 through 2.4.11. Although these communities are outside of the RSA, they are the largest towns in the vicinity from which resource users are likely to travel to the RSA.

Wherever applicable, study areas from other components of the application were used to facilitate the transfer of data for environmental setting and analysis purposes. Table 1 summarizes the study areas used for the Resource Use component. Figure 1 depicts the study areas listed in Table 1.

Table 1 Study Areas for the Resource Use Component

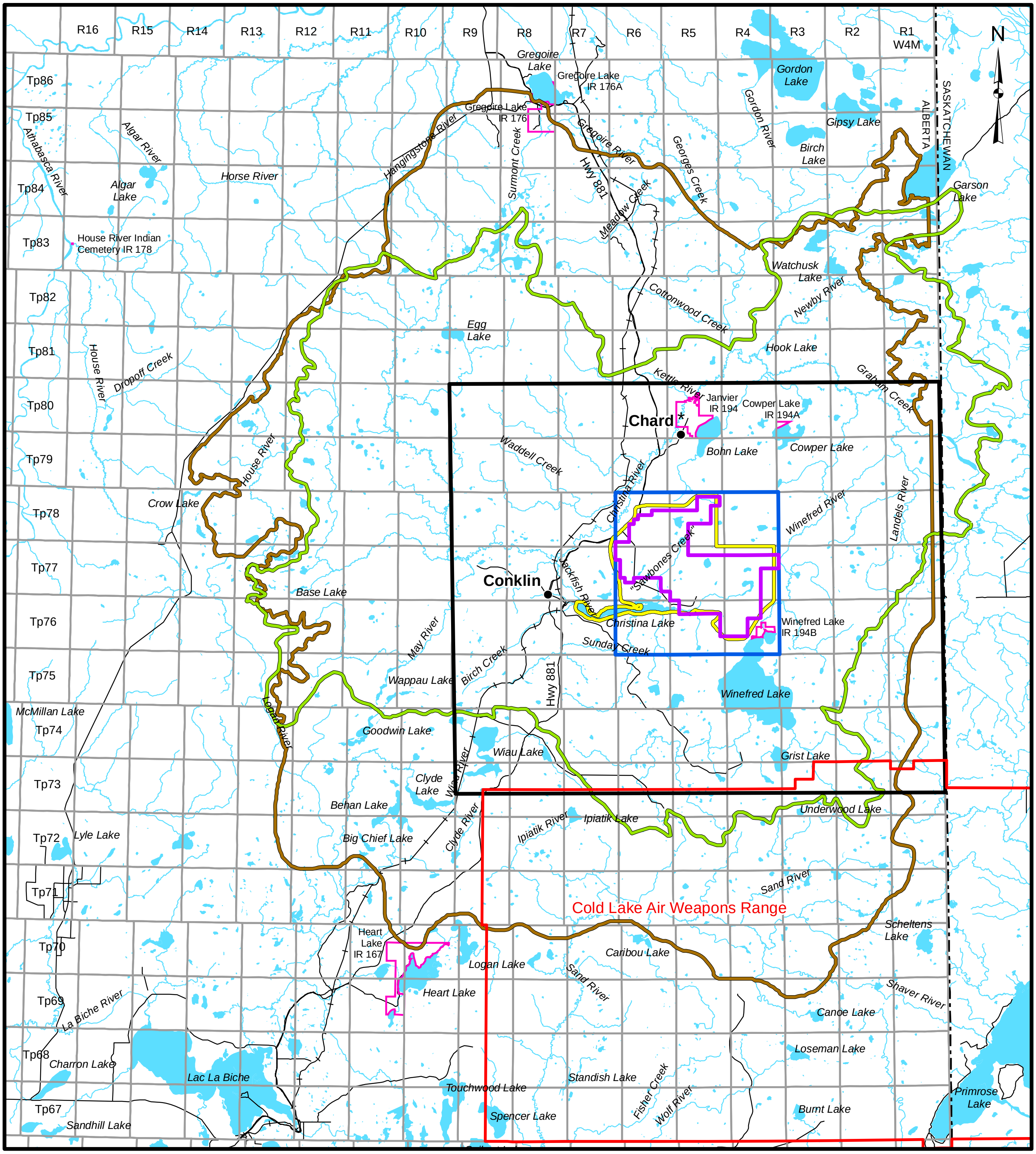
Key Indicator Resources	Local Study Area	Regional Study Area
aggregate resources	Resource Use	Resource Use
agriculture	Resource Use	Resource Use
berry picking	Resource Use	Terrestrial Resources
forestry	Resource Use	Terrestrial Resources
fishing	Aquatic Resources	Aquatic Resources
hunting and trapping	Resource Use	Terrestrial Resources
non-consumptive recreation	Resource Use	Resource Use
protected areas and Environmentally Significant Areas (ESAs)	Resource Use	Resource Use

Environmental setting information on land and resource use was collected through a combination of:

- reviewing and incorporating the findings of past studies performed within the Project area and the surrounding region; and
- collecting additional environmental setting information as necessary to address data gaps.

The primary sources of information used to complete this study include:

- the Athabasca Oil Sands Regional Resource Use Baseline Report (Golder 2001), including the resource user and service provider surveys therein;
- internet and published material from regulatory agencies and resource use service providers regarding resource use activities;
- Alberta Professional Outfitters' statistics for hunting allocations within Wildlife Management Units (WMUs);
- Alberta Sustainable Resource Development (ASRD) information related to hunting, trapping and fishing;
- the Alberta Energy Resources Conservation Board's (ERCB) Land Status Automated System (LSAS) (See Figure 1 for an outline of the area for which an LSAS search was completed);
- environmentally important area studies;
- forestry general development plans;
- a review of resource plan guidelines and zoning;
- results from the 2001 Resource User Telephone Questionnaire (RUQ) conducted by Golder;
- a review of existing, recent environmental impact assessments from the same area; and
- personal communications with service providers and regulators in the area.



LEGEND

- TERRESTRIAL RESOURCES REGIONAL STUDY AREA
- RESOURCE USE REGIONAL STUDY AREA
- LSAS SEARCH (AUGUST 24, 2007)
- RESOURCE USE LOCAL STUDY AREA
- AQUATIC RESOURCES REGIONAL STUDY AREA
- AQUATIC RESOURCES LOCAL STUDY AREA
- INDIAN RESERVE
- AIR WEAPONS RANGE
- OPEN WATER
- RIVER OR STREAM
- ROADWAY
- RAILWAY
- COMMUNITY

20 0 20

SCALE 1:1,000,000 KILOMETRES

NOTE

Unnamed watercourse locally known as "Sawbones Creek"
*Also known as the Hamlet of Janvier

REFERENCE

Alberta digital data obtained from Geomatics Canada (August 2001), AltaLIS Ltd. (September 2004), Veritas DGC Inc. (July 2004), Alberta Pacific Ltd. (April 2004), Desktop Mapping Technologies Inc., used under license.
Saskatchewan digital data obtained from Information Services Corp. (September 2004), used under license.
Projection: UTM Zone 12 Datum: NAD 83

PROJECT

CHRISTINA LAKE REGIONAL PROJECT - PHASE 3

TITLE

RESOURCE USE STUDY AREAS

MEG ENERGY CORP.

PROJECT No. 07-1346-0009.9120			SCALE AS SHOWN	REV. 0
DESIGN	BB	27 Sep. 2007	FIGURE: 1	
GIS	ZB	27 Feb. 2008		
CHECK	BB	28 Feb. 2008		
REVIEW	IGG	05 Mar. 2008		

Project: I:\CLIENTS\MEG\07-1346-0009\mapping\mxd\resource_use\resource_use_rsa_lsa.mxd

2 RESOURCE USE PLANS AND ZONING

The following is a description of the land use plans and zoning that are relevant to the Project due to their proximity to, or geographic overlap with, either the Resource Use LSA or the RSA.

2.1 REGIONAL SUSTAINABLE DEVELOPMENT STRATEGY

The Regional Sustainable Development Strategy (RSDS) (AENV 1999) for the Athabasca Oil Sands Region was initiated by Alberta Environment (AENV) in co-operation with provincial and federal agencies and regional stakeholders. The strategy developed from a need to maintain Alberta's commitment to environmental and resource management during the growth of oil sands developments. The RSDS has been in effect since July 1999 and is implemented by AENV, ASRD and the Cumulative Environmental Management Association (CEMA).

Resource use related principles identified for the RSDS region (AENV 1999) include:

- renewable resources will be managed to ensure long-term viability and future use potential;
- renewable resources will be managed for traditional, recreational and resource development uses;
- non-renewable resources will be managed to maximize benefits to Albertans;
- resources will continue to be developed within the requirements of provincial legislation, policies and guidelines; and
- all resource development will occur in an orderly manner that considers and preserves environmental quality not only within Alberta, but also in neighbouring government jurisdictions.

2.2 REGIONAL MUNICIPALITY OF WOOD BUFFALO MUNICIPAL DEVELOPMENT PLAN (BYLAW NO. 00/005 MAY 2000)

The Project lies in the southern portion of the Regional Municipality of Wood Buffalo (RMWB). The purpose of the Municipal Development Plan (MDP) is to provide broad land use policies for the Municipality. The MDP indicates that the Municipality has limited jurisdiction over many activities permitted on Crown lands, such as oil and gas exploration, pipeline development, timber harvesting activities, as well as recreational and traditional Aboriginal uses. Policy 2.51 of the plan states that the Municipality will “work in cooperation with the Province and Industry to ensure oil sands developments are compatible with adjacent land uses and resources and have minimum impact on the natural environment” (RMWB 2000b).

2.3 REGIONAL MUNICIPALITY OF WOOD BUFFALO LAND USE BYLAW 99/059

The RSA is entirely within the RMWB, in the area zoned Rural District (RD). The purpose of the this RD is “to manage development in the Rural Services Area, outside established hamlets, including the accommodation of oil sands mining, extraction and upgrading” (RMWB 2000a). Included in the permitted uses for the area are oil sands mining, extraction, upgrading and oil sands pilot projects.

2.4 CHRISTINA LAKE MANAGEMENT PLAN (1991)

The Christina Lake Management Plan (AEP 1991) affects land in the LSA. It was adopted for Improvement District No. 18 and approved in December 1991. The Plan was prepared in response to an increase in the variety and amount of resource use and development pressures on Christina Lake and its shore. The result has been the establishment of the Hamlet of Conklin, a commercial lodge operation, several resource extraction and processing industries, and the regular use of Christina Lake for commercial fishing, sport fishing and other forms of recreation. Christina Lake is also a special resource to local residents who value the need for its preservation due to its cultural significance and for the provision of essential products such as food, water and other means of traditional livelihood.

The following sections of the Plan (AEP 1991) are relevant to the Project:

- Resource Management Objectives for mineral resources are “To ensure that petroleum, natural gas and oil sands exploration and development is carried out in an environmentally sensitive manner and is integrated with other uses.”
- Resource Management Guidelines for mineral resources includes a stipulation that “proponents of mineral exploration must demonstrate that their operations will not negatively impact the attributes that make the lake and its surrounding land valuable as a recreational resource. These attributes include the beach, water, fisheries, wildlife, recreational facilities and aesthetics (such as sight, sound and smell) of the lake.”

2.5 HAMLET OF CONKLIN AREA STRUCTURE PLAN, 2002

The Hamlet of Conklin Area Structure Plan (RMWB 2002) provides goals, objectives and policies for land use, environmental management, parks, recreation, schools, transportation, municipal services, policing and emergency response. The Area Structure Plan (ASP) indicates that due to the moderate growth and development pressures from resource industry activities, there is need for an adequate supply of residential, commercial and industrial sites. Environmental management policies state the need to protect Christina Lake and area for traditional Aboriginal uses and from environmental degradation. There is potential for archaeological sites within the ASP boundaries and therefore new developments will be subject to a Historical Resources Assessment (Volume 6, Section 5).

2.6 ZONING: GREEN AND WHITE AREAS

Public land administered under the *Public Lands Act* is owned by the government of Alberta. Its use and allocation are outlined in the Act. For administrative purposes public land is divided into two broad categories, the White Area and the Green Area (ASRD 2004). The Project falls within the Green Area. In the Green Area (or forested lands), public land is managed for timber production, watershed, wildlife and fisheries, recreation and other uses. Agricultural use is limited to activities that are compatible with other uses.

3 LAND USE DISPOSITIONS

Authority to use public land is granted through dispositions issued under the provisions of the Public Lands Act. A disposition is a land use contract that gives specific rights to a land or resource user (e.g., lease, licence or permit) (ASRD 2004). Records for all surface and subsurface dispositions held on Crown land are archived in the LSAS. This database is maintained by the Alberta Department of Energy Information Centre.

Several land-based projects and activities exist within and near the Resource Use LSA. Most are related to resource extraction, particularly gas wells, oil sands projects, pipelines, transmission lines, trapping and timber harvesting. A LSAS search was completed on August 24, 2007 for the following townships and ranges overlapping and surrounding the LSA: Ranges 4 through 6 and Townships 76 through 78, W4M (Figure 1). Tables 2 and 3 provide a summary of the types of surface dispositions that exist within and near the Resource Use LSA and the disposition holders.

Table 2 Surface Dispositions Within and Near the Local Study Area

Surface Activity Code	Disposition Name and Explanation
CNC	consultative notation – company: a notation on a piece of land indicating company interest
CNT	consultative notation: a notation on a piece of land indicating department interest
CRP	conservation and reclamation plan
DRS	disposition reservation
DWD	drilling waste disposal
EZE	easement: agreement between landowner and company; usually for power lines or buried cable
FMA	forest management agreement: tenure agreement between a forest company and the government providing the forest company with the right to grow, harvest and remove timber
GRL	grazing lease: lands not suited for cultivation that are leased for grazing purposes; may be leased for up to ten years
ISP	industrial sample plot: for forestry, designates a 150 m buffer around a permanent sample plot where no development is permitted
LOC	licence of operation: usually for roads, also for launches, erosion control, marsh development, reservoirs
MLL	miscellaneous lease: miscellaneous such as campgrounds, corrals, water wells, hunting/fishing lodges
MLP	miscellaneous permit
MSL	mineral surface lease: well sites, flare stacks, mining areas and some access roads
PIL	pipeline installation lease: sites associated with pipelines including compressor sites, meter sites and heater sites
PLA	pipeline agreement: pipelines, flowlines and cathodic protection lines
PNT	protective notation: area selected by the government for protection

Table 2 Surface Dispositions Within and Near the Local Study Area (continued)

Surface Activity Code	Disposition Name and Explanation
RRD	registered roadway: a developed roadway registered with ASRD
SMC	surface material licence
SME	surface material exploration: for exploring potential mining surface materials
SML	surface material lease: permits for extraction activities such as sands, gravel, peat and topsoil extraction over an extended period of time
TFA	temporary field authorization: issued for either site preparation or additional workspace, in which case it must be associated with an approved activity
TPA	trapping area: indication of a trapline
VCE	vegetation control easement

Table 3 Disposition Holders Within and Near the Local Study Area

Disposition Holder	Surface Activity Codes
297917 Alberta Ltd.	CRP; SME; SML
Access Pipelines Inc.	PIL; PLA
Alberta Energy and Utilities Board	DRS;
Alberta Infrastructure and Transportation	CNT; RRD
Alberta Pacific Forest Industries Inc.	FMA; ISP
AltaGas Ltd.	PLA
Altalink Management Ltd.	EZE; MLL; TFA; VCE
Atco Electric Ltd.	MLL
Avenir Operating Corp.	LOC; MSL; PIL; PLA
Barr None Lodges and Catering Ltd.	MLL
Black, Fred	TPA
BP Canada Energy Company	DWD; LOC; MSL; PLA
Canadian Natural Resources Limited	LOC; MSL; PIL; PLA
Central Aggregate Company Ltd.	SME
Consun Contracting Ltd.	LOC; MLP; SML
CS Resource Limited	DWD;
Devon ARL Corporation	MSL; TFA
Devon Canada Corporation	CRP; DWD; EZE; LOC; MLL; MSL; PIL; PLA; SML
Down-Cicordia Connie	TPA
Edgar Tatum and Alvina Laboucane (Estate of)	GRL
EnBridge Pipelines (Athabasca) Inc.	PLA
EnCana Corporation	CRP; DWD; LOC; MLL; MSL; PIL; PLA; SML; TFA
EnCana FCCL Oil Sands Ltd.	LOC; MSL;
EnCana Oil and Gas Partnership	LOC; MSL; TFA
FortisAlberta Inc.	EZE; VCE
Great Divide Pipelines (Athabasca) Inc.	PLA

Table 3 Disposition Holders Within and Near the Local Study Area (continued)

Disposition Holder	Surface Activity Codes
Janvier, David	TPA
Janvier, Harry	TPA
Janvier, James	TPA
Janvier, Stuart	TPA
Land Division Lac La Biche office – land use area	PNT
Martin, Bill	TPA
McCallum, Yvonne	TPA
MEG Energy Corp.	EZE; LOC; MLL; MSL; PIL; PLA; SMC; SML; TFA
Nexen Inc.	CNC; LOC; MSL
Nova Gas Transmission Ltd.	PIL; PLA
Paramount Energy Operating Corp.	LOC; MSL; PIL; PLA; TFA
Paramount Energy Trust	TFA
Paramount Resources Ltd.	DWD; LOC; MSL; PLA
Peats, Gordon	TPA
Primewest Energy Inc.	DWD
Rogers Communication Inc.	MLL
Sunrise Sand & Gravel Exploration & Reclamation Ltd.	LOC; SML
Superman Resources Inc.	LOC; MSL; PLA
Talisman Energy Inc.	DWD
The Multicultural Alliance Corporation	CRP
Thom, Donald	TPA
York, Gary	TPA

4 EXISTING AND APPROVED DEVELOPMENT

Existing and approved developments in the Resource Use RSA include various oil and gas developments, communities and transportation infrastructure.

4.1 OIL SANDS

As of October 2007, there are seven companies (including MEG) with existing and approved oil sands developments in the RSA (Figure 2).

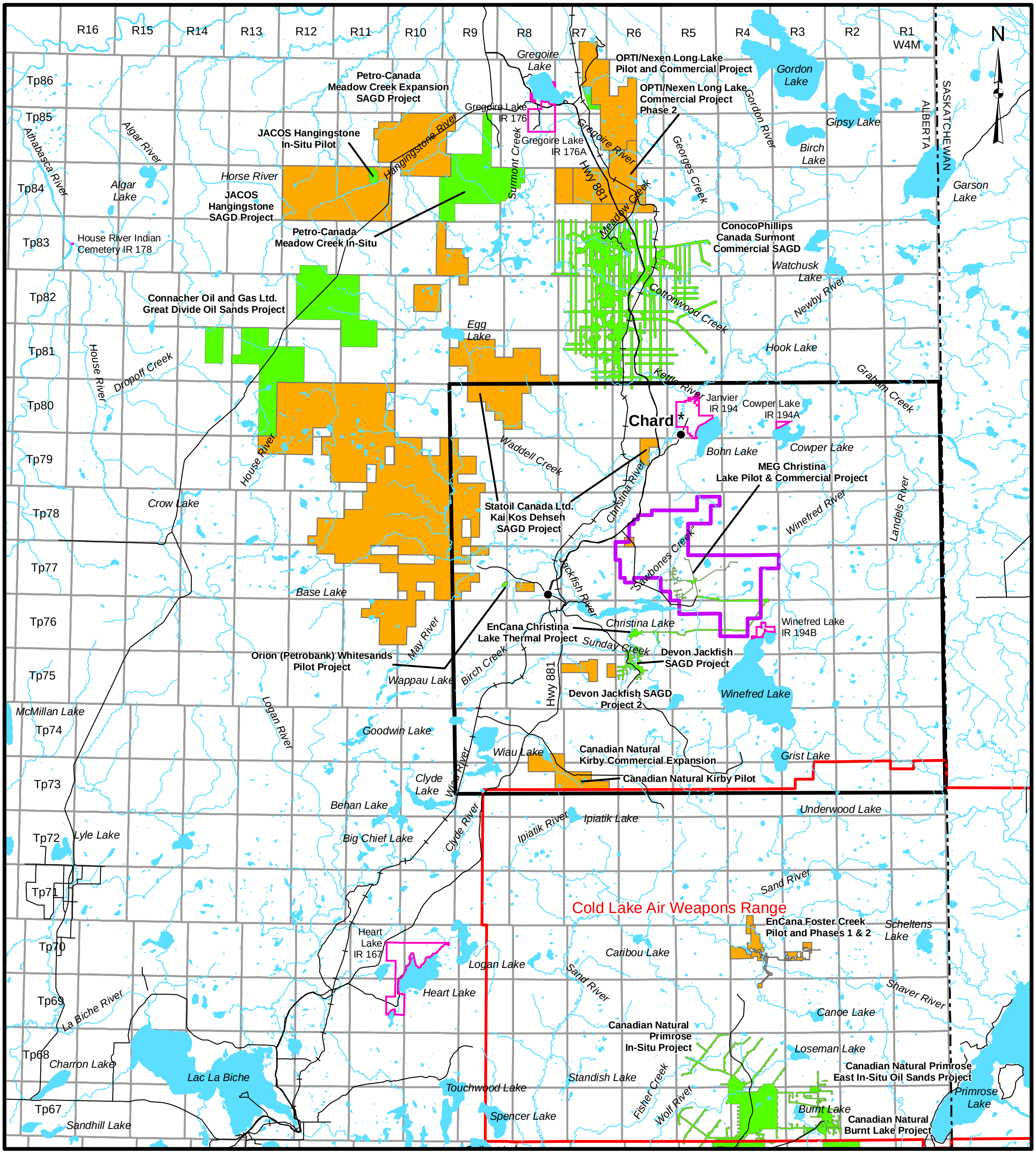
The following existing and approved projects are within or overlap the RSA (Figure 2):

- **Canadian Natural Resources Limited**: Kirby Pilot Project;
- **ConocoPhillips Canada:** Surmont Commercial SAGD;
- **Devon Canada Corporation**: Jackfish SAGD Project;
- **EnCana FCCL Oil Sands Ltd.**: Christina Lake Thermal Project;
- **MEG Energy Corp**: Christina Lake Regional Project;
- **Petrobank Energy and Resources**: Whitesands Pilot Project; and
- **StatoilHydro:** Kai Kos Dehseh SAGD Project.

4.2 CONVENTIONAL OIL AND GAS

Oil and gas leases include well sites (Mineral Surface Leases [MSL]) and access roads to well sites (Licence of Occupation [LOC]). Overlapping and near the LSA, 11 companies hold MSLs and 14 companies hold LOCs. Companies holding conventional oil and gas leases include:

- Avenir Operating Corp.;
- BP Canada Energy Corporation;
- Canadian Natural Resources Ltd.;
- Devon ARL Corporation;
- Devon Canada Corporation;
- EnCana Oil and Gas Partnership;
- EnCana Corporation;
- Nexen Inc.;
- Paramount Energy Operations Corp.;
- Paramount Resources Ltd; and
- Superman Resources Inc.



LEGEND

- RESOURCE USE REGIONAL STUDY AREA
- RESOURCE USE LOCAL STUDY AREA
- INDIAN RESERVE
- AIR WEAPONS RANGE
- EXISTING AND APPROVED DEVELOPMENT
- PLANNED DEVELOPMENT
- OPEN WATER
- RIVER OR STREAM
- ROADWAY
- RAILWAY
- COMMUNITY

20 0 20

SCALE 1:1,000,000 KILOMETRES

NOTE

Unnamed watercourse locally known as "Sawbones Creek"
*Also known as the Hamlet of Janvier

REFERENCE

Alberta digital data obtained from Geomatics Canada (August 2001), AltaLIS Ltd. (September 2004), Veritas DGC Inc. (July 2004), Alberta Pacific Ltd. (April 2004), Desktop Mapping Technologies Inc., used under license.
Saskatchewan digital data obtained from Information Services Corp. (September 2004), used under license.
Projection: UTM Zone 12 Datum: NAD 83

PROJECT

CHRISTINA LAKE REGIONAL PROJECT - PHASE 3

TITLE

OIL SANDS DEVELOPMENTS

MEG ENERGY CORP.

PROJECT No. 07-1346-0009.9120			SCALE AS SHOWN	REV. 0
DESIGN	BB	27 Sep. 2007	FIGURE: 2	
GIS	TN	03 Mar. 2008		
CHECK	BB	04 Mar. 2008		
REVIEW	IGG	05 Mar. 2008		

4.3 PIPELINES

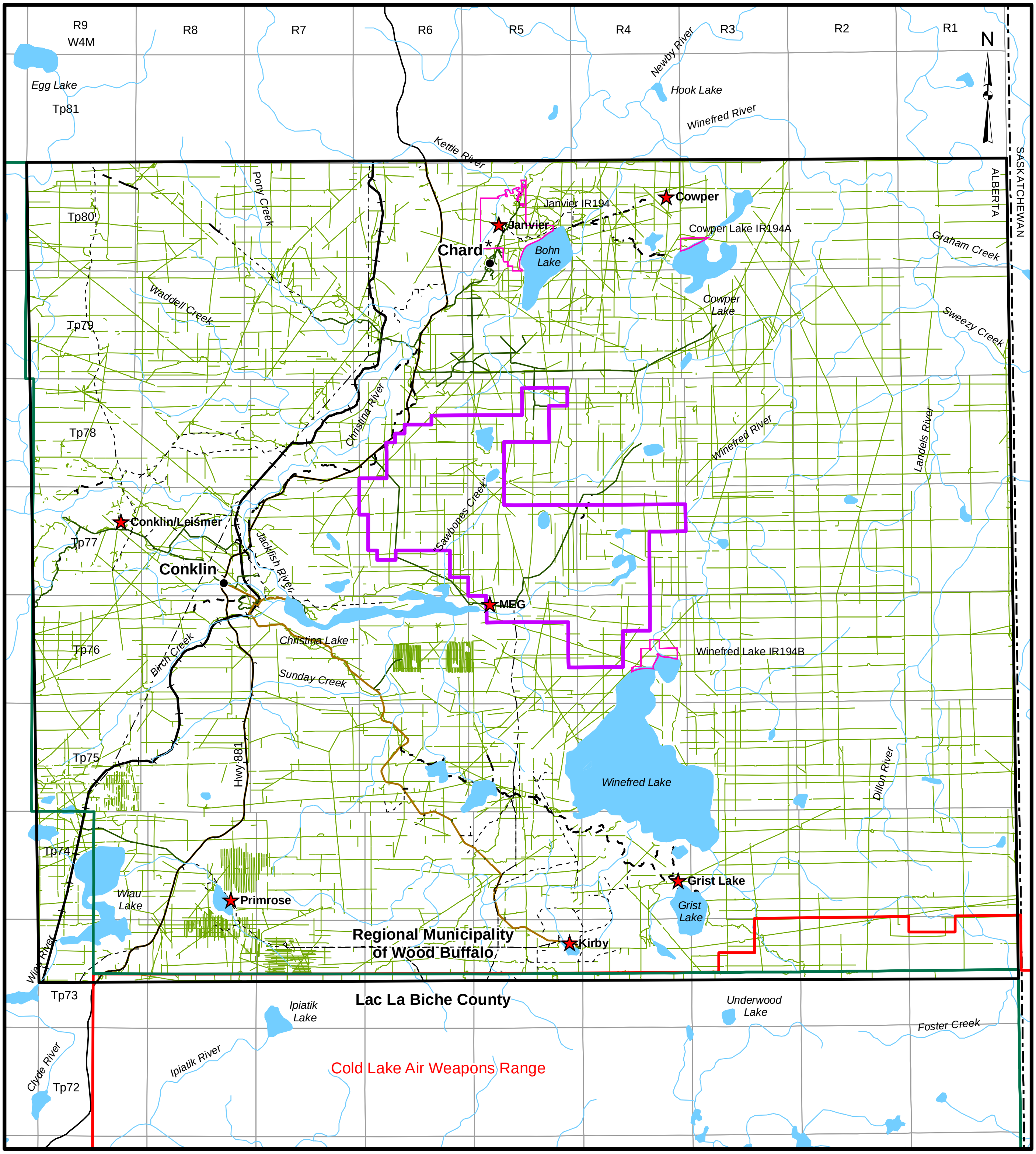
Major pipelines and gathering systems, held under Pipeline Agreements (PLAs), in and near the Resource Use LSA are owned by the following companies:

- Access Pipeline Inc.;
- AltaGas Ltd.;
- Avenir Operating Corp.;
- BP Canada Energy Corporation;
- Canadian Natural Resources Ltd.;
- Devon Canada Corporation;
- Enbridge Pipelines (Athabasca) Inc.;
- EnCana Oil and Gas Co. Ltd.;
- Great Divide Pipeline Limited;
- Nova Gas Transmission Ltd.;
- Paramount Energy Operating Group; and
- Superman Resources Inc.

The majority of the companies above also hold Pipeline Installation Leases (PIL) within and near the Resource Use LSA. These leases are sites associated with pipeline such as compressor sites, meters and heater sites.

4.4 COMMUNITIES

Three communities are located in the vicinity of the Project. These are Chard (also known as the Hamlet of Janvier), Conklin and the Chipewyan Prairie Dene First Nation (CPDFN) reserves (Figure 3). Detailed economic and social setting information about these communities is provided in the Socio-Economic Impact Assessment (Volume 6, Section 6).



LEGEND

RESOURCE USE REGIONAL STUDY AREA	PAVED ROAD
RESOURCE USE LOCAL STUDY AREA	GRAVEL ROAD (1 LANE)
COUNTY/MUNICIPAL DISTRICT	GRAVEL ROAD (2 LANE)
INDIAN RESERVE	TRUCK TRAIL
AIR WEAPONS RANGE	UNIMPROVED ROAD
OPEN WATER	CUTLINE
RIVER OR STREAM	TRANSMISSION LINE
	RAILWAY

AIRSTRIP

COMMUNITY

10 0 10

SCALE 1:500,000 KILOMETRES

NOTE

Unnamed watercourse locally known as "Sawbones Creek"
*Also known as the Hamlet of Janvier

REFERENCE

Digital data obtained from AltaLIS Ltd. (June 2004), Alberta Pacific Ltd. (April 2004), Desktop Mapping Technologies Inc., used under license.
Projection: UTM Zone 12 Datum: NAD 83

PROJECT

CHRISTINA LAKE REGIONAL PROJECT - PHASE 3

TITLE

COMMUNITIES AND ACCESS IN THE REGIONAL AND LOCAL STUDY AREAS

MEG ENERGY CORP.

PROJECT No. 07-1346-0009.9120			SCALE AS SHOWN	REV. 0
DESIGN	BB	27 Sep. 2007		
GIS	ZB	27 Feb. 2008		
CHECK	BB	28 Feb. 2008		
REVIEW	IGG	05 Mar. 2008		

FIGURE: 3

Project: I:\CLIENTS\MEG\07-1346-0009\mapping\mxd\resource_use\rsa_lsa_comm_access.mxd

4.5 ACCESS

Resource use is dependent on the access available and is influenced by changes in access. Increased accessibility to an area may result in increased demand for consumptive and non-consumptive resources. Road types, terrain and weather are factors that can dictate the type of vehicle required to successfully gain access to any area. Access along some routes varies with season, depending on ground conditions such as water level and degree of freezing.

Access routes in the RSA and LSA are illustrated in Figure 3. The density of access routes, including roads, railways, cutlines and other linear developments, is 1.63 km/km^2 in the RSA. Land access types and their distributions are shown in Table 4. Cutlines and rights-of-way for power lines and pipelines represent the largest proportion of access route length in the RSA.

