WorleyParsons Komex

resources & energy

Alberta Sulphur Terminals Ltd.
Bruderheim Sulphur Forming and Shipping Facility

Volume IID

1. Introduction

Project Number 62720000
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Executive Summary

Alberta Sulphur Terminals Ltd. (AST), a division of HAZCO Environmental Services (HAZCO) which in turn, is a division of CCS Income Trust (CCS), is applying to Alberta Environment (AENV) and the Natural Resources Conservation Board (NRCB) for approval to construct and operate a sulphur forming and shipping facility (the Project). The Project will be developed on a portion of Section 35, Township 55, Range 20, West of the 4th Meridian (35-55-20 W4M – the Site), approximately 2.2 km east of Bruderheim, Alberta, in the Industrial Heartland area of Lamont County.

The Environmental Impact Assessment (EIA) study area comprises the Principal Development Area (PDA), Local Study Area (LSA) and Regional Study Area (RSA). The PDA was defined as the area within the Site that will contain the Project including rail and road access for receiving molten sulphur, molten sulphur unloading and transfer facilities, sulphur forming facilities to produce sulphur pastilles, loading and shipping facilities for formed sulphur and sulphur pastilles temporary storage area. The LSA for the majority of disciplines assessed in the EIA is the Site (Groundwater, Historical Resources, Surface Water Quantity and Surface Water Quality) or the Site plus a 200 m buffer zone (Aquatics, Biodiversity and Fragmentation, Land Use and Reclamation, Soil, Vegetation and Wildlife). The RSA for the majority of disciplines is the Site plus a 500 m buffer zone (Surface Water Quantity and Surface Water Quality) or the Site plus a 1,000 m buffer zone (Aquatics, Biodiversity and Fragmentation, Soil, Vegetation and Wildlife).

The EIA will assist regulators and the public in understanding and evaluating the potential effects and benefits of the Project during construction, operation and reclamation. The EIA identifies and assesses peak disturbance, residual impacts and cumulative effects associated with the Project. It evaluates potential impacts to physical, biophysical and historical resources, in addition to potential socio-economic impacts. The EIA also identifies mitigative measures and adaptive management plans to reduce or eliminate potential adverse effects.

For most individual impact assessments, a qualitative, final evaluation rating was used where specific guidelines did not exist. This rating was a combination of quantitative analysis and professional judgment that takes into account the various descriptors for each attribute (direction, magnitude, geographic extent, duration, confidence and reversibility) and the potential effects of the specific impact. This rating was applied to residual impacts and cumulative effects. The following table lists the ratings applied and the level of action required for each.

Table ES-1: Final Impact Rating

Rating	Level of Action
Class 1	The predicted trend in an indicator under projected land use development could threaten the long-term sustainability of the quantity or quality of the indicator in the local and regional study areas. An action plan, developed jointly by regional stakeholders, could be developed to monitor the affected indicator, identify and implement further mitigation measures to reduce any impact and promote recovery of the indicator, where appropriate. This class of impact might also be applicable to an exceedance of a regulatory guideline or where the impact is expected to have long-term effects.
Class 2	The predicted trend in an indicator under projected land use development will likely result in a decline in the quantity or quality of the indicator. The decline could be to lower-than-baseline but stable levels in the local and regional study areas after closure and into the foreseeable future. In addition to responsible industrial operational practices, monitoring and recovery initiatives could be required if additional land use activities occur in the study area before closure of the projected land use development. This class of impact might also be applicable to an exceedance of a regulatory guideline or where the impact is expected to have mid-term effects, but where recovery will take place shortly after closure of the projected land use development.

Table ES-1: Final Impact Rating (Cont'd)

Rating	Level of Action
Class 3	The predicted trend in an indicator under projected land use development could result in a slight decline in the quantity or quality of the indicator in the local and regional study areas during the life of the projected land use development, but resource levels should recover to baseline after closure. In some cases, a short-term, low to moderate magnitude impact could occur, but recovery will take place within five years. No new resource management initiatives are necessary. Responsible industrial operational practices should continue. This class of impact could also be applicable where regulatory guidelines are not exceeded, but where a relative change in magnitude of an indicator occurs.
Class 4	The projected land use development results in no change and no contribution toward affecting the quantity or quality of the indicator in the local and regional study areas during the life of the projected land use development. Responsible industrial operational practices should continue. Therefore, no cumulative effects result from the Project.

Volume IID – Land Use and Reclamation, Historical, Socio-Economics and Public Consultation

Section 2: Land Use and Reclamation

The objectives of the Land Use assessment were to evaluate:

- existing land uses within the Land Use LSA and RSA
- potential conflict with nearby agricultural activities
- the Project's ability to fit within the existing development profile
- the Project's compatibility with the surrounding rural setting
- the potential impact to neighbouring residences and businesses

Although Lamont County is largely agricultural, it contains a zone designated for heavy/medium industrial use as part of Alberta's Industrial Heartland. The proposed Project is situated entirely within the Heavy/Medium Industrial Policy Area of Lamont County's Industrial Heartland on a portion of the Site. The Site plus a 200 m buffer zone is the LSA for the Land Use component. The Industrial Heartland boundary in Lamont County serves as the RSA and contains both the Heavy/Medium Industrial Policy Area and the 1.6 km Agricultural Policy Area buffer zone.

The assessment determined that the Project will have limited or no impact on surrounding land uses.

The proposed Project conforms to the non-discretional planning parameters and land use objectives of Lamont County and Alberta's Industrial Heartland. Specifically, the Project represents industrial development within the lands identified and zoned for industrial development within Alberta's Industrial Heartland and Lamont County. It is a supporting industry to Alberta's petroleum industry, which is specifically noted as a desirable activity in the Alberta Industrial Heartland Structure Plan for Lamont County, one of the three principal documents used to define land use in the County. The remaining two planning documents, the Lamont County Municipal Development Plan and the Lamont County Land Use Bylaw, encourage industrial growth in the county, but the specific type of industrial development is left to the discretion of the Development Authority and this body's interpretation of the project's activity and its appropriateness for the District.

The proposed Project will have minor local impact on residential, agricultural and recreational uses, as follows:

- residential impacts are limited to the preclusion of residential development within the LSA, which in any event, is currently limited by its inclusion within Alberta's Industrial Heartland
- agricultural land use is diminished by the proportion of agricultural lands that lie within the PDA
- the primary recreational land use that potentially will be affected is birdwatching, specifically around the wetlands located in the northwest portion of the LSA. The Project is being designed to mitigate potential impacts to this wetland. Impacts to hunting are also anticipated, although these impacts are expected to be essentially contained within the wildlife RSA. Hunting is typically prohibited on lands developed and used for industrial purposes and the wildlife RSA is contained within lands currently zoned for industrial use or within adjacent buffer lands.

No impacts to other industrial land uses are anticipated, although it is noted that the compatibility of sulphur forming with chlorate production was evaluated as a specific safety concern. Potential impacts to areas with vegetation and wildlife are described in Volume IIC, Section 3: Vegetation and Volume IIC, Section 4: Wildlife.

Mitigation strategies associated with other components of the EIA will be implemented and are relevant to Land Use related impacts. Relevant components include the following:

- Volume IIA, Section 2: Climate and Air Quality and Volume IIA, Section 3: Noise and Light
- Volume IIB, Section 4: Surface Water Quality
- Volume IIC, Section 2: Soil; Section 3: Vegetation; Section 4: Wildlife; and Section 5: Biodiversity and Fragmentation

The Conservation and Reclamation (C&R) Plan is contained in Appendix I of the Land Use section.

The C&R plan outlines a conceptual closure plan for the Site which includes provisions for achieving equivalent land capability for the PDA upon Project closure. This includes any potential remediation that may be required to address contamination associated with the Project, including remediation of soils potentially affected by acidification due to sulphur deposition. The conceptual closure plan also addresses the return of the landscape, including surface and near-surface drainage, to pre-disturbance conditions and addresses revegetation of the PDA upon Project closure.

Reclamation will commence as soon as possible within one year of decommissioning of all or a portion of the facility. It is expected that reclamation will be completed within five years of the complete decommissioning of the facility.

Parameters used to determine reclamation success will include:

- comparison of post-reclamation topography and drainage patterns with pre-disturbance conditions
- weed surveys to evaluate the success of weed management and vegetation reclamation programs
- soil monitoring to evaluate any residual soil acidity
- evaluation of soil quality parameters to determine if reclamation suitability of the topsoil and subsoil has been improved through proposed reclamation activities
- a detailed topsoil depth assessment to ensure topsoil depths are appropriate in reclaimed areas

In general, success in achieving equivalent land capability through reclamation is dependent on the quality of reclamation materials and the care taken to maintain the quality of those materials through the

reclamation process. Successful reclamation of topsoil disturbances in Central Alberta has been demonstrated at hundreds of oil and gas and industrial facilities and the procedures for reclamation success are well documented and understood. Similarly, amelioration of soil acidity and sodicity by lime application is a well understood and accepted practice in Alberta and worldwide. The use of proper reclamation practices upon Project closure are anticipated to return soil to similar or better quality than currently exists in the PDA.

Section 3: Historical Resources

A Historical Resources Overview was conducted for the proposed Project. The purpose of the overview is to provide background information regarding potential conflicts with historical resources and to make recommendations regarding the need for a Historical Resources Impact Assessment.

Previous studies conducted within the Site and in its immediate surrounding area resulted in the recording of 14 archaeological sites. These sites were observed on the surface of previously cultivated fields. Subsequent shovel testing at each of the sites failed to reveal the presence of intact subsurface cultural materials. In addition to being subject to previous cultivation, large portions of the Site were stripped of topsoil in 1981 in anticipation of development. The possibility of intact archaeological resources remaining within the PDA is low. No historic or palaeontological resources are recorded within the PDA.

The potential for intact historical resources, including palaeontological materials, to be impacted by the proposed Project is low. Additionally, the area proposed for development was previously assessed and no undisturbed cultural materials were observed (Fedirchuk 1981). Therefore, it is recommended that AST and their agent, WorleyParsons Komex, have satisfied their historical resources concerns with respect to the *Historical Resources Act* (RSA 2000). It is further recommended that AST be granted *Historical Resources Act* clearance for the proposed Project.

This Historic Resources Overview has been submitted to Alberta Tourism, Parks, Recreation and Culture for review, in an application for *Historical Resources Act* clearance. Clearance was declared by Alberta Tourism, Parks, Recreation and Culture on April 12, 2007.

The findings of this Historic Resources Overview pertain only to the development as outlined in this Project. Any changes or additions to the development project, resulting in development outside of the Site must be reviewed in terms of historical resource concerns and the potential need for further assessment.

Section 4: Socio-Economic Assessment

The socio-economic assessment concluded that the Project impacts will be positive from a socio-economic perspective.

The economic impact of the Project was determined using the Alberta Economic Multipliers developed by Alberta Finance (2006). Economic impacts to Alberta during construction were determined to be approximately $53.5 million. The annual economic impact to the province of Alberta during the Project's operation was determined to be between $35.5 million/y and $70.5 million/y. When possible, these impacts were separated into economic impacts in the LSA and RSA.

The Project will employ a labour force of 45 people throughout the 6–9 month construction phase. There are no expected peaks or troughs during the construction phase. The Project will employ an estimated 22 people during the operations phase. It is expected that the Project will create 23 spin-off employment opportunities in the province of Alberta during its operations. It is expected that all labourers during the construction phase will be housed in local hotels and motels and that there will therefore, be no long term population and infrastructure impacts to the LSA and RSA. However, during the operations phase it is possible that there could be a population increase of 0–68 people, which represents a maximum population increase of 0.8% in the RSA. It is expected that community services, infrastructure and

housing availability in the LSA and RSA will be able to accommodate the impacts associated with the maximum population increase.

Ancillary industries may benefit from the operations phase of the Project. AST plans to outsource a portion of its maintenance and will require chemicals and other supplies, meals and entertainment for staff, as well as consulting services. Furthermore, existing businesses are not expected to be negatively impacted by the Project, provided that elemental sulphur produced by AST is not reactive with sodium chlorate produced by a neighbouring industrial facility. Testing is underway to compare the potential reactivity of sulphur and chlorate to that of other common organic particulates. Results will be reported to the NRCB and AENV independently, and communicated to interested stakeholders.

If the Project is operating on the Site, the most serious negative impact is a possible drop in property values in the area demarcating a buffer zone surrounding the area zoned for heavy industrial use. Projected impacts to property values are presented in this report; however, high levels of uncertainty surround these projections.

Section 5: Public Consultation Requirements

WorleyParsons Komex and RMC and Associates supported AST in the development and implementation of the public consultation program for the EIA.

The overall aims of the public consultation program were to:

- provide an opportunity for potentially affected parties to become informed about the Project and EIA and provide input as appropriate
- address specific stakeholder information and consultation needs, particularly given the level of stakeholder concerns, issues and questions about the Project
- facilitate community input for Project design and development
- meet or exceed the Natural Resources Conservation Board (NRCB), and Albertan Environment (AENV) regulatory and filing requirements
- meet Terms of Reference (TOR) (AENV 2007) for the Project

Consultation Program

Although consultation activities were conducted before the EIA phase, the formal public consultation program was initiated in June 2006. The program was developed to meet both regulatory requirements and anticipated stakeholder expectations. The consultation program consisted of the following activities, which aimed to elicit stakeholder concerns and suggestions which have been documented.

1. **Open House, June 6, 2006**: The purpose of the open house was to provide information about AST, HAZCO, CCS Income Trust, the Project and the EIA process. Questions raised by the public were answered in an open public forum.
2. **Information Mail-Out, October 26, 2006**: An information package was mailed to identified stakeholder groups. It included a stakeholder cover letter; the Public Disclosure Document; Draft AENV TOR; Appendix II: Stakeholder Comments and Concerns; and a “Question and Answer” sheet concerning the EIA process.
3. **One-on-one interviews with stakeholders within 1.5 km of the Principal Development Area (PDA)**: Landowners (including industry), residents and occupants within 1.5 km of the PDA were contacted in-person. Those who were not available for a personal meeting were interviewed by phone. The aim of the personal interviews was to discuss and document stakeholder concerns; answer questions concerning the Project and the TOR; and record stakeholders’ recommendations

regarding how the longer-term consultation process should be structured. The personal meetings were extensively documented and a copy of the conversation was provided to the stakeholder.

