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FIGURES

13 LAND AND RESOURCE USE

13.1 Introduction

North American's oil sands leases are located in the northern part of Lakeland County and the southern extremity of the Regional Municipality of Wood Buffalo (RMWB). Other land and resource uses occur on or near the Project lands. Construction and operation of the Project may result in a change to the accessibility and availability of the land and resource uses in the area. Changes may include a reduction or increase in access, a change to timing of other land and resource use, and an increase in the population using the resources and other effects.

13.2 Objective

The objectives of the land and resource use baseline and impact assessment are to:

- Identify current land and resource uses in the Project area;
- Identify regulatory conditions and policy governing the various land and resource uses;
- Identify trends in use; and
- Determine impact to land and resource uses resulting from the Project and from the potential cumulative development case.

The baseline condition and impact assessment of the land and resource uses are assessed in the land and resource use local study area (LSA) and regional study area (RSA) and are deemed to be specific to each land and resource use.

13.3 Issues and Indicators of Impact

The issues and indicators considered in the land and resource use baseline and impact assessments are derived from the Terms of Reference (TOR), Section 4.10 (AENV, 2007), the concerns identified during public consultation, and the indicators identified in other land and resource use environmental impact assessment (EIA) investigations.

The issues that have been raised include:

- Management planning for aggregate resources;
- Management planning for forest harvest;
- Increased access to formerly remote areas which may impact berry picking and other traditional uses;
- Impact to hunting, trapping and fishing due to habitat disturbance or constraint, or increased access; and
- Impact to non-consumptive recreation from increased population in the region.

The indicators of land and resource use included in this report are:

- Land use zoning and planning;
- Environmentally important areas;
- Access;
- Subsurface resources including oil sands, conventional oil and gas, and mineral resources;
- Aggregate and sand resources;
- Agriculture; and
- Recreation.

Effects of the Project activities and mitigative measures were evaluated for these key indicators. Any residual impact remaining following mitigation was rated using the effects criteria as described in Volume 2, Section 1.

Other indicators of land and resource use in the area include:

- Forestry;
- Berry picking;
- Hunting;
- Trapping;
- Fishing; and
- Outfitting.

These indicators are all closely linked with other, larger sections of the EIA and will be discussed in both baseline and impact assessments in those sections. The Traditional Ecological Knowledge and Traditional Use sections encompass some of the land and resource uses and issues and are discussed in Volume 5, Section 16. Forestry and berry picking are innately linked to vegetation and are covered in Volume 4, Section 10. Hunting, trapping and outfitting are linked to wildlife and are covered in Volume 4, Section 11. Fishing is included in Volume 3, Section 8. Formal recreational facilities found in each community are discussed in the Socio-Economic Impact Assessment in Volume 5, Section 14. This report includes the less formal outdoor recreation pursuits.

13.4 Study Areas

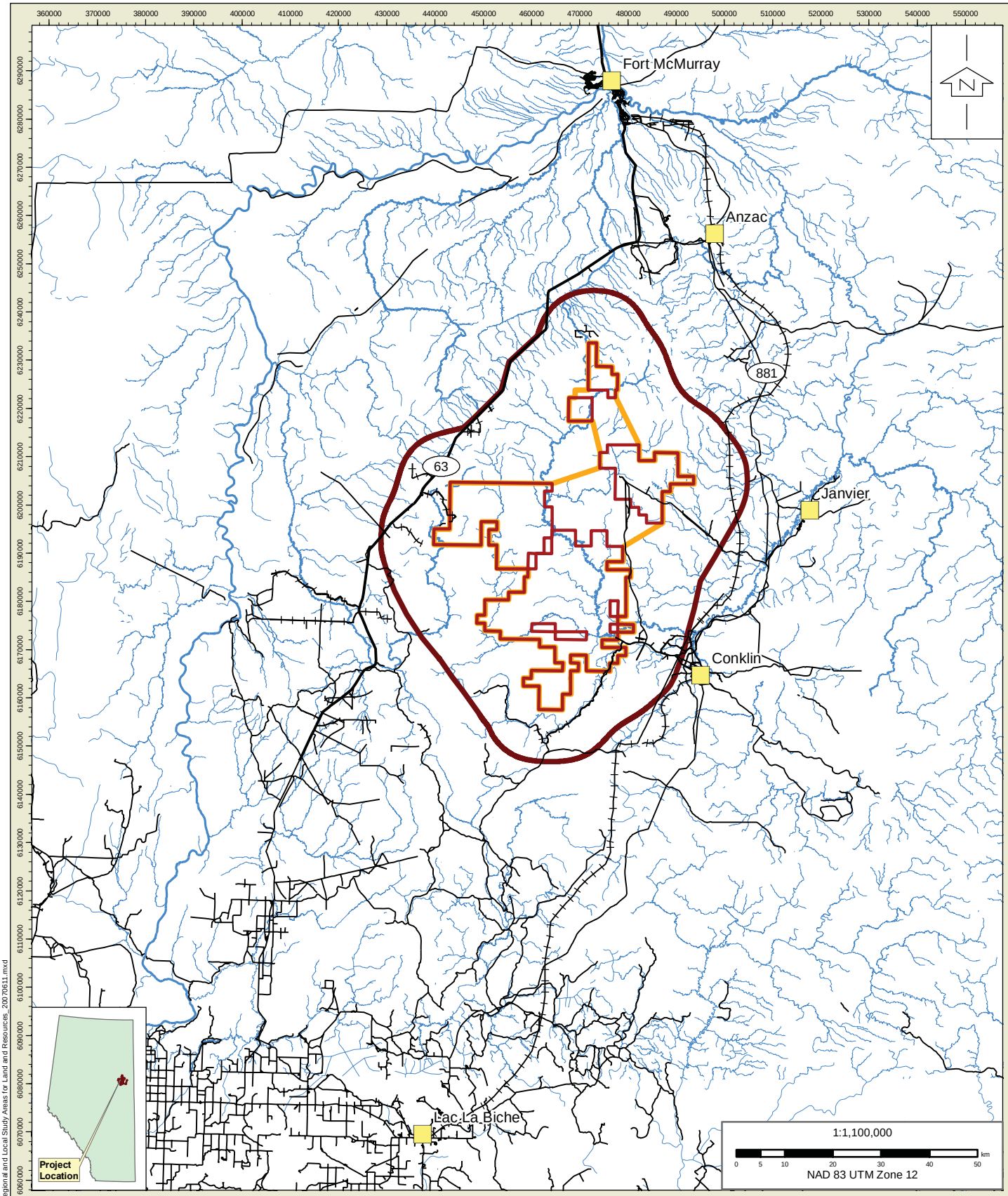
13.4.1 Spatial Boundaries

The LSA has been designated for the indicators and issues identified for land and resource use based on the potential for direct interference. The LSA is the same as the Terrestrial LSA, which is determined from the lease lands of the Project. The RSA boundaries were designated at a distance of 11 km from the LSA boundaries, similar to the Terrestrial RSA boundaries. In some

cases, such as aggregate resources, information is presented for an area greater than the RSA, such as the RMWB or Lakeland County. Figure 13.4-1 shows the LSA and RSA boundaries.

13.4.2 Temporal Boundaries

The temporal boundary is set by the life span of the Project, which is estimated to be 42 years, between 2008 and 2050. The 42 year time frame includes the construction, continued drilling and operation phases of the Project. Closure and reclamation will follow to 2053. Construction is estimated to commence in 2008 and be ongoing continuously through approximately 2018 when the Thornbury Expansion and Northwest Leismer are constructed. A further construction project is anticipated at South Leismer in the late 2020s. Operations hiring will begin in 2009, and operations and construction will occur simultaneously for approximately ten years. Drilling will occur throughout the life of the Project. Reclamation of pads will be ongoing throughout the Project as appropriate and will also follow closure of the plant facilities. The construction and operation phases will have the potential for greatest impact on land and resource uses in the LSA and RSA.



Legend

- RSA
- LSA
- Leases
- Lake
- River
- Road
- Trail
- Town

Title:

REGIONAL AND LOCAL STUDY AREAS FOR LAND AND RESOURCE USE

North American Oil Sands Corporation

Approved:	Revision Date:
BM^{c}N	June 11, 2007

File: Regional and Local Study Areas for Land and Resources_20070611.mxd

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13.5 Methods

The scope of the land and resource use assessment incorporated the TOR (AENV, 2007) within a framework that included collection of baseline land and resource use information, assessment of the potential for the Project to impact identified land uses, and mitigation proposals for potential impacts.

Land and resource use was identified from various sources, including the data already collected and presented in EIAs submitted for other projects in the area. The information from other EIAs has been updated and augmented from a variety of sources. The information sources used for land and resource use include the following:

- Personal communication and discussions with selected local land and resource users;
- Review of Nexen Inc. and OPTI Canada Inc. Long Lake South EIA (2006) and Long Lake Phase I EIA (OPTI, 2000);
- Review of EIAs submitted for other projects in the region (e.g., Gulf Canada Resources [ConocoPhillips], 2001; Petro-Canada, 2001; Devon Canada Corporation, 2003; MEG, 2005a, 2005b);
- Review of published material of land and resource use activities;
- Review of reports posted on various websites from government and non-government organizations;
- Review of Land Status Automated System (LSAS) information, a database operated by Crown Resources Data and Services (Alberta Sustainable Resource Development [ASRD]);
- Review of the industry and government management plans relevant to the Project area; and
- Information provided by other Project EIA component leads following field investigation.

The information obtained provides a description of specified land and resource uses within the study areas. Quantitative information was used when available. No formal surveys of land and resource users were conducted as part of this study.

13.6 Existing Conditions

13.6.1 Land and Resource Uses in the Study Areas

Land and resource uses include both renewable and non-renewable resources (Table 13.6-1). Industrial use of non-renewable resources has also resulted in an increase in, or change to, the use of renewable resources as there are more people using resources and there is greater access to previously isolated areas. Tourist activities in the land and resource use RSA are rooted in recreational activities such as hunting, fishing, and wildlife viewing. More information on these topics is presented in section 13.7 of the land and resource use section.

Table 13.6-1 Land and Resource Use in the LSA and RSA

Renewable Resources	Non-renewable Resources
Forestry	Oil sands mining and in-situ operations
Hunting (commercial, sport and traditional)	Conventional oil and gas
Recreation (e.g., tourism, camping, off-road vehicle use, snowmobiling, birding)	Aggregate and sand mining operations
	Other mineral operations
Trapping	
Fishing (commercial and sport)	
Berry picking	
Agriculture	

As stated in section 13.3, forestry, hunting, trapping, fishing, berry picking and traditional ecological knowledge and traditional use are discussed in other sections of this EIA.

13.6.2 Land Use Zoning and Planning

The Project is located on Crown lands in the area of the province known as the green area, which is an area of publicly administered land. The Project is situated in both Lakeland County and the RMWB. The Project does not fall within the lands identified under the integrated resource plan for oil sands development.

The land and resource use planning for the forested zone, where the Project leases and LSA are located, is accomplished through a number of public organizations. The LSA is located on public lands administered through ASRD and governed by the *Public Lands Act*. ASRD administers forest, reclamation and hunting management on public lands, as well as leasing of surface land uses.

The Project also falls within the Municipal Development Plan for the RMWB (RMWB, 2000), the Municipal Development Plan for Lakeland County (Lakeland County, 2007), and the Regional Sustainable Development Strategy (RSDS) developed by AENV (2000). According to AENV, the RSDS "provides a framework and process for addressing the area's growing number of environmental issues, and for ensuring development is environmentally sustainable" (AENV, 2006). Development of subsurface minerals is governed by Alberta Energy, and administered through the Alberta Energy and Utilities Board (EUB). Together, the legislation, guidelines and planning documents of these and other government bodies provide the land and resource use planning framework for the Project lands. Some of the other government departments involved include Alberta Tourism, Parks, Recreation and Culture (ATPRC) and Alberta Infrastructure and Transportation (roads and access). The RMWB provides land and resource use planning for the urban areas including Fort McMurray, Anzac, Conklin and Janvier. The main resource-related departments, legislation and planning documents are summarized in Table 13.6-2; however, this table is not exhaustive.

Table 13.6-2 Summary of Major Public Planning and Resource Management Policies and Legislation for the Land and Resource Use LSA and RSA

Regulating Agency	Land and Resource Use Legislation, Policy, Plan or Administration	Major Focus in the Land and Resource Use Study Areas
Sustainable Resource Development	*Public Lands Act*	Governs all surface land uses of publicly held land. Includes agricultural and grazing uses.
	Forests Act *Forest and Prairie Protection Act* *Forest Reserves Act*	Governs the forest management agreements setting out allowable harvest. Allows for forest recreation areas. Regulates fire control, prevention and education on all public lands. Provides process for acquiring land to maintain a forest reserve.
	Surface Rights Act	Provides for arbitration in surface access disputes.
	Wildlife Act	Governs the issuance of hunting and trapping licenses and conservation.
	Fisheries (Alberta) Act	Governs the licensing of fishing in Alberta, and the marketing of fish.
Alberta Energy	*Mines and Minerals Act* Energy and Utilities Board Administration	Includes the administration of development and conservation of natural resources on public lands, including oil, natural gas, oil sands, minerals (including sand and gravel) and electricity.
Alberta Energy	*Oil Sands Conservation Act* and *Oil and Gas Conservation Act*	These Acts establish a regulatory regime and scheme of approvals administered by the EUB for the development of oil and gas resources and oil sands resources and related facilities in Alberta (Alberta Energy, 2007).
Alberta Environment	*Environmental Protection and Enhancement Act*	The Act ensures that "the use of resources and the environment today does not impair prospects for their use by future generations" (Government of Alberta, 2007).
Alberta Environment	*Water Act*	This Act focuses on managing and protecting Alberta's water and on streamlining administrative processes (Alberta Environment, 2006).
Lakeland County	*Municipal Government Act*	Municipal Development Plan sets out resource management goals and environmental objectives. Does not override the various provincial acts and departments that govern Crown land in Lakeland County, so does not govern the Project lands. The Project will comply with municipal development permitting for buildings.
Regional Municipality of Wood Buffalo	*Municipal Government Act*	Municipal Development Plan sets out resource management goals and environmental objectives. Does not override the various provincial acts and departments that govern Crown land in the RMWB, so does not govern the Project lands. The Project will comply with municipal development permitting for buildings.

Some of the Project lands within the LSA fall into the Provincial Woodland Caribou Conservation Strategy and key ungulate winter range areas. Additionally, the principles of integrated resource planning are applicable to areas of multiple resource development whether an IRP is in place or not, and the opportunity to harmonize access, forest harvesting, aggregate development, and all other uses exists and is being practiced throughout the RSA.

The communities along Highway 881 are undertaking a planning review process. The RMWB has held focus groups and workshops to determine opportunities for development in Anzac, Janvier and Conklin (Armin A. Preiksaitis & Associates Ltd., 2005; 2006). The potential for

commercial development along Highway 881 is being explored by the RMWB in the Area Structure Planning process.

13.6.3 Environmentally Important Areas

Environmentally important areas are places that have been designated or protected for their special environmental features. Some areas are legally protected (e.g., Provincial Parks), while others are not (e.g., Environmentally Significant Areas). Environmentally important areas within the LSA and RSA are described within this report and are shown on Figure 13.6-1 and include:

- Areas designated as Environmentally Significant Areas (ESAs);
- Areas protected under legislation; and
- Areas designated as Historical Sites.

13.6.3.1 Environmentally Significant Areas

ESAs are areas that contain unique or representative landforms, rare or endangered vegetation, or important wildlife habitat. ESAs often contribute to biodiversity as they represent a unique combination of landscape features, vegetation communities, habitats, species populations and genetic resources that are uncommon in the region. In Alberta, ESAs are identified based on the following criteria (Sweetgrass Consultants, 1997):

- Areas that provide an important linking function and permit the movement of wildlife over considerable distances, including migration corridors and migratory stopover points;
- Areas that perform a vital environmental, ecological or hydrological function such as aquifer recharge;
- Areas that contain rare or unique geological or physiographic features;
- Areas that contain significant, rare or endangered plant or animal species;
- Areas that are unique habitats with limited representation in the region or are a small remnant of once large habitats which have virtually disappeared;
- Areas that contain unusual diversity of plant and/or animal communities due to a variety of geomorphological feature and microclimatic effects;
- Areas that contain large and relatively undisturbed habitats and provide sheltered habitat for species which are intolerant to human disturbance;
- Areas that are excellent representatives of one or more ecosystems or landscapes that characterize a natural region;
- Areas with intrinsic appeal due to widespread community interest or the presence of highly valued features or species such as game species or sport fish; and
- Areas with lengthy histories of scientific research.

ESAs are not protected by legislation.

A list of ESAs has been compiled from a database provided by ATPRC (ATPRC, 2007) and was based on work completed by Sweetgrass Consultants Ltd. (1997). There is one ESA in the LSA (Egg Lake – Algar Lake Diversity Area), and an additional ESA in the RSA (Crow Lake Diversity Area), which are shown on Figure 13.6-1 and are summarized in Table 13.6-3.

Table 13.6-3 ESAs in the Land and Resource Use LSA

Name	Location	Significance	Features
Egg Lake – Algar Lake Diversity Area	Twp. 78-83 Rge. 7-13 W4M	Provincial	- One of the most diverse and relatively intact boreal forest landscapes in Alberta - Significant patterned fen - Important caribou habitat - High vegetation diversity
Crow Lake Diversity Area	Twp. 79 Rge. 13 W4M	Provincial	- Excellent representation of central mixedwood - Includes an ecological reserve - Rare vegetation species - High vegetation diversity - High landform diversity

13.6.3.2 Protected Areas

There are different types of areas that can be protected by legislation within Alberta (ATPRC, 2006) and are regulated under the *Wilderness Areas, Ecological Reserves, Natural Areas and Heritage Rangelands Act* and the *Provincial Parks Act*. Additionally, areas may be protected through agreement between land and resource users. The land classifications that identify protected areas are summarized in Table 13.6-4.

Table 13.6-4 Alberta Land Classification Descriptions

Ecological Reserves	Ecological reserves are samples of functioning ecosystems protected for scientific research, education and heritage appreciation. Road access and facilities are not developed in Ecological Reserves.
Wildland Parks	Wildland Parks encompass large areas of natural landscape where human developments and interference with natural processes are minimized. Wildland Parks accommodate a wider range of outdoor recreation pursuits than Wilderness Areas, including hunting, fishing and the use of horses.
Provincial Parks	Provincial parks are provincially significant natural and historical landscapes and features. A range of facilities along with interpretive and educational programs enhance opportunities for visitors to explore, understand, appreciate and respect the natural environment.
Wilderness Areas	Wilderness areas are large areas that retain their primeval character, unaffected by human influences. Visitors travel on foot to experience solitude and personal interaction with nature
Natural Areas	Natural Areas protect special and sensitive natural landscapes of local and regional significance while providing opportunities for education, nature appreciation and low intensity recreation. Facilities are limited to staging areas, trails and signs.
Recreation Areas	Recreation areas cater to a wide range of intensive recreation pursuits in natural, modified or man-made settings. Most Recreation Areas have little or no preservation value due to the levels of facility development, intensity of visitor use and frequently small size.
Heritage Rangelands	Heritage Rangelands preserve and protect natural features that are representative of Alberta's prairies. Grazing is used to maintain the grassland ecology.

The ATPRC website was searched for protected areas within the RSA (ATPRC, 2007) and the results are summarized in Table 13.6-5. Figure 13.6-1 shows the location of the protected areas in the RSA.

Table 13.6-5 Protected Areas in the Land and Resource Use RSA

Name	Location	Features
Stony Mountain Wildland Park	Twp 82-84, Rge 8-9 W4M	- Preserves excellent examples of patterned and non-patterned fens - Caribou herd range - Six provincially rare plants identified in the vicinity of Maqua Lake - Special Places 2000 candidate site (ATPRC, 2007)
Crow Lake Provincial Park	Twp 78-79, Rge 14-15 W4M	- Preserves Crow Lake and the valley slopes adjacent to the Crow Lake Ecological Reserve - The steep valley sides are forested with mixed stands of white spruce, aspen and some balsam fir - Parts of the area have escaped fire for a long time resulting in old growth spruce being over 150 years old - Bald eagle nests have been found along the lake's shores (ATPRC, 2007)
Crow Lake Ecological Reserve	Twp 78, Rge 14 W4M	- This site is a complex mosaic of glacial landforms - On the reserve's west side are old-growth white spruce-balsam fir forests dating back 140 years - Bird species include gray jay, yellow-rumped warbler, boreal chickadee, red-breasted nuthatch, house wren, ovenbird, and red-eyed and warbling vireos - Lakes and waterbodies attract bald eagles, osprey and common loon - Mammals in the reserve include beaver, moose, black bear, wolf and lynx (ATPRC, 2007)

13.6.3.3 Historical Sites and Areas

Provincial historical resources include structures, archaeological sites, palaeontological resources and other works of humans or nature that are deemed valuable for their cultural, historical, natural, scientific or aesthetic interest (ATPRC, 2006). Under the *Historical Resources Act*, historical resources can be designated as Provincial Historical Resources if preservation is of public interest.

Historical resources studies were conducted for the Project. A discussion of the investigation of historical resources is found in Volume 5, Section 15. A discussion of traditional ecological knowledge and traditional use is found in Volume 5, Section 16. Prior to the field visit, a record review of the Archaeological Site Inventory Data records maintained by ATPRC, Heritage Resource Management Branch was conducted. This search revealed that 27 previously recorded archaeological sites were located within the RSA. None were located within the North American leases.

A targeted field assessment based on an Archaeological Sensitivity Model was employed for the Leismer, Corner, Hangingstone and Thornbury leases. Within these leases, a total of 39 areas were selected for archaeological survey. These areas were considered to hold moderate to high archaeological potential relative to the study area, and as such were subjected to an aerial and/or ground reconnaissance. A total of 2,134 shovel tests were excavated within the targeted areas. All were negative for cultural material. As such, no known specific historical or archaeological locations within the leases will be impacted by the proposed developments. Based on the level of effort used during these studies, it was concluded that North American has conducted sufficient work for an archaeological baseline study suitable for inclusion in the EIA.

13.6.4 Access

Primary access into the region is via a paved highway system including highways 63 and 881. Highway 63 runs north and south through Fort McMurray. Highway 881 connects to Highway 63 west of Anzac and runs south to Lac La Biche, passing the communities of Anzac, Fort McMurray No. 468 First Nation at Willow Lake, Conklin and Janvier/Chard and the Chipewyan Prairie Dené First Nation. Highways 63 and 881 both pass the Project. Highway 63 is being twinned and will also include staging areas for trucks. Highway 881 was completely paved in 2006, and shoulders will be widened between Highway 63 and the Gregoire Lake Provincial Park access in 2007. A bypass around Lac La Biche was also completed in 2006.

Municipal and oil and gas roads, seismic lines and off-road trails used by all-terrain vehicles (ATVs), snowmobiles and hikers are also used to access the area. Currently disturbed areas, including clearcuts, industrial sites, well sites, roads, pipelines, seismic cutlines and trails, account for 2,624 ha (2% of the land and resource use LSA). Table 13.6-6 provides a summary of disturbance in the LSA. Table 13.6-7 provides a list of access road disposition holders in the LSA.

Table 13.6-6 Summary of Disturbance in the LSA

Disturbance	Hectares	Percent of LSA
Well sites and industrial sites	244	0
Cutlines and trails	1,196	1
Roads	86	0
Pipelines	1,098	1
Total	2,624	2

Table 13.6-7 Summary of Access Road Disposition Holders in the Land and Resource Use LSA

Company	Number of Access Road Holders
Alberta – Pacific Forest Industries Inc.	4
BP Canada Energy Company	23
Burlington Resources Canada Ltd.	1
Canadian Coastal Resources Ltd.	1
Canadian Natural Resources Limited	79
Devon Canada Corporation	34
EnCana Oil & Gas Corporation Ltd.	22
MEG Energy Corp.	1
North American Oil Sands Corporation	19
Paramount Energy Operation Corp.	100
Paramount Resources Ltd.	22
PrimeWest Energy Inc.	7
Stylus Energy Inc.	2
Superman Resources Inc.	18
Telus Communications Inc.	1

13.6.5 Traffic

Traffic has been identified as a concern of residents in Conklin, Janvier, Anzac, Gregoire Lake Estates, the Fort McMurray First Nation, and Lac La Biche, given the increase in large tractor-trailer loads and traffic due to construction of projects on or near Highway 881 (Volume 5, Section 15, Socio-Economic Impact Assessment provides more details). The specific concerns of the communities differ slightly, but include:

- Volume of traffic, especially at peak commuting times;
- Speed of all traffic through the communities;
- Truck traffic in the town of Lac La Biche;
- Potential for collision as driveways enter directly onto the highway at Fort McMurray No. 468 First Nation and Gregoire Lake Estates;
- Safety of school children being bussed to school;
- Highway maintenance including line painting and plowing;
- Animal mortality; and
- Dust.

Table 13.6-8 provides a summary of traffic movements on Highway 881 over the past four years (Alberta Infrastructure and Transportation (AIT), 2007).

Table 13.6-8 Average Annual Daily Traffic Counts on Highway 881 between 2003 and 2006

	Average Annual Daily Traffic Counts (AADT)			
	2003	**2004**	**2005**	**2006***
Highway 63 and highway 881 Junction	1,600	1,740	3,400	4,350
West of Anzac turnoff	1,140	1,170	2,830	3,790
East of Anzac turnoff	610	630	2,340	3,030
South of Long Lake Project	n/a	n/a	990	1,290
South of Surmont Project	n/a	n/a	510	720
North of Janvier	390	390	390	710
South of Janvier	360	360	360	640
North of Conklin	260	260	270	720
South of Conklin	220	220	240	630
16.5 km North of Hwy 858 and 881 Imperial Mills	n/a	420	560	880
East of Sir Winston Churchill Park	n/a	1,060	1,060	1,420
At Lac La Biche Corner, East of Hwy 36 and 55	9,240	9,280	8,940	9,400

n/a not applicable

* Produced by CornerStone Solutions Inc. on March 9, 2007, and posted on Alberta Infrastructure and Transportation website, 2007.

As traffic issues are assessed in Volume 5, Section 14, they are not discussed further in this section.

13.6.6 Railroad

The Athabasca Northern Railway, formerly owned by Canadian National Railway, now owned by CANDO Contracting Ltd., runs five days per week from Boyle to Lac La Biche and from Lac La Biche to the Lynton siding south of Fort McMurray, passing through the communities of Conklin and Janvier. The railway is a freight line that serves the oil sands region and takes approximately 1,000 loads per month of pipe, steel and dimensional loads north and sulphur and coke loads south (Brent Grendys, Athabasca Northern Railway, personal communication, 2007). The railway is east of the RSA, and is not considered further in this section.

13.6.7 Airstrips

Existing airstrips in the vicinity of the lease area include:

- Conklin – a local grass strip;
- Janvier – one strip west of Bohn Lake;
- Fort McMurray Airport – full service regional airport;
- Kirby – approximately 10 km southeast of Kirby Lake;
- Lac La Biche – a lighted, all weather airstrip; and,
- Leismer airstrip – This airstrip is located in the RSA. There is currently a joint industry initiative to improve the airstrip to facilitate larger aircraft that will service the producers located south of Fort McMurray.

13.6.8 Linear Corridors

Linear corridors include any access routes and cutlines that could be used by off-road vehicles (i.e., ATVs and snowmobiles), although the intent may not be to provide increased access. Industrial development (i.e., forestry, conventional oil and gas and oil sands) has required the clearing of a number of linear corridors including improved and unimproved industry roads, pipelines, seismic lines and trails. At present, approximately 2,381 ha (2%) of linear corridors exist within the LSA.

13.6.9 Heritage Rivers

The Canadian Heritage Rivers System (CHRS) was developed to conserve and protect Canada's river heritage, to give them national recognition and preserve their natural, cultural and recreational value (CHRS 2004, Internet site). No Heritage Rivers are located within the RSA of the Project.

13.6.10 Historic Trails

The RMWB Historic Trails Research Project was completed to provide an inventory of the major trails and travel routes in the Wood Buffalo area prior to 1940. All readily available sources of historical record were investigated, and historic summaries of the trails and route maps were published in a report titled *Historical Trails Research Project, Wood Buffalo Regional Municipality*

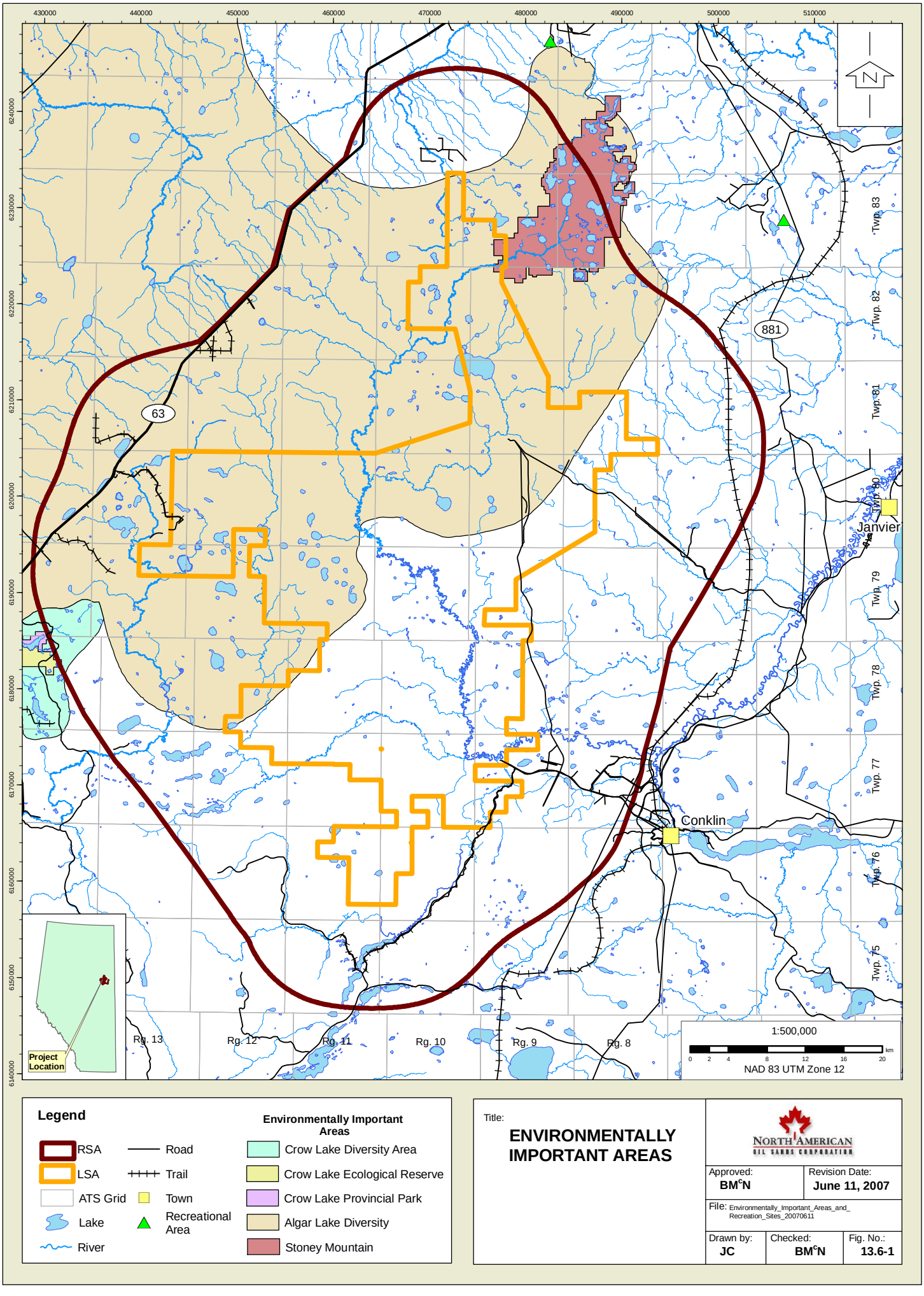
(Points West Heritage Consulting Ltd., 2004). The following two major historic trails are noted as possibly present in the RSA:

Trail to Willow (Gregoire) Lake (Trail #60b)

This trail was likely used from 1870 to the 1920s and appears to be along one of the travel routes to Lac La Biche. The trail leads southeast of Fort McMurray to Willow Lake (Red Willow Lake), which is believed to have been a fishing camp for the fort. The Christina River was formerly called the Red Willow River, and it is possible that the Red Willow Lake mentioned in the historic records was actually Christina Lake.

Lac La Biche to Fort McMurray Trail/Cart Road (Trail #43, #60, #60a, #64, #66, #78, #80, #260)

This trail was likely made around the same time that Fort McMurray was built (1870) and used until the 1920s. The route heads north between Lac La Biche and Fort McMurray, jumping from lake to lake. From Fort McMurray, the trail heads south to Gregoire Lake, then on to Christina, Wiau and Heart lakes. This route was virtually unusable in the summer and most summer travel was by canoe or steamboat on the river. The route was likely first used as a pack trail and gradually became wider and of sufficient quality to be useable by carts and wagons and probably remained largely a winter trail.



Legend

- RSA
- LSA
- ATS Grid
- Lake
- River
- Road
- Trail
- Town
- Recreational Area

Environmentally Important Areas

- Crow Lake Diversity Area
- Crow Lake Ecological Reserve
- Crow Lake Provincial Park
- Algar Lake Diversity
- Stoney Mountain

Title:

ENVIRONMENTALLY IMPORTANT AREAS

NORTH AMERICAN OIL SANDS CORPORATION

Approved:	Revision Date:
BM[C]N	June 11, 2007

File: Environmentally_Important_Areas_and_Recreation_Sites_20070611

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13.7 Resources and Land and Resource Users

13.7.1 Surface Interests

Authority to use public land is granted through dispositions issued under the provisions of the *Public Lands Act.* A disposition is a land and resource use contract that gives specific rights to a land or resource user (e.g., lease, license, or permit; ASRD, 2004). Records for all surface and subsurface dispositions held on Crown land are archived in the LSAS database.

LSAS searches were performed on December 22, 2006, January 29, 2007, January 30, 2007, and February 08, 2007, to identify the surface lease holders that have interests in the Project leases. Land based projects located within the lease boundaries are mostly related to resource extraction, particularly gas wells, oil sands projects, access roads, pipelines, transmission lines and trapping. Table 13.7-1 provides a summary of the surface dispositions and holders within the LSA.

Table 13.7-1 Summary of Surface Dispositions within the Land and Resource Use LSA

Surface Activity Code	Disposition Name	Explanation	Disposition Holder
AOA	Area of operating agreement	An agreement between the Land Manager for public land and an oil and gas company	Talisman Energy Inc.
			Paramount Energy Operating Corp.
CNT	Conservation notation	Indicates that an agency wishes to be consulted prior to any commitment or disposition of the land and may indicate potential gravel resources	Infrastructure and Transportation
			Lac La Biche Office – Land Use Area – Lands Division
			Edmonton Office – Public Lands
CRP	Conservation and reclamation plan	Usually for areas where sand and gravel have been extracted	297917 Alberta Ltd.
CTL	Coniferous timber license	License issued for holding the timber right	Millar Western Forest Products Ltd.
DRS	Disposition reservation	Held by the provincial government for the protection of a facility	Alberta Energy and Utilities Board
DWD	Drilling waste disposal	Sump sites	EnCana Oil and Gas Corporation Ltd.
			Northrock Resources Ltd.
			Paramount Resources Ltd.
			Canadian Natural Resources Limited
			Northstar Energy Corporation
EZE	Easement	Agreement between landowner and company; usually for powerlines or buried cable	ATCO Electric Ltd.
FMA	Forest management agreement	Issued agreement for holding the timber right	Alberta Pacific Forest Industries Inc.
ISP	Industrial sample plot	Indicates a forest industry company has an interest in an area covering a permanent sample/research plot within their forest management agreement	Alberta Pacific Forest Industries Inc.

Surface Activity Code	Disposition Name	Explanation	Disposition Holder
LOC	License of occupation	Usually for roads, also for launches, erosion control, marsh development, reservoirs	BP Canada Energy Company
			EnCana Oil and Gas Corporation Ltd.
			Paramount Energy Operating Corp.
			Stylus Energy Inc.
			MEG Energy Corp.
			Canadian Natural Resources Limited.
			Devon Canada Corporation
			Alberta Pacific Forest Industries Inc.
			Superman Resources Inc.
			North American Oil Sands Corporation
			Burlington Resources Canada Ltd.
			Telus Communications Inc.
			PrimeWest Energy Inc.
			Paramount Resource Ltd.
MLL	Miscellaneous lease	Miscellaneous leases such as campgrounds, corrals, water wells, wilderness cabins	North American Oil Sands Corporation
			Paramount Energy Operating Corp.
MLP	Miscellaneous permit	Miscellaneous permits such as campgrounds, corrals, water wells, wilderness cabins	Alberta Pacific Forest Industries Inc.
			Enbridge Pipelines (Athabasca) Inc.
			Layman, Arthur
MSL	Mineral surface lease	Well sites, flare stacks, mining areas and some access roads	Canadian Natural Resources Limited
			BP Canada Energy Company
			EnCana Oil and Gas Corporation Ltd.
			Paramount Energy Operating Corp.
			Stylus Energy Inc.
			Imperial Oil Resources Limited
			Devon Canada Corporation
			North American Oil Sands Corporation
			Deer Creek Energy Limited
			Superman Resources Inc.
			Alta Gas Ltd.
			PrimeWest Energy Inc.
			Northstar Energy Corporation
			Paramount Resources Ltd.
PIL	Pipeline installation lease	Sites associated with pipelines including compressor sites, meter sites, and heater sites	Canadian Natural Resources Limited
			Alta Gas Ltd.
			Paramount Energy Operating Corp.
			Nova Gas Transmission Ltd.
PLA	Pipeline agreement	Pipelines, flowlines and cathodic protection lines	BP Canada Energy Company
			EnCana Oil and Gas Corporation Ltd.
			Canadian Natural Resources Limited
			PrimeWest Energy Inc.
			Paramount Energy Operating Corp.
			Alta Gas Ltd.
			Enbridge Pipelines (Athabasca) Inc.
			Devon Canada Corporation
			Nova Gas Transmission Ltd.
			Husky Oil Operating Limited
			Paramount Resources Ltd.
			Northstar Energy Corporation
PNT	Protective notation	Area selected by the government for protection	Lac La Biche Office – Land Use Area – Lands Division
			Infrastructure and Transportation

Surface Activity Code	Disposition Name	Explanation	Disposition Holder
RDS	Roadway	Unregistered roadways such as winter roads	RMWB
RRD	Registered roadway	A developed roadway registered with ASRD	Infrastructure and Transportation
SML	Surface material lease	Permits surface extraction activities such as sand, gravel, peat and topsoil extraction over an extended period of time	297917 Alberta Ltd.
TFA	Temporary field authorization	Issued for either site preparation or additional workspace, in which case it must be associated with an approved activity	ATCO Electric Ltd.
			Canadian Natural Resources Limited
			MEG Energy Corp.
			Bounty Developments Ltd.
			North American Oil Sands Corporation.
			Enbridge Pipelines (Athabasca) Inc.
			Paramount Energy Operating Corp.
TPA	Trapping area	Indication of trapline	Peats, Gordon
			Fisher, William
			Quintal, Peter
			Cadieux, Raymond
			Quintal, Osborne A
			Cunningham, Wayne
			Doonanco, David J
			Bourassa, Clement
			Egger, Ronald Leo
			Nashim, Frank
			Zinck, Polyanna
			Milne, Colin H
			Stepanowich, John
			Prince, Doug
			Nokohoo, George
			Cheecham, Marie L
			Janvier, Harry
			York, Gary
USP	Unrefined Spill		Canadian Natural Resources Limited

13.7.2 Subsurface Interests

Mineral and surface materials within the land and resource use LSA include oil sands, petroleum and natural gas as well as other industrial metals and minerals.

Table 13.7-2 provides a list of companies that hold oil and gas and/or oil sands leases within the lease boundaries of the LSA. Oil sands lease holders are shown on Figure 2.3-1 (Volume 1), and petroleum and natural gas leases within the RSA are presented on Figure 2.3-2 (Volume 1).

A Mineral Land Index Search was conducted on December 22, 2006, January 29, 2007, January 30, 2007 and February 08, 2007, to identify the subsurface lease holders that have interests in the Project LSA. Table 13.7-2 includes all companies that hold an oil sands and/or oil and gas lease in the LSA.

There are no metallic and industrial minerals permits in the land and resource use RSA.

Table 13.7-2 Companies Holding Oil Sands and Oil and Gas Leases in the Land and Resource Use LSA

Oil Sands Lease Holders
Imperial Oil Resources Limited (75%); Nexen Inc. (25%)
Japan Canada Oil Sands Limited
North American Oil Sands Corporation
Petroland Services (1986) Ltd.
Petroleum and Natural Gas Lease Holders
Paramount Energy Operating Corp.
Devon Canada Corporation
Canadian Natural Resources Limited (77.5%) / Barnwell of Canada Limited (12.5%) / Enmark Inc. (10%)
Canadian Forest Oil Ltd. (50%) / Calpine Canada Resources Company (50%)
Canadian Forest Oil Ltd. (50%) / PrimeWest Energy Inc. (50%)
Canadian Natural Resources Limited (50%) / PrimeWest Energy Inc. (35%)
Delta Resources Inc.
Devon Canada Corporation (55%) / Northrock Resources Ltd. (45%)
Devon Canada Corporation (70%) / Giant Grosmont Petroleums Ltd. (4%) / NAL Resources Limited (11.05%) / NAL Energy Inc. (10.95%)
Devon Canada Corporation 52.5%) / Paramount Resources Ltd. (25%) / Giant Grosmont Petroleums Ltd. (3%) / NAL Resources Limited (8.2875%) / NAL Energy Inc (11.2125%)
Devon Canada Corporation (75%) / Paramount Energy Operating Corp. (25%)
EnCana Oil & Gas Corporation Ltd.
Paramount Energy Operating Corp.
Paramount Energy Operating Corp. (50%) / Northrock Resources Ltd. (22.5%) / Paramount Energy Operating Corp. (27.5%)
Paramount Energy Operating Corp. (50.375%) / PrimeWest Energy Inc. (35%) / Barnwell of Canada Limited (8.125%) / Enmark Inc. (6.5%)
Paramount Energy Operating Corp. (65%) / PrimeWest Energy Inc. (35%)
Stylus Energy Inc. (80%)/Chair Resources Inc. (20%)
Superman Resources Inc. (60%) / Compton Petroleum Corporation (20%) / Paramount Energy Operating Corp. (20%)
Superman Resources Inc. (65.8521%) / Barnwell of Canada Limited (19.9125%) / Enmark Inc. (14.2354%)
Superman Resources Inc. (75%) / Canadian Natural Resources Limited (25%)
Vault Energy Inc. (50%) / Canadian Natural Resources Limited (38.75%) / Barnwell of Canada Limited (6.25%) / Enmark Inc. (5%)
BP Canada Energy Company

13.7.3 Granular Resources

Granular resources include gravel and sand. These aggregates are used in the construction of facilities (concrete) and roads on oil sands and other projects. In 2002, the Athabasca Regional Issues Working Group (RIWG) completed a survey to establish the existing supply and annual demand for aggregate in the RMWB (RIWG, 2002). The survey indicated a potential shortage of aggregate if annual use continued at the given rate. The report identified the region south of Fort

McMurray as having total aggregate of 2,523,299 m^3 and road grade quality aggregate of 1,009,218 m^3.

In 2005, the overall status of aggregate in the RMWB changed with the opening of the Muskeg Valley Quarry (250 ha in size) and the subsequent 2005 application by Birch Mountain Resources to open the Hammerstone Quarry (1,500 ha) (Birch Mountain, 2006; Birch Mountain website). Both quarries are north of Fort McMurray. These quarries are outside of the RSA, but contribute to the overall aggregate sourcing in the RMWB, extending the lifespan of aggregate resources in the RMWB by several decades. The constraints to construction of buildings and infrastructure identified by RIWG (2002) are alleviated by the new quarries located north of Fort McMurray. The locations of the quarries are not optimal for projects between Fort McMurray and Lac La Biche, but are within trucking distance if required.

ASRD governs the permitting of aggregate extraction on Crown land and a review of LSAS was conducted on December 22, 2006, for surface activity codes that may indicate granular resources in the land and resource use RSA. The list of surface activity codes was determined by searching the ASRD website (ASRD, 2006). The activity codes are discussed below:

- Consultative Notations (CNT), which require contact with the deposition holder before conducting an activity and may indicate potential gravel resources;
- Surface Material Lease (SML), which may indicate gravel reserves;
- Surface Material Licence (SMC), which may indicate gravel reserves;
- Surface Materials Exploration (SME), which may indicate potential gravel resources;
- Protective Notations (PNT), which may place restrictions on the types of activities that may occur; and
- Deposition Reserves (DRS), which are held by the provincial government for the protection of a facility.

Table 13.7-3 shows the granular resource leases in the LSA. Potential aggregate resources are presented in Figure 13.7-1.

Table 13.7-3 Potential Aggregate Resource Dispositions in the Land and Resource Use LSA

Company	Comment
Department of Infrastructure and Transportation	Surface materials exploration
Edmonton Office – Public Lands	Surface materials exploration
297917 Alberta Ltd.	Sand and gravel

13.7.4 Agriculture

There were no agricultural activities identified in the LSA through the LSAS search.

13.7.5 Forestry

13.7.5.1 Timber Management

Commercial timber harvesting is an important resource in the Project area. Al-Pac holds the forest management agreement (FMA) with the Crown for commercial timber management in the Fort McMurray region. The FMA is further subdivided into Forest Management Units (FMUs). Throughout development of the Project, consultation with Al-Pac will ensure that harvesting efforts are combined to minimize additional clearing for the Project.

The Project LSA falls within three FMUs: A14, L3 and L11.

The Province of Alberta has developed guidelines for determining the annual allowable cut (AAC). The approved AAC reflects the land base available for timber harvesting and the forest management strategies applied to that land base (Dave Cheyne [Al-Pac], Personal Communication, 2006). Al-Pac has the rights to all deciduous forest resources within FMUs A14, L3 and L11. Coniferous timber allocations are managed by Al-Pac, which are split between timber quota holders and miscellaneous timber use (MTU) operators. A timber quota grants the holder the right to harvest a share of the AAC in a given FMU. Aside from Al-Pac, a coniferous timber license is held by Millar Western Forest Products Ltd. in FMUs A14 and L3. Timber is also used for firewood, construction materials and small-scale timber harvest and sales. Table 13.7-4 provides the AAC in FMUs A14, L3 and L11 (Al-Pac, 2004).

Table 13.7-4 Annual Allowable Cut in the FMUs in which the LSA is Situated

FMU	Primary Conifer (m^3)	Secondary Conifer (m^3)	Deciduous (Primary and Secondary) (m^3)
A14	270,100	45,150	286,750
L3	152,000	21,050	110,150
L11	251,800	N/A	426,000

N/A not applicable

13.7.5.2 Timber Supply

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 (ASRD, 1996). This rating reflects factors affecting tree growth such as soil, topography, climate, elevation and moisture. Timber productivity ratings (TPR) of good, moderate, fair, or unproductive are assigned to stands within an area, and TPR is one factor used to calculate the AAC for the FMU. The Terrestrial LSA identified approximately 104,829 ha of productive forests. Table 13.7-5 shows the percentage of area within the land and resource use LSA with TPR of good, moderate, fair or unproductive. The TPR for the RSA is not estimated as the data set is not complete for the entire area. Forest resources are discussed in Volume 4, Section 10.

Table 13.7-5 Timber Productivity in the LSA

Timber Productivity Rating Classification	Area (ha)	Percent of LSA (%)*
Good	23,316	16
Moderate	62,265	43
Poor	19,248	13
Unproductive	33,696	23

* Total LSA area is 145,349 ha.

13.7.5.3 Merchantable Timber

Merchantable timber volumes are estimated using historical AVI data for the Central Mixedwood Subregion. Average coniferous, deciduous and total volume factors including height and Crown closure will be provided for coniferous, deciduous and mixedwood community types by Al-Pac.

13.7.6 Berry Picking

Berry picking is an important activity in the land and resource use LSA and RSA. Berries and other traditional plants, such as mint, are picked by First Nations people and also for non-traditional purposes by recreational berry pickers (Volume 5, Section 16). Results from a Land and Resource Use Questionnaire described in the Petro-Canada Meadow Lake EIA (Petro-Canada Meadow Lake is located west of the land and resource use LSA) found that 44% of the respondents picked wild berries to some degree (Petro-Canada, 2001). Respondents used various methods to access berry picking locations including vehicle, quad and hiking. Blueberries were the most commonly picked berry in the Meadow Creek LSA, followed by cranberries (high and low bush), strawberries and raspberries. Other berries that may be sought in the area are Saskatoons, chokecherries and rose hips (Devon, 2003).

A description of vegetation including berry habitat in the LSA and RSA is provided in Volume 4, Section 10. A summary of potential berry habitat in the LSA is shown in Table 13.7-6. Potential berry habitat is shown in Figure 13.7-2. Some of the same habitat is included in each category, hence the total hectares associated with berry picking habitat is 48,676 ha.

Table 13.7-6 Potential Berry Habitat for Commonly Picked Berries in the Land and Resource Use LSA

	Hectares in the LSA	Percent of LSA
Blueberry habitat	37,245	26
Cranberry habitat	18,898	13
Strawberry habitat	914	1

13.7.7 Hunting

Wildlife populations in the LSA and RSA are described in Volume 4, Section 11. Both traditional and recreational hunters use the RSA for hunting of various wildlife species. Caribou are a protected species within the RSA and can only be hunted by First Nations peoples. Hunting is managed by the provincial government through a licensing program.

Both the LSA and RSA are located within the Boreal Hunting Region (ASRD, 2002). Hunting is regulated through ASRD, which separates the province into Wildlife Management Units (WMUs). In the RSA, there are two WMUs: 512 and 519. The southern portion of the LSA is located in

WMU 512, while the northern portion of the LSA is located in WMU 519 (Alberta Outdoorsmen, 2007). Table 13.7-7 shows which and when allowable species can be hunted in the WMUs.

Table 13.7-7 Hunting Seasons for WMUs 512 and 519 in the Land and Resource Use LSA

Species	Type	Archery	General
Mule deer	antlered	August 25 - 31	September 1 - November 30
White-tailed deer	antlered and antlerless	August 25 - 31	September 1 - November 30
Moose	antlered	August 25 - 31	September 1 - October 31 November 1 - November 30
Black bear	Fall 2006	August 25 - 31	September 1 - November 30
	Spring 2007		April 17 - June 15
Ruffed and spruce grouse	n/a	None	September 1 - November 30
Sharp-tailed grouse	n/a	None	September 1 - November 30
Ptarmigan	n/a	None	WMU 512: not permitted WMU 519: September 1 - December 15
Ducks	n/a	None	September 1 - December 16
Coots, common snipe	n/a	None	September 1 - December 16
White-fronted and Canada geese	n/a	None	September 1 - December 16
Snow and Ross' geese	n/a	None	September 1 - December 16

The ASRD website was searched for hunting harvest data (ASRD, 2002). The number of hunting licenses sold for big game animals per WMU per year is presented in the following tables. These values do not include hunting activities by First Nation hunters.

The general trend is that hunting in the RSA appears to be declining as shown in Table 13.7-8 with the exception of hunting Mule Deer in WMU 519 which has been variable.