Table 4 Linear Baseline Disturbances Within the Resource Use Study Areas

Access Type	LSA [344 km^2]		RSA [6,476 km^2]	
	Length [km]	Density [km per km^2]	Length [km]	Density [km per km^2]
railway	0	0	93	0.01
ROW[(a)]	272	0.79	3,004	0.46
cutlines/trails	3,518	10.24	6,887	1.06
road[(b)]	287	0.84	456	0.07
Secondary Highway 881 (paved)	0.78	<0.01	95	0.01
trail – truck	1.52	<0.01	117	0.02
Total	**4,080**	**11.87**	**10,653**	**1.63**

(a) ROW = Rights-of-Way (e.g., pipelines or transmission lines).
(b) Road refers to gravel one or two lane roads or unimproved roads.

The density of identified access routes in the LSA is 11.31 km/km^2. Compared to the RSA, this is a significantly higher density of access. The LSA represents only 5% of the total area but has 34% of the total access length in the RSA. This is due to existing development and exploration in the area. Industry (e.g., oil sands and forestry) has developed several types of linear corridors, such as improved and unimproved industry roads, pipelines, seismic lines and trails. Cutlines, trails and roads represent the largest proportion of access route length in the LSA.

Although it is not the primary intention of these corridors, linear developments may provide increased public access to parts of the RSA for uses such as off-road vehicles (e.g., All-Terrain Vehicles (ATVs) and snow machines).

4.5.1 Roads

The primary access route into the region is via Secondary Highway 881, which is a highway that links the lease area to Fort McMurray and the rest of the provincial highway system. As of August 2006 Secondary Highway 881 from Lac La Biche to Fort McMurray was paved. The 2006 Annual Average Daily Traffic (AADT) volume along Secondary Highway 881 north and south of Conklin and north and south of Janvier (Chard) averages 675 vehicles per day (Alberta Infrastructure and Transportation 2007). These traffic volumes are up from significantly from 2003 volumes (Table 5).

Table 5 Annual Average Daily Traffic North and South of Conklin and Janvier

Traffic[a]	2003	2004	2005	2006	% Change 2003 to 2006
south of Conklin	220	220	240	630	186.4
north of Conklin	260	260	270	720	176.9
south of Janvier	360	360	360	640	77.8
north of Janvier	390	390	390	710	82.1

[a] Annual Average Daily Traffic measured in vehicle counts.
Source: Alberta Infrastructure and Transportation 2007.

Access to the project site is provided through an all season road located off of Secondary Highway 881 between Conklin and Chard. A similar all season road runs southeast from Conklin to south of Winefred Lake.

New roads allow entrance into areas that were inaccessible to the public before development activities. For instance, the paving of Secondary Highway 881 was completed in August 2007. This improvement was in response to increasing use of this road, primarily by industry. As a result of improved access areas used by trappers, hunters and fishers are becoming accessible to a much larger population. Although access improves the capacity of individuals to use resources, it can also increase the demand for those resources, putting them under increased pressure.

4.5.2 Trails

Linear developments such as pipelines, cutlines and transmission lines, can provide increased access options for resource users and are often used by local people and outfitters as ATV trails. ATV use, particularly snowmobiling is a popular resource use in the RSA. Christina Lake Lodge offers snowmobiling as a winter activity. There are also many local people who own snowmobiles for personal use. Within the Fort McMurray area, the McMurray Sno-Drifters Club maintains about 200 km of signed trails, with another 150 km under development (McMurray Sno-Drifters Club 2007) however these trails are all located approximately 65 km north of the RSA. These linear developments, and their use, can influence a variety of natural resources such as vegetation, habitat units and wildlife (e.g., barriers to movement, increased wildlife/vehicle collisions) which in turn effects resource uses such as hunting and trapping.

4.5.3 Railroads

The Athabasca Northern Railway (ANY) is a provincially regulated company providing rail service between Boyle and Fort McMurray, passing through Conklin and Chard. At Boyle, ANY connects to Lakeland & Waterways Railway which in turn connects with Canadian National Railways in Edmonton. This railway is a freight line that serves the Athabasca Oil Sands Region, shipping petroleum coke, sulphur, pipe, scrap metal, logs and various dimensional loads.

4.5.4 Airstrips

Existing airstrips near the lease area include:

- MEG Airstrip – a gravel airstrip owned and operated by MEG, located 23 km east of Conklin;
- Conklin – a local grass strip and the Leismer Airstrip located 12 km north of Conklin;
- Janvier – west of Bohn Lake;
- Cowper – by the fire lookout north of Cowper Lake;
- Grist Lake – at the north end of Grist Lake;
- Kirby – about 10 km southeast of Kirby Lake; and
- Primrose – east of Wiau Lake.

5 EXISTING CONDITIONS

5.1 ENVIRONMENTALLY IMPORTANT AREAS

Environmentally important areas are places protected for their significant environmental features. Some areas are legally protected (e.g., Provincial Parks and Recreation Areas) while others, such as Environmentally Significant Areas (ESAs), are not. The following sections summarize the different categories of environmentally important areas in the RSA.

5.1.1 Protected Areas

There are no protected areas in the RSA.

5.1.2 Heritage Rivers

The Canadian Heritage River System (CHRS) was developed to manage Canada’s outstanding rivers and to help conserve their natural, cultural and recreation values over the long term (CHRS 2004). In 2004 along with the Alberta section of the Clearwater River, the northern portion of Christina River was designated as a Heritage River under the CHRS (CHRS 2004). This section of Christina River lies southeast of Fort McMurray, about 35 km south of its confluence with the Clearwater River and is outside the RSA. There are no heritage rivers identified in the Resource Use RSA.

5.1.3 Environmentally Significant Areas

Environmentally Significant Areas are important and often sensitive features of the landscape, containing unique or representative landforms, rare or endangered vegetation, or significant or important wildlife habitat. Often ESAs contribute to biodiversity because they represent a unique combination of landscape features, vegetation communities, habitats, species populations and genetic resources that are otherwise uncommon in the region. Each ESA is given one of four levels of significance and background information for determining that level:

1. International: features that are unique in the world;

2. National: features that are limited in distribution at a national level or which are the best and only representatives in Canada;

3. Provincial: features that are of limited distribution in Alberta or are best examples of a particular feature in Alberta; or

4. Regional: features that are of limited distribution in the Boreal Forest Natural Region or are the best examples of a feature in the Boreal Forest Natural Region (Bilyck et al. 1996).

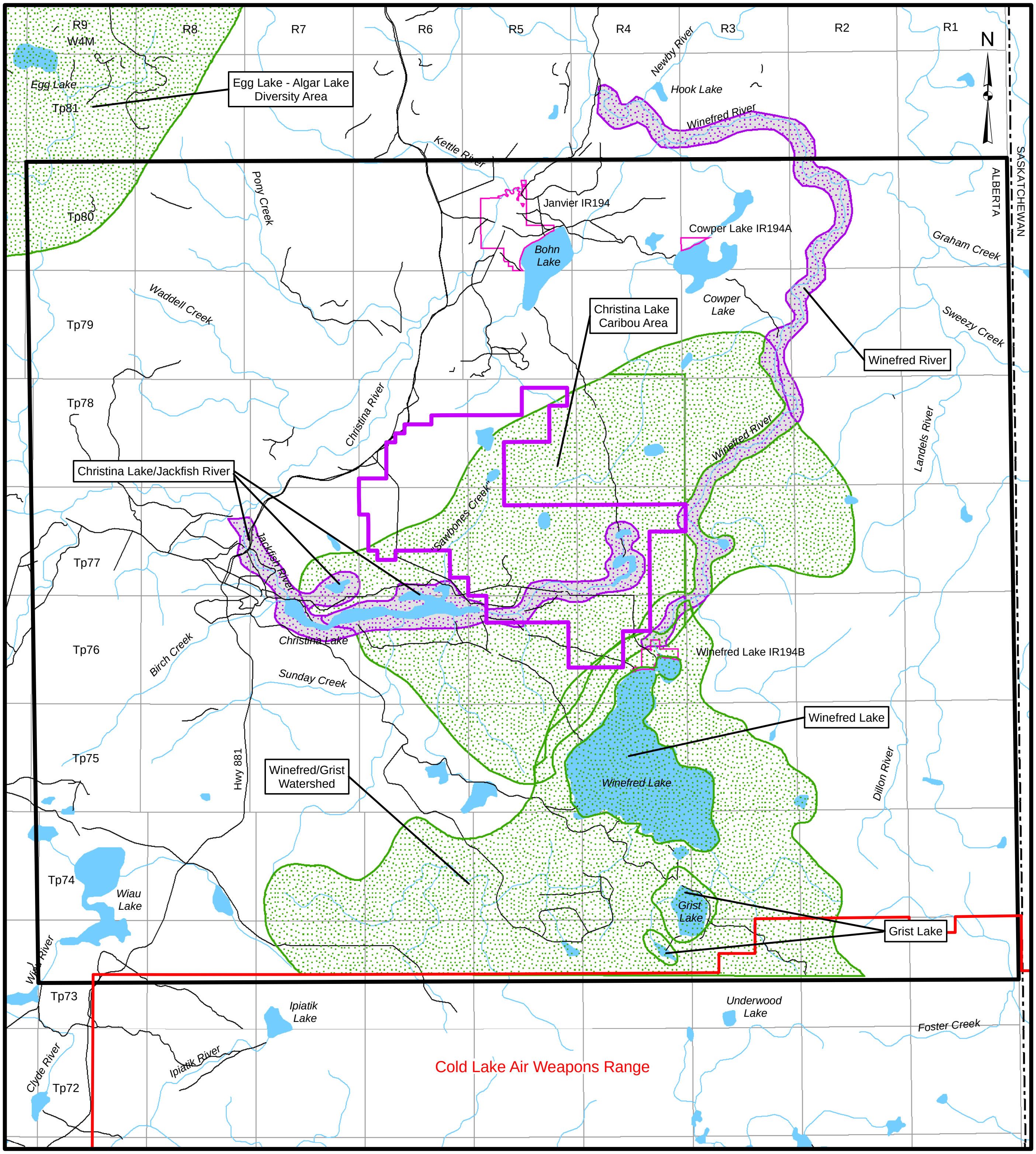
Environmentally significant areas are not legislatively mandated protected areas. However, an ESA designation does indicate both biotic and abiotic resources in the area. There are seven ESAs located within the Resource Use RSA: Egg Lake-Algar Lake Diversity Area; Grist Lake; Winefred Lake; Winefred/Grist Watershed; the Christina Lake Caribou Area; Christina Lake/Jackfish River and Winefred River. The latter four ESAs overlap the LSA (Golder 2001; Sweetgrass Consultants Ltd. 1997)

Figure 4 shows the location of each ESA in relation to the study areas. Regionally significant ESAs are shown only if they overlap the LSA. Table 6 shows the percent of each ESA that falls within the LSA and RSA. Table 7 summarizes the management guidelines for all seven ESAs.

Table 6 Environmentally Significant Areas

ESA	Total Area [ha]	Area in LSA [ha]	% within LSA	Area in RSA [ha]	% within RSA
Christina Lake Caribou Area	101,502	25,634	25	101,502	100
Christina Lake/Jackfish River	11,893	3,487	29	11,893	100
Winefred River	12,932	133	1	9,005	70
Egg Lake-Algar Lake Diversity Area	495,228	0	0	6,201	1
Grist Lake	3,114	0	0	3,114	100
Winefred Lake	12,325	0	0	12,325	100
Winefred/Grist Watershed	92,548	531	<1	92,548	100

Sources: Sweetgrass Consultants Ltd. 1997; Westworth and Associates Ltd. 1990.



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SCALE 1:500,000 KILOMETRES

LEGEND

- RESOURCE USE REGIONAL STUDY AREA
- RESOURCE USE LOCAL STUDY AREA
- INDIAN RESERVE
- AIR WEAPONS RANGE
- OPEN WATER
- RIVER OR STREAM
- ROADWAY

ENVIRONMENTALLY SIGNIFICANT AREA

- PROVINCIAL
- REGIONAL

NOTE

Unnamed watercourse locally known as "Sawbones Creek"
*Also known as the Hamlet of Janvier

REFERENCE

Digital data obtained from AltaLIS Ltd. (June 2004), Alberta Pacific Ltd. (April 2004), Sweetgrass Consultants Ltd. (2001), Westworth and Associates Ltd. (1990), used under license.
Projection: UTM Zone 12 Datum: NAD 83

PROJECT

CHRISTINA LAKE REGIONAL PROJECT - PHASE 3

TITLE

ENVIRONMENTALLY SIGNIFICANT AREAS

MEG ENERGY CORP.

PROJECT No. 07-1346-0009.9120			SCALE AS SHOWN	REV. 0
DESIGN	BB	27 Sep. 2007	FIGURE: 4	
GIS	ZB	27 Feb. 2008		
CHECK	BB	28 Feb. 2008		
REVIEW	IGG	05 Mar. 2008		

Project: I:\CLIENTS\MEG\07-1346-0009\mapping\mxd\resource_use\rsa_esas.mxd

Table 7 Description and Management Guidelines of Environmentally Significant Areas

ESA	Significance	Description	Management Considerations
Christina Lake Caribou Area	provincial	important caribou area; important otter habitat	maintaining unfragmented natural habitats for caribou
Christina Lake/Jackfish River	regional	important sport and domestic fishery; important waterfowl nesting area; significant woodland caribou habitat	maintenance of buffers to control siltation and prevent loss of streambank cover; preserve habitat integrity and control access during the waterfowl breeding seasons; maintaining unfragmented natural habitats for caribou
Winefred River	regional	important sport fishery; important otter habitat; high vegetation diversity	maintenance of water levels and quality; monitoring of vegetation species, conservation of more extensive areas of habitat for vegetation, consideration should be given to areas of connecting habitat that link natural populations and to the isolation of particular types of habitat
Egg Lake-Algar Lake Diversity Area	provincial	important caribou area; significant patterned fen; high vegetation diversity; one of the most diverse and relatively intact Boreal Forest landscapes in Alberta	maintaining unfragmented natural habitats for the diversity of plant and animal species
Grist Lake	provincial	important sport fishery; hydrological important lake; one of the most productive fisheries in the boreal forest of Alberta	maintenance of buffers to control siltation and prevent loss of streambank cover; maintaining natural cover on the uplands to protect the watershed
Winefred Lake	provincial	trophy fishing lake; important sport fishery; bald eagle nesting area; moulting and staging waterfowl; double-crested cormorant and great blue heron nesting	maintenance of buffers to control siltation and prevent loss of streambank cover; preserve habitat integrity and control access during the waterfowl breeding seasons; maintaining natural cover on the uplands to protect the watershed
Winefred/Grist Watershed	provincial	important sport and trophy fishing; important river otter production; river otters, double-crested cormorants; great blue herons and bald eagles present	maintenance of buffers to control siltation and prevent loss of streambank cover; preserve habitat integrity and control access during the waterfowl breeding seasons; maintaining natural cover on the uplands to protect the watershed

Sources: Golder 2001; Sweetgrass Consultants Ltd. 1997; Westworth and Associates Ltd. 1990.

5.2 AGGREGATE RESOURCES

Alberta Sustainable Resource Development administers and manages sand and gravel resources on public lands. Recently, the Athabasca Regional Issues Working Group (ARIWG) conducted a survey to establish existing supply and annual demand for aggregate in the RMWB. According to this survey, there is a total supply of road base aggregate of 1,009,218 m^3 with an annual demand of 290,159 m^3 in the area south of Fort McMurray (ARIWG 2003) (Table 8). Discoveries made since 2002 are not included in this supply estimate. Over time, although demand is increasing, additional supplies are also being located, including the Birch Mountain Resources Muskeg Valley Quarry and the Parsons Creek Resources Project, both located north of Fort McMurray.

Table 8 Aggregate Resources in the Regional Municipality of Wood Buffalo

Location	Aggregate Supply Status[a][b]			Estimated Remaining Supply [years][c]
	Aggregate Type	Total Supply [m³]	Annual Demand [m³]	
Regional Municipality of Wood Buffalo	road base	32,709,218	6,834,659	1.8
	concrete[d]	4,509,218	406,979	8.1
south of Fort McMurray	road base	1,009,218	290,159	0.5
	concrete[d]	1,009,218	201,979	2.0
north of Fort McMurray and west of the Athabasca River	road base	2,500,000	1,894,500	0
	concrete[d]	2,500,000	205,000	9.2
north of Fort McMurray and east of the Athabasca River	road base	29,200,000	4,650,000	3.3
	concrete[d]	1,000,000	0	0

(a) Source: ARIWG 2003.
(b) New aggregate supplies that may have been discovered post-2002 are not included.
(c) Source: Birch Mountain Resources Ltd. 2004; Birch Mountain's calculation of remaining supply (as of 2007).
(d) Concrete aggregate refers to the coarse component of concrete aggregate only.

Existing data on the supply status of aggregates is limited as many contractors feel that the disclosure of information detailing the annual volumes of gravel extracted from operating borrow pits reveals too much information as to the nature of their business and thus, can affect their position in the marketplace (Highwood Environmental Management Ltd. et al. 2003).

Within and near the LSA there are three Surface Mineral Exploration (SME) dispositions (not including the disposition held by MEG) held by 297917 Alberta Ltd. located at 33-76-5 W4M and 31-77-4 W4M, and Central Aggregate Company Ltd located at 32-76-5 W4M. There are also five Surface Material Lease (SML) holders not including MEG within or near the LSA. MEG holds the only Surface Material Licence (SMC) within or near the LSA.

5.3 AGRICULTURE

The RSA is in the Green Area and generally supports little agricultural activity.

Based on an LSAS search (August 24, 2007), no wild rice or grazing operations are located in the LSA. There are two grazing leases located near the LSA. The grazing lease held by Alvina Laboucane and Edgar Tatum is located north of the LSA at 32-78-6 W4M and at several sections on 79-06 W4M totalling 148.52 ha. The grazing lease held by John Stepanowich is 169.38 ha and located north of the LSA on 79-05-W4M and 80-05-W4M. Joe Hoffman owns a wild rice operation in the RSA, south of Winefred Lake on Sections 23 and 24 of Range 4, Township 74, W4M.

5.4 FORESTRY

Timber rights within most of the Terrestrial Resources RSA have been granted to Alberta-Pacific Forest Industries Inc. (Al-Pac) under a Forest Management Agreement (FMA). The Terrestrial Resources LSA occurs within the Forestry Management Unit (FMU L11), with most of the RSA within the L11 operating unit (Al-Pac 2004). The FMU L11 is part of Zone C where coniferous cutting rights are shared between Al-Pac, a directed Coniferous Timber Permit of 15,000 m^3 and miscellaneous timber use. Refer to the Forestry Baseline Report for the details of timber supply in the Terrestrial Resources LSA (Volume 5, Appendix 5-III).

Timber productivity rating is the potential timber productivity of forest land and non-forested vegetated land based on the height and age of the dominant species. This rating reflects factors affecting tree growth such as soil, topography, climate, elevation and moisture (AEP 1997). In the Alberta Vegetation Inventory (AVI) system, stands are given a timber productivity rating of good, moderate, fair or unproductive. Timber Productivity Ratings (TPR) are assigned to the landbase and are one factor in calculating Annual Allowable Cut (AAC) for the FMU. The Terrestrial Resources LSA contains approximately 7,439 ha of productive forests (22% of the LSA).

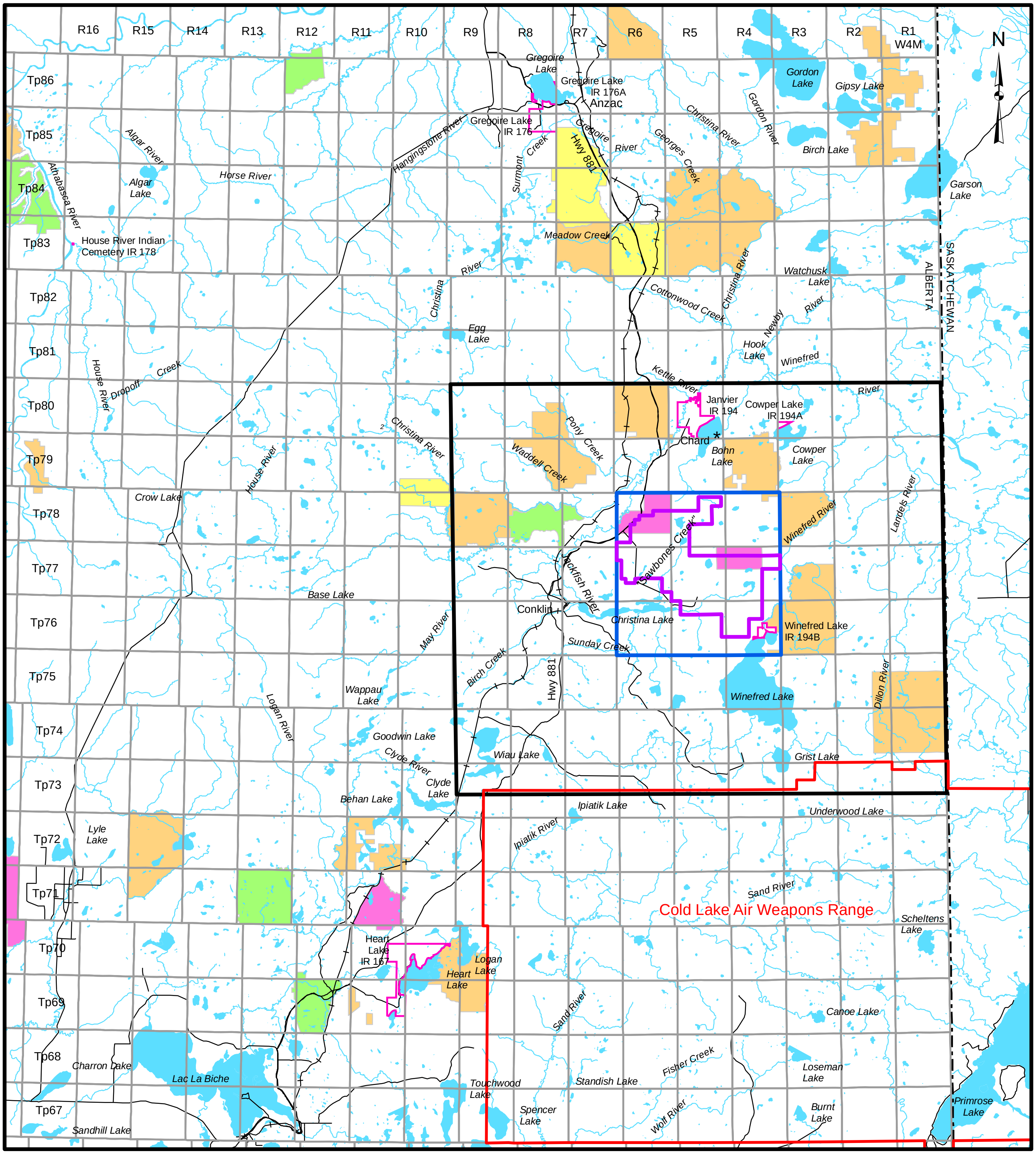
Merchantable timber volumes are estimated using historical AVI data for the Central Mixedwood Subregion and provides average coniferous, deciduous and total volume factors (e.g., height and crown closure) for coniferous, deciduous and mixedwood stand types. In the Terrestrial Resources LSA, the merchantable timber volume of productive forest stands is 2,350 ha of deciduous stands and 4,091 ha of coniferous stands.

A search of the LSAS indicated 24 Industrial Sample Plots (ISP), mature and immature permanent forest sample plots, all of which are allocated to Alberta Pacific Forest Industries Inc., within and near the LSA. The locations and sizes of the ISPs near the LSA listed are in Table 9.

Al-Pac's General Development Plan for 2007 to 2011 includes planned cuts in the Terrestrial and Resource Use RSAs (Figure 5).

Table 9 Industrial Sample Plots Within and Near the Local Study Area

Activity	Location	Size [ha]
ISP-950207	4-06-076-08-04	0.91
ISP-950023	4-06-078-07-SE 4-06-078-17-SE 4-06-078-17-SW	4.50
ISP-060266	4-06-076-08-SW	1.54
ISP-060265	4-06-076-14-SW	3.23
ISP-060264	4-06-076-14-NE	3.04
ISP-060263	4-06-076-14-NW	3.04
ISP-060262	4-06-076-14-NW	3.04
ISP-060261	4-06-076-14-SE	3.04
ISP-060260	4-06-076-12-SE	3.04
ISP-060259	4-06-076-12-NW	3.04
ISP-060257	4-06-076-13-NW	3.04
ISP-060256	4-06-076-15-NW	3.04
ISP-060255	4-06-076-15-NW	3.04
ISP-060254	4-06-076-10-SE	3.04
ISP-060253	4-06-076-10-NE	3.04
ISP-060252	4-06-076-10-NW	3.04
ISP-060251	4-06-076-11-SE	1.54
ISP-060250	4-06-076-11-NW	3.04
ISP-060248	4-06-076-10-SE	3.04
ISP-060104	4-06-076-10-SE	3.04
ISP-010131	4-06-078-33-11	2.25
ISP-010118	4-04-077-30-13	2.25
ISP-010117	4-04-077-30-05	2.25
ISP-010116	4-04-078-05-05	2.25
Total		**66.32**



LEGEND

- RESOURCE USE REGIONAL STUDY AREA
- LSAS SEARCH (AUGUST 24, 2007)
- RESOURCE USE LOCAL STUDY AREA
- INDIAN RESERVE
- AIR WEAPONS RANGE
- OPEN WATER
- RIVER OR STREAM
- ROADWAY
- RAILWAY

FORESTRY GENERAL DEVELOPMENT

- 2007
- 2007 / INTEGRATED LANDUSE MANAGEMENT PLANS
- 2008 TO 2011
- PLANNING UNIT BOUNDARY - FIRST PASS COMPLETE

20 0 20

SCALE 1:1,000,000 KILOMETRES

NOTE

Unnamed watercourse locally known as "Sawbones Creek"
*Also known as the Hamlet of Janvier

REFERENCE

Alberta digital data obtained from Geomatics Canada (August 2001), AltaLIS Ltd. (September 2004), Veritas DGC Inc. (July 2004), Alberta Pacific Ltd. (April 2004), Desktop Mapping Technologies Inc., used under license. Saskatchewan digital data obtained from Information Services Corp. (September 2004), used under license.
Projection: UTM Zone 12 Datum: NAD 83

PROJECT

CHRISTINA LAKE REGIONAL PROJECT - PHASE 3

TITLE

FORESTRY GENERAL DEVELOPMENT PLAN IN THE REGIONAL AND LOCAL STUDY AREAS

MEG ENERGY CORP.

PROJECT No. 07-1346-0009.9120			SCALE AS SHOWN	REV. 0
DESIGN	BB	27 Sep. 2007	FIGURE: 5	
GIS	ZB	27 Feb. 2008		
CHECK	BB	28 Feb. 2008		
REVIEW	IGG	05 Mar. 2008		

Project: I:\CLIENTS\MEG\07-1346-0009\mapping\mxd\resource_use\rsa_lsa_forestry_dev.mxd

5.5 BERRY PICKING

Berry picking is an important activity for First Nations people, but it is also carried out for non-traditional purposes. Information regarding specific area and types of plant collection by First Nations is detailed in the Traditional Land Use Assessment (Volume 6, Section 2). Information on berry habitat is available from the Terrestrial Vegetation and Wetlands Baseline Report and is based on ecosite phases (Volume 5, Appendix 5-II). Typical berry picking target species are high and low bush cranberries and blueberries. Table 10 provides an indication of the percent coverage of these vegetation types likely to support blueberries, low-bush cranberries, raspberries and strawberries within the Terrestrial Resources LSA and RSA.

Table 10 Areas of Habitat Likely to Support Berries

Berry Type	Area in LSA [ha]	Percent of LSA [%]	Area in RSA [ha]	Percent of RSA [%]
blueberry	4,473	13	397,624	26
low-bush cranberry	2,453	7	261,481	17
raspberry	77	<1	168,952	11
strawberry	404	1	163,192	11

The results of the RUQ indicated that wild berries were picked to some degree by 44% of respondents. However, the LSA is distant from large centres such as Fort McMurray and Lac La Biche and people generally do not travel far from their homes to pick berries. The LSA is therefore considered to have low importance for berry picking for non-traditional users. However, potential berry picking habitat was mapped using Landsat™ satellite imagery and a Geographic Information System (GIS) to allow the relative abundance of plant communities to be compared within the Terrestrial Resources RSA and LSA. The LSA has some potential for blueberry and low-bush cranberry picking as habitat likely to support these berries covers 20% of the LSA (Figure 6). Overall, the proportion of berry habitat is small within the LSA compared to within the Terrestrial Resources RSA.

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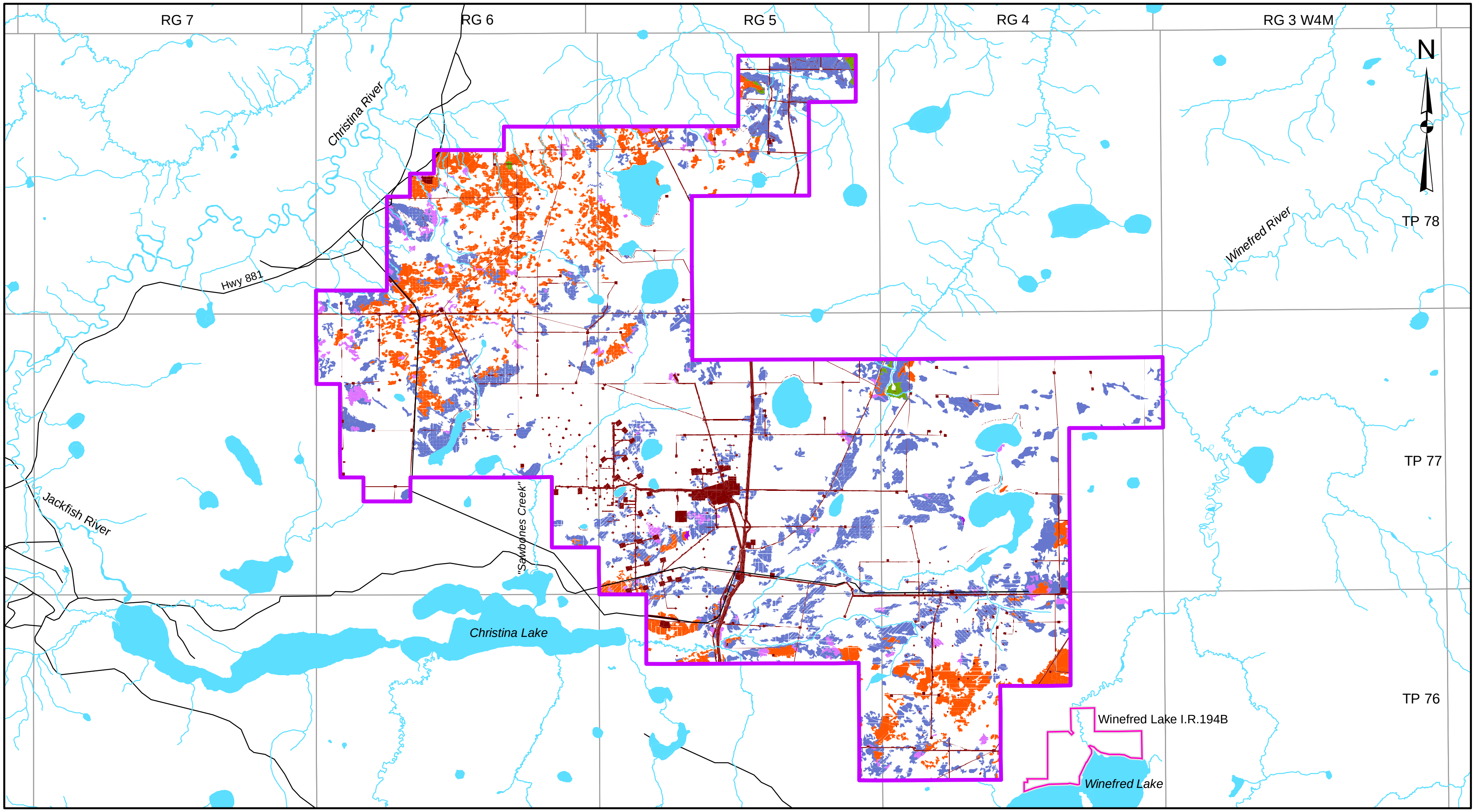


LEGEND

- RESOURCE USE LOCAL STUDY AREA
- INDIAN RESERVE
- OPEN WATER
- RIVER OR STREAM
- ROADWAY

DISTURBED

- EXISTING AND APPROVED DISTURBANCE (THE MAJORITY OF SEISMIC LINES WITHIN THE LSA HAVE NOT BEEN SHOWN IN ORDER TO CLEARLY PRESENT THE RELEVANT DETAILS OF THIS MAP)

BERRY PICKING HABITAT

- BLUEBERRY
- BLUEBERRY, STRAWBERRY
- LOW-BUSH CRANBERRY
- LOW-BUSH CRANBERRY, RASPBERRY
- RASPBERRY

NOTE

Unnamed watercourse locally known as "Sawbones Creek"

REFERENCE

Digital data obtained from AltaLIS Ltd. (June 2004), Veritas DGC Inc. (July 2004), Alberta Pacific Ltd. (April 2004), Pearson Timberline Ltd. (April 2004), used under license.
Projection: UTM Zone 12 Datum: NAD 83

PROJECT

CHRISTINA LAKE REGIONAL PROJECT - PHASE 3

TITLE

POTENTIAL BERRY PICKING AREAS
IN THE LOCAL STUDY AREA

MEG ENERGY CORP.