4. **One-on-one interviews with local government officials, leaders and key service providers**: These people were met in person and/or contacted by phone and email to discuss and document their concerns, answer questions concerning the Project and Draft TOR and record recommendations regarding how the longer-term consultation process should be structured. In addition, they were updated on activities and current plans with respect to consultation plans and regulatory filings. Key service providers and opinion leaders included professionals in the public service sector who could be impacted by the Project, such as the fire department, RCMP, ambulance services, school board trustees, etc. These contacts were documented for regulatory purposes.
5. **Individuals residing beyond 1.5 km and within 5 km of the PDA who expressed formal objections and/or interest in the Project**: These residents who had initiated a formal notice of objection to the Project and/or expressed interest in the Project were contacted by phone with the same objectives as stated above (3 and 4). A summary of any concerns were documented.
6. **Project objectors, petition signers and/or those who expressed formal objections or interest in the Project who reside beyond 5 km of the proposed PDA:** Formal objectors and petition signatories as well as other interested parties who were not captured within the three above-noted groups were contacted by phone with the same objective as the groups above. They were added to the mailing list for future communications.
7. **Newsletter – Volume 1, December 2007**: during the above consultation process of one-on-one and phone interviews, many individuals expressed interest in being updated on the progress of the Project through a newsletter. The first issue was mailed to all stakeholders in December 2006.
8. **AST/Community EIA Consultation Committee Meeting, January 31, 2007**: The possibility of forming a community group to enhance communication on the EIA process was presented to stakeholders during the interviews and phone calls. Individuals who expressed interest were polled for the most convenient date, time and location for the initial meeting. Facilitated by RMC and Associates, the AST/Community EIA Consultation Committee meeting was held the evening of January 31, 2007 at the Lamont Recreation Centre.
9. **Newsletter – Volume 2, March 2007**: a second information newsletter was mailed March 5, 2007 to all stakeholders.
10. **AST & Community EIA Consultation Committee meeting, April 3, 2007**: A second 'working group' meeting was held with local individuals to "collectively develop ideas and recommendations for AST regarding the mandate, structure and operating norms for a community committee to enhance communication regarding AST environmental studies that best meets the community's informational needs".
11. **AST & Community Committee Meeting, May 3, 2007:** The purpose of the meeting was to determine which issues the committee would address first.
12. **AST & Community Committee Meeting, June 7, 2007:** The purpose of the meeting was to review and finalize the proposed air-related work plan and to identify the best process to distribute air-related information to the broader community.

The key issues raised by key stakeholders were documented, discussed and addressed by AST.

Table ES-2: Volume IID Final Impact Summary Table for the Application Scenario

Potential Impact	Geographic Extent	Magnitude	Direction	Duration	Reversibility	Confidence	Rating
Land Use Reclamation							
Agriculture	Local	Low to Moderate	Negative	Mid-term	Reversible	High	3
Hunting and wildlife	Regional	Low to moderate	Negative	Mid-term	Reversible	Moderate	3
Birdwatching	Local	Low to Moderate	Negative	Mid-term	Reversible	Moderate	3
Socio-Economic							
Construction Phase							
Population	Regional	Low to moderate	Neutral	Short-term	Reversible	High	4
Economic	Regional	Not applicable	Positive	Short-term	Permanent	Moderate	4
Employment	Regional	Negligible	Positive	Short-term	Not applicable	Moderate	4
Emergency services	Regional	Negligible	Negative	Short-term	Permanent	Moderate	3
Infrastructure	Local	Negligible	Neutral	Short-term	Not applicable	High	4
Housing	Regional	Negligible	Neutral	Short-term	Reversible	High	4
Community services	Regional	Negligible	Negative	Short-term	Reversible	High	4
Operations Phase							
Population	Regional	Negligible	Neutral	Mid-term	Permanent	Moderate	4
Employment	Regional	Negligible	Positive	Mid-term	Permanent	High	4
Housing	Regional	Negligible	Neutral	Long-term	Permanent	Moderate	4
Potential negative impacts to existing businesses	Local	Low to Moderate – Moderate to High	Negative	Mid-term	Permanent	Low	3
Property values	Local	Low to Moderate – Moderate to High	Positive, negative and neutral	Mid-term	Not applicable	Low	3
Emergency services	Regional	Negligible	Negative	Mid-term	Permanent	Moderate	3
Community services	Regional	Negligible	Neutral	Mid-term	Permanent	Moderate	4

Acronyms, Abbreviations and Defined Terms

Acronym	Definition
$(NH_4)_2SO_4$	ammonium sulphate
35-55-20-W4M	Section 35, Township 55, Range 20, West of the 4th Meridian (the Site)
A	symbol for hole area from the action leakage rate formula
A	cross-sectional area available for flow
A1	Agricultural Use Area 1
A2	Agricultural Use Area 2
AAAQO	Alberta Ambient Air Quality Objectives
AADT	average annual daily traffic
AAF	Alberta Agriculture and Food
AAFRD	Alberta Agriculture Food and Rural Development
abiotic	not biological; not involving or produced by organisms
ACD	Alberta Community Development
acid	molecule that is able to give up a proton (H^+) to, or accept electrons from, a base; gives a solution with a pH of less than 7
acidification	reduction of the pH of soil, waterways and lakes
adaptive planning	flexibility built into design and layout to accommodate future modifications required by changed standards, limits and guidelines
AENV	Alberta Environment
aerobic bacteria	bacteria that require oxygen to survive and grow
AET	areal evapotranspiration
AFSC	Agricultural Financial Services Corporation
AIH	Alberta Industrial Heartland: a large industrial centre in central Alberta including Edmonton, Fort Saskatchewan, Strathcona County, Sturgeon County and Lamont County
AII	industrial total
ALF	available labour force
ALR	action leakage rate – leakage expected to occur through a synthetic impermeable liner having 2 holes of 2 mm in diameter every 1-ha of area
alumina catalyst	medium used to regenerate and recycle amines used to adsorb hydrogen sulphide gas
amine units	process units used to remove hydrogen sulphide from a gaseous process stream using amine compounds
anaerobic bacteria	bacteria that do not require oxygen to survive and grow
ANC	acid-neutralizing capacity
ANHIC	Alberta Natural Heritage Information Centre
ANPC	Alberta Native Plant Council
AO	aesthetic objectives
APA	Agricultural Policy Area
API	American Petroleum Institute

Acronym	Definition
aquatics	aquatic resource conditions, including fish and benthic invertebrate habitat capability and their characteristics in waterbodies
aquifer	an underground porous geological formation that stores or carries water
ARET	accelerated reduction/elimination of toxics
ASIC	Alberta Soil Information Centre
ASL	ambient sound level
ASP	Alberta's Industrial Heartland Area Structure Plan/Lamont County
asphalt bulk sulphur storage pad	storage pad used to stockpile formed sulphur pastilles in preparation for shipment
ASRD	Alberta Sustainable Resource Development
ASRL	Alberta Sulphur Research Ltd.
AST	Alberta Sulphur Terminals Ltd.
ASWQ	Alberta Surface Water Quality
AVI	Alberta Vegetation Inventory
AWI	Alberta Wetland Inventory
BC MWLAP	British Columbia Ministry of Environment, Lands and Parks
bioavailability	the degree to which toxic substances or other pollutants present in the environment are available to potentially biodegradative microorganisms
bitumen upgrader	term used for a refining facility that converts bitumen (heavy oil) into a lighter grade synthetic oil that can be further refined to make useable products such as gasoline and diesel
BSL	basic sound level
BTEX	benzene, toluene, ethylbenzene and xylenes
buffer	a solution or liquid with a chemical constitution allowing it to neutralize acids or bases without a great change in pH
^{o}C	degrees Celsius
CA	annual crop total
Ca^{2+}	calcium ion
$CaCO_3$	calcium carbonate
CALPUFF	California Puff Model
camlock	fitting used to quick-connect pipes and hoses
CanSIS	Canadian Soil Information System
capital spending	expenditures by a company for plant and equipment
carbonate alkalinity	carbonate alkalinity is a measure of the amount of negative carbonate and bicarbonate ions in solution
CASA	Clean Air Strategic Alliance
CCME	Canadian Council of Ministers of the Environment
CCS	CCS Income Trust
CCS	Canadian Crude Separators

Acronym	Definition
CDWQG	Canadian Drinking Water Quality Guidelines
CEA	cumulative effects assessment
CEPA	Canadian Environmental Protection Act
CGCM3	Coupled Global Climate Model 3
Class II waste disposal facility	landfill facility that is designed and permitted to dispose of non-hazardous solid wastes in the Province of Alberta
clay soil liner	low permeability containment layer constructed using compacted clay soil
CLU	contemporary land use
cm	centimetre
cm y^{-1}	centimetres per year
CN	Canadian National Railway
CNR	Command Notification System
CO	carbon monoxide
CO_2	carbon dioxide
CO_3^{2-}	carbonate ion
COD	chemical oxygen demand – used to indirectly measure the amount of organic compounds in water
collection hopper	receptacle that collects formed sulphur pastilles and directs those pastilles onto a conveyor belt
Compliance Source Emissions Testing	testing implemented on sources of air emissions, such as combustion stacks, to verify that those emissions comply with regulated standards
conditioning unit	unit in the sulphur forming process that regulates the rate and temperature of the liquid sulphur that is fed into the process
COPC	chemicals of potential concern
COSEWIC	Committee on the Status of Endangered Wildlife
CP	perennial crop total
CPNVI	Central Parkland Native Vegetation Inventory
CPR	Canadian Pacific Railway
CPR1	cardiopulmonary resuscitation
CPR2	uncultivated pasture total
CPUE	catch per unit effort
CR	concentration ratio
CSA	Canada Standards Association
CSL	comprehensive sound level
CWQ	Canadian Water Quality
CWS	Canada-wide Standards
dBA	A-weighted decibel
dBC	C-weighted sound levels
degassed sulphur	sulphur that contains less than 10 ppm by weight of hydrogen sulphide

Acronym	Definition
DFO	Department of Fisheries and Oceans
DO	dissolved oxygen
DOC	dissolved organic carbon
double containment system	containment system for storing potentially hazardous liquids that includes two independent containment layers
draw down tube	tube used to control (reduce) fluid levels in a containment vessel
duplex filter	filter designed to remove two types of impurities, such as particulate and organic matter
dust suppression package	process component that suppresses dust that may be emitted to atmosphere at a material transfer point
EC	electrical conductivity
EC20	concentration that affects 20% of text organisms
EC50	concentration that affects 50% of test organisms
EIA	Environmental Impact Assessment
elemental	a pure substance that cannot be broken down into different kinds of matter
emergency response	the action taken after an event to minimize the consequences of an emergency
EMS	environmental management system
EMS	Emergency Medical Services
EOC	Emergency Operations System
EPEA	*Environmental Protection and Enhancement Act*
ER	exposure ratio
ERP	Emergency Response Plan
ESA	Environmental Significant Areas
EUB	Alberta Energy and Utilities Board
FAP	Fort Air Partnership
feed tank	tank at the beginning of the sulphur processing system that is used to control the rate of sulphur feed to the forming process
ferrous iron	iron with an oxidation number of +2
fish/trap-hour	fish catch rate; fish caught per hour
FMZ	Fur Management Zone
FOLC	The Friends of Lamont County for Responsible Industrial and Community Development
FONG	open, non-patterned graminoid dominated fen
formed sulphur	sulphur that has been formed into solid pastilles using the Rotoformer process
fugitive dust	dust that is not emitted from definable point sources
fugitive sulphur emissions	sulphur emissions that are not emitted from definable point sources
FWHIS	Fish and Wildlife Historical Information System
g	the gravitational constant (9.8 m/s^2)
g s^{-1}	grams per second

Acronym	Definition
GHG	greenhouse gases
GIS	geographic information system
GJ/mon	gigajoules per month
gm/t	grams per tonne
groundwater	water beneath the earth's surface in underground streams and aquifers
gypsum	a soft white mineral composed of hydrous sulfate of lime
H	Hour
H&S	Health and safety
H^+	hydrogen ion; the symbol for a proton
H_2CO_3	carbonic acid
H_2O	Water
H_2S	hydrogen sulphide
H_2SO_4	hydrogen sulphate
ha	hectare
HADD	harmful alteration, disruption, or destruction of fish habitat
HAZCO	HAZCO Environmental Services
HCO_3	bicarbonate
HDPE	high density polyethylene
HEC	human equivalent condition
HHRA	Human Health Risk Assessment
HNO_3	nitric acid
HP	horsepower
HRIA	Historical Resources Impact Assessment
HRV	historical resources value
hw	the symbol for liquid depth from the action leakage rate formula
hydraulic conductivity	the extent to which a given substance allows water to flow through it
hydrogen plant feedstock	plant that is used to generated hydrogen gas, which is in turn used in the heavy oil upgrading and/or oil refining process
hydrogeological	pertaining to the geology of ground water with emphasis on its chemistry and movement
i	hydraulic gradient in the surficial deposits
I/C	Industrial/Commercial District
ICS	Incident Command System
infrastructure	basic facilities, such as transportation, communications, power supplies and buildings, that enable an organization, project or community to function
interstitial water	subsurface water contained in pore spaces between grains of rock and sediment
IPCC	Intergovernmental Panel on Climate Change
ISQG	Interim Freshwater Sediment Quality Guidelines

Acronym	Definition
ITE	Institute of Transportation Engineers
K	hydraulic conductivity
K	degrees Kelvin
K^+	potassium ion
keq H^+/(ha•y)	kiloequivalents of hydrogen ions per hectare per year
kg	kilogram
kg s^{-1}	kilograms per second
kg/d	kilograms per day
kg/ha/y	kilograms per hectare per year
kg/t	kilograms per tonne
km	kilometres
km/h^{-1}	kilometres per hour
km^2	square kilometre
kPa	kiloPascals
kraft pulp	pulp produced by a process where the active cooking agent is a mixture of sodium hydroxide and sodium sulphide
Kw	kilowatt
L/min	litres per minute
L/s	litres per second
LCC	Lamont County Council
Le Chatelier's Principal	used to predict the effect of changing the amount of reactants, products, temperature or system volume on the composition of a chemical system at equilibrium
leak detection layer	layer located between the primary and secondary containment layers that is used to monitor the integrity of the primary containment layer
LEK	local environmental knowledge
L_{eq}	energy equivalent sound level
Level I fire	minor fire that can be isolated or controlled and is not of a serious nature
Level II fire	fire that cannot be isolated or controlled, but can be managed by local fire and emergency response service
Level III fire	fire that cannot be isolated or controlled and cannot be managed by local fire and emergency response service
L_{max}	maximum sound level for a given time period
load out conveyor	conveyor used to transfer formed sulphur onto rail cars
LOAEL	lowest observed adverse effect level
LOS	level of service
LSA	Local Study Area
LST	local standard time
LUB	Land Use Bylaw
LZ	landing zone

Acronym	Definition
m	metre
m/m	metres per minute
m/s^{-1}	metres per second
m/y	metres per year
m^2	metres squared
m^2/day	metres squared per day
m^3	cubic metres
m^3 h^{-1}	cubic metres per hour
m^3/day	metres cubed per day
m^3/s	metres cubed per second
m^3/y	metres cubed per year
MAC	maximum acceptable concentrations
Man-hours	number of workers multiplied by hours worked
masl	metres above sea level
mbgs	metres below ground surface
MDBP	Municipal Development Plan Bylaw
meq	milliequivalents
meq/L	milliequivalents per litre
metallic sulfides	compounds formed by metal elements bonding to sulphides
metering pump assembly	process unit that measures flow volumes and rates through a pump
mg/kg	milligrams per kilogram
mg/L	milligrams per litre
mg/m^3	milligrams per cubic metre
Mg^{2+}	magnesium ion
mitigation	any action taken to permanently eliminate or reduce the long-term risk to human life, property and function from hazards
mL	millilitre
mL/minute	millilitres per minute
mm	millimetre
mm day^{-1}	millimetres per day
mm/y	millimetres per year
MP	McElroy-Pooler dispersion coefficient
MPC	Municipal Planning Commission
MPOI	maximum points of infringement
MRL	minimal risk limit
MSDS	Material Safety Data Sheets