Table 13.7-8 Number of Hunters in the RSA

Year	White Tailed Deer		Mule Deer		Moose		Black Bear	
	WMU 512	WMU 519	WMU 512	WMU 519	WMU 512	WMU 519	WMU 512	WMU 519
1995	867	440	114	19	660	298	88	66
1996	673	478	50	9	621	263	68	34
1998	586	264	140	24	683	329	48	18
1999	534	156	55	14	413	274	55	16
2000	268	49	55	4	378	341	52	28
2001	303	60	93	12	423	214	37	13

There are 25 outfitters who have allocations for harvesting black bear, white-tailed dear, mule deer and moose within the LSA (WMUs 519 and 512). The number and types of allocations in the LSA in 2006 were provided by the Alberta Professional Outfitters Society (Fiona Nelson, personal communication, 2007) and are presented in Table 13.7-9.

Table 13.7-9 Outfitters and Allocations in the Land and Resource Use LSA for 2006

Outfitter	WMUs	Allocation Numbers and Types							
		Black Bear - Bow	Black Bear - Open	Mule Deer - Open	Moose - Open	Moose - Rut	Moose - Bow	White-Tailed Deer - Bow	White-Tailed Deer - Open
Dale McKinnon AB Guide & Outfitter Ltd.	519	2	50						
909770 AB LTD/Big Horn Hunting Adventure	519	2			2	2			
Northern Timber Trophy Hunts & Wild. Adv	519		5						5
Burnt Lake Outfitters	519		9						
Trophy Buck Outfitters	519				2				
Fuchs, Barbara	519				2				
Northern Timber Trophy Hunts & Wild. Adv	519					9			
North River Outfitting	519								2
Northern Adventure Hunts	519					2			
Grand Slam Hunting Adventures Ltd.	519								3
Tagged-Out Hunting Enterprises	519								12
Udell's Guiding and Outfitting	519				2				
Ryk Visscher's Hunting Adventures Ltd.	512	2	29						
909770 AB LTD/Big Horn Hunting Adventure	512	2	18					2	
Egge Wilderness Guiding & Outfitting	512		13			3			4
North Country Outfitting Inc.	512		2			5			
Grand Slam Hunting Adventures Ltd.	512		3	13			4	6	21
Bruin Adventures Inc.	512		4						
Kirschner, Martin	512			1					
Avenir Guiding & Outfitting	512			2	6	1			
Northern Points Outfitting and Guiding	512			1					9
Pesony, Celene	512				2				
Bear Springs Inc.	512				6				
Wayne Zaft Hunting Adventures Ltd.	512							7	
North River Outfitting	512								29

Note: Open cell indicates no allocation.

13.7.8 Trapping

Trapping in Alberta is governed through the use of a registered trapline system. Under this system, trapline owners are licensed to harvest in a registered fur management area (RFMA). Owners are requested to provide yearly harvest data to ASRD so harvesting can be managed and monitored. This information is protected under the Freedom of Information and Privacy Act; therefore, ASRD can only release harvest information after receiving permission from the RFMA license holder.

There are approximately 1,700 RFMAs in Alberta. Revenue from all RFMAs in the province has shown a long-term decline from 1977 to 2001 (Golder, 2001). This corresponds to a similar decline in both harvests and pelt prices over this time. Trappers attribute the decrease in value of pelts to decreasing demand for furs and decreasing quality of furs taken from traplines in the region. Earning a living by trapping has become very difficult, and as a result, many trappers have entered other industries (Golder, 2001).

Species harvested by the trapping industry include: black bear, wolf, coyote, lynx, fox, beaver, squirrel, muskrat, otter, weasel, mink, fisher and marten.

There are 18 traplines registered within the LSA, previously presented in Table 13.7-1. Some of these trappers have identified cabins out of which they base some of their trapping. Not all trappers identified all of their cabins as some trappers prefer to keep this information private. Figure 13.7-3 shows the identified locations.

The Alberta Trappers' Compensation Program provides a framework to compensate trappers in RFMAs for trapping business losses related to industrial activities on Crown land (Alberta Outdoorsmen, 2006).

13.7.9 Fishing

ASRD regulates all fishing and angling within the province of Alberta. The province has been divided into three distinct management zones based on ecosystem type (i.e., Eastern Slopes, Parkland-Prairie and Northern Boreal). The ecosystem zones are further divided into watershed units to ensure that fishing regulations meet the specific waterbodies and fish population needs for individual areas (Alberta Outdoorsman, 2006).

The LSA and RSA are located within Fisheries Management Zone 3 (Northern Boreal Zone), Watershed Unit NB4. This area is characterized by low gradient streams draining areas of muskeg, which in turn, drain into the larger watersheds of the area (Alberta Outdoorsman, 2006). The watersheds located within the Project area include the Clearwater and Christina rivers and their tributaries.

Popular game fish of the zone are yellow perch, northern pike, walleye, lake whitefish, Arctic grayling and lake trout (Alberta Outdoorsman, 2006). Five lakes within the Aquatic Resources RSA (Willow [Gregoire] Lake, Christina Lake, Sucker Lake, Winefred Lake and Cheecham [Georges] Lake) are known to support sport fish (Volume 3, Section 8). The main fishing locations within or near the RSA are the Christina River, Clearwater River, Christina Lake, Winifred Lake and Willow (Gregoire) Lake and are all easily accessible (i.e., by automobile). Only the Christina River is within the land and resource use RSA.

The sensitivity of the fishing lakes in the RSA to acid deposition is addressed in Volume 3, Section 7 (Surface Water Quality). It was determined that Willow (Gregoire), Cheecham

(Georges) and Sucker lakes were all well buffered with median alkalinity values of greater than 40 mg/L.

A description of the sportfish community within the LSA and RSA is presented in the Fish and Fish Habitat baseline report (Volume 3, Section 8). Table 13.7-10 lists the fishing locations and fishing seasons within the Aquatic Resources RSA and describes the fish species limits for each location.

Table 13.7-10 Fishing Locations within the Aquatic Resources RSA

Location	Fishing Season	Fish Species Limits
Willow (Gregoire) Lake	May 19 to March 31	Northern pike 3 over 63 cm, perch limit 15, walleye limit 0, lake whitefish limit 10, burbot limit 10.
Christina River	June 1 to October 31	Arctic grayling limit 2 over 35 cm (limit 0 from Sept. 1 to Oct. 31); mountain whitefish limit 5 over 30 cm; walleye limit 3 over 50 cm; pike limit 3 over 63 cm; burbot limit 10.
Hangingstone River	June 15 to October 15	June 16 to Oct. 31 – Arctic grayling limit 2 over 35 cm (limit 0 from Sept. 1 to Oct. 31); pike limit 3 over 63 cm.
House River and Tributaries	June 1 to October 31	June 1 to Oct. 31 – Arctic grayling limit 2 over 35 cm (limit 0 from Sept. 1 to Oct. 31); walleye limit 3 over 50 cm; pike limit 3 over 63 cm.
Christina Lake	May 18 to March 31	Walleye limit 0; pike limit 3 over 63 cm; perch limit 15; lake whitefish limit 10; burbot limit 10.
Clearwater River (downstream of the Christina River)	June 1 to October 31	June 1 to Oct. 31 – Arctic grayling limit 2 over 35 cm (limit 0 from Sept. 1 to Oct. 31); mountain whitefish limit 5 over 30 cm; walleye limit 3 over 50 cm; pike limit 3 over 63 cm; burbot limit 10.
Sucker Lake	May 19 to March 31	walleye limit 3 over 50 cm, northern pike 3 over 63 cm, perch limit 15, lake whitefish limit 10, burbot limit 10, Arctic grayling limit 2 over 35 cm (0 from May 19 to 31 and September 1 to March 31).
Winefred Lake	May 18 to March 31	May 18 to Mar. 31 – Walleye limit 0; pike limit 2 (1 under 63 cm and 1 over 100 cm); perch limit 15; lake whitefish limit 10; burbot limit 10; bait ban.
Cheecham (Georges) Lake	May 19 to March 31	Northern pike 3 over 63 cm, perch limit 15

Source: Alberta Outdoorsman 2007

13.7.10 Non-Consumptive Outdoor Recreation

Anzac, Conklin and Janvier all have community recreation societies that maintain community recreation facilities such as baseball diamonds, community halls, skating rinks and other civic facilities. Recreation facilities and use are described in Volume 5, Section 15.

Outdoor recreational activities are focused along waterways, on lakes and along vehicular trails. Recreation activities in the Project area include non-consumptive land and resource use such as camping, hiking, cross-country skiing, bird watching, wildlife viewing, swimming, boating, driving ATVs and snowmobiling. Consumptive recreation includes hunting, fishing, trapping and berry picking (discussed in other sections).

13.7.10.1 Parks, Recreation Areas and Campgrounds

The most common non-consumptive recreational activity in the Fort McMurray area was camping according to the BOVAR (1996) study. There are no formal recreation areas and campgrounds in the land and resource use LSA (Alberta Hotel and Lodging Association, 2007). Stony Mountain Wildland Park, Crow Lake Diversity Area and Crow Lake Provincial Park all intersect with the RSA, but campgrounds are not affected.

13.7.10.2 Water-based Activities

Rivers

The main recreational river in the RSA is the Upper Christina River. Recreational paddling may occur during the summer with high water conditions and weather permitting. The Christina River receives much less use than the Clearwater River as it normally does not have enough water and the riverbed is rocky (Gulf Canada Resources, 2001).

Lakes

There are no known recreational lakes located within the RSA. The following lakes are located nearby, but outside, the RSA and are easily accessed through existing roadways:

- **Willow (Gregoire) Lake:** This lake is located approximately 30 km southeast of the city of Fort McMurray and is northeast of the land and resource use RSA. It is accessible year round, making it one of the more heavily used recreational areas in the region. The lake is the focus of various recreational activities and sites including Gregoire Lake Provincial Park, Willow Lake Day-Use, and Camp Yogi.

- **Christina Lake:** This lake is approximately 8 km southeast of the land and resource use RSA, and Conklin is adjacent to the lake. The lake is accessible year round and offers a number of recreational activities. There are no publicly owned recreational facilities on the lake, but there is access to the lake through a private resort and through the Wassasi Day Use Area. The Wassasi Day Use Area is administered through the Conklin Recreational Society and is available to local residents only (University of Alberta, 2007).

13.7.10.3 Land-based Activities

Hiking

Recreational hiking is not a high-use activity in this area because the terrain has low usability during the summer when recreational hiking is most likely to occur (Gulf Canada Resources, 2001). Most hiking is casual use of developed trails in provincial parks and recreational areas. Limited hiking may occur on trapper trails or by anglers looking for access to more remote water bodies (Gulf Canada Resources, 2001). The Stony Mountain Wildland Park offers back-country hiking areas.

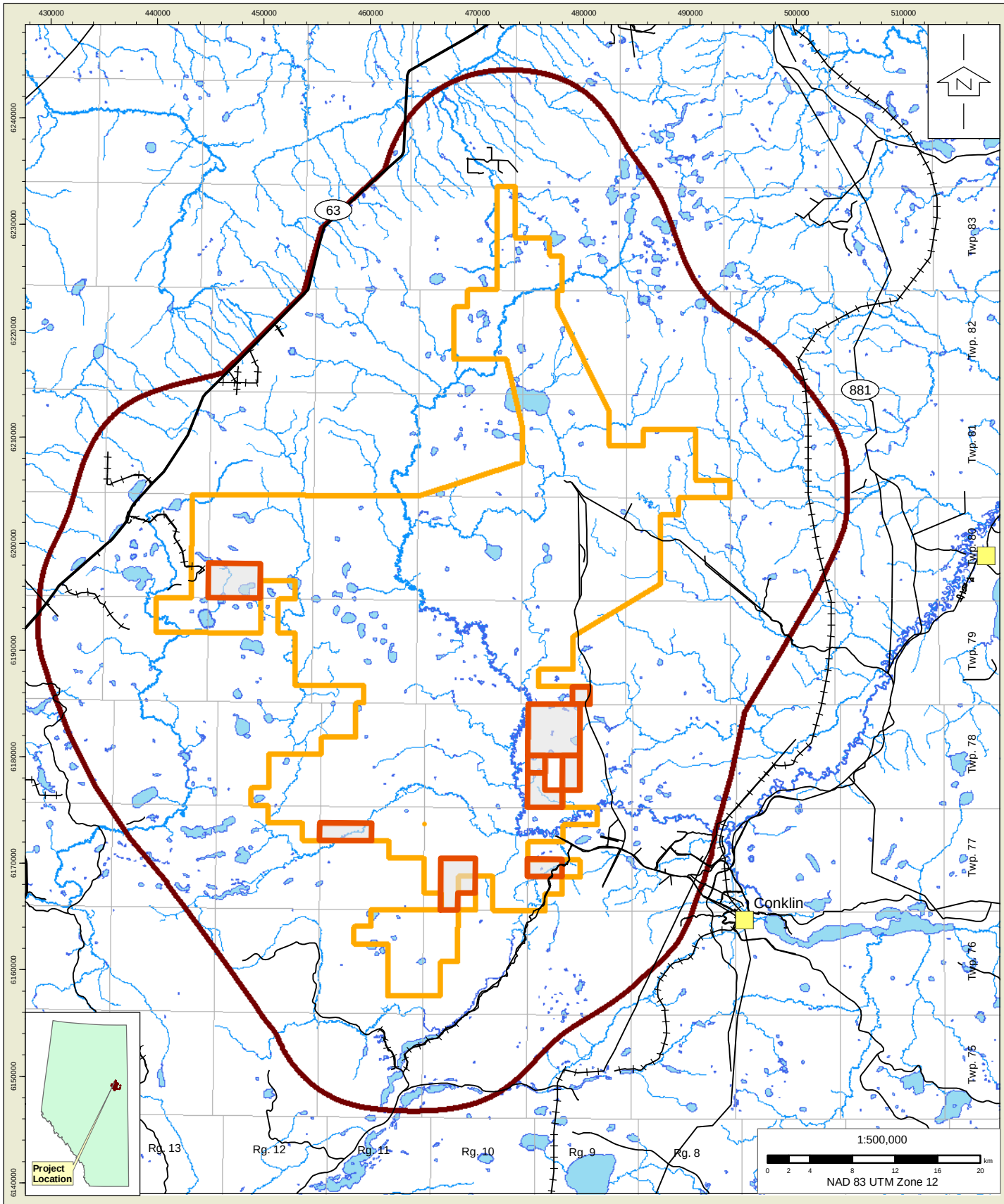
Snowmobiling

Snowmobiling is a popular form of recreation in the area. The McMurray Snow-Drifters Snowmobile Club operates in the area and maintains about 200 km of signed trails. Due to the large amount of forestry and seismic work in the area, the Club has partnered with industry to ensure that snowmobiling is possible and safe (McMurray Snow Drifters Club, 2007). The Stony

Mountain trail maintained by the McMurray Snow Drifters may cross the northern edge of the RSA. Many of the snowmobilers in the area are trappers accessing traplines (Imperial Oil, 2005).

Cross-country Skiing

Cross-country ski areas are found in selected parks and recreation areas such as the Stony Mountain Wildland Park. Organized trails are not found within the RSA.



Legend

- RSA
- LSA
- Aggregate Resource Leases
- ATS Grid
- Lake
- River
- Road
- Railroad
- Town

Title:

POTENTIAL AGGREGATE RESOURCES

NORTH AMERICAN OIL SANDS CORPORATION

Approved:	Revision Date:
BM^{C}N	June 11, 2007

File: 13.7-1 Aggregate_Resource_Leases_in_the_LSA_20070611.mxd

Drawn by:	Checked:	Fig. No.:
JC	BM^{C}N	13.7-1

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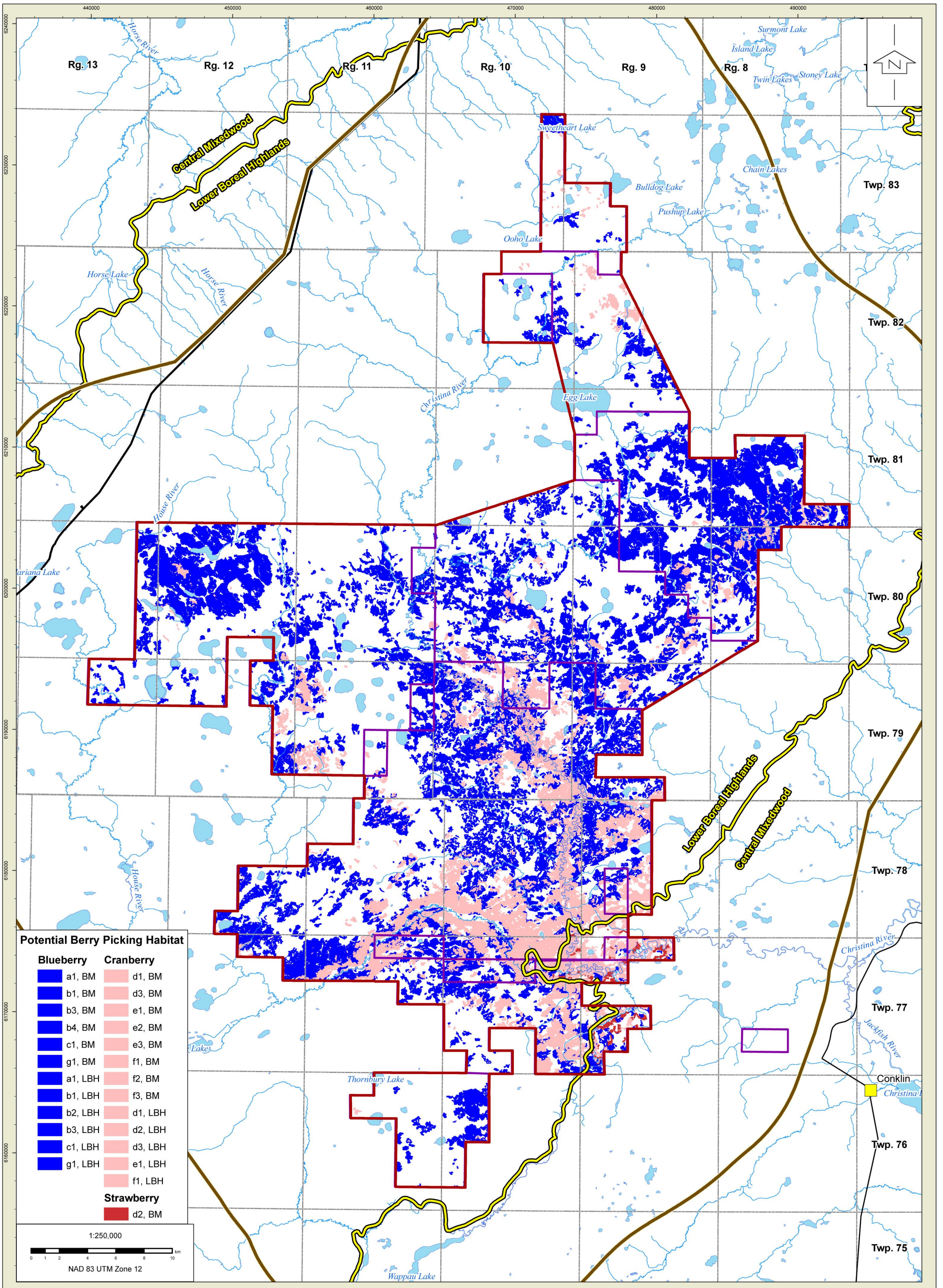

Title:

POTENTIAL BERRY PICKING HABITAT IN THE LSA

NORTH AMERICAN OIL SANDS CORPORATION

Approved:	Revision Date:
LM/PB	July 26, 2007

File: N:\PROJECTS\63200000\ArcView\MXD\Vegetation\Potential_Berry_Habitat_LSA.mxd

Drawn by:	Checked:	Fig. No.:
SC	LM	13.7-2

455000 460000 465000 470000 475000 480000

6195000 6190000 6185000 6180000 6175000 6170000 6165000 6160000

Rg. 12 Rg. 11 Rg. 10 Twp. 80 Twp. 79 Twp. 78 Twp. 77

Christina River

Thornbury Lake

Lower Boreal Highlands

Central Mixedwood

N

b c a

Potential Berry Picking Habitat

Blueberry
- a1, BM
- b1, BM
- b3, BM
- b4, BM
- c1, BM
- g1, BM
- a1, LBH
- b1, LBH
- b2, LBH
- b3, LBH
- c1, LBH
- g1, LBH

Cranberry
- d1, BM
- d3, BM
- e1, BM
- e2, BM
- e3, BM
- f1, BM
- f2, BM
- f3, BM
- d1, LBH
- d2, LBH
- d3, LBH
- e1, LBH
- f1, LBH

Strawberry
- d2, BM

1:110,000

0 0.5 1 2 3 4 5 km

NAD 83 UTM Zone 12

Project Location

Legend
- North American Vegetation LSA
- North American Vegetation RSA
- Natural Subregions
- North American Lease
- Major Road (Hwy. 63)
- Road (881)
- Twp. Rg. Lines
- Lake
- Rivers

Title:

POTENTIAL BERRY PICKING HABITAT IN THE LSA

NORTH AMERICAN OIL SANDS CORPORATION

Approved:	Revision Date:
LM/PB	July 26, 2007

File: N:\PROJECTS\63200000\ArcView\MXD\Vegetation\Potential_Berry_Habitat_LSA_A.mxd

Drawn by:	Checked:	Fig. No.:
SC	LM	13.7-2a

470000 475000 480000 485000 490000

Rg. 10 Rg. 9

Sweetheart Lake
Hargingstone Creek
Bulldog Lake
Pushup Lake
Ooho Lake
Christina River
Egg Lake

Twp. 83
Twp. 82
Twp. 81

Lower Boreal Highlands

6230000 6225000 6220000 6215000 6210000 6205000 6200000 6195000

Potential Berry Picking Habitat

Blueberry	Cranberry
a1, BM	d1, BM
b1, BM	d3, BM
b3, BM	e1, BM
b4, BM	e2, BM
c1, BM	e3, BM
g1, BM	f1, BM
a1, LBH	f2, BM
b1, LBH	f3, BM
b2, LBH	d1, LBH
b3, LBH	d2, LBH
c1, LBH	d3, LBH
g1, LBH	e1, LBH
	f1, LBH

Strawberry
d2, BM

N

b
c
a

1:110,000
0 0.5 1 2 3 4 5 km
NAD 83 UTM Zone 12

Project Location

Legend

- North American Vegetation LSA
- North American Vegetation RSA
- North American Lease
- Major Road (Hwy. 63)
- Road (881)
- Twp. Rg. Lines
- Lake
- Rivers

Title:

POTENTIAL BERRY PICKING HABITAT IN THE LSA

NORTH AMERICAN OIL SANDS CORPORATION

Approved:	Revision Date:
LM/PB	July 26, 2007

File: N:\PROJECTS\63200000\ArcView\MXD\Vegetation\Potential_Berry_Habitat_LSA_B.mxd

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SC	LM	13.7-2b

440000 445000 450000 455000 460000 465000

6200000 6195000 6190000 6185000 6180000 6175000 6170000

Rg. 13 Rg. 12 Rg. 11 Twp

Twp. 80

Twp. 79

Twp. 78

Twp. 77

Twp. 76

House River

House River

House River

Christina River

Base Lake

Thornbury Lake

Lower Boreal Highlands

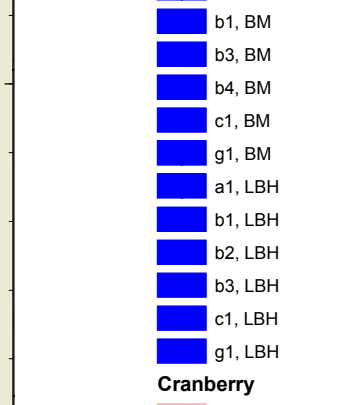
N

Potential Berry Picking Habitat

Blueberry
- a1, BM
- b1, BM
- b3, BM
- b4, BM
- c1, BM
- g1, BM
- a1, LBH
- b1, LBH
- b2, LBH
- b3, LBH
- c1, LBH
- g1, LBH

Cranberry
- d1, BM
- d3, BM
- e1, BM
- e2, BM
- e3, BM
- f1, BM
- f2, BM
- f3, BM
- d1, LBH
- d2, LBH
- d3, LBH
- e1, LBH
- f1, LBH

Strawberry
- d2, BM



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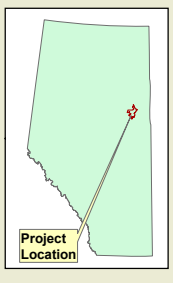
0 0.5 1 2 3 4 5 km

NAD 83 UTM Zone 12



Legend

- North American Vegetation LSA
- North American Vegetation RSA
- North American Lease
- Major Road (Hwy. 63)
- Road (881)
- Twp. Rg. Lines
- Lake
- Rivers

Title:

POTENTIAL BERRY PICKING HABITAT IN THE LSA

NORTH AMERICAN OIL SANDS CORPORATION

Approved:	Revision Date:
LM/PB	July 26, 2007

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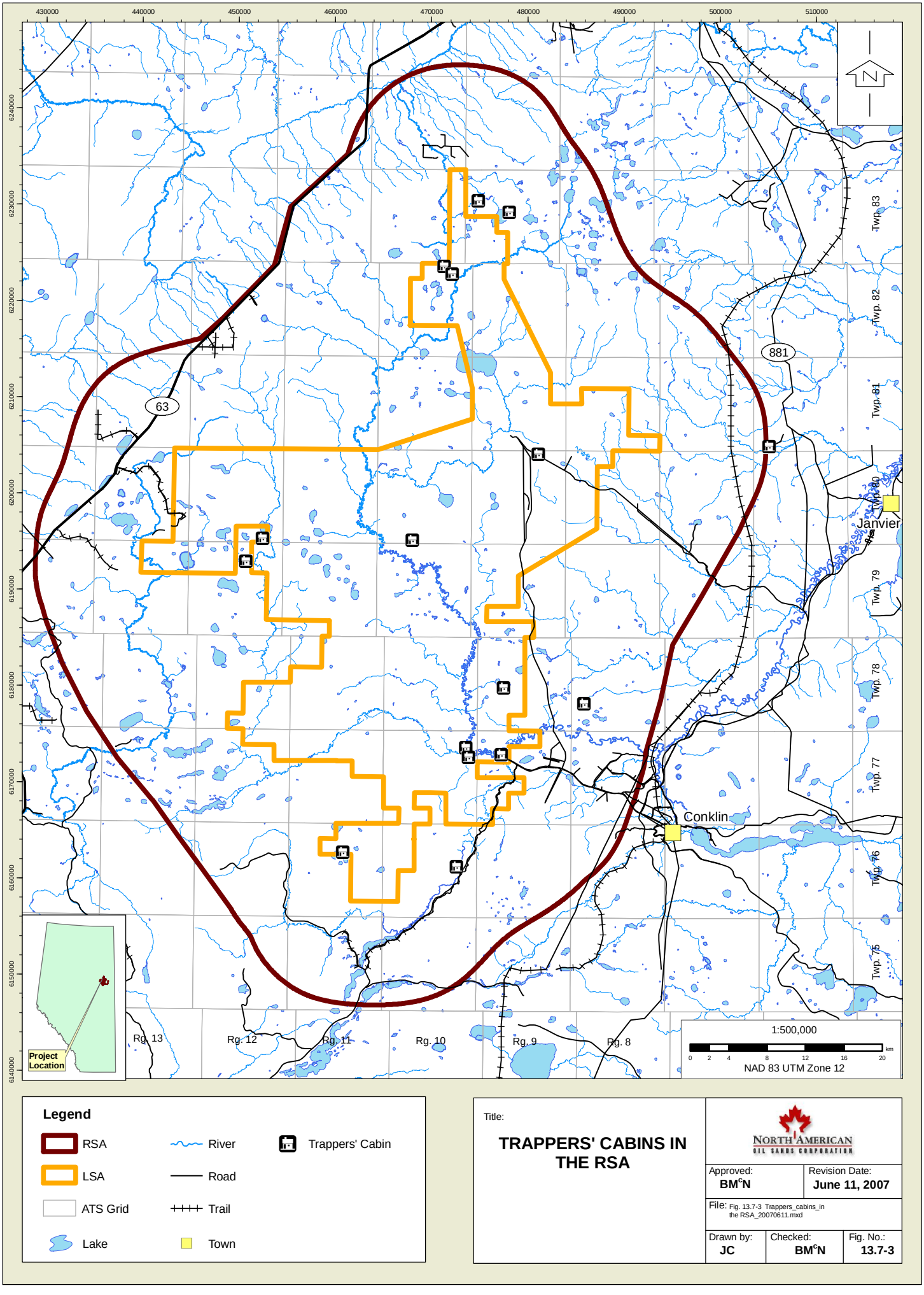

Title:

TRAPPERS' CABINS IN THE RSA

NORTH AMERICAN OIL SANDS CORPORATION

Approved:	Revision Date:
BM[C]N	June 11, 2007

File: Fig. 13.7-3 Trappers_cabins_in the RSA_20070611.mxd

Drawn by:	Checked:	Fig. No.:
JC	BM[C]N	13.7-3

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13.8 Project Effects, Mitigative Measures and Impact Assessment

13.8.1 Potential Effects Associated with the Project Activities

The construction, operation and reclamation phases of the Project each have impacts and effects on land and resource use indicators. Construction must comply with land use planning and involves clearing and infrastructure development. Operations include continuous infrastructure development, and produce air and water emissions. Reclamation will result in closure of the facilities and final reclamation aims to return the land to equivalent land capability (Alberta Queen's Printer, 2004) as per the Conservation and Reclamation Plan outlined in Volume 1, Section 8. Throughout the Project's different phases, the intensity of impact will vary.

A goal of the Conservation and Reclamation (C&R) plan addressed in Volume 1 is to return similar soil and terrain conditions to those that existed before disturbance, and to result in equivalent land capability for forest ecosystems after reclamation. Successful return to equivalent land capability for forest ecosystems is important to supporting the target ecosite phase vegetation, related biophysical characteristics, and land uses that will be sustainable over time. Some of the aspects of the C&R plan to return land use capability, and which are congruent with the Cumulative Environmental Management Association (CEMA) Reclamation Working Group and the Oil Sands Mining End Land Use Committee recommendations include the following:

- Baseline data was collected to establish pre-disturbance land capability (including soil and terrain conditions) and vegetation conditions;
- Priorities in setting end land use and reclamation targets included reclamation to the pre-disturbance land uses, and being consistent with government regulations and guidelines;
- Reclamation addresses end land use compatible with pre-disturbance and adjacent land conditions and the target reclamation conditions to achieve this (e.g., soil, terrain, drainage, revegetation (including weed control), wetlands and soil handling);
- The soil and terrain reclamation targets were dominantly a return to conditions with a land capability similar to pre-disturbance conditions and physically able to support the target land use and related ecosite phase;
- Vegetation reclamation targets were predominantly chosen to be similar to pre-disturbance ecosite phases. Achieving these self-sustaining vegetation conditions promotes a return to pre-disturbance land uses including forest productivity, natural areas, biodiversity/habitat and traditional use;
- Vegetation prescriptions use native plants where feasible and utilize the framework of the *Field Guide to Ecosites of Northern Alberta*. Natural regeneration is proposed for some sites where appropriate;
- Minimizing disturbance, as practical, is used to conserve productive forest lands and traditional use;
- Land reclamation will be carried out on a progressive basis;
- Applicable legislation was considered in the design, and the EPEA Approval reclamation requirements will be followed;

- Reclamation monitoring will be carried out to assess reclamation success and will utilize government regulatory reclamation guidelines; and

- The C&R was developed in coordination with regulatory agencies.

Additional information can be found in Volume 1, Section 8.

Potential impacts to land and resource use from the Project will be in relation to clearing and infrastructure development (including use of granular resources), increased human population, and change in aesthetic effect such as noise. These Project-related changes are described in the following sections.

13.8.1.1 Site Clearing and Infrastructure Development

Development of facilities and associated infrastructure for the Project includes plant facilities, pads, and linear corridors such as roads, pipelines and transmission lines (3,032 ha; 3% of the land and resource use LSA). New disturbance will account for 2,850 ha of the Project footprint. Some of the proposed linear corridors will follow existing disturbances such as seismic lines and trails, minimizing the need for further disturbance in the area (Volume 1, Section 8).

The CPF locations were selected based on a number of factors including maximizing the use of existing land disturbances, maintaining a 100 m buffer around water bodies and watercourses, and locating the facilities on solid ground.

Clearing of areas for Project infrastructure will lead to a change in access, which can alter land and resource use. Further to providing increased access, if not properly managed, clearing of vegetation and linear disturbance can cause landscape fragmentation, changes in vegetation regime, and soil erosion. Clearing and disturbance will be greatest during the construction phase of the Project, which also requires granular resources for both roads and plant facilities. Additional land disturbances will be minimal throughout the operation and reclamation phases, except for drilling and wellpad development which continue throughout the operation phase. The conservation and reclamation plan (Volume 1, Section 8) provides details on soil and vegetation management and mitigation of impacts from site clearing and infrastructure development.

The Project facilities and equipment will be located in remote areas, away from primary and secondary highways and from any community. The facilities are not expected to be visible from the communities, primary or secondary highways. The facilities will be buffered by existing trees up to the point when logging is scheduled for the area.

The pipelines for the Project will be both aboveground and belowground. Aboveground pipelines will connect the CPF with the production pads. In total, 279 ha are anticipated to be required for pipelines and ROW. Since the aboveground pipelines have the potential to disrupt wildlife movement, wildlife crossing structures have been included as a mitigation strategy in the Wildlife Section of this EIA (Volume 4, Section 11).

The development of roads and drilling pads throughout the LSA disrupts the sequencing of forest harvest plans developed by Al-Pac in the LSA. North American is working with Al-Pac to integrate management of required forest harvest activities. In total, 430 ha of additional roads will be developed and 2,197 ha will be developed for pads and industrial sites such as CPFs and camps.

Hunting, trapping, fishing, and berry picking may be affected by increased access due to Project infrastructure. Infrastructure and roads may affect traditional use throughout the LSA area. More remote areas may become more accessible to more users, both traditional and recreational.

There is an increased potential for man-made forest fires given increased recreational access. The linear disturbances and fragmentation of the landscape can affect wildlife movement and habitat. Increased linear development makes it easier for wolves to travel in the bush and has been a contributor to ungulate predation in the region (James and Stuart-Smith, 2000). As well, linear and pad disturbances can physically disrupt berry patches. Raspberries are opportunistic in cleared areas, and can be expected to increase in some areas as a result of clearing.

Formal recreational opportunities are not affected by Project infrastructure and clearing as no campgrounds are located within the LSA. However, increased access to remote areas may increase impromptu camping, snowmobiling and other types of non-consumptive recreation. Access will be discussed in further detail in Section 13.8.2.3.

13.8.1.2 Increased Population/Workforce

The population increases in Conklin, Janvier, Chipewyan Prairie First Nation Reserve, Lac La Biche and Lakeland County are discussed in Volume 5, Section 14.

Population increases will increase traffic on Highway 881. Throughout the construction phase of the Project, passenger vehicles, buses, and wide and heavy loads on tractor-trailer units will travel to the Project. Throughout the operations phase, operational personnel are anticipated to travel to and from the site on Highway 881. Traffic on the highway will continue to be of concern to the local users and is discussed further in Volume 5, Section 14.

An increase in regional population will result in a proportional increase in recreational and land and resource use activities including fishing, hunting and trapping, berry picking, and use of camping and lodging facilities. Increased access in the Project area, along with increased pressure on wildlife habitat from resource development, may limit hunting and trapping success, or may mean greater numbers of animals are successfully hunted. In addition and as a result of the increase in access, more people in the region may choose to pick berries and participate in other recreational activities.

13.8.1.3 Noise

Noise generated may affect perceived enjoyment of recreational activities in the area of the CPFs, and may also affect wildlife patterns. North American will incorporate noise reduction techniques into the detailed design of facilities to manage noise levels in surrounding areas. The noise assessment in Volume 2, Section 3, found that noise from the Project will have a negligible impact.

13.8.2 Impact Assessment and Mitigation Measures

Effects from Project activities are interpreted by identifying changes, or impacts, in the key indicators of land and resource use in the following sections. Mitigation measures that will be undertaken to lessen or remove the impact on the indicators are also listed below. Any residual impact following mitigation is then assessed as the final impact assessment of the Project on the land and resource use indicators. Project impacts and mitigations are described in the following paragraphs. Table 13.8-1 summarizes the mitigation strategies for each impact and indicator.

Table 13.8-1 Summary of Mitigation of Project Impacts

	Forestry	Hunting & Trapping	Fishing	Berry Picking	Agriculture	Granular Resources	Non-consumptive Outdoor Recreation
Clearing & Disturbance	Clearing of previously undisturbed areas, timber salvage and creation of access roads will be coordinated with Al-Pac and existing clearings will be used to the greatest extent possible. Coordination will result in no loss of forest resources through disrupted harvest scheduling. Cleared areas will be revegetated throughout the Project life, when possible, and upon reclamation.	Access will be restricted to the plant site. Use of existing disturbed areas, to the greatest extent possible, to minimize new clearings. Disturbed areas will be reclaimed. A Conservation and Reclamation plan has been developed for the Project.	New roads or linear disturbances are not planned in proximity to the area's lakes which have been deemed suitable for fishing.	Cleared areas will be revegetated and reclaimed according to the conservation and reclamation plan.	Not applicable (N/A).	New granular resources will be mapped and exploited if found on the Project lease. Optimizing road construction with other resource users in the LSA will reduce use of road grade gravel.	Cleared areas will be reclaimed according to the conservation and reclamation plan. Traditional areas will be avoided or relocated.
Infrastructure Development	Facilities will be removed, and the site will be reclaimed according to the conservation and reclamation plan.	Reclamation according to the conservation and reclamation plan. Appropriate buffers of riparian areas will be protected. Constructing wildlife crossings for aboveground pipelines.	Appropriate buffers for riparian areas will be protected. Well pads will be located 100 m from waterbodies where practicable.	Cleared areas will be reclaimed upon Project completion according to the conservation and reclamation plan. Where feasible, buffers will be maintained along roadsides to minimize dust migration.	N/A	Locations from which granular resources were taken will be reclaimed to equivalent land capability. Any new resources discovered during operations will be mapped.	No site in the LSA.

	Forestry	Hunting & Trapping	Fishing	Berry Picking	Agriculture	Granular Resources	Non-consumptive Outdoor Recreation
Increased human population	N/A	North American will inform workers of provincial licensing requirements. Hunting will not be permitted on CPF or well sites. Where required, debris will be spread on pipeline rights of way to reduce ease of access. Caribou habitat conservation plan.	North American fishing policies and provincial licensing requirements will be explained to workers.	N/A	N/A	N/A	New formal recreation facilities may be developed by the municipality in response to regional population increase.
Noise	N/A	Noise will be minimized at pads, and facilities will be removed upon decommissioning.	Noise will be minimized at pads, and facilities will be removed upon decommissioning.	Noise will be minimized at pads, and facilities will be removed upon decommissioning.	N/A	N/A	Noise will be minimized at pads, and facilities will be removed upon decommissioning.

13.8.2.1 Land Use Planning and Resource Integration

There is currently no formal integrated resource plan for the area in which the Project is located. However, the Project is consistent with the RSDS for the Athabasca Oil Sands Area (Alberta Environment, 2006) and the Government of Alberta's Sustainable Resource and Environmental Management practices (Sustainable Resource and Environmental Management, 2006). The provincial management of oil and gas resources in the area is focused on oil sands development, as evidenced by the recent shut in of some gas projects in the area by the Province. North American will work with other land and resource users to maximize integration of resource management. North American has developed an integrated management plan with Al-Pac for the Project that includes timber salvage and the reduction of fire hazard. North American will follow the relevant FireSmart guidelines (Partners in Protection, 2003) including having appropriate setbacks from forest and surface vegetation and firefighting equipment.

In addition, North American is working with Al-Pac on a progressive approach to share in the building of roads that both industries can use. This may assist in reducing the number of roads necessary in the area. There is no impact from the Project on land use planning and resource development.

North American will institute mitigation measures for impact to caribou habitat according to the Caribou Protection Plan developed for the Project, and described in Volume 4, Section 11. North American is seeking to join the Alberta Caribou Committee or other similar organizations devoted to caribou protection and management. North American contracted the Center for Conservation Biology from the University of Washington to conduct an environmental assessment on its behalf on the impacts of oil sands development on North American lease lands on moose, caribou and wolf. This environmental assessment and ongoing monitoring aids in detecting impacts and is discussed further in Volume 4, Section 11.

13.8.2.2 Environmentally Significant and Protected Areas

The Crow Lake Diversity Area is located at the western edge of the RSA. It will not be impacted by the Project because there are no plans to have facilities in the immediate vicinity. The increase in access that will result from the Project also will not have an impact on this ESA, as the ESA is currently accessible by Highway 63. Increased population may increase the use of this area; however, it is a provincial resource for public use.

The Project will have an impact on the Egg Lake – Algar Lake Diversity Area as a large portion of the LSA overlaps with this area. According to Sweetgrass Consultants (1997), the management consideration for this ESA is the maintenance of unfragmented natural habitats for caribou. The conservation planning for caribou and their habitats is provided in Volume 4, Section 11. The effects of the Project on caribou and their habitats including appropriate mitigation are provided in Volume 4, Section 11.

Stony Mountain Wildland Park is a public resource established and maintained for Albertans and visitors and is located at the northern section of the LSA. There is no formal management directive for the Stony Mountain Wildland Park (Parks and Protected Areas, personal communication, 2007). North American will not locate any facilities or conduct any drilling in the Stony Mountain Wildland Park. As a result of increased population in the area, there may be an increase in the use of the park. Overall there will be no impact on the Stony Mountain Wildland Park.

13.8.2.3 Access

The Project will increase access into the LSA. Access to the CPFs will be restricted. However, access to other facilities will not be restricted, except for safety reasons. North American will restrict access to pads during sensitive operations and will provide signage to make users aware of oil sands facilities.

Linear corridors, such as pipeline ROWs or roads to pads, will provide access to previously remote locations within the RSA. Efforts will be made to minimize the width of the ROW by overlapping uses whenever possible and restricted access control measures, such as spreading vegetative debris on seismic lines, will be taken to limit accessibility. The Project footprint will create approximately 430 ha of additional gravel road disturbance which will increase the ease of access to more remote areas away from Highway 881. Current secondary road infrastructure in the RSA is minimal, and although the incremental increase is five times that of baseline area in roads, the increased disturbance will still be less than 0.1% of the LSA.

Increase in access can have both positive and negative impacts on land and resource use and will likely be taken advantage of by both consumptive and non-consumptive recreational users. Overall, consumptive and non-consumptive recreational uses can be enhanced by greater access to remote locations. Users that prefer to use remote areas will now have greater access; however, it is not known if the number of people who prefer to use remote areas will increase. A potential consequence of increased access and greater ease of remote access is competition for consumptive resources such as berry picking, hunting and fishing. The competition may displace some traditional users. The extent of increased access in the LSA is related to increased (new) disturbance, which is estimated to be 3% of the LSA.

Increased access to remote locations may be both positive and negative, depending on the user. Therefore, the overall impact is considered neutral. The extent is regional, magnitude is low, and duration of impact is long-term. It is considered continuous, reversible in the long-term and impact is negligible.

The following sections describe the impact that increased access will have on each of the recreational uses.

Fishing

New roads or linear disturbances are not planned in proximity to the area's lakes, which have been deemed suitable for fishing. No change in access to these lakes is anticipated.

Regional population increases may increase the number of fishermen in the area. However, fishing is managed as a public resource through provincial licensing requirements and fish and game inspections. During all aspects of the Project, all North American Project staff and contractors are required to follow the Province of Alberta's Fishing Regulations. North American will make the provincial requirements known to employees and contractors.

The majority of the lakes in the Aquatic Resources RSA that hold fish are not considered susceptible to acid deposition as they are in an area where lakes are considered well buffered against acidic inputs. No impact to fishing is anticipated from the Project.

Hunting

Land clearing and terrain modification due to Project activities have the potential to affect wildlife movement, both by causing direct habitat loss, and by increasing human and predator access to remote areas. For example, linear corridors provide ease of travel for both wildlife and hunters.

Therefore, there is the potential to reduce habitat effectiveness with increased density of linear features. The construction, operation, and closure of the Project will have various impacts on wildlife habitat availability, habitat effectiveness, and habitat connectivity, and may lead to direct and indirect mortality and displacement of wildlife. A discussion of wildlife in the LSA and RSA is included in Volume 4, Section 11.

Hunting is a publicly managed activity through licensing. Additionally, skill and luck are involved in successful hunting. Traditional users are not subject to the licensing limitations and may be displaced by other hunters. However, they will also have greater access to more remote locations. Hunting will not be permitted near the CPF or well sites for safety reasons. North American will make provincial regulations regarding hunting known to its employees and contractors.

Measures to mitigate the impacts that Project activities may have on wildlife and, therefore, on hunting success, include the following:

- Using existing disturbed areas to the greatest extent possible to minimize new clearing;
- Protecting and maintaining riparian habitat through appropriate buffers between facilities and streams;
- Managing facilities noise levels;
- Constructing wildlife crossings for aboveground pipelines; and
- Reclaiming cleared areas to restore wildlife habitat upon Project completion.

The increase in disturbance in the LSA due to the Project is estimated to be 2,850 ha, or 3% of the LSA. The Project has the potential to affect habitat availability, mortality risk and movements of hunted species. The Project effects on wildlife were assessed as low to moderate magnitude impacts, given the indicators and areas considered. These impact assessments are detailed in Volume 4, Section 11.

Overall, the residual impact to hunting is considered to be negative, regional, medium in impact, continuous, reversible, with a medium environmental impact throughout the Project operations phases, and negligible after closure.

Berry Picking

Dust from vehicular traffic may settle on berry patches, making berries unpalatable prior to washing. Where feasible in the forest management plan, vegetation buffers will be maintained along roadsides to minimize dust migration.

The Project footprint will displace 1,012 ha of blueberry habitat, or 3% of the existing blueberry habitat. It will disturb 469 ha of low bush cranberry habitat, or 2% of the baseline cranberry habitat. The Project footprint will disturb 56 ha of potential strawberry habitat, or 6% of baseline habitat. Hence, during operations, the berry habitat may be reduced, thereby reducing berry picking. Raspberries are anticipated to increase after clearing in some areas. Increased access may bring more berry pickers to more remote areas, and some patches previously accessed by few users may become very popular. During Project construction and operation, the Project impact is negative, regional low in magnitude, long term, occasional, and reversible in the long-term.

Reclamation of the Project is anticipated to increase blueberry habitat by 896 ha over baseline. It will increase cranberry habitat by 156 ha over baseline, and return strawberry habitat to baseline levels.

Post reclamation, impact on berry habitat is positive in direction, regional in extent, low in magnitude, short-term in duration, isolated, reversible in the short-term with high confidence. Following closure and reclamation, environmental impact to berry habitat is rated as negligible.

Traditional Users

Traditional uses in the study area include hunting, trapping, berry picking, fishing, camping and recreational travel on historical trails. A traditional ecological knowledge and traditional use study is underway for the Project. Traditional users will face competition from recreational and sport users and new users will have access to areas that were formerly remote. At the same time, traditional users also may enjoy easier access to traditional resources through use of roads and infrastructure.

Disruption of hunting and trapping may occur if wildlife movement patterns are altered. Hunters must maintain a safe buffer around oil and gas facilities to avoid damaging infrastructure, which may curtail hunting success. Hunters can try different areas looking for game, but traplines are fixed and managed by the Government of Alberta. There are 18 traplines registered in the LSA. North American will provide compensation for trappers whose activities have been affected by Project infrastructure. Trapper compensation will be in accordance with the provincial framework or industry accepted standards.

Areas of importance to traditional users are being identified through ongoing consultation with First Nations and other users, and a discussion of traditional use is included in Volume 5, Section 11. With consultation, North American will seek to avoid sacred or important traditional areas, and will seek to mitigate any impact to important local trails. An estimation of impact from the Project is addressed in Volume 5, Section 16.

Non-Consumptive Recreation

There are no formal recreational facilities in the LSA; however, an increase in access may facilitate an increase in impromptu recreational activities such as snowmobiling, camping, driving ATVs, and cross country skiing. The formal recreational facilities that are in the RSA may receive more use due to an increase in population. The construction and operation phases of the Project will have an onsite camp that will have formal recreation facilities for construction workers. These workers are not anticipated to be heavy users of local formal camping, boating and municipal recreational facilities. Any personnel who move to the region will contribute to the ongoing use of all formal recreation facilities. Increased population will also likely result in increased formal recreation facilities, in the long-term.

Impact to non-consumptive recreation due to increase in access is considered to be both positive and negative, depending on the user; therefore, the overall impact is neutral. It is considered to be regional, negligible in magnitude, reversible and long-term, with an overall environmental impact of negligible.

13.8.2.4 Agriculture

There were no wild rice operations or grazing leases identified in the LSA through the LSAS search. Therefore, the Project is not considered to have an impact on agricultural land users.

13.8.2.5 Granular Resources

In total, it is estimated that the Project will require 2,735,000 m^3 of aggregate. This is a greater volume than currently available to North American from the dispositions on the Project lease and what is currently known to be available south of Fort McMurray, as is discussed in the RIWG survey. The new and proposed aggregate mines north of Fort McMurray provide a potential source of aggregate for the Project.

North American has developed relationships with other sand and gravel operations in the RSA. They will continue to work with these operators to secure sand and gravel sources. The area south of Fort McMurray represents the primary sourcing area for the Project. However, the new quarries north of Fort McMurray are also accessible to the Project, and these have significant capacity.

Mitigation measures include, where possible, reclaiming the aggregate from well pads that have been abandoned during the life of the Project and using it for the construction of new pads and roads, developing new sources of gravel, and optimizing road construction with other users, such as forestry, to optimize the gravel resources utilized for road construction. Any additional granular resource pits found and utilized on the LSA will be fully reclaimed according to the conservation and reclamation plan (Volume 1, Section 8). In addition, North American could use the quarries north of Fort McMurray to mitigate the impact on the aggregate resources in the RSA.

Granular resources are a non-renewable resource and consumption removes the resource. However, the resource is identified and licensed for use by the provincial government. Based on the current known quantities of granular resources for the extra regional area south and north of Fort McMurray the residual impact is considered negative, extra-regional, medium in impact, long-term, occurring regularly over the Project life and irreversible. Confidence is medium.

13.8.2.6 Forest Management

The integrated forest management plan between North American and Al-Pac has been developed to optimize forest harvesting operations with construction operations. The plan allows Al-Pac to schedule cut-blocks, where possible, to coincide with pad clearing by North American. Where cutblocks are not feasible for initial clearing, timber salvage on the clearing will be arranged with Al-Pac. This coordination will result in no loss of forest resources.

Pads areas that are cleared to a larger extent than needed through the operations phase will be allowed to revegetate, and will be harvested with the surrounding stands in the next harvest rotation. Cleared areas will be revegetated upon Project completion and reclamation. The integrated planning also allows for rationalization of road infrastructure for the two industries.

Impact to timber resources is dealt with in Volume 4, Section 10.

13.8.2.7 Summary of Residual Impacts

Residual impacts are those that remain following mitigative measures and have been identified in the previous sections. These residual impacts are summarized in Table 13.8-2.