PROJECT No. 07-1346.0009.9120			SCALE AS SHOWN	REV. 1
DESIGN	LV	05 Oct. 2007	FIGURE: 6	
GIS	TN	25 Feb. 2008		
CHECK	BB	28 Feb. 2008		
REVIEW	IGG	05 Mar. 2008		

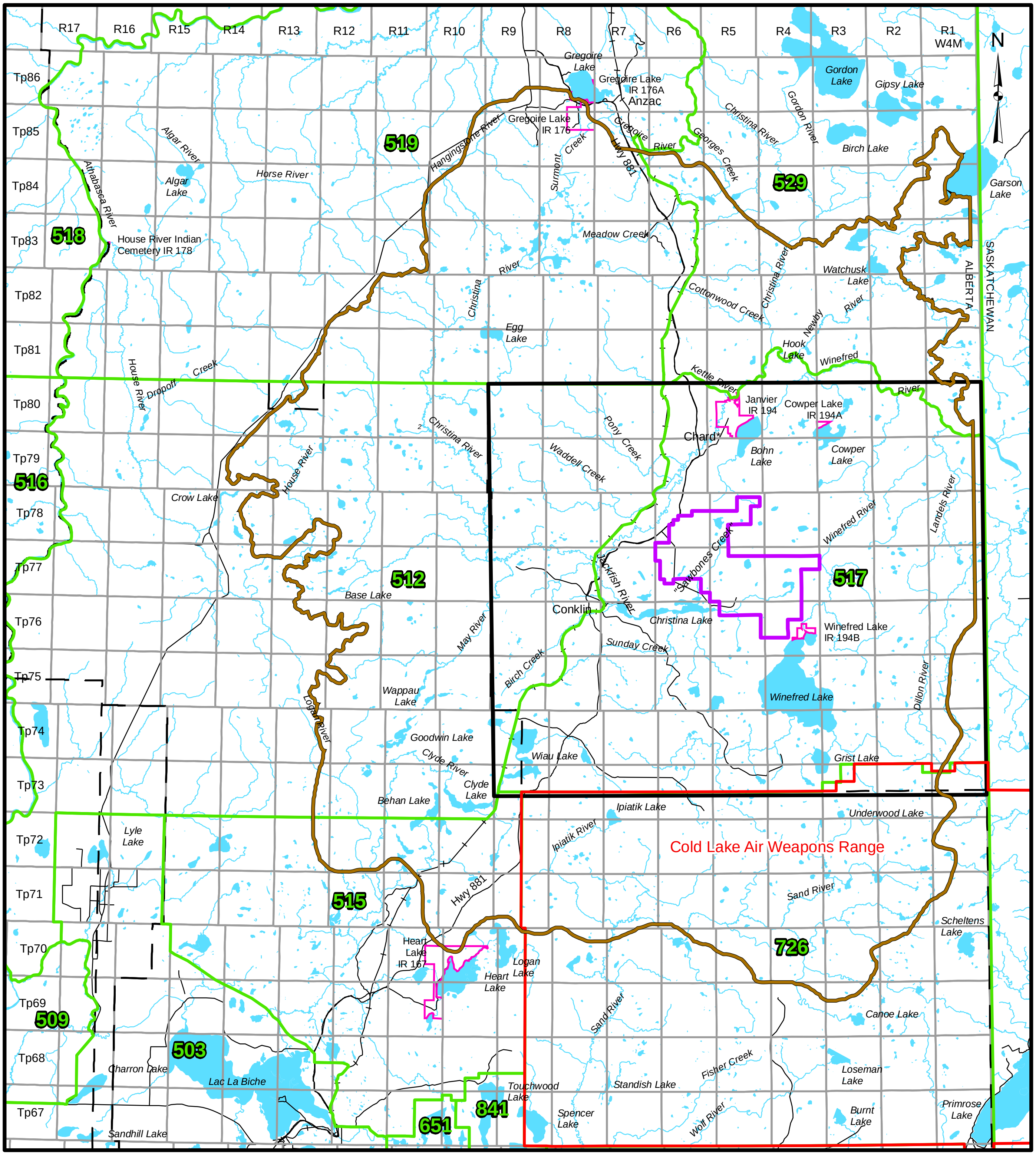
5.6 HUNTING

Hunting in Alberta is regulated through ASRD and is managed through the use of Wildlife Management Units (WMUs). There are six WMUs located within the Terrestrial Resources RSA (WMU 512, 515, 517, 519, 529 and 726), one of which (WMU 517) overlaps the LSA (Figure 7). WMU 726 encompasses the Cold Lake Air Weapons Range and no hunting is allowed within this WMU.

Alberta Land Inventory (ALI) maps related to hunting were reviewed to determine the capability of the LSA to support waterfowl and ungulate species. Based on adverse topography that limits the development of wetlands, poor fertility of the soil and water that limits the growth of vegetation (AENV 1972) there are severe limitations to waterfowl production within the LSA. The two lakes nearest the LSA, Christina Lake and Winefred Lake, are also rated as having severe limitations to the production of waterfowl. These limitations relate to a reduced marsh edge and the depth of water within the lake (AENV 1972).

Most of the LSA is ranked as having moderate to severe limitations to ungulate production (specifically moose and caribou) due to a lack of nutrients, adverse soil characteristics and poor soil moisture conditions (AENV 1975). The northernmost sections of the LSA, however, are ranked as having only very slight limitations to the production of ungulates (specifically caribou) due to poor soil moisture (AENV 1975). The lands are winter ranges on which animals from surrounding areas depend (AENV 1975).

Big game animals with hunting seasons in the boreal region include white-tailed deer, mule deer, moose, black bears, wolves and coyotes (Sports Scene Publications Inc. 2006). Important upland game birds with open hunting seasons in the boreal region include ruffed grouse, spruce grouse, sharp-tailed grouse and ptarmigan. Important waterfowl species include ducks such as mallards, northern pintails, northern shovelers, blue-winged teals, green-winged teals, scaups, redheads and canvasbacks. White-fronted geese, Canada geese, snow geese and Ross' geese may also be hunted (Sports Scene Publications Inc. 2006). Table 11 lists hunting seasons for WMU 517 within the LSA.



LEGEND

- TERRESTRIAL RESOURCES REGIONAL STUDY AREA
- RESOURCE USE REGIONAL STUDY AREA
- RESOURCE USE LOCAL STUDY AREA
- WILDLIFE MANAGAMENT UNIT
- INDIAN RESERVE
- AIR WEAPONS RANGE
- OPEN WATER
- RIVER OR STREAM
- ROADWAY
- RAILWAY

20 0 20

SCALE 1:1,000,000 KILOMETRES

NOTE

Unnamed watercourse locally known as "Sawbones Creek"
*Also known as the Hamlet of Janvier

REFERENCE

Alberta digital data obtained from Geomatics Canada (August 2001), AltaLIS Ltd. (September 2004), Veritas DGC Inc. (July 2004), Alberta Pacific Ltd. (April 2004), Desktop Mapping Technologies Inc., used under license. Saskatchewan digital data obtained from Information Services Corp. (September 2004), used under license.
Projection: UTM Zone 12 Datum: NAD 83

PROJECT

CHRISTINA LAKE REGIONAL PROJECT - PHASE 3

TITLE

WILDLIFE MANAGEMENT UNITS IN THE TERRESTRIAL RESOURCES REGIONAL STUDY AREA

MEG ENERGY CORP.

PROJECT No. 07-1346-0009.9120			SCALE AS SHOWN	REV. 0
DESIGN	BB	27 Sep. 2007	FIGURE: 7	
GIS	TN	05 Mar. 2008		
CHECK	BB	05 Mar. 2008		
REVIEW	IGG	05 Mar. 2008		

Table 11 Hunting Seasons for the Local Study Area, 2007

Species	Type	Season	
		Archery Only[a]	General[b]
white-tailed deer	antlered and antlerless	August 25 to 31	September 1 to November 30
mule deer	antlered	August 25 to 31	September 1 to November 30
moose	antlered	August 25 to 31	September 1 to October 31
black bear	fall 2007	August 25 to 31	September 1 to November 30
	spring 2008[c]	none	April 17 to July 15
ruffed and spruce grouse	n/a	none	September 1 to November 30
sharp-tailed grouse	n/a	none	September 1 to November 30
ducks, coots, common snipe, white-fronted and Canada geese and snow and Ross' geese (including falconry hunting)	n/a	none	September 1 to December 16

(a) Archery Only Season are those where only a bow and arrow may be used to hunt.

(b) General Season are those where either a firearm, cross-bow or a bow and arrow may be used.

(c) The spring 2008 season requires a new year licence.

n/a = Not applicable.

Source: Sports Scene Publications 2007.

Twenty-eight percent of RUQ survey respondents indicated that they hunt within the region generally encompassing the RMWB (Golder 2001). Table 12 lists the game species hunted by the respondents and the percent of hunters targeting each species. The game species hunted most often is moose (67%), followed by deer (63%) and grouse (33%). More grouse (12) are taken per hunter than any other species, followed by rabbit (11) and duck (6). Information on species abundance, distribution and habitat potential within the Terrestrial Resources RSA is provided in the Wildlife Baseline Report (Volume 5, Appendix 5-IV).

Table 12 Species Hunted Based on Responses to the Resource User Telephone Questionnaire

Type of Game	Percent Hunting This Species	Average Number Caught per Hunter per Year[a]
moose	67	1
deer	63	1
grouse	33	12
duck	8	6
rabbit	7	11
goose	6	5
black bear	4	1
mule deer	<1	1
partridge	<1	5
waterfowl	<1	4

(a) The numbers used to calculate the average number hunted per year do not include those who responded with an average (e.g., 1 bear over 4 years = 0.25), or fraction values less than one.

Five hunters (about 1% of those surveyed, or 4% of all hunters in the RUQ) reported specifically using the Christina Lake or Conklin areas for hunting. These individuals reported hunting for deer (4) or moose (1) in the area.

There are outfitters who have allocations for harvesting black bear, mule deer, white-tailed deer and moose within WMU's 512, 515 517, 519 and 529. Allocations give outfitters the right to purchase a hunting licence for a client from outside Alberta or Canada, and most clients for outfitters in Alberta are from the United States (Mabel Brick, pers. comm.). Each licence is for one animal with the exception that a black bear licence allows the hunter to harvest a maximum of two bears. Permit holders (outfitters) in WMU 517 are listed in Table 13. A summary of the number of allocations in 2007 for all the WMUs is presented in Table 14.

Table 13 Permit Holders in the Local Study Area (WMU 517), 2007

Species	Number Of Allocations								
	Black Bear		Moose		White-Tailed Deer	Mule Deer	All		
Allocation Type	Open[a]	Bow[b]	Open	Rut[c]	Open	Open	Open	Bow	Rut
Permit Holders									
Ayers, Don (Tuff)	44	4	0	0	0	0	44	4	0
North River Outfitters Ltd.	0	0	0	0	21	2	21	2	0
Saddle Mountain Outfitters	8	0	0	0	0	0	8	0	0
Winefred Lake Lodge	0	0	2	0	4	0	6	0	0
Winefred Lake Outfitters	0	0	2	5	8	0	10	0	5
Total	52	**4**	**4**	**5**	**33**	**2**	**89**	**6**	**5**

[a] Allocation for hunting during either applicable bow or rifle season.
[b] Allocation for hunting with an authorized bow and arrow.
[c] Allocation for hunting of only moose several weeks prior to and during the open season.
Source: Mabel Brick, Pers. Comm.

Table 14 Summary of Big Game Allocations in the Regional Study Area, 2007

WMU	Species	Number of Allocations			All Allocations
		Open[a]	Bow[b]	Rut[c]	
512	black bear	69	4	n/a	73
	moose	14	4	9	27
	white-tailed deer	63	15	0	78
	mule deer	17	0	0	17
	Total	**163**	**23**	**9**	**195**
515	black bear	24	4	n/a	28
	moose	6	0	7	13
	white-tailed deer	34	10	0	44
	mule deer	0	0	0	0
	Total	**64**	**14**	**7**	**85**

Table 14 Summary of Big Game Allocations in the Regional Study Area 2007 (continued)

WMU	Species	Number of Allocations			All Allocations
		Open[(a)]	Bow[(b)]	Rut[(c)]	
517	black bear	52	4	n/a	56
	moose	4	0	5	9
	white-tailed deer	33	0	0	33
	mule-deer	2	0	0	2
	Total	**91**	**4**	**5**	**100**
519	black bear	64	4	n/a	68
	moose	8	0	13	21
	white-tailed deer	22	0	0	22
	mule deer	0	0	0	0
	Total	**94**	**4**	**13**	**111**
529	black bear	36	4	n/a	40
	moose	4	0	10	14
	white-tailed deer	9	0	0	9
	mule deer	4	0	0	4
	Total	**53**	**4**	**10**	**67**
All	black bear	245	20	n/a	265
	moose	36	4	44	84
	white-tailed deer	161	25	0	186
	mule deer	23	0	0	23
	Total	**465**	**49**	**44**	**558**

(a) Allocation for hunting during either applicable bow or rifle season.

(b) Allocation for hunting with an authorized bow and arrow.

(c) Allocation for hunting of only moose several weeks prior to and during the open season.

n/a = Not applicable.

Source: Mabel Brick, Pers. Comm.

Harvest data for moose, mule deer, white-tail deer and black bear are available for WMUs 512, 515, 517, 519 and 519 for 2002 to 2006 (Table 15). Within WMU 517, there has been a noticeable decline in moose harvesting within the last two years. A relatively higher rate of moose harvest occurs in WMU 512. Additionally, the harvest of white-tail deer within WMU 517 was noticeably lower in 2006.

Table 15 Harvest Statistics (2002 to 2006) in the Regional Study Area

WMU	Species	Number of Individuals Harvested					
		2002	2003	2004	2005	2006	2002 to 2006
512	moose	158	200	127	137	132	**754**
	mule deer	13	7	7	4	n/d	**31**
	white-tailed deer	187	252	246	256	186	**1,127**
	black bear	26	n/d	5	24	n/d	**55**
	Total	**384**	**459**	**385**	**421**	**318**	**1,967**
515	moose	64	81	48	54	48	**295**
	mule deer	8	n/d	7	0	4	**19**
	white-tailed deer	165	280	223	135	167	**970**
	black bear	16	n/d	37	10	28	**91**
	Total	**253**	**361**	**315**	**199**	**247**	**1,375**

Table 15 Harvest Statistics (2002 to 2006) in the Regional Study Area (continued)

WMU	Species	Number of Individuals Harvested					
		2002	2003	2004	2005	2006	2002 to 2006
517	moose	26	33	20	9	3	**91**
	mule deer	4	7	7	4	n/d	**22**
	white-tailed deer	74	68	79	66	13	**300**
	black bear	9	n/d	14	9	11	**43**
	Total	**113**	**108**	**120**	**88**	**27**	**456**
519	moose	102	129	87	43	55	**416**
	mule deer	n/d	n/d	n/d	n/d	4	**4**
	white-tailed deer	60	40	17	97	43	**257**
	black bear	n/d	n/d	n/d	12	n/d	**12**
	Total	**162**	**169**	**104**	**152**	**102**	**689**
529	moose	26	40	69	15	17	**167**
	mule deer	4	n/d	4	n/d	n/d	**8**
	white-tailed deer	10	11	11	29	n/d	**61**
	black bear	n/d	n/d	9	13	n/d	**22**
	Total	**40**	**51**	**93**	**57**	**17**	**258**
all	moose	376	483	351	258	255	**1,723**
	mule deer	29	14	25	8	8	**84**
	white-tailed deer	496	651	576	583	409	**2,715**
	black bear	51	n/d	65	68	39	**223**
	Total	**952**	**1,148**	**1,017**	**917**	**711**	**4,745**

n/d = No data available.
Source: Bruce Treichel, Pers. Comm.

Moose is an important big game animal for hunting. Moose licence data are available for WMU 517 (Table 16). Licence data for other species are not available on species-specific basis (Bruce Treichel, Pers. Comm.).

Table 16 Moose Hunting Licence Sales in the Local Study Area (WMU 517), 2002 to 2006

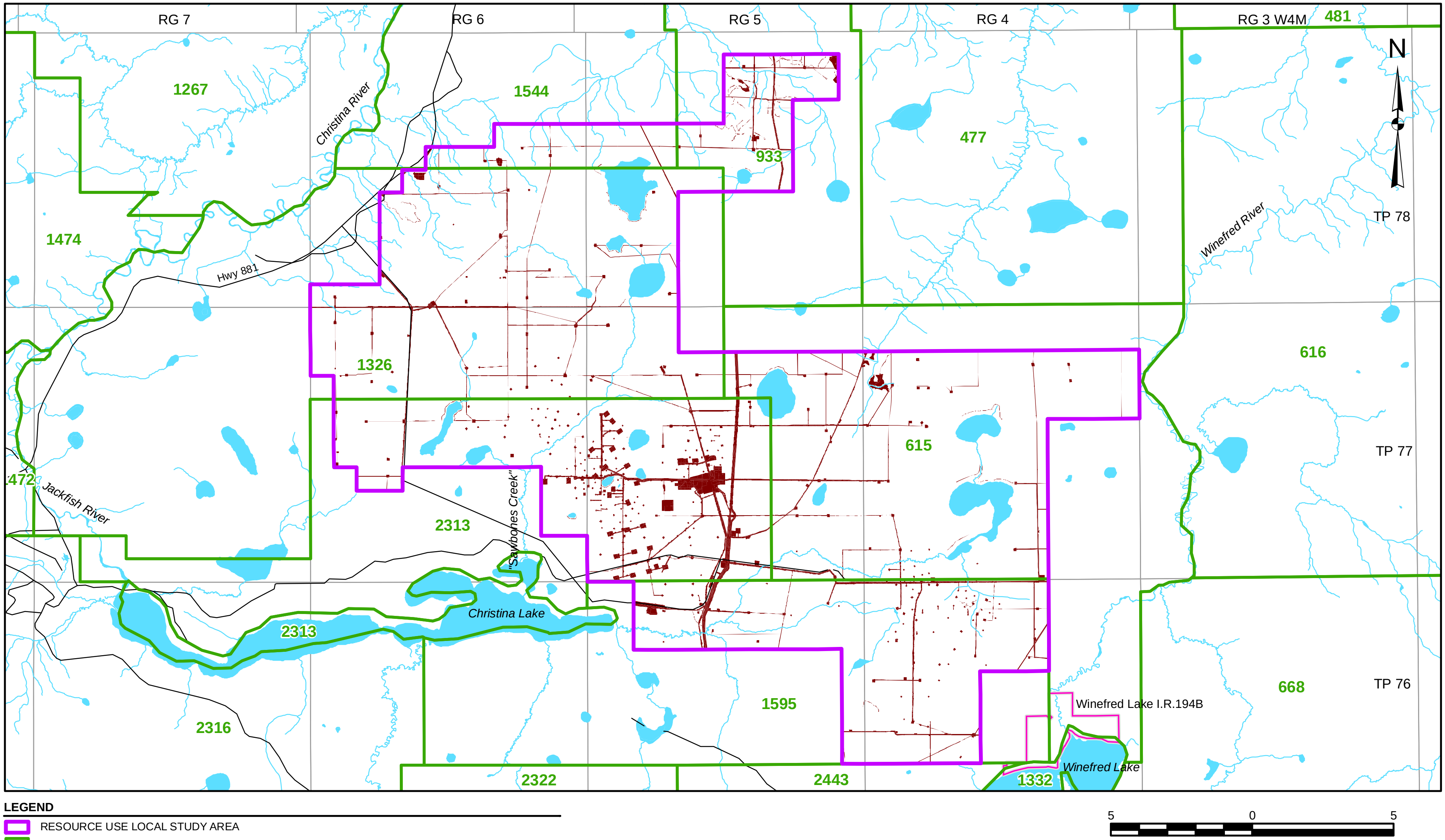
WMU	2002	2003	2004	2005	2006
517	72	59	37	31	10

Source: Bruce Treichel, Pers. Comm.

5.7 TRAPPING

Trapping is managed by a registered trapline system of Registered Fur Management Areas (RFMAs). Trapline owners are licensed to harvest in an RFMA and are requested to provide yearly harvest data to Alberta Fish and Wildlife so harvesting can be monitored and managed. Figure 8 shows the RFMAs overlapping the LSA.

I:/CLIENTS/MEG/07-1346-0009/mapping/mxd/resource_use/lsa_rfma.mxd



LEGEND

- RESOURCE USE LOCAL STUDY AREA
- REGISTERED FUR MANAGEMENT AREA
- INDIAN RESERVE
- OPEN WATER
- RIVER OR STREAM
- ROADWAY

DISTURBED

- EXISTING AND APPROVED DISTURBANCE (THE MAJORITY OF SEISMIC LINES WITHIN THE LSA HAVE NOT BEEN SHOWN IN ORDER TO CLEARLY PRESENT THE RELEVANT DETAILS OF THIS MAP)

NOTE

Unnamed watercourse locally known as "Sawbones Creek"

REFERENCE

Digital data obtained from AltaLIS Ltd. (June 2004), Veritas DGC Inc. (July 2004), Alberta Pacific Ltd. (April 2004), Pearson Timberline Ltd. (April 2004), used under license.
Projection: UTM Zone 12 Datum: NAD 83

PROJECT

CHRISTINA LAKE REGIONAL PROJECT - PHASE 3

TITLE

REGISTERED FUR MANAGEMENT AREAS IN THE LOCAL STUDY AREA

MEG ENERGY CORP.

PROJECT No. 07-1346.0009.9120			SCALE AS SHOWN	REV. 1
DESIGN	BB	05 Oct. 2007	FIGURE: 8	
GIS	TN	25 Feb. 2008		
CHECK	BB	28 Feb. 2008		
REVIEW	IGG	05 Mar. 2008		

Six traplines overlap the LSA (RFMAs 615, 933, 1326, 1544, 1595 and 2313). Species that are typically trapped include large carnivores, semi-aquatic fur-bearers, small mammals and mustelids. For reasons of confidentiality, harvest returns are not available for individual RFMAs. However, aggregate data is available for the six RFMAs for the years 2002 to 2005. The aggregate data for the above RFMAs is presented in Table 17.

Table 17 Aggregate Fur Trapping Harvest for Registered Fur Management Areas 615, 933, 1326, 1544, 1595 and 2313

Year	Beaver	Black Bear	Coyote	Fisher	Fox	Lynx	Mink	Muskrat	Otter	Squirrel	Weasel	Wolf	Total
2002	116	1	15	15	5	8	2	16	14	12	8	0	**212**
2003	95	10	4	11	0	5	0	66	5	10	5	2	**213**
2004	29	7	15	11	2	1	0	59	2	0	0	2	**128**
2005	15	4	19	5	2	1	0	0	5	10	0	1	**62**
Total	**255**	**22**	**53**	**42**	**9**	**15**	**2**	**141**	**26**	**32**	**13**	**5**	**615**

Source: Verna Wolfram, Pers. Comm.

Revenue from all RFMAs in the province has shown a long-term (1977 to 2001) decline that corresponds to a similar decline in both harvests and pelt prices over this same period. Trappers in the region have indicated that lower fur prices have made earning a living by trapping very difficult, thus many trappers have entered other industries. Reasons attributed to the decrease in the value of pelts include decreasing demand for furs and decreasing quality of furs taken from traplines in the region (Golder 2001).

5.8 FISHING

This section describes the level of fishing in the Aquatic Resources RSA and LSA. Refer to the Fish and Fish Habitat Baseline Report (Volume 4, Appendix 4-V) for details on fish populations and habitats.

5.8.1 Commercial Fishing

Within Alberta, there has been a freeze on the sale of commercial fishing licences since 1987 (Ken Bodden, Pers. Comm.). Current commercial licence holders can sell their licences to other fisherman, but there are no new licences issued. The freeze, combined with a government buyout program of existing licences is intended to encourage a more viable industry.

Table 18 contains the commercial fisheries information for Christina Lake, Cowper Lake, Kirby Lake and Royemma Lake. All of these lakes are eligible for commercial fishing and have a licence base (Ken Bodden, Pers. Comm.). Christina Lake has two licence holders with 24 nets; Cowper Lake has one licence holder with eight nets; Kirby Lake has three licence holders with 40 nets; and Royemma Lake has one licence holder with 6 nets. There has been no commercial fishing on Cowper Lake since 1989 and the government is averse to opening it again because of the demand from sport fishing.

Table 18 Commercial Fisheries Information for Christina Lake, Kirby Lake and Royemma Lake (2000 to 2006)

Year	Lake	Weight and Value	Type of Fish				All
			cisco	whitefish	northern pike	walleye	
2000	Christina	kg	0	5,095	0	0	5,095
		$	$0	$6,669	$0	$0	$6,669
	Kirby	kg	12	794	146	0	952
		$	$11	$1,893	$121	$0	$2,025
	Royemma	No Commercial Fishing Occurred					
	Total	**kg**	**12**	**5,889**	**146**	**0**	**$6,047**
		$	**$11**	**$8,562**	**$121**	**$0**	**$8,694**
2001	Christina	kg	0	5,570	120	45	5,735
		$	$0	$8,634	$240	$250	$9,124
	Kirby	kg	0	1,505	161	n/d	1,666
		$	$0	$4,741	$161	n/d	$4,902
	Royemma	kg	0	646	33	n/d	679
		$	$0	$1,689	$66	n/d	$1,755
	Total	**kg**	**0**	**7,721**	**314**	**45**	**8,080**
		$	**$0**	**$15,064**	**$522**	**$250**	**$15,836**
2002	Christina	kg	0	2,589	68	30	2,657
		$	$0	$5,178	$136	$105	$5,419
	Kirby	kg	0	2,295	535	n/d	2,830
		$	$0	$5,783	$1,204	n/d	$6,987
	Royemma	No Commercial Fishing Occurred					
	Total	**kg**	**0**	**4,884**	**603**	**30**	**5,517**
		$	**$0**	**$10,961**	**$1,340**	**$105**	**$12,406**
2003	Christina	kg	0	2,688	59	10	2,757
		$	$0	$8,601	$177	$32	$8,810
	Kirby	kg	0	855	270	0	1,125
		$	0	$2,026	$607	$0	$2,633
	Royemma	No Commercial Fishing Occurred					
	Total	**kg**	**0**	**3,543**	**329**	**10**	**3,882**
		$	**$0**	**$10,627**	**$784**	**$32**	**$11,443**
2004 to 2005	No Commercial Fishing Occurred						
2006	Christina	No Commercial Fishing Occurred					
	Kirby	kg	0	4,680	85	0	4,765
		$	0	$9,360	$81	$0	$9,441
	Royemma	No Commercial Fishing Occurred					
All	**All**	**kg**	**12**	**26,717**	**1,477**	**85**	**28,291**
		$	**$11**	**$54,574**	**$2,793**	**$387**	**$57,765**

n/d = No data.

Source: Ken Bodden, Pers. Comm.

5.8.2 Sports Fishing

Alberta is divided into three Fish Management Zones (Sports Scene Publications Inc. 2007). The Project is located within Zone 3 (Northern Boreal) and watershed unit NB4. Watershed unit NB4 encompasses the Athabasca River watershed downstream of the north boundary of Township 78, including the Clearwater River and Christina River watersheds and the Slave River and Lake Athabasca watersheds and the lakes and streams north of Lake Athabasca. Common sport fish include lake whitefish, northern pike, Arctic grayling, walleye, lake trout and yellow perch. Fifty percent of RUQ respondents indicated they fish in the region (Golder 2001). The 11 different species of fish are listed in Table 19 by the percent of people who fish for that species. The most sought after species is walleye (44%), followed by northern pike (35%), rainbow trout (28%) and perch (17%).

Three fishing lodges are located within the vicinity of the Project in the Aquatic Resources RSA:

- Christina Lake Lodge is located at Conklin;
- Winefred Lake Lodge, located along the southeast shore of Winefred Lake; and
- Grist Haven Lodge, located at the south end of Grist Lake.

Table 19 Responses to Fish Species Caught

Type of Fish	Percent of People Fishing for this Species[(a)]	Average Number of Fish Caught per Person per Year	Range in Number of Fish Caught
walleye (pickerel)	44	18	0 to 99
northern pike	35	16	0 to 60
rainbow trout	28	27	1 to 150
perch	17	37	2 to 200
lake trout	14	11	0 to 50
whitefish	4	10	0 to 40
goldeye	4	25	0 to 50
Arctic grayling	3	19	12 to 25
burbot	<1	n/d	n/d
chub	<1	n/d	n/d
any type of fish	15	16	0 to 100

(a) Only those that responded that they fish were considered in calculating percentages.

n/d = No data.

Survey respondents identified seven fishing locations in the Aquatic Resources RSA (Figure 1). Forty-two people indicated they use the area, representing 9% of the people surveyed in Fort McMurray, Lac La Biche and Anzac. Location specific information is presented in Table 20. The most fished location in the region is Christina lake, which is used by 14 of the 42 respondents who indicated they fish in the area. Other regularly fished lakes included Winefred and Grist lakes as well as the Cowper and Hook lakes. The Alberta Land Inventory (AENV 1977) rates Winefred and Grist lakes as Class 1 (no significant limitations to sport fish production), whereas Christina Lake is rated Class 2 (few or minor limitations to sport fish production), Christina River is rated Class 1 and Cowper Lake is rated Class 2.

Table 20 Fishing Locations, Access and Success by Species

Location	Access	Number of RUQ Respondents Who Use the Area	Fish Species	Average Percent of the Fish Caught that Were Eaten[a]	Change in Fishing Success in the Last Five Years [%][a]		
					More	Less	Same
Christina Lake	vehicle, truck, boat	14	any	33	0	0	100
			northern pike	41	0	17	83
			perch	10	0	0	100
			walleye	69	0	0	100
			lake trout	n/a	0	0	100
Cowper Lake	vehicle, truck	5	perch	57	0	25	75
			rainbow trout	75	0	0	100
Grist Lake	vehicle, truck, boat	9	lake trout	73	20	20	60
			rainbow trout	100	0	0	100
			walleye	50	0	50	50
Hook Lake	vehicle, truck, snowmobile, fly-in	5	any	0	100	0	0
			perch	63	0	50	50
Winefred Lake	truck, boat	7	northern pike	3	0	0	100
			rainbow trout	100	0	0	100
			walleye	41	0	0	100
Christina River	truck, boat	1	walleye	100	0	0	100
Jackfish River	truck, snowmobile	1	walleye	100	0	0	100

[a] Only those who responded to the percent consumption question and success question were included in calculating percentages. Due to rounding conventions, values may not equal totals.

n/a = Not applicable.