Acronym	Definition
MVC	motor-vehicle collisions
MWH/mon	power flux per month
N	Nitrogen
n	number of individuals
n.d.	not defined
n/a	not applicable
Na^+	sodium ion
NAAQO	National Ambient Air Quality Objectives
$NaHCO_3$	sodium bicarbonate
NCIA	Northeast Capital Industrial Association
Ne	effective porosity
neutralization sludge	sludge formed by the neutralization of sulphuric acid using either caustic soda or lime
NGO	non-governmental organizations
NH_4NO_3	ammonium nitrate
NIA	noise impact assessment
NO	nitric oxide
NO_2	nitrogen dioxide
NO_2^-	nitrite ion
NO_3^-	nitrate ion
NOAEL	no observed adverse effect level
NO_x	nitrogen oxides
NPRI	National Pollutants Release Inventory
NR CAER	Northeast Region Community Awareness and Emergency Response
NRC	Natural Regions Committee
NRCB	Natural Resources Conservation Board
NTU	nephelometric turbidity unit
O_2	oxygen
O_3	ozone
OEL	Occupational Exposure Limit
off-specification sulphur	sulphur that does not comply with shipping specifications either because of excessive mineral or organic content
OH^-	hydroxide ion
OM	organic matter
oxidation	the removal of electrons from an element or compound
ozone precursors	chemical compounds, such as carbon monoxide, methane, non-methane hydrocarbons and nitrogen oxides, which in the presence of solar radiation react with other chemical compounds to form ozone
PAH	polycyclic aromatic hydrocarbons

Acronym	Definition
PAI	potential acid input
PDA	Principal Development Area
PEL	probable effect levels
PEMS	Prairie Emergency Medical Systems
PET	potential evapotranspiration
PFRA	Prairie Farm Rehabilitation Administration
PG	Pasquill-Gifford dispersion coefficient or atmospheric stability class
pH	measure of the acidity or basicity (alkalinity) of a material when dissolved in water
piezometer	instrument which measures hydraulic pressures
PM_{10}	particulate matter with mean aerodynamical diameter less than 10 µm
$PM_{2.5}$	particulate matter with mean aerodynamical diameter less than 2.5 µm
PPE	personal protective equipment
ppb	parts per billion
ppm	parts per million
precipitate	separate as a fine suspension of solid particles
protons	positively charged particles forming part of atomic nuclei
psi	pounds per square inch
PSL	permissible sound level
pump hanger	device for vertically positioning a pump
PW	pumping well
Q	symbol for action leakage rate from the action leakage rate formula; groundwater contributions
QA	quality assurance
QC	quality control
R.R.	Range Road
radial stacking conveyor	conveyor that places formed sulphur in a radial pattern
rail transfer loop	rail line placed in an approximately circular pattern
RCMP	Royal Canadian Mounted Police
Rd	road
Receiving tank	tank used to receive liquid sulphur delivered by rail or truck
recirculation loop	water circulation loop that returns spent cooling water to the start of the cooling water circuit
reduction	addition of electrons to an element or compound
RELAD	Regional Lagrangian Acid Deposition
RfC	reference condition
RGDR	regional gas dosimetry ratio
Rotoform emissions	particulate sulphur emissions for the Rotoform process

Acronym	Definition
ROW	right(s) of way
RSA	Regional Study Area
runoff control system	system of ditches and culverts used to collect runoff from the sulphur processing area to the stormwater collection pond
S	Sulphur
s^{-1}	per second
S_2O_3	thiosulfate
SABA	supplied air breathing apparatus
Sandvik Rotoform process	sulphur forming process developed and patented by Sandvik and referred to as the Rotoform process
SAR	sodium adsorption ratio
SAR	species at risk
SARA	*Species at Risk Act*
saturated	most concentrated solution possible at a given temperature
SCA	soil correlation area
SCBA	self-contained breathing apparatus
SEIA	Socio-Economic Impact Assessment
SIL	survey intensity level
Site	Section 35-55-20 W4M
S^o	symbol for elemental sulphur
SO_2	sulphur dioxide
SO_4^{2-}	sulphate ion
sour gas	hydrogen sulfide gas; H_2S
SO_x	sulphur oxides
specific gravity	the ratio of the density of a material to the density of water
spontaneous combustion	self-ignition of combustible material through the chemical action of its parts
stakeholders	people or organizations with an interest or share in an undertaking, such as a commercial venture
sulphur acidification	lowering of pH in soils or water by sulphur dioxide
sulphur forming	process of converting liquid sulphur into solid sulphur particles
sulphur pastille	sulphur pastilles of uniform shape, stability and quality formed by the Sandvik Rotoform process
sulphur recovery	separation and recovery of sulphur from a hydrocarbon refining process
sulphur train	a train used to convey liquid or solid sulphur
sulphuric acid	a strong acid; H_2SO_4
surface water	water that flows in streams and rivers, natural lakes, in wetlands, and in reservoirs constructed by humans
surface water runoff	pond used to collect and contain surface runoff from the sulphur forming and handling

Acronym	Definition
collection pond	area
surge bin	bin used to collect and store surges in solid sulphur pastilles
sweet fuel gas	methane that is used as fuel and does not contain hydrogen sulphide
t/d	tonnes per day
t/y	tonnes per year
TDS	total dissolved solids
THE	total exactable hydrocarbons
temperature conditioned	sulphur that is conditioned and controlled to be in a specific temperature range
TIA	traffic impact assessment
TKN	total Kjeldahl nitrogen
TOC	total organic carbon
TOR	Terms of Reference
totalizer	metering device that totals the volume of liquid passed through that meter
TP	total phosphorus
TPH	total petroleum hydrocarbons
TRV	toxicological reference values
TSS	total suspended solids; the weight of particles suspended in water
Twp	Township
UF	urban fringe
USEPA	United States Environmental Protection Agency
USGPM	US gallons per minute
USLE	universal soil loss equation
UTM	universal transverse mercator
V	Velocity
visible sheen	collection of hydrocarbons that is visible on the surface of a waterbody
VOC	volatile organic compounds
W4M	West of the 4th Meridian
vpd	vehicles per day
WA	*Water Act*
WCB	Workers' Compensation Board
wetland	area regularly saturated by surface water or groundwater and characterized by a prevalence of vegetation adapted for life in saturated soil conditions (e.g., swamps, bogs, fens, marshes and estuaries)
WHMIS	Workplace Hazardous Materials Information System – national chemical hazard communication system for regulation of information pertaining to hazardous materials
WMU	Wildlife Management Unit
WVC	wildlife-vehicle collisions
y	year

Acronym	Definition
µeq/L	microequivalents per litre
µg m^{-3}	micrograms per cubic metre
µm	microns (micrometres)
µS/cm	Microsiemens per centimetre

1. Introduction

The proponent, Alberta Sulphur Terminals Ltd. (AST), a division of HAZCO Environmental Services (HAZCO) which, in turn, is a division of CCS Income Trust (CCS), is applying to Alberta Environment (AENV) and the Natural Resources Conservation Board (NRCB) for approval to construct and operate a facility for sulphur receiving and forming, temporary sulphur pastille storage and shipment for export (the Project). The facility is to be developed on a portion of Section 35, Township 55, Range 20, West of the 4th Meridian (35-55-20 W4M – the Site), approximately 2.2 km east of Bruderheim, Alberta, in the Industrial Heartland area of Lamont County (Figure 1.1-1).

The purpose of this Environmental Impact Assessment (EIA) is to assess and report the potential environmental and socio-economic impacts of the Project. The EIA portion of this application has been organized into four sub-volumes:

Volume IIA – Air, Noise and Human Health

1. Introduction
2. Climate and Air Quality
3. Noise and Light
4. Public Health and Safety

Volume IIB – Water and Aquatic Resources

1. Introduction
2. Groundwater Quality and Quantity
3. Surface Water Quantity
4. Surface Water Quality
5. Aquatic Resources

Volume IIC – Terrestrial Ecosystems

1. Introduction
2. Soil
3. Vegetation
4. Wildlife
5. Biodiversity and Fragmentation

Volume IID – Land Use, Historical, Socio-Economics and Public Consultation

1. Introduction
2. Land Use and Reclamation
3. Historical Resources
4. Socio-Economic Assessment
5. Public Consultation Requirements

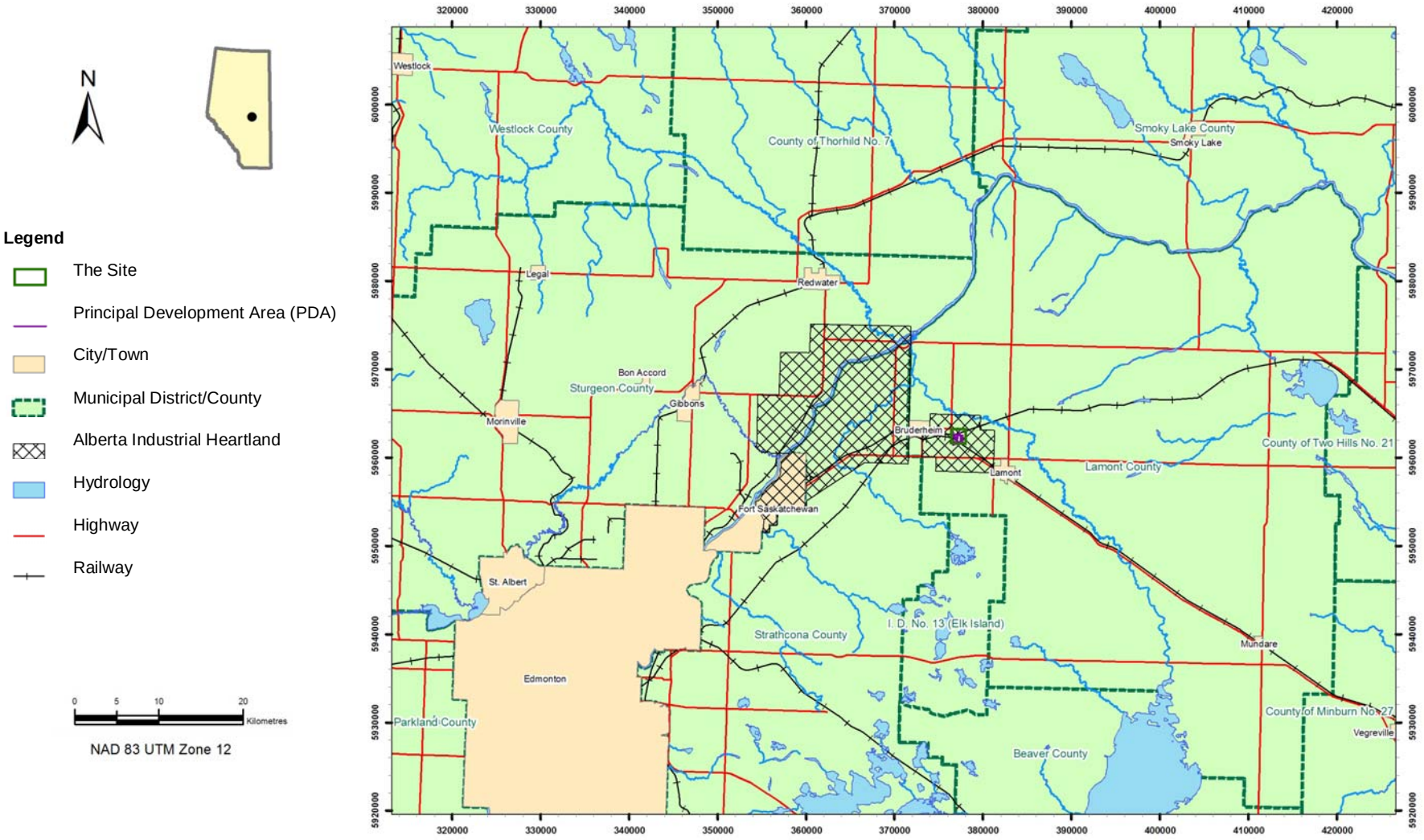

Figure 1.1-1: Regional Setting

This EIA forms part of the application for the Project submitted by AST and has been prepared according to the following requirements:

- AENV: *Environmental Protection and Enhancement Act* (EPEA 1993)
- AENV: Final Terms of Reference (TOR: AENV 2007)
- NRCB*: Natural Resources Conservation Board Act* (NRCB 2001)
- Permit to Divert Groundwater, to be issued by AENV under the Water Regulation of the *Water Act*: to provide up to 24,000 m^3 of cooling water per year to supply water during periods when the volume of water collected in the stormwater runoff control pond is not sufficient to operate the sulphur forming cooling system
- Development Permit issued by Lamont County under the *Municipal Government Act* (Government of Alberta 2000a) to allow construction of surface facilities associated with the Project
- authorization under the *Historical Resources Act* (Government of Alberta 2000b) for clearance to construct the Project

The concordance table that correlates the various clauses of the TOR to the application and EIA can be found in Volume I.

1.1 Project Description

The Project encompasses construction and operation of a facility for sulphur receiving and forming, temporary sulphur pastille storage and shipment for export. All infrastructure and activities will be confined to the lands owned by HAZCO. The Project includes:

- rail and road access for receiving molten sulphur
- molten sulphur unloading and transfer facilities
- sulphur forming facilities to produce sulphur pastilles
- loading and shipping facilities for formed sulphur
- sulphur pastilles temporary storage area

The Project will service oil and gas production and refining operations located in the Fort Saskatchewan area as well as northeastern Alberta. With increased applications, approvals and operation of bitumen upgraders and ongoing sulphur recovery initiatives, a shortage of sulphur forming facilities in Alberta is now apparent. AST will provide oil and gas producers in the area with a state-of-the-art sulphur forming, temporary pastille storage and shipping facility with design elements and monitoring programs that focus on environmental protection.

1.1.1 Sulphur Generation

The sulphur that would be accepted, formed and shipped by the Project is generated primarily by bitumen upgrading facilities located in the Fort Saskatchewan, Fort McMurray and Lloydminster areas. Amine units are part of the upgrader sulphur plant and remove H_2S from all upgrading gas streams, which produces sweet fuel gas (low sulphur content) and hydrogen plant feedstock. The plant consists of H_2S removal units (amine units) and sulphur recovery units, which convert H_2S to elemental sulphur.

The sulphur recovery units oxidize or burn part of the H_2S into SO_2, which then reacts with H_2S to form liquid elemental sulphur and water. The initial reaction takes place in the burners

of a reaction boiler and in-line burners before the converters/condensers, known as sulphur "trains". First, second and third stage converters containing a (bauxite) alumina catalyst promote the reaction of H_2S with SO_2 at temperatures from 204–316°C. Modern processes reduce sulphur emissions and improve sulphur recovery.

Sulphur is recovered as a liquid by condensing sulphur vapour from the gases in the steam-generating heat exchangers of each sulphur train. The liquid sulphur is then gathered and stored, and entrained residual H_2S is removed from the stored sulphur.

Upgrading facilities at Lloydminster, Fort McMurray and Fort Saskatchewan currently generate sulphur at a rate of approximately 1 million tonnes/year (t/y). The rate of sulphur production in these areas is expected to rise to approximately 2 million t/y per year by 2008, and 3 million t/y by 2013 as upgrading operations are expanded to accommodate the increased production associated with heavy oil.