Table 13.8-2 Residual Impact Assessment

Environmental Issues Associated with the Project	Rating							
	Direction of Impact	Extent of Impact	Magnitude of Impact	Duration of Impact	Frequency of Occurrence of Impact	Permanence of Impact	Level of Confidence	Environmental Impact
Increased access to remote areas	Neutral	Regional	Low	Long-term	Occasional	Reversible in the long-term	Low	Negligible
Granular Resources are depleted in the RSA	Negative	Extra-Regional	Medium	Long-term	Regularly	Irreversible	Medium	Medium
Wildlife habitat reduction and increased remote access affects hunting success.	Negative	Regional	Medium	Long-term	Continuous	Reversible	Medium	Low to Medium during operations, Negligible after reclamation
Land clearing and terrain modification may affect areas used for berry picking	Negative during operations to positive after reclamation	Regional	Low	Long-term	Occasional	Reversible in long-term	Medium	Negative during operations, Positive after reclamation
Increased population affects non-consumptive recreation use	Neutral	Regional	Negligible	Long-term	Occasional	Irreversible	Medium	Negligible

13.9 Cumulative Effects Assessment

The previous assessments considered the combined effects of the Project and existing and approved developments and activities in the LSA. The cumulative effects assessment considers the effects of the Project plus existing, approved, and planned developments within the study area. Cumulative effects on land and resource use are evaluated with the potential impacts from other developments that are predicted to overlap in time and space with the potential impacts from the Project. Planned developments are projects that have been publicly disclosed (but not approved) as of March 1, 2007 and include:

- Possible Highway 63 and Highway 881 connector bypass around Anzac;
- Possible Highway 63 and Highway 881 connector west of Conklin;
- Canadian Natural Resources Limited Kirby Project;
- Devon Jackfish II SAGD; and
- OPTI / Nexen Long Lake South SAGD.

In the cumulative case, none of the project footprints are within the RSA for North American. The two road connectors may be in or near the RSA. All of the combined projects may increase population in the area. Physical development of the projects does not overlap or abut the RSA, so linear disturbance will not be substantially changed within the RSA.

13.9.1 Access and Population

The linear disturbance and roads within the RSA will be largely attributable to North American's footprint. Therefore, the cumulative case is not substantially greater than the application case in

increasing access to the RSA, except for the two proposed connector roads. The cumulative impact on access is neutral because it is positive for some land and resource users as it presents new opportunities to access previously remote locations, while it may be considered negative for other users as it may also increase competition for resources.

More people living and working in the area will mean more use of consumptive and non-consumptive resources. It is not possible to estimate the level of increase in usage.

The following sections discuss the cumulative impact that increased access has on each land and resource use.

13.9.1.1 Hunting and Trapping

The cumulative impact on hunting and trapping is neutral. The increase of access to the RSA will be largely due to North American roads and infrastructure, so no increase of local access is anticipated in the cumulative case. The two connector roads may increase animal mortality. Increased access also increases fragmentation and habitat loss which may result in a decrease in wildlife population. This decrease may reduce hunters' and trappers' overall success. Additional information on the impact on wildlife can be found in Volume 4, Section 11.

13.9.1.2 Berry Picking

The cumulative impact on berry picking is neutral. The cumulative case will have approximately the same disturbance in the RSA as for the application case, as the three oil sands projects are outside the RSA and will not contribute to linear disturbance and infrastructure in the RSA. The two proposed connector roads would disturb vegetation in the RSA. Additional information on the impact on vegetation can be found in Volume 4, Section 10.

13.9.1.3 Fishing

The cumulative impact on fishing is considered positive as individuals that fish have greater access to fish bearing water bodies and therefore can have greater success. However, the cumulative case will not increase access to lakes considered good for fishing. No increase in impact to fishing is anticipated due to access in the RSA in the cumulative case. ASRD regulates all fishing and angling within the province of Alberta. More information on the impact on fish is provided in Volume 3, Section 8.

13.9.1.4 Traditional Use

The cumulative impact on traditional use as a result of increased access is neutral as traditional users will face greater competition from non-traditional users for hunted animals, berries and other traditional plants, but traditional users will also gain more access into previously remote areas. Traplines may also be disturbed and trapper's cabins may be discovered and used/vandalized. More information on the impact on traditional use is provided in Volume 5, Section 16.

13.9.1.5 Non-consumptive Recreation

Rights-of-way and roads allow for more recreational activities such as driving ATVs, snowmobiling, cross country skiing and impromptu camping. This has a positive impact on non-consumptive recreational users as they are able to enjoy these activities in a wider area.

13.9.2 Granular Resources

The cumulative impact on granular resources is negative. There are presently not enough known aggregate resources in the area south of Fort McMurray to meet the probable long-term cumulative demand. Although this is positive for the granular resource producers from an economic point of view, it is negative for the industry that requires it. If no other local source is found, industry will be forced to bring in aggregate from other locations (i.e., north of Fort McMurray), which is expensive and will also increase the need for trucks on roadways. Continued integrative resource planning may alleviate some of the pressure on the local need for aggregate.

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14 SOCIO-ECONOMIC IMPACT ASSESSMENT

14.1 Introduction

The purpose of a social impact assessment is to assess the potential effects of developments on social structures and capacity of communities in the area where the development occurs. The social impact assessment estimates the ability of the communities to respond to changes evoked by a project, as measured through change in areas of housing, public services, physical infrastructure and community capacity.

The purpose of an economic impact assessment is to quantify the economic contribution that developments will make to the RSA and to the province. There are three main reasons for doing an assessment of regional economic impacts:

- To determine the extent to which new employees will be brought into local communities which, in turn, determines the increases in population that these communities can expect. This information is used in the social impact assessment, which addresses the effects population increases will have on demands on community infrastructure and services;

- To estimate how much of the employment and business income generated directly and indirectly by the development will actually stay in the communities in the region. This provides a measure of the benefit the project contributes locally; and

- To determine what impact the project development will have on local government costs and revenues.

The provincial economic impact assessment provides estimates of the employment and income that the development will generate in the province as a whole.

This SEIA describes the social and economic baseline conditions and the anticipated effect on those parameters from construction and operation of the Project. The terms of reference (TOR) issued by Alberta Environment (AENV) guide the assessment of the social and economic conditions in the study area. Social effects on population, services, infrastructure and Aboriginal traditional land uses and culture are assessed. An assessment is made of the impact from training opportunities and economic opportunity on the local, regional, provincial and national scales.

14.2 Study Boundaries

14.2.1 Spatial Boundaries

The Project leases are located in the northern portion of Lakeland County and the southern portion of the Regional Municipality of Wood Buffalo (RMWB). Portions of the Project leases are located south of the hamlet of Anzac, while the bulk of the Project is located west and northwest of the hamlets of Conklin and Janvier (Figure 14.2-1). The communities that are closest to the Project and are anticipated to be most directly affected by population increases, traffic, impact to traditional land use and local business opportunities during construction and operation are Conklin, Janvier and the Chipewyan Prairie Dené First Nation (CPDFN) at Janvier. These communities constitute the LSA.

The RSA for the socio-economic assessment includes the LSA communities, as well as Anzac, Gregoire Lake Estates and the Fort McMurray No. 468 First Nation at Willow Lake (FMFN), Lac La Biche, Lakeland County north of Lac La Biche, the Heart Lake First Nation (HLFN) and Mariana Lake (Figure 14.2-1). The RSA communities were chosen to reflect where impacts relating to the Project may occur, such as:

- Traffic passing through communities (Anzac, Gregoire Lake Estates, FMFN and Lac La Biche);
- Location of the Project with respect to traditional lands (FMFN, CPDFN, HLFN);
- Provision of municipal services to the rural communities (RMWB); and
- Population impacts (Lac La Biche and Lakeland County as the main service centre for North American).

Population effects from the Project on Anzac, Gregoire Lake Estates and FMFN are not considered likely for the Project, as these communities are located much closer to two other SAGD projects, Long Lake and Surmont. Additionally, these communities are experiencing high housing costs and are not considered likely communities for new in-migrants associated with the Project.

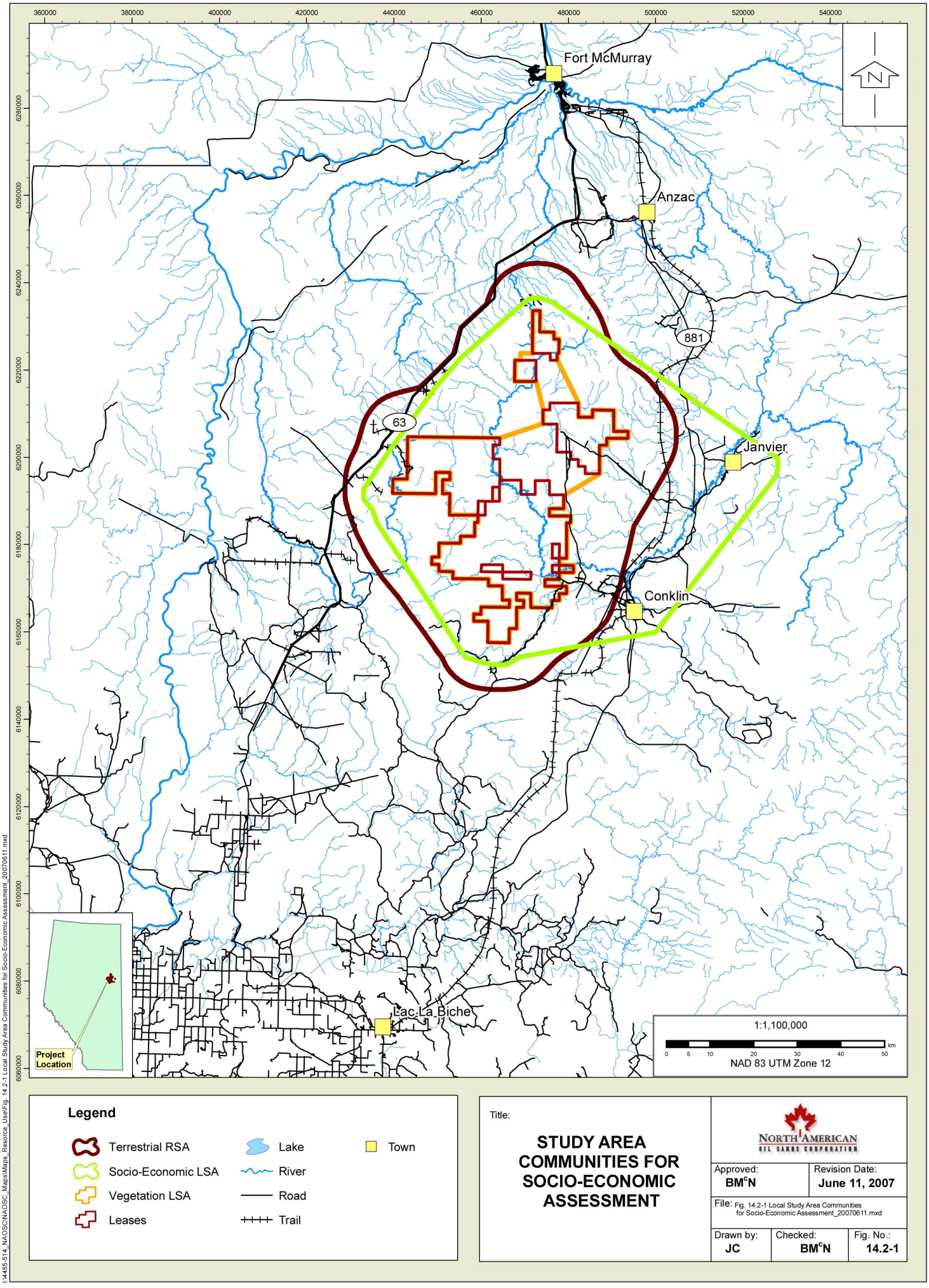
The RSA does not include the city of Ft. McMurray as the Project will be serviced out of Lac La Biche. Although not explicitly included in the RSA, the socio-economic assessment considers impacts on the RMWB in its role as the provider of infrastructure and municipal services to the communities included in the LSA.

There are several existing and proposed oil sands development projects within the RSA. The projects that are included in the baseline, application and cumulative cases are identified in Table 1.1-1 (Volume 1, Section 1).

The study area for the economic impact assessment includes the above described local and regional study areas and the Province of Alberta.

14.2.2 Temporal Boundaries

The temporal boundary is set by the economic life span of the Project, which is estimated to be 42 years, between 2008 and 2050. The 42 year time frame includes the construction, continued drilling and operation phases of the Project. Closure and reclamation will follow to 2053. Construction is estimated to commence in 2008 and be ongoing through approximately 2018 when Thornbury Expansion and Northwest Leismer are constructed. A further construction project is anticipated at South Leismer in 2032. Operations hiring will begin in 2009, and operations and construction will occur simultaneously for approximately ten years. Drilling will occur throughout the life of the Project. Reclamation of pads will be ongoing throughout the Project as appropriate and will also follow closure of the plant facilities.



Legend

- Terrestrial RSA
- Socio-Economic LSA
- Vegetation LSA
- Leases
- Lake
- River
- Road
- Trail
- Town

Title:

STUDY AREA COMMUNITIES FOR SOCIO-ECONOMIC ASSESSMENT

NORTH AMERICAN OIL SANDS CORPORATION

Approved:	Revision Date:
BM^{C}N	June 11, 2007

File: Fig. 14.2-1 Local Study Area Communities for Socio-Economic Assessment_20070611.mxd

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14.3 Key Issues

Several sources were reviewed to determine the socio-economic issues for the Project:

- Public consultation record (Volume 1, Section 6);
- TOR (Volume 2, Appendix D);
- Statements of intervention from the RMWB to the EUB (Suncor Voyageur application hearing, July 2006);
- Submissions from Lac La Biche and Lakeland County to the Oil Sands Review Committee;
- SEIAs prepared for in-situ oil sands projects in the Lakeland County and RMWB, including:
    - Jackfish SAGD (Devon Canada Corporation, 2003);
    - Jackfish 2 SAGD (Devon ARL Corporation, 2006);
    - Christina Lake Regional Project (MEG Energy Corp., 2005);
    - Surmont In-situ Oil Sands Project (Gulf Canada, now ConocoPhillips Canada, 2001);
    - Long Lake (OPTI, 2000); and
    - Long Lake South Project (Nexen/OPTI, 2006).

Issues of importance to the communities in the LSA and RSA include:

- **Traffic:** Increases in traffic are anticipated on all sections of Highway 881 associated with current and proposed developments, which has implications for highway safety due to volume, speed, congestion and multiple users ranging from local vehicles to tractor trailer units.
- **Employment and training opportunities:** Local and Aboriginal businesses and individuals seek participation in the employment and training opportunities created by the Project.
- **Housing and accommodation:** Constraints exist for housing and accommodating construction and operations workforces.
- **Communities in transition:** Identified concerns include:
    - The interaction of the local communities with the construction and operations workforce;
    - The potential changes to the rural community identity from long term population increases;
    - The loss of traditional rural lifestyle; and
    - The challenges of local communities in accessing opportunities presented through oil sands developments.
- **Municipal services:** The ability of the RMWB to provide municipal services in rural communities has been identified as a concern. Regional issues within the RMWB were presented in intervenor statements before the EUB during the Suncor Voyaguer hearing in 2006. The issues identified focus on potential impacts to the human environment from the recent high rate of annual growth in the region and the resulting effect on cost of

living and the ability to supply adequate services. The RMWB's issues are primarily centred on Fort McMurray rather than the rural communities. However, the implication for smaller communities is that municipal services may be constrained by the demands of conditions existing in Fort McMurray and by financial, physical and personnel constraints to developing infrastructure in the smaller communities.

- **Capacity:** Concerns that Lac La Biche and Lakeland County have capacity to accommodate growth in population resulting from direct and indirect jobs at oil sands projects. In 2006 and 2007, the two municipalities gave a presentation to the Oil Sands Review Committee (Lac La Biche – Lakeland County Economic Development Partnership, undated, LLBRICC, 2007), indicating that the municipalities should be included in future planning for oil sands development. Both communities are favourable about the potential growth related to future oil sands development. The town and county have jointly undertaken infrastructure and planning initiatives that position the town and county to accommodate population increase and resulting economic benefit. Those present were concerned that they may not be considered in the provincial and regional planning for oil sands development.

14.4 Economic Impact Assessment Methods

14.4.1 Sources and Use of Data

An economic impact assessment begins with information provided by the proponent. In the case of the development phase, as much information as possible is collected regarding:

- Project components and timing;
- Plans with respect to engineering and Project management;
- Requirements for, and likely sourcing of, construction materials and equipment; and
- Manpower projections by amount and skill type.

Operating information provided by the proponent generally includes:

- Planned production;
- Likely phasing of new investment to maintain production;
- Number and types of staff required; requirements for, and likely sourcing of, materials and equipment for project operation and maintenance;
- Hiring and purchasing policies; and
- Estimates of taxes and royalties generated by the Project.

Margins of reliability associated with the project information provided by North American carry through to the estimates of economic impact that are based on this information. Uncertainties surrounding project data normally can range up to plus or minus 25%.

The information provided by North American is combined with data available publicly (e.g., provincial multipliers [Alberta Finance, 2006]) to generate estimates of the Project's indirect and induced effects.

Impacts are calculated separately for Project construction and operations.

Unless otherwise stated, all income and cost data are presented in 2006 Canadian dollars.

There are a number of limitations associated with any economic impact assessment, which are important in the current economic climate.

- The assessment does not distinguish between incremental and displacement effects. Economic impact assessment implicitly assumes that there is excess capacity in the economy and that supplying the demands of a new project will employ people and resources that would be unemployed in the project's absence. However, if there is full or close to full employment, the project may divert resources from other productive uses. In Alberta, there is currently little excess capacity in the economy. This is particularly true for the construction industry and is likely to continue for some time (Construction Sector Council, 2006). During construction, the Project will compete with other activities, both ongoing and prospective, that require the same labour skills. Although the Alberta Government has initiated programs to bring workers in from outside the province, there are constraints on the extent to which this can be accomplished. Thus, not all of the economic activity generated by the Project's construction can be considered incremental. This may be less true for the operations phase, as labour shortages will likely moderate by the time the later components of the Project come on-stream.

- The distribution of economic benefits or the equity of that distribution is not assessed. Although some local residents may gain by the creation of jobs in a particular area, and although the area as a whole may be economically better off as a result, the net effect on some sectors of the economy may be negative.

- The accuracy of estimates of economic impact varies according to the size of the area being considered. In Canada, input-output models have been developed for the country and for individual provinces. Thus, multipliers for Alberta as a whole (and for other provinces) are relatively accurate. However, input-output tables have not been developed for sub-provincial areas. Instead, provincial statistics must be adapted, usually on a professional judgement basis, to reflect local conditions. The result is that the confidence levels in the effects estimated for the RSA are lower than those for the province.

14.5 Social Baseline and Impact Assessment Methods

14.5.1 Data Collection

Data sources for the social baseline assessment and the application case impact assessment included the following:

- SEIA reports completed for projects in the area including
    - Jackfish SAGD (Devon Canada Corporation, 2003);
    - Jackfish 2 SAGD (Devon ARL Corporation, 2006);
    - Christina Lake Regional Project (MEG Energy Corp., 2005);
    - Surmont In-situ Oil Sands Project (Gulf Canada, now ConocoPhillips Canada, 2001);
    - Long Lake (OPTI, 2000); and
    - Long Lake South Project (Nexen/OPTI, 2006).

- The documents and information provided by Lakeland County and the Town of Lac La Biche on their websites, and in response to information requests;

- The documents and information provided by the RMWB on its website, and in response to information requests;

- The intervention statements submitted by the RMWB at the Suncor Canada Voyageur hearing before the EUB in July 2006, and the response of the EUB (2006);

- Documents, news releases and information posted on various private, provincial and federal government websites including, but not limited to, Northern Lights Health Region, Aspen Regional Health, Northland School Division and Northern Lights School Division, Alberta Infrastructure and Transportation, Indian and Northern Affairs Canada, Alberta Municipal Affairs and Housing and the Child and Family Services Authority;

- Information garnered by North American during its consultations with local and aboriginal communities; and

- Personal communication with various individuals.

14.5.2 Social Impact Assessment

The social impact assessment describes the characteristics of the communities in proximity to the Project and the capacity of these communities to accommodate changes associated with the Project or series of projects. The community characteristics are described through indicators of housing, medical services, regional and municipal infrastructure and services, local governance, protective services, sense of community and traditional use. The capacity of the community to respond to and manage the anticipated changes brought by the Project is described through comparison of the anticipated change to these same indicators.

Evaluation of the anticipated changes includes the following parameters:

- The capacity of the communities' physical and service infrastructure to meet the anticipated future needs; and

- The social effects of increased population which may include overcrowding, poverty, drug and alcohol abuse, the need for social services, increased access to employment and training, and changes in quality of life.

The baseline case describes the existing conditions in the communities of the RSA prior to initiation of the Project. These conditions are described for the various focus areas and indicators identified in the TOR and through issue identification, assuming the incorporation of various oil sands and other infrastructure projects underway or approved. In the application case, the baseline conditions are compared with the anticipated effects from the Project. The CEA case estimates the changes associated with all of the planned projects in the area, and the contribution that the Project makes to the cumulative effect. The developments included in each of the baseline, application and cumulative cases are included in Table 1.1-1 of Volume 2, Section 1.

14.6 Cumulative Effects Assessment Methods

The RSA for the cumulative effects assessment (CEA) of socio-economic effects is the same as that used in the assessment of Project-specific effects. It includes:

- Conklin;
- Janvier;
- Chipewyan Prairie Dené First Nation;
- Mariana Lake;
- Lakeland County north of Lac La Biche;
- Lac La Biche; and,
- Heart Lake First Nation.

Because the Project will affect traffic in Anzac, Gregoire Lake Estates, and the Fort McMurray First Nation, these communities are also included in the CEA for traffic. Similarly, because the Project will affect the RMWB in its role as provider of municipal services to the communities of Conklin, Janvier, and Mariana Lake, the RMWB is included in the CEA of fiscal impacts.

The developments included in the socio-economic CEA are based on guidelines contained in a document produced by AENV in conjunction with the EUB (EUB and AENV, undated) that indicates that the CEA "must…have regard for reasonably foreseeable projects, activities and natural events that could affect the magnitude, duration or significance of a project's cumulative effects" where "reasonably foreseeable projects" are defined as projects that are:

- Approved;
- Currently undergoing regulatory review;
- About to be submitted for review;
- Officially announced by a proponent;
- Directly associated with the project under review;
- Not directly associated, but induced if the project is approved; and,
- Identified in a development plan for the area.

Although the RSA has a number of developments and activities that will give rise to socio-economic effects (such as roads, commercial subdivisions, and so on), the effects associated with these projects will be minor compared to those associated with oil and gas development in the area. The socio-economic CEA therefore focuses on effects from cumulative oil and gas activities.

The oil and gas projects considered in the CEA are listed in Table 14.6-1.

Table 14.6-1 Projects Included in Socio-Economic CEA

Project and Phase	Likely Date for Start-Up	Capacity (bpd)	Total New bpd (not discounted)	Percent Certainty	Total New bpd (discounted)
Under construction					
Connacher Great Divide	2007	10,000			
MEG Christina Lake Commercial	2008	22,000			
Devon Jackfish 1	2008	35,000			
EnCana Christina Lake expansion	2008	8,000			
ConocoPhillips Surmont 2, 3 & 4	2008-2014	75,000			
Sub-total			150,000	100	150,000
Approved but not yet under construction					
Petro-Canada Meadow Creek	TBD	40,000			
Sub-total			40,000	90	36,000
Application submitted but not yet approved					
Devon Jackfish 2	2010	35,000			
Nexen/OPTI Long Lake 2 - 4	2010-2014	140,000			
North American Kai Kos Dehseh	**2010-2017**	**220,000**			
Sub-total			395,000	60	237,000
Formally announced					
CNRL Kirby	2011	30,000			
EnCana Christina Lake expansion	2010-2015	172,000			
JACOS Hangingstone 1 and 2	2010-2012	30,000			
Sub-total			232,000	25	58,000
Total	**N/A**	**817,000**	**817,000**	**N/A**	**481,000**

Source: Alberta Employment, Immigration and Industry, 2006b and Oilsands Review, 2007

Table 14.6-1 indicates that oil and gas projects that have the potential to affect socio-economic conditions in the RSA could produce new capacity of 817,000 bpd over the next 10 years. However, it is likely that not all of these projects will proceed. Apart from the need for regulatory approval, there are several factors that will affect whether or not a project proceeds including labour shortages, increasing capital costs, potential changes to Alberta's oil and gas royalty structure, the phasing out of the accelerated capital cost allowance for oil sands projects, and the likelihood of measures to reduce greenhouse gas emissions. In short, projecting future capacity is highly speculative.

The Canadian Association of Petroleum Producers (CAPP) and the Regional Infrastructure Working Group (RIWG) have devised a method of discounting projects on the basis of their status. The method assumes that the level of uncertainty attached to a project diminishes as it moves through a process beginning with a formal announcement, through the regulatory process, to construction. These "discount rates" – or, conversely, degrees of certainty – are used in the table above to estimate a more probable level of new capacity in the region at about 480,000 bpd. This is the figure used in the cumulative assessment of socio-economic impacts.

Two different assessments are provided. One is for the RSA in general. However, cumulative effects on Aboriginal communities within the RSA are different from those elsewhere and, for this reason, they are discussed separately.

14.7 Baseline Case

14.7.1 History of the Study Area

Human inhabitants have lived in the northeastern portion of Alberta for at least 10,000 years. Archaeological evidence of Aboriginal peoples is found throughout the region. Cree Burn Lake, an important historical meeting and trading place north of Fort McMurray, dates back approximately 8,000 years and has been designated a Provincial Historic Site. The traditional uses of the land included hunting, trapping, fishing, and food and medicinal plant gathering.

European fur traders and explorers arrived in the area in the eighteenth century and trapping and commercial fur trading became a part of the local economy. Lac La Biche played a crucial role in the fur trade, as it marks one of the areas disputed between the Hudson's Bay and the Northwest Company fur traders. Portage La Biche marks a continental divide, where rivers north of Lac La Biche flow north to the Arctic Ocean and rivers south of Lac La Biche flow east to Hudson's Bay, and was important in the transcontinental river journeys between the Atlantic and Pacific Oceans.

Catholic missionaries established a mission and school at Lac La Biche in 1853 that operated until 1963. As exploration of the Canadian north expanded in the twentieth century and fur trading declined in importance, Lac La Biche became a recreational destination once the Alberta and Great Waterways Railway began in 1909, linking Edmonton and Fort McMurray via Lac La Biche. This railway developed several sidings including Conklin, Chard and Anzac, which eventually developed into communities. A distinctive hotel was built in Lac La Biche to attract summer visitors arriving on the railway, although it was short lived as a hotel. Secondary Road 881 between Lac La Biche and Fort McMurray was completed in the 1980s, linking Conklin, Anzac and Janvier with Fort McMurray and Lac La Biche via road.

There is also an agricultural area within Lakeland County, primarily for livestock and cereal production. The cultural diversity in the Lac La Biche area reflects a population of Aboriginal, Lebanese, French and other European heritage.

Fort McMurray, also a fur trading area, became a staging location for people and freight moving north. Access to the region north of Lac La Biche was restricted to foot, horse, river, rail or air travel until 1967 when a gravel road from Grassland to Fort McMurray was constructed (now Highway 63).

Documentation of the tar-like sands along the Athabasca River was included in the accounts of northern explorers such as Peter Pond. The focus of early oil sands production was open pit mines north of Fort McMurray, near the town of Fort MacKay. Experimentation with separating the sand from the bitumen began in the 1920s, but it took over thirty years to establish a commercial operation, in the 1960s, at the Great Canadian Oil Sands Company (now Suncor Canada) site north of Fort McMurray. Further oil sands development occurred in the late 1970s with the construction of the Syncrude Canada Ltd. mine and plant. Oil sands development did not increase again until 1996, due to a number of factors including cost of production, federal energy policy, price of oil, technology and royalty structures. The early development of oil sands created a population increase in Fort McMurray from 1,200 in the early 1960s to 35,000 in 1985. Population declined slightly between 1985 and 1996, but has since nearly doubled in ten years.

In-situ methods of extracting bitumen are used where overburden is deep enough to make open pit mining too costly. These methods have been in experimentation for over 25 years, but have recently become commercially viable. The projects located south of Fort McMurray all rely on in-situ extraction to remove bitumen. This method generally uses steam injection to soften the bitumen, which is then collected through well bores drilled below the softened bitumen-sand zone.

Since 1996, approximately $37.4 billion of construction investment has occurred in the Athabasca oil sands developments. Development has included expansion of the Suncor and Syncrude mines and operations plants, several new mines, development of commercial scale in-situ extraction plants and the introduction of new extraction technology and facilities.

These new developments have changed the communities of the region. The population of Fort McMurray has doubled since 1985, with most of the increase in population occurring since 2000. Other industries also operate in the northeast portion of the province, including forest harvesting, conventional oil and gas extraction, hunting and trapping, mineral exploration, recreation, education and traditional land uses. The forest industry is estimated to create $40 million expenditure per year in the Lac La Biche and Lakeland County area and is the second major industry of the area after oil sands development. Over 175,000 visitors use the recreational facilities of the RSA. However, the level of new investment in other industries is much less than in oil sands development. The recent expansion of the oil sands extraction and upgrading industry has resulted in community constraints and opportunities that are unique to such a strong resource-based community expansion.

14.7.2 Population in the Study Areas

The population of the communities of the RSA is shown in Table 14.7-1. The data are gathered from the Statistics Canada 2006 census, municipal statistics gathered by the RMWB, Municipal Affairs and Housing, and Indian and Northern Affairs.

Population in the RSA has increased in the past five years. In particular, the population increase in the small, rural communities of the LSA has increased by approximately 50 percent in 5 years, with most of that increase occurring in the past year. The First Nations reserves have seen official population increases of between 9 and 28 percent.

Lac La Biche saw a slight decline in population, which may reflect a more transient population related to college students. However, Lakeland County saw an increase of 20 percent in 5 years reflecting the expansion of housing lots around the town of Lac La Biche and in Plamondon. Population in the communities of the RSA has increased at an annualized compound rate of 2.8 percent per year.

The workcamp population is estimated for camps and projects in the RMWB south of Fort McMurray.

Table 14.7-1 2001, 2005 and 2006 Population in the Study Area

Area	2001	2005	2006	% increase since 2001
Local Study Area				
Conklin[1]	213	242	338	59
Janvier[1]	143	141	218	52
Chipewyan Prairie Dené First Nation Reserve at Janvier[2, 4]	252	321	323	28
LSA 2006 Total	**608**	**704**	**879**	**44%**
Regional Study Area				
Lac La Biche[3]	2,776	N/A	2,758	-0.6
Lakeland County (ex-Lac La Biche and First Nations Reserves)[3]	5,306	N/A	6,365	20
Heart Lake First Nation Reserve[2, 4]	169[4]	186[4]	188[4]	9
Mariana Lake[1]	11	5	9	-20
RSA Population (including LSA)	**8,870**	N/A	**10,199**	**15%**
Workcamps – South of Fort McMurray (estimated)[5]	N/A	N/A	4,500	N/A

1 Regional Municipality of Wood Buffalo, 2005, 2006. Municipal Census found at www.woodbuffalo.ab.ca.

2 Indian and Northern Affairs Canada website.

3 Statistics Canada 2006 Census population figures at ttp://www12.statcan.ca/english/census06/data/profiles/community/Index.cfm?Lang=E

4 Alberta Municipal Affairs, December 31, 2005.

5 Devon ARL Corporation, Jackfish 2 Environmental Impact Assessment, September 2006. Based on camp capacity.

14.7.3 Regional Economy

As shown in Table 14.7-1, Lakeland County and Lac La Biche comprise 90% of the population of the RSA as a whole (excluding work camps). This fact, plus the lack of data for many of the smaller communities, means that the following description of economic conditions in the RSA is dominated by Lac La Biche and Lakeland County. Data and information for the smaller communities, including Conklin, Janvier, Mariana Lake, the Chipewyan Prairie Dené and Heart Lake First Nations are provided where available.

14.7.3.1 Economic Base

The economy of the RSA is well diversified representing a range of industries, businesses, and occupations. Except for health and education, no one industry employs more than 20% of the workforce.

Tourism is of substantial importance in the area with over 175,000 tourists visiting annually (AlbertaFirst.com, Community Profiles). Other significant economic activities include forestry, agriculture, and oil and gas exploration and extraction. More than 30 companies are active in the forestry sector, the largest being Alberta-Pacific's pulp mill located 65 km northwest of Lac La Biche.

The agricultural sector employed over 500 people in the local study area in 2001 (AlbertaFirst and Statistics Canada, 2001). This number may have dropped in the intervening period due to depressed markets in recent years. Although a variety of crops and livestock are represented, agricultural activities are focused primarily on beef cattle production. Calf/cow operations typically generate about 70% of agricultural revenues in the region (AlbertaFirst).

Traditional activities such as hunting, fishing, trapping and gathering are an important economic component for many Aboriginal and Métis residents both on and off reserve.

The oil and gas sector has been a significant employer of workers and businesses in the First Nations communities and in Conklin and Janvier for several years. In the rural communities of the RMWB, over 23.5% of workers are employed either by an oil company or by a contractor to an oil company (RMWB, 2006). However, the oil sands sector is a relatively new driver for the economy of Lakeland County and Lac La Biche. They are within close proximity to a dozen existing or proposed oil and gas developments in the Cold Lake region and in the southern part of the RMWB. This, plus on-going drilling, seismic, and pipeline construction activities, has promoted an increase in the local capacity to service these activities and the town is actively encouraging this growth (Oilsands Review, 2006). Projects that are currently operational in the RSA are shown in Table 14.7-2.

Table 14.7-2 Operational Oil Sands Projects in the Regional Study Area

Project and Phase	Phase	Start Up Date	Capacity (bpd)
In Operation			
ConocoPhillips Surmont	One	2006	25,000
EnCana Christina Lake	One	2002	10,000
Jacos Hangingstone	Pilot	2002	10,000
MEG Christina Lake	Pilot	2007	3,000
OPTI / Nexen Long Lake	Pilot	2003	2,500
	Phase 1	2006	72,000
Orion Whitesands	Pilot	2006	2,000
Total Capacity in Operation at 2007			124,500

Source: National Energy Board, 2006.

14.7.3.2 Labour Force

At the time of writing, the most recent source of data for labour force in sub-provincial areas was the 2001 Census. Between 2001 and 2006, population in the RSA increased by 15% (Table 14.7-1); assuming the same percentage increase in labour force would suggest that the RSA's labour force currently totals about 4,690. Within the local study area, 2001 labour force data are available only for Lac La Biche, Lakeland County, and the Chipewyan Prairie and Heart Lake First Nations. With the growth of the oil and gas industry and associated construction activities, the economic structure of the area has changed somewhat since 2001 with the result that the table is likely only broadly representative of the current labour force composition of the area.

Table 14.7-3 Labour Force by Industry, 2001

	Lac La Biche	Lakeland County	CPDFN	Heart Lake FN	Total	%	% in Alberta
Agriculture and other resource-based industries	125	640	15	0	780	19	11
Manufacturing and construction	85	435	0	0	520	13	16
Wholesale and retail trade	125	205	10	0	340	8	15
Finance and real estate	55	75	0	0	130	3	5
Health and education	450	475	15	10	950	23	15
Business services	155	355	10	10	530	13	19
Other services	330	475	20	5	830	21	19
Total	**1,325**	**2,660**	**70**	**25**	**4,080**	**100**	**100**

Source: Statistics Canada, 2001 and AlbertaFirst.

As Table 14.7-3 shows, the labour force in the local study area is distributed across a number of industries with only the health and education sector employing more than 20% of the total. The preponderance of health and education is partially attributable to Lac La Biche's status as a regional centre for government services and to Portage College.

The primary sector - "agriculture and other resource-based industries"- employed 800 people in 2001, or almost one-fifth of the total.

The secondary sector comprised about 13% of the area's labour force in 2001, due largely to the Alberta-Pacific pulp mill which currently employs over 450 workers (albertafirst.com, Community Profiles, Lakeland County). Since 2001, there has been considerable growth in businesses servicing oil and gas developments in the RSA and, as a result, the percentage that these activities comprise of the region's total labour force has likely increased accordingly.

In 2001, 68%, or about two-thirds, of the labour force was employed in the service sector, including health and education, wholesale and retail trade, finance and real estate, and business and other services. This is slightly lower than the provincial average of 73%.

Table 14.7-4 Labour Force by Occupational Group, 2001

Occupation	Lac La Biche	Lakeland County	CPDFN	Heart Lake FN	Total	%	% in Alberta
Management	160	215	10	5	390	9	8
Business, finance and administration	195	320	10	0	525	13	29
Natural and applied sciences and related	60	90	0	0	150	4	3
Health occupations	65	110	0	0	175	4	9
Social science, education, government and religion	240	240	0	10	490	12	10
Art, culture, recreation and sport	20	35	0	0	55	1	3
Sales and service	280	465	15	0	760	19	30
Trades, transport and equipment operators and related occupations	200	590	20	10	820	20	3

Occupation	Lac La Biche	Lakeland County	CPDFN	Heart Lake FN	Total	%	% in Alberta
Occupations unique to primary industry	85	525	10	0	620	15	4
Occupations unique to processing, manufacturing,& utilities	25	80	0	0	105	3	2
Total	**1,330**	**2,670**	**65**	**25**	**4,090**	**100**	**100**

Note: Totals above do not correspond to totals in industry table due to rounding.

Source: Statistics Canada, 2001 and AlbertaFirst.

The occupational distributions shown in Table 14.7-4 are similar to the provincial averages with the exception of four groups. The percentages of both "business, finance and administration" occupations and occupations in "sales and service" are markedly lower in the local study area than in the province as a whole. By contrast, "trades, transport and equipment operators and related occupations" and "occupations unique to primary industry" together comprise 35% of the local area's labour force versus 7% in the province overall. This is partially due to the importance of the forestry, agriculture, and oil and gas sectors in the area, but may also be attributable to the existence of Portage College in Lac La Biche. To the extent that it is the latter, this bodes well for the availability of local workers to fill positions in the SAGD projects proposed for the area.

14.7.3.3 Earnings and Income

Available data for earnings and income in the RSA are shown in Table 14.7-5.

Table 14.7-5 Earnings and Income, 2000

For all persons aged 15 and over with income:	Study Area				Alberta
	Lac La Biche	Lakeland County	CPDFN	Weighted Average	
Average earnings	$29,625	$27,695	$27,900	$28,335	$31,350
Median income	$18,270	$18,485	$11,840	$18,280	$23,025

Source: Statistics Canada, 2001.

As Table 14.7-5 shows, average earnings in 2000 in all three communities were similar. The average for the three communities, weighted by the size of the labour force in each area, was $28,335. In 2007 dollars, this would be equivalent to about $33,450 (based on the CPI for Edmonton). Average earnings in the study area in 2000 were almost 10% lower than the provincial average of $31,350.

The median income in the study area averaged $18,280 on a weighted basis, but was significantly lower in the CPDFN than in Lac La Biche or Lakeland County. All were lower than the provincial average median income. In Lac La Biche and Lakeland County, 81% of income was derived from earnings, identical to the provincial average. The remainder came from government transfers or other sources. In CPDFN, earnings provided 76% of income while the remainder came from government transfers.

14.7.3.4 Participation and Unemployment

Participation rates represent the percentage of the population aged 15 and over who are working, or are actively trying to find work. In 2001, participation rates in Lac La Biche and Lakeland County averaged about 70%. The participation rate in CPDFN was lower, at 54%. To some extent, lower participation rates in First Nations communities may reflect the greater incidence of non-wage activities, such as hunting, trapping, and plant gathering. Participation rates, and the percentage of income from earnings, may have increased since 2001 as a result of initiatives between aboriginal groups and industry to build capacity and business opportunities.

Unemployment rates (i.e., the number unemployed as a percentage of the labour force) ranged considerably in 2001. The lowest rate was 4.5 % in Lakeland County followed by 7.5% in Lac La Biche. Unemployment in CPDFN was 42%. In March, 2007 unemployment in the regions which encompass the RSA was about 4% (Alberta Employment). Anecdotal evidence suggests that the rate is still much higher in First Nations communities.

14.7.4 Communities of the LSA

14.7.4.1 Conklin

Conklin is the community nearest to the proposed Leismer and Corner development areas. Conklin is approximately mid-way between Lac La Biche and Fort McMurray and just off of Highway 881. Until the highway was built in the mid 1980s, this community was very isolated, with access to Lac La Biche or Fort McMurray via railway or aircraft, only. Residents are primarily Métis with an increasing influx of new residents of non-Métis heritage. Conklin has a community centre where the municipality maintains an office, Keyano college delivers high school upgrading classes, the family and community support services are delivered and the Northern Lights Health Region authority delivers a once a week health clinic. There is a small store. Education and emergency services are available in the community, though these are not equivalent to the level of service delivery in Fort McMurray or Lac la Biche. More acute care or broader services must be obtained from either Fort McMurray or Lac La Biche.

Municipal infrastructure in Conklin includes electrical, telephone, natural gas and a water treatment facility providing potable water. Currently, industrial users also use the treated water, causing shortages for residents. An upgrade to the capacity of the water treatment system has been proposed, but construction is not proposed until 2008 (W. Tremblay, Pers. Comm. 2007). Future residential development in the community is constrained due to the water treatment facility being at maximum capacity. As well, the water treatment system upgrade is expected to increase taxes for homeowners who are concerned about equity of cost for industrial users. A recycling program is in place in the community. There is a sewage lagoon, but individual properties have septic tanks from which sewage is trucked to the sewage lagoon for treatment. There is a Class 2 municipal landfill at Conklin, also at capacity.

Two public airstrips in the area include a grass airstrip at Conklin, utilized only for emergency medical evacuation, and the Leismer airstrip located 12 km away.

Primary access is via Highway 881, south to Lac La Biche and north to Fort McMurray. With the completed paving of Highway 881 in 2006, highway traffic past Conklin is anticipated to increase. There are commercial camp developments at the junction of the Conklin access and Highway 881, with potential for more commercial development adjacent to the highway and along the access road into Conklin. A new Area Structure Plan is underway for Conklin.

Residents in Conklin have enjoyed a tight knit rural community that is now experiencing an influx of people, both living in Conklin and temporarily working in the local area. Some residents

express a sense of loss of community. At the same time, residents are forward looking in identifying opportunities for local businesses and employment. The transition in this community has been occurring slowly over the past 20 years. Recent oil sands development has enhanced the visibility of change in the community, including new people living in the community, higher housing prices, more jobs and business opportunities, and increased traffic and transient population.

The residents have traditional uses that include hunting, trapping, berry picking, and other activities. They perceive a decline in wildlife and berries, as impacted by collective industrial development such as linear corridors and surface disturbance for seismic, pipelines and other facilities, and traffic on the roads. The community is interested in commissioning a traditional use study reflecting their community.

Housing

In Conklin, single-family privately owned dwellings are most common. New housing subdivisions are also included in the Area Structure Plans, but their development depends on the upgrade of water and waste water facilities. A feasibility study for this upgrade is currently underway. Development of multi-family dwellings is also limited by the nature of water delivery and waste water collection systems, and the preference in the hamlet for larger one to two acre lots.

Ten years ago, a one acre lot sold for $3,500 (W. Tremblay, Pers. Comm., 2007) Recently, unserviced, two acre lots have sold for approximately $80,000, (S. Osachoff, Pers. Comm. 2007). A current listing for a fully serviced lot with both a house and cabin is $250,000. There are several private sale listings posted on existing lots within the hamlet.

The recent population increase has not resulted in increased house building. Apparently, people are moving in with members of their family living in Conklin. With increasing population, persons per household is increasing, resulting in overcrowding as more people move into the communities for work opportunities, and to avoid the high cost of housing in Fort McMurray. The 2006 municipal census indicates the average number of people per single family dwelling is 3.8 and 3.2 persons per manufactured home. The population of Conklin increased by 125 people between 2001 and 2006, or 59%, and most of this increase was recorded between 2005 and 2006. New housing is minimal and housing costs are increasing. Home builders are not currently active in the community.

Wood Buffalo Housing and Development Corporation (WBHDC) has two housing developments in the hamlet, with several newer duplex units. WBHDC would like to develop more, or focus on multi-family housing, but are constrained by lot size, water system capacity, and availability and cost of house builders (B. Lutes, 2006, Pers. Comm.). There is a concern in the community that new housing lots or houses built by WBHDC will be priced higher than local residents can afford, limiting their ability to remain in the community.

There is no specific housing for elders. Specialized housing is available in Lac La Biche or Fort McMurray.

There are three open camps located at the Conklin access road junction. These camps provide accommodation and board to construction and service personnel working on other oil sands developments in the area.

Education

The Conklin Community School is part of the Northland School Division and provides kindergarten to grade 9 with a complement of 5 teachers and 3.5 para-professionals. Capacity of the school is 50 students and enrolment was 31 students plus 2 ECS students in 2006 (Northland School Division website, 2007). Teacher housing is provided in the community. Teacher retention and continuity of the school are concerns in the community, as attraction of teachers is a challenge. Transition is difficult for rural students entering the Fort McMurray public and Catholic systems in Grade 10. First Nations and Métis students may have challenges including issues resulting from the variable quality of education delivered in the rural schools compared to Fort McMurray, achievement levels in standard curriculum, language skills, low parental involvement in school and racism (MEG, 2005). Additionally, some rural students must board with families in Fort McMurray and may lack a support network. The Northland School Division, in cooperation with Awasyak Child and Family Services, operated a boarding house for Conklin students attending high school in Fort McMurray. These challenges contribute to a sense of isolation and a higher drop out rate amongst Aboriginal students (ATC, 2003). Aboriginal students also face conflicting social pressures between traditional lifestyles and accessing the employment and job opportunities available from oil sands development, which require completion of grade 12.

Keyano College, located in Fort McMurray, provides adult upgrading programs through its learning centre in Conklin community hall.

Medical Facilities and Services

The Margaret A. Quintel Health Centre in Conklin is administered by the Northern Lights Health Region. It offers once a week visits from nurses. Dental outreach programs are provided three times per month. The centre provides basic health assessments for seniors and minor first aid, as well as post natal assessment, school immunization, community education programs and home visits to recuperating residents. Most clinic users are local residents rather than industrial workers (MEG, 2005). Acute care health care is available in either Lac La Biche or Fort McMurray.

Protective and Emergency Services

Police patrol is provided by the rural division of the Royal Canadian Mounted Police (RCMP) in Fort McMurray. The Fort McMurray detachment recently added three officers to the rural division in response to increasing workload and need, for a total of 16 officers in the rural division. Additionally, there are three First Nations positions and a Traffic Analyst. No police facilities are located in the community of Conklin. The community perceives an increase in petty theft, drunken driving and drug abuse. Additionally, response time from Fort McMurray is considered slow.

Conklin has a volunteer fire department. A new pumper truck will be operational in 2007. Additionally, they have a mutual aid agreement with Sustainable Resource Development for forest fire protection. Ambulance service in the community is provided from the Fort McMurray Fire Department. This community has access to a 911 call centre administered in Fort McMurray. The rural fire and Emergency Medical Service (EMS) calls to Fort McMurray 911 have been increasing over the past two years, 18.5 percent between 2004 and 2005, and 22.5 percent between 2005 and 2006 (RMWB, 2007). These calls include all of the rural communities in the RMWB, but indicate an increasing use pattern for rural communities.

Emergency response planning is the responsibility of the RMWB.

Social Services

Social service programs are delivered through the Family Resource Centre, which is part of the Region 9 Northeast Alberta Child and Family Services Department. Programs focus on family and child wellness. The community has concerns over drug and alcohol abuse, overcrowding and youth at risk. Alberta Alcohol and Drug Awareness Centre (AADAC) and the mental health authority attend Conklin every second week.

Recreational Facilities

There are minimal formal recreation facilities in Conklin including a baseball diamond and a playground at the school. There is a community hall with multiple users. A new multi-purpose pad is being constructed in 2007, which will provide basketball hoops and a play structure, and double as a skating rink in the winter. Many inhabitants enjoy outdoor pursuits such as hunting, fishing, berry picking, snowmobiling and other outdoor recreations, particularly with Christina Lake adjacent to the community.

14.7.4.2 Janvier

The Hamlet of Janvier (RMWB designation) is also known as Chard (Canada Post designation and railroad siding designation) and is south of Fort McMurray, just east of Highway 881. The hamlet of Janvier is located partly in the RMWB and partly on the CPDFN reserve, and there is a split in delivery of services between the federal and municipal sides of the community. The population is primarily Aboriginal, with some Métis and mostly First Nations living off reserves in the community. In Janvier, health services are provided through nurse visits to the municipal office. A level of emergency services is available at the clinic on the CPDFN reserve, but more acute health care or broader services must be obtained from either Fort McMurray or Lac La Biche. The community also has a municipal office and the Father Perin School.

Some services are shared between Janvier and CPDFN and reflect the adjacent and interconnected position of the communities. Infrastructure includes access to electricity, telephone and natural gas services. The current water treatment facility provides potable water for both the CPDFN and the hamlet, and water is distributed to households. The water treatment and delivery system is near capacity. A sewage treatment facility exists in Janvier, but most residences have septic tanks that are pumped and trucked to the treatment facility. Individual septic systems are also found on the CPDFN. The sewage treatment facility is at capacity and requires maintenance. Solid waste is disposed in the local waste dump or through shipping to Fort McMurray. An industrial landfill, which could accept oilfield waste, has been proposed for the community.

Housing

In Janvier, there are just over 50 houses, primarily single-family privately owned dwellings (J. Nokohoo, Pers. Comm., March 2007). Overcrowding is an issue as more people move into the communities for work opportunities, and to avoid the high cost of housing in Fort McMurray. The RMWB 2006 census indicates an average of 3.3 persons per single family dwelling and 2.4 persons per manufactured home. The population in Janvier increased by 52 percent between 2005 and 2006 (RMWB, 2006).

In Janvier, in 2006, the WBHDC had four single-family houses available through a similar mortgage program to Fort McMurray. Three additional units were proposed in 2006, but building contractors have been difficult to find for the community. Community services for water and

septic are somewhat limiting to large scale subdivision potential, although there is potential to expand Janvier South Hamlet (Preiksaitis, 2005, 2006).

There is no specific housing for elders. Specialized housing is available in Lac La Biche or Fort McMurray.

There are a few lots for sale in Janvier, for approximately $15,000 each. These are unserviced, two acre lots (S. Osachoff, Pers. Comm., 2007).

Education

Father R. Perin School is located in Janvier, providing kindergarten to grade 9, with an enrolment of 79 students plus 10 ECS students (Northland School Division website, 2007). Capacity of the school is 130 students. Currently, 8 teachers and 3.5 para-professionals are employed at the school. The school population is drawn from Janvier and the CPDFN. Students from Janvier attend high school in Fort McMurray while students from the First Nation attend high school on the CPDFN reserve. As with students from Conklin, transition to the Fort McMurray public and Catholic systems in Grade 10 may be difficult as children need to board away from home, and issues may arise related to preparedness of students for the curriculum, achievement levels in standard curriculum, language skills, low parental involvement in school and racism (MEG, 2005).

Keyano College offers outreach programs to Janvier, to help adult learners upgrade basic academic courses and earn high school equivalency diplomas.

Medical Facilities and Services

Historically, the community members of Janvier could access community-based health care at the clinic on the CPDFN, and emergency service could still be accessed. However, health care delivery for Janvier residents is now separate from the CPDFN, and program delivery is focused on home care nursing services provided by the Northern Lights Health Region. Community nursing programs are being established at this time, with an initial focus on care and health of the elderly.

Emergency and Protective Services

Police patrol is provided by the rural division of the RCMP in Fort McMurray. There is a patrol cabin located in the community.

Janvier had a volunteer fire department, but it is not functioning at this time (J. Nokohoo, Pers. Comm., March 2007). There is a fire truck on the reserve. Additionally, Janvier has a mutual aid agreement with Alberta Sustainable Resource Development for forest fire protection. Ambulance service in the community is provided from the Fort McMurray Fire Department. This community has access to a 911 call centre administered in Fort McMurray.

Emergency response planning is the responsibility of the RMWB.

Social Services

Social service programs are delivered through the Janvier Family Resource Centre, which is part of the Region 9 Northeast Alberta Child and Family Services Department. The programs have a focus on family and youth outreach, with a wide variety of programs in the community. There is a focus on drug prevention and addiction programs.

Recreational Facilities

There are minimal formal recreation facilities in Janvier; however, there is a community hall. Many inhabitants enjoy outdoor pursuits such as hunting, fishing, berry picking, snowmobiling and other outdoor recreations.