An indication of fishing activity is provided in Table 21, which shows recreational fishing licence sales for Fort McMurray and Anzac, Conklin, Lac La Biche and all of Alberta. In Lac La Biche, there has been an increase in licence sales since 2003.

Table 21 Recreational Fishing Licence Sales

Communities	Number of Fishing Licences Sold						
	2001	2002	2003	2004	2005	2006	2007
Fort McMurray and Anzac	6,359	6,231	5,124	5,909	5,749	6,174	5,941
Conklin[(a)]	151	125	103	93	159	148	126
Lac La Biche	2,406	2,235	2,126	2,300	2,410	2,637	2,682
Total	**8,916**	**8,591**	**7,353**	**8,302**	**8,318**	**8,959**	**8,749**
Total in Alberta	**226,752**	**217,522**	**221,248**	**209,825**	**211,974**	**238,483**	**229,037**

(a) Licences are sold at Winefred Lake Lodge.

Source: Verna Wolfram, Pers. Comm.; Numbers are recreational fishing licences sold by issuers including non-residents, numbers are approximate as there maybe some licences cancelled. The 2007 season is still in progress, so the numbers are only to Oct 2007.

In addition to an increase in licensed fishing, illegal fishing (i.e., fishing without a licence) may also be increasing in the parts of the Aquatic Resources RSA, particularly on the part of transient workers in lakes such as Christina Lake or Gregoire Lake north of the Aquatic Resources RSA (Trevor Sellin, Pers. Comm.). These lakes are more accessible from work camps and because workers may be in the area only a short time they may not take the time to purchase a licence for a limited number of fishing trips. However, this activity is difficult to measure as it occurs over a large area and people are not usually caught.

The types of sport fish found in the rivers and creeks in the Aquatic Resources RSA are listed in Table 22. Christina Lake and Christina River are located in the Aquatic Resources LSA. Only those waterbodies that are considered popular sport fishing locations or where ASRD has identified sport fish are identified in Table 22. Species composition may change as environmental conditions change; therefore, species identified in a lake one year, may not be present the next.

Table 22 Lakes and Rivers Supporting Sport Fish in the Aquatic Regional Study Area

Waterbodies	Access	Lake Trout	Whitefish	Perch	Pike	Burbot	Arctic Grayling	Walleye	Goldeye
Christina River	truck, boat	-	-	-	X	X	X	X	X
Christina Lake	car/truck, boat	-	X	X	X	-	X	X	-
Sunday Creek	ATV	-	-	-	X	-	-	-	-
Grist Lake	car/truck, boat	X	X	-	X	-	X	-	-
Wiau Lake	ATV	-	-	-	X	-	-	-	-
Winefred Lake	truck, boat	-	X	X	X	X	-	X	-

- = Not present.

Sources: (Golder 2001; Mitchell 2001).

5.9 NON-CONSUMPTIVE RECREATION

5.9.1 Potential Areas for Recreational Uses

A LSAS was done on August 24, 2007, for townships overlapping and near the LSA (Figure 1). Areas with a notation allowing recreational use can be used by resource users. Areas indicating notations for recreational users are listed in Table 23. All relate either to the Christina Lake area, falling under the Christina Lake Management Plan or the Winefred Lake area.

Table 23 Land Status Automated System (August 24, 2007) Results for Potential Recreational Activity Within the Local Study Area

Designation	Location
PNT 890605	covers the same area as the Christina Lake Management Plan (1991) 4-05-76-19-NW, NE 4-05-76-30-SE, SW 4-05-76-31 4-05-77-06 4-06-77-01 4-06-77-02 4-06-77-03 4-06-77-04 4-06-77-05
PNT 910119	Winefred Lake 4-04-76-02-SW,NW,NE 4-04-76-03-NE 4-04-76-04-SW, NW 4-04-76-05-SE,NE 4-04-76-09 4-04-76-10-NW

5.9.2 Lodges

Within the Resource Use RSA, Christina Lake Lodge, Grist Haven Lodge and Winefred Lake Lodge offer fishing and recreational opportunities such as boating, ATV touring, snowmobiling, ice fishing and cross-country skiing.

Of the three lodges, Christina Lake Lodge is closest to the LSA. In addition to guest cabins and campsites, the lodge has year-round accommodations for oil and gas workers. In recent years MEG has been a key client and housing workers allows the lodge to stay open year round (Tracy Flynn, Pers. Comm.). Worker accommodations have the capacity for 92 (one person per room) to 112 (one person per bed) people. These worker accommodations are used primarily in the winter months but begin filling in September and October. Workers who stay at the lodge will fish on occasion and some chose Christina Lake for this reason (Tracy Flynn, Pers. Comm.). In the summer months families stay an average of 5 to 15 days and are primarily from Fort McMurray. Camping and fishing are the most popular activities followed by hunting, ATV touring and water based recreation.

Grist Haven Lodge is busiest in the summer months beginning May long weekend until the end of September. The lodge has seven cabins that can each accommodate four people. Fishing is the most popular activity and in recent years the lodge has noticed an increase in the number of guests from Fort McMurray, usually in groups of about four men (Grist Haven Lodge, Pers. Comm.).

Winefred Lake Lodge also provides oil and gas worker accommodations and like Christina Lake Lodge this added business allows the lodge to operate year round (Jerelyn Mathias, Pers. Comm.). Unlike at Christina Lake Lodge the workers staying at Winefred Lake do not engage in any recreational activity as they find it difficult to schedule activities around their long shifts. (Jerelyn Mathias, Pers. Comm.). The maximum capacity for the lodge is forty people per day. Fishing is the most popular activity and the lodge is the only place in the LSA where fishing licences can be purchased. Other popular activities include hunting, ATV touring and snowmobiling. Guests that take advantage of outfitting services are primarily from the United States. Most other guests are from Alberta.

5.9.3 Camping, Hiking and Other Recreation

Resource User Telephone Questionnaire respondents who reported camping as an activity were asked where they camp and the average number of times per year they visit each camping location. Table 24 summarizes camping activity in the RSA.

Table 24 Camping Locations and Visitor Frequency

Camping Location	Average Number of Visits per Year	Range of Visits per Year	Number of RUQ Respondents	% of RUQ Respondents
Christina Lake	10.14	1 to 60	7	5.0
Grist Lake	1.33	1 to 2	3	2.1
Winefred Lake	1.00	1	1	0.7

Note: Some respondents listed more than one camping area.

In the RUQ respondents reported the following:

- One respondent reported ATV riding in the Conklin area;
- One respondent reported birdwatching along the Christina River;
- One respondent reported snowmobiling along the Christina River; and
- One respondent reported horseback riding along Secondary Highway 881.

5.9.4 Boating and Water-Based Recreation

Six percent of the people that responded to the RUQ and who participated in outdoor activities say they participate in recreational canoeing or kayaking in the RMWB or areas to the south toward Lac La Biche (Golder 2001). However, no canoeing or kayaking is reported in the Resource Use RSA; the Athabasca River and the Clearwater River constitute the most popular canoeing and kayaking locations in the region. In the RSA, two RUQ respondents reported boating at Christina Lake.

6 CONCLUSIONS

Subject matter discussed in this baseline report on resource use include access to resources, identification of environmentally important areas, agriculture, aggregate resources, forestry, berry picking, hunting, trapping, fishing and non-consumptive recreation. For each type of resource use, this report has identified relevant government guidelines, available statistics on usage levels and important locations of resources in the study areas. Results of the RUQ survey were used to identify residents' patterns of use in the RSA. Some service providers and regulators were also contacted to develop an understanding of resource use activities in the RSA.

Access in the RSA is available via roads, railways, cut lines and rights-of-way. Density along these routes is higher in the LSA than in the RSA. At present, limited access is an important factor in levels of resource use in the RSA. Secondary Highway 881 is the main access route to the RSA.

Protected areas and ESAs are types of environmentally important areas. There are no legally protected areas in the RSA or the LSA, however, there are seven ESAs in the RSA: Christina Lake Caribou Area, Christina Lake/Jackfish River, Winefred River, Winefred/Grist Watershed, Grist Lake, Winefred Lake and the Egg Lake-Algar Lake Diversity Area. All but the last three overlap the LSA. Management considerations exist for these ESAs, however, they do not have protected area status.

Consumptive resource uses considered in this report included agriculture, extraction of aggregates, forestry, berry picking, hunting, trapping and fishing. Agricultural activities are minimal as the RSA is located in the Green Area of the province. Agricultural activities identified near the LSA are limited to one wild rice operation and two grazing leases. Like agriculture, aggregate extraction occurs in relatively few areas throughout the RSA, but aggregates represent a greater concern, as they are in increasing demand in the area. Forestry is also a relatively important industry in the RSA. Alberta Pacific Forest Industries Inc. is the forest management agreement holder for the RSA. The LSA contains approximately 7,439 ha of productive forests. There is significant berry habitat in the LSA; however, berry picking is not of high importance to non-traditional resource users due to the distance of the study areas to major centres such as Lac La Biche and Fort McMurray.

Hunting in the RSA is regulated within six Wildlife Management Units (WMUs). Moose, mule deer, white-tailed deer and black bear are hunted within the RSA. There are also several outfitters that have allocations within each of the WMUs in the RSA. There are six Registered Fur Management Areas (RFMAs) overlapping the LSA. The most commonly trapped species are beaver, muskrat and coyote. Trapping activities and revenues have been steadily declining over the past decade. Fishing is an important activity in the RSA, for both food and recreation. Commercial fishing activity in the RSA has declined significantly since the late 1980s due to a freeze on commercial license sales and a government buyout program of existing licenses. Sport fishing in the RSA is based mainly in Christina, Grist and Winefred lakes; fishing lodges are located close to each. Common sport fish include whitefish, northern pike, Arctic grayling, walleye, lake trout and yellow perch. Fifty percent of RUQ respondents indicated that they fish in the region (Golder 2001). The most sought after species is walleye (44%), followed by northern pike (35%), rainbow trout (28%) and perch (17%).

Non-consumptive recreation in the RSA includes boating, ATV use, camping, bird watching and horseback riding. These activities occur mainly at Christina Lake, Grist Lake, Winefred Lake and along Secondary Highway 881. However, limited access, combined with the distance from major population centres has resulted in relatively low use of the area for recreational activities.

7 REFERENCES

AENV (Alberta Environment). 1972. Land Capability for Wildlife - Waterfowl Alberta Land Inventory Winefred Lake - 73 M.

AENV. 1975. Land Capability for Wildlife - Ungulates Alberta Land Inventory Winefred Lake - 73 M.

AENV. 1977. Sport Fish Capability Alberta Land Inventory Winefred Lake - 73M.

AENV. 1999. Regional Sustainable Development Strategy for the Athabasca Oil Sands Area. Publication No. 1/754. Edmonton, AB. Submitted July, 1999. 66 pp.

AEP (Alberta Environmental Protection). 1991. Christina Lake Management Plan Final Draft.

AEP. 1997. Alberta Vegetation Inventory. Version 2.2.

Al-Pac (Alberta-Pacific Forestry Industries Inc.). 2004. Alberta-Pacific FMA Area Forest Management Plan September 2004. Alberta-Pacific Forest industries Inc. Boyle, AB.

Alberta Infrastructure and Transportation. 2007. Alberta Highways 1 to 986 Traffic Volume History 1997 - 2006.

ARIWG (Athabasca Regional Issues Working Group). 2003. Aggregate Survey 2002. Fort McMurray, AB.

ASRD (Alberta Sustainable Resource Development). 2004. Alberta Public Lands. Guide to Acquiring Public Lands. June 9, 2004.

Bilyck, L.P., A. Saxena, J.A. Bentz and S. Gordon. 1996. Environmentally Significant Areas Inventory of Selected Portions of the Boreal Forest Natural Region, Alberta. Prepared for Resource Data Division, AEP by Geowest Environmental Consultants Ltd. Edmonton, AB.

Birch Mountain Resources Ltd. 2004. Application to the Natural Resources Conservation Board and Alberta Environment together with an Environmental Impact Assessment for the Muskeg Valley Quarry. Prepared by AMEC Earth and Environmental. March 15, 2004. Calgary, AB.

Golder (Golder Associates Ltd.). 2001. Athabasca Oil Sands Regional Resource Use Baseline. Prepared for Petro-Canada Oil and Gas, Rio Alto Exploration Ltd., Shell Canada Limited and Suncor Energy Inc. Calgary, AB. Submitted November, 2001. 120 pp. + Appendices.

Highwood Environmental Management Ltd., Clark EcoDynamics Inc. and AMEC (AMEC Earth and Environmental Ltd.). 2003. A Literature Review and Intensity Analysis of Resource Use in the Regional Municipality of Wood Buffalo. Prepared for the Sustainable Ecosystem Working Group of the Cumulative Environmental Management Association. Submitted November, 2003. 70 pp.

Mitchell, B. 2001. Alberta Fishing Guide. Volume 31. Barry Mitchell Publishing Ltd. Red Deer, AB. 100 pp.

RMWB (Regional Municipality of Wood Buffalo). 2000a. Land Use Bylaw 99/59.

RMWB. 2000b. Regional Municipality of Wood Buffalo Municipal Development Plan. Bylaw 00/005. Fort McMurray, AB. 109 pp.

RMWB. 2002. Hamlet of Conklin Area Structure Plan.

Sports Scene Publications Inc. 2006. 2006 Alberta Guide to Hunting Regulations.

Sports Scene Publications Inc. 2007. 2007 Alberta Guide to Sportfishing Regulations.

Sweetgrass Consultants Ltd. 1997. Environmentally Significant Areas of Alberta. Prepared for Alberta Environmental Protection, Resource Data Division. Volumes 1, 2 and 3. Calgary, AB. 682 pp.

Westworth and Associates Ltd. 1990. Significant Natural Features of the Eastern Boreal Forest Region of Alberta. Technical Report. Prepared for Alberta Forestry, Lands and Wildlife. Edmonton, AB. 147 pp.

7.1 PERSONAL COMMUNICATIONS

Brick, Mabel (Alberta Professional Outfitters). 2007. Fax, telephone and email communication with Bethany Beale (Golder) on November 1, 2007.

Bodden, Ken (Alberta Sustainable Resource Development). 2007. Phone and email communication with Bethany Beale (Golder) on October 23, 2007.

Flynn, Tracy (Christina Lake Lodge). 2007. Telephone conversation with Bethany Beale (Golder) on November 14, 2007.

Found, Christine (Alberta Fish and Wildlife). 2007. Telephone conversation with Bethany Beale (Golder) on July 12, 2007.

Grist Haven Lodge (office). 2007. Telephone conversation with Bethany Beale (Golder) on November 13, 2007.

Mathias, Jerelyn (Winefred Lake Lodge). 2007. Telephone conversation with Bethany Beale (Golder) on November 19, 2007.

Sellin, Trevor (Alberta Fish and Wildlife). 2007. Telephone conversation with Bethany Beale (Golder) on November 13, 2007.

Treichel, Bruce (Alberta Sustainable Resource Development). 2007. Email communication with Bethany Beale (Golder) on November 13, 2007.

Wolfram, Verna (Alberta Sustainable Resource Development). 2007. Email communication with Bethany Beale on November 2, 2007.

7.2 INTERNET SOURCES

CHRS (Canadian Heritage River System). 2007. Designated Heritage Rivers. Available at: http://www.chrs.ca/Rivers/Clearwater/Clearwater_e.htm. Accessed November 2007

McMurry Sno-Drifters Club. 2007. Trail map guide. Available at: http://altasnowmobile.ab.ca/mcmurray/images/maps/keymap.gif. Accessed November 2007.

APPENDIX 6-III

SOCIO-ECONOMIC BASELINE REPORT

MEG Energy Corp. (MEG) is proposing an expansion to its Christina Lake Regional Project (CLRP), in order to further develop its oil sands leases in the area. The Christina Lake Regional Project – Phase 3 (the Project) is an expansion of the existing development area and will use Steam Assisted Gravity Drainage (SAGD) bitumen recovery technology. The Project will consist of two new plants and 138 new wellpads. Construction of the Project is anticipated to begin in 2010. The operational life of each plant is expected to be 25 years. Total production from the two new plants will produce an incremental increase of 150,000 barrels per day (bpd) of bitumen. It is anticipated that reclamation of the Project will be complete by 2044.

This Socio-Economic Baseline Report is part of the Environmental Impact Assessment for the Project.

The objectives of the baseline report are to:

- describe the socio-economic conditions and trends in areas that may be affected by the Project to estimate potential impacts and suggest appropriate mitigation;
- define the socio-economic sensitivities; and
- construct a baseline of socio-economic data that can be used to monitor change in the affected communities such that where unforeseen impacts occur they can be iteratively addressed as the Project proceeds.

The data collected for the baseline study was used to complete the Socio-Economic Impact Assessment Report. The baseline study describes existing socio-economic conditions in a Regional Study Area (RSA) and a Local Study Area (LSA). These two study areas encompass communities that could be affected by the Project primarily due to their proximity to it. These communities are also likely to benefit through employment and procurement opportunities and through company community investments. Information contained in this report includes descriptions of population demographics and trends, labour force characteristics, the local economy and social and physical infrastructure of study area communities.

The RSA includes:

- the Regional Municipality of Wood Buffalo (RMWB), including Fort McMurray and Anzac;
- Lakeland County;
- the Beaver Lake First Nation’s Beaver Lake reserve;

- the Fort McMurray First Nation reserves (FMFN) (Reported as Gregoire Lake IR 176 and Gregoire Lake IR 176a by Statistics Canada);
- the Town of Bonnyville; and
- the City of Cold Lake.

The LSA includes:

- the Hamlet of Conklin;
- the Hamlet of Chard;
- the Chipewyan Prairie Dene First Nation (CPDFN) reserve (Reported as Janvier IR 194 by Statistics Canada);
- the Town of Lac La Biche; and
- the Heart Lake First Nation reserves.

Both study areas fall within the boundaries of the Wood Buffalo-Cold Lake Economic Region, which also includes the MD of Bonnyville No. 87 and St. Paul County.

The estimated population of the RSA in 2006 was 76,265, while the population in the LSA was 3,750. Both populations tend to be young; the median age is on average 5 years younger than Alberta's. Thirteen percent of the population of the RSA is aboriginal and 48% of the population of the LSA is aboriginal. Each study area has shadow populations that are not accounted for in official census and were estimated to be 20,049 and 3,571 in the spring of 2007 in the RSA and LSA, respectively.

Overall, labour market participation is higher in the study areas than in the province as a whole, however, unemployment rates vary from 4.5 to 7.5% depending on the community. First Nation on-reserve populations tend to have much higher unemployment rates, where jobs tend to be seasonal in nature. Median incomes and average earnings are considerably lower in areas of the RSA where populations tend to have lower educational levels. The data provides evidence of a significant wage gap between low and high income earners in the RSA (and the LSA). Rising housing costs in study area communities has become a critical concern, prompting the development of a regional affordable housing task force.

Resource based industries, such as oil and gas and forestry, employ almost one quarter of workers in study area communities. Ninety-eight percent of major projects in the RSA are oil sands or pipeline projects in the oil and gas industry.

Labour for trade related occupations in the oil and gas industry is in very high demand in the RSA and in the province as a whole. As such, the shadow population has continued to rise as employers recruit labour from out of study area and out of province locations. Much of this population is accommodated in work camps and other temporary housing. Planning and funding mechanisms are largely in place to manage challenges of a rapidly growing population.

ACKNOWLEDGEMENTS

This Socio-Economic Baseline Report was prepared for MEG Energy Corp. (MEG) by Golder Associates Ltd. (Golder) in support of the Christina Lake Regional Project – Phase 3 Environmental Impact Assessment (EIA).

The core management team for the Project included: Tod Collard (Senior Advisor), Ian Gilchrist (Project Director), Robin Cockell (Project Manager) and Cathryn Moffett (Project Coordinator).

Paul St. Rose served as senior drafting advisor and Thanh-Van Nguyen acted as the senior Geographic Information System advisor. The report was prepared by Bethany Beale (Socio-Economic Component Lead) and reviewed by Linda Havers (senior advisor), Robin Cockell and Ian Gilchrist.

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1 INTRODUCTION

MEG Energy Corp. (MEG) is a Calgary-based, privately held energy company focused on the development and recovery of bitumen, shallow gas reserves and the generation of power in northeast Alberta. MEG's Christina Lake Regional Project (CLRP) consists of 80 sections of oil sands leases within the Regional Municipality of Wood Buffalo (RMWB), approximately 15 km southeast of Secondary Highway 881 and 20 km northeast of Conklin.

MEG currently has approval to construct and operate the first two phases of the CLRP over 23 sections of land. In addition, MEG is developing a facility expansion (Phase 2B) to increase the production capacity of the Central Plant to 60,000 barrels per day (bpd). The Phase 2B plant will be located immediately adjacent to the existing Phase 1 and 2 processing facilities.

MEG is now proposing a further expansion of the CLRP to fully develop its Christina Lake oil sands leases. The Christina Lake Regional Project – Phase 3 (the Project) is an expansion of the current CLRP development area and will use Steam Assisted Gravity Drainage (SAGD) bitumen recovery technology. The Project will consist of two additional processing facilities (Plants 3A and 3B), 138 SAGD multi-well pads and associated steam generating equipment. Plant 3A will be located in the southeast corner of the lease (Sections 20 and 29-76-4 W4M) and Plant 3B will be located in the northwest end of the lease (Sections 32 and 33-77-6 W4M).

Construction of the Project is proposed to occur in two phases. Phase 3A is anticipated to begin construction in 2010, with initial steam injection in 2012. Phase 3B is anticipated to begin construction in 2012, with initial steam injection in 2014. The operational life of each plant is expected to be 25 years. Total production from the two new plants will produce an incremental 150,000 bpd of bitumen (approximately 23,800 cubic metres per day). It is anticipated that reclamation of the Project will be complete by 2044.

The Socio-Economic Baseline Report provides information to complete the Environmental Impact Assessment (EIA) for the Project. The report addresses requirements of the Terms of Reference (Volume 2, Section 2) for the Socio-Economic Impact Assessment (SEIA) as set out by Alberta Environment (AENV), providing detailed information concerning the socio-economic setting of the Project (AENV 2008).

1.1 OBJECTIVES AND METHODS

Objectives for undertaking the socio-economic baseline study were to:

- describe the socio-economic conditions and trends in areas potentially affected by the Project to understand potential impacts and appropriate mitigation;
- define the socio-economic sensitivities; and
- construct a baseline of socio-economic data that can be used to monitor change in the affected communities such that where unforeseen impacts occur they can be iteratively addressed as the Project proceeds.

The following socio-economic variables were selected for discussion in this report:

- demographics including:
  - population; and
  - gender and age;
- components of the economic setting including:
  - key sectors; and
  - labour force characteristics;
- components of the social setting including:
  - local governments;
  - housing;
  - schools and post-secondary institutions;
  - health services;
  - protective and emergency services;
  - social services;
  - Aboriginal community investment by industry; and
  - recreation.

Two study areas have been defined for purposes of the socio-economic component, each requiring a different level of baseline data appropriate to the potential for impacts. These are referred to as the Local Study Area (LSA) and the Regional Study Area (RSA). The LSA includes communities that by virtue of their proximity, are expected to be directly effected by the Project. Some of these effects may be, for example, increased traffic and/or noise, impacts associated with employment and business, and increased demand on social services. The LSA is also likely to benefit directly from the Project in ways such as job opportunities and economic growth from worker spending.

The RSA encompasses the area where socio-economic effects are more broadly dispersed and typically include economic benefits from contract opportunities and fiscal benefits such as taxes and royalties. The RSA includes:

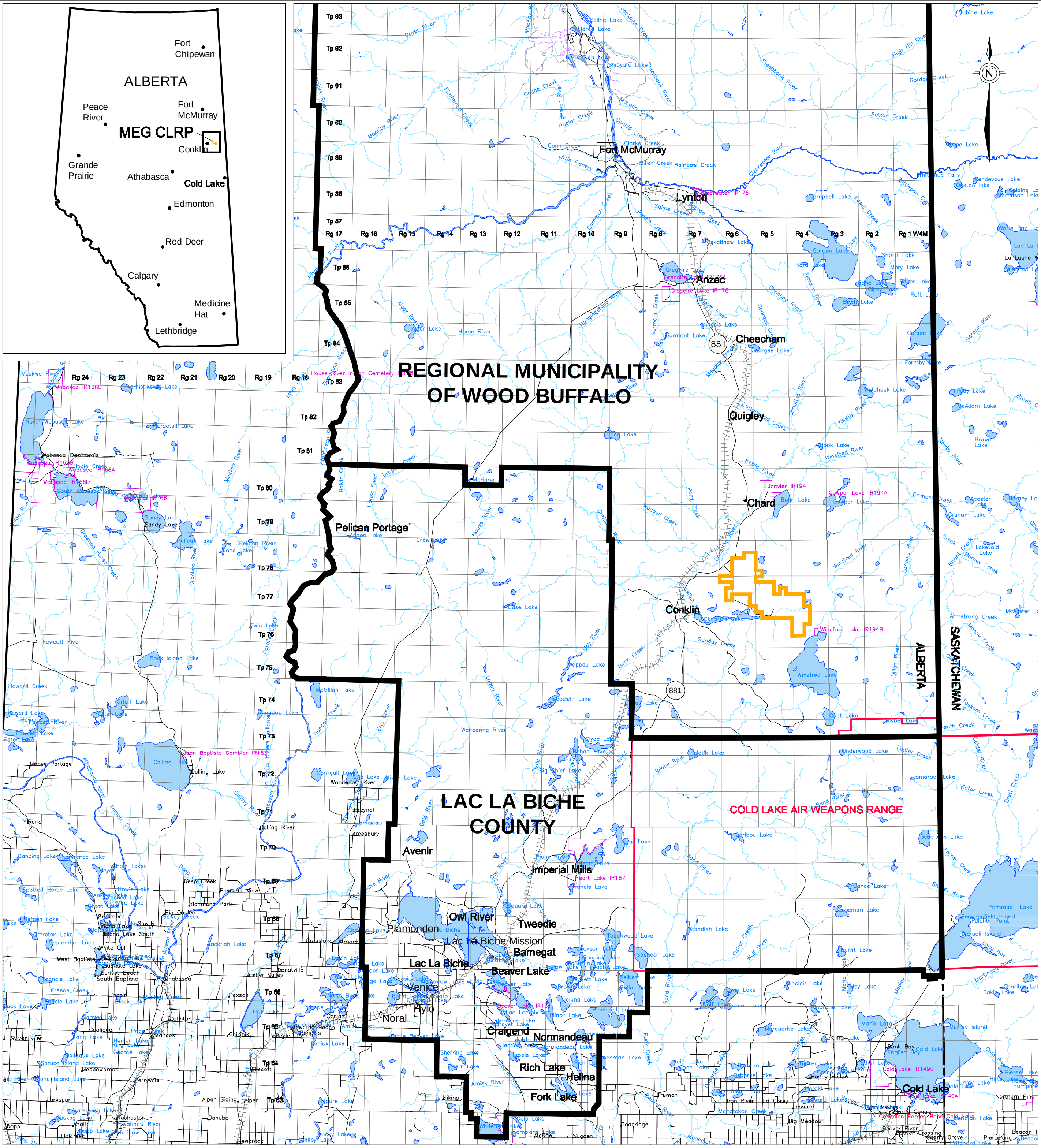
- the Rural Municipality of Wood Buffalo (RMWB) (Including Fort McMurray and Anzac);
- Lakeland County;
- the Beaver Lake First Nation's Beaver Lake reserve;
- the Fort McMurray First Nation reserves (FMFN) (Reported as Gregoire Lake IR 176 and Gregoire Lake IR 176a by Statistics Canada);
- the Town of Bonnyville; and
- the City of Cold Lake.

At the time of writing, Lakeland County and the Town of Lac La Biche had amalgamated into Lac La Biche County. However, as data was available separately for Lakeland County and Lac La Biche, for this report Lakeland County is included as part of the RSA and the Town of Lac La Biche is included as part of the LSA.

The LSA is comprised of communities in the southern portion of the RMWB nearest to the Project as well as communities in Lac La Biche County. The LSA includes:

- the Hamlet of Conklin;
- the Hamlet of Chard;
- the Chipewyan Prairie Dene First Nation (CPDFN) reserve (Reported as Janvier IR 194 by Statistics Canada);
- the Town of Lac La Biche; and
- the Heart Lake First Nation (HLFN) reserves 167 and 167a.

Figures 1 and 2 show the socio-economic study areas.



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SCALE KILOMETRES

LEGEND

- ROAD
- RAILWAY
- RIVER
- OPEN WATER
- INDIAN RESERVE
- COLD LAKE AIR WEAPONS RANGE
- SOCIO-ECONOMICS MEG LEASE BOUNDARY
- SOCIO-ECONOMICS REGIONAL STUDY AREA

NOTE

* Also known as the Hamlet of Janvier

REFERENCE

ALBERTA NTDB DIGITAL DATA OBTAINED FROM GEOMATICS CANADA, AUGUST 2001. DATUM: NAD 83 PROJECTION: UTM ZONE 12

PROJECT

CHRISTINA LAKE REGIONAL PROJECT - PHASE 3

TITLE

SOCIO-ECONOMICS REGIONAL STUDY AREA

MEG ENERGY CORP.