1.1.2 Project Components and Development Timing

The primary components of the proposed sulphur forming and shipping facility are:

- infrastructure for the reception of liquid sulphur and shipment of formed sulphur
- storage facilities for liquid and formed sulphur
- sulphur forming facilities
- sulphur transfer and loading infrastructure

1.1.2.1 Sulphur Reception

Liquid sulphur can be received at the facility by railcar, truck or (in future) pipeline. Only liquid sulphur that has been degassed to a maximum of 10 ppm H_2S will be accepted. Upon arrival, the liquid sulphur is unloaded via a pumping station into insulated and heated receiving tanks. Liquid sulphur is then pumped to a feed tank where it is filtered and temperature conditioned prior to being formed.

1.1.2.2 Sulphur Holding

Storage is provided for sulphur in its liquid form, prior to being formed, as well as in its pastille form, prior to being shipped. The sole purpose is to allow efficient operation of the forming facilities, while accommodating delivery and shipping. Liquid sulphur will be stored in 3,000 t, insulated and clad, steel tanks that meet the requirements of EUB Directive 55 (EUB 2001, Internet site) and API 650 (API 1998) modified. The initial development will include three 3,000 t tanks, rising to six – 3,000 t tanks at maximum capacity. Formed sulphur will be stored on a double-lined asphalt pad equipped with run-on and runoff controls. This pad has the capacity to store 90,000 t of finished product, approximately half of which will be established as part of initial construction.

1.1.2.3 Sulphur Forming

After the sulphur is transferred to the receiving tanks, it is pumped through a duplex filter and conditioning unit and cooled to an optimal forming temperature of 125°C. The sulphur enters a recirculation loop that feeds the Rotoform HS® drop forming equipment. The feed to the Rotoformer uses metering equipment and nozzles specifically designed to provide a continuous sulphur feed across a rotating stainless steel belt. The belt is cooled by cold water

jets sprayed against the underside of the rotating belt, causing the pastilles to cool and solidify above.

1.1.2.4 Transfer and Shipping Infrastructure

The solid pastilles are deposited into a collection hopper, conveyed to a radial stacking conveyor and the asphalt bulk sulphur storage pad. A wind screen will be built upwind of the sulphur pastille stockpile. Initially, a front-end loader will transfer the stockpiled sulphur to a surge bin equipped with a dust suppression package. The dust treated product will then be deposited on a load-out conveyor equipped with weight measurements and totalizer and onto rail or trucks for shipment. An automated loading system will be introduced as part of future expansion to full production. In this instance, the formed sulphur will be transferred into vertical holding bins that are used to directly load rail cars. The EIA is based on a forming capacity of 6,000 t/d, half of which will be associated with initial construction.

Water utilized by the Rotoform HS® equipment will be sent through a closed loop cooling tower which provides filtration and temperature reduction. Make-up water for the cooling tower will be supplied from a runoff pond which is designed to collect and treat surface water from the Site and also serves as the source of fire protection water. Additional make-up water will be provided by a groundwater supply well.

1.1.2.5 Development Schedule

The proposed facilities will be developed in stages to accommodate the rate of sulphur production generated by existing and proposed oil sands development programs as well as market conditions. The initial stage will include the development of all Project components with sufficient capacity to process approximately 3,000 t/d of sulphur. Subsequent expansions will occur to process approximately 6,000 t/d of sulphur. The anticipated timing for the initial stage of development is summarized in Table 1.1-1 and is dependent on the pace and outcome of the regulatory process.

Table 1.1-1: Initial Development Timing

Task	Anticipated Timeframe
Project disclosure	2005
EIA scoping	Early 2006
EIA implementation	2006
Application submission	Mid 2007
Detailed design	Late 2007
Construction	Early 2008
First operations	Mid 2008
Project lifespan	25 years

The receipt, forming, temporary storage and shipping of formed sulphur will occur continuously over the lifespan of the facility (estimated to be 25 years), assuming there is a viable international market for sulphur produced in Alberta.

Failure to meet the proposed timeline, or approve the Project in general, will result in the blocking of incremental volumes of sulphur produced by oil sands upgrading facilities, either in new locations or at existing facilities. For example, sulphur produced by Syncrude is

currently being stored in above-ground blocks, and Suncor is considering this option for sulphur generated by its Voyageur upgrader. Sulphur forming facilities are currently not available to the independent upgraders that are scheduled to come on-line in the next few years.

1.2 Spatial Boundaries

1.2.1 Principal Development Area

The Principal Development Area (PDA) is located within a portion of Section 35-55-20 W4M (the Site) and comprises the area of disturbance and development as illustrated in Figure 1.1-1. The PDA contains the forming and shipping facility, located in the west-central portion of the Site, and rail transfer loop used to receive and ship sulphur.

1.2.2 Local Study Area

The LSA for the majority of disciplines assessed in the EIA is the Site (groundwater, historical resources, surface water quantity and surface water quality) or the Site plus a 200 m buffer zone (aquatics, biodiversity and fragmentation, land use and reclamation, soil, vegetation and wildlife).

1.2.3 Regional Study Area

The RSA incorporates the LSA into a larger geographical area where potential regional effects could occur. As with the LSA, the extent of the RSA for each EIA component was determined according to the indicators used. Where no impact (Class 4) is predicted within the LSA, no analysis of regional effects was undertaken.

1.2.3.1 Cumulative Effects Study Areas

Cumulative effects assessments (CEA) are only applicable when other announced, but yet-to-be approved, projects exist that would affect the same area. Cumulative effects were generally assessed within the RSA for each specific EIA component. Where no impact is predicted within the LSA, no analysis of cumulative effects was undertaken (see Section 1.5.3).

1.3 Temporal Boundaries

The Project schedule is preliminary and subject to modification in response to the receipt of regulatory approvals, business considerations and weather factors. Assuming favourable regulatory approval and market conditions, construction of the Project is scheduled to begin in early 2008 with initial sulphur processing starting in mid 2008. The Project is expected to operate for 25 years. A detailed schedule is provided in Volume I.

Temporal boundaries used in this assessment vary depending on the disciplines and the resource assessed. Temporal boundaries extend from the June 2006 for the baseline assessments to five years after reclamation of the Project for the Land Use and Reclamation assessment.

1.4 Assessment Criteria

The purpose of the EIA is to assess and report on the potential impacts associated with the construction and operation of the Project. This includes impacts to the biophysical landscape as well as socio-economic and cultural impacts to local communities and historical sites. The EIA also includes preventative, mitigative and compensatory actions to reduce impacts of the Project.

Impact assessments were based upon measured, predicted or reasonably expected changes in some attributes of a selected indicator. The choice of indicators was determined from reviewing other EIAs completed in the Alberta Industrial Heartland for applicability to this region through input from stakeholders and the professional judgment of scientists conducting the EIA.

For each identified indicator, an assessment of the potential residual impact was made using the attributes of:

- direction
- geographical extent
- magnitude
- duration
- confidence
- reversibility

The definition of each attribute used in the assessment is given below.

1.4.1 Direction

The direction of impact may be described as positive (beneficial), negative (detrimental) or neutral:

- Positive: measured or estimated impact represents a real or potential increase in abundance, quality or other attribute of the indicator
- Negative: measured or estimated impact represents a real or potential decrease in abundance, quality or other attribute of the indicator
- Neutral: a “neutral” direction indicates there is no impact to quantify; therefore, no quantitative assessment (e.g., extent, magnitude, duration) is possible; the confidence (based on an understanding of cause and effect relationship(s) and the quality and quantity of available data) in the assessment is discussed below

1.4.2 Geographic Extent

Impacts may be confined to small local areas, or may occur over a large geographic extent. Generally, impacts may be local or regional:

- Local: measured or estimated impact occurs only within the boundaries of the LSA
- Regional: measured or estimated impact occurs beyond the boundaries of the LSA and mainly within the boundaries of the RSA

1.4.3 Magnitude

Three levels of magnitude have been selected:

- Negligible: measured or estimated impact represents a 1% or less change in the indicator (quality, quantity or other attribute) from baseline conditions
- Low to Moderate: measured or estimated impact represents a greater than 1% to 10% change in the indicator (quality, quantity or other attribute) from baseline conditions
- Moderate to High: measured or estimated impact represents a greater than 10% change in the indicator (quality, quantity or other attribute) from baseline conditions

Some disciplines have specific threshold values (e.g., AAAQOs (AENV 2005, Internet site)) that determine the magnitude of the impact, rather than a combination of quantitative analysis and professional judgment that is used where specific guidelines and regulations do not exist.

1.4.4 Duration

Some impacts may persist for short periods of time, others may be virtually permanent. The following designations for duration are used:

- Short-term: measured or estimated impact persists for no longer than five years
- Mid-term: measured or estimated impact persists to the end of the operational life of the Project
- Long-term: measured or estimated impact is measurable beyond the end of the operational life of the Project

1.4.5 Confidence

All measurements or predictions of direction, magnitude, geographic extent and duration of an impact are made on the basis of available data and understanding of the Project. The confidence ratings used are:

- Low: no clear understanding of cause and effect is evident because of the lack of a relevant information base or directly relevant data. This generally applies to conditions relevant to the RSA where no data was collected or available, and no detail is available regarding other planned developments.
- Moderate: a good understanding of cause and effect is evident from the existing knowledge base; however, there is limited data or a lack of directly applicable data. This generally applies to conditions within the LSA where larger-scale data was collected, but the resource in question is very site-specific and could not be surveyed within this year's time frame or models were used but could not be validated.
- High: a good understanding of cause and effect is available from the existing knowledge base and good, directly-applicable data are available. This generally applies to conditions within the LSA where data was collected and information about the Project was available (e.g., footprint).

1.4.6 Reversibility

All disciplines provide basic explanation regarding whether or not the impact is reversible.

1.4.7 Final Impact Rating

For each individual impact assessment, a qualitative, final evaluation rating has been used where specific guidelines do not exist. This rating is a combination of quantitative analysis and professional judgment that takes into account the various descriptors for each attribute (direction, magnitude, geographic extent, duration, confidence and reversibility), and the potential effects of the specific impact. For some indicators, there are specific threshold values that will determine an indicator's ranking (e.g., for air quality, human health). Other indicators have no such threshold value and a combination of objective analysis and subjective professional judgment is used. Impact classification does not always relate directly to standard descriptors used to explain the impact occurring; this is often seen where a relative change of high magnitude is occurring, yet the impact is classified as Class 3 because the overall effect (e.g., impacts to one small stream within a watershed) may be unmeasureable.

The final impact rating is an aggregated, relative, numerical ranking determined by both the analysis of impact and the level of action the author recommends, as a professional, as necessary to address the impact. This ranking is applied to both the Project-specific impacts and cumulative effects residual impacts (see Table 1.4-1).

Table 1.4-1: Final Impact Rating

Rating	Level of Action
Class 1	The predicted trend in an indicator under projected land use development could threaten the long-term sustainability of the quantity or quality of the indicator in the local and regional study areas. An action plan, developed jointly by regional stakeholders, could be developed to monitor the affected indicator, identify and implement further mitigation measures to reduce any impact, and promote recovery of the indicator, where appropriate. This class of impact might also be applicable to an exceedance of a regulatory guideline, or where the impact is expected to have long-term effects.
Class 2	The predicted trend in an indicator under projected land use development will likely result in a decline in the quantity or quality of the indicator. The decline could be to lower-than-baseline but stable levels in the LSA and RSA after closure and into the foreseeable future. In addition to responsible industrial operational practices, monitoring and recovery initiatives could be required if additional land use activities occur in the study area before closure of the projected land use development. This class of impact might also be applicable to an exceedance of a regulatory guideline, or where the impact is expected to have mid-term effects, but where recovery will take place shortly after closure of the projected land use development.
Class 3	The predicted trend in an indicator under projected land use development could result in a slight decline in the quantity or quality of the indicator in the LSA and RSA during the life of the projected land use development, but resource levels should recover to baseline after closure. In some cases, a short-term, low to moderate magnitude impact could occur, but recovery will take place within five years. No new resource management initiatives are necessary. Responsible industrial operational practices should continue. This class of impact could also be applicable where regulatory guidelines are not exceeded, but where a relative change in magnitude of an indicator occurs.
Class 4	The projected land use development results in no change and no contribution toward affecting the quantity or quality of the indicator in the LSA and RSA during the life of the projected land use development. Responsible industrial operational practices should continue. Therefore, no cumulative effects result from the Project.

1.5 Assessment Scenarios

The assessment was based on three cases – baseline case, application case and cumulative effects case as required by the TOR (AENV 2007). Impacts of the Project were evaluated from a project-specific and cumulative perspective by undertaking comparisons of change within these cases. These generally included comparisons of the environmental characteristics occurring in the baseline case with environmental conditions predicted to occur in the application case and in the cumulative effects case (see Figure 1.5-1).

1.5.1 Baseline Case

The baseline case includes the existing environmental and socio-economic conditions and existing and approved projects and activities as of June, 2006.

1.5.2 Application Case

The application case includes the baseline case plus the Project within the LSA. Construction and operation of the Project will occur sequentially. A maximum worst-case disturbance case was assessed for the application case in which all construction and operation components of the Project were assumed to occur concurrently. This conservative, worst-case approach over-predicted the Project impacts. In some cases, impacts were evaluated at closure (decommissioning and reclamation) to determine residual effects at that time.

1.5.3 Cumulative Effects Case

The cumulative effects case includes baseline, application and existing projects or activities in combination with other planned projects or activities that could occur within the same geographic area (spatial) and within the same time (temporal). The Project Inclusion List in Table 1.5-1 shows existing and planned projects or activities.

Cumulative effects were evaluated where Class 1, 2 or 3 impacts were identified for that particular discipline (as per impact ratings explained in Section 1.4.7). Class 4 ratings indicate that no change would occur as a result of the Project. Therefore, a cumulative effects assessment was not undertaken for issues identified as Class 4.

1.5.3.1 Project Inclusion List

The Project Inclusion List (see Table 1.5-1) includes the various anthropogenic disturbances on the landscape that must be included in the applicable assessment case to effectively determine project and cumulative effects. As the study areas for each component vary, the project inclusion for a particular assessment also varies. Therefore, each component has modified the comprehensive project inclusion list for their assessment. The projects included for cumulative effects include other operators as well as facilities associated with the Project.