14.7.4.3 Chipewyan Prairie Dené First Nation at Janvier

Chipewyan Prairie Dené First Nation (CPDFN) reserve is located adjacent to Janvier and has 661 registered members, of whom 323 are listed as residents on the reserve (Municipal Affairs and Housing, 2006). However, this may be an underestimate of population on the reserve as members are believed to be moving back to the reserve and staying with family. Services provided on the reserve include health care (nursing station), education to Grade 12 and emergency services. Keyano College has a remote campus on-site in Janvier.

The water treatment plant and sewage lagoon are shared with the Hamlet of Janvier. Water is delivered, and sewage trucked out to the lagoon. The CPDFN has a multiplex recreational and educational facility, a hockey rink and ball diamond.

Housing

CPDFN has approximately 110 dwellings and is anticipating building 25 new dwellings in 2007 (J. Nokahoo, Pers. Comm., 2007). New housing is needed to relieve the pressure of overcrowding. Housing repairs and maintenance are also an issue for many houses on the reserve.

Education

Children attend kindergarten to Grade 9 at the Father R. Perin School in Janvier. First Nations children are eligible to attend Grades 10 to 12 at the Chipewyan Prairie Dené High School, which currently has an enrolment of 37 and a capacity of 75 to 85 in a new facility in the community centre. An increase in enrolment would require additional teaching staff.

Keyano College offers outreach programs to CPDFN, to help adult learners upgrade basic academic courses and earn high school equivalency diplomas.

Medical Facilities and Services

The Federal government provides for health care on First Nations reserves and communities, and the First Nations and Inuit Health Branch of Health Canada provide health services at the CPDFN Health Centre. Nurses staff the centre. Dental care visits are scheduled each month (MEG, 2005).

14.7.5 Communities and Issues of the Regional Study Area

14.7.5.1 Lac La Biche and Lakeland County

Lac La Biche is a fully serviced community located on the southern shore of Lac La Biche and is the largest urban community in Lakeland County. It is the main service centre for Lakeland County including Provincial government services, education, health and social services, RCMP, ambulance and fire protection services. The town has full municipal infrastructure, including water, sewer and natural gas distribution systems, and a solid waste disposal site.

The town and Lakeland County have jointly built a regional water treatment facility, currently at 35% capacity (Lac La Biche – Lakeland County Economic Development Partnership, undated). This expanded capacity allowed for the extension of water lines west of Lac La Biche to lots along the southern side of Lac La Biche and in Plamondon. When rural connections of existing properties have been made, the water treatment facility will be able to accommodate approximately 400 additional connections (B. Kolenosky, Pers. Comm., June 2007). The town and county operate a wastewater treatment facility at Field Lake, which requires upgrading to both meet increasing demand and protect area lakes. Estimated costs to upgrade or build a new facility are between $22 and $50 million.

Plamondon is the second largest community in the county, but was amalgamated into the county in 2002. Lakeland County also includes Venice, Hylo, Beaver Lake First Nation and Heart Lake First Nation. Numerous small settlements also exist such as Beaver Lake, Owl River and Rich Lake. In general, except for the First Nations reserves, the small communities of Lakeland County rely on Lac La Biche for services and on the county for administration. These small communities, including Plamondon, are discussed here as part of Lakeland County.

Amalgamation talks are proceeding between the town of Lac La Biche and Lakeland County. A plebiscite was held in April 2007, with a favourable response, and the municipalities are pursuing the steps for amalgamation.

Housing

Lac La Biche has a full range of housing including single family dwellings, multi-family dwellings, affordable housing, rental accommodation and senior's accommodation. Lakeland County has mostly single family dwellings. There are currently plans for approximately 100 new lots in the town and up to 700 new lots in Lakeland County (J. Palmer, Pers. Comm., February 2007). Demand for housing in Lac La Biche and Lakeland County reflects immigration of people who work in Fort McMurray, but have permanent or recreational residences in Lac La Biche, retirees from other communities, and people moving to the area for economic opportunity.

Municipal records indicate that the number of new dwellings has been increasing in both the town and the county over the past five years (Table 14.7-6).

Table 14.7-6 Number of Dwellings in Lac La Biche and Lakeland County

	2002[1]	2003[1]	2004[1]	2005[1]	2006[2]
Lac La Biche	994	994	994	1,004	1,169
Lakeland County	2,647	2,690	2,755	2,857	3,158

1 Community profiles compiled by Alberta Municipal Affairs, at http://www.municipalaffairs.gov.ab.ca/cfml/profiles/index.cfm

2 Statistics Canada, 2006 Census, Community Profiles, Total Private Dwellings.

In 2006 the price of a three bedroom bungalow with attached garage was in the range of $260,000 - $290,000, and housing prices have been increasing in the community. The asking price of several single family dwellings within the town of Lac La Biche, as listed on the Multiple Listing Service (MLS) in April 2007, ranged from approximately $180,000 to $500,000. The community also has two "ready to move" house manufacturing companies (Lac La Biche – Lakeland County Economic Development Partnership, undated).

In 2006 there were 239 rental units in the town. Table 14.7-7 summarizes the changes in vacancy and rental rates over the past ten years. The change in vacancy rate between 2001 and 2006 reflects the building of some multi-family housing. Student accommodation is available for

Portage College students, but is insufficient to house the student population. Increasingly, seasonal work crews are taking up short term rental accommodation within the town.

Table 14.7-7 Rental Rate Changes for Accommodation in Lac La Biche in 1997, 2001 and 2006

Rental Unit	1997 Average Rent	2001 Average Rent	2006 Average Rent	Vacant Units in 2006[1]
One Bedroom	$398	$509	$599	4 out of 87 or 4.6%
Two Bedroom	$518	$634	$726	15 out of 122 or 12.3%
Three Bedroom	$515	$634	$739	3 out of 21 or 14.3%
Overall Vacancy Rate	24.8 %	1.8%	9.6%	22 out of 230 or 9.6%

1 Survey represented 230 out of the 239 rental units in Lac La Biche. Rental units are defined as private, non-subsidized housing units in buildings of 4 or more units.

Source: Apartment Vacancy and Rental Cost Survey, 2006. Alberta Seniors Housing at http://www.seniors.gov.ab.ca/housing/affordable_housing/vacancy_rental/index.asp

With price increasing for both owned and rental properties, and increasing competition for housing, affordable housing is at a premium in the community. The town has initiated an affordable housing task force, but it is in a preliminary stage. A needs assessment of the community is being undertaken by Family and Community Support Services (FCSS) in 2007 and will include a housing review. Additionally, a men's shelter and treatment centre are in the planning stage. The community has a women's emergency shelter.

The senior's lodge in Lac La Biche, Lacalta Lodge, currently has 40 units, and a new lodge is being built. Additionally, there are over 45 senior and low-income housing units administered by the Greater North Foundation. There are 12 self contained seniors' units in Plamondon, all subsidized based on rent as a percentage of income.

Education

Lac La Biche offers primary and secondary schooling from kindergarten to Grade 12, and post secondary schooling at Portage College. Primary and secondary school is administered by the Northern Lights School Division No. 69. Table 14.7-8 indicates the various schools in Lac La Biche, the grades offered, the 2006 enrolment, and percent utilization.

Table 14.7-8 Schools and Percent Utilization in Lac La Biche and Lakeland County

Location	Grades	2004 Enrolment	Approximate 2006 Enrolment	Percent Utilization
Vera M. Welsh Elementary School	ECS – Grade 3	450	470	89
Central Elementary	Grades 4 and 5	244	280	81
Dr. Swift Middle School	Grades 6 - 8	410	468	100
J.A. Williams High School	Grades 9 - 12	550	619	88
Lac La Biche Off Campus	Grades 8 - 12	Varies	Varies	n/a
Ecole Plamondon	K to Grade 12	430	470	89

Source: Northern Lights School Division, February 27, 2007.

Upgrades and new construction are proposed for Lac La Biche schools in the current three year capital plan of the Northern Lights School Division. These upgrades will increase capacity in overcrowded schools through construction of a new K-Grade 4 school and eventual construction of a new high school. However, these proposals were not funded by the government in the 2006 capital funding announcement and the current government has not announced capital spending to include these schools. Therefore, space is limited in the Dr. Swift Middle School and at very high usage in all other schools.

The school division is concerned that low availability of affordable housing is a cause of attraction and retention difficulties, particularly for support services and buildings trades necessary for upkeep and maintenance.

The high school offers trades programs through the Registered Apprenticeship Program, which allows high school students to take the introductory portions of certain trades training and directly transfer to college. This Trades Program takes more funding per student than other academic programs, but is not funded at a higher level per student. Hence, trades programs are being cut back to enable funding of other programs at a time when trades training is at a premium in the workforce (T. Moghrabi, Pers. Comm., February 2007).

Portage College has its main campus in Lac La Biche, offering 30 certificate and diploma programs in seven major study areas. These include Power Engineering and other trades training, catering and food services, university transfer, and on-line learning programs. In total, Portage College offers programs in nine centres and on-line, and is actively seeking to provide courses relevant to current and future job opportunities arising in the area from oil sands developments.

Health Care

Health care is administered through the Aspen Regional Health Authority. Lac La Biche has an acute care facility, the Lac La Biche Healthcare Centre with 23 acute care beds and 42 long term care beds. There is currently unused bed capacity, but these beds cannot be opened without an increase in funding. This facility provides other services including emergency room treatment, inpatient treatment, obstetrics, and general surgery. In the past two years, emergency room use has doubled, in part due to increased industrial activity (M. Williams, Pers. Comm. April 2007). The Aspen Health Region has prepared a plan for preparing for and managing growth in the use of Lac La Biche medical facilities, which was submitted as a request to the provincial Government in 2006. The plan identifies changes in funding, structure and staffing needed to meet current and anticipated demands on the Lac La Biche Healthcare Centre.

There is one medical clinic in the community with nine family physicians. The treatment area for the hospital is broad, extending north to include Conklin and Janvier, Wandering River, and east, south and west of Lac La Biche.

Community care (home care, seniors programs, etc.), physiotherapy and occupational therapy, early childhood care programs, mental health care and other programs are available in the community. For specialist medical care, patients go to Edmonton.

The community also has pharmacies, dentists, psychologists, and an optometrist.

Protective Services

The Lac La Biche detachment of the RCMP provides policing for the community and Lakeland County, which includes Highway 881 north of Lac La Biche to just south of Conklin. There are currently 18 members in the detachment. The detachment saw an increase in arrests in 2006 over previous years, expected to continue in 2007. Demand for policing includes drug and alcohol related crimes, property crimes, and violent crimes. As well, traffic related incidents are on the rise, with three times the collisions on Highway 881 in the past eight months since paving was completed (C. White, Personal Communication, April 2007).

The Lac La Biche volunteer fire department has three fire trucks and 10 members available on a 24 hour basis. These members are trained to a Class A firefighting capability, providing fire and explosion response, vehicular rescue, and ice and water rescue (Lac La Biche – Lakeland County Economic Development Partnership, Undated).

Lac La Biche and Lakeland County are serviced by a fully staffed ambulance service providing full time advanced life support service. There is an air ambulance operating from Lac La Biche and three mobile ambulance services, which offer service to the oil and gas industry.

Social Services

Lac La Biche is the provincial government delivery centre for numerous social services including mental health, child and family services, alcohol and drug abuse counselling, human resources and employment services. There is a Youth Assessment Centre in the community, providing residential treatment for youth in crisis. Family and Community Support Services (FCSS) provides assistance to groups providing services in the community, focusing on wellness. FCSS publishes the community resource directory. There is a daycare at Portage College.

Aboriginal social services include the Aboriginal Headstart Program to help children develop skill necessary for successful learning, the Beaver Lake Wah-Pow Detoxification and Treatment Centre for both aboriginal and non-aboriginal clients, Heart Lake First Nations social services, and the Lac La Biche Canadian Native Friendship Centre.

The Hope Haven women's shelter is fully staffed to provide emergency shelter and counselling to women and children in family crisis. There are over 45 self contained senior housing units, along with low-income housing, administered by Greater North Foundation.

Social services are still able to meet the needs of the community, except in affordable housing.

Recreational Facilities

In the town of Lac La Biche there are several formal recreation facilities including a swimming pool, ball diamonds, a curling rink, hockey rink, library, 18-hole golf course, bowling, rock climbing and fitness facilities. Portage College has recreational facilities, including the swimming pool, some of which are open to the community. Every year the community hosts Lac La Biche Pow Wow days in August, a community fair, fishing derby and celebration.

The area is a highly visited tourist destination, with over 175,000 visitors annually. Sir Winston Churchill and Lakeland Provincial Parks are both northeast of the town, the former located on an island connected by causeway to the mainland. There are over 150 lakes in the area, many sandy beaches, and camping and birding opportunities. Hunting and fishing are popular pastimes.

14.7.5.2 Heart Lake First Nation

Heart Lake First Nation Reserve at Heart Lake is located northeast of Lac La Biche. The Aboriginal Canada Portal indicates 292 registered band members with 176 on the reserve at Heart Lake (INAC, 2007).

The community is reported to have 33 dwellings (INAC, 2007). There is a band administration office, a recreation centre and a health centre (Heart Lake Lena Obichon Health Centre). The Heart Lake Kohls School provides kindergarten to Grade 9. Infrastructure and services include water treatment facility, sewage treatment, garbage landfill, and fire hall.

Heart Lake First Nation Social Services, centred out of Lac La Biche, provides services to the population on the reserve, with a focus on youth and seniors.

The Heart Lake First Nation claims traditional lands north of the reserve, through the Project lease area.

14.7.5.3 Anzac and Gregoire Lake Estates

Located south of Fort McMurray, the communities of Anzac and Gregoire Lake Estates are adjacent to Willow (Gregoire) Lake, which is a local recreational area including a Provincial park. The population of Anzac has increased by 25% in the past three years and available subdivision lots in the town are now fully occupied. A recent application for lots and new housing was approved by RMWB council. New subdivisions may be approved once the water line from Fort McMurray is complete in 2007. Housing prices are similar to Fort McMurray with listings for mobile homes with land or houses on two acre lots at approximately $400,000 (Multiple Listing Service, July 2006). The available lots in the town are fully occupied, increasing pressure on prices. The WBHDC has four seniors' homes in Anzac. There are no multi-family units in Anzac other than the teacher housing. Temporary housing in camper trailers was noted in Anzac in 2006.

Anzac has electrical, telephone, natural gas, and water and waste water treatment facilities. However, the water is trucked from the treatment plant, and individual septic systems are used for residential waste water collection before being emptied and trucked to the sewage lagoon. Water treatment facilities are centrally located in the hamlet and are near capacity for the community. A new water line from Fort McMurray is under construction and anticipated to be completed in 2007. Solid waste is trucked to the municipal landfill.

The town has an elementary school (at capacity for students), volunteer fire protection services, community hall, outdoor skating rink, motel, restaurant and some commercial businesses. In 2006, Northland School Division received approval of funding for a new kindergarten to Grade 12 school in Anzac. The approved funding does not include money for teacher housing, which is currently provided to teachers of the existing school. Teacher housing is considered a critical issue for the attraction of new teachers (Neil Rutley, Personal Communication, 2006).

The Northern Lights Health Region provides for community health care and home care nurses to visit the community once a week. The community hall serves as the centre for delivery of health and social services. Social services are provided by the Family and Community Support Services organization and Alberta Child Services. The Anzac Recreation and Social Society organizes community events such as the winter fair and community dances and maintains local recreational facilities.

Police patrol is provided by the rural division of the RCMP in Fort McMurray. Local oil sands developers have contributed to enhanced police patrol in the community, largely related to traffic

on Highway 881. Anzac has a volunteer fire department. Ambulance service in the community is provided from the Fort McMurray Fire Department. This community has access to a 911 call centre administered in Fort McMurray.

Gregoire Lake Estates is a residential community located along the north shore of Willow (Gregoire) Lake. Further development within the estates is not permitted under the municipal development plan. Population has increased 55% since 2001. Housing prices are similar to those of Anzac and Fort McMurray.

Traffic on Highway 881 is a concern for both communities as access to both communities is from Highway 881. Additionally, many people travel to and from work on the highway, and school children are bussed to Fort McMurray on the highway. The residents and local oil sands developers have formed the Willow Lake Traffic Advisory Committee to address traffic concerns.

14.7.5.4 Fort McMurray No. 468 First Nation Reserve at Willow Lake

The FMFN reserve at Willow (Gregoire) Lake is west of Anzac and borders the south side of Willow Lake. The population comprises 583 people who are registered members, and approximately 256 people live on the reserve (INAC, March 2006) according to official census. However, more people are reportedly returning to the reserve to avoid the higher cost of housing in Fort McMurray and for jobs at nearby facilities. Housing is at a premium and overcrowding is reported. The lands around the reserve are the traditional lands of the Fort McMurray No. 468 First Nation and include areas of plant gathering, trails to the gathering places at Gypsy and Gordon Lakes, and hunting, fishing and trapping lands.

The community is serviced by electricity and telephone service, although not all households have telephones (Gulf, 2001). There is a central water treatment plant with truck delivery to individual houses. A sewage lagoon is in operation. The roads are largely gravel, and are maintained by the FMFN. Children from the reserve can attend school in either Anzac (kindergarten to Grade 6) or in Fort McMurray for all grades, both requiring bussing. Community recreation facilities include the Band Hall. A community health clinic is based on the reserve, but acute health care and doctor services are available only in Fort McMurray (ATC website, 2006). There are small businesses, including a gas station. Police patrol is provided by the rural division of the RCMP in Fort McMurray. Fire protection is provided by the Anzac Volunteer Fire Department. Ambulance service in the community is provided from the Fort McMurray Fire Department. This community has access to a 911 call centre administered in Fort McMurray. The community also has a drug and alcohol awareness campaign as part of the National Native Alcohol and Drug Abuse Program (NNADAP) for youth at risk and a dedicated staff member for the program. Additionally, the Mark Amy Addictions Counselling Centre is located on the reserve at Willow (Gregoire) Lake.

Many of the homes on the reserve have driveways entering directly onto Highway 881. The increase in traffic on Highway 881 is a concern for community members.

14.7.5.5 Work Camps

The shadow population in the camps of the RSA is estimated to be 4,500 persons in approximately 14 camps (Devon, 2006). With the exception of the EnCana Foster Creek facility, all of the oil sands developments south of Fort McMurray (currently under construction or operating) are located in the RMWB rather than Lakeland County. The largest workforce among these projects is for construction at OPTI/Nexen Long Lake, nearing completion. The shadow populations are housed at the construction sites at which they work or in open camps, but may utilize the urban services of Fort McMurray or Lac La Biche for recreation, acute health care, and emergency and protective services.

14.7.5.6 Mariana Lake

Mariana Lake is primarily a highway service stop approximately 100 km south of Fort McMurray on Highway 63. In 2006, nine people were living in the community. Services include a restaurant, service station and a camp/lodge. Housing is limited, with one single family dwelling and a multi-unit staff facility. Emergency services are provided by Fort McMurray Fire Department, Alberta Sustainable Resource Development, and the rural division of the RCMP in Fort McMurray. Health care is not provided in the community, but is available in Fort McMurray and Lac La Biche. Outdoor recreational opportunities in the area include fishing, snowmobiling and cross country skiing.

14.7.5.7 Municipal Service Delivery in the Local and Regional Study Areas

Municipal, provincial and federal governments all have a role in providing services to the communities within the LSA. Municipal planning and infrastructure delivery, social services, health care, high school and post-secondary education, and protective services are all coordinated on a regional basis within both the RMWB and Lakeland County. However, all of the rural communities in the LSA are within the RMWB.

Within the RMWB, Fort McMurray is the regional centre for municipal and provincial service delivery. Program delivery in the rural communities is on an outreach basis, except for primary education which is provided by teachers living in the communities. Table 14.7-9 shows the level of government involved in service delivery in the LSA communities.

Table 14.7-9 Regional Service Delivery Agents in the Local Study Area

	Municipal /Emergency Services	Infrastructure	Education	Health Care	Social Services
Lakeland County and Lac La Biche	Affordable housing, development planning, protective services (ambulance, fire, police), emergency response preparedness.	Municipal roads, water and sewer lines, recycling, solid waste handling, municipal buildings.	Not delivered by municipal authority.	Not delivered by municipal authority.	Family and Community Support Services delivery; Independent agencies.
Regional Municipality of Wood Buffalo	Affordable housing, development planning, protective services (ambulance, fire, police), emergency response preparedness.	Municipal roads, water and sewer lines, recycling, solid waste handling, municipal buildings.	Not delivered by municipal authority.	Not delivered by municipal authority.	Family and Community Support Services delivery; Independent agencies.
First Nations	Community government with elected Chief and Council.	Funded and delivered by Federal Government.	Funded and delivered by Federal Government.	Funded and delivered by Federal Government; Acute care in the provincial health centres in either Fort McMurray or Lac La Biche.	Funded and delivered by Federal Government; delivery may be through provincial programs; Aboriginal counselling centres and services.

	Municipal /Emergency Services	Infrastructure	Education	Health Care	Social Services
Province of Alberta	Land release to the RMWB for housing; grants, emergency response preparedness.	Schools, highways, hospitals, recreation facilities.	Northlands School Division provides schooling in each community with local school boards, teachers live in the community. Fort McMurray Public and Private School boards (high school transfer from rural communities). Keyano College post-secondary education facility in Fort McMurray provides outreach programs in rural communities. Northern Lights School Division provides schooling in Lac La Biche and Plamondon. Teachers live in the communities. Portage College provides post-secondary education in Lac La Biche and other centres.	Northern Lights health Region, acute care in Fort McMurray, home care and dental outreach to communities. Residents can also use the acute care facilities and medical services in Lac La Biche. Aspen Health Region includes acute and long term care in Lac La Biche.	Regions Seven and Nine Child and Family Services.
Federal Government	Emergency Response Preparedness.	Some shared funding of road infrastructure; all infrastructure in First Nations communities.	School built and staffed on reserves. Transfer funding for First Nations children to attend municipal schools.	Primary nursing care in First Nations communities.	In First Nations communities.

Town of Lac La Biche and Lakeland County

The development of oil sands projects around Conklin is increasing the use of Lac La Biche as a service and staging centre for these developments. Most of the developments that identify Lac La Biche as a preferred service centre have so far been located in the RMWB, except for some developments located in the Cold Lake Weapons Range which is considered to be part of Lakeland County. The location of the developments in the RMWB means that the eventual tax revenue will go to the RMWB while the increasing social pressure of development will focus on Lac La Biche. The population increase in Lakeland County and Lac La Biche over the period 2001 to 2006 was 2.8% per year compared to 1% per year during the 1996 to 2001 period. There has already been an increase in the average price of housing in the communities of Lakeland County and Lac La Biche. Both the price of housing and low availability are affecting the affordability of housing in the communities.

Lakeland County and Lac La Biche have submitted written statements to the Government of Alberta Oil Sands Multi-Stakeholder Committee Consultation Panel (Lac La Biche – Lakeland County Economic Development Partnership, undated and LLBRIC 2007). The written statements indicated that the municipalities were supportive of continued oil sands development, particularly south of Fort McMurray, as these communities can support an increase in population. Additionally, they identify economic development as important to their citizens and look forward to the opportunity to participate in oil sands development. A planning study undertaken by Lakeland County in 2006 (Urban Systems, April 2006) indicated that population renewal is a vital concern for the community, to encourage young members to remain or return, and to ensure that the service level demanded by an increasing recreational and retired population can be supported by a vibrant working age and permanent population.

The RMWB

The RMWB and some of the service organizations in the municipality provided intervenor statements to the EUB hearing on the Suncor Voyageur Application (July 2006). These statements and media interviews with the Mayor of the RMWB have made headlines across Alberta, as they indicate the cumulative effect of rapid growth on the community. As well, the 2005 Case Study developed by RIWG (2005) sets out the service and infrastructure gaps identified at the time if the municipality was to meet current and anticipated future growth. The government of Alberta undertook a review of social issues related to rapid oil sands development and provided a report and recommendations (Radke, et. al, 2006). The issues raised in all cases are the result of the cumulative effect of rapid population growth in the municipality over the past five years, due to the development of oil sands operations, and the inability of the Municipality and Province to upgrade infrastructure at the same rate.

The RMWB has identified challenges in urban and rural service delivery (RMWB 2006b, Preiksaitis, 2006a, Applications Management Consulting Ltd. 2006, Associated Engineering Alberta Ltd. 2006, IPS 2006). The RMWB issues are summarized below:

- Industrial developments have increased the local population while provincial funding of regional and municipal infrastructure and services, such as roads, schools, protective services, recreational facilities and medical services, has not kept pace with the speed of increase in use in the municipality. Provincial release of land for housing developments has been slow, limiting availability of lots for development.

- Development is challenging to the municipality in terms of municipal funding sources, the ability of municipal personnel to meet the current and anticipated demands on municipal services, and the ability to undertake long term planning.

- The municipality estimated infrastructure shortfall at over $1 billion in 2006. The provincial government announced in February 2007 nearly $400 million of funding for municipal infrastructure for Fort McMurray in recognition of the infrastructure bottleneck the community faces with continued oil sands development. Half of the monies were identified for health care, including three clinics, increased staff wages, staff housing and wage subsidies for northern cost of living, to attract and retain staff. Additionally, monies were earmarked to finish the water and wastewater treatment facilities and to fund 300 affordable housing units.

- There is a lag in the municipal tax base created by the long construction phases of the new developments, while the construction phases bring users to the municipal infrastructure. The lag means that debt is the primary source of funding open to the municipality in the short term, with deferred offset through taxes in the future. Debt financing currently in place is at the approved limit for a municipality as set by Alberta Municipal Affairs.

- Low availability and decreasing affordability of housing in Fort McMurray and rural communities is considered to be a direct impact of the rate of oil sands development, and is a deterrent to attracting and retaining personnel in service and government jobs. Average prices for single family dwellings in 2006 were $450,000. This attraction and retention issue is broadly felt throughout the social service, government and retail sectors.

- All of the municipal and social service delivery agents in Fort McMurray are facing a labour shortage which includes teachers, municipal planners, nurses, doctors, police, and support staff. The competition for labour in all of these fields is province wide. It is felt to be exacerbated in Fort McMurray because of the high cost and low availability of housing, and by competition with oil sands developers for skilled staff.

- Competition in the labour market has resulted in higher wages required for public service sector employees when compared to other Alberta centres, reducing the ability of public sector agencies to balance budgets, as provincial budget funding does not account for higher wages.

- Costs for construction of infrastructure have risen due to competition for construction workers in both the RMWB and the province. These costs in the RMWB are 30% to 70% higher than those in other Alberta communities.

The urban municipal region is experiencing a human capital deficit caused in part by the high cost of living compared to other northern Alberta growth communities. This creates a cost of living impact for middle and low or fixed income earners, or earners whose compensation is set on a provincial scale, such as health and education workers. Additionally, there is competition for government and service industry employees from industrial employers in the region, many of whom are able to pay higher salaries.

14.7.5.8 Traffic

Traffic has been identified as a concern by residents in Conklin, Janvier, Anzac, Gregoire Lake Estates, the FMFN, and Lac La Biche, resulting from an increase in large tractor-trailer loads and traffic due to construction of projects on or near Highway 881. The Highway 663 bypass around Lac La Biche was completed in 2006 to alleviate traffic along the main street of the town to connect to Highway 881. However, some truck traffic still utilizes the direct route through the town. The specific concerns of the communities differ slightly, but include:

- Volume of traffic, especially at peak commuting times;
- Speed of all traffic through the communities;
- Truck traffic in the Town of Lac La Biche;
- Potential for collision as driveways enter directly onto the highway at Fort McMurray No. 468 First Nation and Gregoire Lake Estates;
- Safety of school children being bussed to school;
- Highway maintenance including line painting and plowing; and
- Dust.

Access to the south end of the study area is via Highway 55 to Lac La Biche, then Highway 881 north to Conklin. Access from the north is via Highway 63 connecting to Highway 881. Construction traffic for recent developments has largely traveled south from the Highway 63 and 881 junction, as this route is a high-load corridor. The recent bypass around Lac La Biche and complete paving of Highway 881 will encourage truck traffic on the southern route. Until overhead lines are buried on the southern portion of Highway 881, all oversize and high loads must come south into the LSA from Highway 63. However, trucks delivering dimensional loads can exit the LSA on Highway 881 to the south.

The Average Annual Daily Traffic (AADT) counts along Highway 881 between 2003 and 2006 are shown in Table 14.7-10. The table shows the pattern of traffic during the years of construction of Long Lake (pilot project in place in 2003, construction of Long Lake commercial operation began in the fall of 2004) and Surmont (AIT, 2006b). Additionally, MEG, Jackfish and Whitesands have been in construction farther south on Highway 881 during this time frame. The traffic using the north end of Highway 881 through the FMFN and passing Anzac significantly increased between 2004 and 2006. This increase is indicative of the volume of traffic associated with construction phases of in-situ developments to date, as tractor trailer traffic utilized only the north portion of Highway 881 past Anzac until paving was complete in 2006. Traffic past Conklin and Janvier has increased substantially between 2005 and 2006. Increasing traffic east of Sir Winston Churchill Park may be associated with the complete paving of Highway 881 and the truck bypass around Lac La Biche, which both make truck access to the LSA easier.

Table 14.7-10 Average Annual Daily Traffic Counts on Highway 881 between 2003 and 2006

	Average Annual Daily Traffic Counts (AADT)			
	2003	**2004**	**2005**	**2006***
Highway 63 and Highway 881 Junction	1,600	1,740	3,400	4,350
West of Anzac Turnoff	1,140	1,170	2,830	3,790
East of Anzac Turnoff	610	630	2,340	3,030
South of Long Lake Project	n/a	n/a	990	1,290
South of Surmont Project	n/a	n/a	510	720
North of Janvier	390	390	390	710
South of Janvier	360	360	360	640
North of Conklin	260	260	270	720
South of Conklin	220	220	240	630
16.5 km North of Hwy 858 and 881 Imperial Mills	n/a	420	560	880
East of Sir Winston Churchill Park	n/a	1,060	1,060	1,420
At Lac La Biche Corner, East of Hwy 36 and 55	9,240	9,280	8,940	9,400

n/a not applicable

* Produced by CornerStone Solutions Inc. on March 9, 2007, and posted on Alberta Infrastructure and Transportation website, 2006.

Oil sands producers in the area around Anzac, Fort McMurray No. 468 First Nation and Gregoire Lake Estates have developed several strategies to deal with the volume of heavy traffic on the north end of Highway 881. These strategies include:

- Support of the Willow Lake Traffic Advisory Group, to discuss and act on concerns;
- Financially supporting enhanced policing primarily for traffic violations;
- A radar trailer to alert motorists of their speed, particularly in residential areas;
- Staging of heavy and dimensional loads between midnight and 6 am;
- Bussing of construction workers; and
- Employee awareness sessions.

14.7.5.9 Communities in Transition

The way of life in the small and relatively remote communities along Highway 881 has changed over the past 20 years, first through the completion of Secondary Road 881 (subsequently Highway 881) and, secondly, through the development of conventional oil and gas facilities and SAGD oil sands developments in the areas around the communities. The potential for employment and development of small business is high. However, the community infrastructure to support increases in population is not well developed. As well, community capacity to deal with the social implications of sudden economic development, such as gambling and drug and alcohol abuse, is not well developed. Capacity to meet new employment or business opportunities requires business planning, access to financing, and a local and stable labour force.

Communities are experiencing increases in crime and drug availability without a significant increase in rural policing resources. The ATC reports that Aboriginal children in the region have a lower high school completion rate than other children, which may impact access to further education and the skilled jobs associated with oil sands developments (ATC, 2003). Reduced levels of high school completion are also occurring as students take lower skilled jobs rather than complete school. Both of these concerns may have implications for the long term employment capacity of the community.

Approximately 50% of the population in Janvier and Conklin are of Aboriginal descent, mostly Métis. Additionally, the CPDFN is adjacent to Janvier. There is increasing involvement with the oil sands industry as well as forestry and conventional oil and gas in the region.

There is also an inter-generational change occurring where younger First Nations and Métis persons are drawn to the wage economy and may be less involved in the traditional land uses of their communities. Traditional uses include berry picking, plant gathering, trapping, camping, fishing and hunting. As well, burial sites and seasonal gathering places are located throughout the study area. The FMFN, HLFN and CPDFN all claim traditional lands in the study area. Living from the land requires access to wide stretches of land in which wildlife and vegetation are relatively undisturbed. Current oil sands and forestry activity increases the access to the land, for both Aboriginal traditional land users and other non-Aboriginal users and physical disturbance may reduce berry and other plant picking areas. Those members who live entirely from traditional sources are also those least able and least likely to access the wage economy. A study of traditional use in the Project area is underway, and is discussed in Volume 5, Section 16.

As well, the more peaceful, rural lifestyle is disrupted by large capital developments, primarily in the construction phase. The open camps at the Conklin corner and construction and operations camps within a short distance of Conklin, means that up to two to three times as many temporary residents as permanent residents may be living in or near the hamlet. The potential to add permanent population to the established hamlets through operations personnel and to increase the economic viability of the communities may offset the change in lifestyle. However, increased populations require adequate infrastructure, which is generally at the capacity for current populations in local communities. In particular, First Nations reserves face a housing and infrastructure deficit for current populations, and members returning to the reserves to take advantage of employment opportunities may add to the overcrowding and over use of facilities.

14.8 Application Case Economic Impact Assessment

14.8.1 Local Economic and Fiscal Impacts

An explanation of local economic and fiscal impacts is provided in the following sections.

14.8.1.1 Local Opportunities

A description of local opportunities is provided in the following sections.

Maximization of Local Participation

North American currently operates, and will continue to operate, in such a way as to be the preferred employer in the region. The company believes that both it and the entire region benefit from having skilled workers in the community.

North American is committed to contracting and employing as many local contractors and people as possible, with its first priority the communities within 30 km of North American operating areas;

that is, Conklin, Janvier, CPDFN, Anzac and FMFN. Given the Aboriginal nature of these communities, North American's priority is to maximize participation in the Project by long term residents of each of these communities, and their families. North American also commits to contracting businesses and employing people in the larger local area outside of the immediate 30 km radius. In 2006, North American "spent over $13 million locally and partnered with over 60 businesses and contractors local to seven neighbouring communities between Lac La Biche and Fort McMurray." (North American, 2006).

As is the case for all of North American's contractors, local contractors must demonstrate that they have the capacity to perform the work involved and must meet North American's safety, environmental and other work standards. However, subject to these conditions, local contractors will be given some preference over non-local companies.

North American has a list of local vendors and will work with other companies in the area to develop a comprehensive Local Vendor Database. Information gathered as part of this database will include the business's location, nature and capacity, and the number of employees. Prime bidders will be requested to provide estimates of their planned local content and to provide regular reports regarding their use of local businesses and workers.

Throughout construction and operations phases, North American will work with local communities to develop information on residents' education, skills, work experience and interests. This information will be matched against the jobs available to identify qualified local candidates. Although North American will continue to require that operations employees have a minimum of Grade 12 or equivalent, this is not intended as a barrier to employment, but rather as a reflection of the skilled nature of the work and as an incentive to stay in school. North American will work with the community to provide students with motivation and mentorship. Where an applicant does not have Grade 12, consideration is given on an individual basis where applicants have a skilled trade, a fourth class power engineering certificate or greater, or ten or more years of work experience.

Communication of Employment and Business Opportunities

North American communicates, and will continue to communicate, upcoming employment and contract business opportunities for local communities in the following ways:

- Open houses in local communities;
- Newsletters to communities charting contract and employment opportunities;
- Timeline documents to communities which communicate long term employment/contract scopes in North American operations;
- Availability of two people in North American Aboriginal Affairs department to communicate with local people about contractor and employment opportunities at North American;
- Training and employment opportunities posted in public notice areas in each local community; and,
- Services of local employment agencies.

Local Training and Employment Initiatives

North American has and will continue to promote training and employment initiatives for local people. The company was involved in three different training and employment initiatives for the 2006 - 2007 drilling and seismic season, and is working toward similar programs in the future. These initiatives included:

- Drilling Rig Training & Employment Program: This was an initiative for the Winter 2006/2007 drilling season under which nine local and Aboriginal peoples were trained as leasehands at Enform in Nisku to work on North American contracted drilling rigs. Four candidates completed the full drilling season with North American.

- EMR/EMT Program: Under a partnership with North American, Métis Employment Services, Portage College, and Canadian Industrial Paramedics (CIP), twelve candidates entered the EMR/EMT training program at Portage College. Three graduates were hired to work on North American's drilling program.

- Rig Hauling and Pipeyard Employment Program: Under this initiative, Muldoon Trucking, the rig hauling and pipeyard contractor for North American's drilling program, trained and employed local people to be loader operators, swampers, and truck drivers.

In 2007, North American implemented a Field Aboriginal Liaison position for drilling operations. This person's responsibility is to support the trainees of each program and the companies employing the new trainees as they adapt to their new employment. Helping trainees to adjust to different work and living conditions will further North American's goal of maintaining local employment.

North American recently gave away its first post secondary education scholarship for local communities to a graduating student from Conklin. North American's scholarship fund is for students from local communities in its area of operations, who are attending post secondary education in industry or community related programs.

North American belongs to the Southern Athabasca Oil Sands Group (SAOSG) and the Lac La Biche Regional Industry Consultation Committee (LLBRICC). The SAOSG represents oil sands recovery process operators located south of Fort McMurray. The group shares information and looks at ways of coordinating activities in a way that benefits the local communities.

The LLBRICC is a community group representing Lac La Biche and Lakeland County. Some of the objectives of the Committee are to:

- Promote and plan for community economic development opportunities in the greater Lac La Biche region that would support industry longer term planning;

- Help to address related regional social and environmental issues;

- Help to identify and resolve issues and opportunities;

- Share pertinent information regarding both industry and community developments; and

- Collaborate or partner in specific initiatives as circumstances warrant.

It is intended that industry members include not only the SAGD companies, but forestry, railway, pipeline, and other relevant companies operating in the area as well. The regional community will be represented through existing organizations such as:

- Lakeland County;
- Town of Lac La Biche;
- Lac La Biche and District Chamber of Commerce;
- Kikino Métis Settlement;
- Buffalo Lake Métis Settlement;
- Métis Nation of Alberta – Zone 1;
- Heart Lake First Nation;
- Beaver Lake Cree Nation;
- Northern Lights School Division;
- Lac La Biche Regional Community Development Corporation;
- Portage College; and
- Other organizations as appropriate.

The LLBRICC will share information with other regional stakeholders when required, including the Conklin Community Association and the Chipewyan Prairie Dené First Nation.

North American also belongs to the Fort McMurray First Nation IRC and the Chipewyan Prairie Dené First Nation IRC. These initiatives, and others directed specifically at Aboriginal peoples, are further discussed in the section on local operations impacts.

14.8.1.2 Effects from Project Construction

Effects from Project construction are described in the following sections.

Overview of Project Development

The estimated timing of Project construction (including procurement), capital costs, and capacity by hub is shown in Table 14.8-1.

Table 14.8-1 Construction Timing, Cost and Production Capacity by Hub

Project Hub	Estimated Start Date for Construction	First Steam	Nominal Capacity (bpd)	Capital Cost ($MM 2006)
Leismer Demonstration	2008	Q4 2009	10,000	$582
Leismer Commercial	2009	Q2 2010	10,000	$379
Leismer Expansion	2010	Q2 2011	20,000	$991
Corner	2011 2013	Q3 2012 Q4 2014	40,000 40,000	$2,089
Thornbury	2012 2016	Q4 2013 Q2 2017	40,000 20,000	$1,950
Hangingstone	2015	Q1 2016	20,000	$633
Northwest Leismer	2017	2018	20,000	$691
South Leismer	2032	2034	(20,000)	$525
Total	N/a	N/a	220,000	$7,840

Project development will start in 2008 with construction of the Leismer Demonstration Hub. Further development will be done in 20,000 bpd to 40,000 bpd stages with capacity in place by approximately 2018 to produce 220,000 bpd. For the next 15 years, activity will be restricted to the addition of wells necessary to maintain production at 220,000 bpd. In about 2032, further development will take place on the Leismer Development Area with construction of the South Leismer Hub. Productivity maintenance activities will continue over the next 20 years or so with Project closure in the early 2050s.

The total capital cost of the Project over its entire life will be $7,840 million including the following major components:

- Central plant facilities $2,330 million
- Well pads $1,148 million
- Well drilling $2,565 million
- Seismic and delineation drilling $199 million
- Gathering and other infrastructure $1,599 million

Out of the total cost of $7,840 million, 93% will be spent from 2008 to 2017. The assessment of construction effects, therefore, focuses on this time period. Although further development will take place, in the form of on-going well drilling and pad construction and in the construction of South Leismer, economic effects from these activities are not considered.

Geographical Distribution of Development Expenditures

Expenditures associated with seismic and with delineation and well drilling, totalling $2,764 million, will all remain within the Province. Capital expenditures on surface facilities, totalling $5,077, are expected to be distributed geographically as shown in Table 14.8-2.

Table 14.8-2 Estimated Distribution of Expenditures on Surface Facilities Construction

	RSA	Other Alberta	Elsewhere in Canada	Foreign	Total
Engineering	0%	50%	0%	50%	100%
Major equipment and materials	3%	35%	45%	17%	100%
Offsite fabrication	0%	75%	0%	25%	100%
Construction management	0%	100%	0%	0%	100%
Onsite construction*	5%	60%	25%	10%	100%

* Includes wages, benefits, subsistence, contractors' overheads and profits, equipment rental, etc.

The potential for local involvement in the construction of surface facilities lies in supplying some of the materials and services required and for supplying some of the onsite construction labour. North American will continue to evaluate local capacities and suppliers to optimize local participation in construction and operations and expects that local capability will increase over time.

The potential for local involvement in well drilling may include supplying some of the direct labour, as well as some of the supplies and services necessary for drilling operations.

Plans for Engineering and Contracting

For the Leismer Hub, North American plans to use a global firm with offices in Alberta to provide engineering and procurement services. North American will manage construction internally and will contract directly with module fabricators and on-site constructors. For future hubs, the intention is to standardize the design for a "repeatable" facility. Once this is done, some of the detailed engineering work, procurement and fabrication may subsequently be done off-shore.

Direct Construction On-Site Employment

On-site employment will include construction and drilling workers. Requirements over the period 2008 – 2017 are shown in Table 14.8-3.

Table 14.8-3 On-Site Workers Required 2008 - 2017

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Total
Construction Workers Range* P-Y**	0-300 110	300 300	300 300	300 300	300 300	300 300	300 300	300 300	300 300	300 300	N/a 2810
Drilling Workers Range* P-Y**	0-70 45	70 70	70-140 90	140 140	140 140	140 140	140 140	70 70	70 70	70-0 55	N/a 960
Total P-Ys	155	370	390	440	440	440	440	370	370	355	3,770

* Reflects range over the year by quarter.

** P-Y = person-years.

The Leismer Demonstration Hub has already been approved by the EUB and AENV. Site clearing and access construction will likely begin in 2007, while construction on the demonstration hub will begin in 2008 with 50 construction workers and 50 drilling workers. The number of construction workers will reach its peak of 300 in Q4 2008 and, pending approvals, will persist at that level through 2017. The number of drilling related workers will rise from 50 in Q2 2008 to reach its peak of 140 at the end of 2010, staying at that level through 2014 and dropping to 70 workers for the subsequent 3 years. Limited drilling will occur for replacement wells over the life of the Project.

Over the period 2008-2017, the Project will generate about 3770 person-years (P-Y) of onsite construction and drilling employment. Over the life of the Project, construction and well drilling will generate 4300 P-Y of work in total, including 3260 P-Y associated with the construction of surface facilities and 1040 with well drilling and completion. (This number does not include work generated by replacement well drilling.) All workers will be accommodated in construction camps on or close to the site.

The types of skills and breakdown by percentage that will be required for facilities construction are shown in Table 14.8-4.

Table 14.8-4 Estimated Trades Required for Facilities Construction

Trade	Percent of Total P-Y	Trade	Percent of Total P-Y
labourers	7	ironworkers & ironworker welders	2
pipefitters & pipefitter welders	10	carpenters	4
equipment operators	16	pipe/instrument fitters	5
electricians	10	ironworkers -- rebar	2
welders	8	painters	1
sheet metal workers	10	cement finishers	2
structural steel workers	14	surveyors	1
insulators	7	millwrights	1
Total			100%

Trades which will be required for well drilling and completion include rig crews, drilling supervisors, directional drillers, geologists, welders, and labourers, among others.

It is difficult to predict the extent to which requirements for construction and drilling workers will be filled locally. This will depend on a number of factors including local unemployment rates, availability of required skills, and competing demands for trades and labourers over the construction period. Several other projects have been proposed in the southern part of the RMWB which will require generally the same types of workers as the Project and, as is the case currently, most local workers with the required education and training for construction activities will already be employed.

It is assumed, for the purpose of the economic calculations, that 5% of the direct employment created by Project development will be filled by currently local but unemployed residents (including new graduates from Portage College). Given total direct employment of 3770 P-Y for Project development from 2008 to 2017, this suggests that, over this period, about 190 P-Y will go to workers who are already local residents. At an average wage, including supplements, of $96,500 (the average for all types of construction workers in Edmonton as of March 2007 [CANSIM]) this will generate labour income of about $18 million over the 2008-2017 period.

This estimate of local labour income does not include construction workers who are initially non-local but who decide to relocate to the RSA. In the past, construction workers have not typically relocated for individual jobs. However, current municipal census data for Fort McMurray indicates that construction workers make up 50% of migrants to the community. Given that construction on the Project will take place continuously over the period 2008-2017, it is considered likely that some workers will decide to move to the area. For the purposes of the economic calculations, it is assumed that 10 – 20% of construction and drilling workers who are not already local will relocate to the RSA. Using this assumption, relocated workers will perform 360 P-Y of work and generate an additional $35 million of local labour income. The total increase in local labour income associated with Project development is therefore about $55 million over the 2008-2017 period.

Local Purchasing

The initiatives described in Section 14.6-2 are designed to optimize the use of local goods and services. Some examples of supplies and services that may be available and purchased locally include emergency medical technician services, security, catering, gravel, hauling, tree clearing, mulching, earth moving and compaction and fuel supply. As shown in Table 14.8-2, these purchases are likely to comprise about 3% of the total cost of equipment and materials.

Equipment and materials will cost about $1,380 million over the period 2008-2017 (out of about $1,475 million over the life of the Project). Assuming that wages comprise 35% of this amount,[1] local labour income associated with these purchases will be about $14 million. Based on an average wage of $80,000[2], this translates into about 175 person-years of employment from 2008 to 2017. If increased capacity exists, local expenditures and employment may be increased accordingly. This assumes that it is possible for local suppliers to find local workers with the required skills to provide the additional goods and services needed.

Total Local Effects from Project Construction

In addition to the direct and indirect effects described above, economic impact theory suggests that some of the increased wages paid to direct and indirect workers will be spent on consumer goods and services produced locally. The provincial ratio of induced household income to direct plus indirect income is 28% (Alberta Finance, 2006). Given the small size and limited economy of the RSA relative to the province, it is assumed that the local ratio will be one-third the provincial – that is, roughly 9%. On the basis of this assumption, induced spending will create additional household income in the area of approximately $6 million over the construction period and will translate into about 90 person-years of employment.[3]

Again, this assumes that local workers are available to fill these positions. There is currently a shortage of workers for sales and service positions in the RSA (LLBRICC, 2007), a situation that is likely to persist for some time given the low wage levels in this sector relative to the oil and gas industry, and the likelihood of continued high levels of demand for workers from the oil and gas sector.

1 This is based on a comparison of industry intensity ratios and industry multipliers for the construction, wholesale trade, and truck transportation industries, which suggests that about 35% of the value of purchases from these industries reflects direct labour income (Alberta Finance, 2006).
2 This amount roughly reflects the wage that workers would have to be paid in order to compete with construction labourer jobs (CANSIM, 2007).
3 Based on an average wage for the Wood Buffalo-Cold Lake region for tertiary industries excluding Public Administration of roughly $53,000 excluding benefits (ALIS, 2005) or $63,600 assuming benefits of 20% This estimate is increased to a 2006 level of $68,000 based on the increase in wages generally in Alberta from 2005 to 2006 of 6.9% (Alberta Employment, Immigration and Industry, 2006a).

Total local construction employment and income that may be generated by construction of the Project is summarized in Table 14.8-5.

Table 14.8-5 Summary of Local Construction Impacts 2008 - 2017

	Total		Average per Year	
	Employment (person-years)	**Labour Income** ($millions)	**Employment** (person-years)	**Labour Income** ($millions)
Direct				
already local	*190*	*$18*	*19*	*$1.8*
relocated local	*360*	*$35*	*36*	*$3.5*
Sub-total	550	$53	55	$5.3
Indirect	175	$14	18	$1.4
Induced	90	$6	9	$0.6
Total	**815**	**$73**	**82**	**$7.3**

14.8.1.3 Local Effects from Project Operation

Local effects from Project operation are described in the following sections.

Definition of Project Scope for Analysis of Local Operations Effects

The life of the Project is estimated at roughly 40 years and economic effects from Project operation will persist over this time frame. However, as shown in Table 14.8-1, the Project will not reach capacity until after development of the first 9 hubs – that is, in about 2017. Thus, impacts from operations will be less in the first 10 years than they will be thereafter.

However, although the economic impacts in the first 10 years will be lower on an annual average basis than those during most of the Project's remaining life, the period 2008-2017 will be an important one to the local region in terms of job creation, economic diversification, and population growth. The analysis of operations impacts therefore focuses on this time period.

Some estimates of impact are also provided for the Project at capacity, expressed in terms of effects that will be generated in a typical year at capacity production. The analysis also touches on impacts that will be generated over the life of the Project. The latter estimates are based on the assumption that effects during the last 10 years of the Project before closure in 2050 will approximate those generated in the first 10 years. This may understate local impacts since it is likely that local capacity will be greater in 30 years than it is now.

Besides operations employment, additional employment will be generated by on-going construction of well pads and on-going well drilling and completion. However, these impacts are minor relative to those associated with Project operations and are not considered in this analysis.

Direct Employment

Total Direct Employment

The schedule for Project development from 2008 to 2017 is shown in Table 14.8-6 along with the operational workers required during that time frame.

Table 14.8-6 Operations Workers Required 2008 - 2017

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Total
General Operations	21	67	86	100	202	310	435	533	617	646	3,017
Unidentified Contractors	0	5	10	14	20	32	42	50	60	68	301
Camp Workers	31	36	39	44	55	68	79	83	90	92	617
Total	52	108	135	158	277	410	556	666	767	806	3,935

Operations employment will begin with about 50 people in 2008. As the Project develops, operational workers are added gradually, reaching a peak of about 650 workers in 2017. This number includes employees and regular contractors. The total employment generated over the 2008-2017 period is about 3935 P-Y.

After 2017, the number of camp workers drops to about 80 people, reflecting the end of the 2008-2017 construction period. Construction will not begin again until the early 2030s when the final hub, South Leismer, will be developed. After development of South Leismer, operations employment rises slightly to about 840 workers per year. The average, over the period from 2018 to 2040, when the Project is operating at capacity, is about 820 workers. For the last 10 years of the Project, from 2040 to 2050, it is assumed for the purposes of the economic impact estimates, that employment will be similar to that in the first 10 years. The total operations employment generated over the life of the Project is therefore 26,725 P-Y.

The type of work by qualification is shown in Table14.6-7.

Table 14.8-7 Operations Workers Required by Qualification

Qualification	%
Power Engineers	36
Camp Workers (cooks, cleaning, maintenance)	13
Service Rig Experience	9
Instrument Mechanic/Tech	9
Pipe Fitter Trades Certification or Apprenticeship	8
Paramedic or EMT Certification	4
Electrician Certification	4
Trades Certification (Any trade)	3
Millwright Certification	3
Engineering or Engineering Technologist Certification	3
Warehouse and Purchasing Experience	2
Safety Certification	2
Administration (various skills)	2
Heavy Equipment Operator	1
Total	99

The types of qualifications shown in Table 14.8-7 reflect those in 2017, when the Project is close to reaching capacity. The distribution of skills may be slightly different in earlier years.