PROJ	07.1346.0009.8700		FILE No.	Socio-Ec-RSA
DESIGN	BB	11/01/08	SCALE AS SHOWN	REV. 0
CADD	TRE	01/04/08		
CHECK	BB	02/04/08	FIGURE: 1	
REVIEW	IGG	07/04/08		

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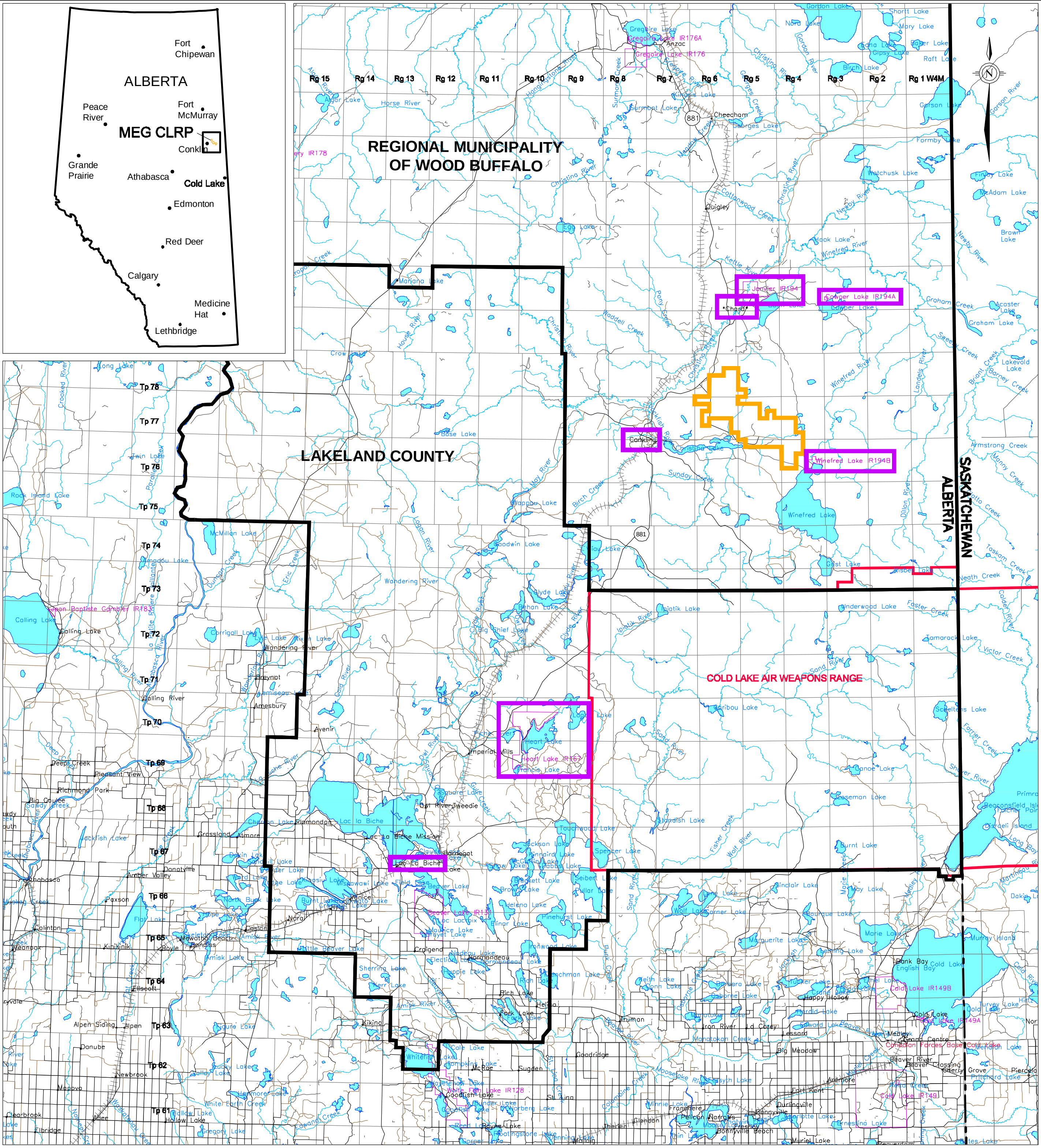

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SCALE KILOMETRES

LEGEND

- ROAD
- RAILWAY
- RIVER
- OPEN WATER
- INDIAN RESERVE
- COLD LAKE AIR WEAPONS RANGE
- SOCIO-ECONOMICS MEG LEASE BOUNDARY
- SOCIO-ECONOMICS LOCAL STUDY AREA COMMUNITIES

NOTE

* Also known as the Hamlet of Janvier

REFERENCE

ALBERTA NTDB DIGITAL DATA OBTAINED FROM GEOMATICS CANADA, AUGUST 2001. DATUM: NAD 83 PROJECTION: UTM ZONE 12

PROJECT

CHRISTINA LAKE REGIONAL PROJECT - PHASE 3

TITLE

SOCIO-ECONOMICS LOCAL STUDY AREA

MEG ENERGY CORP.

PROJ	07.1346.0009.8700	
DESIGN	BB	11/01/08
CADD	PSR	01/04/08
CHECK	BB	02/04/08
REVIEW	IGG	07/04/08

FILE No. Socio-Ec-LSA

SCALE AS SHOWN REV. 0

FIGURE: 2

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Socio-economic baseline data were collected between October and December of 2007 through a combination of review of previous studies performed within the RSA, and collection of additional baseline information to address data gaps.

Secondary sources of information used to complete this study include:

- the MEG Application for Approval of the Christina Lake Regional Project (Phase 2) July 2005 (MEG 2005);
- internet and published material from government agencies and service providers;
- Statistics Canada Community Profiles for 2001 and 2006;
- Indian and Northern Affairs Canada First Nation Profiles for 2007;
- the RMWB Census;
- Alberta Infrastructure and Transportation Annual Average Daily Traffic report for 2007;
- Canadian Mortgage and Housing Corporation rental and housing statistics; and
- personal communications with service providers and government officials in the area.

Due to Statistics Canada's staggered release dates of 2006 census information, some of the socio-economic baseline data included here are from the previous census undertaken in 2001. Key informant interviews, however, were undertaken to triangulate or verify data for accuracy, or suggest how baseline conditions may have changed in the six years between 2001 and 2007 (the time of writing).

2 EXISTING AND APPROVED CASE

2.1 STUDY AREAS OVERVIEW

2.1.1 Regional Study Area

The RSA is situated within the boreal forest, which supports a variety of activities ranging from natural resource development (oil and gas, and forestry) to tourism, hunting and fishing as well as traditional activities such as trapping and berry picking.

The estimated population of the RSA in 2006 was 76,265, not including the shadow population (i.e., people who live in work camps, campgrounds or hotels near the Project) (Statistics Canada 2007a). Thirteen percent of the population was Aboriginal in 2001 with the majority having self-identified as Métis (Statistics Canada 2002b). Fifty-eight percent of the population in 2006 was of working age (i.e., aged 15 to 64). This is considerably lower than Alberta as a whole (70% of the population is of working age) and is due to a high population of youth under the age of 15 (Statistics Canada 2007a).

Labour market participation is higher in the RSA than in the province and the unemployment rate is also lower with the exception of reserve populations (Statistics Canada 2002b). Median incomes and average earnings are lowest in areas of the RSA with lower educational levels (Statistics Canada 2002b). Incomes and earnings are highest in Cold Lake and the RMWB (Statistics Canada 2002b). Housing costs are higher here as well (CMHC 2007a,b). The data provides evidence of a significant wage gap between low and high income earners in the RSA (CMHC 2007a,b). As housing costs continue to rise in the RMWB low income earners will find it more difficult to afford suitable housing.

Industry and occupational profile data indicate that resource-based industries and trades, transport and equipment operators and related occupations employ a significant proportion of the labour force (Statistics Canada 2002b). This is not surprising given that 98% of major projects in the RSA are oil sands or pipeline projects (AEIIb). Labour for trade-related occupations in oil and gas is in very high demand in the RSA and in the province as a whole (Emery 2006). The shadow population has continued to rise in the RSA as experienced labour moves into camps and other temporary accommodations (RMWB 2006).

2.1.2 Local Study Area

The LSA is located entirely within the boundaries of the RSA and includes communities nearest to the Project. The Project is located in the southern portion of the RMWB (Figure 2). The communities nearest to the Project are the Hamlet of Conklin, the Hamlet of Chard, the CPDFN reserve, Lac La Biche and the HLFN reserves. Conklin and Chard are primarily Aboriginal (Métis and First Nations) communities, although the non-Aboriginal population has recently increased as a result of oil and gas, and forestry activities in the area (MEG 2005). Both have basic services such as small shops, primary schools and access to emergency and protective services. Due to their remoteness and small population, the level of service is limited. As the LSA has a significant Métis population, additional services such as housing, referrals, advocacy and support are provided by the Métis Nation of Alberta Zone I, the Conklin Métis Local 193 and Chard Local 214.

The CPDFN includes three reserves; Janvier IR 194 (known as the CPDFN reserve), Cowper Lake IR 194A and Winefred Lake IR 194B. Janvier IR 194 is the population center for CPDFN and therefore all socio-economic data is provided for Janvier IR only. Where available, data is presented for the CPDFN and the CPDFN reserve. Cowper Lake reserve is located on the north shore of Cowper Lake in Township 80 and Range 3 W4M. Winefred Lake reserve is located to the north of Winefred Lake in Township 76 and Range 4 W4M. The CPDFN reserve is 97 km southwest of Fort McMurray and is a service centre for CPDFN members. The CPDFN is associated with other First Nations including the Fort McMurray #468 First Nation (FMFN) through the Athabasca Tribal Council (ATC).

The HLFN includes three reserves: Heart Lake reserve IR 167, Heart Lake reserve IR 167A and Blue Quills First Nation. The Blue Quills First Nation is 16 km northwest of Mayerthorpe, Alberta and is not located in the LSA. Heart Lake reserve 167 is located 45 km northeast of Lac La Biche. Heart Lake reserve 167A is located east of reserve 167 on two quarter sections of land in Township 69 Range 12 W4M (Figure 2). HLFN is associated with other First Nations including Beaver Lake First Nation through Tribal Chiefs Ventures Incorporated.

Lac La Biche is the nearest full-service town with complete educational, medical, social and community services. Lakeland County and Lac La Biche are evolving into a regional service centre as the area continues to build its residential and business base in response to new oil and gas activity south of Fort McMurray to Cold Lake. Local services and infrastructure have expanded to meet the needs of a growing population. As of August 2007, Lakeland County and Lac La Biche amalgamated as Lac La Biche County.

Secondary Highway 881 is an important link through the LSA and as of August 2006, the full length of Secondary Highway 881 from Lac La Biche to Fort McMurray has been paved.

The estimated population of the LSA in 2006 was 3,750 (Statistics Canada 2007a). Almost half of the population in 2001 self-identified as Aboriginal (Statistics Canada 2002b). The shadow population of the LSA in May 2007 was 3,571 (Dianne Farkouh), nearly equal to the number of permanent residents in 2006. Like the RSA, the LSA has a younger population than the province and a smaller proportion of the population is of working age (66%) (Statistics Canada 2007a).

Labour force statistics available for the LSA are heavily influenced by Lac La Biche as it represents 89% of the known labour force population (Statistics Canada 2002b). Educational attainment, earnings and income are all lower in the LSA than in the RSA and the province. Unemployment rates in the LSA are high; however, as is true for the RSA, the study areas are unique in the province as a significant proportion of the labour force is employed in resource-based industries where work is often seasonal in nature. Unemployment and participation rates for the RSA and LSA do not capture the seasonal nature of many jobs in these areas (Statistics Canada 2002b). Almost all of the work for major projects in the LSA is related to oil sands project construction (AEIIb).

2.2 DEMOGRAPHICS

2.2.1 Population

2.2.1.1 Data Sources

There are five sources of population data used to estimate the overall population of the study areas:

- Indian and Northern Affairs Canada (INAC) First Nation Profiles;
- the RMWB municipal census data, including an estimation of the shadow population, or people who temporarily live in the RMWB but their place of permanent place of residence is elsewhere;

- the Athabasca Regional Issues Working Group (RIWG), which has produced an estimate of the work camp population living in the RMWB in May 2007;
- Alberta Employment, Immigration and Industry (AEII), which has produced a population forecast for Economic Regions in the province including the Wood Buffalo-Cold Lake Economic Region. This Economic Region coincides with the RSA boundaries except for the inclusion of populations living in the Municipal District (M.D.) of Bonnyville No. 87 and St. Paul County; and
- Statistics Canada official census data.

2.2.1.2 Regional and Local Study Areas

The population of the RSA has increased 18% since 2001 (Table 1). The RMWB and Lakeland County are the fastest growing municipalities in the province with growth driven by job opportunities in the oil and gas sector. Demand for labour, however, is outpacing the regional labour force's capability to fill positions (Section 2.3.2 Labour Force Characteristics). As a result, many projects must access workers from outside the RSA, Alberta and Canada. Only workers (and their families) that relocate permanently to the area are captured in the Statistics Canada Census. However, many workers live in camps or other temporary accommodations and make up part of the shadow population. The estimated population of the RSA for 2006 is 76,265 (not including the shadow population) with the RMWB at approximately two-thirds of the total population.

Table 1 Population of the Regional Study Area

Community	1996	2001	% Change 1996 to 2001	2006	% Change 2001 to 2006
RMWB	35,213	41,445	17.7	51,496	24.3
Lakeland County	4,842	5,306	9.6	6,365	20.0
Bonnyville	5,100	5,709	11.9	5,832	2.2
Cold Lake	11,791	11,520	-2.3	11,991	4.1
Beaver Lake reserve	306	390	27.5	379	-2.8
FMFN reserves	188	238	26.6	202	-15.1
Total	**57,440**	**64,608**	**12.5**	**76,265**	**18.0**
Alberta	**2,696,826**	**2,974,807**	**10.3**	**3,290,350**	**10.6**

Source: Statistics Canada 2002b, 2007.

The estimated population of the LSA in 2006 was 3,750 (Table 2) with the population of Lac La Biche making up almost three-quarters of that total. Lac La Biche itself has not experienced a significant growth in population because it has less suitable land for development and until the recent municipal/county amalgamations, land would need to be annexed from Lakeland County for residential development to occur. Residential development has been primarily on County land just outside the town of Lac La Biche. Therefore, while the population of Lac La Biche itself does not appear to have grown, the growing number of County residents has effectively increased the use of town services and infrastructure. This has led to several upgrades and expansions of services (Section 2.4).

Table 2 Population of the Local Study Area

Community	1996	2001	% Change 1996 to 2001	2006	% Change 2001 to 2006
CPDFN reserve[a]	254	252	-0.8	271	7.5
Chard[b]	207 (1999)	143 (2002)	-30.9 (1999 to 2002)	218	52.4 (2002 to 2006)
Conklin[b]	215 (1999)	213 (2002)	-0.9 (1999 to 2002)	338	58.7 (2002 to 2006)
Heart Lake reserve 167[a]	-	124	-	165	33.1
Lac La Biche[a]	2,611	2,776	6.3	2,758	-0.6
Total LSA	**3,287**	**3,508**	**6.7**	**3,750**	**6.9**
RSA[c]	**57,440**	**64,608**	**12.5**	**76,265**	**18.0**
Alberta[b]	**2,696,826**	**2,974,807**	**10.3**	**3,290,350**	**10.6**

[a] Source: Statistics Canada 2002b; 2007.

[b] Source: RMWB 2006.

[c] The total population of the RSA includes the populations of Chard, Conklin and Anzac.

- = No data.

The RMWB census recorded a population of 299 for Conklin in 2007 (Wendy Tremblay, 2007, Pers. Comm.). The response rate, however, was considered low; the current population of Conklin is estimated to be about 350 (Wendy Tremblay, 2007, Pers. Comm.).

The populations of Conklin and Chard vary seasonally and these trends are not captured in the RMWB census, which is essentially a “snapshot” of the population on April 2, 2006. Lack of available and affordable housing is a critical issue; for some families, crowding or living in trailers or Recreation Vehicles (RVs) is the norm. At various times of the year family members may move out of Conklin and Chard to work or attend high school in Fort McMurray and Lac La Biche, returning to Conklin and Chard between school sessions or when work is available. (Wendy Tremblay, 2007, Pers. Comm.)

Future population increases in the LSA will be driven by growth in Lac La Biche County as a result of a burgeoning service sector and a recent trend people from Edmonton and Fort McMurray purchasing lakefront property as summer homes or as a place to retire (Jane Palmer, 2007, Pers. Comm.; Section 2.4.2).

Shadow Population

The population of workers staying in camps or local accommodation while working on projects varies throughout the year and is highest in the winter months. A survey conducted in May 2007 by the Athabasca Regional Issues Working Group (RIWG) estimated that this population of workers totalled 20,049 in the RMWB (Table 3). Almost 20% of this population lived in camps in the LSA (i.e., south of Fort McMurray). As this survey was done in the spring the count presented in Table 3 should be regarded as conservative.

Table 3 Work Camps/Lodges Located South of Fort McMurray in the Wood Buffalo Region (as of May 15, 2007)

Camp Name	Location	Camp Owner	Camp Operator	Open / Private	Count
Japan Canada Oil Sands	Located off Hwy 63 south of Fort McMurray	Japan Canada Oil Sands	n/a	private RV's only	57
Anzac Open Camp	On Hwy 881, 23 km south of Anzac	PTI Group Inc.	PTI Group Inc.	open	133
Conklin Open Camp	In Conklin on corner of Hwy 881 and Conklin Corner	PTI Group Inc.	PTI Group Inc.	open	10
Christina Lake	EnCana Christina Lake Project – South of Conklin	EnCana	PTI Group Inc.	private	190
Chard Camp	34 km north of Conklin Corner	Core Pipeline	PTI Group Inc.	private	20
Winefred Lake Lodge	SE of Conklin. Turn off Hwy 881 on to Amoco Road for 1 hour	Winefred Lake Lodge	Winefred Lake Lodge	open	0
Karen's Katering	Located in Conklin on corner of Hwy 881 and Conklin Corner	Karen's Katering	Karen's Katering	open	18
Devon Canada Jackfish	20 km east of Conklin	Devon Canada	n/a	private	536
MEG Construction Camp	East of Conklin	MEG	Travers Catering	private	161
MEG Drilling Camp	East of Conklin	MEG	Travers Catering	private	81
MEG House	East of Conklin	MEG	Travers Catering	private	30
Long Lake – North Camp	7 km SE of Anzac	Travers Catering	Travers Catering	private	735
Long Lake – South Camp	8 km SE of Anzac	Travers Catering	Travers Catering	private	906
Long Lake – East Camp	9 km SE of Anzac	Travers Catering	Travers Catering	private	257
Long Lake – Wiebe Camp	10 km SE of Anzac	Travers Catering	Travers Catering	private	176
Long Lake – Kinosis Camp	11 km SE of Anzac	Travers Catering	Travers Catering	private	89
Paramount Resources – gas plants	Legend, East Legend, Ells, North Liege, Thickwood Hills, Leismer, Kettle River, Corner – gas plants	n/a	n/a	private	25
Whitesands Operations Camp	West of intersection of Hwy 881 and Conklin	n/a	n/a	private	5
ConocoPhillips – exec./ contractor housing	22 km south of Anzac on Hwy 881	Travers Armark	Travers Armark	private	7

Table 3 Work Camps/Lodges Located South of Fort McMurray in the Wood Buffalo Region (as of May 15, 2007) (continued)

Camp Name	Location	Camp Owner	Camp Operator	Open / Private	Count
ConocoPhillips – Surmont	22 km south of Anzac on Hwy 881	Travers Armark	Travers Armark	private	135
Total work camp population in the LSA (not including Lac La Biche)					**3,571**
Population of all work camps in RSA (not including Lakeland County)					**18,626**
Population of all work camps and hotels/motels in the RSA (not including Lakeland County)					**20,049**

Survey conducted though the week of May 7 to 15, 2007.
Source: Dianne Farkouh, 2007, Pers. Comm.
n/a = Not applicable.

Table 3 does not include a count of workers staying at Christina Lake Lodge (located west of the Project near Conklin) in May 2007. Occupancy statistics for Christina Lake Lodge, which can accommodate between 92 (one person per room) and 114 (one person per bed) workers a night, for May to June 2007 indicated a total of 509 overnight stays (each person is counted once each night). In contrast, in February to March 2007 there was a total of 2,795 overnight stays (Tracy Flynn, 2007, Pers. Comm.). Other camps in the LSA also likely experience a wide seasonal range in worker counts.

Aboriginal and Reserve Populations

Almost half of the population in the LSA and 13% of the RSA identifies as Aboriginal (Tables 4 and 5). The majority of the Aboriginal population of the RSA and LSA self-identified as Métis on the 2001 Census (Statistics Canada 2002a; RMWB 2006). The LSA First Nation population is concentrated mainly in on-reserve populations and in Chard (Delores Cardinal, 2007, Pers. Comm.). The RMWB Aboriginal population is more evenly split between Métis (46%) and First Nation (49%) than other locations in the study areas (Statistics Canada 2002a).

It is important to note that Statistics Canada estimates of reserve populations should be considered low as many aboriginal people do not participate in the census. INAC reports accurate reserve population data on a monthly basis. Therefore, the estimates of 49% and 13% aboriginal populations in the LSA and RSA are likely conservative.

Table 4 Aboriginal and Reserve Populations of the Regional Study Area

Community	Aboriginal Population	Total – All Persons	% Aboriginal	January 2008 Registered Reserve Populations[a]			
				On Own Reserve	Off Reserve	On Other Reserves	Total Registered Reserve Population
RMWB	5,130	41,360	12.4	n/a	n/a	n/a	n/a
Lakeland County	940	4,955	19	n/a	n/a	n/a	n/a
Bonnyville	805	5,535	16.2	n/a	n/a	n/a	n/a
Cold Lake	850	11,445	7.4	n/a	n/a	n/a	n/a
Beaver Lake reserve	385	390	98.7	334	555	13	914
FMFN reserves	220	235	93.2	250	340	7	598
Total RSA	**8,330**	**63,920**	**13**	**584**	**895**	**20**	**1,512**
Alberta	**156,220**	**2,941,150**	**5.3**	**n/a**	**n/a**	**n/a**	**n/a**

(a) INAC 2008.

Source: Statistics Canada 2002a.

n/a = Not applicable.

Table 5 Aboriginal and Reserve Populations of the Local Study Area

Community	Year	Aboriginal Population	Total – All Persons	% Aboriginal	January 2008 Registered Reserve Populations[d]			
					On Own Reserve	Off Reserve	On Other Reserves	Total Registered Reserve Population
CPDFN reserve[c]	2001	250	250	100	327	357	4	688
Chard[a]	2006	190	218	87.2	n/a	n/a	n/a	n/a
Conklin[a]	2006	291	338	86	n/a	n/a	n/a	n/a
Heart Lake reserve 167[c]	2001	120	120	100	176	100	18	294
Lac La Biche[b]	2001	920	2,690	34.2	n/a	n/a	n/a	n/a
Total		**1,771**	**3,616**	**49**	**503**	**457**	**22**	**982**
RSA		**8,330**	**63,920**	**13**	**584**	**895**	**20**	**1,512**
Alberta		**156,220**	**2,941,150**	**5.3**	**n/a**	**n/a**	**n/a**	**n/a**

(a) RMWB 2006.

(b) Statistics Canada 2002a, 2007a.

(c) Registered Indian population reported for 2001.

(d) INAC 2008.

n/a = Not applicable.

According to INAC almost forty-four percent of registered members of the Beaver Lake First Nation, the FMFN, CPDFN and HLFN lived on reserves in the RSA and LSA as of January 2008 (Tables 4 and 5). Fifty-four percent lived off reserve. There is no reliable way of knowing how many of the members living off-reserve live within the RSA and LSA but it is likely that many would be included in the census of Aboriginal populations of the study areas (i.e., there are many CPDFN members that live in Chard and Conklin).

Population in 2010

Alberta Employment, Immigration and Industry has produced a population forecast from 2007 to 2012 for the Wood Buffalo-Cold Lake Economic Region (which is slightly larger than the RSA). According to the Alberta government, the 2007 population of the Wood Buffalo-Cold Lake Economic Region is 133,022 (AEII 2007). The Alberta government predicts that the population of this region will reach 159,047 by 2010 (AEII 2007), when construction of the Project is scheduled to begin, an increase of 6.14% annually, based primarily on natural growth.

In the LSA the Aboriginal population will likely remain at almost half of the total population. In the RSA the Aboriginal population will also likely remain at the same relative size.

Based on the above projection it is expected that growth rates for the RSA and LSA will exceed current growth rates of 3.37 and 1.34% a year, respectively (2001 to 2006). Therefore, the population of the LSA in 2010 will be at least 3,955 and the population of the RSA will be at least 87,077, not including the shadow population.

2.2.2 Gender and Age

2.2.2.1 Regional and Local Study Area

Age characteristics of the RSA and LSA are presented by gender in Tables 6 and 7. In the LSA, 2006 Statistics Canada data was available only for Lac La Biche, and CPDFN reserve; 2001 data was available for Heart Lake reserve 167.

Table 6 Age Characteristics by Gender in the Regional Study Area

Community	Sex	Age											
		0-4	**5-14**	**15-24**	**25-44**	**45-54**	**55-64**	**65-74**	**75-84**	**>85**	**Total**	**Median**	**%>15**
RMWB	Male	1,875	3,440	4,575	9,980	5,165	2,180	335	95	15	27,660	32.3	80.8
	Female	1,695	3,335	4,115	8,730	4,055	1,420	315	130	45	23,840	30.8	78.9
	Total	**3,565**	**6,770**	**8,685**	**18,705**	**9,215**	**3,600**	**655**	**230**	**60**	**51,495**	**31.6**	**79.9**
Lakeland County	Male	220	525	455	825	485	410	235	120	20	3,295	38.0	77.5
	Female	190	540	400	825	465	335	205	95	30	3,070	36.7	76.1
	Total	**410**	**1,065**	**850**	**1,640**	**950**	**740**	**440**	**215**	**45**	**6,365**	**37.3**	**76.7**
Bonnyville	Male	220	385	520	915	395	195	150	105	45	2,925	30.9	79.1
	Female	235	390	455	860	350	220	180	160	70	2,910	33.8	78.9
	Total	**455**	**770**	**970**	**1,770**	**740**	**550**	**330**	**265**	**110**	**5,830**	**32.3**	**79.0**
Cold Lake	Male	425	1,080	960	2,180	900	360	200	85	15	6,205	31.8	75.7
	Female	465	920	845	2,065	775	450	220	100	45	5,790	32.2	76.1
	Total	**890**	**1,960**	**1,800**	**4,240**	**1,680**	**705**	**425**	**190**	**65**	**11,990**	**32.0**	**75.9**
Beaver Lake reserve	Male	25	40	40	55	15	15	5	0	0	190	23.1	68.4
	Female	20	50	35	45	15	10	0	0	0	190	21.0	60.5
	Total	**45**	**90**	**75**	**110**	**25**	**20**	**5**	**5**	**0**	**380**	**21.5**	**64.5**
FMFN reserves	Male	5	15	25	30	5	5	5	5	0	85	28.3	88.2
	Female	10	30	15	35	5	5	5	10	0	115	24.8	65.2
	Total	**25**	**45**	**35**	**60**	**15**	**15**	**5**	**20**	**0**	**205**	**27.5**	**73.2**
RSA	Male	2,770	5,485	6,575	13,985	6,965	3,165	930	410	95	40,360	-	79.6
	Female	2,425	5,265	5,865	12,560	5,665	2,440	895	495	190	35,915	-	78.3
	Total	**5,390**	**10,700**	**12,415**	**26,525**	**12,625**	**5,630**	**1,860**	**925**	**280**	**76,265**	**-**	**79.0**
Alberta	Male	103,835	219,760	250,200	493,369	258,835	162,260	91,845	52,925	13,755	1,646,800	35.4	80.4
	Female	98,760	209,165	239,085	487,605	253,360	160,705	97,475	68,860	28,535	1,643,550	36.7	81.3
	Total	**202,595**	**428,915**	**489,280**	**980,970**	**512,200**	**322,970**	**189,325**	**121,795**	**42,290**	**3,290,350**	**36.0**	**80.8**

Note: Includes RMWB, Lakeland County, Bonnyville and Cold Lake.

Source: Statistics Canada 2007a.

Table 7 Age and Sex Characteristics of CPDFN Reserve, Heart Lake Reserve 167 and Lac La Biche

Community	Sex	Age											
		0-4	5-14	15-24	25-44	45-54	55-64	65-74	75-84	>85	Total	Median	%>15
CPDFN reserve	Male	15	25	25	25	15	10	10	5	0	135	28.2	70.4
	Female	10	30	25	35	15	10	5	0	0	135	25.9	70.4
	Total	20	55	55	60	25	25	10	5	0	275	26.8	72.2
Heart Lake reserve 167 (2001)	Male	10	20	15	15	0	5	0	0	0	65	15.8	50.0
	Female	5	15	15	15	5	0	0	5	5	55	18.8	54.5
	Total	20	40	25	30	5	5	0	0	0	125	17.3	52.0
Lac La Biche	Male	125	230	205	455	155	105	75	50	15	1,325	29.6	73.2
	Female	120	220	215	395	170	120	85	65	45	1,435	32.7	76.0
	Total	245	440	420	770	325	215	155	120	60	2,760	31.4	74.8
Total	**Male**	**150**	**275**	**245**	**495**	**170**	**120**	**85**	**55**	**15**	**1,610**	**-**	**73.6**
	Female	**135**	**265**	**255**	**445**	**190**	**130**	**90**	**70**	**50**	**1,630**	**-**	**75.5**
	Total	**285**	**535**	**500**	**940**	**360**	**245**	**165**	**125**	**60**	**3,215**	**-**	**74.4**

Source: Statistics Canada 2002b, 2007a.

According to the RMWB 2006 census, Conklin is 56.9% male and 43.1% female. Chard is 55.8% male and 44.2% female (RMWB 2006). The proportion of males in both Conklin and Chard has increased since 2000 when the percentage of males was 49.5 and 53.1%, respectively (RMWB 2006). This is likely due to the predominance of male-worker oriented industries (i.e., forestry and oil and gas) operating in the area. Overall, however, the estimated ratio of males to females in the LSA is more even (1.03:1).

The population of the RSA is older than the population of the LSA with 79% of its population over the age of 15. In the LSA, approximately 74% of the population is over the age of 15. Approximately 74% of the population of Anzac, Chard, Conklin, Fort Chipewyan and Fort McKay is over the age of 15 (RMWB 2006). The populations of Chard and Conklin represent 21% of the total population of these communities. Approximately 74% of the population of Lac La Biche, CPDFN reserve and Heart Lake reserve 167 is over the age of 15. The RSA and LSA both have large youth populations resulting in a smaller working age population in comparison to the province as a whole.

In 2006, the working age population (age 15 to 64) of the RSA was approximately 44,570, or 58% of the total RSA population. The working age population of the LSA was approximately 2,460, or 66% of the total LSA population. In the province the working age population represents 70% of the population. There are more people under the age of 15 living in the study areas than in the province as a whole. The number of retirees (or persons over the age of 64) is low in both study areas.

2.3 ECONOMIC SETTING

2.3.1 Introduction

Labour force characteristics such as participation and unemployment rates, income and earnings, and industry and occupational representation in each study area are presented in this section. In addition, as education level correlates strongly with employment and income, these statistics are also presented. Major projects in the RMWB and Aboriginal involvement in oil sands activity are discussed. Taken together these statistics provide information about economic activity and the composition of the labour force of the RSA and LSA.

2.3.2 Labour Force Characteristics

2.3.2.1 Educational Attainment

Regional and Local Study Areas

Table 8 presents the education level of the population aged 20 to 64 in the RSA and LSA in 2001. Data was not available for Chard and Conklin.

In 2001, in the RSA, 24.5% of the population aged 20 to 64, reported having received a high school diploma or certificate as their highest level of educational attainment. Approximately 23% of the population of the RSA had a trades certificate or diploma as their highest level of educational attainment. In the province as a whole fewer people had achieved a trades certificate or diploma as their highest level of education but a greater proportion of individuals in the province completed college or university level education. Therefore the level of education in the RSA is lower on average than in Alberta.

Data available for the LSA are heavily influenced by the presence of Lac La Biche as it represents a high percentage of the total LSA population. Approximately 17% of the population had received a trades certificate or diploma as their highest level of education. Overall the LSA had a lower level of education than the RSA and the province in 2001.

Education levels in both the RSA and LSA in 2001 follow current labour requirements of the active primary industries in the region. The proportion of those aged 20 to 64 with a trades certificate or diploma in the study areas has likely increased due to increasing demand for tradespersons in this region and the willingness of the oil and gas industry to sponsor local students and pay for customized training programs in communities close to projects.