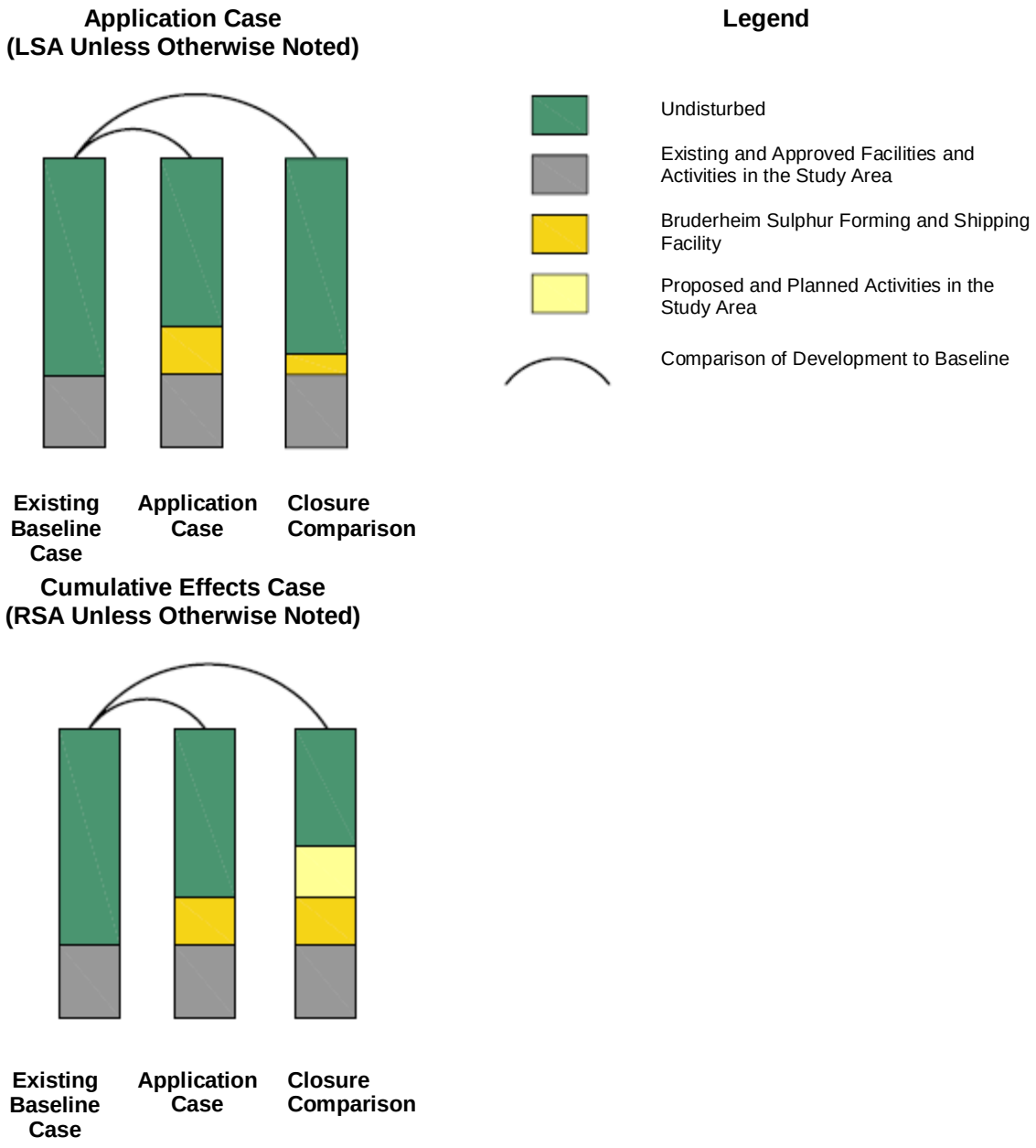

Figure 1.5-1: Comparisons of Change for Impact Assessment

Table 1.5-1: Project Inclusion List

Operator	Facility	Project Status		
		Existing	Approved (Not Operating)	Planned (Not Approved)
Access Pipeline	Redwater Trim Blending Facility		X	
Agrium Products Inc.	Fort Saskatchewan Fertilizer Plant	X		
Agrium Products Inc.	Redwater Fertilizer Plant	X		
Air Liquide Canada	Scotford Cogeneration Power Plant	X		
Alberta Sulphur Terminals	Bruderheim Sulphur Forming Facility			X
ARC Resources	Redwater Gas Conservation Plant	X		
ATCO Midstream	Fort Saskatchewan Sour Gas Plant	X		
Aux Sable Canada	Heartland Offgas Project			X
BA Energy	Heartland Bitumen Upgrader		X	
BP Canada Energy	Fort Saskatchewan Fractionation Plant	X		
Bunge Canada	Fort Sask. Oilseed Processing Plant	X		
Canexus Chemicals Canada	Bruderheim Sodium Chlorate Plant	X		
CE Alberta BioClean	Fort Saskatchewan Chemical Plant		X	
Degussa Canada Inc.	Gibbons Hydrogen Peroxide Plant	X		
Dow Chemical Canada	Fort Saskatchewan Chemical Plant	X		
ERCO Worldwide	Bruderheim Sodium Chlorate Plant	X		
Keyera Energy	Fort Saskatchewan Fractionation Facility	X		
Marsulex	Fort Saskatchewan Chemical Plant	X		
Newalta Corporation	Redwater Disposal Facility	X		
North West Upgrading Inc.	North West Upgrader Project			X
Petro-Canada Oilsands Inc.	Sturgeon Upgrader Project			X
Prospec Chemicals	Fort Saskatchewan Xanthate Plant	X		
Provident Energy Ltd.	Redwater Fractionation Facility	X		
Redwater Water Disposal Company	Redwater Waste Disposal Facility	X		
Shell Canada Limited	Scotford Upgrader	X	X expansion	
Shell Canada Products	Scotford Oil Refinery	X		
Shell Chemicals Canada	Scotford Styrene & MEG Plant	X		
Sherritt International Corporation	Fort Saskatchewan Fertilizer Plant	X		X
Synenco Energy Ltd.	Northern Lights Upgrader Project			X
Terasen Pipelines	Heartland Storage Tank Terminal			X
TransAlta Cogeneration	Fort Sask. Cogeneration Power Plant	X		
TransCanada Energy	Redwater Cogeneration Power Plant	X		

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WorleyParsons Komex

resources & energy

Alberta Sulphur Terminals Ltd.
Bruderheim Sulphur Forming and Shipping Facility

Volume IID – Land, Historical, Socio-Economics and Consultation

2. Land Use and Reclamation

Project Number 62720000
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APPENDICES

Executive Summary

Alberta Sulphur Terminals Ltd. (AST), a division of HAZCO Environmental Services (HAZCO), which in turn is a division of CCS Income Trust (CCS), retained WorleyParsons Komex to complete a Land Use and Reclamation assessment for the proposed Bruderheim Sulphur Forming and Shipping Facility (the Project) to be located in a portion of Section 35-55-20 W4M (the Site). The objectives of the assessment were to evaluate:

- existing land uses within the Land Use Local Study Area (LSA) and Regional Study Area (RSA)
- potential conflict with nearby agricultural activities
- the Project's ability to fit within the existing development profile
- the Project's compatibility with the surrounding rural setting
- the potential impact to neighbouring residences and businesses

Although Lamont County is largely agricultural, it contains a zone designated for heavy/medium industrial use as part of Alberta's Industrial Heartland. The proposed Project is situated entirely within the Heavy/Medium Industrial Policy Area of Lamont County's Industrial Heartland. The Site plus a 200 m buffer zone is the LSA for the Land Use component. The Industrial Heartland boundary in Lamont County serves as the RSA and contains both the Heavy/Medium Industrial Policy Area and the 1.6 km Agricultural Policy Area buffer zone.

The assessment determined that the Project will have limited or no impact on surrounding land uses. The Terms of Reference issued from Alberta Environment for this assessment is as follows:

Review current land use issues and identify the anticipated changes in nature, location and duration of land use as a result of the Project. Discuss:

a) conformity with land use objectives and planning parameters for the Lamont County, Alberta's Industrial Heartland Area Structure Plan;

The proposed Project conforms to the non-discretional planning parameters and land use objectives of Lamont County and Alberta's Industrial Heartland. Specifically, the Project represents industrial development within the lands identified and zoned for industrial development within Alberta's Industrial Heartland and Lamont County. It is a supporting industry to Alberta's petroleum industry, which is specifically noted as a desirable activity in the Alberta Industrial Heartland Structure Plan for Lamont County, one of the three principal documents used to define land use in the County. The remaining two planning documents, the Lamont County Municipal Development Plan and the Lamont County Land Use Bylaw, encourage industrial growth in the county, but the specific type of industrial development is left to the discretion of the Development Authority and this body's interpretation of the project's activity and its appropriateness for the District.

b) potential project impact on local and regional land use management, residential areas, agricultural development, areas with native vegetation, wildlife habitat, recreation uses, and other industrial uses in the region;

The proposed Project will have minor local impact on residential, agricultural and recreational uses, as follows:

- residential impacts are limited to the preclusion of residential development within the LSA, which in any event, is currently limited by its inclusion within Alberta's Industrial Heartland
- agricultural land use is diminished by the proportion of agricultural lands that lie within the Principal Development Area (PDA)

- the primary recreational land use that potentially will be affected is birdwatching, specifically around the wetlands located in the northwest portion of the LSA. The Project is being designed to mitigate potential impacts to this wetland. Impacts to hunting are also anticipated, although these impacts are expected to be essentially contained within the wildlife RSA. Hunting is typically prohibited on lands developed and used for industrial purposes and the wildlife RSA is contained within lands currently zoned for industrial use or within adjacent buffer lands.

No impacts to other industrial land uses are anticipated, although it is noted that the compatibility of sulphur forming with chlorate production was evaluated as a specific safety concern. Testing is underway to compare the potential reactivity of sulphur and chlorate to that of other common organic particulates. Results of these tests will be reported to the Natural Resources Conservation Board (NRCB) and Alberta Environment (AENV) independently and communicated to interested stakeholders.

Potential impacts to areas with vegetation and wildlife are described in Volume IIC, Section 3: Vegetation and Volume IIC, Section 4: Wildlife

c) mitigation plans to minimize these effects; and

Mitigation strategies associated with other components of the Environmental Impact Assessment (EIA) will be implemented and are relevant to Land Use related impacts. Relevant components include the following:

- Volume IIA, Section 2: Climate and Air Quality and Volume IIA, Section 3: Noise and Light
- Volume IIB, Section 4 Surface Water Quality
- Volume IIC, Section 2: Soil; Section 3: Vegetation; Section 4: Wildlife; and Section 5: Biodiversity and Fragmentation
- Reclamation Plan (see below)

These mitigation strategies will effectively mitigate potential impacts associated with Land Use. No additional mitigation plans or strategies are proposed which are specific to Land Use related impacts.

d) reclamation concepts and objectives. Develop a conceptual reclamation/closure plan for the PDA considering regulatory requirements, stakeholder input, land use objectives and other factors necessary for a reclamation plan to be implemented.

The Conservation and Reclamation (C&R) Plan is contained in Appendix I.

Discuss how the reclamation/closure plan design will:

e) assess for and mitigate/remediate on site contamination;

f) return equivalent land capability as compared to pre-disturbance conditions;

g) integrate the proposed landscape with the surrounding landscapes including inter-connectivity to the surrounding landscapes;

h) integrate surface- and near-surface drainage within the Principle Development Area (PDA); and

i) be incorporated into planning and development of the Project.

The C&R plan outlines a conceptual closure plan for the Site which includes provisions for achieving equivalent land capability for the PDA upon Project closure. This includes any potential remediation that may be required to address contamination associated with the Project, including remediation of soils potentially affected by acidification due to sulphur deposition. The conceptual closure plan also addresses the return of the landscape, including surface and near-surface drainage, to pre-disturbance conditions and addresses revegetation of the PDA upon Project closure.

Provide and discuss:

j) the anticipated timeframes for completion of reclamation activities;

k) the applicable parameters that should be used to monitor and evaluate the reclaimed land;

l) any constraints to reclamation such as timing of activities, availability of materials and influence of natural processes and cycles;

m) any soil-related constraints or limitations that may affect reclamation; and

n) specifically discuss the feasibility of the methods prescribed for reclamation (i.e., their proven success in trials or other locations).

Reclamation will commence as soon as possible within one year of decommissioning of all or a portion of the facility. It is expected that reclamation will be completed within five years of the complete decommissioning of the facility.

Parameters used to determine reclamation success will include:

- comparison of post-reclamation topography and drainage patterns with pre-disturbance conditions
- weed surveys to evaluate the success of weed management and vegetation reclamation programs
- soil monitoring to evaluate any residual soil acidity
- evaluation of soil quality parameters to determine if reclamation suitability of the topsoil and subsoil has been improved through proposed reclamation activities
- a detailed topsoil depth assessment to ensure topsoil depths are appropriate in reclaimed areas

In general, success in achieving equivalent land capability through reclamation is dependent on the quality of reclamation materials and the care taken to maintain the quality of those materials through the reclamation process. Successful reclamation of topsoil disturbances in Central Alberta has been demonstrated at hundreds of oil and gas and industrial facilities and the procedures for reclamation success are well documented and understood. Similarly, amelioration of soil acidity and sodicity by lime application is a well understood and accepted practice in Alberta and worldwide. The use of proper reclamation practices upon Project closure are anticipated to return soil to similar or better quality than currently exists in the PDA.

2. Land Use and Reclamation

2.1 Introduction

2.1.1 Project Background

This Land Use and Reclamation assessment was prepared for the Environmental Impact Assessment (EAI) for the proposed AST Project at Bruderheim, Alberta. It provides information on the various land uses within the Land Use Local Study Area (LSA) and Regional Study Area (RSA). The LSA and RSA are located entirely within Lamont County and the Alberta Industrial Heartland that includes the Heavy/Medium Industrial Policy Area (IPA) and its surrounding 1.6 km Agricultural Policy Area (APA) buffer (ASP 2001). This zoned area has a limited degree of land uses allowed within its boundaries.

In addition to current land use, the Municipality of Lamont County's land use policy and strategy are indicated in the Land Use and Municipal Development Plan, which are used to determine the future direction of industrial development and how the Project conforms to these guidelines.

Initial investigations determined current baseline conditions for the area. Potential impacts and cumulative effects based on existing conditions were evaluated for the Project; and, mitigative measures were evaluated to reduce negative impacts and residual effects.

Conversations with the Métis Council of Alberta (Métis Council 2006, pers. comm.) and the Municipality of Lamont (Janssen 2006, pers. comm.) confirmed there were no Aboriginal groups or Aboriginal group activity within the boundaries of the RSA.

2.2 Scope of Work

The principal issues identified for Land Use and Reclamation relate to the Terms of Reference (TOR) and the policy and strategy laid out in defining documents for Lamont County. Emphasis is placed on the following three documents and their land use policy:

- Municipal Development Plan Bylaw (MDPB) 633/02 (MDPB 2002)
- Land Use Bylaw (LUB) No. 632/02 (LUB 2002)
- Alberta's Industrial Heartland Area Structure Plan (ASP) (ASP 2001)

The Project has the potential to raise a number of questions with regard to the construction and operation phases and how the three aforementioned documents relate to the Project. Potential issues and those that have been raised with the community with regard to land use and the Project include:

- potential conflict with nearby agricultural activities
- the Project's ability to fit within the area's development profile
- the Project's compatibility with the surrounding rural setting
- the potential impact to neighbouring residences and businesses

Within this framework, key components considered for this study included:

- linear development
- mineral dispositions and land surface rights
- forestry
- agriculture
- hunting
- trapping
- fishing
- parks and protected areas
- recreation
- residency

In addition, this report was prepared according to requirements and guidelines set forth in the *Environmental Protection and Enhancement Act* (EPEA) for completion of an EIA (AENV 1993, Internet site).

2.3 Terms of Reference

2.3.1 Land Use

This assessment also addresses the issues that are identified in the Terms of Reference (TOR) (AENV 2007):

Review current land use issues and identify the anticipated changes in nature, location and duration of land use as a result of the Project. Discuss:

a) conformity with land use objectives and planning parameters for the Lamont County, Alberta's Industrial Heartland Area Structure Plan;

b) potential Project impact on local and regional land use management, residential areas, agricultural development, areas with native vegetation, wildlife habitat, recreation uses, and other industrial uses in the region;

c) mitigation plans to minimize these effects; and

d) reclamation concepts and objectives. Develop a conceptual reclamation/closure plan for the PDA considering regulatory requirements, stakeholder input, land use objectives and other factors necessary for a reclamation plan to be implemented.