Power Engineers comprise the largest segment of workers required for the Project. About 80% of the Power Engineers required will be 3rd or 4th class. The remainder will be 2nd class with a small number requiring 1st class.

The next largest category is camp workers, although the relative importance of this category varies from year to year depending on whether or not construction and drilling are being undertaken. Trades will also be in high demand including pipefitters, electricians, millwrights, and others. Six percent of workers will require paramedic, EMT, or safety certification.

A variety of skills will be required for administrative positions and for other operations workers.

Local Participation in Direct Operations Employment

Hiring for the Project is expected to begin in 2009 and ramp up gradually over the next 8 years. Portage College is working closely with North American and other companies to develop and expand programs to meet industry's needs. Currently, the College offers welding and steamfitter/pipefitter programs and training for heavy equipment operators. It is upgrading its Power Engineering lab and will, at some time in the future, offer an electrician and heavy duty equipment technician program (Lac La Biche - Lakeland County Economic Development Partnership, not dated.)

Local hiring may, however, be constrained by similar projects competing for the same skills. For this reason, it is assumed, for the purposes of the economic impact assessment, that initially, only 10% of operating positions will be filled locally. This percentage is expected to increase to 20% by 2011. On this basis, about 650 P-Y of work will be generated for already local residents over the 2008-2017 period – an average of 65 jobs per year.

Although there will be a permanent camp for operations workers, it is likely that some non-local workers will decide to relocate to the RSA in order to be closer to their place of work. For the purposes of the economic impact estimates, it is assumed that 15% to 20% of non-local workers will relocate to the RSA. This will generate an additional 600 P-Y of employment for the local area (an average of 60 jobs per year) for a total of 1250 P-Y over the 2008-2017 period. Assuming an average annual compensation of $100,000, (information from North American) these jobs will generate income to local workers over the 2008-2017 period of about $125 million – an average of $12.5 million per year. Once at capacity, local labour income will be in the order of $30 million per year.

Employment and income will also be generated for local residents by ongoing well pad construction and well drilling and completion. However, these impacts will be minor compared to those associated with the Project's normal operation and are not quantified here.

Local Purchasing

Depending on energy prices, fuel and electricity will comprise about 60% of total operating costs. Neither will generate local impacts of any magnitude. However, maintenance, supplies and other "consumables" will comprise about 15% of operating costs and of these, North American expects that about 20% could go to local suppliers. The percentage is limited by the fact that a large portion of consumable costs are chemicals which are not now, nor are likely to be, available locally. Goods and services which could be sourced locally include camp supplies and services, equipment rentals, courier services, HVAC maintenance services, bussing, scaffolding, insulation, janitorial and laundry services, hauling, electric motor services, Hot Shot service, road maintenance, miscellaneous pipe fittings and safety supply items, vehicle maintenance, office supplies, contracted personnel and tele-communication services (telephones, cellular phones and two way radios).

The cost of consumables will vary over the 2008-2017 period depending primarily on production levels but on average over this period, they will cost about $35 million per year. For the purposes of the economic impact analysis, it is assumed that 20% of these purchases will be from local

suppliers (although this ratio may increase slightly over time as local capacity grows). Assuming a factor of 20%, roughly $7 million per year will go to local suppliers. Assuming that wages comprise 40% of this amount,[4] local labour income associated with these purchases will be about $3 million annually. Based on an average wage of $80,000,[5] this will be equivalent to about 35 full-time equivalent jobs per year. This assumes that it is possible for suppliers to find workers locally, or to recruit workers to the area, with the required skills to produce the goods and services needed.

Once at capacity, local purchases will generate 120 full-time equivalent jobs per year in the RSA, with annual income of about $10 million.

Total Local Effects From Project Operation

Local effects from operation of the Project will stem from direct onsite employment, from employment generated by purchases from local suppliers of goods and services required for plant and camp operation (indirect effects), and from jobs created through the spending of employment incomes earned directly or indirectly (induced employment).

The provincial ratio of induced household income to direct plus indirect income is 28% (Alberta Finance, 2006). Given the small size and limited economy of the RSA relative to the province, it is assumed that the local ratio will be one-third the provincial – that is, roughly 9%. On the basis of this assumption, induced spending will create additional household income in the area of about $15 million over the 2008-2017 period (an average of $1.5 million per year) and will translate into about 200 person-years of employment (an average of 20 jobs per year).[6]

Again, this assumes that local workers are available to fill these positions. As noted in the section on construction impacts, there is currently a shortage of workers for sales and service positions in the RSA, a situation that is likely to persist for some time given the low wage levels in this sector relative to the oil and gas industry and the likelihood of continued high levels of demand for workers from the oil and gas sector.

Total local employment and income that will be generated by operation of the Project annually at capacity is summarized in Table 14.8-8.

4 This is based on a comparison of industry intensity ratios and industry multipliers for “support activities for mining and oil and gas extraction”, “wholesale trade”, “repair and maintenance” and “truck transportation”, which suggests that about 40% of the value of purchases from these industries reflects direct labour income (Alberta Finance, 2006).

5 This amount roughly reflects the wage that workers would have to be paid in order to compete with construction labourer jobs (CANSIM, 2007).

6 This is calculated as 9% of the sum of direct local income ($125 million) plus indirect income ($30 million) divided by an average wage for the Wood Buffalo-Cold Lake region for tertiary industries excluding Public Administration of roughly $68,000 in 2006 (see FN 3).

Table 14.8-8 Summary of Local Operations Impacts 2008 – 2017

	Total		Average per Year	
	Employment (person-years)	**Labour Income** ($millions)	**Employment** (person-years)	**Labour Income** ($millions)
Direct				
already local	*650*	*$65*	*65*	*$6.5*
relocated local	*600*	*$60*	*60*	*$6.0*
Sub-total	1,250	$125	125	$12.5
Indirect	350	$30	35	$3.5
Induced	200	$15	20	$1.5
Total	**1,800**	**$170**	**180**	**$17.0**

Note: Totals are rounded.

Over the 2008 – 2017 period, direct employment generated in the RSA from Project operation will be 1250 P-Y for an average over the period of 125 P-Y per year. Including direct, indirect, and induced impacts, employment in the RSA will be 1800 P-Y in total over the 2008-2017 period for an annual average of 180 P-Y.

At capacity, direct local employment from Project operation will be 295 P-Y per year with annual labour income of about $30 million. Including direct, indirect and induced impacts, employment in the RSA from Project operation at capacity will be almost 470 P-Y per year with annual income of $43 million.

Other Economic Effects

Land and Resource Use Effects

The primary land use that will be impacted by the Project is traditional use by the local Aboriginal communities. The Project will add to existing pressures on hunting, fishing, trapping, and gathering. Many of the Aboriginal peoples in the LSA supplement their livelihoods through hunting, fishing, or trapping and a loss or reduction in such opportunities translates into an economic loss. Because this is primarily a cumulative issue, it is addressed more fully in the cumulative effects assessment in Section 14.10.

Cost of Housing

Although a camp will be provided to house permanent employees, some will likely choose to relocate to the RSA in order to be closer to their place of work. For the purposes of the economic impact estimates, it was assumed that 15-20% - or about 125 - of non-local workers would relocate over the 2008-2017 period. In addition, it is estimated that about 40 workers engaged in construction and drilling will relocate. This direct increase in population, plus the Project's demand for local goods and services, will lead to a further increase in local jobs. Together, the result will be an increase in population of about 1150 people over the next 10 years and a demand, assuming 3.3 people per household, for about 350 new houses.

Lac La Biche Region, which will be the location of most of the new jobs, is planning for growth and will have 800 new lots available for residential housing development over the next 5 years (LLBRICC, 2007). Thus, the housing supply will be able to accommodate the growth in population associated with the Project. However, increased demand will put pressure on house

prices. Increased demand for housing in Conklin and Janvier will also push prices up in these communities.

Cost of Labour

Currently, the labour market throughout the province is tight and the RSA is experiencing shortages in many of the trades and in service workers in the retail and hospitality sectors (Lac La Biche - Lakeland County Economic Development Partnership, not dated). Programs being offered and developed at Portage College, and training initiatives offered by North American, will help to address this situation but the Project's demand for trades will likely exacerbate trades shortages putting upward pressure on wages. This in turn will exacerbate the current shortage of workers in the sales and service sectors that cannot afford to pay competitive wages. Over the longer term, these effects will diminish as supply responds to demand.

Fiscal Effects on the RSA

Because the Project straddles Lakeland County and the RMWB, property taxes will accrue to both municipalities. Based on current mill rates, municipal taxes payable on the Project will be about $3.9 million for each 40,000 bpd facility (Pers. Comm., Don Rae, April 2007). About 10% of municipal taxes paid will be forwarded to the province as education tax. The remaining 90% will be retained by the municipalities. (The high proportion retained by the municipality is due to the fact that the Project entails a high proportion of machinery and equipment which is exempt from education taxes.)

A summary of property taxes is provided in Table 14.8-9. Over the period 2008-2017, the amount of property tax paid builds up as capacity develops. By 2017, the Project has capacity of 220,000. Although production does not stay at this level over the entire life of the Project, property taxes remain constant.

Table 14.8-9 Summary of Property Taxes ($ millions)

Taxes retained by:	2008 - 2017		2018 - 2050		Life of Project
	Average per year	Total over period	Average per year	Total over period	Total
Lakeland County	$6.5	$65	$12.9	$425	$490
RMWB	4.3	43	9.7	320	365
Province	1.2	12	2.5	80	95
Total	**$12.0**	**$120**	**$25.1**	**$825**	**$950**

Note: Totals are rounded.

As noted above, there will be some in-migration to the RSA as a result of the Project. Most of the in-migration will be to Lac La Biche or Lakeland County. Workers relocating to Lac La Biche or Lakeland County will pay property taxes to the municipality in which they reside; however, these revenues will be balanced by the costs associated with providing municipal services to the new residents, resulting in no net gain for the municipalities. However, there may be some issues related to timing. The demand for municipal services is immediate, while the taxes to pay for them lag behind.

Given their small size and level of services, it is unlikely that many workers will relocate to Conklin or Janvier (Section 14.7.2). The exception to this may be a number of Métis or First Nations members who have moved to Fort McMurray to live and work on projects north of the City and

who, if oil and gas work is available closer to home, may relocate back to their original communities. This could lead to an increased demand for infrastructure and services in these communities which would further strain the RMWB's fiscal situation.

14.8.2 Project Impacts on First Nations and Métis Communities

14.8.2.1 Background

First Nations and Métis people live throughout the RSA. To a certain extent, economic impacts for them will be the same as for all other residents. However, there are at least three issues that differentiate impacts on Aboriginal peoples from those of the general populace:

- Many First Nations and Métis people still engage in traditional practices such as hunting, fishing, plant gathering, and trapping. Although the vast majority does not depend on these activities for their livelihood, many supplement their incomes and/or diets through these activities. The decline or loss of traditional practices represents an economic loss to these people.

- Métis communities are less formally organized, funded and recognized. Hence engagement is more difficult.

- Many First Nations people live on or near reserve communities. Because much of the funding for infrastructure in these communities comes from Indian and Northern Affairs Canada, the impacts on housing and other infrastructure have different implications than they do in other centres.

- North American has agreements with the Industry Relations Corporations (IRCs) that exist in each of the First Nations communities. These agreements, and other regional agreements, may have an effect on the extent to which jobs and income from oil sands projects accrue to First Nations people.

With respect to traditional practices, North American will offer compensation to trappers whose activities are affected by the Project. Impacts on other traditional uses, and on housing and other infrastructure in First Nations communities, will be largely cumulative and are discussed in Section 14.10. North American's involvement in community and regional agreements, and its commitments to Aboriginal peoples in the region, are discussed below.

14.8.2.2 Community Commitments

North American has stated that it has a particular interest in engaging the local aboriginal communities (North American, 2005) and is committed to:

- Engaging in open and consistent communications with Aboriginal communities near Project operations;

- Engaging in beneficial partnerships with local communities regarding employment, training, education, environmental stewardship and community investment;

- Involving Aboriginal communities in all future activities; and

- Ensuring the environmental and traditional values of the community and region are honoured and respected.

In 2006, North American implemented a Field Liaison position for drilling operations which will extend through construction. This person's responsibility is to support the trainees of each program and the companies employing the new trainees as they adapt to their new employment. Helping trainees to adjust to different work and living conditions will further North American's goal of maintaining local employment.

North American has agreements with the Fort McMurray First Nation and the CPDFN under their IRCs. The IRC agreements formalize the process by which the proponent and the First Nations will continue to work together for the Project.

14.8.2.3 Education of Youth

North American is aware that education of youth is a key element in ensuring that the Aboriginal communities in the RSA benefit from the Project. Demographic and educational data are not available for Conklin or Janvier but data for the CPDFN and the Heart Lake Nation – which are likely to be representative of Conklin and Janvier as well - indicate that the Aboriginal population in the RSA is younger than the provincial average, that a relatively high percentage of children aged 15-19 are not in school either full or part time, and that high school graduation rates are much lower than in the province as a whole. The following table summarizes this information.

Table 14.8-10 Youth and Educational Achievement

	CPDFN and Heart Lake FN	Alberta
Population aged 19 years or younger	49%	28%
Population aged 15-19 not in school	60%	30%
Population aged 20-34 with less than high school	71%	18%

Source: Statistics Canada, 2001.

The data in the table above are from 2001; community-specific data are not yet available from the 2006 Census. Percentages on the First Nations may have changed since 2001; however, they are unlikely to have reached the provincial levels. North American will attempt to bridge these gaps by participating in and developing programs directed at youth. Programs which North American will consider supporting include:

- The Traditional Celebration of Achievement. This is an event honouring Aboriginal high school graduates in the Wood Buffalo region. All high schools participate in the celebrations, which also serve to inspire achievement among younger students.

- The Alberta Aboriginal Apprenticeship Project (AAAP). The AAAP assists qualified Aboriginal peoples to enter and complete an apprenticeship program of their choice; provides workplace support for Aboriginal apprentices and their employers; and, promotes the hiring of Aboriginal apprentices to employers. (www.thinktrades.com/candidates.htm)

- The National Aboriginal Achievement Foundation (NAAF). The NAAF encourages and empowers Aboriginal young people by providing important career planning information, by connecting youth with industry and by providing financial support for post-secondary studies in all disciplines (www.naaf.ca/html/about_e.html).

- The Aboriginal Transition Program offered by Keyano College in Fort McMurray in conjunction with the University of Alberta. The Program focuses on providing Aboriginal students with the skills needed to be successful in their academic careers by offering courses

based on good study habits, how to learn effectively and critical reading, writing and research. Students completing the Program at Keyano can then apply to a variety of transfer programs at the U of A (www.keyano.ca/).

14.8.3 Economic and Fiscal Impacts on the Province

14.8.3.1 Effects from Project Construction

Background to Assessment

A detailed description of Project development time lines and costs is contained in the section on local economic impacts. The following is a brief summary.

Project development will start in 2008 with construction of the Leismer Demonstration Hub. Further development will be done in 20,000-40,000 bpd stages with capacity in place by approximately 2018 to produce 220,000 bpd. In the early 2030s, further development will take place on the Leismer Development Area with construction of the South Leismer Hub. The analysis of provincial impacts from construction encompasses the entire period from 2008 to the early 2030s, including completion of South Leismer. The analysis does not reflect impacts from productivity maintenance activities – that is, well pad construction and well drilling and completion – that take place between 2017 and the construction of South Leismer and through to Project completion in about 2050.

Geographical Distribution of Expenditures

The expected geographic distribution of expenditures associated with construction of surface facilities is shown in Table 14.8-11.

Table 14.8-11 Estimated Distribution of Expenditures on Surface Facilities Construction

	Alberta	Elsewhere in Canada	Foreign	Total
Engineering	50%	0%	50%	100%
Major equipment and materials	38%	45%	17%	100%
Offsite fabrication	75%	0%	25%	100%
Construction management	100%	0%	0%	100%
Onsite construction*	65%	25%	10%	100%

* Includes wages, benefits, subsistence, contractors' overheads and profits, equipment rental, etc.

Expenditures on engineering and procurement services will all remain in Alberta for the first few years of the Project. North American plans to use WorleyParsons Alberta for the Leismer Demonstration Hub and, following that, for the engineering and design for a repeatable 20,000 bpd facility. After that, the detailed engineering will likely be done by WorleyParsons Asia and/or other offshore firms. The split shown in the table above approximates the division between engineering done within Alberta and offshore.

Much of the major equipment and materials required for Project construction is available within Alberta. Once through steam generators, free water knock out and treater vessels, along with other pressure vessels, will be manufactured in Alberta in the Calgary and Edmonton region, although some will also be manufactured in Ontario. Once all of the Leismer hubs are completed,

it is North American's intention to procure equipment outside of Canada to the extent economically attractive and logistically feasible for all subsequent hubs.

Modularization of facilities will be maximized such that work done on-site will be restricted to activities such as access clearing, road building, rough and finished grading, piling and concrete foundations, module setting, closure piping and welding, and electrical power distribution and hook up. After the Leismer Hub is complete, much of the modularization will likely be done offshore.

Construction management will be done by North American itself and thus all expenditures associated with construction management will remain in province.

The skills necessary for on-site construction are all available within Alberta. However, currently, labour is extremely tight and workers are being imported from outside the province to build projects. The projected level of investment in oil sands projects over the next decade suggests that this situation could persist over this period. It is therefore estimated that only about two-thirds of on-site construction expenditures will remain in-province.

Direct Employment and Income

Direct employment will be created in the province from several activities including:

- Engineering;
- Fabrication/modularization;
- Onsite construction of the plant, well-pads, and other infrastructure; and
- Drilling and completion of wells necessary for Project start-up.

Spending on engineering in Alberta is estimated at about $280 million. A comparison of the "industry multiplier" and the "industry intensity ratio" for "professional, scientific and technical services" (of which engineering is a part) suggests that labour costs comprise 47% of total expenditures (Alberta Finance, 2006). The average salary for engineers in "Engineering, Procurement and Construction" is about $110,000 before benefits or about $143,000 including benefits (APEGGA, 2006). Thus, spending of $280 million connected with construction of the Project will generate about 920 P-Y of work in Alberta.

In order to control costs, North American intends to design equipment to maximize off-site fabrication and assembly to the extent possible. Off-site fabrication will cost about $965 million of which about 75% will be spent in Alberta, roughly 30% of which will be labour costs.[7] Assuming an average wage equal to that for construction workers generally of $96,500 including benefits (CANSIM), this is equivalent to 2,250 person-years of off-site work.

Onsite construction employment requirements are detailed in the section on local economic impacts. As noted in that section, the Project will generate 3770 person-years of onsite employment over the period from 2008 to 2017. Another 530 P-Y will be created during the construction of South Leismer for a total of 4300 P-Y, including 3260 P-Y for the construction of surface facilities and 1040 P-Y for well drilling and completion. Sixty-five percent of onsite labour

7 Based on a comparison of the industry multiplier and industry intensity ratio for household income for "fabricated metal products manufacturing" (Alberta Finance, 2006).

for the construction of surface facilities is expected to be from the province. All of the workers required for well drilling and completion are expected to be provincial. The associated work created for Alberta workers is therefore a total of 3160 P-Y. At an average salary for construction workers of $96,500 (CANSIM), this work will generate about $305 million of labour income.

Based on these assumptions, the direct employment and income generated by Project construction are as shown in Table 14.8-12.

Table 14.8-12 Direct Provincial Employment and Labour Income from Project Construction

	Employment (person-years)	**Labour Income** ($millions)
Engineering	920	$130
Offsite Fabrication	2250	$215
Onsite:		
• Construction of surface facilities	*2120*	*$205*
• Well drilling and completion	*1040*	*$100*
Sub-total	3160	$305
Total	**6330**	**$650**

Total Provincial Impacts from Project Construction

In addition to employment and income generated by the Project directly, positive impacts will be created within the province as a result of purchases from provincial suppliers of goods and services required for Project construction (indirect effects), and from jobs created through the spending of employment incomes earned directly or indirectly (induced employment).

Using the direct employment and income shown above and published provincial multipliers (Alberta Finance, 2006), it is estimated that the construction of the Project will generate the total provincial contributions shown in Table 14.8-13.[8]

Table 14.8-13 Total Provincial Impacts from Project Construction

	Employment (person-years)	**Labour Income** ($millions)	**GDP** ($millions)
All hubs and associated well drilling	14,560	$1,300	$1,820

14.8.3.2 Effects from Project Operation

Employment and Income

The expected schedule for operations hiring, and the numbers and types of workers required, are detailed in the section on local economic impacts. The following is a summary.

Employment will begin with about 50 people in 2008. As the Project develops, operational workers are added gradually reaching a peak of about 650 workers in 2017. This number

8 Total employment and labour income were calculated using industry multipliers (closed model) for the construction industry. GDP was calculated on the basis that, according to industry intensity ratios, total GDP for the construction industry is 1.4 times total labour income (Alberta Finance, 2006).

includes employees and regular contractors. The total employment generated over the 2008-2017 period, including operations workers, contractors, and camp workers, is about 3900 P-Y.

After 2017, the number of camp workers drops to about 80 people, reflecting the end of the 2008-2017 construction period. Construction will not begin again until the early 2030s when the final hub, South Leismer, will be developed. After development of South Leismer, operations employment rises slightly to about 840 workers per year. The average, over the period from 2018 to 2040, when the Project is operating at capacity, is about 820 workers. For the last 10 years of the Project, from 2040 to 2050, it is assumed for the purposes of the economic impact estimates, that employment will be similar to that in the first 10 years, The total operations employment generated over the life of the Project is therefore 26,725 P-Y.

All operations workers will be encouraged to live in one of North American's permanent camps. They will be flown or driven to and from the work site with pick-up points in Calgary, Edmonton, and possibly Lac La Biche. These workers may come from Alberta, but could also come from outside the province. In order to be conservative in estimating the positive economic impacts from Project operation, it is assumed, for the sake of the economic impact calculations that, on average over the life of the Project, 25% of workers will come from outside the province.

Based on this assumption, direct employment created for Alberta workers by Project operation will be about 615 P-Y per year at capacity and just over 20,000 P-Y over the life of the Project. Assuming an average wage of $100,000 (based on information from North American), these jobs will generate labour income for provincial workers of about $60 million per year at capacity and about $2 billion over the life of the Project.

Total effects from operation of the Project will stem from direct onsite employment, and from indirect and induced effects. Indirect employment will be generated by purchases from provincial suppliers of goods and services required for plant and camp operation. Induced employment will be created as workers, employed directly or indirectly as a result of the Project, spend their incomes on a variety of provincially-produced goods and services.

Using published provincial multipliers for the oil and gas extraction industry (Alberta Finance, 2006), it can be estimated that the operation of the Project will generate the total provincial contributions shown in Table 14.8-14.[9]

Table 14.8-14 Total Provincial Impacts from Project Operation

Impacts:	Employment (person-years)	Labour Income ($millions)	GDP ($millions)
Per year at capacity	3,200	$170	$630
Over life of the Project	104,000	$5,600	$20,720

Fiscal Effects

The Project will generate revenues for different levels of government over its 42-year life. These revenues include direct and indirect income taxes payable to the provincial and federal governments, royalties, and property taxes. Sources of government revenue that could be

9 Total employment and labour income were calculated using industry multipliers (closed model) for the oil and gas extraction industry. GDP was calculated on the basis that, according to industry intensity ratios, total GDP for the oil and gas extraction industry is 3.7 times total labour income (Alberta Finance, 2006).

quantified in this analysis are direct and indirect personal income taxes, royalties, direct corporate income taxes and municipal and education taxes.

Personal taxes will be payable by workers employed directly, indirectly, and through induced effects in an amount roughly equal to 16% (CANSIM) of the labour income created through these effects. The provincial government will retain about one-third of the total tax revenue (CANSIM). Total labour income generated by Project operation over the life of the Project will be $5.6 billion. Thus, personal taxes payable to the province will be about $300 million. Averaged over the 42 years of the Project's life, this is equivalent to about $7 million per year.

Royalties payable to the province from bitumen produced by the Project will vary from year to year but could total $5 billion over the life of the Project. Averaged over the 42 years of the Project's life, this is equivalent to about $120 million per year. (It should be stressed that this estimate reflects an annual average and is very rough. Actual royalty amounts will depend on several factors, particularly oil prices and the results of the province's review of Alberta's oil and gas royalty structure.)

Corporate income taxes paid directly by North American will also vary substantially, especially during the early years of the Project, but are estimated to total almost $5 billion over the Project's life of which about 38% will flow to the provincial government. Averaged over 42 years, this is equivalent to an average provincial tax payment of roughly $120 million per year.

As noted in the section on local economic impacts, property taxes payable on the Project will be roughly $950 million over its life (roughly $20 million on average annually). All will stay in the province, distributed 90% to Lakeland County or the RMWB, and the remaining 10% directed to the provincial education fund.

Total provincial revenues from the above sources are about $11 billion over the life of the Project or roughly $265 million per year averaged over 42 years. These revenues are not entirely net. Increased traffic on highways and roads in the Project area during construction and operation will have effects on provincial costs for road maintenance and/or upgrading. To the extent that the Project contributes to the increase in traffic, it is responsible for the increase in provincial operating costs. In addition, population growth in the RSA will necessitate requirements for provincial funding for education and health. North American will be responsible for a portion of these costs.

14.9 Application Case Social Impact Assessment

14.9.1 Workforce

Each of the 20,000 bpd production facilities is forecast to have a peak construction workforce of 300 workers. Each production facility is estimated to take 18 to 20 months to construct and the peak workforce is anticipated to be present for approximately three calendar quarters, or 8 to 9 months, during construction of each CPF. For the purpose of estimating construction workers requiring camp accommodation, North American has estimated a constant construction workforce of 300 persons from 2008 to 2017.

For the Leismer Demonstration, Leismer Commercial, Leismer Expansion and Corner hubs (all accessed from Highway 881), construction will occur continuously from 2008 through 2012. Corner Expansion Hub will be constructed between 2012 and 2014. Construction will begin on the western and northern leases, with construction of Thornbury Hub in 2012 – 2013. Hangingstone Hub and Thornbury Expansion Hub will be constructed between 2014 and 2016. Northwest Leismer Hub will be constructed in 2017 with first steam in 2018. Hence, construction crews will be present in the east side camp almost continuously between 2008 and 2015, with a

break in 2013, then again in 2017 - 2018. Construction crews will be working on the west side facilities, and living in the west side camp, in 2013, 2015 and 2016. Construction of one last facility at South Leismer Hub will begin in the 2030s, bringing construction crews back into the Leismer area.

Drilling and completion will commence at the same time as construction of surface facilities. The peak drilling workforce is estimated to be 140 persons between late 2010 and 2015. Drilling and completion crews will be in the area sporadically during the life of the Project.

Operations staff will be hired during the final stages of construction for each of the hubs. When Leismer Demonstration, Leismer Commercial, Leismer Expansion, Corner, Corner Expansion, Thornbury, Thornbury Expansion and Hangingstone hubs are all operational in 2017, approximately 650 full time operations workers will be required, including employees and identified contractors. Camp personnel and unidentified contractors will comprise another 160 workers.

Total workforce peak is estimated at about 1,200 persons in 2017 and again during construction of the South Leismer Hub in the 2030s. The peak declines to 790 persons after construction is complete at Northwest Leismer Hub until construction begins at South Leismer Hub in the 2030s. These numbers are conservative, using peak construction and drilling workforce numbers as a constant throughout the times these crews are needed, although actual workforce will fluctuate somewhat.

14.9.2 Housing Strategy

North American plans two permanent camps: the first will be located just off the Waddell road at SE ¼ 32-78-9 W4M as shown on Figure 14.2-1 and the second is anticipated to be just off Highway 63 in the vicinity of Mariana Lake, although a specific location has not been identified at this time.

The first camp will provide accommodation for construction workers, drillers and operations workers throughout the entire Project. It will initially be built to 450 person capacity, to accommodate the construction crew and initial operations team for the Leismer Demonstration and Leismer Commercial hubs. North American anticipates expanding this camp to 600 person capacity in approximately 2010 when construction of the Leismer Expansion Hub begins. The expanded camp will not accommodate the peak construction, drilling and operations workforce anticipated for the eastern facilities, estimated to occur in 2012 and 2014. The estimated workforce requiring open camp or temporary construction camp accommodation would be approximately 260 persons.

The second camp will serve workers at Thornbury and Hangingstone hubs. North American anticipates being able to access the Hangingstone Hub area from Highway 63 and to accommodate workers in a joint permanent camp shared with operators of Thornbury Hub. The camp location is not known at this time, but for the purpose of this report is estimated to be in the vicinity of Mariana Lake. It will be built to house approximately 350 persons. This would be the camp accommodation for the construction and operations crews during construction of Thornbury, Thornbury Expansion and Hangingstone hubs. The estimated peak workforce requiring accommodation would be 735 persons in 2016. Therefore, approximately 400 persons would require temporary accommodation, likely a temporary construction camp during this period.

North American's housing strategy acknowledges that workers may live anywhere in Alberta or outside of Alberta, and travel to the area for their shifts. Some of these workers may already live in the RSA while others are anticipated to be interested in living close to their work, which may include moving to Conklin, Janvier or Lac La Biche. North American believes that population

increase may add to the viability of the small rural communities if that population increase is slow and can be accommodated by existing or upgraded infrastructure and housing. North American may consider home ownership incentives for workers wanting to live in Conklin or Janvier.

14.9.3 Workforce Transportation Policy

North American anticipates providing transportation to the site for work crews, both during construction and operations. North American may fly work crews into the area following appropriate upgrade to the Leismer airstrip. The Leismer airstrip is west of Conklin. North American anticipates picking up workers in Calgary, Edmonton and may consider Lac La Biche if enough workers are hired from the surrounding area. North American will encourage workers to take company provided transportation to the camp, but will not restrict access for workers. Some construction and operations workers may choose to drive to the site in personal vehicles.

North American will transfer workers by bus from the airstrip to the camp and from the camp to the CPFs, both during construction and operations. This will create traffic on the local roads west of Highway 881, some of which are shared ownership with Alberta Pacific Industries or other oil and gas companies. These roads are open for public traffic, regardless of ownership, but traffic is anticipated to be industry related.

Workforce transportation to the second camp near Mariana Lake will more likely be accomplished by bus or individual worker transportation rather than fly-in. Crew transportation between the camp and CPFs will be by bus.

14.9.4 Construction and Operations Traffic

Construction related traffic has been estimated on a daily basis for each 20,000 bpd hub. The Leismer Commercial Hub is used as the template for traffic associated with each additional 20,000 bpd hub. North American estimates an average of 5 semi-tractor trailer units a day will utilize Highway 881 from the south, starting in first quarter of 2008. At peak times, there will be 10 semi-tractor trailer units per day, as well as gravel hauling. Additionally, 70 oversize loads will be brought to the site in a period between August and December 2008, which is approximately an average of 1 every 2 days. This traffic pattern will be repeated for each 20,000 bpd hub on the east side of the Project, extending through 2014.

The same pattern will occur between 2012 and 2015 on and east of Highway 63 during the construction of Thornbury, Thornbury Expansion and Hangingstone hubs.

Construction traffic will again be centred on Highway 881 south of Conklin in the 2030s, with the final expansion of the South Leismer Hub.

Crews will utilize buses on the Project access roads between the camp and the production sites. Additionally, camp operations, construction management traffic and shift change traffic to the airstrip will add daily trips to the Project access roads west of Highway 881.

Operations traffic anticipated on a daily basis over the life of the Project includes local operations between the CPFs and wells, external traffic such as semi-tractor trailers delivering supplies from Edmonton or elsewhere, and camp support operations and crew changes. In total, daily traffic on the local roads is estimated to include approximately 110 different vehicles. Of these, approximately 20 vehicles are anticipated to be operating only in the local area, and the remaining 90 vehicles will use Highway 881 as well as the local Project related roads. The bulk of the 90 highway vehicles will be B-train trucks hauling product and diluent (estimated at 60 trucks daily). The approximately 60 B-train trucks will cease operation once pipeline connections are completed, in approximately 2012.

14.9.5 Population

The impact to population in the communities of the RSA from the Project is estimated through a number of assumptions. These include:

- Population assumptions are made only to the end of 2017 (the 10 years after the Project commences during which new hubs are being constructed).

- Population increase associated with the Project is anticipated to affect Conklin, Janvier and Lac La Biche. The first two communities are in close proximity to the Leismer and Corner development areas and the Project considers Lac La Biche to be its closest service centre.

- Population increase is not anticipated in Anzac and Gregoire Lake Estates for several reasons including: current cost of housing in these communities is high and equivalent to Fort McMurray; current supply of housing is constrained in these communities; and these communities are much closer to two other major developments, Long Lake and Surmont, which will likely have greater attraction for working individuals in these communities, due to proximity.

- Population increase in the First Nations communities of the RSA is not estimated as the general public cannot easily move to these communities. First Nations members returning to the reserve to take up jobs and business opportunities will increase the populations, as is already occurring according to recent population statistics. Physical infrastructure and housing limitations may curtail the rate of population increases.

- The construction workforce will primarily maintain permanent residences elsewhere. However, for the purposes of estimating population numbers, it was assumed that 5% of construction and drilling work would go to workers already resident in the RSA. The rest will be non-local. However, given the long term construction timeframe and the current experience of Fort McMurray, it is likely that some of the non-local workers will relocate to the RSA in order to be closer to their place of work. For the population estimates, it was assumed that 10% of non-local construction and drilling workers would relocate during the initial years, increasing to 20% by 2011.

- Population increases in the RSA arising from indirect jobs created by Project construction were estimated based on the assumption that 3% of North American's purchases of supplies and services needed for the construction of surface facilities would be from local businesses, that labour costs would comprise 35% of these purchases, and that the average wage paid by RSA suppliers would be $80,000. (The basis for these assumptions is provided in section 14.6.)

- The operations workforce will increase steadily over 10 years as new hubs are developed. It was assumed that, from 2008 to 2011, 10% of operations jobs would go to workers already resident in the RSA, increasing to 20% thereafter. For the residual, non-local workers, it was assumed that 15% would relocate to the RSA in the initial years, increasing to 20% by 2011. (The basis for these assumptions is provided in section 14.6.)

- Population increases in the RSA arising from indirect jobs created by Project operation were estimated based on the assumption that 20% of North American's purchases of non-energy consumables would be from suppliers in the RSA, that labour costs would comprise 40% of these purchases, and that the average wage paid by RSA suppliers would be $80,000. (The basis for these assumptions is provided in section 14.6.)

- Population changes in the RSA arising from induced jobs created by Project construction and operation were estimated on the basis that induced labour income would be 9% of direct plus indirect labour income and that the average wage payable in the affected industries would be $68,000. (The basis for these assumptions is provided in section 14.6.)

- The population numbers do not include those people needed to meet increasing demands, related to Project related population, on municipal, educational, policing and other public services.

- Each household is estimated to have 3.3 persons in it.

- School age children have been estimated at 1.0 per household (MEG, 2005).

Total population increase to the RSA associated with construction from 2008 to 2017 is estimated to be 240 persons. Total population increase associated with operations to the end of 2017 is estimated to be 910 persons. These estimates total 1150 persons and are represented in Figure 14.7-1. The annual increment of persons moving to the area fluctuates, and is shown in Figure 14.7-2.

At 3.3 persons per household, the population increase of 1,150 represents 349 new households. The annual increment of housing needed is greatest in 2015, as the trend in annual housing needs follows the trend in annual population increase. However, the annual increment needed in 2008 is over 30 housing units, indicating the need for increased building in the next year.

Of this population, the bulk is anticipated to move to Lac La Biche, given the higher level of services available relative to the small local communities. However, some people are anticipated to move to Conklin and Janvier.

The annualized change in population between 2001 and 2006 in the RSA communities was 2.8%. This rate of change can be used to forecast population change into the future, as per the baseline case. The effect of the Project can be contrasted to the baseline population increase without the Project, as seen in Figure 14.7-3.

14.9.6 Housing

North American will provide camp housing near Leismer development area for combined workforces for construction, drilling and operations of the eastern leases. At any time when camp capacity is exceeded over the construction and operations periods, North American anticipates utilizing either temporary construction camps or accommodations in the open camps of the region.

A west camp will be constructed during construction, drilling and operation of the western properties starting with the Thornbury Hub in 2013 and continuing to the end of 2016. North American will utilize temporary construction camps or open camp accommodation in the region if camp capacity is exceeded.

Population change in the communities of the LSA is estimated to be relatively modest as Conklin, Janvier and the CPDFN are about 1.5 hours drive (in good conditions) to the nearest major centre for groceries, high school, health care, and other services. However, current experience of projects in the area suggests that some of the workforce will desire to relocate to these communities, while others continue to utilize the camps.

North American will work with the communities, the RMWB and WBHDC to identify housing strategies to address timing of workforce development and possible new residents. North American would like to encourage workers to live in the local communities, but not at the expense of current residents. North American may consider incentives for employees wanting to build a new house locally, or may consider working with a house builder to ensure enough volume of housing starts in Conklin to secure the builder's time.

14.9.6.1 Conklin

If 10% of the anticipated population change related to the development of Leismer and Corner Development areas is estimated to affect Conklin, then approximately 115 persons would move to the community by 2017. Population increase in the early years of the Project may occur, despite restrictions to housing development, since lots are available for sale in Conklin.

It is estimated that 10% of the housing units needed for new residents associated with Kai Kos Dehseh eastern developments will be located in Conklin. Although there is a restriction on new housing subdivisions until the new water treatment facility is built, this is estimated to begin in 2008. There are lots available now for sale. Therefore, 10% of the housing needed is 35 dwellings, representing approximately 3 to 4 dwellings per year.

The evolution of Conklin to accommodate an influx of workers and families would require considerable consultation between the RMWB, the WBHDC, North American and the community, over the first years of the Project, to ensure that current residents are also able to access the new housing market.

At the moment, attracting a house builder to the rural region is difficult, without a number of houses to be built at the same time. This may be a deterrent to new residents. At this time, Conklin cannot develop new housing subdivisions until an upgrade to the water treatment facility is completed, which is not anticipated until 2008 or later. Ownership and purchase of any new lots is a concern for current residents in Conklin.

An influx of new residents would support or increase the housing prices currently seen within the community. This may price some local residents, or residents returning to the community for work opportunities, out of the market. Additionally, overcrowding is currently an issue and affordable housing is needed in the community. New housing is needed quickly to ensure that price inflation due to tight demand is reduced.

14.9.6.2 Janvier and the CPDFN

Population change in these communities is estimated to be relatively modest. If 5% of the anticipated population change related to the development of Leismer and Corner Development Areas is estimated to affect Janvier, this would result in an increase of 58 persons to the end of 2017. Some lots are available for sale.

It is estimated that 17 new dwellings would be needed to accommodate this population. However, attracting a house builder to the rural region is difficult, without a guarantee or promise of a number of houses to be built at the same time. This may be a deterrent to new residents.

14.9.6.3 Lac La Biche and Lakeland County

Population increase in Lac La Biche is based on the remaining estimate of new residents attributable to the Project, or 979 persons. This increase is anticipated to require 297 new dwellings over approximately 10 years, or approximately 30 per year. New lots are available to meet this demand. New housing depends on availability of home builders in the area, which

again depends on volume of demand at any given time. Price increases would be expected from competition in the market place, and affordable housing may remain challenged in the community, as builders focus on the market for private housing.

14.9.6.4 Mariana Lake

The siting of the future west side camp may affect Mariana Lake, although it is unlikely the camp will be on the highway. As with previous development, Mariana Lake will continue to be an important stop for traffic on Highway 63. The west side developments will contribute to traffic on Highway 63, as will the dimensional loads for the east side developments. There is no specific population impact identified for the community from either construction or operations.

14.9.7 Municipal Infrastructure

An increase in population would affect municipal infrastructure, primarily the water treatment and sewage lagoons. In Conklin and Janvier, these systems are already at capacity and increased capacity is needed to accommodate more residents. The Conklin water treatment facility upgrade is in a feasibility and scoping phase, and is anticipated to begin in 2008. Both Conklin and Janvier have been involved in updating their Area Structure Plans and Highway 881 development planning. These plans are well underway.

Lac La Biche and Lakeland County have taken a proactive approach to building joint water and sewage facilities that currently are at 35% capacity. The new facilities can accommodate some increase of population and tie in the rural residential lots of the county around Lac La Biche.

Lakeland County is consulting with residents over a new solid waste landfill facility, as current landfills are nearing capacity. These facilities are anticipated to have a 50 year lifespan.

While roads within the North American Project are technically within Lakeland County, most of the roads will be private roads maintained by North American or other industrial corporations, including Al-Pac. The road between Conklin and the Waddell turn-off is a provincial road.

North American has been part of meetings between local industry, Lakeland County and the Town of Lac La Biche. These meetings of the Lac La Biche Regional Industry Consultation Committee are primarily for purposes of information sharing.

The RMWB is acting to meet the infrastructure needs of the rural communities and has initiated the planning processes for the communities. The RMWB faces funding issues related to levels of debt and financing of rural initiatives may be delayed, or may cost more than anticipated. Additionally, finding contractors to take on the work in these small communities may be a challenge.

14.9.8 Education

An increase of households would likely increase the population of school age children in the communities. Conklin School can currently accommodate approximately 15-20 more children. If each of the 35 new households estimated to move to Conklin had a school age child, the capacity of the school would be overtaken between 2012 and 2017. Father Perin School in Janvier has capacity for 40 more children which can accommodate the estimated increase in school age children in the community. Increasing the number of school age children population in these rural communities would increase the viability of the schools, as the school district struggles with small schools, scattered widely, and for which they must maintain housing for teachers.

Upgrades to schools in Lac La Biche have been identified as necessary to meet current and projected usage. However, these upgrades, including building two new schools, have not yet been funded. Funding, engineering and building the school could take several years. Hence, an increased number of school age children in the community may cause overcrowding in classrooms and higher student to teacher ratios in some grades. If each household moving to the community had one school age child, the total would be 297 children in 10 years. In the initial years of the Project the school system could accommodate these children, but the upgrades must occur to avoid negative impact.

14.9.9 Health Care

North American will provide on-site emergency medical personnel anticipated to be able to deal with first aid situations during construction and operations. They will follow the Alberta Occupational Health and Safety Code and will have trained first aid staff and emergency responders. North American personnel housed in the camps are not anticipated to access the rural community based health care programs in Conklin and Janvier, which are largely aimed at elder care and community based health care. The health centre on the CPDFN reserve would not be available to construction or operations personnel, whether living in the camp or the community, unless they were First Nations.

In Lac La Biche, the emergency room will see an increase in use, based on recent increases in use associated with increasing developments in the RSA. The non-resident camp population may use the medical facilities and services and, if so, may contribute to an inequality in funding as the health care formula for the area would not account for them. This may lead to an imbalance of service usage and funding. The Aspen Health Region anticipates requiring changes in staffing, structure and funding of the Lac La Biche Healthcare Centre to be able to continue to meet current and future demand. They have a request before the provincial government to manage this anticipated change. Additionally, new permanent residents will utilize the services of doctors, dentists and other medical personnel within the community but will be accounted for in health care funding formulas.

14.9.10 Protective Services

More population will require more protective and emergency services. An increase of transient population in the area may increase drug and alcohol abuse and property crime. However, additional permanent residents are not considered likely to cause a significant increased demand on policing in local communities. Additionally, construction and operations personnel living in the camps will be somewhat isolated from Conklin, Janvier and Lac La Biche. The fly-in policy will limit the interaction with the local communities.

Most policing issues are related to traffic on the road; speed, safety of other travelers, volume at different times of day and number of trucks on the road. Being so far from Lac la Biche, and having a fly-in transportation option, worker travel will be reduced on the highway, leaving mostly tractor-trailer units and light commercial vehicles on the road, along with some local worker transportation. Increased use of Highway 881 south of Conklin is already resulting in increased collisions, and is anticipated to be a draw on police services. Distance from Lac La Biche means that response time to incidents on Highway 881 may be over an hour. North American will work with other southern oil sands operators to address traffic and policing concerns in the Conklin area.

Increasing permanent population is the basis of increasing numbers of police officers in a detachment. The increase in population associated with the first ten years of the North American Project is anticipated to be within the capability of the current Lac La Biche detachment, or require one more officer by the end of the ten years. Recruitment of officers to all police forces in

Canada is an issue, and it takes time to plan for and achieve the expansion of a detachment (C. White, April 2007, Pers. Comm.)

North American will maintain an ambulance on site during construction and operations. They will train operations personnel in use of fire extinguishers, for such use as initial response in a camp facility fire. Larger fire emergencies would require outside fire suppression equipment or specialty response.

Recent statistics indicate increasing calls from the rural community for the fire and EMS services of Fort McMurray. With increasing local permanent population, this is anticipated to continue. Fort McMurray recently advertised for full time fire department personnel. Conklin recently received a new pumper truck.

Increasing population in Conklin, Janvier and Lac La Biche will increase demands for fire and ambulance service. Fire and EMS capacity is considered adequate to meet any increased demands, except in Janvier where the volunteer fire department is not operating.

14.9.11 Social Services

North American will provide drug and alcohol awareness training to construction and operations personnel. Those living in the camps will be somewhat isolated from the social services in Conklin, Janvier and Lac La Biche, and are not anticipated to place demands on these communities' social services.

Increases of permanent population may increase the demand on social services. For those delivered through provincial programs, such as mental health and drug and alcohol abuse counselling, and child and family welfare, funding and staffing changes may be required. Those provided through other organizations will place a higher demand on volunteers and funding. In particular, the need for affordable housing and a men's detox centre and shelter housing may become more pressing. Family and Community Support Services is conducting a needs assessment in 2007.

14.9.12 Recreation

More residents in the area, both in Conklin and in the camps, will result in increased use of outdoor recreation opportunities. Devon (2006) reports the results of a survey indicate construction workers as well as operations workers use the hunting, fishing, camping, and other outdoor recreation opportunities. With increased roads and linear disturbance throughout the North American lease areas, there will be increased access to the area for hunters. As well, being the nearest community to the camp, Conklin will see an increase of people using the bar and restaurant, the day use areas on Christina Lake, and attending community functions.

North American will enforce a no firearms policy, in camp and parking lots associated with the camp, so that increases in hunting should not be associated with the construction or operations workforces.

Lac La Biche has a number of formal recreation facilities, all of which will see increased usage with increased population.

The Lac La Biche area is gateway to a large tourist destination of parks and lakes. Increased traffic is anticipated, in part due to curiosity about the Athabasca Oil Sands region. Increased building of motels and hotels is already underway in Lac la Biche, but these are anticipated to be in high demand by workers associated with development. Therefore, tourists may find a restriction in accessibility of accommodation in the area.

14.9.13 Traffic in the RSA

Construction will add tractor trailers travelling both directions through Lac la Biche and south of Conklin. Seventy dimensional loads over 3-month periods will not add appreciably to traffic numbers past Anzac, FMFN and Gregoire Estates, but will need to be managed in conjunction with other construction traffic. North American will support the Willow Lake Traffic Advisory committee and its initiatives, and will work with other operators to stage these loads. Size of load means that other traffic on Highway 881 will be affected, so North American will seek to move these loads between midnight and 5 am.

Operations traffic will build up with each CPF, but the highest traffic count will be noticeable on the local roads within the Project leases, comprising crew changes and service trucks. Additionally, initial years have trucking in of diluent and trucking out of product. The product trucks will be most noticeable around Conklin and Janvier as they will haul to the Cheecham Terminal and Fort McMurray. This trucking will stop in approximately 2012 with the proposed construction of a pipeline to Edmonton.

Assumptions include:

- Each vehicle will use the road twice in a day;
- Local servicing vehicles will be 75% from Lac La Biche and 25% from Conklin and Janvier;
- Traffic calculations are made only for the eastern CPF developments, and Highway 881; and
- Calculations were limited to 2014, and do not include the construction hiatus between 2014 and 2016 when construction of the Northwest Leismer Hub begins.

Change anticipated to Annual Average Daily Traffic (AADT) counts at specific communities is as follows:

- Between 1% and 3% increase in AADT at the Lac La Biche corner of Highways 36 and 55;
- Between 7% and 12% increase in traffic to and past Conklin and Janvier, excluding the dimensional loads;
- Less than 1% increase in traffic past Anzac, FMFN and Gregoire Estates, most of it staged to pass at night;
- The greatest percent increase in traffic will occur on the road between the Project access and Lac La Biche, where anticipated peak traffic may add 32% to the AADT of 2006; and
- Peak traffic years are estimated to be 2012 and 2014.

These increased vehicle movement loads are within the rated capacity of Highway 881. However, the impact to users of the highway will be negative.

Highway 63 will be the main route for all construction and operations traffic associated with the Thornbury and Hangingstone Development areas. Current upgrades to the road include twinning the Highway along its entire length. This will improve safety on the road, as slower, larger loads will no longer constrict traffic.

14.9.14 Traditional Use by Aboriginal Communities

Impact to traditional use of the RSA is the subject of a separate study in this EIA. The impact is described in Volume 5, Section 16.

14.9.15 Mitigation

North American will act independently where it has the requisite control to:

- Reduce the demands that are made on municipal infrastructure and services during construction;
- Phase in the increases in permanent population associated with Project operation;
- Mitigate pressures on municipal infrastructure and services during Project operation; and
- Enhance the positive impacts that the Project creates for the people in the area.

Measures to reduce demands on municipal infrastructure and services during construction will include:

- Provision of a full service construction and operations camp, with recreational facilities;
- Providing fly-in transportation to reduce travel on Highway 881;
- Bussing of workers between the airstrip and camp and between the camps and CPF sites, to reduce traffic;
- Providing staff trained in emergency medical response on site to meet requirements for isolated work sites;
- Providing onsite ambulance for emergency transportation;
- Training in initial fire suppression for personnel;
- Monitoring and management of strict adherence to camp rules prohibiting firearms, and drug abuse;
- Scheduling of large dimensional loads on the north end of Highway 881; and
- Continued consultation with and support of local communities.

Measures to phase in the increases in permanent population associated with Project operation will include provision of an operations camp, with capacity for all workers.

Measures to mitigate pressures on municipal infrastructure and services during operation will include:

- Communicating with the housing construction industry and local communities to ensure that they have advance notice of the Project's schedule and expected workforce requirements;

- Communicating the Project schedule and projected workforce size with health services providers in the NLHR and Aspen Health Region, so that they can plan for coming years; and

- Providing workers with access to an employee assistance plan, to help workers with addictions counselling or those who are in distress.