Table 8 Education Level in the Regional and Local Study Areas

	Total Population (Age 20 to 64)	% of Population with Less Than a High School Certificate		% of Population with a High School Certificate and/or Some postsecondary		% of Population with Trades Certificate or Diploma		% of Population with a College Certificate or Diploma		% of Population with a University Certificate, Diploma or Degree	
		No.	%	No.	%	No.	%	No.	%	No.	%
Regional Study Area											
RMWB	27,545	5,547	20.1	6,615	24.0	6,707	24.3	4,796	17.4	3,897	14.1
Lakeland County	2,770	945	34.1	490	17.7	470	17.0	519	18.7	350	12.6
Bonnyville	3,195	925	29.0	849	26.6	570	17.8	485	15.2	365	11.4
Cold Lake	6,905	1,099	15.9	1,940	28.1	1,519	22.0	1,341	19.4	1,006	14.6
Beaver Lake reserve	180	65	36.1	50	27.8	40	22.2	10	5.5	0	0
FMFN reserve 176	55	20	36.4	25	45.5	0	0	10	18.1	0	0
FMFN reserve 176a	75	55	73.3	10	13.3	0	0	0	0	0	0
Total RSA	**40,725**	**8,656**	**21.3**	**9,979**	**24.5**	**9,306**	**22.9**	**7,161**	**17.6**	**5,618**	**13.8**
Local Study Area											
CPDFN reserve	130	95	73.1	25	19.2	0	0	0	0	0	0
Heart Lake reserve 167	55	45	81.8	0	0	10	18.2	0	0	0	0
Lac La Biche	1,565	390	24.9	380	24.3	285	18.2	220	14.1	290	18.5
Total LSA	**1,750**	**530**	**30.3**	**405**	**23.1**	**295**	**16.9**	**220**	**12.6**	**290**	**16.6**
Alberta	**1,816,025**	**394,053**	**21.7**	**395,182**	**21.8**	**263,082**	**14.5**	**329,722**	**18.2**	**368,104**	**20.3**

Note: Due to rounding percentage totals may not equal 100.

Source: Statistics Canada 2002b.

Aboriginal Population

Table 9 shows education level of the Aboriginal population aged 25 years and over in the LSA and RSA in 2001. Data presented in Table 10 is based on Statistics Canada Aboriginal Community Profiles. In the LSA a profile was available for Lac La Biche only and is not available for reserve populations.

In terms of education level, the Aboriginal populations of both the RSA and LSA did not differ from the Aboriginal population in Alberta in 2001.

2.3.2.2 Participation and Employment

Regional and Local Study Areas

Participation rates represent the percentage of population aged 15 and over who have or are actively trying to find work. Unemployment rates represent the number of unemployed people as a percentage of the labour force. Table 10 summarizes the participation and unemployment rates in the RSA and LSA in 2001. Statistics Canada data is not available for Conklin or Chard, however, the RMWB estimates that the unemployment rate for Conklin is about 5% (Wendy Tremblay, 2007, Pers. Comm.). Unemployment rates are lowest in the RMWB and Lakeland County but are generally higher than the provincial average in both the RSA and LSA. For the RSA the average participation rate is 70.1%. In the LSA the average participation rate is 52.9%. Both rates are below the provincial average.

More recent data is available for the Wood Buffalo-Cold Lake Economic Region, which corresponds with the RSA. In 2006, the unemployment rate and participation rate in this region was 4.4 and 75.2%, respectively (Statistics Canada 2007b). These are better than provincial rates. In 2005 and 2006 unemployment rates in this economic region were lower in the winter months increasing in spring, declining again in summer and increasing once more in the fall (AEII 2006). This pattern is likely related to the seasonal nature of employment in the resource-based economy of this economic region. No other economic region in the province followed a similar pattern for 2005 or 2006.

Table 9 Educational Attainment of the Aboriginal Population

Community	Total Population 25 Years and Over	Persons with less than a High School Graduation Certificate		Persons with a High School Graduation Certificate		Persons with Some Post-Secondary		Persons with a Trades, College or University Certificate or Diploma		Persons with a University Degree or Higher	
		No.	%	No.	%	No.	%	No.	%	No.	%
Regional Study Area											
RMWB	2,585	965	37.3	380	14.7	270	10.4	900	34.8	60	2.3
Lakeland County	520	270	51.9	35	6.7	30	5.8	165	31.7	15	2.9
Bonnyville	380	185	48.7	35	9.2	30	7.9	120	31.6	10	2.6
Cold Lake	380	130	34.2	25	6.6	80	21.1	135	35.5	10	2.6
Beaver Lake reserve	155	65	41.9	0	0.0	35	22.6	50	32.3	0	0
FMFN reserves	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Total RSA	**4,020**	**1,615**	**40.2**	**475**	**11.8**	**445**	**11.0**	**1,370**	**34.1**	**95**	**2.4**
Local Study Area											
CPDFN and Heart Lake 167 reserves	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Lac La Biche	370	165	44.6	10	2.7	55	14.9	135	36.5	0	0
Alberta	**73,845**	**30,005**	**40.6**	**5,930**	**8.0**	**10,860**	**14.7**	**23,215**	**31.4**	**3,825**	**5.2**

Source: Statistics Canada 2002a.

n/a = Aboriginal community profiles are not available for reserve populations.

Table 10 Participation and Unemployment Rates, 2001

Community	Participation Rate	Unemployment Rate
Regional Study Area		
RMWB	82.3	4.5
Lakeland County	73.7	4.5
Bonnyville	71.3	7.3
Cold Lake	80.9	5.4
FMFN reserve 176	57.1	37.5
FMFN reserve 176a	61.1	27.3
Beaver Lake reserve	64.4	31.0
Local Study Area		
CPDFN reserve	54.3	42.1
Heart Lake reserve 167	35.7	-
Lac La Biche	68.6	7.5
Alberta	**73.1**	**5.2**

Source: Statistics Canada 2002b.

- = No data.

Aboriginal Population

Table 11 summarizes the participation and unemployment rates for the Aboriginal population of the study areas in 2001. The average participation rate is higher in the RSA than in the province. The average unemployment rate in the RSA, however, is also higher than in the province as a whole. In the LSA, the Aboriginal population, overall, has a higher unemployment rate and a lower participation rate than the Aboriginal population in Alberta as a whole.

Table 11 Participation and Unemployment Rates for the Aboriginal Population, 2001

Community	Participation Rate	Unemployment Rate
Regional Study Area		
RMWB	71.8	12.1
Lakeland County	60.7	7.3
Bonnyville	67.9	18.9
Cold Lake	73.7	10.7
FMFN reserve 176	57.1	37.5
FMFN reserve 176a	61.1	27.3
Beaver Lake reserve	64.4	31.0
Local Study Area		
CPDFN reserve	54.3	42.1
CPDFN[a]	55.9	36.8
Heart Lake reserve 167	35.7	0.0
Lac La Biche	62.4	22.1
Alberta	**64.2**	**14.9**

[a] INAC 2007

Source: Statistics Canada 2002a.

Initiatives between Aboriginal groups and industry to build capacity and business opportunities may increase participation rates in the Aboriginal population. However, there are still substantial barriers that Aboriginals face in gaining access to good jobs. Key among these is that a significant number (40%) of the Aboriginal population in the LSA and RSA lacks a high school graduation certificate (Table 9), a general requirement for employment with oil companies and in forestry. Other barriers to the education of Aboriginal students are discussed in more detail in Section 2.4.3.

It should also be noted that unemployment rates represent an average for the year. Unemployment for CPDFN members tends to be much lower during the winter months when members are engaged in work related to site clearing and other seasonal work and then increases when the ground thaws and such work is no longer available (MEG 2005).

2.3.2.3 Income and Earnings

Regional and Local Study Areas

Median incomes in the RSA as a whole were on par with the province in 2000 (Table 12). For the LSA, data is not available for Conklin, Chard or HLFN but data for Lac La Biche and CPDFN reserve indicate that median incomes in the LSA likely fall well below the median income of the province as a whole. Average earnings for those in the RSA who worked full time for the full year in 2000 are lower than the provincial average with the exception of Cold Lake and the RMWB where earnings have risen to meet higher costs of living.

Table 12 Income and Earnings in 2000

Community	Median Income ($)	Average Earnings ($)[a]
Regional Study Area		
RMWB	30,447	60,342
Lakeland County	18,484	36,041
Bonnyville	21,447	43,388
Cold Lake	30,182	44,474
FMFN reserve 176	-	-
FMFN reserve 176a	-	-
Beaver Lake reserve	10,208	14,527
Local Study Area		
CPDFN reserve	11,840	37,111
Lac La Biche	18,268	37,159
Alberta	**23,025**	**44,130**

[a] Worked full year, full time.

- = No data.

Source: Statistics Canada 2001b.

Aboriginal Population

Table 13 shows income and earnings for the Aboriginal population in the RSA and LSA. Statistics for the population as a whole do not differ significantly from the Aboriginal population. Average earnings on the CPDFN reserve were $37,111; however, the median income was considerably lower at $11,840, suggesting a wide wage gap between high and low income earners. The same observation is made for Lac La Biche and the Aboriginal population of the RSA and LSA in general. As the cost of living increases in the RSA and LSA, these inequities become more acute as increasingly more low income earners are unable to afford the basics. Lower wage earners are also less able to pay for goods and services in a market driven by the demands of a growing higher income population.

Table 13 Income and Earnings in 2000 for the Aboriginal Population

Community	Median Income($)	Average Earnings($)[(a)]
Regional Study Area		
RMWB	20,178	50,924
Lakeland County	11,824	26,837
Bonnyville	14,165	34,200
Cold Lake	17,044	44,463
FMFN reserve 176	-	-
FMFN reserve 176a	-	-
Beaver Lake reserve	10,208	14,527
Local Study Area		
CPDFN reserve	11,840	37,111
Heart Lake reserve 167	-	-
Lac La Biche	8,211	24,996
Alberta	**13,437**	**33,775**

[(a)] Worked full year, full time.

- = No data.

Source: Statistics Canada 2001b; 2001a.

2.3.2.4 Industry and Occupations

Regional and Local Study Areas

Industry and occupational profile data is available for Lac La Biche, Heart Lake reserve 167 and CPDFN reserve (Table 14). Data is not available for Conklin or Chard. Given that Lac La Biche and the two reserves make up 85% of the total population of the LSA, it is assumed that the census-based information provided below approximates the labour force composition of the entire LSA in 2001. It is likely that the labour force composition has not changed drastically for either the LSA or RSA since 2001. However, due to recent oil and gas activity and infrastructure projects in the RSA there is likely a higher proportion of the population engaged in resource-based industries and manufacturing and construction today.

Table 14 Experienced Labour Force by Industry, 2001

Community	Total Experience Labour Force	Agriculture and Other Resource-Based	Manufacturing and Construction	Wholesale and Retail Trade	Finance and Real Estate	Health and Education	Business Services	Other Services
Regional Study Area								
RMWB	25,935	29.7	13.3	13.6	3.5	11.3	13.2	15.5
Lakeland County	2,660	24.1	16.4	7.7	2.8	17.9	13.3	17.9
Bonnyville	2,990	16.2	15.1	18.4	3.3	17.6	8.7	20.6
Cold Lake	6,630	7.5	9.0	12.4	2.3	12.7	7.9	48.3
FMFN reserves	85	23.5	23.5	0	0	0	11.8	35.3
Beaver Lake reserve	120	16.7	8.3	0	0	37.5	0	33.3
Total RSA	**38,420**	**24.4**	**12.9**	**13.3**	**3.2**	**12.5**	**11.9**	**21.8**
Local Study Area								
CPDFN reserve	65	23.1	0	15.4	0	23.1	15.4	30.8
Heart Lake reserve 167	25	0	0	0	0	40.0	40.0	0
Lac La Biche	1,325	9.4	6.4	9.4	4.2	34.0	11.7	24.9
Total LSA	**1,415**	**9.9**	**6.0**	**9.5**	**4.0**	**33.6**	**12.4**	**24.8**
Alberta	**1,681,985**	**10.9**	**15.8**	**15.4**	**5.0**	**15.4**	**18.8**	**18.7**

Source: Statistics Canada 2001b.

While data is not available for Conklin, it is estimated that most of the labour force is engaged in trade-related occupations, heavy equipment operation, power engineering or working in administrative types of positions (Wendy Tremblay, 2007, Pers. Comm.).

Health and education are important employment sectors in Lac La Biche due to the presence of several schools, Portage College and the William J. Cadzow Lac La Biche Healthcare Centre.

Fort McMurray, Lac La Biche, Bonnyville and Cold Lake are local service centres and this is reflected in the data (Table 14). CPDFN reserve is the service centre for the CPDFN. Over half of the labour force on the CPDFN reserve is employed in health and education and other services. Resource-based industries employed more people in the RMWB and Lakeland County than any other sector. The economy of both study areas is tied very closely to the oil and gas industry. It is likely that a significant percentage of service providers serve oil and gas industry workers or companies.

Nearly half of the people from the FMFN reserves are employed in primary industries or manufacturing and construction. This is likely due to their proximity to Fort McMurray and the importance of those industries to the city.

Almost 40% of the people from Beaver Lake and Heart Lake reserves are employed in health and education. Healthcare and educational institutions tend to be large employers and the Town of Lac La Biche is within commuting distance of these reserves. Both reserves also have a school and a health centre on site where residents are employed.

Overall, the RSA has a well-diversified labour force with agricultural and other resource-based industries and other services each employing more than 20% of the experienced workforce. In the LSA, the service industry and health and education industries are the most predominant.

Between 2005 and 2006 the Wood Buffalo-Cold Lake Economic Region showed various gains and losses in industry employment. The industries with the highest year-over-year increase in employment were: forestry, fishing, mining and oil and gas at 1,900 positions; trade, 1,100 positions; and health care and social assistance, 300 positions. Those industries with the largest decrease in employment were: transportation and warehousing which lost 600 positions, agriculture with a loss of 300 positions, and public administration which lost 200 positions (AEII 2006).

The Wood Buffalo-Cold Lake Economic Region relies heavily on primary resources activities such as forestry. Alberta Pacific Forest Industries Inc. (Al-Pac) operates the world’s largest single-line kraft pulp mill, producing 560,000 tonnes of pulp annually. Over 30 smaller companies operate in the LSA producing rough and planed lumber, chips shavings and sawdust. The factory sector employs 1,700 people directly and induced employment is estimated at 3,200 in the “Athabasca-Fort McMurray” Forestry Region, which includes Lakeland County and Lac La Biche (Alberta Forest Products Association and ASRD 2005; Alberta Forest Products Association 2007, Website; ASRD 2007, Website). Total economic output from this sector in the Athabasca-Fort McMurray Forest Region in 2003 was $1.35 billion, with corporate and property taxes accounting for $34.1 million (Alberta Forest Products Association and ASRD 2005).

The LSA is situated between two major oil sands producing areas: Fort McMurray and Cold Lake. EnCana ECCL Oil Sands Ltd. (EnCana) Christina Lake Thermal Project is serviced primarily from Lac La Biche and it is likely the Project will also be serviced from Lac La Biche. Drilling, seismic and pipeline construction have promoted growth in servicing these sectors. Within the RMWB, a total of 37 oil, gas and oil sands projects are near completion or were scheduled to begin construction in 2007, with a total value of $64 billion (AlbertaFirst 2007, Website).

A third primary industry active in the RSA is agriculture with the most activity concentrated in Lakeland County. There are 387 farming operations in Lakeland County averaging 996 acres in size, most of which (64.3%) are cattle operations. Based on total gross farm receipts, average farm outputs in Lakeland County are slightly below provincial averages. Gross farm receipts include income from agricultural product sales, program payments and rebates, dividends and income from custom work. Agriculture in Lakeland County was negatively affected by United States import restrictions after the Bovine Spongiform Encephalopathy (BSE) incident in 2005. Even before the BSE crisis many farmers and farm workers supplemented their incomes by taking jobs off the farm, typically in seasonal positions with oil and gas (Alberta Agriculture, Food and Rural Development 2001a, 2001b; MEG 2005).

Table 15 lists the experienced labour force by occupation in both study areas. In the RSA and LSA sales and services and trades, transport and equipment operators and related occupations employed the highest proportions of the experienced labour force.

Tables 14 and 15 reflect participation in the wage economy only; however, subsistence activities are also a component of the local economy. Roughly three-quarters of the CPDFN and many residents of Chard and Conklin supplement their livelihoods through hunting, fishing, trapping and gathering (MEG 2005).

Aboriginal Population

Table 16 lists the experienced labour force by industry for the Aboriginal population in both study areas. The largest difference between the Aboriginal population of the LSA and RSA and the total population of the RSA and LSA generally is a slightly higher proportion of Aboriginal people employed in agriculture and other resource-based industries and business and other services.

Similarly, a greater proportion of the Aboriginal population in both the RSA and LSA is employed in sales and service, trades, transport and equipment operation and related occupations, and occupations unique to the primary industry than in the total population of the RSA and LSA (Table 17).

Table 15 Experienced Labour Force by Occupation, 2001

Occupation	RSA	RMWB	Lakeland County	Bonnyville	Cold Lake	FMFN Reserves	Beaver Lake Reserve	LSA	CPDFN Reserve	Heart Lake Reserve 167	Lac La Biche	Alberta
Total Experienced Labour Force	**38,430**	25,940	2,660	2,990	6,625	95	120	**1,410**	65	20	1,325	**1,681,980**
Management	**8.3**	8.0	8.1	8.5	9.7	0	8.3	**12.1**	15.4	0	12.1	**10.5**
Business, Finance and Administration	**13.3**	14.0	12.0	12.7	11.4	21.1	8.3	**14.5**	15.4	0	14.7	**17.3**
Natural and Applied Sciences and Related	**7.4**	8.0	3.4	4.2	7.2	0	0	**4.3**	0	0	4.5	**7.0**
Health	**3.3**	2.9	4.1	6.0	3.4	0	8.3	**4.6**	0	0	4.9	**4.9**
Social Science, Education, Government Service and Religion	**6.0**	5.2	9.0	7.5	7.1	10.5	8.3	**17.0**	0	0	18.1	**7.0**
Art, Culture, Recreation, and Sport	**1.1**	0.9	1.3	1.0	1.6	0	0	**1.4**	0	0	1.5	**2.2**
Sales and Service	**25.5**	23.0	17.5	22.6	39.5	26.3	41.7	**21.6**	23.1	50.0	21.1	**23.4**
Trades, Transport and Equipment Operators and Related	**27.2**	31.6	22.2	21.6	14.7	31.6	16.7	**16.3**	30.8	50.0	15.1	**16.8**
Unique to Primary Industry	**5.3**	3.5	19.7	11.9	3.6	0	12.5	**6.7**	15.4	0	6.4	**6.9**
Unique to Processing, Manufacturing and Utilities	**3.2**	3.5	3.0	3.7	1.7	0	8.3	**1.8**	0	0	1.9	**3.9**

Source: Statistics Canada 2002b.

Table 16 Experienced Labour Force by Industry for the Aboriginal Population (%), 2001

Community	Total Experience Labour Force	Agriculture and other resource-based	Manufacturing and Construction	Wholesale and Retail Trade	Finance and Real Estate	Health and Education	Business Services	Other Services
Regional Study Area								
RMWB	2,455	30.8	15.5	9.2	2.4	7.1	17.7	17.1
Lakeland County	405	19.8	19.8	13.6	0	11.1	14.8	21.0
Bonnyville	365	6.8	16.4	24.7	4.1	13.7	0	32.9
Cold Lake	420	13.1	19.0	10.7	0	7.1	17.9	32.1
FMFN reserves	85	23.5	23.5	0	0	0	11.8	35.3
Beaver Lake reserve	120	16.7	8.3	0	0	37.5	0	33.3
Total RSA	**3,850**	**24.8**	**16.4**	**10.8**	**1.9**	**8.9**	**15.1**	**21.6**
Local Study Area								
CPDFN reserve	65	23.1	0	15.4	0	23.1	15.4	30.8
Heart Lake reserve 167	25	0	0	0	0	40.0	40.0	0
Lac La Biche	335	14.9	3.0	14.9	0	13.4	17.9	37.3
Total LSA	**425**	**15.3**	**2.4**	**14.1**	**0**	**16.5**	**18.8**	**34.1**
Alberta	**63,160**	**10.5**	**18.2**	**12.2**	**2.7**	**15.8**	**15.3**	**25.3**

Source: Statistics Canada 2002a; 2002b.

Table 17 Experienced Labour Force by Occupation for the Aboriginal Population (%), 2001

Occupation	RSA	RMWB	Lakeland County	Bonnyville	Cold Lake	FMFN Reserves	Beaver Lake Reserve	LSA	CPDFN Reserve	Heart Lake Reserve 167	Lac La Biche	Alberta
Total Experienced Labour Force	**3,860**	2,455	405	365	420	95	120	**420**	65	20	335	**63,160**
Management	**3.7**	4.1	2.5	2.7	2.4	0	8.3	**4.8**	15.4	0	3.0	**6.4**
Business, Finance and Administration	**10.5**	10.4	13.6	5.5	10.7	21.1	8.3	**14.3**	15.4	0	14.9	**13.9**
Natural and Applied Sciences and Related	**3.4**	4.7	0	0	3.6	0	0	**2.4**	0	0	3.0	**2.8**
Health	**2.2**	1.4	0	6.8	3.6	0	8.3	**3.6**	0	0	4.5	**2.7**
Social Science, Education, Government Service and Religion	**4.4**	3.5	4.9	9.6	2.4	10.5	8.3	**3.6**	0	0	4.5	**8.3**
Art, Culture, Recreation, and Sport	**5.2**	0.8	0	0	0	0	0	**2.4**	0	0	3.0	**1.6**
Sales and Service	**31.1**	27.3	30.9	49.3	35.7	26.3	41.7	**36.9**	23.1	50.0	38.8	**28.3**
Trades, Transport and Equipment Operators and Related	**32.3**	37.7	25.9	13.7	27.4	31.6	16.7	**21.4**	30.8	50.0	17.9	**24.0**
Unique to Primary Industry	**7.8**	6.5	12.3	6.8	11.9	0	12.5	**11.9**	15.4	0	11.9	**7.5**
Unique to Processing, Manufacturing and Utilities	**4.6**	3.9	7.4	6.8	3.6	0	8.3	**2.4**	0	0	3.0	**4.5**

Source: Statistics Canada 2002b; 2002a.

2.3.2.5 Major Projects

Major projects (i.e., projects involving capital expenditures of more than $5 million) contribute to the economy of the province and affect the social and economic settings of local communities. They include new roads, schools hospitals and housing as well as major industrial projects. The Alberta Inventory of Major Projects lists construction activities by type indicating what kinds of projects are occurring to what degree in an area. Table 19 summarizes the value of major projects announced, proposed, under review, under construction or completed as of November 2007 in the RSA and LSA.

Major projects in proximity to the LSA communities include the following:

- completion of the paving of Secondary Highway 881 north and south of Conklin ($12.1 million);
- Devon Canada Corp. Jackfish SAGD Oilsands Project Phase 2 (construction planned to begin in the third quarter of 2008) ($600.0 million);
- EnCana Christina Lake Thermal Project south of Christina Lake under construction until 2009 ($575.0 million);
- the proposed Statoil Kai Kos Dehseh SAGD Project Leismer Pilot near Conklin ($850.0 million); and
- proposed affordable housing units in Anzac, Conklin, Fort Chipewyan and Chard/CPDFN by the Wood Buffalo Housing and Development Corporation ($5.7 million).

Table 18 Value of Major Projects by Type

Type of Project	Number of Projects		Total Cost $Millions		Range of Proposed Construction Schedules	
	RSA	LSA	RSA	LSA	RSA	LSA
infrastructure	12	1	1,523.8	12.1	2006 to 2013	2006 to 2007
institutional	9	0	244.3	0	2006 to 2009	n/a
mining	3	0	185.6	0	-	n/a
oil sands	31	3	79,082.0	2,025.0	2000 to 2012	2000 to 2009
pipelines	11	0[(a)]	67,868.0	0	2006 to 2010	n/a
residential	18	1	937.6	5.7	2006 to 2008	n/a
recreation	3	0	212.0	0	2006 to 2008	-
All	**87**	**5**	**150,053.3**	**2,042.8**	**2006 to 2013**	**2000 to 2009**

[(a)] Pipelines may pass through the LSA.

- = No data.

Source: Alberta Economic Development 2007.

2.3.2.6 Aboriginal Involvement in Oil Sands Development

Overall, the value of contracts with Wood Buffalo Aboriginal companies for work in the oil sands have increased 142% to $411.5 million since 2002 and more than four-and-a-half times since 1998 (Table 20).

Table 19 Oil Sands Value of Contracts With Wood Buffalo Aboriginal Companies (Millions $)

1998	1999	2000	2001	2002	2003	2004	2005	2006
72	102	213	252	170	213	255	312	411.5

Source: D. Farkouh, 2007, Pers. Comm.

Table 21 indicates that Aboriginal employment in permanent operations jobs has followed approximately the same trends as Table 20.

Table 20 Aboriginal People Employed by the Oil Sands Industry in Permanent Operations Jobs in the Wood Buffalo Region

Employer	1998	1999	2000	2001	2002	2003	2004	2005	2006
Company	445	496	565	633	688	650	617	835	725
Contractor	330	500	582	631	720	970	679	617	n/a
Total	**775**	**996**	**1,147**	**1,264**	**1,408**	**1,620**	**1,296**	**1,452**	**725**

n/a = No contractor data was available for 2006.

Source: D. Farkouh, 2007, Pers. Comm.

2.3.3 Summary

Higher educational levels are generally correlated with higher income levels. Communities in the study areas generally have lower levels of educational attainment than the province. Overall, average earnings and incomes are also below provincial averages for the total population and also for the Aboriginal population (with the exception of the RMWB).

The labour force in the RSA and LSA is concentrated in primary industries, manufacturing and construction, trades and trade-related occupations. This is likely due to the importance of forestry, agriculture and oil and gas sectors in this area. The programs available at Portage College and Keyano College, many of which are targeted to these industries, is also a factor in the make up of the labour market (Section 2.4.4.2). There is the potential, therefore, that workers living in the RSA and LSA may fill some of the positions on Oil Sands projects proposed between Cold Lake and Fort McMurray.

Increasing Aboriginal involvement in oil sands projects may help to ensure that individuals living in locally affected Aboriginal communities benefit economically from these projects.

2.4 SOCIAL SETTING

2.4.1 Local Government

The Project is located in the southern section of the RMWB, which was incorporated through the amalgamation of the City of Fort McMurray and Improvement District No. 18 in 1995. Council consists of the mayor plus 10 members (including one from the Anzac-Conklin-Gregoire Estates-Janvier region). In August 2007, the town of Lac La Biche and Lakeland County finalized their amalgamation and became Lac La Biche County. Amalgamations such as these occur as towns face rising costs and a falling tax base as land-intensive industries move away from cities and into rural communities. Governance of the newly amalgamated Lac La Biche County has not been finalized. Currently, Lakeland County Council consists of a chief administrative officer, a reeve and six ward councillors. The Town of Lac La Biche Council consists of a mayor, deputy mayor and five councillors.

The CPDFN, HLFN, Beaver Lake First Nation, and FMFN No. 468 First Nation exercise local control over their reserve lands. Administration is through elected chiefs and band councils.

2.4.2 Housing

Housing remains an important issue in Conklin, Chard and on the CPDFN reserve. Extended families or more than one family are often living in one house (Wendy Tremblay, 2007, Pers. Comm.; MEG 2005). The condition and maintenance of housing in Chard and the CPDFN reserve has also been noted as an issue for local residents (MEG 2005). Housing availability on the CPDFN reserve is limited, as funds are not available to build new or expand existing homes.

Improved access to the LSA as a result of the paving of Secondary Highway 881 could make commuting to work between Lac La Biche and Fort McMurray more attractive and may stimulate an increase in housing demand in the LSA. In recent years, Conklin and Lakeland County have seen an increase in the demand for rural residential properties (Jane Palmer, 2007, Pers. Comm.; MEG 2005) and this is thought to be related to an increasing number of retirees moving to the area. Developers are targeting this market and building luxury condominiums around Lac La Biche. People from Edmonton and Fort McMurray are also buying lake front property around Lac la Biche Lake. The availability of residential construction crews, however, is limited in part, by demand for construction labour in the oil and gas sector and as a result, housing construction in the study areas can be delayed.

2.4.2.1 Dwelling Counts

Regional and Local Study Areas

Table 21 summarizes 2006 private dwelling characteristics for the RSA. Between 2001 and 2006 the RMWB and Lakeland County saw a significant increase in the number of private dwellings. Of the 8,755 new dwellings constructed between 1986 and 2006 in the RSA over three-quarters were built since 2001, likely in or near Fort McMurray.

The most common type of dwelling in the RSA is single detached houses, followed by apartments in buildings with fewer than five storeys. The RMWB has a greater mix of dwelling types. Due to the large population of Fort McMurray there has been an increase in higher density multi-family projects.

Table 21 Private Dwelling Characteristics of the Regional Study Area

Dwelling Type	RMWB	Lakeland County	Bonnyville	Cold Lake	FMFN Reserves	Beaver Lake Reserve	Alberta
Total private dwellings 2001	14,793	2,265	2,203	4,396	76	94	1,171,841
Total private dwellings 2006	20,505	3,158	2,394	4,834	73	107	1,335,745
% change in private dwellings 2001 to 2006	38.6	39.4	8.7	10.0	-3.9	13.8	14.0
Total private dwellings occupied by usual residents	17,987	2,298	2,269	4,314	60	100	1,256,192
Single detached houses[a]	47.4	85.1	65.2	73.9	83.3	90.0	63.4
Semi-detached houses[a]	5.4	0.4	6.4	11.5	0.0	0.0	4.8
Row houses[a]	9.8	0.4	4.4	2.9	0.0	0.0	7.0
Apartments, duplex[a]	2.1	0.0	0.4	0.5	0.0	0.0	2.6
Apartments in buildings with fewer than five storeys[a]	18.8	0.9	17.6	9.8	0.0	0.0	14.7
Apartments in buildings with five or more storeys[a]	2.8	0.0	0.4	0.0	0.0	0.0	4.4
Other dwellings[a]	13.7	13.1	5.9	1.5	0.0	0.0	3.1
Owned dwellings	12,975	1,965	1,480	3,005	10	30	917,905
Rented dwellings	4,905	305	785	1,300	0	10	330,275
Number of dwellings constructed before 1986	10,190	1,315	1,625	2,585	30	65	785,200
Number of dwellings constructed between 1986 and 2006	7,790	965	645	1,720	30	35	470,995

[a] As a percent of total private dwellings occupied by usual residents.

Source: Statistics Canada 2007a.

In the LSA private dwelling characteristics are available only for CPDFN reserve and Lac La Biche (Table 22). Construction in Lac La Biche has not occurred to the same extent as in Lakeland County as most of the development has occurred on County land adjacent to the Town of Lac La Biche.

Table 22 Private Dwelling Characteristics of CPDFN Reserve and Lac La Biche

Dwelling Type	CPDFN Reserve	Lac La Biche	Alberta
Total private dwellings 2001	95	1,077	1,171,841
Total private dwellings 2006	97	1,169	1,335,745
% change in private dwellings 2001-2006	2.1	8.5	14.0
Total private dwellings occupied by usual residents	95	1,015	1,256,192
Single detached houses[a]	84.2	54.7	63.4
Semi-detached houses[a]	0.0	3.0	4.8
Row houses[a]	10.5	3.4	7.0
Apartments, duplex[a]	0.0	2.0	2.6
Apartments in buildings with fewer than five storeys[a]	0.0	26.6	14.7
Apartments in buildings with five or more storeys[a]	0.0	0.0	4.4
Other dwellings[a]	15.8	10.8	3.1
Owned dwellings	35	560	917,905
Rented dwellings	10	460	330,275
Number of dwellings constructed before 1986	10	695	785,200
Number of dwellings constructed between 1986 and 2006	80	325	470,995

[a] As a percent of total occupied private dwellings.

Source: Statistics Canada 2007a.

2.4.2.2 Housing Cost

The Core Need Income Threshold (CNIT) listing for 2007 was used to describe the status of affordable housing in the study areas. The CNIT identifies the minimum annual income an individual or household would need to earn to be able to afford appropriate housing in a given municipality (Table 23). Residents of the RMWB and the non-market north (including Conklin and Chard) have higher CNITs than Lac La Biche, Bonnyville or Cold Lake.