Discuss how the reclamation/closure plan design will:

e) assess for and mitigate/remediate on-site contamination;

f) return equivalent land capability as compared to pre-disturbance conditions;

g) integrate the proposed landscape with the surrounding landscapes including inter-connectivity to the surrounding landscapes;

h) integrate surface- and near-surface drainage within the PDA; and

i) be incorporated into planning and development of the Project.

Provide and discuss:

j) the anticipated timeframes for completion of reclamation activities;

k) the applicable parameters that should be used to monitor and evaluate the reclaimed land;

l) any constraints to reclamation such as timing of activities, availability of materials and influence of natural processes and cycles;

m) any soil-related constraints or limitations that may affect reclamation; and

n) specifically discuss the feasibility of the methods prescribed for reclamation (i.e., their proven success in trials or other locations).

2.4 Methods

2.4.1 Spatial Boundaries

2.4.1.1 Principal Development Area

The PDA consists of:

- rail and road access for receiving molten sulphur
- molten sulphur unloading and transfer facilities
- sulphur forming facilities to produce sulphur pastilles
- loading and shipping facilities for formed sulphur
- sulphur pastille temporary storage area

The PDA is 24.8 ha and is equivalent to the Project footprint, which is located in a portion of Section 35-55-20 W4M (the Site). This section of land is owned by AST.

2.4.1.2 Local Study Area (LSA)

The LSA is defined as the Site plus a 200 m buffer zone. It is consistent with the LSA used by the vegetation, soils and wildlife studies. The LSA covers an area of approximately 407.4 ha and is located within the larger RSA, as illustrated in Figure 2.4-1.

2.4.1.3 Regional Study Area (RSA)

Alberta's Industrial Heartland Area Structure Plan for Lamont County (ASP) incorporates the land use policies from Lamont County's1998 Municipal Development Plan Bylaw 605/97. These are the basis for the land uses proposed for the area within Alberta's Industrial Heartland (ASP 2001). Lamont County, as a municipal partner of the ASP, stipulated that its land use designations be respected during the planning and development of the area structure plans. The ASP boundary provides a one-section, 1.6 km land buffer around almost the entirety of the IPA (see Figure 2.4-2).

The RSA considers and exceeds the spatial extent of expected air emissions and wind-borne dust from the Project according to a preliminary air quality modeling report (see Volume IIA, Section 2: Climate and Air Quality (Leahey et al. 2005)). The ASP boundary outlined in existing municipal policies and the air emissions predicted in the air modeling studies serve as the two key criteria in the determination of the RSA for this report. The RSA measures 4,571.3 ha and includes the IPA (1,057 ha) as well as the buffering APA (3,514.3 ha). The IPA and APA boundaries within the RSA are outlined in Figure 2.4-2.

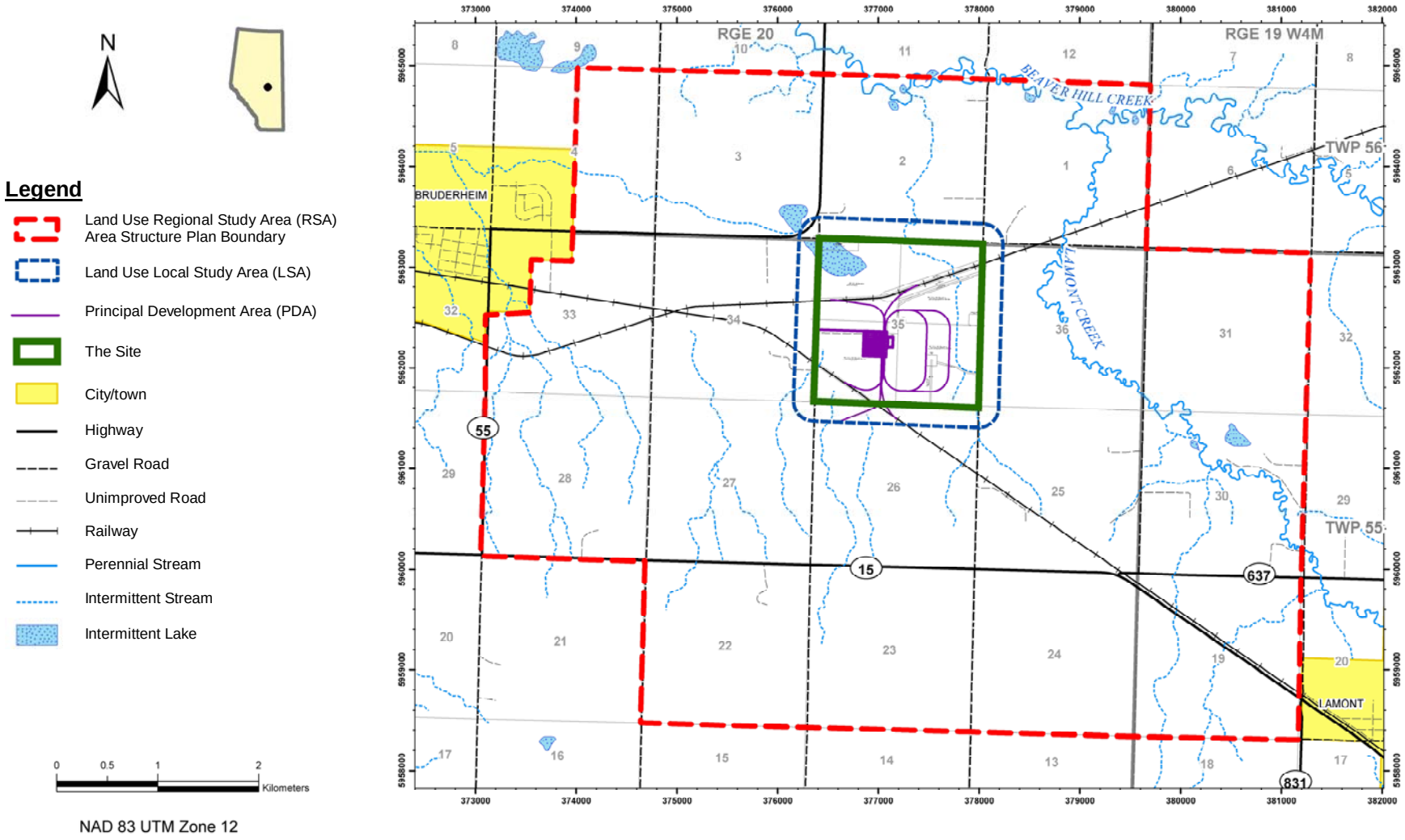

Figure 2.4-1: Land Use LSA and RSA

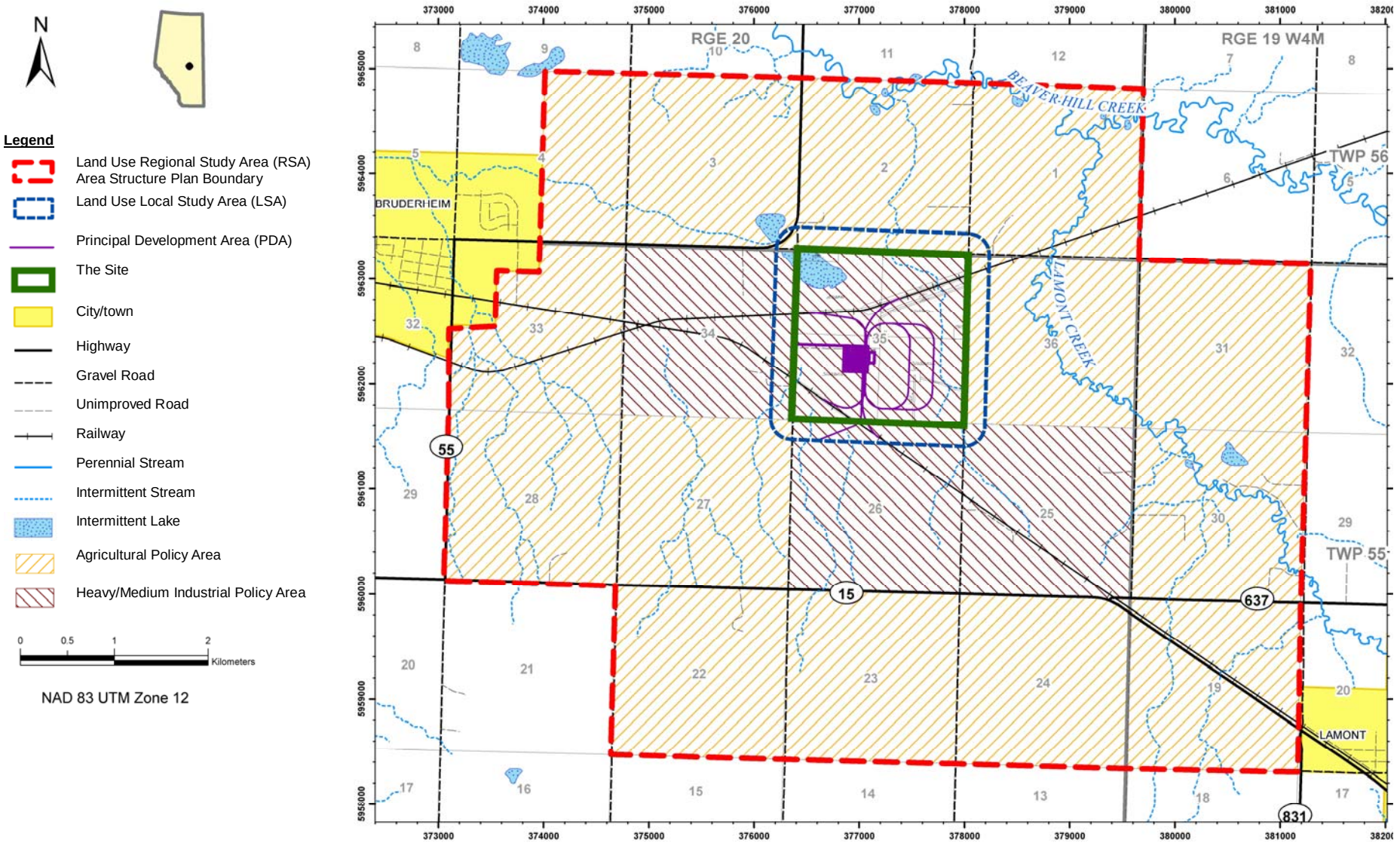

Figure 2.4-2: IPA and APA Boundaries within the Land Use RSA

2.4.2 Temporal Boundaries

The temporal boundaries for this report are baseline, application and closure. Baseline refers to current conditions at the time this assessment was performed (November 23, 2006–March 6, 2007). Application is assessed at the maximum sulphur pastille production of 6,000 t/d. Project operations are predicted to last 25 years. Closure is considered when all Project facilities have been decommissioned and reclamation has taken place. It is assumed that closure occurs five years after decommissioning and reclamation.

2.4.3 Project Inclusion List

The project inclusion list considers the various anthropogenic disturbances that must be included in each assessment case in order to effectively determine Project effects and cumulative effects. Table 2.4-1 provides the list of projects included in these cases.

Table 2.4-1: Project Inclusion List

Status	Baseline Case	Application Case	Cumulative Effects Case
Existing and approved	Canexus Chemicals	Canexus Chemicals	Canexus Chemicals
	ERCO Worldwide		
	Triton Fabrication	Triton Fabrication	Triton Fabrication
Project		Bruderheim Sulphur Forming and Shipping Facility	Bruderheim Sulphur Forming and Shipping Facility

2.4.4 Data Collection

2.4.4.1 Baseline Case

Detailed descriptions of MDPB 633/02 (MDPB 2002), LUB No. 632/02 (LUB 2002) and Alberta's Industrial Heartland ASP (ASP 2001) are provided in Section 2.5 of this document. Supplemental conversations with representatives of the Municipality of Lamont County and the Industrial Heartland Association clarified information within the documents and provided specific details regarding policy and how it pertains to the Project's LSA and RSA. Primary sources of information were personal telephone conversations and emails to representatives of the various regulatory and informational bodies pertaining to land uses in the area. Personal contact was made with the following agencies and organizations:

- Natural Resources Conservation Board
- Alberta Government, Energy Information Centre
- Fisheries Management, Fish and Wildlife (Alberta Sustainable Resource Development)
- Alberta Registry Services
- Parks Canada, Elk Island National Park Agency
- Agriculture Financial Services Corp.
- Alberta Economic Development
- Lamont County Agricultural Service Board
- Sustainable Resources and Development
- Municipality of Lamont County
- Lamont Fish and Game Association

- Alberta Economic Development, Parks and Protected Areas Division
- Canexus Chemicals
- Kalyna Country
- Métis Council of Alberta

Additional sources, primarily Internet, were used to gather basic information regarding regulations and zoning on a number of issues for Lamont County and the defined RSA. Again, personal conversations with representatives from various agencies were used to supplement information obtained online. Contact with the Alberta Government and the Alberta Registries office was made to conduct a Land Status Automated System (LSAS) report to determine Mineral Dispositions and Land Surface Rights.

2.4.4.2 Application Case

Potential impacts of the Project were assessed for direction, geographic extent, magnitude, duration, confidence and reversibility as defined in Volume I: Project Description. A final impact rating of Class 1, 2, 3 or 4 was applied to potential impacts according to the criteria defined in Table 2.4-2.

Table 2.4-2: Final Impact Rating

Rating	Level of Action
Class 1	The predicted trend in an indicator under projected land use development could threaten the long-term sustainability of the quantity or quality of the indicator in the local and regional study areas. An action plan, developed jointly by regional stakeholders, is required to monitor the affected indicator, identify and implement further mitigation measures to reduce any impact and promote recovery of the indicator, where appropriate. This Class of impact might also be applicable to an exceedance of a regulatory guideline or where the impact will have long-term effects.
Class 2	The predicted trend in an indicator under projected land use development will likely result in decline in the quantity or quality of the indicator. The decline could be to lower-than-baseline but stable levels in the local and regional study areas after closure and into the foreseeable future. In addition to responsible industrial operational practices, monitoring and recovery initiatives could be required if additional land use activities occur in the study area before closure of the projected land use development. This Class of impact might also be applicable to an exceedance of a regulatory guideline or where the impact is expected to have mid-term effects, but where recovery will take place shortly after closure of the projected land use development.
Class 3	The predicted trend in an indicator under projected land use development could result in a slight decline in the quantity or quality of the indicator in the local and regional study areas during the life of the projected land use development, but resource levels should recover to baseline after closure. In some cases, a short-term, low to moderate magnitude impact could occur, but recovery will take place within five years. No new resource management initiatives are necessary. Responsible industrial operational practices should continue. This Class of impact could also be applicable where regulatory guidelines are not exceeded, but where a relative change in magnitude of an indicator occurs.
Class 4	The projected land use development results in no change and no contribution toward affecting the quantity or quality of the indicator in the local and regional study areas during the life of the projected land use development. Responsible industrial operational practices should continue. Therefore, no cumulative effects result from the Project. Mitigation measures were developed to adaptively manage any potential impacts of the Project on land use in the LSA.