In order to enhance positive impacts for people in the area of the Project, North American will:

- Contract and employ as many qualified and competitive local contractors and people as possible, with priority for the communities within 30 km of North American operating areas; that is, Conklin, Janvier, CPDFN, Anzac and Fort McMurray First Nation;

- Contract businesses and employ people in the larger local area outside of the immediate 30 km radius;

- Give preference to local contractors who demonstrate that they are qualified, competitive and have the capacity to perform the work involved and meet North American's safety, environmental and other work standards;

- Collaborate with other companies in the area to develop a list of local businesses detailing the nature and capacity of the business, number of employees, etc. for use by the companies and their contractors;

- Collaborate with other companies in the area to develop the Leismer airstrip to capacity for larger planes, to enable the fly-in – fly-out transportation of workers and thereby reduce the traffic on the roads;

- Request prime bidders to plan for local subcontracting, hiring and the local purchase of goods by asking in a Request For Qualifications what local content the contractors plan for;

- Provide for regular reporting regarding the use of local and local Aboriginal businesses and workers;

- Develop a skills inventory for the communities in the LSA including information on residents' education, skills, work experience and interests. These profiles will be matched against a Job Opportunities List to identify qualified local candidates;

- Give special consideration on an individual basis to hiring applicants who do not have Grade 12 but who, for example, have qualifications such as a skilled trade, a fourth class power engineering certificate or greater, or ten or more years of work experience;

- Continue to communicate upcoming employment and contract business opportunities for local communities using Open Houses, newsletters, and timeline documents detailing long term employment/contract scopes in North American operations;

- Continue to staff North American's Aboriginal Affairs department to communicate with local people about contractor and employment opportunities at North American;

- Post training and employment opportunity notices in public areas in each local community;

- Use the services of local employment agencies;
- Continue to promote training and employment initiatives for local people (North American's existing training and employment initiatives are described in the section on local economic impacts);
- Engage in open and consistent communications with Aboriginal communities near North American's operations;
- Engage in mutually beneficial partnerships with local communities regarding employment, training, education, environmental stewardship and community investment;
- Involve local communities in future activities;
- Ensure the environmental and traditional values of the community and region are honoured and respected;
- Support local trainees to help them adapt to their new employment, thereby increasing their chances of success; and
- Participate in youth training programs such as:
    - The Traditional Celebration of Achievement. This is an event honouring Aboriginal high school graduates in the Wood Buffalo region. All high schools participate in the celebrations, which also serve to inspire achievement among younger students.
    - The Aboriginal Transition Program offered by Keyano College in Fort McMurray in conjunction with the University of Alberta. The Program focuses on providing Aboriginal students with the skills needed to be successful in their academic careers by offering courses based on good study habits, how to learn effectively and critical reading, writing and research. Students completing the Program at Keyano can then apply to a variety of transfer programs at the U of A. (www.keyano.ca/News/default.asp?strPageSize=1&strCurrentPage=5&Category=Student+Services).
    - The Alberta Aboriginal Apprenticeship Project (AAAP). The AAAP assists qualified Aboriginal peoples to enter and complete an apprenticeship program of their choice; provides workplace support for Aboriginal apprentices and their employers; and, promotes the hiring of Aboriginal apprentices to employers. (www.thinktrades.com/candidates.htm).
    - The National Aboriginal Achievement Foundation (NAAF). The NAAF encourages and empowers Aboriginal young people by providing important career planning information, by connecting youth with industry and by providing financial support for post-secondary studies in all disciplines. (www.naaf.ca/html/about_e.html).

14.9.15.1 Mitigation by Local Agencies

North American will support and work with local organizations to facilitate planning on a project-specific, cumulative, and regional basis. This will include, but is not restricted to:

- Working with Portage College to develop programs to supply needed skills for the construction, operation, and maintenance of SAGD projects;

- Consulting and working closely with the Lac La Biche Regional Industry Consultation Committee (LLBRICC), other local communities and organizations, and other companies operating in the region to help identify impacts, both from its Project and cumulatively, and to develop ongoing responses that will mitigate negative impacts and enhance positive impacts; and

- Consulting and working closely with the LLBRICC and the Southern Athabasca Oil Sands Group, other local communities and organizations, and other companies operating in the region to help to develop a regional planning framework that will anticipate regional growth and provide the basis for responding appropriately to this growth, including population modeling.

14.9.15.2 Mitigation by the Province

Although the Lac La Biche region was not specifically identified by the Oil Sands Ministerial Strategy Committee (Radke et al., 2006), as a high growth area, North American suggests that the same recommendations developed for the Cold Lake – Bonnyville and Peace River Areas be applied to the Lac La Biche region as well. These recommendations (Radke et al., 2006) include:

- "**RECOMMENDATION 28(a):** The Oil Sands Ministerial Strategy Committee and the Oil Sands Sustainable Development Secretariat should be charged with careful monitoring of growth and growth trends in the Cold Lake – Bonnyville and Peace River areas. Should population forecasts indicate that levels of 'high growth' (at least six percent per year) will be sustained over at least three years, government planning and budgeting for these areas should be done in the same way as recommended for the Athabasca oil sands area.

- **RECOMMENDATION 28(b):** The provincial government should deal with issues related to rural/urban revenue and cost sharing in the Cold Lake – Bonnyville and Peace River areas. As growth continues, these will become ever larger issues.

- **RECOMMENDATION 28(c):** The provincial government should review the criteria and funding under the Resource Road Program to ensure it meets the needs of the Peace River and Cold Lake – Bonnyville regions. The province should also extend the program beyond its current 2008-09 end date."

14.9.16 Summary of Impacts

14.9.16.1 Economic Impacts

The Project will generate substantial economic benefits in the province and in the RSA. While the Project may also create or add to some regional and provincial pressures, in purely economic terms, the benefits are significantly greater.

Effects in the RSA from 2008-2017 will include:

- Direct employment as a result of Project construction of approximately 550 person-years;

- Direct household income as a result of Project construction of approximately $55 million for local residents;

- Total employment and income for RSA residents (including direct, indirect, and induced effects) during Project construction of 815 person-years and $73 million respectively;

- Direct job creation during Project operations of an average of 125 jobs per year and $12.5 million in labour income;

- Total employment and income for RSA residents (including direct, indirect, and induced effects) during Project operation of 180 jobs per year and $17 million per year respectively; and

- Property taxes of approximately $65 million to Lakeland County and $43 million to the RMWB.

Effects in the RSA once the Project is operating at capacity include:

- Direct employment of 295 person-years per year and total employment (including direct, indirect, and induced effects) of 470 person-years per year; and

- Property taxes averaging $13 million per year to Lakeland County and $10 million per year to the RMWB.

Effects on the province as a whole will include:

- Employment for workers in Alberta during Project construction of 14,560 person-years, labour income of $1.3 billion, and GDP of $1.8 billion;

- Employment per year during Project operation at capacity of 3,200 person-years for workers in Alberta with associated annual labour income of approximately $170 million and GDP of $630 million; and

- Provincial revenues in the form of personal income taxes, royalties, corporate income tax payable by North American directly, and property taxes of $11 billion over the Project's 42-year life.

14.9.16.2 Social Impacts

The Project will result in impacts to the social environment of the RSA. These include:

- Increased permanent population of 1,150 people over 10 years. Most are anticipated to move to Lac La Biche, but a small percentage may move to Conklin and Janvier;

- Need for 349 new dwellings over 10 years, mostly in Lac La Biche and Lakeland County. The Lac La Biche/Lakeland County housing development industry is anticipated to be able to meet demand, with available lots and house builders;

- Need for upgraded municipal infrastructure before new subdivisions are opened for those new dwellings anticipated in Conklin and Janvier. Area Structure Plans are underway for both communities, as is new water treatment facility planning in Conklin. Lack of house builders in the communities is a deterrent to new home purchase;

- Increased population driving higher prices for housing in all of the communities. Availability of affordable housing is already limited in Lac La Biche, Conklin and Janvier. Lac La Biche is initiating an affordable housing initiative, including a men's shelter and detox centre. Overcrowding may continue in Conklin and Janvier. The WBHDC has plans for more affordable housing units in Conklin;

- Increased permanent population creating demands on the medical, emergency response and social services of the RSA, which will be included in the provincial funding formulae for these services. The Aspen Health Region is proactive in planning for increases in use, but funding is dependent on the province;

- Increased camp or shadow population placing additional demands on the medical and possibly the emergency response services. These are not included in the funding formulae for these services; and

- Increased traffic in all communities. With staging of construction related traffic, conflict during high volume times will be reduced. Production related truck traffic will decline after the first four years of the Project, following pipeline connections.

The RMWB has been able to meet the requirements of municipal service delivery in Conklin and Janvier, most of which are delivered on an outreach basis. Continued success in delivering the services depends on maintaining the staff to travel to these communities. Attraction and retention issues are a concern to the RMWB, and may, in the future, affect rural outreach programs.

Figure 14.9-1 Estimated Cumulative Population Increase in the RSA Over Time Associated with the Kai Kos Dehseh Project

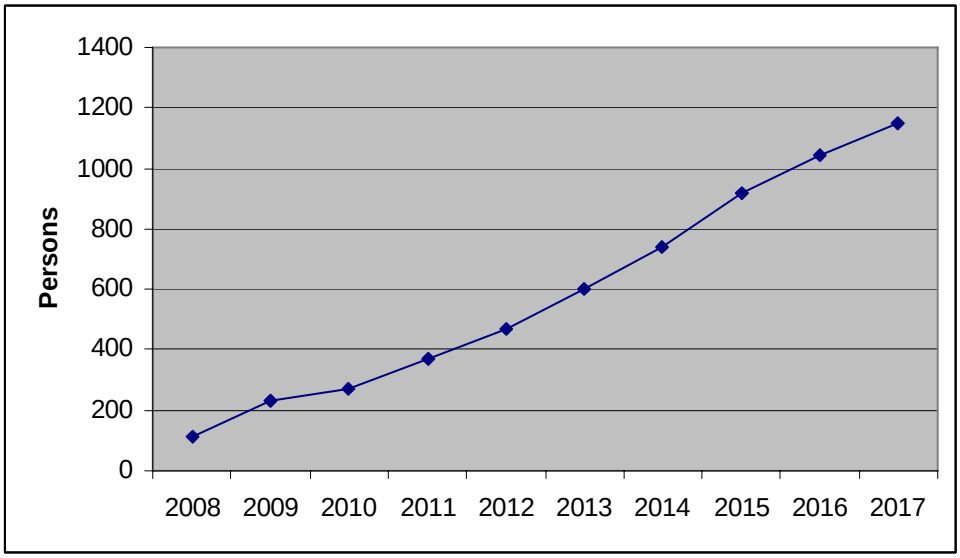


Figure 14.9-2 Estimated Annual Increment in RSA Population from Construction and Operations Phases of the Kai Kos Dehseh Project to 2017

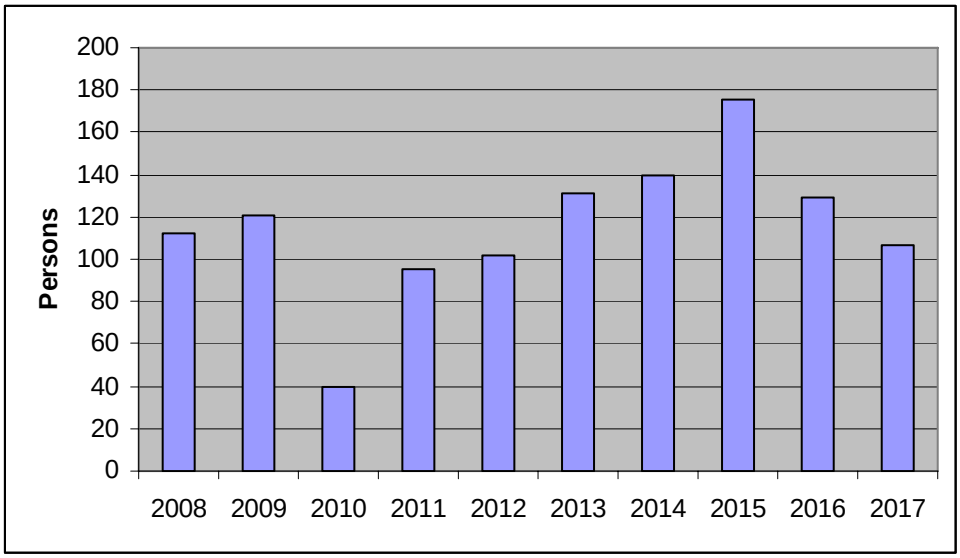
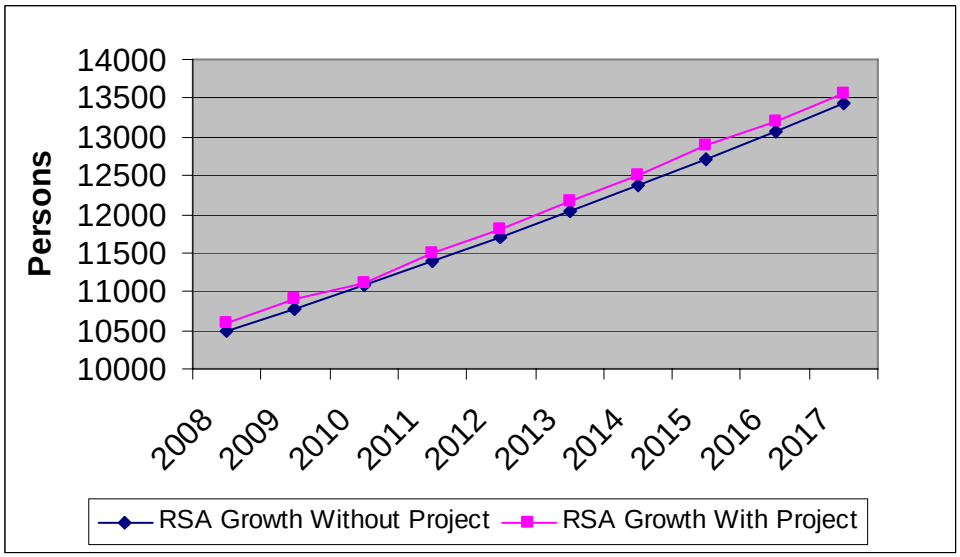


Figure 14.9-3 Estimated Population Change in the RSA With and Without the Kai Kos Dehseh Project



14.10 Cumulative Effects Assessment

14.10.1 Cumulative Economic Impacts

The extent of the economic impacts that will occur in the RSA from the development and operation of 480,000 new barrels per day of capacity can be roughly estimated based on the impacts generated by the Project. Those impacts (described in Section 14.8) were based on increasing capacity over a 10-year period starting in 2008 and reaching 220,000 bpd in 2017. The potential new capacity of 480,000 bpd are all in-situ projects, similar to North American's, and will require roughly the same types of workers and inputs. Assuming the capacity builds gradually over the next decade, the economic impacts from cumulative development and operation should be about 2.2 (480,000/220,000) times those estimated for North American.

Quantifiable impacts include:

- Direct employment from Project development over the next decade equal to about 40 full-time jobs per year for already local residents and 80 jobs per year for construction and drilling workers who relocate to the RSA. The labour income associated with this employment will be in the order of $12 million per year;

- Indirect and induced employment from Project development over the next decade equal to about 60 full-time jobs per year with associated annual income of about $4 million;

- Operating employment over the next decade equal to 140 full-time jobs per year for already local residents and another 130 for non-local operations workers who relocate to the region. The associated labour income will be about $30 million per year;

- Indirect and induced employment from Project operation over the next decade equal to about 120 full-time jobs per year with associated annual income of about $10 million;

- Operating employment once projects have reached capacity equal to about 650 local full-time jobs per year with associated labour income of about $65 million per year;

- Indirect and induced employment from Project operation at capacity equal to about 385 full-time jobs per year with associated annual income of about $30 million; and

- Property taxes payable to Lakeland County of about $145 million over the 2008-2017 period and roughly $30 million per year after all projects have reached capacity. Taxes payable to the RMWB will be about $95 million over the 2008-2017 period and roughly $20 million per year after all projects have reached capacity.

Other cumulative economic effects include:

- Opportunities for growth in local businesses servicing all projects in the area and, therefore, for economic development in the RSA;

- Increased housing costs;

- High demand for trades people, possibly resulting in pressure for increased wages;

- Continued shortages of sales and service workers in the RSA;

- Higher municipal costs for Lac La Biche, Lakeland County and the RMWB to meet demands placed on infrastructure and services by workers moving into these municipalities. Although these costs will generally be met by the increases in property taxes payable by new residents, in the RMWB there are already significant gaps in infrastructure and municipal services (RIWG, 2006). Conklin and Janvier will likely experience increases in population due to proposed cumulative development in the south end of the RMWB. In order to accommodate any significant increases in population, these communities will require upgrades to municipal infrastructure and access to more government services, adding further to the fiscal demands on the RMWB; and

- Inflationary pressures on municipal costs due to the need to compete with industrial projects for labour, contractors and equipment (RIWG, 2006). This is an issue in the RMWB and could become an issue in Lac La Biche and Lakeland County depending on the pace of development relative to the supply of labour, contractors, and equipment.

In the province as a whole, cumulative effects will include additional demand for construction workers and supplies, exacerbation of labour shortages, increased pressure on construction costs, and the possible delay or cancellation of projects.

14.10.2 Cumulative Social Impacts

14.10.2.1 Population Growth

Total new production capacity over the 2008-2017 period, as shown in Table 14.8-1, is estimated at 817,000 bpd undiscounted and about 480,000 bpd discounted. In the discounted case, projects are discounted according to their status in the application process, and reflect the more probable scenario. North American fully intends to proceed with its Project, subject to Board approval. However, in order to be consistent with the discounting process suggested by CAPP and used for other projects for which applications have been submitted, but not yet approved, North American's Project has been assigned a 60% probability of proceeding. Its discounted capacity is, therefore, 132,000 bpd, or 28% of the total discounted capacity of 480,000 bpd.

Based on the population increase of 1,150 people associated with the Project at 220,000 bpd, it can be estimated that the population increase associated with 480,000 bpd of capacity will be about 2,500 people (480,000/220,000 x 1,150). (Based on undiscounted capacity, the population increase would be about 4,270 people.) The assessment of social impacts is based on the discounted case; that is, it assumes a cumulative population increase in the RSA over the next 10 years of 2,500 people. However, it is important to note that North American's population contribution to the discounted case is not as large as a simple comparison between its Project-specific population increase (of 1,150 people) and that associated with total discounted capacity (of 2,500 people) would suggest. As with the discounted barrels of capacity, North American's Project represents 28% of population increase and related social impacts in the cumulative case. This is approximately 700 people over 10 years.

Population increase on First Nations reserves is limited to those persons who are members of the First Nation. Increasing business opportunity and job opportunity as well as lower cost of housing has brought members back to the reserves in the RSA. However, First Nations persons are not limited to living on the reserve, and may chose to relocate to any of the other communities in the RSA, making up part of the population change. Population increase on the reserves will likely continue to happen, but is not estimated here due to the limiting factors above.

14.10.2.2 Social Effects from Population Growth

Housing

The potential cumulative population increase would require approximately 760 new dwellings, of which 210 dwellings would be required by residents associated directly or indirectly with the Project. This is within the current known developable lots identified in the RSA. If this increase occurred evenly in each year, it would add approximately 76 new residences per year to the RSA communities. Using previous estimates for each community, this would result in 76 dwellings in Conklin, 38 dwellings in Janvier, and 646 dwellings in Lac La Biche and Lakeland County. Dedicated house building industries would be required in these communities.

Affordable housing and a homeless shelter will become more important in the communities. Demand for student housing will also become greater.

Education

If each new household has one school age child, then the cumulative increase in population may add 31% to the school age children population in the RSA. This would challenge the current capacity of the schools in the RSA.

Regional Services and Infrastructure

An increase of 2,500 persons to the Lac La Biche/Lakeland County region would likely require two to three more police officers. Additionally, the increase in workcamp population in the RSA might require more policing services. Planning for and achieving the transfer of these officers could take three to five years.

Increasing permanent population will increase the demand on the medical infrastructure in all communities, but will also be accounted for in funding formulae. Aspen Health Region has proposed a plan for meeting current and anticipated changes to the Alberta Government. Construction and camp populations, which will be larger than the permanent population increase, can be expected to impact the level of emergency room visits in Lac La Biche, as is currently happening.

Current municipal infrastructure and proposed upgrades, such as landfill space, in Lac La Biche and Lakeland County will be adequate to meet the demand of cumulative increasing population.

Upgrades to Conklin and Janvier infrastructure must be in place to accommodate any increase in population.

The increase in bitumen production in the region will have an increased requirement for trades people, both in construction and operations. Increasing demand on trades programs will affect high school programs and Portage College, as well as all trades colleges throughout Alberta. Adequate provincial funding of programs will be necessary to meet demand. Student housing and classroom space, as well as instructors, will be challenged to accommodate a large student increase.

Communities in Transition

All of the communities of the RSA are in transition, with increasing population and increasing industry. The average age of population in Lac La Biche and Lakeland County, which has previously seen a trend toward retirees, will likely drop as more working age people move into the community. The community will see an increase in demand for services and retail. The nature of

the community will change in response to the volume of people using the centre. However, the influx will focus more expansion on country residential living within the county.

The smaller communities of the RSA will attract more retail and business services as more people move to the communities. The communities will not be as close knit with more fluctuation in residents than has traditionally been the case.

Adequate planning and government action, at provincial, federal and municipal levels, is needed to avoid the constraints on community services currently being experienced in Fort McMurray.

Traffic

Traffic over the ten years between 2008 and 2017 will be a mix of construction and operations traffic, as projects are expanded. In particular, the traffic through and past Lac La Biche and on the south end of Highway 881 will increase. Traffic issues of speed, volume and safety are anticipated to continue to be an issue on this stretch of Highway. The bypass around Lac La Biche will alleviate some of the traffic through the town. North American is anticipated to contribute 28% of the traffic to this segment through the 10 years.

The volume of traffic anticipated for Conklin will be higher in the cumulative case, as many of the announced projects are east of Conklin. Currently, there is a bypass road which alleviates some of the traffic through the community. North American does not contribute a large change to the Conklin traffic, except through permanent employees traveling to work and truck traffic passing Conklin turnoff during construction.

Fort McMurray First Nation, Anzac, and Gregoire Estates will continue to feel an increase in traffic from all the disclosed projects unless the power lines on the south end of Highway 881 are buried, and oversized loads can travel into the region on the south end of Highway 881. Additionally, a project to connect Highway 63 and Highway 881 south of Anzac, known as the Stoney Mountain bypass, would alleviate all of the truck traffic through the communities along the north end of Highway 881. Until this bypass is built (no date for a feasibility study has yet been given), all projects will contribute to this increase in traffic. Large oversize loads will likely continue to be staged between midnight and 5 am, reducing conflicts in traffic on the road.

Of all the cumulative projects considered, North American will contribute most to the traffic on Highway 63, during the construction and operations years of the western hubs. For most projects, only dimensional loads are likely to use Highway 63, while North American will use Highway 63 during construction of 60,000 bpd capacity. Highway 63 is being twinned, which will alleviate traffic issues of volume and speed.

Additionally, a connecting road between Highway 881 and Highway 63, located approximately west from Conklin, has been discussed. Again, this is not in the feasibility phase of planning. This road would serve the interests of many companies, including Al-Pac.

14.10.3 Cumulative Impacts on Aboriginal Peoples and Communities

14.10.3.1 Employment

Many Aboriginal peoples have benefited from the employment associated with oil sands development. Future projects will ensure an extremely high demand for workers both for Project construction and operation. However, Aboriginal peoples encounter a number of obstacles that prevent them from benefiting from development to the extent that they otherwise might. One of the barriers is the lack of bussing or private transportation from communities to the work sites.

North American will consider the provision of bussing from communities within the LSA, if warranted.

Another barrier is lack of the requisite training or education. Generally, jobs with oil and gas companies require Grade 12 or GED. Many jobs require additional education or training. For example, a large percentage of the jobs associated with SAGD operations require power engineering tickets. In order for more Aboriginal peoples to be eligible for employment, and especially higher skilled employment, offered by the oil companies, many of the communities' adults will have to upgrade their education and skills and graduation rates from Grade 12 will need to increase. This is also true, to a lesser extent, with regard to employment with local companies hired to supply or service the developments although, depending on the type of work, not all of these companies require Grade 12 or GED.

In the future, the extent to which Aboriginal peoples benefit from cumulative development will be highly dependent on the effectiveness of programs directed at youth. As noted in Section 14.8.2, there appears to be a relatively high proportion of people or younger in the Aboriginal communities of the RSA with educational achievement far below provincial levels. Programs that encourage the education of Aboriginal youth therefore have the potential to greatly increase the future ability of the CPDFN, and other Aboriginal communities, to benefit from oil sands and other types of development.

14.10.3.2 Business Opportunities

Future SAGD developments will generate increased demands for supplies and services related to Project construction, normal plant operations, plant turn-arounds and on-going development and well-servicing. Many of these activities will persist over many decades, providing a basis for the local Aboriginal businesses that already exist to expand and for new businesses to be developed.

However, in order for local companies to take advantage of these opportunities, local businesses will need to build capacity and diversify, and they would benefit from more accessible business support. To this end, North American will provide a Community Development liaison who will continue to provide support for existing and future businesses opportunities.

14.10.3.3 Income

Effects of oil sands developments on Aboriginal incomes will depend on the effects of employment and business development. This applies both to income levels and the distribution of income among community members. There is currently a disparity between high and low income earners in many First Nations communities which will continue and possibly worsen if segments of the community continue to be unable to qualify for work opportunities.

Community incomes, or livelihoods, will also be affected by the ability to practice traditional activities. Hunting, trapping, fishing, and gathering are important activities among many Aboriginal peoples. Increasing development and the associated growth in regional population will have increasing effects on the ability to sustain traditional practices. Compensation is generally available for the loss of some of these activities, such as trapping. Other traditional activities are not amenable to compensation. To the extent that oil sands development reduces subsistence opportunities and forces the substitution of bought products for wild food, there is an economic loss. In addition, the loss of subsistence opportunities, if not coupled with more access by all community members to a wage employment, will lead to a widening of the gap that currently exists between high and low income earners.

14.10.3.4 Housing in First Nations Communities

As noted earlier, cumulative population increases in the LSA will likely result in the need for additional houses in Conklin, Janvier and Lac La Biche. In all of these communities, market forces will help to ensure that an increase in the demand for houses will eventually result in a greater supply. However, the potential difficulty of obtaining the services of a home builder in the smaller communities could add to the time it takes for supply to meet demand and, in the mean time, overcrowding will continue and housing prices will rise.

Cumulative development is unlikely to affect population in First Nations communities directly. However, population increases in the region could affect these communities indirectly. Increased housing prices in Fort McMurray have forced some to move back to First Nations communities and, in the absence of a significant increase in the amount of housing, and especially affordable housing in Fort McMurray, this trend is likely to continue.

Housing is already inadequate in many First Nations communities (INAC, 2000). Furthermore, on reserves, houses are funded by INAC Canada with no automatic, and certainly no immediate, link between population increases and the number of houses funded. Thus, an increase in the population in these communities would lead, or add to, accommodation shortages and overcrowding.

14.10.3.5 Community Infrastructure in First Nations

In many First Nations communities, infrastructure is inadequate:

> "A 2001 study conducted by UMA Engineering identified the need for 45 capital infrastructure projects in five communities, covering housing, sewage treatment systems, road, and community infrastructure. Generally, the physical and social infrastructure in First Nations communities is below the standards of typical Alberta communities and the findings of the UMA study suggest that this holds true in the Wood Buffalo region." (RIWG, 2005)

Infrastructure inadequacies in First Nations communities will be exacerbated if their populations increase in response to higher accommodation costs in Fort McMurray. However, as is the case for housing, capital facilities on reserves are built and maintained by Indian and Northern Affairs Canada. Whereas other municipalities benefit from an increase in property taxes as their populations grow, and can use these taxes to help pay for needed infrastructure (albeit with some degree of time lag), this option is not available to First Nations communities. The time lag between need and provision of infrastructure is often lengthy.

14.10.4 Summary of Cumulative Socio-Economic Impacts

14.10.4.1 Economic Impacts

The Project will contribute to the following cumulative economic effects:

- Direct or indirect employment in the RSA over the next decade of approximately 1,800 person-years of work associated with the development of oil sands projects. Some of these jobs will be filled by people already resident in the RSA and some jobs will induce workers to relocate to the area. On average, the wages resulting from this employment will be in the order of $16 million per year.

- Direct or indirect employment in the RSA over the next decade of approximately 3,900 person-years of work associated with the operation of oil sands projects. On average, the wages resulting from this employment will be in the order of $40 million per year.

- Direct, indirect, and induced operating employment, once projects have reached capacity, equal to about 1,035 local full-time jobs per year with associated labour income of about $95 million per year.

- Growth in local businesses servicing the projects and therefore for economic development in the RSA.

- Demand for trades people, possibly resulting in pressure for increased wages.

- Continued shortages in the RSA of sales and service workers.

- Property taxes payable to Lakeland County of about $145 million over the 2008-2017 period and roughly $30 million per year after all projects have reached capacity. Taxes payable to the RMWB will be approximately $95 million over the 2008-2017 period and roughly $20 million per year after all projects have reached capacity.

- Higher municipal costs for Lac La Biche, Lakeland County and the RMWB to meet demands placed on infrastructure and services by workers moving into these municipalities.

- Inflationary pressures on municipal costs due to the need to compete with industrial projects for labour, contractors and equipment (RIWG, 2006).

- Further reduction in opportunities for Aboriginal peoples to practice subsistence activities, thereby leading to a widening of the gap that currently exists between high and low income earners in Aboriginal communities.

14.10.4.2 Social Impacts

The Project will contribute to the following social cumulative impacts in the RSA:

- Increase of 2,500 permanent residents in the communities of the RSA. Additionally, there will be an increase of camps and shadow populations throughout the RSA;

- Need for 760 new dwellings over ten years, most of them in Lac La Biche;

- Increased numbers of school age children in the communities of the RSA, possibly surpassing the capacity of Conklin and Lac La Biche schools. Current proposed upgrades to Lac La Biche school will be necessary to accommodate the children. Viability of the Conklin school will be increased;

- Upgrades to the medical facility capacity in Lac La Biche, and increased numbers of police officers in the area;

- Increases to traffic on Highway 881 over the 10 years of the cumulative case. These increases will bring problems of speed, volume and intensity of truck traffic through and near all of the communities of the RSA;

- Increases to populations in Aboriginal communities, resulting in overcrowding until houses are built. This is dependent on funding from INAC and availability of a house builder in the area; and

- Loss of community identity in Aboriginal communities in the RSA with the influx of permanent and camp workers in the area, which will continue in the cumulative case. As more local people become engaged in the job and business opportunities associated with the projects, the isolated, rural and traditional community identity will be impacted.

Current municipal infrastructure in Lakeland County and Lac La Biche should be able to accommodate the increased permanent population.

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15 HISTORICAL RESOURCES

15.1 Introduction

Potential impacts on historical resources are addressed in this section. The development of the Project has the potential to impact historical resources through land clearing and infrastructure construction. Historical resources studies were conducted according to guidelines set out by Alberta Tourism, Parks, Recreation and Culture (ATPRC). Studies included baseline data collection within proposed development locations as well as targeted areas within the development areas. This section of the EIA has been prepared in accordance with Section 7.0 of the TOR (AENV, 2006).

Archaeological, historic and palaeontological sites are non-renewable resources and are susceptible to alteration, damage or destruction by ground disturbance. The value of these resources cannot be measured by individual artifacts or biological specimens; their value lies in the integrated information derived from interrelationships among individual artifacts and fossil specimens, associated features and contextual situations. The ability to interpret historical resource materials and the significance of particular sites within a landscape requires an understanding of the relationship between archaeological, historical or palaeontological materials and the sediments and strata within which they are contained. Removing or mixing sediments results in permanent loss of information needed to understand these resources. As a result, historical resources are susceptible to destruction and depletion from disturbance.

Archaeological and historic resources comprise residues of past cultures or societies. Because the cultural resources can be thousands of years old, they are non-renewable. Although the cultural societies responsible for creating the archaeological material are unavailable for observation, the preserved context and associations in which the remains functioned can reveal much about past human behaviour, adaptations and relationships. Many facets of these resources, particularly patterns of cultural deposition (observable in undisturbed context) are extremely fragile, ephemeral and the product of unique processes and conditions that have led to preservation. Site integrity, i.e., undisturbed state, is therefore extremely important to interpreting the remains. Consequently, once they are disturbed, they cannot be replaced, re-created or restored.

Once identified, archaeological and historic period sites are assigned heritage values, which are based on the material remains observed and/or recovered as a result of the field program as well as the regional archaeological context.

Palaeontology provides information on extinct forms of animals and plants, past ecosystems, evolution and natural climate change. Palaeontological resources, or fossils, comprise evidence of past multicellular life, including body fossils (e.g., bones, shells, plant stems), impressions (e.g., leaf imprints) and trace fossils (e.g., dinosaur trackways). They date from several thousand to hundreds of millions of years ago and are often the remains of now extinct species. Fossilization is the exception rather than the rule, and as the communities may no longer exist, fossils are non-renewable resources. The stratigraphic context (i.e., surrounding rock) of the fossil provides important information on age, environment and associations. Site integrity, i.e., undisturbed state, is therefore extremely important to interpreting the remains as well.

15.2 Study Areas

The historical resources field studies were conducted within the Leismer, Corner, Thornbury and Hangingstone development areas. Additionally, as the application for the Leismer Demonstration Project had been submitted at the time of the field reconnaissance, a full historical resources

impact assessment (HRIA) was conducted for the footprint of the Leismer Demonstration Project within the Leismer development area as proposed at that time (Roskowski, 2007).

15.2.1 Model Area

A model of archaeological discovery potential was developed for use in Project planning and historical resources management. The model was used to select target areas within the development areas for the collection of baseline data. Pay zones were defined as the predicted boundary in which Project development would occur. Target areas were selected within these pay zones, as well as in the general development area boundaries to obtain a representative sample of the baseline data.

15.2.2 Research Area

The historical resources research area was established to provide a regional context for baseline data. The area was defined by Borden Blocks that include lands adjacent to the development areas that held common physical and archaeological site characteristics (Figure 15.2-1). The research area consisted of 36 Borden Blocks, extending from Townships 75 to 86, and from Ranges 7 to 14, W4M.

Archaeological sites are referred to by a Borden Number, which consist of four letter symbol and number combinations (e.g., FaPq 11). Within this system, the upper case letters represent major blocks, 2° by 4° in size (e.g., F = 52° to 54° latitude, P = 112° to 116° longitude) and the lower case letters denote 10' units within the major block (e.g., a = 0' to 10' latitude; q = 40' to 50' longitude) (Borden, 1954). The numbers refer to specific sites within the units and are assigned by the Historic Resources Management Branch (HRMB) of ATPRC.

15.2.3 Regional Environment

The proposed development area is located almost entirely in the Boreal Highlands Natural Subregion, within the Boreal Forest Natural Region of Alberta (Natural Regions Committee 2006; Figure 15.2-2). The Boreal Highlands Natural Subregion is the third largest natural subregion in Alberta (Natural Regions Committee, 2006) and the Project is situated in its most southeasterly portion. Over 50% of the Boreal Highlands Natural Subregion is characterized by medium-textured glacial till deposits creating hummocky uplands, while 30% is covered by lacustrine and organic deposits situated in lowland areas (Natural Regions Committee, 2006).

The boreal forest has been termed a disturbance forest (Rowe, 1961) and is maintained by the frequent occurrence of fires (La Roi, 1967). The forests in the Boreal Highlands Natural Subregion are diverse, including aspen and white spruce forests in the uplands, balsam poplar and white birch forests in seepage areas and lodgepole pine-jack pine hybrids common in well drained areas (Natural Regions Committee, 2006). Black spruce and shrubs are characteristic of the muskeg, bogs and fens in the area (Natural Regions Committee, 2006). Due to changes in moisture, variations in the vegetation communities are found throughout this subregion.

The Project area is located at the northern extent of Alberta's Lakeland region. The Lakeland region has the greatest concentration of lakes including Primrose Lake, Lac La Biche, Winefred Lake and Heart Lake, all of which are located south and east of the Project study area. However, smaller lakes are typical within the Project area, and include Egg Lake, Base Lake and Thornbury Lake. The principal drainage system within the Project area is the Christina River.

Wildlife within the research area includes a variety of small birds and mammals. Beaver, moose, hare, black bear, wolf, lynx and ermine are known to inhabit the area; however, these species likely occupy the drier upland regions, especially along river valleys. Fish bearing streams are found throughout the area, with a concentration of fish lakes to the south. Fish species that may

be found include lake trout, walleye, whitefish, burbot, yellow perch, Arctic grayling and northern pike.

15.2.4 Project Environment

The four development areas (Leismer, Thornbury, Corner and Hangingstone) are similar in terms of their general environment; however, the specific attributes of the development areas result in differing levels of archaeological discovery potential. The local environment within each development area is discussed separately.

15.2.4.1 Leismer Development Area (Townships 76-79, Ranges 9-11, W4M)

Leismer is the southernmost development area and is bounded by May River, Wappau and Thornbury lakes to the south, Base Lake to the west, and Waddell and Pony creeks to the east. The Christina River runs through the central portion of the development area. Of the four development areas, Leismer has the most topographic variation. Areas of lower elevation, characterized by black spruce and marsh grasses, are typical throughout this development area, especially around lake margins. Landforms within hummocky terrain, found in the central portion of this development area, are often covered by jack pine or aspen vegetation, indicative of well drained soils. Terraces along the margins of the Christina River are occasionally present. Open expanses of water are common, with at least 30 unnamed lakes located within this development area boundary.

15.2.4.2 Thornbury Development Area (Townships 79-80, Ranges 11-13, W4M)

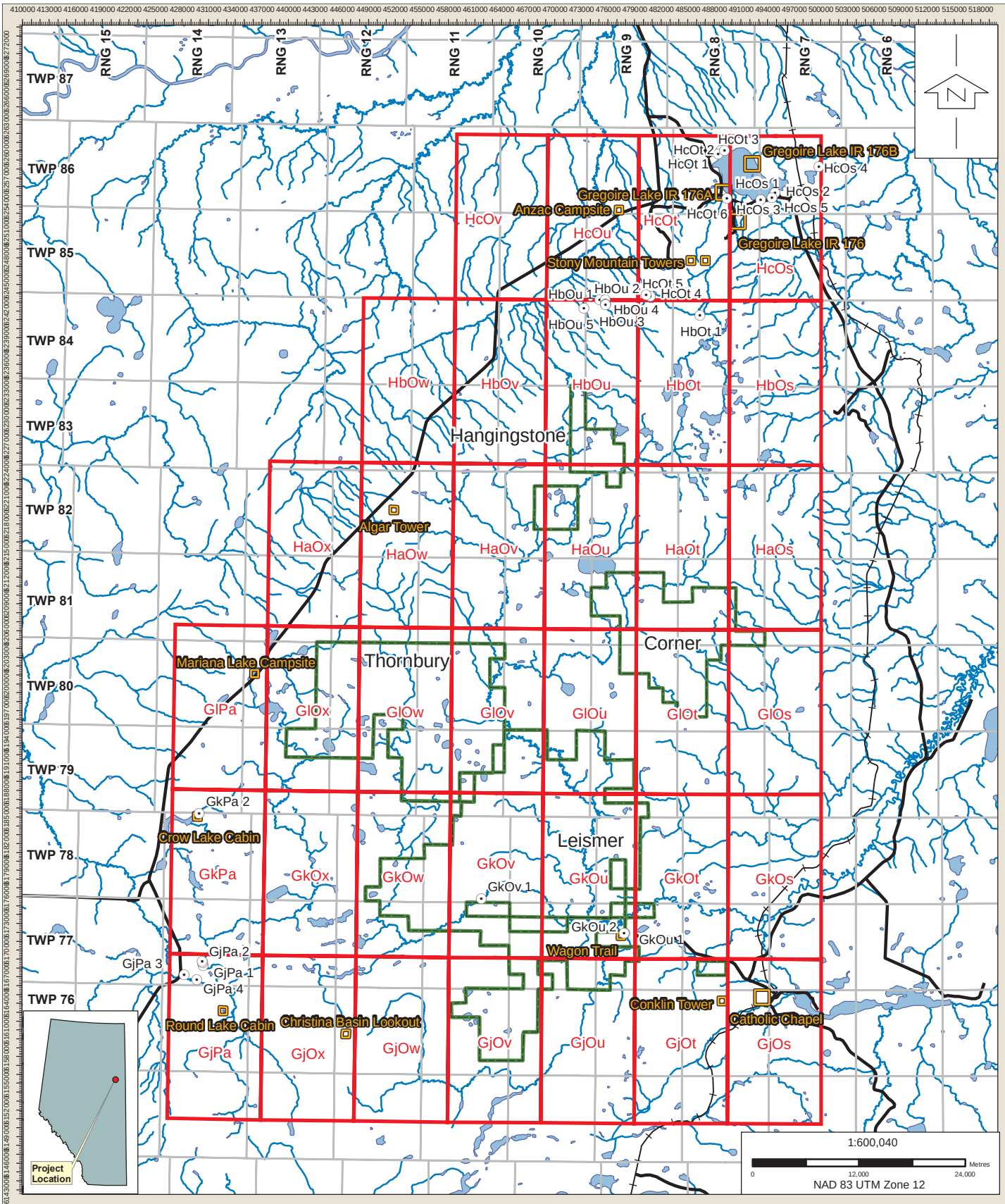
The Thornbury development area, located northwest of the Leismer development area, is situated north of Base Lake and east of House River. The Christina River runs along the eastern edge of this development area. Wetlands encompass over 90% of this development area. Fens and bogs, characterized by shrubs and grasses, may be interspersed between stands dominated by black spruce, willow and Labrador tea. A few aspen and balsam poplar-covered knolls are found in the eastern portion of this development area, just west of the Christina River.

15.2.4.3 Corner Development Area (Townships 80-81, Ranges 8-9, W4M)

Corner is the easternmost development area and is situated north of Waddell Creek, east of Kettle River and west of Christina River. Pony Creek runs through the east-central portion of this development area. The western portion of the Corner development area is dominated by low topography and wetland vegetation. Interspersed fens are found throughout the western portion of this development area. The eastern portion of Corner is characterized by hummocky terrain dominated by aspen vegetation with some interspersed stands of jack pine. Few terrace edges were noted along Pony Creek.

15.2.4.4 Hangingstone Development Area (Townships 82-83 Ranges 9-10)

Hangingstone is the northernmost development area and is bounded by Egg Lake to the south and the Clearwater River to the north. Hangingstone is the most saturated of the four development areas. Vegetation is characterized by fens and bogs generally consisting of marsh grasses with interspersed clusters of black spruce. Knolls are rare, and when present are covered with a thick sod layer indicative of the organic soil beneath.



Legend

- Archaeological Site
- Borden Designation
- Historic Site
- North American Development Boundaries
- Major Road
- Railway
- Township Grid

Title:

Research Area

Data Source: 1:250,000 NTDB, Department of Energy, Mines, and Resources, 73M, 74D, 83P, and 84A

NORTH AMERICAN OIL SANDS CORPORATION

Approved:	Revision Date:
JT	May 25, 2007

File: 1702_borden_250507_v5

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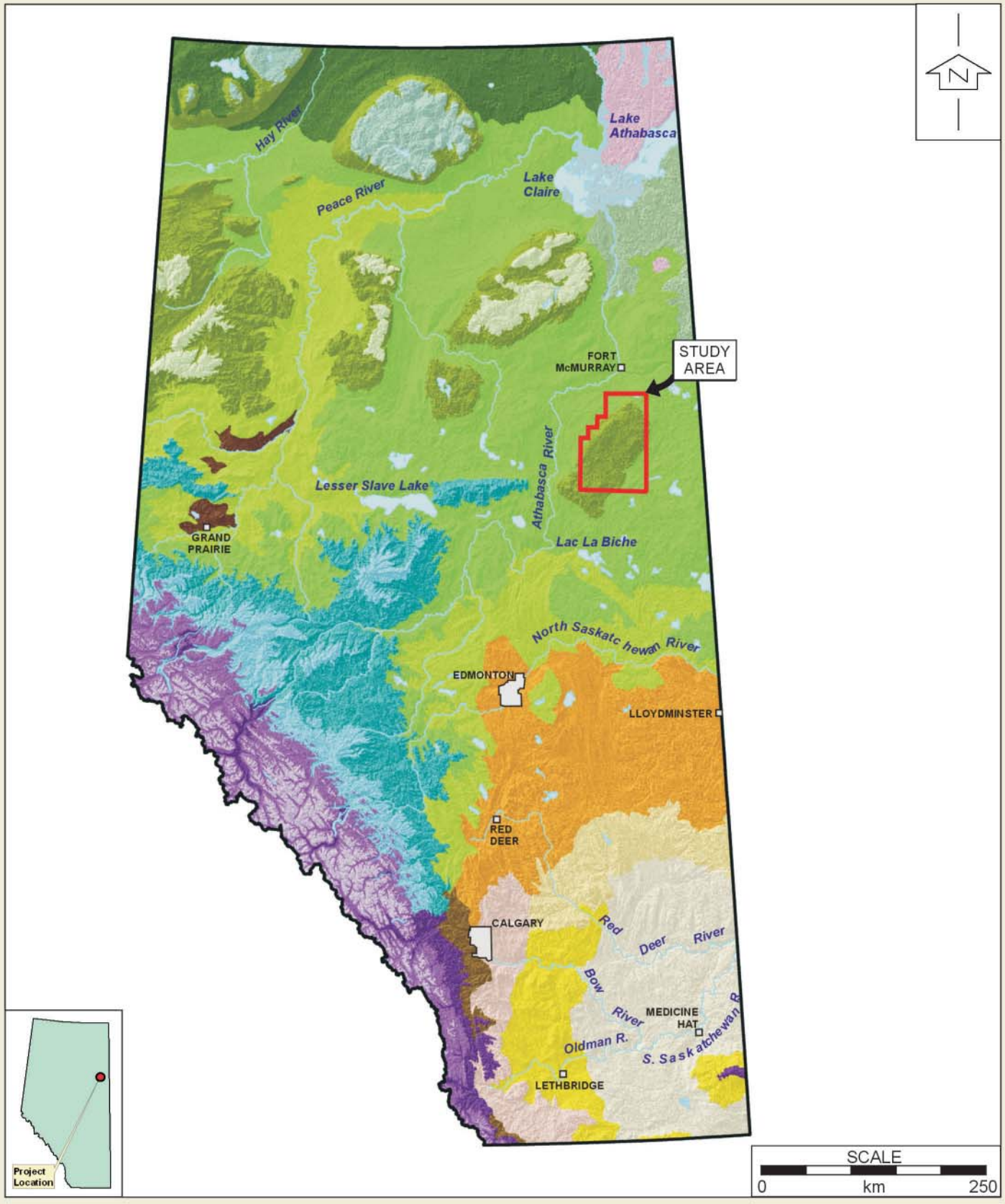
KW	LR	15.2-1



Legend

Boreal Forest Natural Region
- Central Mixedwood
- Dry Mixedwood
- Northern Mixedwood
- Boreal Subarctic
- Peace-Athabasca Delta
- Lower Boreal Highlands
- Upper Boreal Highlands
- Athabasca Plain

Rocky Mountain Natural Region
- Alpine
- Subalpine
- Montane

Foothills Natural Region
- Upper Foothills
- Lower Foothills

Canadian Shield Natural Region
- Kazan Uplands

Parkland Natural Region
- Foothills Parkland
- Peace River Parkland
- Central Parkland

Grassland Natural Region
- Dry Mixedgrass
- Foothills Fescue
- Northern Fescue
- Mixedgrass

Title:

Natural Regions and Subregions of Alberta

Alberta
GOVERNMENT OF ALBERTA

NORTH AMERICAN OIL SANDS CORPORATION

Approved:	Revision Date:
JT	May 30, 2007

File: 1702_AB_Nat_Reg.

Drawn by:	Checked:	Fig. No.:
KW	LR	15.2-2

15.3 Temporal Boundaries

The temporal scope of the EIA reflects the timing and nature of the Project as well as information available on other proposed projects. Three temporal boundaries were used in this assessment: baseline, application and closure. Baseline refers to the conditions in the model and research areas that were present when field surveys were conducted. The application case used a conservative approach, which assumes a maximum disturbance case where all components of the Project are fully developed and operational at the same time.

The facility locations for the Leismer Commercial, Leismer Expansion and Corner Hub are better defined; the remainder of the Project is more conceptual. Contingent upon regulatory approval, first steam is planned for 2009 (Leismer Demonstration), 2010 (Leismer Commercial), 2011 (Leismer Expansion) and 2012 (Corner). Beyond these initial developments, timing of well pad construction and reclamation and the location of Project facilities are estimates (Volume 1, Section 2.4).

15.4 Historical Resources

15.4.1 Definition

In Alberta, historical resources are protected under the *Alberta Historical Resources Act* (RSA 2000) and are defined as precontact, historic, and palaeontological sites and their contents. Cultural landscapes and traditional use sites may also be considered as historical resources sites. Precontact sites comprise artifacts, features and residues of Aboriginal origin. They predate the arrival of Europeans and are typically characterized by modified bone and stone artifacts, as well as stone features or structures. Historic sites are characterized by structures, features and objects of European influence. Buildings and building remains represent the most prominent type of historic sites. Palaeontological sites are areas where fossils of ancient animals (multicellular invertebrates or vertebrates) or plants have been preserved. Traditional use sites are identified in consultation with members of Aboriginal communities and may include traditional camping, hunting or plant collection locations or areas related to matters of a spiritual nature.

15.4.2 Archaeological Overview

15.4.2.1 Previous Studies in the Research Area

The Project lies entirely within the boreal forest. Based on archaeological evidence, the boreal forest has been continuously occupied for the past 10,500 years. Archaeological sites located just north and south of the Project area attest to this depth of occupation. Projectile points, ranging in age from 10,500 years before present to European contact, have been recovered from sites in both the Fort McMurray and Cold Lake regions.

While the extent of occupation is similar between these two regions, the reasons for long-term activity in these areas differ. Based on the types of sites excavated in the Fort McMurray area, it appears that the distribution of archaeological sites in the study region is largely due to precontact use of Beaver River Sandstone for tool production. In contrast, it appears that the concentration of archaeological sites identified in the Lakeland region is a result of use of the numerous lakes as fishing locales.

Site distribution in the Fort McMurray region indicates that, because of the availability and good working qualities of Beaver River Sandstone (the dominant lithic material in the region), the quarry locations of this material became focal points of activity with numerous satellite camps radiating from them (Unfreed and Fedirchuk, 2001). The first identified quarry site was the Beaver River Quarry; however, further analysis of artifacts collected from the surrounding sites and from the Quarry suggested that the Beaver River Quarry was not the source of the

fine-grained Beaver River Sandstone dominating archaeological sites in the Clearwater Lowlands. It was believed that a fine-grained source lay at or near the Cree Burn Lake Site (Ives and Fenton, 1983; McCullough and Wilson, 1982), possibly in the form of site HhOv 55, to the south of Cree Burn Lake (Unfreed and Fedirchuk, 2001). More recently, during the HRIA conducted for the Birch Mountain Resources Muskeg Valley Quarry Project (Saxberg and Reeves, 2004), sources of fine-grained Beaver River Sandstone were identified at the Quarry of the Ancestors site complex. To date, this quarry is the largest confirmed source of the fine-grained Beaver River Sandstone that overwhelmingly dominates archaeological assemblages in the region.

Several authors have provided cultural sequences for this region (for example, Fedirchuk and McCullough, 1981; McCullough and Wilson, 1982; Fedirchuk, 1995; Reeves, 1996; Ronaghan, 1997; Saxberg, Shortt and Reeves, 1998; Clarke, 2002), which varied due to the many cultural influences within the area. Cultural materials from the southern boreal forest share characteristics with materials found in the northern plains, the northwestern boreal forest and the adjacent barrenlands to the northeast. Consistencies in cultural materials and artifact dates in these areas bear witness to the movements and cultural influences between these zones through time.

Similarly, cultural materials in the Lakeland region to the south of the Project area also exhibit influences from the northern plains, northwestern boreal forest and adjacent barrenlands to the northeast. First Nations groups and early fur traders in the Lakeland region both relied on fish drawn from the lakes for primary subsistence. Evidence of fishing has been recovered from archaeological sites such as the Charlie Labatt site on Cold Lake, and the Duckett Site on Ethel Lake; as such it is assumed that this subsistence activity has been ongoing since the first occupation of the region. This conclusion is supported by the numerous archaeological sites identified around lakes (e.g., Cold Lake, Lac La Biche, Ethel Lake, Heart Lake, etc.) within the Lakeland area. Indeed, the sites situated around fish bearing water sources are more extensive than those in outlying areas, which are likely the manifestation of hunting or gathering activities.