Table 23 Core Need Income Thresholds 2007

Community	Bachelor	1 Bedroom	2 Bedroom	3 Bedroom	4 Bedroom	5 Bedroom
RMWB	$44,000	$57,000	$66,500	$72,500	$75,500	$78,500
Bonnyville	$24,000	$30,000	$32,500	$40,500	$43,500	$46,500
Cold Lake	$24,000	$30,000	$32,500	$40,500	$43,500	$46,500
Lac La Biche		$24,500	$28,500	$38,000	$41,000	$44,000
Non-market North[a]		$49,500	$52,500	$56,000	$57,500	$59,500

[a] Non-market North includes 14 remote communities including Conklin and Chard.

Source: Alberta Municipal Affairs and Housing 2007b.

Rents have steadily increased in Lac La Biche for all bedroom types (Table 24). The largest increase has been for one-bedroom units.

Table 24 Weighted Rents by Bedroom Type in Lac La Biche

Unit Type	1998	1999	2000	2001	2002	2003	2005	2006	2007
1 Bedroom	417	426	440	509	518	528	581	599	740
2 Bedroom	536	539	571	634	648	653	705	726	844
3 Bedroom	539	604	614	634	662	654	700	739	927
Overall Vacancy Rate	**20.4**	**14.8**	**2.2**	**1.8**	**2.6**	**4.4**	**8.4**	**9.6**	**4.3**

Source: Alberta Municipal Affairs and Housing 2007a.

In Cold Lake and the RMWB average rents increased by 17% and 23% respectively between October 2006 and October 2007 (Table 25). The highest rent increase has been for three-bedroom units in the RMWB (32.1% increase) and bachelor suites in Cold Lake (19.9% increase).

Table 25 Private Apartment Average Rents by Bedroom Type in Cold Lake and the Rural Municipality of Wood Buffalo Census Agglomerations

Source	Bachelor		1 Bedroom		2 Bedroom		3 Bedroom +		Total	
	Oct 06	Oct 07	Oct 06	Oct 07	Oct 06	Oct 07	Oct 06	Oct 07	Oct 06	Oct 07
Wood Buffalo CA	1,030	1,263	1,393	1,724	1,717	2,085	1,713	2,263	1,605	1,968
Cold Lake CA	548	657	702	800	758	902	789	905	732	855

Source: CMHC 2007b.

Information sources indicate that average new home prices (i.e., 1,500 to 2,000 sq. ft.) in Lac La Biche and Lakeland County range between $320,000 to $430,000 – a significant increase from 2001 figures (Table 26).

Table 26 Monthly Payments and Values of Dwellings (2001)

	RMWB	Lakeland County	Bonnyville	Cold Lake	RSA Average	Lac La Biche	Alberta
average gross monthly payments for rented dwellings ($)	977	393	551	601	631	550	674
average monthly payments for owner-occupied dwellings ($)	1,100	671	744	853	842	681	875
average value of dwelling ($)	165,834	116,447	98,835	113,238	123,589	118,296	113,238

Source: Statistics Canada 2002b.

Table 27 presents the Canadian Mortgage and Housing Corporations forecast for the resale market in the RMWB. Forecasted average sale prices for 2007 are almost three times the 2001 average dwelling value.

Table 27 Housing Forecast – Resale Market in the Wood Buffalo Census Agglomeration Third Quarter 2007

	2006	2007(F)	%Change 2006/2007	2008 (F)	%Change 2007/2008
MLS® Sales	2,197	2,450	11.5	2,350	-4.1
MLS® Average Price	371,512	460,000	23.8	510,000	10.9

MLS = Multiple Listing Service; F = Forecast.
Source: CMHC 2007a.

2.4.2.3 Housing Availability

The overall vacancy rate in Lac La Biche has declined considerably since the 1990s. In 2001, the overall vacancy rates began to increase until 2006 when the rate dropped from 9.6 to 4.3 in 2007 (Table 28). New construction likely contributed to an increase in vacancy rates following a low in 2001.

Table 28 Overall Vacancy in Lac La Biche

	1998	1999	2000	2001	2002	2003	2005	2006	2007
Overall Vacancy Rate	20.4	14.8	2.2	1.8	2.6	4.4	8.4	9.6	4.3

Source: Alberta Municipal Affairs and Housing 2007a.

Recent vacancy rates in Cold Lake and the RMWB are very low (Table 29).

Table 29 Private Apartment Vacancy Rates (%) by Bedroom Type in the Cold Lake and Rural Municipality of Wood Buffalo Census Agglomerations

	Bachelor		1 Bedroom		2 Bedroom		3 Bedroom		Total	
	October 2006	October 2007	October 2006	October 2007	October 2006	October 2007	October 2006	October 2007	October 2006	October 2007
RMWB CA	0.0	0.0	0.2	0.2	0.1	0.2	1.4	1.4	0.2	0.3
Cold Lake CA	11.1	0.0	5.0	0.5	3.1	2.1	0.0	0.0	3.9	1.3

Source: CMHC 2007b.

Affordable housing in the Lac La Biche (and Lakeland County) is affected by many issues including: rising housing prices in Fort McMurray, forcing some people to relocate to Lac La Biche or Lakeland County and commute to work; property speculation related to proposed oil developments near Fort McMurray; and limited lands for affordable housing developments. The combination of these trends has begun to push housing prices up (Rick Beaupre & Associates Consulting Inc. 2002), prompting the County to form the Lac La Biche and Region Affordable Housing Task Force (Jane Palmer, 2007, Pers. Comm.). Local realtors have suggested that a shortage of trades people is driving new home prices up as well as the willingness of families to in-migrating larger centres to pay higher prices.

Housing availability is very limited in Chard in Conklin. Twenty-five families are on the Wood Buffalo Housing and Development Corporation waiting list for affordable housing (Jessica Daymond, 2007, Pers. Comm.).

2.4.2.4 Construction Activity

Tables 30 and 31 illustrate the difference in housing starts in Lakeland County compared to Lac La Biche. Presales have begun on planned condominium projects in Lac La Biche. These projects currently outnumber new single detached home construction. Area realtors suggest that construction time is faster for homes planned by developers but privately built homes can take up to two years for completion.

Table 30 Value of Residential Building Permits and Number of Housing Starts in Lakeland County

	2001	2002	2003	2004	2005	2006
Residential Building Permits Value (thousands $)	4,719	7,163	7,375	8,344	10,682	33,597
Total Housing Starts	**31**	**48**	**53**	**52**	**60**	**n/a**

n/a = Not available.

Source: Lac La Biche Regional Community Development Corporation 2007, Website.

Table 31 Value of Residential Building Permits and Number of Housing Starts in Lac La Biche

	2001	2002	2003	2004	2005	2006
Residential Building Permits Value (thousands $)	n/a	367	538	130	1,737	6,906
Total Housing Starts	**n/a**	**2**	**5**	**1**	**11**	**n/a**

n/a = Not available.

Source: Lac La Biche Regional Community Development Corporation 2007, Website.

New water distribution and sanitary sewage collection systems are expected to continue to allow new developments west of Lac La Biche (Jane Palmer, 2007, Pers. Comm.; MEG 2005).

In the Wood Buffalo CA housing construction is expected to slow down in 2008 (Table 32).

Table 32 Wood Buffalo Census Agglomeration Housing Forecast – New Construction Third Quarter 2007

	2006	2007(F)[(a)]	% Change 2006/2007	2008 (F)[(a)]	% Change 2007/2008
Single-detached	642	925	44.1	975	5.4
Multiple	908	1,175	29.4	1,225	4.3
Total	1,550	2,100	35.5	2,200	4.8

(a) F= Forecast.

Source: CMHC 2007a.

In Chard and Conklin, the Wood Buffalo Housing and Development Corporation has built three low-cost housing developments namely the Janvier Drive Development in Chard and the Poplar Crescent and Pine Lake Developments in Conklin. Of the 17 units built seven have been rented and ten have been sold (Jessica Daymond, 2007, Pers. Comm.). Those that sold went for an average of $105,000, however, due to rising construction costs, costs associated with land development and servicing new lots, prices are expected to reach $120,000 in 2008. A new road is also needed in Conklin to build on an additional seven lots.

2.4.3 Schools and Post-Secondary Institutions

2.4.3.1 Primary and Secondary

The public system within Lakeland County is administered through the Northern Lights School Division (NLSD), No. 69, which has one of its three division offices in Lac La Biche. The Northland School Division (NSD), No. 61 services the public schools in Conklin and Chard. In addition, there is a francophone school, École Beausejour in Plamondon, which is administered by the East Central Francophone Education Region No. 3. Education needs on the CPDFN reserve are serviced by a high school administered through the CPDFN. In addition, Portage College is located in Lac La Biche and Keyano College offers adult education in Conklin and Fort McMurray.

Enrolment and capacity levels for schools in the study areas are provided in Table 33.

On the CPDFN reserve, there are 18 students attending high school in Fort McMurray and five attending high school in Lac La Biche. All are living in boarding homes with host families. The school has moved into a new on-reserve facility that is part of a larger community centre. Keyano College also operates classes in the new building which includes community meeting space and a cafeteria.

Table 33 Primary and Secondary School Enrolment and Capacity

Location	School Name	Grades	Student Count				Capacity
			00/01	05/06	06/07	07/08	
Northern Lights School Division #69 (Public)							
Lac La Biche	Vera M. Welsh Elementary	ECS-3	498	458	454	450	526
	Central Elementary	4-5	225	236	229	250	344
	Dr. Swift Middle School	6-8	420	423	408	415	470
	Lac La Biche Off Campus	7-12	34	37	37	-	50
	Youth Assessment Centre	7-12	12	10	10	-	-
	J.A Williams High School	9-12	551	571	588	575	650
Plamondon	École Plamondon	ECS-12	444	418	382	460	548
		subtotal	*2,184*	*2,153*	*2,108*	*2,150*	*2,658*
Northland School Division #61 (Public)							
Anzac	Anzac Community School	ECS-6	-	115	115	95	120
Conklin	Conklin Community School	ECS-9	45	33	33	38	100
Chard	Father R. Perin School	ECS-9	-	95	95	88	140
	subtotal		*45*	*243*	*243*	*221*	*360*
East Central Francophone Ed Reg #3 (Public)							
Plamondon	École Beausejour	ECS-10	128	128	158	-	-
		subtotal	*128*	*128*	*158*	*-*	*-*
First Nation Schools (Federal)							
Beaver Lake reserve	Amisk School	ECS-9	97	-	-	100	150
CPDFN reserve	Chipewyan Prairie Dene High School	10-12	30	37	30	38	60
Heart Lake reserve 167	Kohls School	1-10	49	40	40	30	50
		subtotal	*176*	*77*	*70*	*168*	*228*
Total			**2,533**	**2,601**	**2,579**	**2,539**	**3,208**

\- = No data.

ECS = Early Childhood Services.

Sources: Alberta Learning 2001; 2006; 2007; MEG 2005; NLSD 2007a; NLSD 2007b Website; Randy Chernipeski 2007, Pers. Comm.; Gordon Hum 2007, Pers. Comm.; Elvina Gladieu 2007, Pers. Comm.; Paul Eddy 2007, Pers. Comm. Aurele Malo 2007, Pers. Comm.; Ernest Walsh 2007, Pers. Comm.

At Father R. Perin School in Chard, enrolment numbers vary as some families move away and return, sometimes during the same school year (Randy Chernipeski, 2007, Pers. Comm.). All students attending Early Childhood Services (ECS) to grade 9 in Chard live in the community and when they reach high school they must move either to Fort McMurray or Lac La Biche. A new high school is scheduled to open in Anzac in 2008. Once complete, it will be possible for students from Chard to attend that school as it would be more feasible to transport them daily by bus.

Students who attended Conklin Community School were once able to move to a boarding home in Fort McMurray when they reached high school. This arrangement, however, was cancelled due to several factors. As a result, families with high-school-aged children must find their children a boarding situation either in Fort McMurray or Lac La Biche or move the family there. Both Lac La Biche and Anzac are too far for daily trips to school (about 90 minutes in good conditions). These circumstances create a significant barrier to completing education and as a result, some Conklin youth are not attending high school at all (Ernest Walsh, 2007, Pers. Comm.).

Enrolment at Kohls School on Heart Lake reserve 167 has been relatively stable, although there was a small decline in preschool-aged children as the school no longer offers ECS. Students are bussed to Lac La Biche to attend high school.

At J.A. Williams High School in Lac La Biche, enrolment numbers have been more or less constant in recent years. There are concerns that proposed developments could bring more families into the community and that the school would then reach capacity within a couple of years (Aurele Malo, 2007, Pers. Comm.) even after the recent expansion of school facilities. Students attending the high school are from Lac La Biche and neighbouring Métis settlements and reserves. The exact number of students from Conklin is not known but they represent a very small percentage of the student body.

Enrolment has been growing in recent years at the Amisk Community School in Beaver Lake reserve. About half of the students are from the reserve while the others come primarily from Lac La Biche. The school attracts students from off the reserve as class sizes are much smaller than those in Lac La Biche. Amisk School has an average of 20 students per class and Lac La Biche has an average of 30 students per class (Elvina Gladieu, 2007, Pers. Comm.). Amisk School also offers a hot lunch program. Students from Beaver Lake reserve attend high school in Lac La Biche but many do not finish Grade 12 (Elvina Gladieu, 2007, Pers. Comm.).

2.4.3.2 Post-Secondary

Keyano College

Keyano College believes their greatest challenge is the tremendous skill shortage of the region, province and country (Keyano College 2006). To that end, the college plans to build the Oil Sands Trades and Technology Centre, a \$100 million expansion of the Clearwater Campus in Fort McMurray. In September and October 2007 Keyano College received \$6.7 million for additional trades training spaces, online course spaces and faculty retention funding (Dianne Farkouh, 2007, Pers. Comm.). Faculty attraction and retention is important to Keyano College as the cost of living in Fort McMurray is one of the highest in the province. In 2006, as part of faculty retention, Keyano College offered a monthly living allowance and transitional housing options for new staff (Keyano College 2006).

The college has focused on engaging the Aboriginal workforce through programs such as the Aboriginal Financial Management program and the Aboriginal Skills Employment Partnership. On the CPDFN reserve the Preparation for Academic and Career Education (PACE) program was combined with the Northern Alberta Institute of Technology (NAIT) Trades in Motion program in 2006. The PACE programs was delivered in the community with graduating students moving into the Trades in Motion program. The PACE component includes three months compressed training in math, english, critical reading and writing. It also covered safety training, conflict and stress management, study habits test taking and other essential skills (Keyano College 2006).

Keyano College offers courses for university accreditation, the oil sands industry, business and computer technology, health and human services, visual and performing arts, and personal growth. Partnering with industry has generated expansion to three campuses, two in Fort McMurray and one in Fort Chipewyan, as well as learning centres in Fort McKay, Gregoire Lake, Conklin and on the CPDFN reserve (MEG 2005). These facilities serve more than 3,000 full and part-time students (MEG 2005). During the 2005/2006 academic year there were 1,291 Full Load Equivalent (FLE) students; this was a 2.28% decrease in enrolment over the previous year. 33.94% of students were enrolled in the Trades and Heavy Industrial Division.

Portage College

Portage College has its main campus in Lac La Biche and offers a range of programs aimed at facilitating employment in the oil and gas sector. The College is developing customized industry training to enhance the skills of the local workforce (Portage College 2006). Programs range from health and safety training (e.g., first aid, H_2S Alive and Confined Space Entry) and certificate programs in environmental monitoring, and culinary arts (i.e., camp cook) to trades such as welding, power engineering, pipefitting and carpentry.

Portage College is currently working with industry to develop an oil and gas worker program that will have multiple exit points (e.g., labourer, worker and specialist) each with a level of certification. The Program is meant to address the recruitment and retention needs of the industry (Kevin Wahl, 2007, Pers. Comm.). At the time of writing, there were over 1,000 students a year registered in Community and Industry Training programs in Portage College regional centres in Lac La Biche, Cold Lake and St. Paul and in the community campuses in Frog Lake, Saddle Lake, Vegreville, Wainwright, Buffalo Lake, Elizabeth Settlement, Fishing Lake and Goodfish Lake (Kevin Wahl, 2007, Pers. Comm.).

Site work and tendering have been done for a new campus in Cold Lake. This joint-use facility will accommodate 280 FLE students (Portage College 2006). The college is also hoping to soon become a long-term tenant of the new Bonnyville Centennial Centre. Videoconferencing has been installed in Cold Lake, Bonnyville and Lac La Biche.

Portage College is facing similar challenges to Keyano College in attracting and retaining staff. The college has 40% more job openings in 2005/06 over the previous year, but had a 10% decrease in applicants.

During the 2005 to 2006 academic year, Portage College had 1,044 FLEs. In addition to core programming, 988 individuals completed customized training programs/courses (Portage College 2006).

2.4.4 Health Services

Health services in the LSA and RSA are administered by the Northern Lights Regional Health Authority (NLRHA) and the Aspen Regional Health Authority (ARHA).

Within the NLRHA, Conklin had been served by the Margaret A. Quintel Health Centre, located in Conklin. In the summer of 2006, however, the building was condemned. Current health services are provided by a community health nurse who visits the community once a week and works out of the Nakewin Centre in Conklin. Patients requiring more than basic care are referred to hospitals in Lac La Biche or Fort McMurray.

The CPDFN and Chard are serviced by the Janvier Health Centre, which is run by the First Nations and Inuit Health Branch of Health Canada. The Centre is staffed by two nurses who come from Fort McMurray every day and one doctor who comes every second Thursday. The Centre operates from 8:30 am to 4:30 pm and is open Monday to Friday. Dental care is also available three times per month. The Centre is well used by Aboriginal and non-Aboriginal members of the local community (MEG 2005).

For other medical services, residents in these communities are referred to Lac La Biche or Fort McMurray, while emergency cases can be transported by ambulance or air ambulance to emergency rooms in Edmonton or Fort McMurray.

The ARHA provides services to Lac La Biche and Lakeland County through the William J. Cadzow Lac La Biche Healthcare Centre and two clinics; the Association Medical Clinic and the Lindsay Medical Clinic. Together the Healthcare Centre and clinics offer 24-hour emergency care, pharmaceuticals, general care and specialized surgery. The William J. Cadzow Lac La Biche Healthcare Centre was designed to service a population twice the size of Lac La Biche and Lakeland County (MEG 2005) and has 23 active treatment beds and a 41-bed continuing care facility with one respite bed. In May 2007, there were eight individuals in acute beds awaiting placement in the continuing care ward. Long-term care beds are very much needed and plans are underway to address this issue, however, implementation is several years away (Gisland Moerhle, 2007, Pers. Comm.).

The most pressing issue in the ARHA is the low staffing levels and shortage of nurses. Portage College recently developed a diploma program in Practical Nursing, aimed primarily at students who wish to pursue a health services career locally. This initiative may help to address shortages.

In addition to the William J. Cadzow Lac La Biche Health Centre, the Lacalta Lodge provides long-term care and rehabilitation services as well as acts as an outpatient facility for the W.W. Cross Cancer Institute in Edmonton. Health services are also provided by Lac La Biche Community Health Services, which offers a variety of services including home care, mental health, occupational health and seniors programs. Although health service usage levels are below capacity, Lakeland County does have a higher than average injury rate as compared to the rest of the province (MEG 2005).

2.4.5 Protective and Emergency Services

2.4.5.1 Emergency Medical Services

Ambulance service to Conklin and Chard is from Fort McMurray. The local volunteer fire departments will also transport patients and meet an ambulance en route to Fort McMurray but due to the considerable distance, response times are over an hour. Emergency Medical Service calls from Conklin increased from 21 to 25 between 2002 and 2003, while in Chard they declined from 17 to 14 for this same period (RMWB 2004).

In Lac La Biche and Lakeland County emergency transport is provided by Medical Ambulance Services Inc. Lac La Biche currently has 14 EMS staff including one full time paramedic (plus three casual paramedics) and 13 Emergency Medical Technicians (EMTs). The town has four ambulances and Advance Life Support capabilities. Air ambulance is available from the airport in

Lac La Biche with flight tie to Edmonton in 30 minutes. About 70% of call volume is related to emergencies in homes or buildings, while about 30% of the calls are related to motor vehicle accidents (MEG 2005; Floyd House, 2007, Pers. Comm.).

Due to high call volumes to Fort McMurray, ambulance service from Lac La Biche is provided to oil sands projects in the LSA and RSA including the Devon Jackfish Project, Canadian Natural Resource Limited's Kirby Project, Statoilhydro Canada's Kai Kos Dehseh Project and MEG's Christina Lake Regional Project. In 2007, the EMS operator saw an 18% increase in call volumes from these projects over the previous year (Floyd House, 2007, Pers. Comm.). The ambulance from Lac La Biche arranges to meet the company mobile treatment units that respond directly to industrial accidents on Secondary Highway 881 to transport patients to the William J. Cadzow Lac La Biche Healthcare Centre.

The largest challenge facing Emergency Medical Service in Lac La Biche as a result of oil and gas activity is the town's competition with oil and gas companies for staff (Floyd House, 2007, Pers. Comm.). Oil and gas companies will pay EMTs and Emergency Medical Responders (EMRs) $25 to $250 more a day than the town. Paramedics can earn $650 to $1,000 dollars per day working for an oil and gas company. The town pays between $250 and $350 per day. Oil and gas companies will share staff with the town, however Emergency Medical Service staff that work full time for companies are only permitted to work on a casual basis for the town. Forty-five percent of town EMS staff work for oil and gas companies on their days off (Floyd House, 2007, Pers. Comm.). A growing population in Lac La Biche and in the rural area is not anticipated to be an issue as the current fleet and staff is considered sufficient to respond to an influx of up to 8,000 more people to Lac La Biche and area.

2.4.5.2 Fire Protection

Fire protection services in the LSA are delivered by the volunteer fire department in Conklin, with co-ordination and additional support from the Fort McMurray Fire Department. The 911 emergency call centre in Fort McMurray dispatches the local volunteer department. Fire service calls from Conklin and Chard increased from 5 to 14 between 2003 and 2004 (RMWB 2004). The Chard volunteer fire department is currently inactive and the CPDFN reserve, currently in the process of starting up a volunteer fire department, receives support from Conklin (Tom Klein 2007, Pers. Comm.). The Conklin department has 12 volunteers with equipment including a rescue truck, a tanker and a pumper.

Lac La Biche has a volunteer fire department that services the rural areas of Lakeland County in co-operation with four other volunteer fire departments in the county. Lac La Biche's volunteer fire department has 25 trained firefighters while a total of 1,120 volunteers with various skill sets and certifications respond to calls from the six fire districts surrounding Lac La Biche (Austrom Consulting 2007). The town fire department has emergency response equipment, including the Jaws of Life, required to respond to motor vehicle accidents and access to eight pumper trucks, one wildland fire engine (a wildlife fire engine is a truck with a water tank added to the cab and chassis), five water tenders, three rescue units and three command units.

Volunteer fire departments in the LSA and the Fort McMurray Fire Department will not respond to industrial fires on oil sands project sites; companies are therefore responsible for their own fire protection.

2.4.5.3 Policing

The Royal Canadian Mounted Police (RCMP) detachment in Fort McMurray has a rural division that provides policing services to Conklin, Chard and the CPDFN reserve. The division has a patrol cabin in Chard that serves as a base for activities in the area, however, the cabin is not staffed at all times; RCMP members use it on a shift by shift basis (MEG 2005). Community police presence is low in Conklin as RCMP respond only as needed (Wendy Tremblay, 2007, Pers. Comm.). As of 2004, the rural division had one sergeant, two corporals and 12 constables, who focused much of their efforts on the far southern portion of the RMWB (MEG 2005). At that time, most of the calls handled by the rural detachment related to property damage or break and enters. In Chard and on the CPDFN reserve police presence has improved in recent years as the current CPDFN Chief and Council have been working with the RCMP for the benefit of the community (Delores Cardinal, 2007, Pers. Comm.).

Policing services for Lac La Biche and Lakeland County are administered out of the Lac La Biche detachment. In 2005 the detachment had one staff sergeant, two corporals and 13 constables (MEG 2005). In response to high call volumes and case loads the detachment hired an additional five officers and it is expected that staffing needs will continue to increase in the future (Rob Cunningham, 2007, Pers. Comm.). Most calls handled by the detachment are related to liquor-related disturbances including assault and vandalism. About 6,000 calls per year are handled by the detachment, making it one of the busiest in the province. The Lac La Biche RCMP has indicated that they are seldom involved with workers of oil sands projects when their employers have effective workforce management policies (Cpl. Jackson, 2007, Pers. Comm.; MEG 2005).

Both RCMP detachments servicing the LSA offer a variety of public awareness programs on issues ranging from workforce management policies to traffic safety and seat belt use. Some of these programs are offered in collaboration with industry operations (MEG 2005). In Lac La Biche there are also ongoing discussions (between oil and gas companies and police) regarding initiatives to prevent family violence (Rob Cunningham, 2007, Pers. Comm.).

2.4.6 Social Services

Many of Conklin's social services are provided by the community in offices housed in the Nakewin Centre (operated by the Conklin Community Association) including the Conklin Community Resource Centre and the Community Support Office. The Conklin RMWB office and the Métis Employment Service are also residents of the Nakewin Centre and a community health nurse visits once a week to meet the basic health care needs of local residents.

Under the Region 9 Northeast Alberta Child and Family Services Authority (CFSA) Community Support Services 2006 to 2009 Business Plan, strategic priorities include enhancing community capacity in Chard and Conklin. The plan explains; "The provision of services for the people who reside in the smaller communities needs improvement. A priority of the CFSA is to improve access to [services that address family violence and bullying] and to help facilitate the development of accommodation options for the hard to house and the homeless." (CFSA 2006). Access to services to address family violence and bullying is now provided through the Community Support Office which is open 25 hours a week (P Beaudry, 2007, Pers. Comm.). The development of accommodation options in Chard and Conklin is facilitated through the Wood Buffalo Housing and Development Corporation located in Fort McMurray (Section 2.4.2).

The Community Resource Centre offers a wide range of services including referrals for addictions counselling and family services, community programs, advocacy services and events for the people of Conklin, and works closely with the Conklin Community Association and the Conklin Métis Local #193. Programs such as the Senior Enhancement Program (i.e., HomeCare, Meals on Wheels and Monthly Senior's Day) and National Addictions Awareness Week are co-ordinated by the Centre as well as Christmas events, the Terry Fox Run and the Annual Talent Show. Usage levels at the Community Resource Centre are high and the delivery of services depends on volunteers and continual government and industry funding to expand programs and meet the growing needs of the Conklin community (Peggy Beaudry, 2007, Pers. Comm.).

Chard is serviced through the Janvier Community Resources Centre in Chard. This Centre is also part of the Region 9 CFSA. The Centre works closely with the local community association assisting them in the implementation of programs and services such as outreach programs for youth and recreation programs. The community association was the result of a Memorandum of Understanding (MOU) between Chard and the CPDFN, which represents an important step in strengthening the relationship between these two communities.

As with the Resource Centre in Conklin, the Janvier Community Resource Centre provides a wide variety of services to the community including a summer employment program for youth, a mother and child drop-in program, and a women's wellness group. Chard and the CPDFN reserve work collaboratively on drug prevention and drug addiction programs, including an "annual roundup" for all CPDFN members and other local residents to promote a sober lifestyle. Industry has partially funded this event in the past; the vast majority of programs, events and services are delivered as a result of volunteer efforts. Both Chard and CPDFN reserve have drug counselling available from a psychologist that visits once a month and elders provide informal counselling to those that request it.

Child and Family Services in Lac La Biche are provided by the Region 7 North Central Alberta Child and Family Services Authority. This Authority operates a regional office out of Lac La Biche and manages the provision of services to children, families and other community members in the ARHA. Lac La Biche also receives funds from the Provincial Family and Community Support Services (FCSS) program. The FCSS is an 80/20 funding partnership between the Government of Alberta, municipalities and Métis settlements. Through FCSS, communities design and deliver programs that are preventative in nature and enhance well-being for children, seniors and families. Priority setting and resource allocation is the responsibility of the local community.

There is an Alberta Works Contact Centre in Lac La Biche. This centre provides information and referrals for many Provincial programs including income supports, health benefits, child support services, student funding, labour market information and career development and training programs.

The Heart Lake reserve 167 is the site of a sub-office of Tribal Chiefs Child and Family Services, where child protection services are provided to Heart Lake First Nation members. Other social services are Band administered as well, including career development and income assistance programs. Beaver Lake reserve 131 also provides critical social services and a detoxification and treatment facility for drug and alcohol addiction. The Zone 1 Métis Nation of Alberta provides social and career services to members.

Other social services in the study areas (e.g., food banks, supportive counselling, literacy programs) are offered by churches, service clubs and non-profit organizations.

2.4.7 Traffic and Transportation

2.4.7.1 Railways

Athabasca Northern Railway Ltd. provides rail service between Boyle and Fort McMurray, and is routed through both Lac La Biche and Conklin. Current customers include Suncor Energy Inc., Al-Pac, and Syncrude Canada. At Boyle, Athabasca Northern connects to Lakeland & Waterways Railway, which in turn connects with Canadian National Railways in Edmonton (Athabasca Northern Railway 2007, Website). On average, Athabasca Northern transports about 24,000 cars per year between Boyle and Fort McMurray. Most of the rail's cargo is made up of logs (destined for Al-Pac mills), along with coke and sulphur transported south from Fort McMurray. North-bound cargo includes a range of construction materials, primarily destined for oil sands construction projects (B. Grendys, 2007, Pers. Comm.).

2.4.7.2 Airports

Lac La Biche operates an airport on land owned by the town and located in Lakeland County. The airport is serviced by Alberta Central Airways, which runs the only charter service to and from Lac La Biche. The Town of Bonnyville maintains the Bonnyville Regional Airport and services both private and commercial rotary winged and fixed-wing aircraft located on site and serves as a point of call for commercial, corporate and general aviation.

There are also several airstrips in the LSA. These include:

- MEG Airstrip – a gravel airstrip owned and operated by MEG, located 23 km east of Conklin;
- Conklin – a local grass strip;
- Leismer Airstrip - located 12 km north of Conklin;
- Janvier – west of Bohn Lake;
- Cowper – by the fire lookout north of Cowper Lake;
- Grist Lake – at the north end of Grist Lake;
- Kirby – about 10 km southeast of Kirby Lake; and
- Primrose – east of Wiau Lake.

2.4.7.3 Roads

Secondary Highway 881 leads north from Lac La Biche and through Conklin, just west of the Project, providing an alternate route to Highway 63 between Lac La Biche and Fort McMurray.

2.4.7.4 Traffic Levels

Increases in industry-related traffic in the area led to improvements and paving of Secondary Highway 881 north from Lac La Biche and to the junction of Highway 63 in Anzac. Paving was complete in August 2006 and has improved year round access to the LSA. The 2001 to 2005 Annual Average Daily Traffic (AADT) Volume is available for the length of Secondary Highway 881 in the LSA (Table 34).

Table 34 Annual Average Daily Traffic Volume History (2001 to 2005)

	2001	2002	2003	2004	2005	Annual Increase 2001 to 2005
Secondary Highway 881 from Lac La Biche[(a)] to Anzac[(b)]	582	584	591	565	777	7.49%
Secondary Highway 881 from Lac La Biche to Conklin[(c)]	609	611	612	520	587	-0.92%
Secondary Highway 881 from Conklin to Anzac	554	554	567	614	986	15.5%

(a) At the junction of Highway 36 and 55.
(b) At the junction of Highway 63.
(c) At the Major Control Section boundary west of Conklin.

Traffic volumes north of Conklin likely increased between 2004 and 2005 as a result of the Surmont and Long Lake projects. Current traffic volumes are likely higher than 2005 levels as a result of improved conditions due to paving. Secondary Highway 881 is now a viable alternative to Highway 63 to reach Fort McMurray. Shift changes, especially, have created high volume delays on Secondary Highway 881 north of Conklin.