2.4.4.3 Cumulative Effects Assessment

A Cumulative Effects Assessment (CEA) was completed for any potential impacts identified under the application case as Class 1, 2 or 3 impacts. These potential impacts were assessed for cumulative and residual effects of the Project in the RSA. The CEA included the facilities listed in Table 2.4-1. Additional EIAs from companies noted in the project inclusion list were not available for the CEA.

2.5 Regional Policy

2.5.1 Sources

2.5.1.1 Area Structure Plan

Lamont County partners with three other municipalities, Sturgeon, Strathcona and the City of Fort Saskatchewan, to compose the Industrial Heartland of Alberta. The Lamont County ASP published in April, 2001 and adopted by the County, is similar in content to the structural plans of the other three partners (ASP 2001).

The ASP's purpose is to provide 'a framework for further development subsequent to a Municipal Development Plan'. The ASP addresses:

- proposed land uses
- general location of transportation and infrastructure routes
- density of population
- other relevant matters

Defined in the *Municipal Government Act*, the ASP requires that all municipal plans and actions are consistent with the enactment of land use policies adopted by an Order-in-Council in 1996. The ASP serves as a tool to help determine if an area is suitable for a particular facility according to municipal, provincial, federal resource and stakeholder requirements. The ASP reinforces the responsibility of Lamont County to ensure that industry meets the necessary standards and requirements of the various levels of government (ASP 2001).

2.5.1.2 Municipal Development Plan Bylaw (MDBP) 633/02

The objective of the Lamont County MDPB 633/02 (MDPB 2002) is to *provide policies to give the opportunity for many different land uses to occur while at the same time conserving the agricultural base of the County*. The MDPB desires planned growth for the County but with the further stipulation that *future generations will have a desirable place to live and work*. Development in the area is to conform to MDBP policies which ensure it is completed in an orderly, efficient and consistent fashion.

2.5.2 Land Uses

The MDPB emphasizes the agricultural importance of Lamont County and its position within a productive agricultural area. It is based on the *Agricultural Operation Practices Act* and *Municipal Government Act*, which stresses the importance of having a combination of land use types while minimizing conflict between farm and non-farm land uses.

The MDPB and Land Use Bylaw (LUB 2002) (see Section 2.5.2.2) define six distinct land use districts throughout the county, four of which are located in the RSA and its immediate surroundings:

- Agricultural Use Area 1 (A1): blocks of land consisting largely of higher capability agricultural land
- Agricultural Use Area 2 (A2): blocks of land consisting largely of lower capability agricultural land
- Urban Fringe (UF): development around incorporated towns and villages
- Industrial/Commercial District (IC): heavy and medium industry development

The MDPB states that non-agricultural development projects are to be encouraged by Lamont County Council for location in A2 designated areas so as to conserve higher capability farm land for agricultural purposes. Land uses that contradict agricultural activities in A1 will not be allowed in these A1 areas unless special circumstances exist. Figure 2.5-1 shows land use districts for the County and RSA as defined by the MDPB. A map of agricultural zones prior to siting the Heartland's Heavy Industry Zone (IC) was not available but according to Municipality of Lamont, the current IC replaced A1 land (Hamilton 2006, pers. comm.). The Project lies entirely in the Industrial Policy Area (IPA) shown in Figure 2.4-2. The IPA is a 100% Industrial/Commercial district. IPA classification is used in the ASP while the IC classification is used in the MDPB. The two aforementioned figures display the borders of each. The LSA overlaps with the A1 district. Table 2.5-1 shows the area of each land use within the RSA.

2.5.2.1 Industry

With specific regard to industry, the MDPB has various objectives for the County:

- encourage the use of lower capability agricultural land for industrial development
- encourage appropriate industries to locate in the County
- ensure that industrial development meets high environmental standards
- minimize conflicts between industry and other land uses
- ensure municipal costs associated with industrial development are identified to the satisfaction of the County
- support agri-based industrial development

Table 2.5-1: Areas of Land Use Districts in RSA

District	Area (ha)	% of Total
A1 (higher capability agricultural land)	2,120.1	46.38
A2 (lower capability agricultural land)	195.9	4.29
IPA	1,089.0	23.82
UF (urban/fringe)	1,166.3	25.51
Total	**4,571.3**	**100.00**

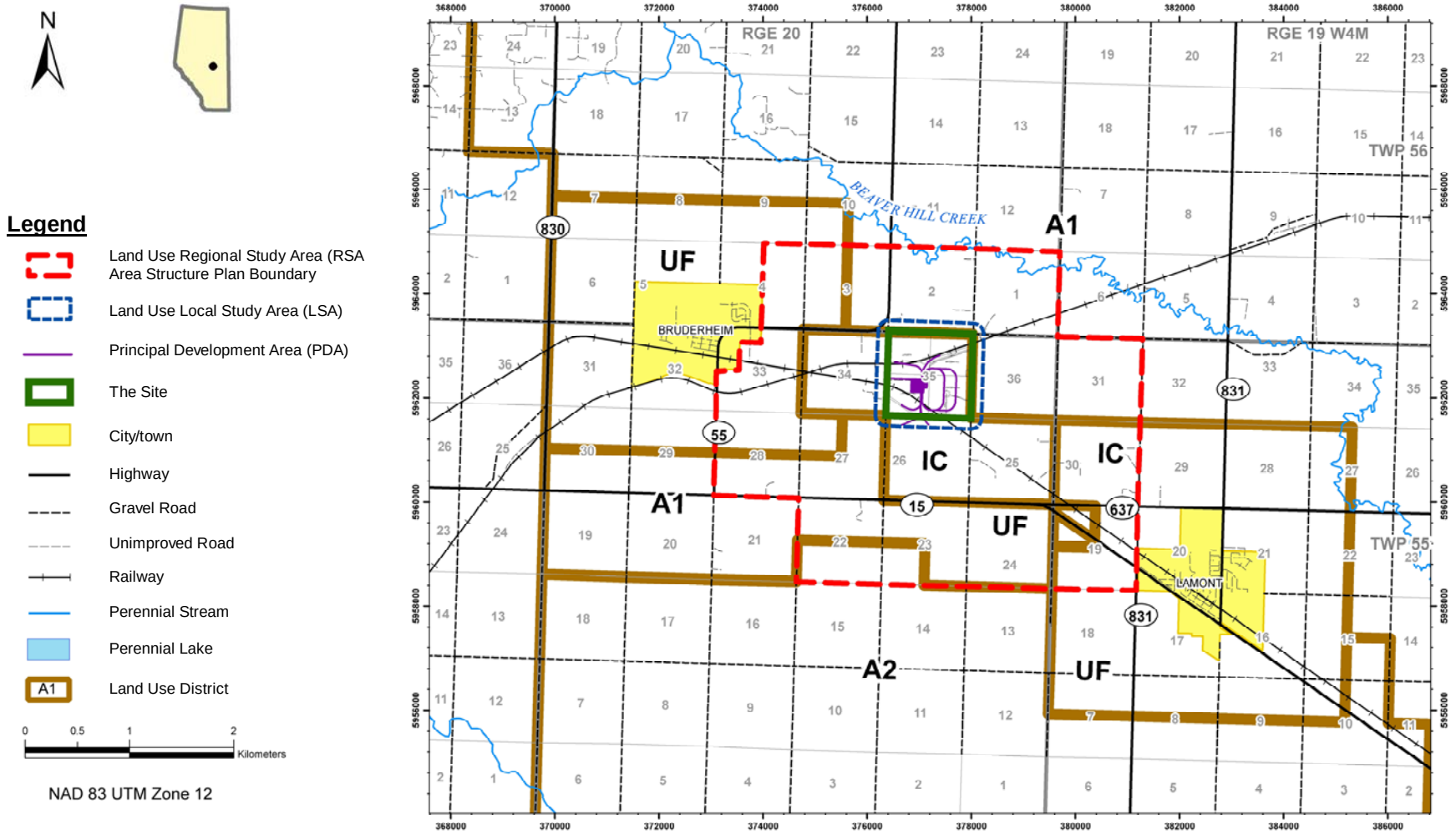

Figure 2.5-1: Land Use Districts Defined by Municipal Development Bylaw Plan

Heavy industry, with high levels of noxious emissions or noise, are to be encouraged to locate in A2 areas, though it should be reiterated that the Heartland IPA was positioned, in its entirety, within what was once A1 land.

The Council considers proposals for development of lands for industrial use if the proposal is for an industrial park. Furthermore:

the County may require the preparation of an environmental impact assessment regarding the impact of proposed development on the natural and human environment, and indicate both if and how any negative impacts can be mitigated. The County will require the implementation of any mitigating actions indicated in the assessment as a condition of any development approval. (MDPB 2002)

A number of stipulations are obligatory in any proposal considered by the Municipality of Lamont County Council. The following are most notable with their possible relation to the Project (LUB 2002):

- not, in the opinion of the County, to conflict or jeopardize the surrounding land uses
- to be considered only in accordance with an approved outline plan or at the discretion of Council, an Area Structure Plan, developed and approved in accordance with the Municipal Government Act
- not be permitted to locate in close proximity as determined by the County, to a hamlet and urban centre or a multi-d-lot residential subdivision
- be accompanied by an identification of all municipal costs associated with the proposal
- meet all provincial requirements and obtain a development permit from the County prior to construction
- be encouraged to locate near or adjacent to provincial highways (LUB 2002)

2.5.2.2 Land Use Bylaw (LUB) 632/02

The LUB (2002) for Lamont County was promulgated in accordance with the *Municipal Government Act* of 1994. The following purposes are considered key in relation to the Project:

- *to regulate the development of those industries, which require large tracts of land. No industrial use shall be allowed in this District if the Development Authority considers it to possess objectionable, dangerous or potentially hazardous conditions.*
- *to regulate and control the use and development of land and buildings within the municipality to achieve the orderly and economic development of land and for that purpose, among other things:*
  - *to prescribe and regulate for each district the purposes for which land and buildings may be used*
  - *to establish a method of making decisions on applications for development permits including the issuing of development permits*
  - *to provide the manner in which notice of the issuance of a development permit is to be given*

Specific to matters of the Industrial/Commercial District within the Industrial Heartland, the following stipulations from the LUB were regarded as relevant to the Project.

2.5.2.2.1 Development Permit

A copy of the Development Permit for Lamont County is available on the Municipality of Lamont County website (Municipality of Lamont County 2006, Internet site).

Application for Development, Section 2.1 of the Bylaw states:

An application for development permit shall be made to the Development Authority in writing, in the form required by the Development Authority. The Development Authority Officer is appointed by resolution of the Lamont County Municipality Council. Each Application for Development shall be accompanied by:

- *a site plan in duplicate showing the legal description; in front, rear and side yards, if any; any provision for off-street loading and vehicle parking; and access and egress points to the site;*
- *a statement of the proposed uses;*
- *a statement of ownership of the land and the interest of the applicant therein (LUB 2002)*

For a proposed industrial use, the Development Authority may require the submission of an EIA which will assess the impact of the proposed development on the natural and human environments and indicate if and how any negative impacts can be mitigated.

2.5.2.2.2 The Decision Process

The Development Authority Officer Shall:

- *Consider and decide on all applications for a development permit for those uses which constitute permitted uses in a district.*
- *Refer to the Municipal Planning Commission (MPC), as established by Council Bylaw, for its consideration and decision any applications for a development permit for all other uses or developments in a district that will not fully comply with the minimum and/or maximum standards for that district, or those where the regulation has been assigned by this Bylaw to the MPC for consideration and decision.*
- *Refer to the MPC for its consideration and decision any application which, at his/her sole opinion and discretion, should be decided by the Commission.*
- *In making a decision on an industrial use, the Development Authority may require that, as a condition of issuing a development permit, the applicant undertake any mitigating actions indicated in the assessment described by an assessment.* (LUB 2002)

Site Conditions

- *The Development Authority may prescribe setback and/or buffering requirements for uses, which may be physically or visually incompatible with nearby land uses.*
- *The Development Authority may require or approve screening for uses, which involve the outdoor storage of goods, machinery, vehicles, building materials, waste materials and other similar materials.*
- *The Development Authority may require the retention of trees or additional planting of such type and extent as considered necessary* (LUB 2002).

2.5.3 Specific Land Use Policy

2.5.3.1 Highways and Rural Roads

The LUB (2002) states the following regarding the development of highways and rural roads:

- *Any development permit issued for development within 0.8 km (0.5 mile) of the right-of-way of a Highway shall be issued subject to approval of the development by Alberta Transportation.*
- *No development shall be located so that access or egress to a secondary road is within 152.4 m (500 ft.) of the beginning or end of a road curve of greater than twenty (20) degrees, or within 304.8 m (1,000 ft.) of the intersection of two roads or highways.*
- *For rural roads:*
  - *There shall be no more than four (4) approaches developed per 0.8 km (0.5 mile) except at the discretion of the Development Authority.*
  - *Prior to any new approach being developed, the landowner or authorized person acting on the owner's behalf shall enter into an approach agreement with the County.*
  - *At the discretion of the Development Authority, and whenever possible, joint access shall be encouraged. Development permits are required for development within 38.1 m (125 ft.) of the centre line.*
  - *No development shall be located so that the access and egress is within 91.5 m (300 ft.) of the beginning or end of a road curve exceeding twenty (20) degrees.*
  - *The planting of trees adjacent to primary highways, secondary roads and rural roads shall be in accordance with the requirements of this Bylaw.*
- *Access or egress to a secondary road may not be permitted where it would be:*
  - *less than 152.4 m (500 ft.) from an existing access or egress on the same side of the road;*
  - *less than 152.4 m (500 ft.) from a bridge; or*
  - *less than 152.4 m (500 ft.) from an at-grade railway crossing;(LUB 2002)*

2.5.3.2 Land Surface Rights

The LUB states that any development involving pipeline and/or power line rights-of-way (ROW) shall be sited to comply with all relevant Federal and Provincial legislation and guidelines (LUB 2002). The MDPB (2002) adds that the *County does not have the authority to regulate highways, pipelines, transmission lines and similar installations that are under provincial control, however, in many instances Council is given an opportunity to comment on the proposed locations of these facilities*.

There are no additional regulations stipulated under the LUB (2002) or the MDPB (2002).

2.5.3.3 Forestry

Specific guidelines regarding forestry in Lamont County are not provided in the ASP, MDPB or LUB and are not applicable for this assessment.

2.5.3.4 Agriculture

The MDPB strives to protect agricultural economy, discourages the use of agricultural land for other activities and seeks to minimize the disruption of farm operations by nearby incompatible land uses (MDPB 2002). Further stipulated within the MDP is the primary goal:

To protect and allow for the enhancement of the valuable agricultural land resource, the agri-based economy and the rural lifestyle.