The Fort McMurray and Lakeland regions each provided occupants with a critical resource; however, as these resources were mutually exclusive it can be suggested that travel between the Fort McMurray area and the Lakeland region likely occurred during precontact times. This is supported by the extensive network of trails recorded by early fur traders, which were likely established during precontact times. This connection between the Fort McMurray and Lakeland regions is further evidenced by the sites within the Project area, which is located centrally between the two regions. Sites in this area tend to be small in size and artifact density, characteristic of a temporally restricted occupation such as a hunting locale or single use campsite. These types of sites would be expected if the area was used as a travel corridor between Fort McMurray and the Lakeland region. Furthermore, the archaeological sites in the research area exhibit influences from Fort McMurray to the north and the Lakeland area to the south. Non-local materials including Beaver River Sandstone and Swan River Chert have been recovered from a few archaeological sites within this region.

15.4.3 Historic Overview

When the first Europeans arrived, the area was inhabited by Chipewyan and Cree peoples who relied on the natural resources of the area for subsistence. The Dené were very early participants in the European fur trade and were regarded as highly skilled hunters and trappers. Much of the trade with the Dené was initially conducted with the Cree working as middlemen. The Cree, in this capacity, ventured westward and established themselves in the rich Athabasca region. The first European exploration into the present day province of Alberta was by French fur traders, to establish trade with the Cree and Chipewyan of the area. The earliest written records relating to fur trade exploration within Alberta were prepared in connection with expeditions led by agents of the Hudson's Bay Company, the North West Company and the XY Company.

In 1778, Peter Pond established the first trading post in the Athabasca drainage, approximately 60 km south of Lake Athabasca. Marriage between the fur traders and the indigenous people resulted in the establishment of the Métis, who were of vital importance as they guided traders into unknown territories, worked as interpreters, hunted and provided provisions, built trading posts, acted as middlemen in trade and transported furs back to the east.

The earliest written documentation pertaining to the Conklin area appears in Peter Fidler's and Philip Turnor's journal entries of 1791. They were on their survey expedition to verify questionable points about some of Samuel Hearne's and Peter Pond's maps and their location of some of the lakes in the region, including Lake Athabasca (MacGregor, 1966). In his journal, Philip Turnor states that the expedition "dared not take the Northwesters' route over the Methy Portage, because various parties passing and re-passing along it had denuded that area of game" (MacGregor, 1966). Instead, he wanted to alter the course and try another long and less known route, further west, in hope that there would be game.

With their Chipewyan guides, the survey party entered the area near Garson Lake and eventually made their way downstream to Newby River which flowed west of the "Grizzil Bear Hill and is called by the Southern Indians [Cree] Mis-ta-hay Mus qua Wau-chu-a-Seepe and by the Chepawyans [Chipewyan] Hot-hale-zag-za Sheth De-za" (Tyrrell, 1934). They then passed the south of Winefred River and started down Christina River which is "called by the Southern Indians Mith-quap-pim-a-Seepe and the Chepawyans Ky-qoz-zae Dez-za or the Red Willow River…to the point of junction" (Tyrrell, 1934). Turnor, in commenting on the locale of Winefred Lake and Christina River notes that "this is a fine country for Cattle, Beaver Geese & [etc.]" (Tyrrell 1934:381).

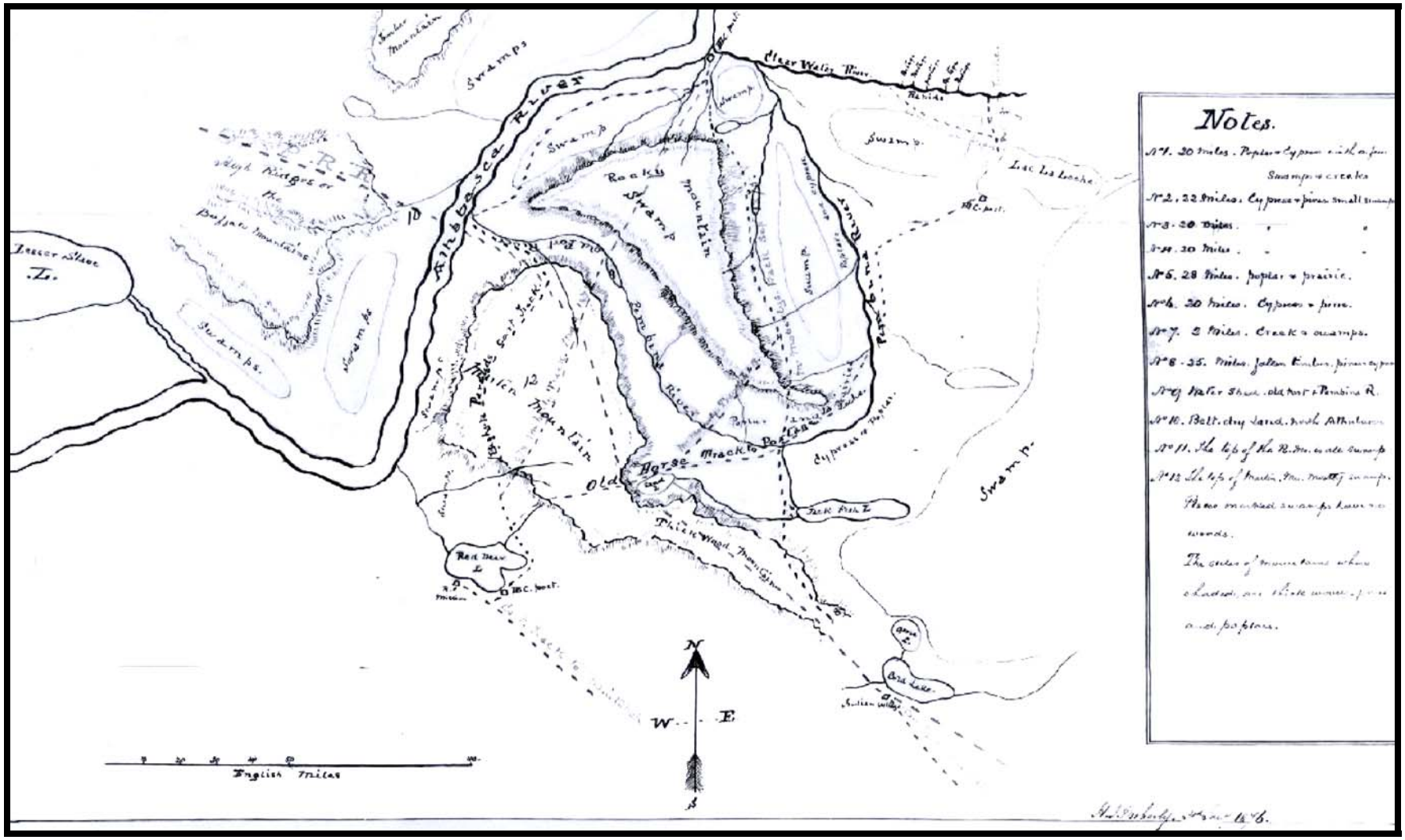
The Project area is, for the most part, outside the main fur trade travel routes of the Clearwater-Athabasca system and the Beaver River route to the south. Fur trade activity in the research area was closely linked to the fur forts in the Fort McMurray (four posts at the confluence of the Clearwater and Athabasca rivers, Fort McMurray) and the Lac La Biche (Greenwich House, Red Deer Lake House and Lac La Biche post) areas. As such, a main trail was established between Lac La Biche and Fort McMurray as well as a series of interlinking trails transecting the region, providing connections for occupants of the area to fur forts and outposts (Figure 15.4-1).

By 1898 the Hudson's Bay Company in Fort McMurray was closed due to dwindling trade; however, as Fort McMurray was the gateway to the arctic, the building was re-opened as a large-freight storage warehouse (Hein, 2000). Through Fort McMurray, goods were shipped "on the Athabasca River to Lake Athabasca, then on the Mackenzie River to the Arctic" (Hein, 2000).

By 1915 the Alberta and Great Waterways Railway reached Lac La Biche (Zaslow, 1948). The railways established a transportation link between Edmonton and Lac La Biche. By 1919 the tracks had been laid to reach the top of the Clearwater River valley near Fort McMurray, and by 1922 the railway reached Fort McMurray proper. Although the Alberta and Great Waterways Railway established the major transportation link through the area, traditional economic practices continued until the beginning of oil sands development, which brought with it a new wage economy.

Although oil sands development has brought industry into the region, this area has been and remains to this day the domain of the people of aboriginal descent: the Cree, Dené and Métis.

Figure 15.4-1 Moberly's Map of Historic Trails in the Region



15.5 Methods

15.5.1 Record Review

Prior to field reconnaissance, a review of the Archaeological Site Inventory Data records maintained by the Historic Resource Management Branch (HRMB) of ATPRC was conducted for research area.

15.5.2 Literature Review

A literature review of available permit reports from the ATPRC archives was conducted. These reports were reviewed to provide information on the archaeological and historic context of the research area and data on relative site significance.

15.5.3 Model of Archaeological Discovery Potential

A model of precontact archaeological site sensitivity was created to illustrate archaeological discovery potential. Archaeological discovery potential is defined by the level of similarity between the attributes for the given area and the attributes common to previously recorded archaeological sites found in the region. The purpose of this model was to guide future field studies once development areas are more defined, and to identify any areas where sites of high interpretive value may be present. Once areas of high, moderate and low archaeological discovery potential are identified, the need for, type of and intensity of field assessment can be determined. Application of the predictive model will facilitate long-term development planning and assist in the formulation of effective archaeological assessment programs through the life of the Project. Developed within a GIS environment, the model can easily evolve through the life of the Project to incorporate new data, such as refined ecosite phase classifications or the results of previous field assessments. These ongoing updates and revisions will produce a more comprehensive sensitivity model that will reflect a gradually increasing understanding of the archaeological database in the study area.

The goal of the program is to provide an efficient tool for the management of historical resources within the proposed development zone. The predictive model:

- Facilitates long-term development planning;
- Assists in the formulation of effective archaeological assessment programs, as required; and
- Addresses heritage concerns as outlined in the *Canadian Environmental Assessment Act*. The Historical Resources Predictive Model is based upon:
    - Ranking of the landscape relative to precontact archaeological site location potential, as determined through the selection of environmental/terrain attributes considered to correlate with site location; and
    - The presence of previously recorded precontact archaeological sites.

15.5.4 Archaeological Context

The Project is located in the Christina River drainage basin, in an area of the boreal forest characterized by extensive wetlands. It is situated between the lower Athabasca/Clearwater lowlands and Lakeland regions, both of which contain some of the densest concentrations of

archaeological sites in the Alberta boreal forest. The availability of a high quality lithic material (Beaver River Sandstone) in the lower Athabasca was a main factor in the intense precontact use of the lower Athabasca/Clearwater lowlands, while the resource rich lakes and associated littoral zones attracted prehistoric inhabitants to the Lakeland region. As a result, these two areas contain a wide variety of archaeological site types, including quarries, workshops, campsites, artifact scatters and isolated finds.

As previously discussed, the area surrounding the Project, largely characterized by low-lying, poorly drained terrain devoid of major waterbodies, contrasts with the lower Athabasca/Clearwater lowlands and Lakeland regions. Subsistence resources such as large game, fish and plants are available in the area, but the distribution of these resources is more diffuse than in areas that contain major lakes or river valleys. It is unlikely that large, long-term campsites were established in the area because of this thin distribution of animal and plant resources. However, the area may have been used as travel conduit linking the Lakeland region and the lower Athabasca/Clearwater lowlands. As such, any sites within the Project area are expected to be small artifact scatters or isolated finds representing single, short-term occupations. These sites would be concentrated along navigable waters (e.g., the Christina River), some small lakes and on prominent landforms adjacent to wetlands. Elements of the predictive model have been designed to capture these anticipated trends.

15.5.5 Model Types

The theoretical approach used in the predictive model for the historical resources section study of the Project is deductive in nature. Deductive models are based on a detailed understanding of human behaviour within a given environment and are, to a large extent, a reflection of the expertise of the archaeologist(s) creating the model. These types of models attempt to map areas of potential according to underlying assumptions regarding site location. These assumptions are informed by a range of information sources including ethnographic records, subsistence strategies, field experience and palaeoenvironmental information.

15.5.5.1 Underlying Assumptions

The Project model is predicated on the assumption that a number of basic human needs must be fulfilled to maintain a viable human population. These include, but are not limited to, the following:

- Subsistence;
- Water;
- Protection (including shelter and transportation);
- Transportation and communication;
- Raw materials (for clothing, shelter, and tool manufacture);
- Social relationships;
- Ideological beliefs; and
- Social principles.

These needs can be met, to a greater or lesser extent, within a given environment. However, areas having a constellation of favourable attributes would be preferable as they contain greater

potential to meet either several or all requirements. Detailed understanding of the ways in which people utilized resources within their environment is based largely on:

- Palaeoenvironmental landscape and reconstruction;
- Ethnographic data;
- Ethnohistoric data; and
- Resource distribution and patterns; combined with
- Cumulative archaeological expertise and experience.

This information is integrated through the application of maximizing resource return for energy expended (optimal foraging theory; Smith et al., 1983) and the concept of "least-cost" analysis. Human populations tend to maximize energy gain while minimizing energy expenditure relative to resource utilization. Optimization is based on:

- Availability of resources;
- Seasonal patterns in resource abundance;
- Variability in resource distribution (i.e., clustered versus dispersed); and
- The means by which resources are harvested (e.g., technology, hunting practices).

Precontact archaeological sites will, therefore, be located in areas that optimize access to required resources. While the general pattern of resource utilization is roughly similar throughout time, the locations of these resources may shift over time as a result of long-term climatic change (e.g., vegetation and drainage patterns) or the continuous cycle of vegetative succession typical of the boreal forest.

15.5.5.2 Site Location Indicators

Based on the assumptions described above, a number of site location indicators have been identified. The majority of these indicators are environmental attributes that have been linked to archaeological site locations in a multitude of studies, although other indicators such as spiritual locations and proximity to previously recorded sites also have an influence on site location. The presence and co-occurrence of indicators helps identify areas of high potential for the presence of precontact archaeological sites. Environmental indicators include, but are not necessarily limited to:

- Areas adjacent to water (e.g., lakeshores, rivers, wetlands, creeks);
- Areas of high relief (e.g., hummocks, hills, knolls, ridges, valley edges, eskers, kames, sand dunes);
- Areas of dramatic change in elevation;
- Well drained areas; and
- Areas with accessible (i.e., exposed) lithic resources (e.g., bedrock, glacial till, glacial erratics, glacial float blocks).

It is also observed that certain types of sites do not adhere to a predictable or easily discernible pattern of site location. These include:

- Spiritual sites and burials which are often, but not consistently, located on unique landscape features;
- Winter campsites which are known to exist on the ice at lake edges and on the muskeg wetlands;
- Berry picking areas which are dependent to a large extent upon vegetative succession and forest fire cycles but are not easily identifiable over the long-term; and
- Quarry sites which are typically isolated and located adjacent to bedrock outcrops or other exposed raw material sources.

Unless these areas have been previously identified geologically, their location is generally unknown. Once located, however, raw material resource locations can affect the historical resource potential of surrounding areas, as they represent a focal point of human occupation. These sites can be surrounded by additional satellite sites, which are associated with the focal sites but often represent a more limited range of activities, time periods and areal extent. Sites that may act as focal points include:

- Large, multicomponent campsites at seasonal aggregation points;
- Quarries;
- Kill sites;
- Large game crossings;
- Fishing stations/spawning grounds; and
- During the postcontact period, fur trade posts.

It is evident, through an examination of the selected indicators, that some attributes may be more important than others in determining site location. The relative importance of these attributes also varies from one ecozone to another. Within the boreal forest, for instance, proximity to water may be the overriding factor determining site location, due to the use of waterways in transportation as well as their greater resource diversity and richness. This contrasts with prairie environments in which topography may be an overriding factor. The importance of the attribute also varies by site type; for example, landscape attributes of a vision quest site within a grassland environment will be dramatically different from those of a boreal winter campsite location, or a quarry.

15.5.5.3 GIS Methods

The site location indicators described above can be identified through the use of Geographic Information Systems (GIS) and available GIS datasets (e.g., Digital Elevation Models [DEMs], surficial geology, vegetation layers). The varying influence of each indicator can be accounted for using spatial analysis tools available in GIS, particularly category ranking and weighted layer combination.

The manipulation of GIS datasets enables the classification of the development area into archaeological sensitivity zones. Five GIS-based steps are completed to create this classification:

- Data selection;
- Data processing;
- Data manipulation;
- Data analysis, and
- Classification of precontact archaeological site potential.

15.5.5.4 Data Selection

Selection of appropriate environmental datasets for precontact site predictive modelling is dependent upon availability and the ability of the datasets to portray indicators of archaeological site location. Frequently GIS datasets do not explicitly inventory the environmental indicators listed above, particularly for palaeoenvironmental attributes. However, indicators may be identified in GIS datasets through the use of proxy variables, which often correlate to the environmental indicator of interest. For example, well drained areas may be identified through variability in plant communities, reflecting the properties of the underlying soils. Within a boreal forest environment, jack pine generally indicate well drained, sandy soils. Vegetation can also be used to identify areas of high relief, particularly when surficial geology information (identifying glacial features such as kames or eskers) is not available. Tree species indicative of well drained terrain may be used to isolate these areas within a more typically wetland terrain.

Some attributes useful for determination of archaeological site sensitivity cannot be discerned in pre-packaged datasets. This is often due to scale limitations or data creation methods that are not designed for archaeological applications. In some instances, specialized datasets can be created for incorporation in the analysis. For example, ridges and knolls as small as 10 m by 10 m can be associated with archaeological sites in the boreal forest. These features are too small to be captured on most vegetation maps and only DEMs of high resolution (pixel size = 2 m or less) are able to depict these landforms with clarity. In order to capture some of these landforms in model aerial photograph analysis, isolation of these features can be conducted and the results incorporated into the GIS-based model. This type of analysis also helps identify ancient landforms that may have attracted human occupation during the prehistoric period. Such features include glacial lake boundaries, meltwater channels and abandoned stream/river courses.

Environmental datasets most commonly used for archaeological site sensitivity mapping are vegetation maps, surficial geology maps, terrain derivatives (acquired from DEMs), hydrology maps and soil inventories. Specific datasets used for the Project are detailed in Table 15.5-1.

In order to identify existing focal points, the locations of known sites were drawn from the HRMB site files and from the Alberta Inventory of Historic Structures and Sites database.

15.5.5.5 Data Processing

Digital datasets can be provided in a myriad of spatial reference systems. In order to ensure spatial consistency and accuracy, each dataset must be referenced to a compatible co-ordinate system and datum. All datasets for this Project were referenced to the Universal Transverse Mecator (UTM) co-ordinate system, Grid Zone 12. The NAD 83 datum was used.

Table 15.5-1 Key Indicator Layers, Layer Weights, Category Ranks and Source Datasets used in the Production of the Project Precontact Archaeological Site Sensitivity Map

Key Indicator Layer	Category	Scale	Data Source
Proximity to Water	0-50 m 50-100 m > 200 m	1:50,000 to 1:20,000	Alberta Sustainable Resources Development (ASRD) Stream Line Network (Slnet)
Vegetation (Primary Species)	Jack Pine (Pj) Aspen (Aw) White Birch (Bw) Balsam Fir (Fb) Balsam Poplar (Pb) Lodgepole Pine (Pl) White Spruce (Sw) Tamarack (Lt) Black Spruce (Sb) Unknown	1:15,000	Alberta Vegetation Index (AVI)
Slope (%)	0 1-5 6-15 >16	1:60,000	Digital Elevation Model
Aspect	North Northeast Northwest Southeast West East Southwest South Flat	1:60,000	Digital Elevation Model
Surficial Geology	Sand Proximity to Meltwater Channel Edges (within 125 m)	1:250,000	Air Photo Interpretation; Alberta Geological Survey Surficial Geology Map
Fish Bearing Streams	Present/absent	N/A	The Fishes of Alberta 1992

15.5.5.6 Data Analysis

Category Ranking

The first step in data analysis is the attachment of rankings to categories of interest within each data layer. For example, each stand type within the vegetation layer receives a ranking based upon its relative importance to archaeological site location. In the boreal forest, vegetation stands indicative of well drained areas generally receive a higher rank than those that represent poor drainage conditions. The result is a vegetation layer that consists of a tessellation of rank values. The higher the rank, the more favorable that location is for the identification of archaeological sites.

Weighted Layer Combination

The final calculation of precontact archaeological site location potential is achieved by amalgamating the ranked key indicator GIS layers in a weighted combination. The weights used in the calculation are determined by an archaeologist and are intended to reflect the relationships between indicators identified using the assumptions detailed above. Relationships will vary

depending upon the area and the physical environment. As such, weights used in predictive models will vary from project to project.

For example, the drainage characteristics of a given location in the boreal forest may be considered more important than its slope. Poorly drained areas rarely contain archaeological sites, even if they are located in flat areas. To illustrate this, drainage (as seen through the proxy variable of vegetation) can be weighted more heavily than the slope layer in the model. The ranked values in the vegetation layer are multiplied by a large number, while the slope layer is multiplied by a small number. The resulting weighted layers are then added together to provide a depiction of archaeological site location potential:

$$\text{Potential} = (y \times \text{vegetation})(z \times \text{slope})$$

where, for the Project:

$y = 5$
$z = 1$

This simplified potential layer will reflect the tendency of humans to use well drained areas in the boreal forest. The layers used in the Project model included slope, aspect, proximity to water, aerial photograph analysis layer and vegetation.

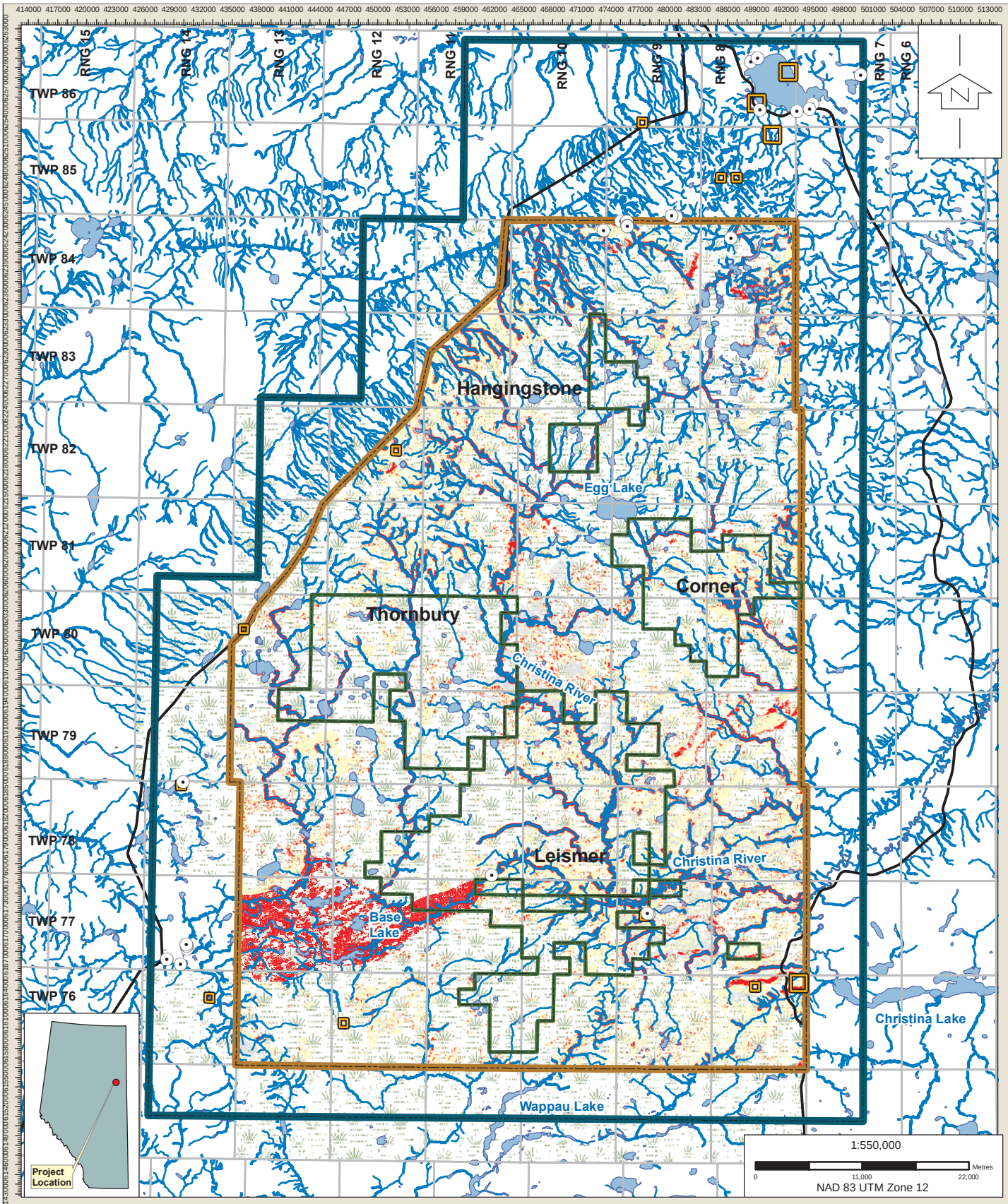
In the weighted layer combination approach, areas characterized by the co-occurrence of attributes considered ideal for the location of archaeological sites receive high potential scores. Areas dominated by environmental attributes that are considered to be detrimental to the location of archaeological sites receive low potential scores. A typical boreal forest example of a high potential area would be a south-facing, jack pine-dominated bench situated adjacent to a stream. A low discovery potential area would be a steeply sloped, north-facing hillside far removed from water sources.

Classification of Precontact Archaeological Discovery Potential

The archaeological discovery potential layer derived from the weighted layer combination is then classified into three categories (high, moderate and low) using threshold values determined by natural breaks in data distribution, analysis of the archaeological discovery potential values histogram and the visual inspection of the mapped archaeological discovery potential layer.

Caveat

While GIS datasets are flexible and useful interpretive tools, they do have limitations due to the scale at which the data have been collected. Within AVI datasets, areas less than 2 ha are frequently not distinguishable. Elevation data within available DEM datasets have been collected at 100 m intervals. Surficial geology data are available from the Alberta Geological Survey, increasingly in digital format, at a 1:250,000 scale. The approach used leverages existing datasets while incorporating new data where required and available. All data sources are fully documented, to ensure awareness of reliability and scale. Limitations of the datasets must be kept in mind when interpreting the model results.



Legend

- Archaeological Site
- Historic Site
- Model Area
- Research Boundary
- North American Development Boundaries
- Major Road
- Township Grid

Archaeological Investigation Units

- I Low Archaeological Discovery Potential
- II Moderate Archaeological Discovery Potential
- III High Archaeological Discovery Potential
- Muskeg/ Wetland Area

Title: North American Archaeological Discovery Potential

Data Source: 1:250,000 NTDB, Department of Energy, Mines, and Resources, 73M, 74D, 83P, and 84A

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15.6 Evaluation of the Model

Ground truthing was conducted using a combination of helicopter survey to confirm the archaeological potential of terrain features identified in the model, and by field testing in which inspection of terrain features and exposures, and a shovel testing program were undertaken. Ground truthing of the model was undertaken during two separate field visits during June 2006.

The aerial reconnaissance consisted of an overflight of the Leismer, Corner, Thornbury and Hangingstone development areas. The purpose was to assess the validity of the Precontact Archaeological Sensitivity Model. This was conducted by flying over each of the four development areas noting where the model correlated with the actual terrain features and where it did not. Adjustments were made to refine the model when necessary. The field sampling program consisted of a targeted survey of selected areas within all four development areas. Sample sites were selected in the pay zones, and areas of moderate to high archaeological potential within the development area boundaries. The pay zones were defined as the predicted boundary in which development would occur. Additionally, as the application for the pilot plant had been submitted at the time of the field reconnaissance, a full HRIA (due diligence) was conducted for the finalized footprint of the plant site, four SAGD pads, access road and pipelines in the Leismer lease only. Subsequently, the footprint has been revised and further HRIA work will be conducted as required.

During the ground reconnaissance, all fortuitous exposures such as tree throws, vehicle track surfaces, and areas of previous construction disturbance were examined for evidence of cultural material. Visual inspection of these areas complimented the shovel testing program. Excavation of 2,149 shovel tests (approximately 40 cm by 40 cm to a depth of approximately 50 cm) was conducted.

15.7 Issues and Assessment Criteria

The need for historical resources studies and an environmental effects assessment of historical resources within the Project area is related to the Project's potential to alter or remove the contents and contexts of historical resources within the development footprint, thereby resulting in a loss of specimens and alterations to the interpretive capacities of these resources. Thus, the issue relative to historical resources is the assumption that the Project will result in some modification or loss of the artifacts and cultural remains representing the archaeological, historic and palaeontological resources in the region, as well as alteration of the contexts in which they can be found and interpreted. Potential Project effects on heritage resources are summarized, for the various Project phases, in Table 15.7-1.

Table 15.7-1 Potential Project Effects on Heritage Resources

Physical Works and Project Activities	Issue or Effect	Source	Relevance
Construction of plant sites, SAGD pads, access roads, borrow areas, and pipelines and activities such as clearing, drilling, grading, ditching, and excavation.	Primary disturbance of historical resources	*Historical Resources Act*	Loss of site content and/or site context

Common to all historical resources is an interpretive capacity rendered by the integration of information regarding site contents and the contexts from which those remains are recovered. The patterning of cultural or biological remains and the nature of remains present at a particular site are used to determine interpretive capacity. As human and animal behaviour is patterned, so too are the arrangement and deposition of remains. Patterning is reflected at a basic level in assigned site types.

Cumulative effects are based on the positive, negative and neutral impacts to historical resources resulting from the development of the Project. The impacts are measured based on the net effects to indicator resources. Historical resources encompass three general groups of indicators: precontact period sites, historic period sites, and palaeontological sites. However, as no historical resources sites were identified during the historical resources studies for the Project, none of these indicators are relevant to this Project.

15.8 Existing Conditions

The record review indicated that the research area lies within 36 Borden Blocks (Table 15.8-1). Within these Borden Blocks there are 27 previously recorded archaeological sites and 14 historic sites. Three of the archaeological sites and one historic site lie within or adjacent to the four development areas, but none are located within the Leismer and Corner pay zones identified for initial SAGD development.

Table 15.8-1 Borden Blocks with Corresponding Number of Archaeological Sites

Borden Designation (# of archaeological sites/# *of historic sites*)					
HcOs (5/*2*)	HbOu (5)	HaOv (0)	GlOv (0)	GkOu (2/*1*)	GjOt (*2*)
HcOt (6/*3*)	HbOv (0)	HaOw (*1*)	GlOw (0)	GkOv (1/*1*)	GjOu (0)
HcOu (*1*)	HbOw (0)	HaOx (0)	GlOx (0)	GkOw (0)	GjOv (0)
HcOv (0)	HaOs (0)	GlOs (0)	GlPa (*1*)	GkOx (0)	GjOw (*1*)
HbOs (0)	HaOt (0)	GlOt (0)	GkOs (0)	GkPa (2/*1*)	GjOx (0)
HbOt (1)	HaOu (0)	GlOu (0)	GkOt (0)	GjOs (0)	GjPa (5/*1*)

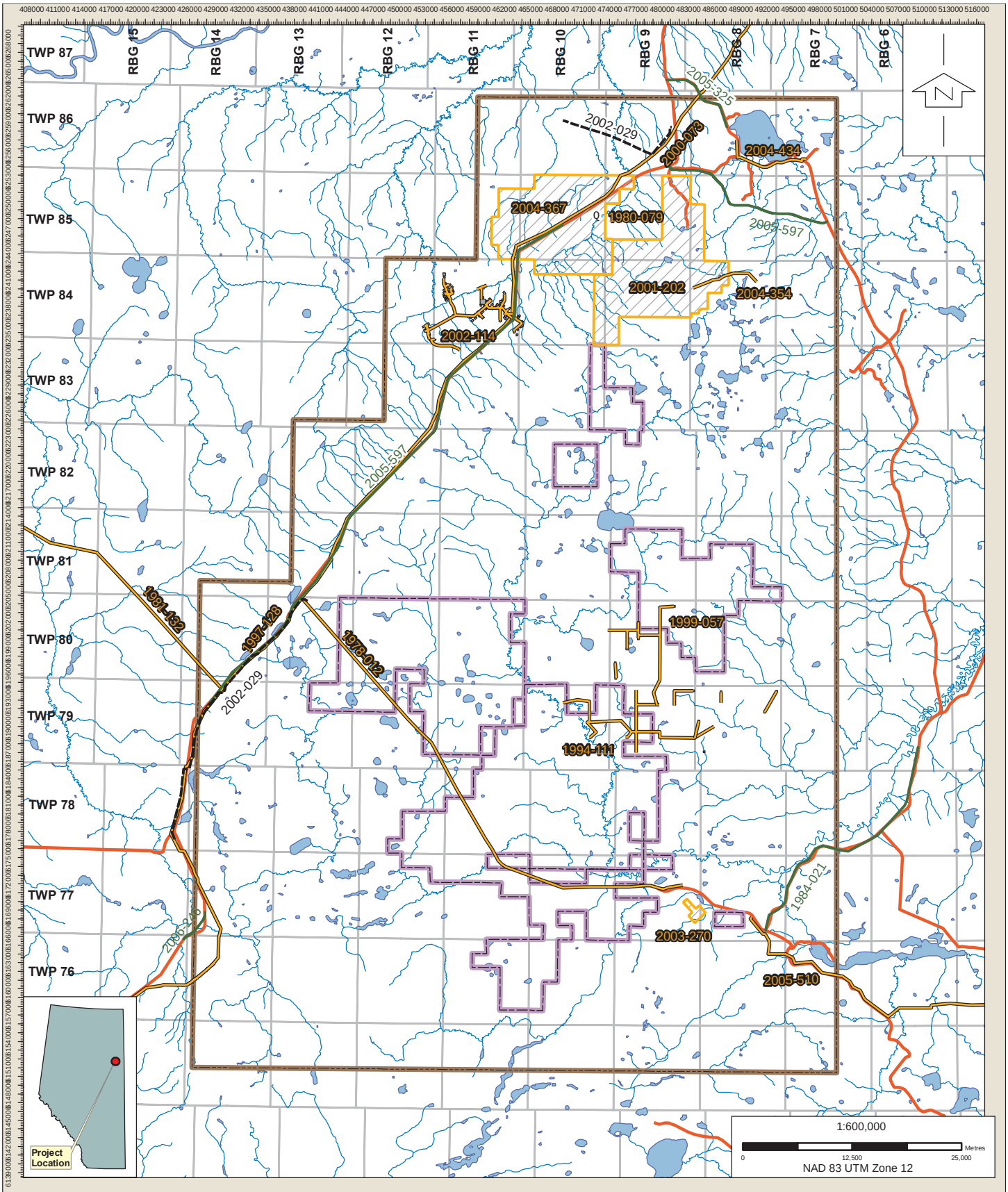
In addition, 26 permitted archaeological studies within the research area were reviewed to gain information on the nature and extent of past studies and on the nature and contexts of archaeological sites within the research area. The majority of the studies are related to pipeline, oil and gas developments (14), but several are also the result of highway upgrades (5), transmission line projects (3), a municipal water supply line, forestry activity and research initiatives. Figure 15.8-1 illustrates these development locations only, not those areas assessed through visual evaluation or shovel testing programs.

Of the archaeological sites on record within the research area, 7 are isolated finds, 17 are lithic scatters/workshops (most of which consist of fewer than 10 artifacts), and 3 are campsites. The literature review of 26 previously submitted archaeological reports for the research area indicated that these sites hold several common characteristics:

- Sites are small in size, often containing only one artifact.
- Sites tend to be identified in areas adjacent to seasonal or permanent watercourses, or on elevated landforms that are well drained.
- Sites are located on low ridges and knolls that are isolated in large expanses of muskeg.
- Site assemblages tend to be dominated by flakes that are the by-products of tool manufacture, with few formed tools and few culturally or temporally diagnostic artifacts.
- Sites tend to be of low to moderate archaeological interpretive value.

Based on the abovementioned characteristics, these sites appear to represent short-term use sites such as would be typical of a hunting site or temporary campsite. No precontact sites with high interpretive value have been previously recorded in the research area.

On the contrary, the historic sites within the research area varied both in use and in location. The historic sites consist of five forestry lookout towers, three First Nations reserves, two cabins, two campsites, one chapel and one wagon trail. Unlike the precontact sites, historic sites are often located on various types of landforms based on site function rather than proximity to available resources.



Legend

- Previous Development Transmission Line
- Previous Development Road
- Previous Development Pipelines
- Previous Development Wellsites
- Previous Development Lease Area
- Q Campsite
- North American Development Boundaries
- Regional Study Area (RSA)
- Road (major)
- Water Course
- Water Body
- Township Grid

Title: Previous Work Conducted in the Region

Data Source: 1: 250,000 NTDB, Department of Energy, Mines, and Resources, 73M, 74D, 83P, and 84A

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15.9 Impact Assessment and Mitigative Measures

As required by Section 7 of the TOR, a report detailing the results of the historical resources studies was prepared for submission and review by ATPRC. The report provides baseline data and presents the model of archaeological discovery potential (Roskowski, 2007).

15.9.1 The Model

The results of the model indicate that approximately 80% of the modelled area is wetland vegetation and 4% is open water, indicating that 84% of the area has no archaeological discovery potential. Of the remaining 16%, 4% is of low archaeological discovery potential, 6% is of moderate archaeological discovery potential and 6% is of high archaeological survey potential.

15.9.2 Evaluation of the Model

The model was evaluated through aerial and ground reconnaissance of the Leismer, Corner, Hangingstone and Thornbury development areas. The results of the aerial assessment indicated that many small landforms of moderate to high archaeological potential were not represented on the model. This is due to the coarse nature of the 1:60,000 DEM resolution. Therefore, it is proposed that the model be refined to capture these landforms as higher resolution data is received.

The field assessment confirmed the generally low archaeological discovery potential of the research area; however, similar to the aerial survey, it was noted that some smaller landforms were not represented. The model was modified using data collected during the field visit as well as new data acquired after the initial reconnaissance. These modifications included the addition of high potential areas not initially recognized by the model, and the inclusion of fish bearing streams as high potential areas based on evidence of intensive use of fish as a subsistence base during historic times.

The literature review revealed that 75% of the sites are clustered at the north end of the research area, with 45% located on the shores of Gregoire Lake and approximately 30% located along the Hangingstone River. Approximately 18% of the sites are located to the southwest of the development areas along the House River and 8% are located along an unnamed creek within the Leismer development area. This illustrates the high archaeological discovery potential of the permanent water sources in the area.

Given the number of shovel tests conducted during these previous studies and the current study, the coverage of the research area and the resulting paucity of sites with high interpretive value, this area appears to be of low archaeological discovery potential.

15.9.2.1 Leismer Development Area

The reconnaissance of the Leismer development area was divided into two components: the potential bitumen resource within the lease and the Leismer Demonstration Project developments. Target areas within both the pay zones and the Leismer Demonstration Project were evaluated either through visual or subsurface testing, or both.

15.9.2.2 Leismer Focus Areas

The evaluation of the model for the Leismer development included a targeted assessment of 22 areas deemed to be of moderate to high archaeological potential within the SAGD pay zones (Figures 15.9-1 to 15.9-4; Table 15.9-1). These areas were generally small knolls covered with jack pine or aspen vegetation, often adjacent to permanent water sources. A total of

1,418 shovel tests were excavated at these locations. Based on possible shifts of the proposed pay zones, a few areas outside of the pay zones were tested as well.

15.9.2.3 Leismer Demonstration Project

The footprint specific assessment of the Leismer Demonstration Project consisted of field testing in all areas deemed to be of moderate to high archaeological discovery potential (Figure15.9-1; Table 15.9-1). As the access road lies generally on higher ground, the entire length of the ROW was walked and shovel testing was conducted where appropriate. Existing cutlines within the proposed Leismer Plant site aided in ground reconnaissance of this development.

All knolls along the pipeline ROW and within the four SAGD pads were shovel tested; however, low-lying wet areas were not traversed. A total of 486 shovel tests were excavated for the final footprint of the Leismer Plant site (80 shovel tests), four associated SAGD pads (26 shovel tests), access road (217 shovel tests) and gathering pipeline (163 shovel tests). No archaeological, historical or palaeontological sites were newly recorded or revisited during the Leismer reconnaissance for the target areas or the Demonstration Project.

Table 15.9-1 List of Permit Reports in the Research Area

Author(s)	Permit No.	Type of Permit	Type of Development	No. of Shovel Tests	No. of Sites Recorded
Head, Thomas*	74-026*	Research	Parks survey		
1974 Parks Archaeological Survey	76-040	Research	None		0
Pollock, John W. (1978)	77-031	Research	None		3
Wilson, Ian R. (1978)	78-012	HRIA	Pipeline		3
Ives, John W. (1980)	80-079	HRIA	Forestry	11	0
McCullough, E. J. (1980)	80-087	HRIA	Oil Sands Gathering System		0
Saylor, Stanley G. (1981)	81-132	HRIA	Pipeline		0
Haley, Shawn (1984)	84-021	HRIA	Highways Upgrade		1
LeBlanc, Raymond*	90-030*	Research	Field School		
Damjkar, Eric	94-111	HRIA	Oil Sands Gathering System	104	0
Gryba, Eugene M. (1998)	97-128	HRIA	Oil and Gas	44	0
Green, D'Arcy C. (2000)	99-057	Post-Impact	Oil Sands Gathering System		0
Unfreed, Wendy J. and Jennifer C. Tischer (2002)	00-073	HRIA	Pipeline	339	0
Wondrasek et al. (2002)	01-030	HRIA, Post-Impact	Pipeline		0
Green, D'Arcy C. and Grant Clarke (2001)	01-202	HRIA	Oil Sands (SAGD)	1,191	7
Blower, David	01-203	HRIA	SAGD	293	0
Gibson, Terrence*	01-319*	HRIA	Forestry		
Peach, Kate (2002)	02-029	Post-Impact	Transmission Lines	55	1
Blower, David and Jennifer C. Tischer (2004)	02-114	HRIA	Oil Sands (SAGD)	293	0
Wondrasek, Robert*	02-204*	HRIA	Pipeline		
Gibson, Terrence*	02-228*	HRIA	Forestry		
Tischer, Jennifer C. (2002)	02-270	HRIA	Oil Sands	40	0
Tischer, Jennifer C. (2003)	03-182	HRIA	Transmission Lines		2
Goldsmith, A. Sean	04-354	HRIA	Pipeline	22	0
Bouchet-Bert, Luc (2005)	04-367	HRIA	Oil Sands (SAGD)	990	1
Cloutier, Riel	04-434	HRIA	Water Supply Line	20	2
Kowal, Walt (2005a)	05-325	HRIA	Highways Upgrade	53	0
Somer, Brad*	05-376*	HRIA	Pipeline		
Blower, David*	05-463*	HRIA	Pipeline		
Murphy, Brent (2005)	05-510	HRIA	Transmission Lines	129	0
Wondrasek, Robert*	05-541*	HRIA	Pipeline		
Kowal, Walt*	05-542*	HRIA	Highway Upgrade		
Blaikie-Birkigt K.A.*	05-595*	HRIA	Forestry		
Kowal, Walt (2005b)	05-596	HRIA	Highways Upgrade	172	0
Kowal, Walt and Mich Otis (2005)	05-597	HRIA	Highways Upgrade	123	0
Turney, Michael*	06-172*	HRIA	Pipeline		

Author(s)	Permit No.	Type of Permit	Type of Development	No. of Shovel Tests	No. of Sites Recorded
Blaikie-Birkigt K.A.*	06-188*	HRIA	Forestry		
Kowal, Walt and Anna Blaxley (2006)	06-246	HRIA	Highways Upgrade	93	0
Wondrasek, Robert*	06-276*	HRIA	Pipeline		
Malasiuk, Jordyce (2006)	06-401	HRIA	Oil Sands Exploration	30	1
Kowal, Walt*	06-438*	HRIA	Highway Upgrade		
Wondrasek, Robert*	06-450*	HRIA	Gathering System		
Ball, Bruce*	06-603*	HRIA	Highway Upgrade		
Blaikie-Birkigt K.A.*	06-615*	HRIA	Forestry		
Malasuik, Jordyce*	06-620*	HRIA	SAGD		
Youell, Alan	06-642	HRIA	Air strip	33	1

* report unavailable

Table 15.9-2 Targeted Areas with Field Evaluation

Target Area	Environment	Archaeological Potential	Evaluation
1	Aspen poplar, steeply sloping to drainage (tested), upper terrace had been previously cleared as such it was not tested	moderate	Photodocumentation and 78 shovel tests
2	Aspen poplar, steeply sloping to drainage, portions that were previously cleared were not tested	moderate	Photodocumentation and 51 shovel tests 33(a), 18(b)
3	Aspen poplar knoll, dry sandy sediments	moderate	Photodocumentation and 59 shovel tests
4	Original location dominated by black spruce muskeg, flat terrain (a), Testing area was moved to aspen poplar/jack pine, gently rolling topography adjacent to an unnamed lake to the south (b)	moderate to high	Photodocumentation and 83 shovel tests, 0(a), 83(b)
5	Jack pine covered knolls, landforms tend to be small, but high	high	Photodocumentation and 51 shovel tests
6	Jack pine terrace edge, relatively flat terrain adjacent to creek	high	Photodocumentation and 81 shovel tests
7	Jack pine, black spruce, undulating terrain	low to moderate	Photodocumentation and 14 shovel tests
8	Mixed aspen, spruce and pine vegetation, undulating terrain	low to moderate	Photodocumentation and 12 shovel tests
9	Jack pine covered knolls, flat terrain adjacent to river, mixed vegetation	moderate to high	Photodocumentation and 25 shovel tests
10	Jack pine covered knolls, flat terrain adjacent to river, mixed vegetation	moderate to high	Photodocumentation and75 shovel tests
11	Aspen poplar, gentle slope to Christina River (tested), some areas are dominated by black spruce from valley break to river (not tested)	moderate to high	Photodocumentation and 83 shovel tests
12	Jack pine covered knolls, dry sandy sediments (a), burnt aspen (b)	moderate to high	Photodocumentation and 98(a) shovel tests, 0(b)
13	Burned in most areas, small knolls covered in jack pine interspersed	moderate to high	Photodocumentation and 73 shovel tests 43(a), 30(b)
14	Burned along river, tested small knolls covered in aspen or jack pine	moderate to high	Photodocumentation and 83 shovel tests 34(a), 49(b)
15	Flat topography, tests a few small jack pine knolls	moderate to high	Photodocumentation and 32 shovel tests
16	Flat topography, jack pine mixed with aspen and black spruce	moderate	Photodocumentaiton and 53 shovel tests
17	Black spruce at river's edge, jack pine knolls to the south of the river	moderate	Photodocumentation and 49 shovel tests 16(a), 0(b), 33(C)
17	Black spruce at river's edge, jack pine knolls to the south of the river	moderate	Photodocumentation and 49 shovel tests 16(a), 0(b), 33(C)
18	Aspen poplar, large rolling hills, dry sandy sediments, no water nearby	moderate	Photodocumentation and 124 shovel tests
19	Mixed jack pine and aspen forest, rolling topography, dry sandy sediments	moderate	Photodocumenation and 72 shovel tests
20	Open jack pine vegetation, gently rolling terrain, dry sandy sediments	moderate	Photodocumentation and 43 shovel tests
21	Open jack pine vegetation to the river, very steep terrace edge	moderate to high	Photodocumentation and 37 shovel tests
22	Open jack pine vegetation to the river, no terrace	moderate to high	Photodocumentation and 91 shovel tests
23	Plant Site 400 m by 200 m aspen poplar, undulating terrain, previously disturbed by cutlines	moderate	Photodocumentation and 80 shovel tests
24	SAGD pads (4) and access roads variable from muskeg swamp to jack pine covered knolls, landforms tend to be small, but high	moderate	Photodocumentation and 26 shovel tests

Target Area	Environment	Archaeological Potential	Evaluation
25	Access road to plant site aspen poplar, undulating terrain, along previous cutline	moderate	Photodocumentation and 217 shovel tests 91(a), 34(b), 92(c)
26	Pipelines variable from muskeg swamp to jack pine covered knolls, landforms tend to be small, but high	moderate	Photodocumentation and 163 shovel tests 122(a), 41(b)
27	Jack pine, gently undulating terrain bounded by muskeg swamps	moderate	Photodocumentation and 32 shovel tests
28	Mixed forest, pine and spruce, gently undulating terrain	moderate	Photodocumentation and 46 shovel tests
29	Mixed pine and aspen forest, terrace adjacent to Christina River	moderate	Photodocumentation and 29 shovel tests
30	Mixed forest dominated by black spruce, with transitional aspen poplar and jack pine, sphagnum moss understorey. Higher potential lands outside the SAGD pay zones adjacent to Pony Creek; however access was limited	Low	Photodocumentation
31	Mixed forest dominated by black spruce, with transitional aspen poplar and jack pine, sphagnum moss understorey	Low	Photodocumentation
32	Mixed forest dominated by black spruce, with transitional aspen poplar and jack pine, sphagnum moss understorey	Low	Photodocumenation
33	Initial location selected for testing was low and wet (a) testing location moved to the west. Tested area was located on a spruce covered ridge (b)	low to moderate	Photodocumentation and 19(b) shovel tests, 0(a)
34	Burned aspen forest, rolling topography, adjacent to creek, not accessible due to blow down	moderate to high	Photodocumentation, recommended testing if access is available
35	Rolling topography, aspen and pine vegetation	moderate	Photodocumentation and 35 shovel tests
36	Knoll in the middle of fen, aspen covered, with thick sphagnum understorey	low to moderate	Photodocumentation and 40 shovel tests
37	Knoll in the middle of fen, aspen covered, with thick sphagnum understorey	low to moderate	Photodocumentation and 20 shovel tests

15.9.2.4 Corner Development Area

The field assessment of the Corner development area was conducted with reference to the archaeological discovery model. Testing within the defined SAGD pay zones was undertaken in areas deemed to be of moderate to high archaeological discovery potential. Similar to the testing for the Leismer development area, some shovel tests were conducted outside of the SAGD pay zone in order to acquire additional baseline data. In general, the Corner development is characterized by low-lying muskeg. Four areas, aspen covered knolls, were tested for archaeological deposits. A total of 126 shovel tests were conducted for this development area (Figure 15.9-2; Table 15.9-1). No archaeological, historical or palaeontological sites were newly recorded.

15.9.2.5 Thornbury Development Area

The reconnaissance of the Thornbury development area indicated that the archaeological discovery potential map was accurate in depicting the extensive tracts of muskeg, fen, bog and open water. Based on the low archaeological discovery potential of this development area few target locations were assessed. Thirty-five shovel tests were excavated on a knoll near the Christina River (Figure 15.9-3; Table 15.9-1). A second location was visually assessed; however due to deadfall resulting from a previous forest fire, the area could not be ground accessed. No archaeological, historical or palaeontological sites were newly recorded.

15.9.2.6 Hangingstone Development Area

Similar to the Thornbury development area, the field reconnaissance for the Hangingstone development area confirmed the low archaeological discovery potential of the area. As such, only two small knolls were targeted for testing to acquire baseline data (Figure 15.9-4; Table 15.9-1). A total of 60 shovel tests were excavated. No archaeological, historical, or palaeontological sites were recorded.

15.9.3 Conclusions

Overall the model depicts the archaeological discovery potential of the research area as low to moderate. Although the fish bearing streams are indicated as being of high archaeological discovery potential, it should be noted that fish bearing streams are often bounded by low-lying areas of muskeg or fen vegetation and may not support large body (edible) fish and, therefore, may be of lower potential. Until more information is available on these streams, each of these sites must be visually assessed to determine the potential, as subtle relief features were not picked up by the model. Based on the results of the model and the archaeological site characteristics in the region, it can be concluded that the research area has lower archaeological potential on average than the surrounding areas to the north and south.