2.4.7.5 Traffic Collisions and Collision Rates

Aggregate traffic collision statistics are available for Secondary Highway 881 in the LSA for 2001 to 2005. Between 2001 and 2005 there were two fatal collisions on Secondary Highway 881; 79 collisions that resulted in injuries and 391 collisions that resulted in property damage only. In total, two people were killed and 122 people were injured in 472 collisions. This level of collision severity is considered to be typical of two-lane undivided highways in the province (Bill Kenny 2007, Pers. Comm.). Both of the fatal collisions were categorized as "run off road," defined by Alberta Infrastructure and Transportation as a single vehicle leaving the road surface and running off the road to one side. This would include rollover and/or striking a fixed object off the road surface (Alberta Office of Traffic Safety, 2007, Pers. Comm.).

The collision rate for Secondary Highway 881 between Lac La Biche and Anzac during the 2001 to 2005 period was 148.95 per 100 million vehicle kilometres, about 15.5% higher than the 2003 to 2005 provincial average of 129 per 100 million vehicle kilometres for comparable highways. This is not considered a significant difference in collision rates (Bill Kenny, 2007, Pers. Comm.) Table 35 summarizes the collision types for Secondary Highway 881 and comparable highways in Alberta. Comparable highways are two-lane undivided highways numbered 500 to 986 in Alberta.

Table 35 Collision Types in the Local Study Area (2001 to 2005)

Collision Type	Secondary Highway 881 From Lac La Biche to Anzac[a]		Comparable Provincial Highways	
	Ranking	Percent of Collisions [%]	Ranking	Percent of Collisions [%]
left turn across path	7 (tie)	0.2	8	0.7
passing on left turn	7 (tie)	0.2	7	1.4
angle	4	2.9	4	3.4
opposite direction	5	1.4	6	1.6
same direction	2	14.6	3	6.5
run off road (two fatal)	1 (tie)	37.9	2	25.3
animal	1 (tie)	37.9	1	58.9
pedestrian	6	0.4	9	0.3
miscellaneous	3	4.2	5	1.9

[a] Some numbers are rounded for presentation purposes.
Source: Alberta Office of Traffic Safety, 2007, Pers. Comm.

There were fewer animal collisions and more run-off-road collisions on Secondary Highway 881 between 2001 and 2005 than on comparable highways in the province. Overall, the types of collisions that occurred on Secondary Highway 881 are not significantly different from the types of collisions that occurred on comparable provincial highways between 2001 and 2005.

2.4.8 Physical Infrastructure

The provision of municipal infrastructure and services such as water and sewage varies among the communities in the LSA.

Conklin has electrical, telephone, natural gas services and a separate water treatment facility that makes potable water available to the community. The RMWB approved an expansion of this facility to meet increased demand in the area and construction is expected to begin in early 2008. Wastewater is collected from individual holding systems in the community and treated at the wastewater sewage lagoon. Conklin residents are competing with industry for septic service; the cost for a septic pump out has more than doubled in the last year as a result of growing demand from oil and gas companies operating in the area (Wendy Tremblay, 2007, Pers. Comm.). Solid waste is disposed of in Conklin's Class 2 landfill. The current level of infrastructure has limited the capacity for housing development in both Conklin and the CPDFN reserve (Jessica Daymond, 2007, Pers. Comm.).

Chard and the CPDFN reserve have access to electricity, telephone and natural gas services. A water treatment facility was constructed in 1997 and pipes potable water to residents in Chard as well as within the reserve. Although this system has met demand, concern has been raised that as additional housing is built on the reserve to meet current demand (e.g., the Janvier Drive development; Section 2.4.2) the system would not have sufficient capacity (MEG 2005).

A small sewage treatment facility is located in Chard and serves residents as well as some homes on the reserve. In 2005 this system was operating at capacity and was in need of repair as the primary treatment process did not appear to be working and raw sewage was being pumped into the lagoon (MEG 2005).

Lac La Biche and Lakeland County have a complete range of municipal infrastructure including electricity, telephone, natural gas, treated water, sewage systems and solid waster collection and disposal.

The community of Plamondon in Lakeland County and various subdivisions around the town of Lac La Biche have been connected to water and sewage lines. The sewage treatment facility has capacity for 7,000 residents and in 2005 served about 3,000 (MEG 2005). The connection of subdivisions and Plamondon to the sewage system has increased the number of users but there is still significant capacity. An expansion to the drinking water treatment plant was completed in August 2004 and can service 8,000 residents in the town. The town's wastewater is pumped to a facility at Field Lake. The initial license issued by Alberta Environment to operate the facility will need to be renewed in 2008. To protect Lac la Biche Lake, the Field Lake lagoon system will have to be replaced or upgraded (Austrom Consulting 2007). A major capital investment will be required for both options and the current rates charged by the town for water and wastewater service will not cover the cost, which is estimated to be between $22 and $50 million (Austrom Consulting 2007). A feasibility study is currently underway.

Lakeland County leases the land for the Beaver Lake Modified Class II Landfill and Lac La Biche acts as operator. Operational costs are shared between the County and the town with Lac La Biche contributing 65% and the County 35%. The Lakeland Regional Waste Management Services Commission was created to secure and develop a site for a regional landfill to replace all six landfills in Lakeland County. Alberta Environment will provide some level of funding for the development of the regional landfill and transfer stations; however, there are some costs that will have to be covered locally (Austrom Consulting 2007).

2.4.8.1 Wood Buffalo Business Case

In 2005, the RMWB submitted a business case to the provincial government to provide a comprehensive overview of what the region had identified as urgent public infrastructure needs. The document was meant to justify provincial funding of $1.2 billion in capital infrastructure projects including water, waste water, road and recreation facilities ($353 million); primary, secondary and post-secondary education facilities ($236 million); highway projects ($500 million); and health facilities and affordable housing ($136 million).

The RIWG has tracked provincial funding that has been allocated to the RMWB since the submission of the business case. As of October 2007, a total of $239 million in provincial funding has been announced for water and waste water treatment; $1.5 billion has been announced for transportation projects with the bulk of that money allocated to the twinning of Highway 63 and just under half announced for the city of Fort McMurray; $6.7 million was announced for Keyano College and $39.9 million was announced for primary and secondary schools; $206.4 million was announced for the Northern Lights Health Region including funding for three new clinics and a helipad; $73 million was announced for affordable housing and $1 million for child care. Funding announcements to date have thus met those required under the 2005 Wood Buffalo Business Case, with the exception of education facilities, where funding fell almost $190 million short of the dollars requested.

2.4.9 Aboriginal Community Investment by Industry

Many of the "host" communities of oil sands projects are Aboriginal communities. As a result many of these companies contribute dollars to support programs and events in Aboriginal communities as a means of strengthening company and community relationships. Since a low of $1.9 million dollars in 2003, contributions have increased to a record high of $3.6 million in 2006 (Table 36). Individual company contributions are kept confidential by RIWG. Please refer to the Social Impact Assessment for a discussion of MEG contributions to communities in the RMWB.

Table 36 Oil Sands Industry Contributions to Wood Buffalo Aboriginal Communities (thousands $)

2001	2002	2003	2004	2005	2006
2600	2500	1900	2500	3500	3600

Source: D. Farkouh, 2007, Pers. Comm.

2.4.10 Recreation

There are a variety of recreational opportunities in the LSA, including hunting, fishing, camping, All-Terrain Vehicle (ATV) use, snowmobiling, hiking, and boating on and near the many lakes in the LSA including Christina Lake, Winefred Lake, Grist Lake and Lac la Biche Lake. Christina Lake, Winefred Lake and Grist Lake all have lodges and are the major recreational destinations closest to the Project. Hunting and fishing also provides employment for local guides and outfitters. An assessment of impacts on resource use (i.e., hunting, trapping, non-consumptive recreation) is included in this Application in Volume 6, Section 3. In Conklin there is the Christina Lake day use area, a public baseball diamond and gymnasium space in the Nekewin Centre.

Lac La Biche owns and operates an arena, a community hall and sport fields located in the town. Lakeland County provides a community facilities co-ordinator who is responsible for planning leisure and cultural services within county boundaries. Within Lakeland County and Lac La Biche there are numerous recreational groups and the county and the town have a history of working together to support these groups with funding for operating facilities or for capital projects. The town and county are working with the Lakeland Interpretive Centre and Regional Leisure Complex Society to develop a facility that will provide interpretive and education programs, community services, social and leisure space, indoor sports and retail services. With high rural residential development throughout the county, there is recognition that the need for recreational opportunities is increasing. In 2003, a Recreation Service Delivery Strategy was completed and the county is developing an “Open Space Master Plan”.

There is ample opportunity for outdoor recreation near Lac La Biche. Activities include camping at Lakeland Provincial Park and Sir Winston Churchill Provincial Park, hiking, fishing, bird watching, cross-country skiing and golf.

2.5 CONCLUSIONS

The following socio-economic variables were selected for discussion in this report:

- demographics including:
  - population; and
  - gender and age;
- components of the economic setting including:
  - key sectors; and
  - labour force characteristics;
- components of the social setting including:
  - local governments;
  - housing;
  - schools and post-secondary institutions;
  - health services;
  - protective and emergency services;
  - social services;
  - Aboriginal community investment by industry; and
  - recreation.

The population of the RSA grew 3.37% a year between 2001 and 2006. The RMWB and Lakeland County are the two fastest growing municipalities in the province. The population of the LSA grew 1.34% a year between 2001 and 2006, indicating that much of the growth is in Lakeland County and in Fort McMurray. There is also a significant shadow population in these areas that fluctuates throughout the year and was estimated at over 20,000 in May 2007. The population in these areas tends to be young but communities are also attracting retirees from larger centres, such as Edmonton and Fort McMurray.

The labour force is engaged mainly in work for or related to resource based industries such as forestry and oil and gas. Approximately 23% of the population of the study areas have attained a trade certificate or diploma. Overall, educational attainment levels are lower in the RSA and LSA than in the province as a whole. Median incomes and average earnings are lowest in communities with lower educational attainment levels. Average earnings are lower overall in the study areas compared to the province as a whole, with the exception of the

RMWB where average earnings were $16,000 (37%) higher. Labour force participation rates are high in this part of Alberta and the unemployment rate is low, except in on-reserve populations. Average rates, however, do not reflect the seasonal nature of work unique to the Wood Buffalo-Cold Lake Economic Region.

Data that was collected on components of the social setting including housing, education, health services, infrastructure and social services highlight many of the key features and issues present in these study areas including; rising housing costs; increasing residential construction and development; responsive post-secondary institutions that deliver training relevant to local needs; the need for and plans for improvements to water and sewage systems; and increased traffic on Secondary Highway 881. At present, several planning mechanisms are in place to address the challenges of a growing population.

3 REFERENCES

Alberta Agriculture Food and Rural Development. 2001a. 2001 Agricultural Profile Lakeland County. Edmonton, AB.

Alberta Agriculture Food and Rural Development. 2001b. 2001 Agricultural Profile North East Region. Edmonton, AB.

AEII (Alberta Employment, Immigration and Industry). 2007a. Alberta Regional Population Outlook 2007-2012. Edmonton, AB.

AEII. 2006. 2006 Annual Alberta Regional Labour Market Review. Edmonton, AB.

AEII. 2007b. Inventory of Major Alberta Projects, November 2007.

Alberta Forest Products Association and Alberta Sustainable Resources Development (ASRD). 2005. Economic Impact of the Alberta Forest Industry. ASRD. Edmonton, AB.

Alberta Learning. 2001. Student Population by Grade, School and Authority 2000/01. Alberta Learning. Edmonton, AB.

Alberta Learning. 2006. Student Population by Grade, School and Authority 2005/06. Alberta Learning. Edmonton, AB.

Alberta Learning. 2007. Student Population by Grade, School and Authority 2006/07. Alberta Learning. Edmonton, AB.

Alberta Municipal Affairs and Housing. 2007a. Alberta Apartment Vacancy and Rental Cost Survey 2007. Edmonton, AB.

Alberta Municipal Affairs and Housing. 2007b. Core Need Income Thresholds 2007. Edmonton, AB.

Austrom Consulting Ltd. 2007. Lac La Biche and Lakeland County Amalgamation Study.

CFSA (Region 9 Northeast Alberta Child and Family Services Authority). 2006. 2006-2009 Business Plan. Fort McMurray, AB.

CMHC (Canadian Mortgage and Housing Corporation). 2007a. Housing Market Outlook Prairie Region Highlights Fourth Quarter 2007. Ottawa, ON.

CMHC. 2007b. Rental Market Report Alberta Highlights Fall 2007. Ottawa, ON.

Emery, J.C. 2006. Alberta's Labour Market Needs to 2015. Institute for Sustainable Energy, Environment and Economy (ISEEE), University of Calgary. Calgary, AB.

INAC (Indian and Northern Affairs Canada). 2008. First Nation Profiles. Ottawa, ON.

Keyano College. 2006. Keyano College Annual Report 2006. Fort McMurray, AB.

Rick Beaupre & Associates Consulting Inc. 2002. Lac La Biche/Lakeland County Municipal Shelter Plan. Prepared for Lac La Biche Regional Community Development Corporation (RCDC) and Lac La Biche & Regional Family & Community Support Services (FCSS).

MEG (MEG Energy Corp.). 2005. Application for Approval of the Christina Lake Regional Project. Volumes 1 TO 5. Submitted to Alberta Environment And Alberta Energy And Utilities Board. Calgary, AB. Submitted August, 2005.

NLSD (Northern Lights School Division #69). 2007a. Area Capacity and Utilization Report. Bonnyville, AB.

Portage College. 2006. 2006 Portage College Annual Report. Lac La Biche, AB.

RMWB (Rural Municipality of Wood Buffalo). 2004. RMWB Fire/EMS Statistical Report 2002/2003/2004.

RMWB. 2006. 2006 Census. Fort McMurray, AB.

Statistics Canada. 2002a. 2001 Census Aboriginal Population Profiles. Released June 17, 2002. Statistics Canada Catalogue no. 93F0043XIE. Ottawa, ON.

Statistics Canada. 2002b. 2001 Community Profiles. Released June 27, 2002. Last modified: 2005-11-30. Statistics Canada Catalogue no. 93F0053XIE. Ottawa, ON.

Statistics Canada. 2007a. 2006 Community Profiles. 2006 Census, released March 13, 2007. Statistics Canada Catalogue no. 92-591-XWE. Ottawa, ON.

Statistics Canada. 2007b. Labour Force Survey. Statistics Canada Catalogue no. 71-001-P1B and CANSIM 287-0055. Last Modified: 2007-01-05. Ottawa, ON.

3.1 PERSONAL COMMUNICATIONS

Alberta Office of Traffic Safety. 2007. Email and telephone communications with Bethany Beale (Golder) on December 14 and 17, 2007.

Beaudry, Peggy (Conklin Community Resources Centre). 2007. Telephone communication with Bethany Beale (Golder) on November 23, 2007.

Cardinal, Delores (Community Resource Worker, Janvier Community Resource Centre). Telephone communication with Bethany Beale (Golder) on December 20, 2007.

Chernipeski, Randy (Principal of Father R. Perin School). 2007. Telephone communication with Santiago Olmos (Golder) on November 27, 2007.

Cunningham, Rob (Lac La Biche RCMP Detachment). 2007. Telephone communication with Santiago Olmos (Golder) on November 28, 2007.

Daymond, Jessica (Wood Buffalo Housing and Development Corporation. 2007. Telephone communication with Bethany Beale (Golder) on November 22, 2007.

Eddy, Paul (Principal of Anzac Community School). 2007. Telephone communication with Santiago Olmos (Golder) on November 28, 2007.

Farkouh, Dianne (Athabasca Regional Issues Working Group). 2007. Email and telephone communications with Bethany Beale (Golder) on November 21 and 23, 2007.

Flynn, Tracy (Christina Lake Lodge). 2007. Fax communication with Bethany Beale (Golder) on November 15, 2007.

Gladieu, Elvina (Administrator at Amisk Community School). 2007. Telephone communication with Santiago Olmos (Golder) on November 23, 2007.

Grendys, Brent (General Manager, Athabasca Northern Railway Ltd.). 2007. Telephone communication with Bethany Beale (Golder) on June 19, 2007.

House, Floyd (EMS Operator). 2007. Telephone communication with Bethany Beale (Golder) on July 11, 2007 and December 19, 2007.

Hum, Gordon (Principal of Chipewyan Prairie Dene High School). 2007. Telephone communication with Santiago Olmos (Golder) on November 27, 2007.

Jackson, Cpl. (Lac La Biche RCMP). 2007. Telephone communication with Linda Havers (Golder) on April 11, 2007.

Kenny, Bill (Geometrics Standards Specialist, Alberta Infrastructure and Transportation). 2007. Telephone communication with Bethany Beale (Golder) on December 18, 2007.

Klein, Tom (Rural Coordinator, Fort McMurray Fire Department). 2007. Telephone communication with Bethany Beale on December 19, 2007.

Malo, Aurele (Principal of J.A. Williams High School). 2007. Telephone communication with Santiago Olmos (Golder) on November 22, 2007.

Moehrle, Gisland (William J. Cadzoe Health Centre, Lac La Biche). 2007. Personal communication with Bethany Beale (Golder) on July 17, 2007.

Palmer, Jane (Lac La Biche and Lakeland County Economic Development). 2007. Telephone Communication with Bethany Beale (Golder) on November 21, 2007.

Tremblay, Wendy (RMWB office, Conklin). 2007. Telephone communication with Bethany Beale (Golder) on November 20, 2007.

Wahl, Kevin (Dean, Community and Industry Training Initiative, Portage College). 2007. Email communication with Santiago Olmos (Golder) on December 7, 2007.

Walsh, Ernest (Principal of Conklin Community School). 2007. Telephone communication with Santiago Olmos (Golder) on November 26, 2007.

3.2 INTERNET SOURCES

Alberta Forest Products Association. 2007. Fact Sheets and Brochures. Available at http://www.albertaforestproducts.ca/resources/factsheets_brochures.aspx. Accessed December 2007.

AlbertaFirst. 2007. Community Profile of Regional Municipality of Wood Buffalo. Available at http://www.albertafirst.com/profiles/statspack/20699.html. Accessed December 2007.

ASRD (Alberta Sustainable Resource Development). 2007. Managing Our Forests. Available at http://www.srd.alberta.ca/forests/managing/default.aspx. Accessed December 2007.

Athabasca Northern Railway Ltd. 2007. Athabasca Northern Railway Ltd. Available at http://anyrr.com/index.php. Accessed December 2007.

Lac La Biche Regional Community Development Corporation. 2007. Building Permits. Available at: http://www.laclabicheregion.ab.ca/index.php?id=84. Accessed December 2007.

NLSD (Northern Lights School District). 2007b. Northern Lights School and Office Directory and Web Pages. Available at http://www.nlsd.ab.ca/Pages/schoolweb.html. Accessed December 2007.

APPENDIX 6-IV

VISUAL LANDSCAPE RATING

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1 VISUAL LANDSCAPE RATING

To rate the Existing and Approved Case (EAC) landscape, five key viewpoints were identified. Detailed ratings of scenic quality and user sensitivity for each viewpoint are shown in Tables 1 through 12. The ratings are based on modelled views of the EAC landscape and photos taken during the spring 2007 field program. These photos can be found in Appendix 6-V.

Table 1 Scenic Quality Ratings (Viewpoint 1 Secondary Highway 881)

Scenic Element	Rating Categories			Rating	Rationale
	High	Medium	Low		
landform	5	3	1	1	low, subdued topography with few interesting features
vegetation	5	3	1	3	some variety of vegetation, but limited to a few types
water	5	3	0	0	water is present, but not noticeable
colour	5	3	1	2	slight variation of hues, but not a dominant scenic element
adjacent scenery	5	3	0	0	adjacent scenery is not visible
scarcity	5	3	1	1	scenery is fairly common to the region
cultural modifications	2	0	-4	-1	some discordant cultural modifications (e.g., clearings and smaller facilities)
Total				**6**	
score[(a)]				low	

[(a)] Low = 0 to 11, moderate= 12 to 18, high = 19 or higher (USDI 1986).

Table 2 Scenic Quality Ratings (Viewpoint 2 Jackfish River Bridge)

Scenic Element	Rating Categories			Rating	Rationale
	High	Medium	Low		
landform	5	3	1	1	low, subdued topography with few interesting features
vegetation	5	3	1	3	some variety of vegetation, but limited to a few types
water	5	3	0	4	open water is dominant landscape feature
colour	5	3	1	2	slight variation of hues, but not a dominant scenic element
adjacent scenery	5	3	0	0	adjacent scenery is not visible
scarcity	5	3	1	1	scenery is fairly common to the region
cultural modifications	2	0	-4	-1	some discordant cultural modifications (e.g., roads and buildings)
Total				**10**	
score[(a)]				low	

[(a)] Low = 0 to 11, moderate= 12 to 18, high = 19 or higher (USDI 1986).

Table 3 Scenic Quality Ratings (Viewpoint 3 Wassassi Day Use Area)

Scenic Element	Rating Categories			Rating	Rationale
	High	Medium	Low		
landform	5	3	1	1	low, subdued topography with few interesting features
vegetation	5	3	1	3	some variety of vegetation, but limited to a few types
water	5	3	0	4	open water is dominant landscape feature
colour	5	3	1	2	slight variation of hues, but not a dominant scenic element
adjacent scenery	5	3	0	0	adjacent scenery is not visible
scarcity	5	3	1	1	scenery is fairly common to the region
cultural modifications	2	0	-4	-1	some discordant cultural modifications (e.g., roads and buildings)
Total				**10**	
score[(a)]				low	

[(a)] Low = 0 to 11, moderate= 12 to 18, high = 19 or higher (USDI 1986).

Table 4 Scenic Quality Ratings (Viewpoint 4 Christina Lake)

Scenic Element	Rating Categories			Rating	Rationale
	High	Medium	Low		
landform	5	3	1	1	low, subdued topography with few interesting features
vegetation	5	3	1	3	some variety of vegetation, but limited to a few types
water	5	3	0	4	open water is dominant landscape feature
colour	5	3	1	2	slight variation of hues, but not a dominant scenic element
adjacent scenery	5	3	0	0	adjacent scenery is not visible
scarcity	5	3	1	1	scenery is fairly common to the region
cultural modifications	2	0	-4	0	no or few cultural modifications (e.g., cabin sites)
Total				**11**	
score[(a)]				low	

[(a)] Low = 0 to 11, moderate= 12 to 18, high = 19 or higher (USDI 1986).

Table 5 Scenic Quality Ratings (Viewpoint 5 Winefred Lake)

Scenic Element	Rating Categories			Rating	Rationale
	High	Medium	Low		
landform	5	3	1	1	low, subdued topography with few interesting features
vegetation	5	3	1	3	some variety of vegetation, but limited to a few types
water	5	3	0	4	open water is dominant landscape feature
colour	5	3	1	2	slight variation of hues, but not a dominant scenic element
adjacent scenery	5	3	0	0	adjacent scenery is not visible
scarcity	5	3	1	1	scenery is fairly common to the region
cultural modifications	2	0	-4	0	no or few cultural modifications (e.g., cabin sites)
Total				**11**	
score[(a)]				low	

[(a)] Low = 0 to 11, moderate= 12 to 18, high = 19 or higher (USDI 1986).

Table 6 Scenic Quality Ratings (Viewpoint 6 Bohn Lake)

Scenic Element	Rating Categories			Rating	Rationale
	High	Medium	Low		
landform	5	3	1	1	low, subdued topography with few interesting features
vegetation	5	3	1	3	some variety of vegetation, but limited to a few types
water	5	3	0	4	open water is dominant landscape feature
colour	5	3	1	2	slight variation of hues, but not a dominant scenic element
adjacent scenery	5	3	0	0	adjacent scenery is not visible
scarcity	5	3	1	1	scenery is fairly common to the region
cultural modifications	2	0	-4	0	no or few cultural modifications (e.g., cabin sites)
Total				**11**	
score[a]				low	

[a] Low = 0 to 11, moderate= 12 to 18, high = 19 or higher (USDI 1986).

Table 7 Sensitivity Ratings (Viewpoint 1 Secondary Highway 881)

Sensitivity Element	Rating	Rationale
type of user	medium	road is used by both aboriginal and recreational users who tend to have higher sensitivity to aesthetics and workers from local oil sands operations who likely have lower sensitivity to aesthetics
amount of use	medium	one major road (Secondary Highway 881) with relatively high traffic, no major recreation areas
public interest	low	aesthetics has not been an issue of major concern in initial stages
adjacent land uses	low	adjacent land has similar characteristics
special areas	low	the Regional Study Area contains a provincial Environmentally Significant Area (Winefred/Grist Watershed), but management considerations do not refer to visual aesthetics
Overall Sensitivity	low	

Table 8 Sensitivity Ratings (Viewpoint 2 Jackfish River Bridge)

Sensitivity Element	Rating	Rationale
type of user	high	recreational and aboriginal users tend to have higher sensitivity to aesthetics
amount of use	medium	close to Conklin, recreation areas and facilities are present
public interest	low	aesthetics has not been an issue of major concern in initial stages
adjacent land uses	low	adjacent land has similar characteristics
special areas	medium	aesthetics has been identified as an issue in the Christina Lake Management Plan the Regional Study Area contains a provincial Environmentally Significant Area (Winefred/Grist Watershed), but management considerations do not refer to visual aesthetics
Overall Sensitivity	medium	

Table 9 Sensitivity Ratings (Viewpoint 3 Wassassi Day Use Area)

Sensitivity Element	Rating	Rationale
type of user	high	recreational and aboriginal users tend to have higher sensitivity to aesthetics
amount of use	medium	close to Conklin, recreation areas and facilities are present
public interest	low	aesthetics has not been an issue of major concern in initial stages
adjacent land uses	low	adjacent land has similar characteristics
special areas	medium	aesthetics has been identified as an issue in the Christina Lake Management Plan the Regional Study Area contains a provincial Environmentally Significant Area (Winefred/Grist Watershed), but management considerations do not refer to visual aesthetics
Overall Sensitivity	medium	

Table 10 Sensitivity Ratings (Viewpoint 4 Christina Lake)

Sensitivity Element	Rating	Rationale
type of user	high	recreational and aboriginal users tend to have higher sensitivity to aesthetics
amount of use	low	no major roads, no major recreation areas, relatively few users
public interest	low	aesthetics has not been an issue of major concern in initial stages
adjacent land uses	low	adjacent land has similar characteristics
special areas	medium	aesthetics has been identified as an issue in the Christina Lake Management Plan the Regional Study Area contains a provincial Environmentally Significant Area (Winefred/Grist Watershed), but management considerations do not refer to visual aesthetics
Overall Sensitivity	low	

Table 11 Sensitivity Ratings (Viewpoint 5 Winefred Lake)

Sensitivity Element	Rating	Rationale
type of user	high	recreational and aboriginal users tend to have higher sensitivity to aesthetics
amount of use	low	no major roads, no major recreation areas, relatively few users
public interest	medium	concerns about aesthetics have been expressed by local groups in initial stages
adjacent land uses	low	adjacent land has similar characteristics
special areas	low	the Regional Study Area contains a provincial Environmentally Significant Area (Winefred/Grist Watershed), but management considerations do not refer to visual aesthetics
Overall Sensitivity	low	

Table 12 Sensitivity Ratings (Viewpoint 6 Bohn Lake)

Sensitivity Element	Rating	Rationale
type of user	high	recreational and aboriginal users tend to have higher sensitivity to aesthetics
amount of use	low	no major roads, no major recreation areas, relatively few users
public interest	low	aesthetics has not been an issue of major concern in initial stages
adjacent land uses	low	adjacent land has similar characteristics
special areas	low	the Regional Study Area contains a provincial Environmentally Significant Area (Winefred/Grist Watershed), but management considerations do not refer to visual aesthetics
Overall Sensitivity	low	

2 REFERENCES

USDI. (United States Department of the Interior, Bureau of Land Management). 1986. Visual Resource Inventory. BLM Manual Handbook H-8410-1, Rel. 8-28. Washington, DC.

APPENDIX 6-V

EXISTING VISUAL CONDITIONS

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The photos shown in this Appendix were taken during the spring 2007 field program. Photos could not be obtained for all modelled viewpoints. Landscape modelling was conducted based on available photos for Viewpoints 1 and 2 (Figure 1 and 2). For Viewpoints 3 to 6, the modelling was based on photos taken in the area that generally resemble the conditions at these viewpoints. The Christina Lake Existing Conditions Photo (Figure 3) is an example of these photos. The viewpoints and corresponding photos are summarized in Table 1.

The Christina Lake Existing Conditions Photo was taken at the same location as the VP-2 Jackfish River Bridge Existing Conditions Photo, however, looking over the lake towards the south shore.

Table 1 Viewpoints and Corresponding Photos

Viewpoint	Description	Corresponding Photo
VP-1 Secondary Highway 881	eastbound about 12 km north of Conklin	VP-1 Secondary Highway 881 Existing Conditions Photo (Figure 1)
VP-2 Jackfish River Bridge	bridge over the Jackfish River inlet in Conklin	VP-2 Jackfish River Bridge Existing Conditions Photo (Figure 2)
VP-3 Wassassi Day Use Area	day use recreation area south of Conklin	none, general characteristics of the viewpoint correspond to Christina Lake Existing Conditions Photo (Figure 3)
VP-4 Christina Lake	on the lake, about 4 km from east end	none, general characteristics of the viewpoint correspond to Christina Lake Existing Conditions Photo (Figure 3)
VP-5 Winefred Lake	on the lake, about 1 km from north shore	none, general characteristics of the viewpoint correspond to Christina Lake Existing Conditions Photo (Figure 3)
VP-6 Bohn Lake	on the lake, about 1 km from south end	none, general characteristics of the viewpoint correspond to Christina Lake Existing Conditions Photo (Figure 3)

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N

Facing East

PROJECT

CHRISTINA LAKE REGIONAL PROJECT - PHASE 3

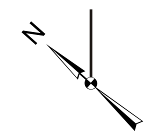
TITLE

VIEWPOINT - 1 HIGHWAY 881
EXISTING CONDITIONS PHOTO

MEG Energy Corp.

PROJECT	07 - 1346 - 0009		FILE No. VP-1 Photo
DESIGN	PT	15/05/07	SCALE N/A REV. 0
COREL	PT	31/08/07	**FIGURE: 1**
CHECK	PT	26/02/08	
REVIEW	IG	26/02/08	

R:\Active_2007\1346\07-1346-0009 MEG Christina Lake Regional Expansion\8900 Visual Resources\MapsFigures\Photos\ExistingConditions\Fig_2.cdr



Facing Northeast

PROJECT

CHRISTINA LAKE REGIONAL PROJECT - PHASE 3

TITLE

VIEWPOINT - 2 JACKFISH RIVER BRIDGE
EXISTING CONDITIONS PHOTO

MEG Energy Corp.

PROJECT		07 - 1346 - 0009	FILE No. VP-2 Photo	
DESIGN	PT	15/05/07	SCALE N/A	REV. 0
COREL	PT	31/08/07	**FIGURE: 2**	
CHECK	PT	26/02/08		
REVIEW	IG	26/02/08		

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N
Facing South

PROJECT

CHRISTINA LAKE REGIONAL PROJECT - PHASE 3

TITLE

CHRISTINA LAKE
EXISTING CONDITIONS PHOTO

MEG Energy Corp.

PROJECT	07 - 1346 - 0009		FILE No. Christina Lake Photo	
DESIGN	PT	15/05/07	SCALE N/A	REV. 0
COREL	PT	31/08/07	**FIGURE: 3**	
CHECK	PT	26/02/08		
REVIEW	IG	26/02/08		