In general, of the four development areas, Leismer holds the greatest archaeological potential due to the presence of the Christina River, a fish bearing stream that is bordered by occasional terraces and well drained landforms. Furthermore, the ratio of uplands to wetlands is higher than the other three development areas. Due to the presence of historic trails recorded in the area, all of the development areas hold some potential for archaeological sites.

Given the attributes of previously recorded sites in the research area, it is predicted that newly recorded archaeological sites will be of low to moderate interpretive value. Due to the nature of the proposed developments, avoidance of newly recorded sites should be possible where necessary.

TWP 80
TWP 79
TWP 78
TWP 77
TWP 76
TWP 75

RNG 14
RNG 13
RNG 12
RNG 11
RNG 10
RNG 9
RNG 8
RNG 7

N

TA 14b
TA 15
TA 35
TA 14a
TA 17a
TA 16c
TA 17b
TA 16b
TA 13a
TA 17c
TA 16a
TA 1
TA 13b
TA 12a
TA 12b
TA 11
TA 10
TA 9
TA 8
TA 7
TA 18
TA 20
TA 19
TA 23
TA 4a
TA 25a
TA 4b
TA 6
TA 26a
TA 26b
TA 25b
TA 25c
TA 5
TA 24
TA 3
TA 2a
TA 2b
TA 22
TA 21

Leismer

GkPa 2
Crow Lake Cabin
GkOv 1
GkOu 2
GkOu 1
Wagon Trail
GjPa 2
GjPa 5
GjPa 1
GjPa 3
GjPa 4
Round Lake Cabin
Christina Basin Lookout
Conklin Tower
Catholic Chapel

Project Location

Legend

- Archaeological Site
- Historic Site
- Model Area
- Research Boundary
- North American Development Boundaries
- Target Area (Visually Assessed)
- Target Area (Shovel Tested)
- Pilot Plant Development
- Major Road
- Township Grid

Archaeological Investigation Units

- I Low Archaeological Discovery Potential
- II Moderate Archaeological Discovery Potential
- III High Archaeological Discovery Potential
- Muskeg/ Wetland Area

1:200,000
0 6,000 12,000 Metres
NAD 83 UTM Zone 12

Title:
North American Leismer Development Boundary Archaeological Discovery Potential

Data Source: 1:250,000 NTDB, Department of Energy, Mines, and Resources, 73M, 74D, 83P, and 84A

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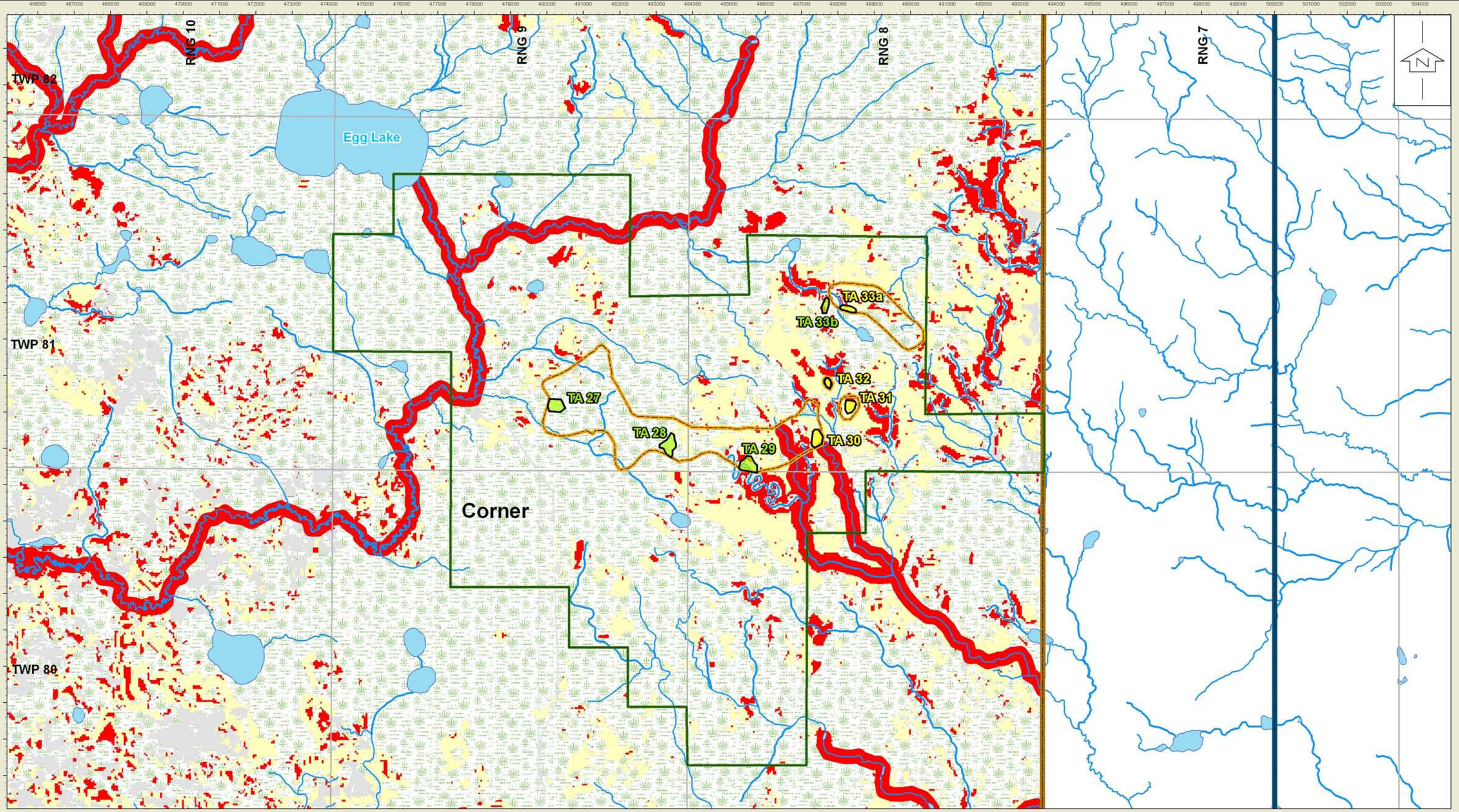

Legend

- Target Area (Visually Assessed)
- Target Area (Shovel Tested)
- Pay Zones
- North American Development Boundaries
- Model Area
- Research Boundary
- Major Road
- Township Grid

Archaeological Investigation Units

- I Low Archaeological Discovery Potential
- II Moderate Archaeological Discovery Potential
- III High Archaeological Discovery Potential
- Muskeg/ Wetland Area

1:100,000

0 3,000 6,000 Metres

NAD 83 UTM Zone 12

Title: North American Corner Development Boundary Archaeological Discovery Potential

Data Source: 1:250,000 NTDB, Department of Energy, Mines, and Resources, 73M, 74D, 83P, and 84A

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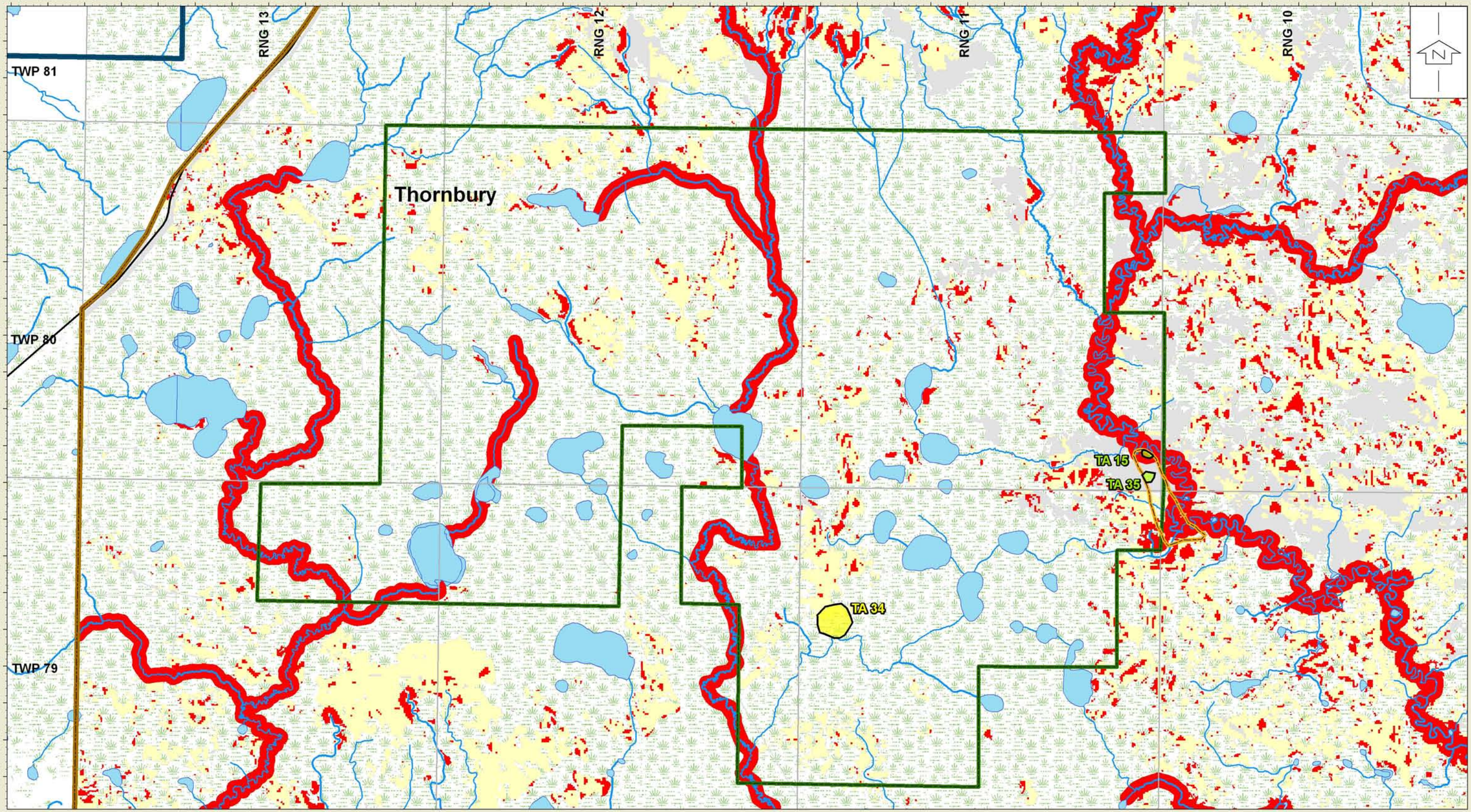

Legend

- Target Area (Visually Assessed)
- Target Area (Shovel Tested)
- Pay Zones
- North American Development Boundaries
- Model Area
- Research Boundary
- Major Road
- Township Grid

Archaeological Investigation Units

- I Low Archaeological Discovery Potential
- II Moderate Archaeological Discovery Potential
- III High Archaeological Discovery Potential
- Muskeg/ Wetland Area

1:100,000

0 3,000 6,000 Metres

NAD 83 UTM Zone 12

Title:

North American Thornbury Development Boundary Archaeological Discovery Potential

Data Source: 1:250,000 NTDB, Department of Energy, Mines, and Resources, 73M, 74D, 83P, and 84A

NORTH AMERICAN OIL SANDS CORPORATION

Approved:	Revision Date:
JT	May 25, 2007

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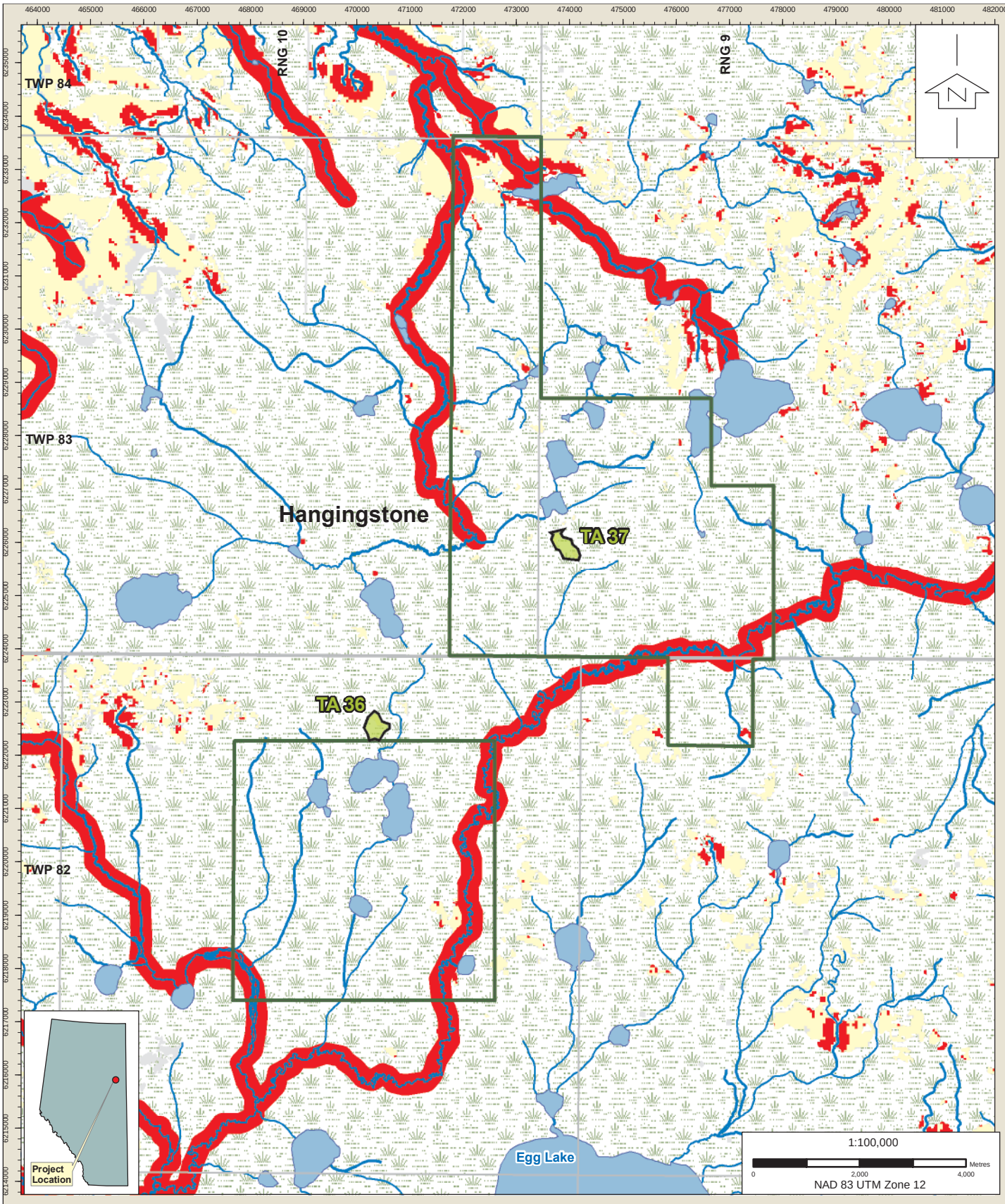
KW	LR	15.9-3



Legend

- North American Development Boundaries
- Target Area (Visually Assessed)
- Target Area (Shovel Tested)
- Major Road
- Township Grid

Archaeological Investigation Units

- I Low Archaeological Discovery Potential
- II Moderate Archaeological Discovery Potential
- III High Archaeological Discovery Potential
- Muskeg/ Wetland Area

Title:

North American Hangingstone Development Boundary Archaeological Discovery Potential

Data Source: 1:250,000 NTDB, Department of Energy, Mines, and Resources, 73M, 74D, 83P, and 84A

NORTH AMERICAN OIL SANDS CORPORATION

Approved:	Revision Date:
JT	May 25, 2007

File: 1702_arcpot_250507_v14

Drawn by:	Checked:	Fig. No.:
KW	LR	15.9-4

15.10 Cumulative Effects Assessment

The cumulative effects of development on historical resource sites can be measured in only the broadest of terms. The inventory of historical resource sites in the general area of the Project has been compiled primarily through impact assessment studies. As a result, the annual growth of the inventory represents an index of the cumulative effects of development on the historical resources in this portion of Alberta. The cumulative effects of non-development related impacts on historical resources are much more difficult to measure, as they result from increased human presence, as well as clandestine collection, disturbance and vandalism of known historical resources.

Historical resources are non-renewable, and negative impacts are irreversible. Therefore the effect to historical resources at closure is expected to be the same as that at application (i.e. construction/operations). Given the nature of historical resources, the direction of the predicted impact from development is always negative, the duration is long-term, the frequency is once and the effects are irreversible. The extent and magnitude of the impact will be determined based on the HRIA of the footprint. It is predicted that the magnitude will be low as sites in the research area are predicted to be of low interpretive potential, and avoidance of archaeological sites should be feasible. The prediction confidence is currently low as the HRIA has yet to be completed. North American has committed to conducting an HRIA of the finalized footprints for the initial Leismer and Corner developments in the summer of 2008, prior to construction.

Only three archaeological sites and one historic site are currently on record within or adjacent to the development areas. These sites, as well as those located in the remainder of the research area, are of low to moderate interpretive potential. The lack of high interpretive value sites, in conjunction with the flexible nature of siting SAGD project footprints which allows for avoidance of archaeological sites, should result in minimal impact to archaeological sites during Project construction. As such there are no anticipated negative cumulative effects relative to historical resources resulting from the construction of the Project. Moreover, the information recorded during the historical resources studies will likely have a positive effect in that it will increase the knowledge of the archaeological potential within the development areas.

15.10.1 Follow-up and Monitoring

The archaeological discovery potential model will be used to plan for future development. The model of archaeological potential will be updated throughout the life of the Project as new information obtained from databases becomes available, including information from ground truthing of the model through field inspections, results of Traditional Land Use studies and consultations with First Nations/Métis groups. Pre-disturbance assessments and either Historic Resources Overviews or HRIAs will be required in order to request *Historical Resources Act* clearance.

North American has committed to an adaptive management program, which will include post-impact audits of development including exploratory drilling programs and associated access, as well as the actual SAGD development and all associated development.

15.10.2 Summary

The generalized heritage resource potential of the study area is low to moderate. All sites previously recorded in the area are of low to moderate significance; no high significance sites have been recorded. In addition, the number of sites recorded in the surrounding area is very low relative to the number of studies previously conducted and the number of shovel tests conducted during the 2006 assessment. Because archaeological discovery potential is low and siting of the

SAGD development footprint is flexible in nature, Project specific effects and cumulative effects are predicted to be low.

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16 TRADITIONAL ECOLOGICAL KNOWLEDGE AND TRADITIONAL USE

16.1 Introduction

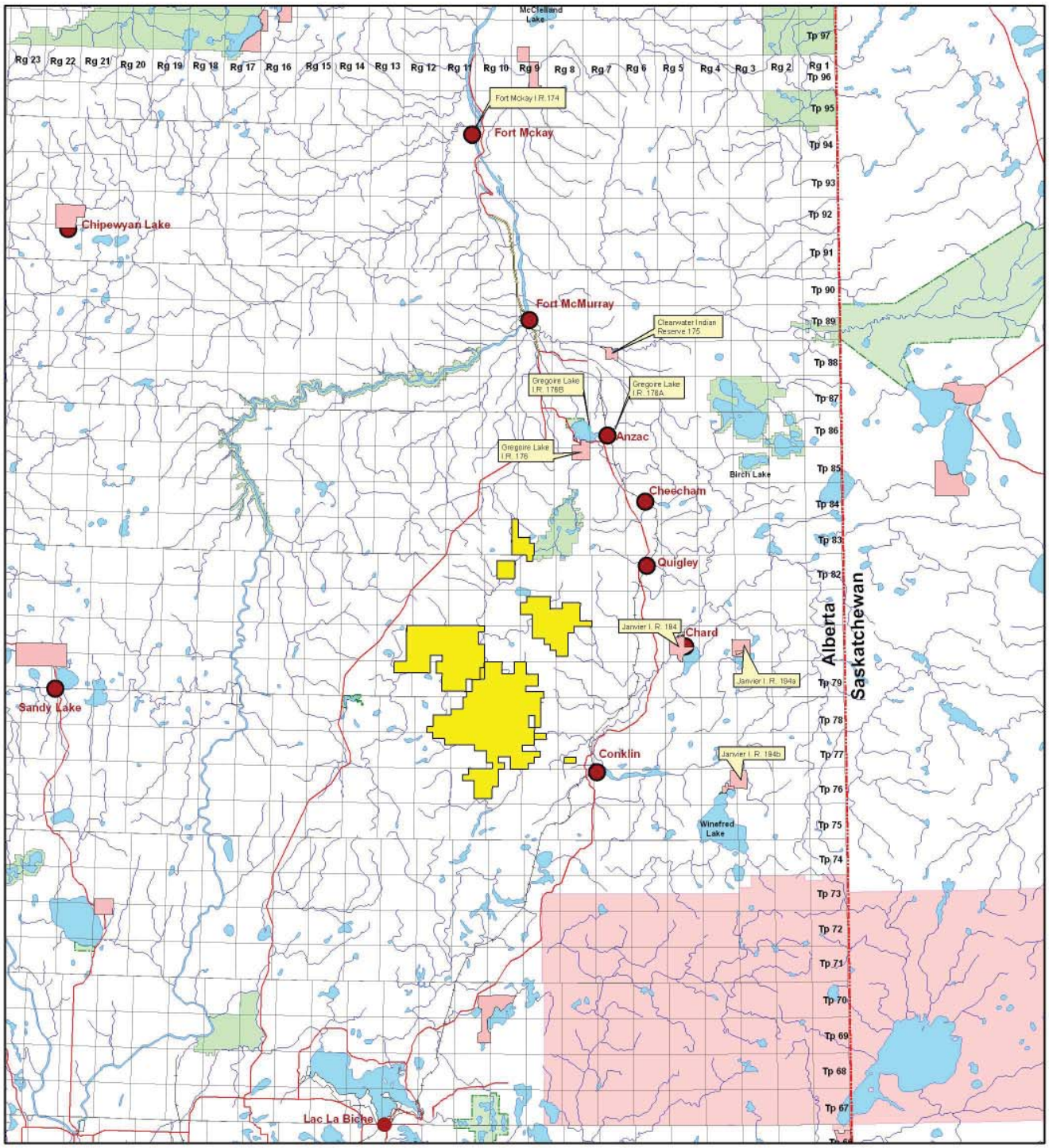
On May 16th, 2005 the province passed *The Government of Alberta's First Nations Consultation Policy on Land Management and Resource Development.* The Policy describes the need for consultation when development activities, taking place on provincial crown land, have the potential to infringe upon First Nations' rights and traditional uses. As a result, Traditional Ecological Knowledge (TEK) and Traditional Use (TU) studies for the Project are being designed and will be carried out in a way that fulfills these provincial regulatory requirements, as well as supports North American's commitment to integrated regional planning and Aboriginal community input for the life of the Project.

North American identified the following Aboriginal groups to be included in the Project's TEK and TU Studies:

- Chipewyan Prairie Dené First Nation
- Chard Métis Local 214
- Conklin Métis Local 193
- Fort McMurray No. 468 First Nation

The location of North American's lease holdings, in relation to the identified groups, is illustrated in Figure 16.1-1. North American intends to complete separate TEK and TU studies with each of the Aboriginal groups. The TEK and TU studies are intended to support North American's application to the Alberta Energy and Utilities Board (EUB) and Alberta Environment (AENV), with a specific focus on the initial developments to take place within Leismer and Corner hubs. Figure 16.1-2 shows the footprint of the two lease areas.

As the Project unfolds, North American will file amendment applications for the remaining developments within the Project area. These amendments will reflect Aboriginal community values and interests as part of a planning process for the life of the Project and will take into account the results of ongoing environmental studies, monitoring, changing regulatory standards, global sustainability standards and expectations, stakeholder and shareholder values, and other as yet unidentified issues and concerns. North American is committed to a transparent, long-term and regional approach that actively supports the meaningful involvement of identified Aboriginal groups in the planning and decision-making process and responds to concerns as they arise.



Legend

- NAOSC Lease Boundary April, 2007
- Town
- Railway
- Road
- Indian Reserve
- Provincial Park
- Wildland Provincial Park

N

1:1,600,000

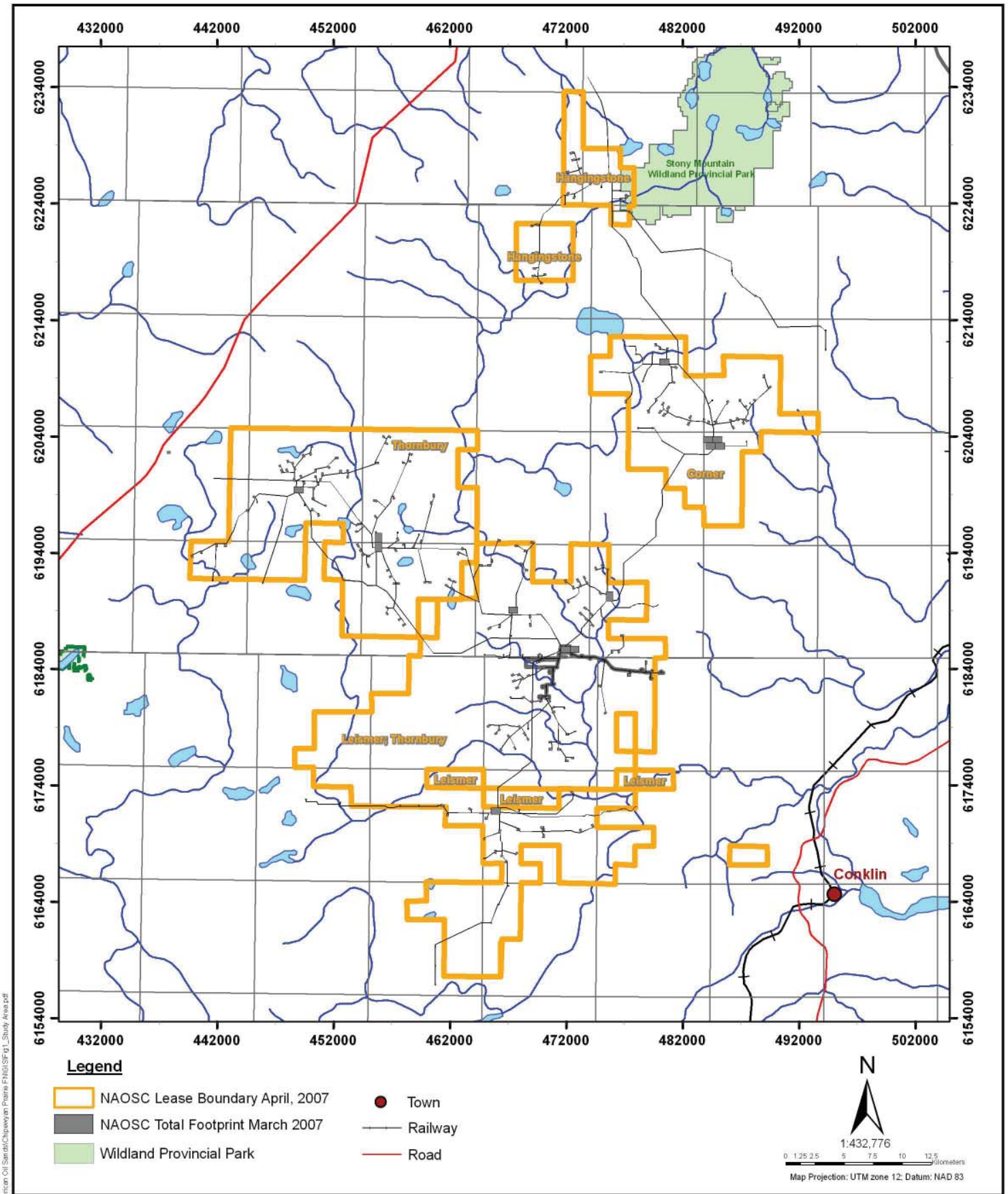
0 5 10 20 30 40 50 Kilometers

Map Projection: UTM zone 12; Datum: NAD 83

NORTH AMERICAN OIL SANDS CORPORATION

Date: April, 2007			Client: NORTH AMERICAN OIL SANDS CORPORATION
Project No: 1702			Project: Kai Kos Dehseh
ArcView File: Fig1_Study_Area			Title: Project Area
Design: KJ	Drawn: KJ	Check: JK	FIGURE: 16.1-1

X:\PROJECTS\170265 Matrix North American Oil Sands\Chipewyan Prairie FN\GIS\Fig1_Study Area.pdf



NORTH AMERICAN OIL SANDS CORPORATION

Date: April, 2007			Client: NORTH AMERICAN OIL SANDS CORPORATION
Project No: 1702			Project: Kai Kos Dehseh
ArcView File: Fig1_Study_Area			Title: North American Development and Lease Area
Design: KJ	Drawn: KJ	Check: JK	FIGURE: 16.1-2

X:\PROJECTS\1702\05 Matrix North American Oil Sands\Chipewyan Prairie FN\GIS\Fig1_Study Area.pdf

16.2 Aboriginal Groups

The Aboriginal groups identified by North American in this study are the communities that are in closest physical proximity to the Project: Conklin Métis Local 193, Chipewyan Prairie Dené First Nation, Chard Métis Local 214, and Fort McMurray No. 468 First Nation.

16.2.1 Conklin Métis Local 193

16.2.1.1 The Community

Conklin is located 150 km north of Lac La Biche. Secondary Highway 881 links the community to Anzac to the north and connects to Lac La Biche to the south. The approximately 300 residents are predominantly Cree speaking Métis. The community is situated within Alberta Métis Region 1, which has the highest representation of Métis people in the Province of Alberta (Figure 16.2-1) and is represented by Métis Local No. 193. Conklin became part of the Regional Municipality of Wood Buffalo in 1995 at which time the Conklin Community Association was formed. The municipal office is located in the Conklin Community Centre.

16.2.1.2 Traditional Territory

Conklin Métis traditional lands extend north-south between Fort McMurray and Lac La Biche and east-west between the Saskatchewan Border and Wabasca. The traditional lands include much of northeastern Alberta but have not yet been mapped. A Conklin Métis Traditional Use and Occupancy Study has recently been initiated and will define the boundaries. The Project is situated within Conklin Métis traditional lands (Figure 16.1-1).

16.2.1.3 Reserve/Settlement Lands

Conklin was one of 11 locations recommended as a Métis Settlement Area by the Métis Association of Alberta in the 1930s and agreed to by the Ewing Commission (1938), which examined the state of the Métis peoples in Alberta. However, when the Métis Settlement Areas were created by the Province of Alberta in 1938, Conklin was not included.

16.2.2 Chipewyan Prairie Dené First Nation

16.2.2.1 The Community

Chipewyan Prairie Dené First Nation is an Athabaskan speaking (Dené) Nation. The Nation's administrative offices are located on Janvier Reserve No. 194 (Janvier/Chard). Janvier Reserve is located approximately 100 km southeast of Fort McMurray along Secondary Highway 881 and adjacent to the Hamlet of Chard. The registered population of the Nation as of March 2007 is 680, with approximately 325 people living on the Reserve (INAC, 2007). Chipewyan Prairie Dené First Nation is a signatory to Treaty 8 and a member of the Athabasca Tribal Council, which includes the Athabascan Chipewyan First Nation, Fort McKay First Nation, Fort McMurray No. 468 First Nation and the Mikisew Cree First Nation.

16.2.2.2 Traditional Territory

Chipewyan Prairie Dené First Nation traditional lands extend to areas east of the Athabasca River and east of the Saskatchewan border, and from Janvier/Chard south into the Cold Lake area and north towards Fort Chipewyan. Chipewyan Prairie Dené First Nation has recently completed a

Traditional Use Study that documents the Nation's traditional lands, use, and history. The Project is situated within Chipewyan Prairie Dené First Nation traditional lands (Figure 16.1-1).

16.2.2.3 Reserve Lands

Chipewyan Prairie Dené First Nation families were not present at the time of the Treaty 8 signing in Fort McMurray in 1899. The first adhesions to Treaty 8 were signed by small family groups living in the vicinity of 'Chipewyan Prairie' between 1900 and 1914. The main reserve, Janvier Reserve No. 194, situated along the Christina River and the shores of Bohn Lake, was officially surveyed in 1922 (Madill, 1986). Between the years 1915 and 1940, there were further adhesions to Treaty 8 and additional lands were reserved: Cowper Lake Reserve No. 194A is located at the north shore of Cowper Lake, and Winefred Lake Reserve No. 194B is located at the north end of Winefred Lake. The Nation has outstanding claims before the Indian Claims Commission.

16.2.3 Chard Métis Local 214

16.2.3.1 The Community

The community of Chard is situated about 100 km southeast of Fort McMurray. The hamlet falls within the jurisdiction of the Regional Municipality of Wood Buffalo and adjoins Chipewyan Prairie Dene First Nation Reserve No. 194. The population of approximately 70 people is predominantly Métis of Chipewyan and Cree descent. Chard is situated within Alberta Métis Region 1 (Figure 16.2-1), which has the highest proportion of Métis in the province. Chard is represented by Métis Local 214.

16.2.3.2 Traditional Territory

Chard Métis Elders commonly name the following geographical reference points in reference to their traditional lands: Cheecham, Bohn Lake, Cowper Lake, Christina River and Lake, Winefred River and Lake, west to Wadell Road and south to Jumbo Lake and Grist Lake. The Project is situated in the traditional lands of Chard Métis (Figure 16.1-1).

16.2.3.3 Reserve/Settlement Lands

Chard settlement was formed at the time of the construction of the Alberta and Great Waterways Railway. Chard Siding, situated a few kilometers south of the current hamlet, was one of many station stops, known as 'sections,' established every seven or eight miles along the line. Chard was Mile 213 from the Dunvegan rail yard in Edmonton. With the formation of the Regional Municipality of Wood Buffalo in 1995, the settlement was moved to its current location.

16.2.4 Fort McMurray No. 468 First Nation

16.2.4.1 The Community

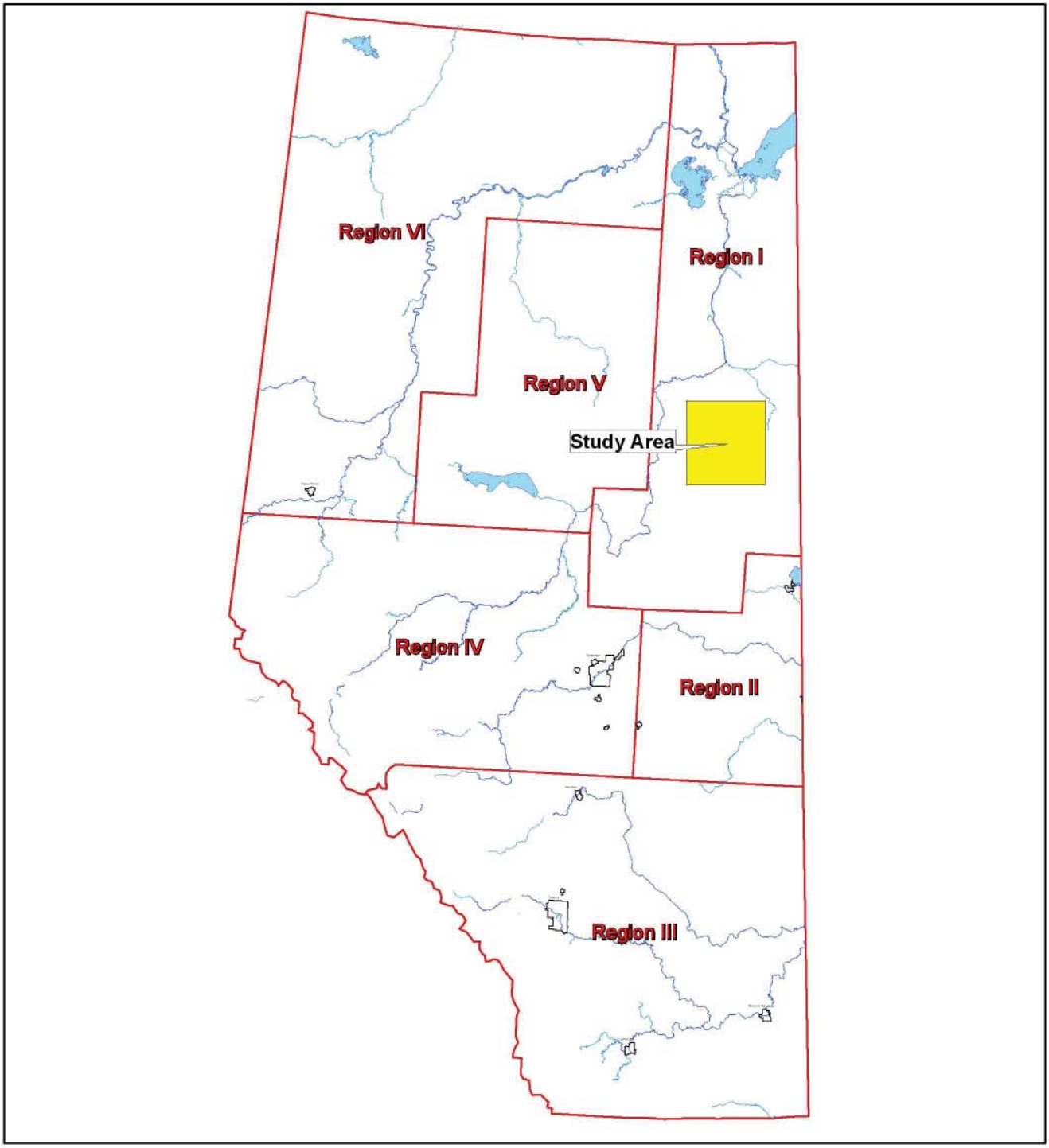
Fort McMurray No. 468 First Nation traces its ancestry to the Woodland and Plains Cree and also the Chipewyan and Beaver people of Alberta (FMFN, 2006). Gregoire Lake Reserve No. 176 is the largest and most populated reserve and the location of the Nation's administration offices. The registered population as of March 2007 is 600, of which approximately 300 live on the Reserve (INAC, 2007). Many of the Nation's members live in Fort McMurray. Fort McMurray No. 468 First Nation is a Treaty 8 First Nation and member of the Athabasca Tribal Council, which includes the Athabascan Chipewyan First Nation, Fort McKay First Nation, Fort McMurray No. 468 First Nation and the Mikisew Cree First Nation.

16.2.4.2 Traditional Territory

The Fort McMurray No. 468 First Nation traditional lands include the Athabasca and Clearwater River watersheds. Fort McMurray No. 468 First Nation has recently completed a Traditional Use study which documents the Nation's traditional lands, use and history. The Project is situated within Fort McMurray No. 468 First Nation traditional lands (Figure 16.1-1).

16.2.4.3 Reserve Lands

Fort McMurray No. 468 First Nation signed adhesion to Treaty 8 in 1899, after which time the Band was referred to as the "Cree-Chipewyan Band of Fort McMurray". The Fort McMurray and Fort McKay First Nations were originally part of the same Band, but divided in the 1940s (Athabasca Tribal Council, 2007). Reserves were established between 1915 and 1921, following government surveys in 1915 (Madill, 1986). Clearwater Reserve No. 175 is located approximately 20 km east of Fort McMurray. The other three areas, Reserves No. 176, No. 176A and No. 176B, are located near Anzac on Gregoire Lake, approximately 50 km southeast of Fort McMurray.



Legend

- Metis Regions
- Cities

N

1:6,699,522

0 25 50 100 150 200 250 Kilometers

Map Projection: UTM zone 12; Datum: NAD 83

NORTH AMERICAN OIL SANDS CORPORATION

Date: April, 2007			Client: NORTH AMERICAN OIL SANDS CORPORATION
Project No: 1702			Project: Kai Kos Dehseh
ArcView File: Fig3_footprint.mxd			Title: Metis Regions of Alberta
Design: KJ	Drawn: KJ	Check: JK	FIGURE: 16.2-1

X:\PROJECTS\1702\05 Matrix North American Oil Sands\Chipewyan Prairie FN\GIS\Fig1_Study Area.pdf

16.3 TEK and TU Study Approach

The approach to conducting the TEK and TU studies evolved from the following elements:

- North American's commitment to a transparent, integrated and regional approach in working with Aboriginal communities affected by the proposed development and to the environment (Volume 1, Section 2);
- Best practices in facilitating a collaborative planning process and creating a common ground for meaningful dialogue between industry proponents and Aboriginal communities throughout the life of the Project;
- Aboriginal communities' definitions of desired involvement in the planning, design, implementation, and monitoring of the Project within traditional lands (stewardship); and
- The Project Final Terms of Reference (TOR).

North American's Aboriginal consultation and engagement personnel and TEK and TU study personnel will work closely together, recognizing that Aboriginal peoples' identity and way of life are inseparably linked to a relationship to 'the land.'

North American acknowledges that the Project may have effects on the traditional lands, culture and well-being of Aboriginal peoples. Therefore, North American commits to creating a transparent process, and designing and developing mitigation strategies in collaboration with affected Aboriginal groups.

To be successful in this endeavour, understanding Project effects from the Aboriginal communities' perspective is paramount. Therefore, the methodology for determining the effects and identifying mitigations will be designed in consultation with the Aboriginal communities. North American will adhere to the protocols and sharing agreements as specified by the identified Aboriginal groups.

16.4 Study Objectives

The TOR objectives as explained to Aboriginal communities were as follows:

- Provide results of consultation with Aboriginal communities to identify the extent of traditional use of the Study area(s). Discuss the vegetation and wildlife used for nutritional and medicinal purposes, and any potential effects the Project may have;
- Identify the traditional uses including fishing, hunting, trapping and plant harvesting (nutritional and medicinal) and cultural use in the Study Area(s). Determine their extent and location, where possible, identify cabin sites, spiritual sites and graves;
- Determine the Project and cumulative impact of development on these uses and identify possible mitigation strategies; and
- Describe how TEK was incorporated into the technical components of the EIA report.

In addition to the objectives for the TEK and TU studies that are specified in the TOR, other considerations will be used in the preparation of the reports, including:

- Conduct the TEK and TU studies for regulatory requirements in a way that provides a benefit to each of the identified Aboriginal groups; and
- Identify ecological concerns and areas of cultural significance to be considered and integrated in regional long-term planning processes.

16.5 Study Methodology

A draft study methodology has been prepared for discussion, review and modification, as necessary, by the identified Aboriginal communities. A common and successful methodological framework is one that is inclusive to all communities, while still encouraging the unique expressions and interests of each group. The general framework includes:

- Conducting a review of previous EIA reports, which contain traditional use studies completed for similar study areas, to compile issues and concerns identified by Aboriginal groups. This will minimize repetition and build on the traditional use data already collected;
- Conducting a review of past TEK and TU studies;
- Attending scoping meetings with identified communities to determine the nature of TEK and TU studies requested by each community based on identified issues;
- Completing community TEK and TU studies for Leismer and Corner hubs as agreed upon in the scoping process with reference to;
    - identification of traditional sites and use areas;
    - existing conditions (pre-1970 and current);
    - recommended mitigation measures;
    - cumulative effects; and
    - follow-up and monitoring;
- Creating a regional constraints map, in collaboration with identified communities, to guide North American's ongoing planning and development processes. This map would continue to evolve over time (i.e., a regionally integrated resource management plan);
- Outlining the 'life of the Project' planning process; and
- Reviewing TEK/TU study results and draft report(s) with each Aboriginal group for their approval prior to submission to regulators.

16.6 TEK and TU Studies Progress to Date

The following sections describe the progress made in executing the study methodology.

16.6.1 Review of Existing EIAs

A review of previous TEK and TU reports prepared as part of EIAs that included the identified communities was undertaken. All issues and concerns identified within the studies were tabulated in detail and are summarized in Table 16.7-1. When a final work plan has been agreed

upon, each community will determine if any issues and concerns have not been addressed. A list of the documents reviewed is presented in Table 16.7-2.

Table 16.6-1 Summary of Issues and Concerns Identified in Previous EIAs

Project Specific	• Project design • Community participation and input • Safety • Reclamation • Abandonment • Mitigation and monitoring
Environment	• Fisheries and aquatic resources • Wildlife populations and habitat • Vegetation • Water quality & quantity • Climate • Soils • Air quality • Noise
Culture	• Traditional use • Traditional foods • Access issues • Cultural and spiritual sites • Heritage • Community health & well-being • Socio-economic factors • Employment and partnerships
Cumulative Effects	• Effects on culture • Effects on environment
Consultation	• Meaningful consultation • Communication between communities and developers • Treaty and Aboriginal rights

Table 16.6-2 Documents Reviewed

Type	Document
Traditional Use Reports	BlackRock Orion. 2002 . ConocoPhillips Canada Surmont In-situ Oil Sands Project. March 2001. ConocoPhillips Canada In-Situ Surmont Oils Sands Project Phase 2. June 2006 Corridor Pipeline January 2001. Devon Canada Jackfish SAGD. November 2003. Devon Canada Jackfish 2 SAGD. September 2006. Gulf Canada Surmont Commercial Oil Sands Project. January 1999. Gulf Canada Surmont In-situ Oil Sands Project. 2001. Husky – Tucker Thermal Project. February 2003. Imperial Oil Resources Limited Cold Lake First Nations Consultation. August 2000. Imperial Oil Resources Limited Mahihkan North and Nabiye. July 2003. Japan Canada Oil Sands Co. Hangingstone SAGD Demonstration Project. June 2000. MEG Energy Corp. Christina Lake Regional Project. July 2005. (EIA report) MEG Energy Corp. Christina Lake Regional Project. April 2006. (Additional information) Nexen Inc. and OPTI Canada Inc. Long Lake South Project. December 2006. OPTI Canada Inc. Long Lake SAGD Project. October 2000. Petro-Canada Meadow Creek Project. November 2001. VanHorne, PanCanadian Resources Christina Lake Thermal Project. December 1998.
Chipewyan Prairie Dené First Nation	Chipewyan Prairie Dené First Nation Traditional Land Use Study: Kai Kos Dehseh Dené “Red Willow River People.” 2007 (In press).
Fort McMurray First Nation	Fort McMurray No. 468 First Nation Traditional Land Use Study: NISTAWAYAW “Where Three Rivers Meet.” 2006.

16.6.2 Progress of Community Studies

North American initiated relationship building with Aboriginal communities potentially affected by the Project in the summer of 2006. Various meetings occurred throughout the fall and winter to discuss the Project and introduce company representatives. Meetings with community representatives to determine the nature and scope of TEK and TU studies commenced in the winter of 2007.

The approach of collaboratively drafting methodologies to conduct TEK and TU studies was presented to communities for their review. Each of the groups is currently engaged in designing a TEK and TU study that will address community needs and input while meeting the provincial regulatory requirements. The Chipewyan Prairie Dené First Nation and Chard Métis Local 214 study will commence in August 2007; the Fort McMurray No. 468 First Nation study methodology will be further defined after an August 15, 2007, helicopter over flight and; discussions with Conklin Métis Local 193 are ongoing. Therefore, the review process with each of the groups is underway and modifications will be made as necessary. In the case of Fort McMurray No. 468 First Nation and Conklin Métis Local 193, once the methodology is approved, the finalized TEK and TU study work plans will be prepared and the studies, as determined by each community, will commence. The results of studies will be submitted to the regulatory authorities.

16.6.2.1 Conklin Métis Local 193 TEK and TU Study Status

Initial Scoping

A joint planning process is underway with Métis Local 193 and the Conklin Community Association, to establish the nature and parameters of TEK and TU studies for the Project and potential impacts to the Conklin community. Introductory meetings took place between Conklin community representatives, North American, and study facilitators on September 5, 2006, February 21, 2007, March 20, 2007 and April 27, 2007.

Conklin and North American have agreed to work collaboratively in designing TEK and TU studies that will satisfy the regulatory process and assist the Conklin Métis Traditional Use and Occupancy Study. A dinner and meeting with Conklin community and Métis Elders occurred on May 22, 2007, to discuss the Project, the TEK and TU studies, and potential methodologies. Discussions are ongoing with Conklin Métis Local 193 to finalize the study process.

Preliminary Concerns

Métis Local 193 and the Conklin Community Association have identified preliminary concerns with regard to the potential effect of the Project on traditional lands. These include:

- Cumulative effects of all current and pending developments;
- The consultation process and Métis Aboriginal rights;
- Caribou protection and habitat;
- Disturbance in the Leismer area and effects on traditional resources and use (Métis cultural identity and cultural continuity); and
- Socio-economic impacts including community services and infrastructure.

16.6.2.2 Chipewyan Prairie Dené First Nation TEK and TU Study Status

Initial Scoping

Preliminary study planning with Chipewyan Prairie Dené First Nation (CPDFN) began in 2006, but various events delayed further study scoping discussions. North American signed a licensing agreement for the use of the CPDFN Traditional Use Study data in September 2006. The CPDFN Industry Relation Corporation (IRC) representatives, North American, and study facilitators agreed on February 7, 2007 to meet with CPDFN Elders shortly after the elections for Chief and Council. The elections were held at the end of February 2007. CPDFN and Chard Métis Local 214 have agreed to conduct a joint TEK and TU study.

Study Methodology

A meeting and helicopter fly-over with the CPDFN and Chard Métis Elders committee and youth participants occurred on July 12, 2007. The committee has requested that interviews with identified knowledge holders and a field survey of the Leismer lease area be conducted. Subsequent surveys would take place prior to development of additional lease areas. Interview dates are to be determined as soon as possible in July and/or August 2007. The field survey for the Leismer TEK and TU field survey will occur at the end of August 2007.

Preliminary Concerns

Preliminary issues and concerns, with regard to the potential effects of the Project identified by CPDFN include:

- Water quality and quantity issues, particularly as they relate to the Christina River watershed and drinking water for future generations;
- Community traplines;
- Emissions; and
- Cumulative effects of development on wildlife, community health and livelihoods.

16.6.2.3 Chard Métis Local 193 TEK and TU Study Status

Initial Scoping

The Chard Métis and the CPDFN have agreed to conduct a joint TEK and TU Study. Section 16.2.2.2 provides complete details on Initial Scoping and the identified preliminary concerns.

16.6.2.4 Fort McMurray No. 468 First Nation TEK and TU Study Status

Initial Scoping

Preliminary scoping meetings were delayed as a result of changes within the Fort McMurray No. 468 First Nation (FMFN) IRC. In September 2006, North American signed a licensing agreement for use of the FMFN's Traditional Use Study data for the Project. The TEK and TU study scoping process began with meetings between FMFN IRC representatives, North American, and study facilitators on February 7, 2007 and March 10, 2007. A lunch and scoping meeting with the FMFN Elders and community was held on July 11, 2007. At the request of the FMFN Elders a helicopter fly-over of the lease areas will occur August 15, 2007 at which time a study methodology will be confirmed.

Preliminary Concerns

Preliminary issues and concerns as identified by the FMFN include:

- Reclamation;
- Wildlife populations;
- Access to hunting and recreation areas;
- Traffic and road infrastructure;
- Pollution (i.e., air emissions);
- Use of chemicals;
- Waste disposal;
- Company reporting and transparency;

- SAGD technology and unknown long-term impacts;
- Cumulative effects of the Project and other existing, approved or proposed projects on the environment;
- Biodiversity (including but not limited to wildlife, wildlife habitat and vegetation);
- Water resources;
- Loss of use and enjoyment of traditional lands;
- Consultation process and capacity issues; and
- Socio-economic issues and concerns.

16.7 Summary

Work plans are being finalized in collaboration with each Aboriginal group to allow for an individualized study approach, tailored for each community. Progress is being made on budget development, and clarification of exact needs will help finalize work plans. The TEK and TU study reports will be submitted to the regulatory authorities upon completion.

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