Two key policies within the MDPB (2002) include:

- *In both Agricultural Use Area 1 and Agricultural Use Area 2, Council shall encourage non-farm land use to locate on lower capability agricultural land in order to conserve higher capability agricultural land for farm uses.*
- *Land uses that may conflict with the agricultural activities shall not be allowed to locate in the Agricultural Use Area 1 unless unique or special circumstances exist as specified in other policies of this Plan.*

2.5.3.5 Hunting and Wildlife

The MDPB (2002) states that Lamont County strives to promote and preserve existing wildlife resources in the County. Objectives include:

- to ensure that critical fish and wildlife areas are conserved where possible
- to minimize conflicts between wildlife and other land uses

Key policies regarding wildlife for Lamont County include:

i) Subdivision or development that, in the County's opinion, would be significantly incompatible with the wildlife resource or habitat shall not be permitted. (MDPB 2002)

ii) Council shall encourage all development in the County to have regard for the maintenance of wildlife resources and their habitats. When reviewing an application for the development, consideration of the possible negative impacts should be evaluated and mitigative measures suggested to minimize such negative impacts. (MDPB 2002)

2.5.3.6 Trapping

Trapping is coordinated through Registered Fur Management Areas (RFMAs). Lamont County lies within fur management zone (FMZ) 7 of Alberta (Alberta Outdoorsmen 2006c, Internet site). Specific guidelines regarding trapping in Lamont County are not provided in the ASP, MDPB or LUB.

2.5.3.7 Fishing

Specific guidelines regarding fishing in Lamont County were not provided in the ASP, MDPB or LUB and are not applicable for this assessment.

2.5.3.8 Parks and Protected Areas

Policy regarding parks and protected areas in many instances overlaps with policy regarding habitat and wildlife. In addition to the aforementioned policy, supplementary regulations exist specifically for Elk Island National Park:

- *All subdivision and discretionary development proposals within 1.0 mile (1.6 km) of Elk Island National Park should be referred to the Park authorities for comment. Such comments should be considered by the County in reviewing the proposal.* (LUB 2002)
- *Industrial, multi-lot residential and intensive agricultural uses should not be permitted to develop within 1.0 mile (1.6 km) of the Park boundary.* (LUB 2002)
- *All subdivision proposals and all applications for significant discretionary development permits within 1.6 km (1.0 mile) of Elk Island National Park shall be referred to the Superintendent of Elk Island National Park with a copy to the Director General of the Western Region, Canada Parks Service, for comment prior to a development permit being issued or a subdivision being approved.* (LUB 2002)

2.5.3.9 Recreation

Recreation opportunities are few in Lamont County with residents taking advantage of facilities in nearby counties (MDPB 2002). The Council would like to encourage increased recreational development in the County, particularly non-facility oriented activities that are compatible with the rural environment (MDPB 2002).

The following MDPB policies were found relevant to the investigation:

Council shall encourage the development of public serving recreational facilities/uses:

- *if they are compatible with the capabilities of a site or surrounding areas*
- *on lower capability agricultural lands, unless Council decides that the benefits to the community justify the use of higher capability agricultural lands*

The MDPB and LUB address the appropriate location of recreational development. These Bylaws state recreational development should only be permitted within A2 agricultural land but this requirement may be waived by the Development Authority.

Vision 2020, A Strategic Vision for the Town of Bruderheim (Bruderheim Town Council 2004), includes a strategy to double the current level of participation in recreation.

2.5.3.10 Residency

The MDPB strives to *allow for a limited degree of residential development while still ensuring that predominantly agricultural areas are unencumbered by such subdivisions.*

In relation to the proximity of residential areas to industrial zones, the MDPB states that no residential development should occur on lands situated closer than:

- *Such distances from the boundary of land containing an extractive industry, potentially noxious industry and other developments/uses detrimental to residential development as deemed acceptable and prudent by the County.* (MDPB 2002)

This latest statement, in itself, may leave some room for interpretation as to what would be considered ‘detrimental’. However, in combination with the LUB, the policy is quite clear. The LUB (2002) states that*: no foundations will be allowed in the Industrial Heartland Area or within 1.6 km of the Industrial Heartland Area.*

2.6 Baseline Assessment

2.6.1 Introduction to Baseline

Current baseline conditions within the RSA, in many ways prove ideal for industrial development because the proposed AST site is located in an area that is mandated for industrial development. The evolution of the industrial zone has mitigated previous impacts and prevented the development of contradicting land use activity. This baseline, in combination with county land use policy, describes current conditions prescribed for heavy/medium industry and serves as a tool to determine if the proposed AST facility is the type of industry suitable for the area.

2.6.2 Assessment Baseline Case

The Lamont County section of the Industrial Heartland was favourably zoned for heavy and medium industry. The Lamont County IPA is situated predominantly on previously disturbed land of low residential density, without the presence of parks, green space or environmentally significant areas (Alberta Community Development, Parks and Protected Areas Division 2006, Internet site). The proposed Site is serviced by two rail lines (CN and CP) and two major highways (Highway 45 from the north and Highway 15 from the south). The road access to the IPA and the Site is not direct from the highways but rather from R.R. 202, which serves as a connector between the two highways.

The area immediately surrounding the IPA, referred to as the Agricultural Policy Area (APA), is largely privately-owned which limits the amount of recreational activities. The relative close proximity of Elk Island National Park and the North Bruderheim (Sand Hills) Natural Area provide excellent opportunities for hiking, skiing, sightseeing and birdwatching while remaining outside of Lamont County's Industrial Heartland. There are no bodies of water that provide fishing opportunities within the LSA and the County in general is not known for fishing or trapping. Some hunting does occur within the RSA but the most popular hunting areas are more than 5 km northeast (Halisky 2007, pers. comm.).

The area within the IPA is still predominantly agriculture. However, Superior Plus Inc. owns ERCO Worldwide, which has been non-operational since the autumn of 2006 and is set to close in 2007. Canexus Chemicals operates a sodium chlorate plant to the west of the Project on Section 24-55-20-W4M. Triton Fabrication runs a fabrication shop to the south on Section 26-55-20-W4M.

2.6.3 Heavy/Medium Industry

2.6.3.1 Baseline Conditions

Heavy/medium industry siting is at the discretion of the Lamont County Council (LCC) and need not necessarily be proposed for the Lamont County IPA, although this type of industry is certainly promoted in the IPA. Heavy/medium industry sitings can occur throughout the County, even outside the Industrial Heartland Area, upon permission granted by the LCC (Hamilton 2006, pers. comm.). By the same token, a heavy industry application can be rejected even if its proposed location falls within the Industrial Heartland Area (Hamilton 2006, pers. comm.).

The IPA is currently under review as the LCC recently held a public session to hear views concerning the expansion of the Industrial Heartland. A representative of the County released the following statement: *We are hoping to update these plans so they recognize and address*

the changing economy, varied growth patterns and opportunities in the region. In undertaking this process, we would like input from you, the local resident, tax payer and stakeholder, prior to the detailed document review as it is you who may be affected by any changes (Lamont County 2006).

If approved, the IPA could be re-zoned as early as 2007. As of November 2006, the County has initiated a review of the MDPB and LUB. Public presentations have been received and Council will now review and discuss the issue. It is expected that supplemental public hearings will be required. The Municipality hopes the process will be completed in the second quarter of 2007 (Carr 2006, pers. comm.).

Three operations currently exist within the IPA of the Industrial Heartland located within Lamont County:

- Albchem Industries, a sodium chlorate plant purchased in 2003 by ERCO Worldwide, which is a division of Superior Plus Inc. (ERCO Worldwide 2007, Internet site). ERCO is located on the northwest quarter of 34-20-55 W4M. The ERCO plant has been in the area since 1990 but is currently not in operation and will be shut down completely in 2007 (Hamilton 2006, pers. comm.).
- Triton Fabrication, owned by Churchill Corporation, is located on the northwest quarter of Section 26-20-55 W4M. Triton provides heavy-industrial general contracting, fabrication and maintenance services to the resource and industrial sectors (Triton 2007, Internet site). The developmental permit for Triton Fabrication was issued in 2003 (Hamilton 2006, pers. comm.).
- Canexus Chemicals was acquired by the Canexus Income Fund and is a subsidiary of Nexen (Nexen 2007, Internet site). Canexus produces sodium chlorate and operates on the southeast quarter of Section 34-20-55 W4M. The plant was constructed in 1990–91 with operations beginning in 1991 (Kirichenko 2007, pers. comm.).

According to Alberta Economic Development's project proposal list for the Heartland, dated November 27, 2006, the AST Project is the only current proposal for Lamont County. This land use study is based on information available at the time of the assessment. Figure 2.6-1 shows all operations, existing and proposed within the Industrial Heartland.

2.6.4 Linear Development Access

2.6.5 LSA and RSA

2.6.5.1 Rail Access

Two existing rail lines, those of Canadian Pacific Railway (CPR) and Canadian National Railway (CN), pass through section 35-55-20 W4M.

The CPR rail line passes through both the northwest and northeast quarters of the PDA, proceeds south of Bruderheim to the west and travels eastward from the RSA.

The CN rail line passes through the southwest quadrant of the PDA and bisects the CPR rail line at 34-55-20 W4M and proceeds through Bruderheim heading west. To the east this rail line travels southeast through the towns of Lamont, Chipman, Hillard and Mundare.

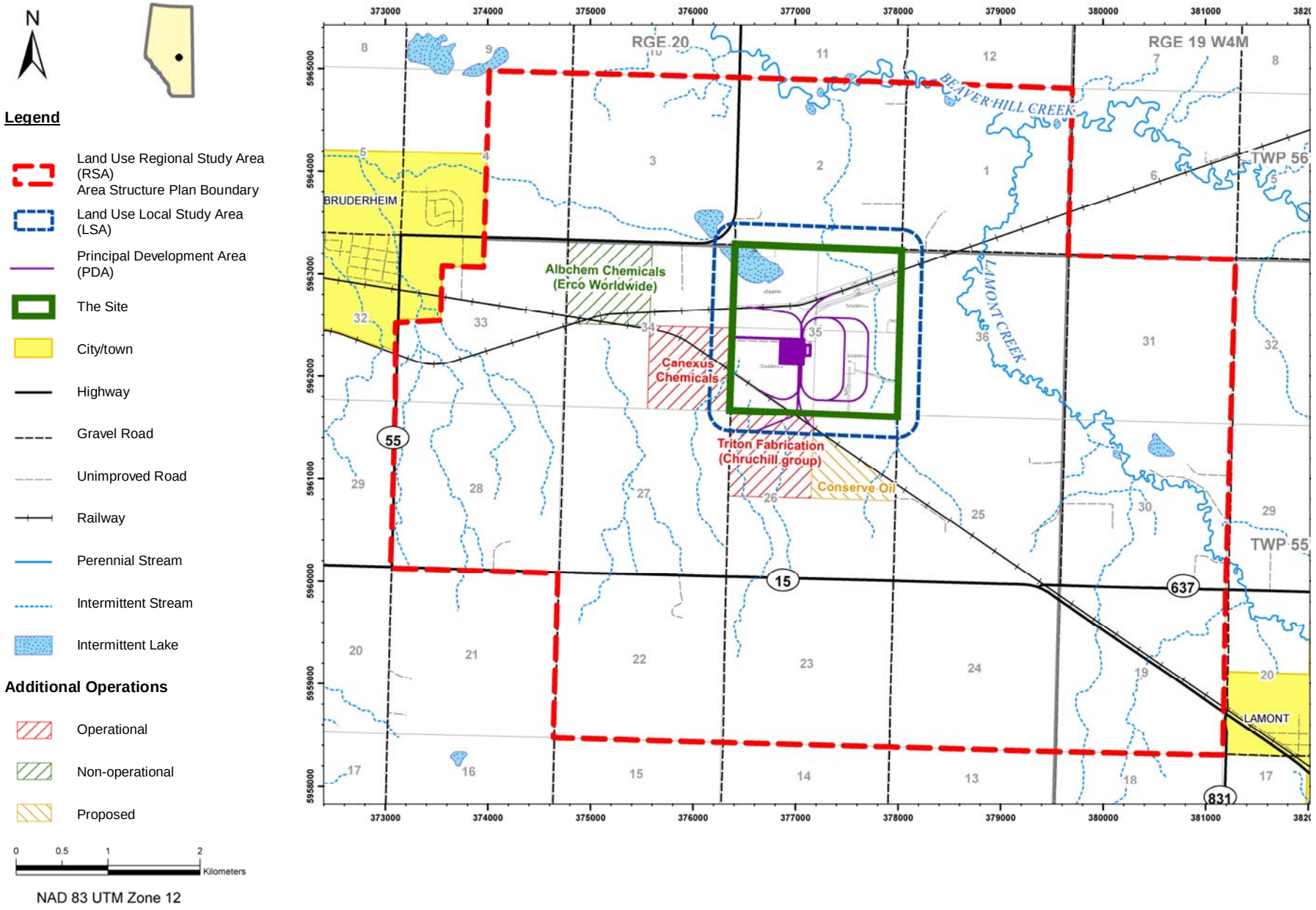

Figure 2.6-1: Industrial Operations in the LSA and RSA

2.6.5.2 Road Access

Direct road access to the facility site is available from R.R. 202, which runs north/south parallel to the west border of the Project's section of land. Entrance to the facility from this road is located approximately halfway along the west border of the section of land for the Project. Access to R.R. 202 is obtained from two major highways; Highway 15 and Highway 45. Inbound and outbound traffic to the east, south and the majority of outbound trips to the west utilize the Highway 15 – R.R. 202 intersection.

Highway 15 runs NW/SE through most of Lamont County but turns due West/East approximately 2 km NW of the town of Lamont. From that point it continues west, running south of the town of Bruderheim and into neighbouring Strathcona County. R.R. 202 bisects Highway 15 approximately 2 km south of the Project site.

Highway 45 passes through Whitford in the northeast section of the County and runs East/West until it meets Highway 38 approximately 5 km east of the Strathcona County border. It then turns due south and runs another approximately 10 km through the Town of Bruderheim where it meets Highway #15. R.R. 202 connects to Highway 45 as it makes its turn west into Bruderheim and continues south providing direct access to the Project site and connection to Highway 15. Table 2.6-1 shows the length of transportation routes in the RSA and LSA.

Table 2.6-1: Transit Route Lengths in LSA and RSA

Name	Length (km) in RSA	Length (km) in LSA
Gravel/improved road	3.65	2.02
Highway 15	8.89	–
Highway 45	6.30	0.2
Highway 637 (now Highway 29)	1.62	–
Highway 831	0.13	–
CN Railway	8.66	1.81
CPR Railway	6.81	2.12
R.R. 200	4.84	–
R.R. 201	6.48	2.03
R.R. 202 (access to PDA)	5.25	2.02
R.R. 203	6.48	–
R.R. 204	0.0	–
Total	**59.11**	**10.2**

Note:
– not present.

2.6.6 Mineral Dispositions and Land Surface Rights

Mineral dispositions and land surface rights searches were conducted through the Alberta Registry system and the Land Status Automated System (LSAS). The LSAS was searched on December 19, 2006. The Alberta Registry Services was contacted on January 3, 2007. Specific information from the LSAS and Alberta Registry Services that related to the LSA and RSA was extracted for this assessment. Due to time constraints, LSAS and Alberta Registry searches within the RSA only included those properties in and attached to the IPA.

2.6.6.1 RSA

Within the RSA, there are a total of 42 oil and gas facilities, 64% (27 facilities) of which are operated by Husky Oil Operations Ltd. (see Figure 2.6-2). The majority are located in the central and northern areas of the RSA.

There are 82 total wells located within the RSA. Husky Oil operates or operated 51% (42 wellsites) of these wells, while Nexen operates another 7% (6 wellsites).

Appendix II lists all land use dispositions and leases and wellsites located within the RSA.

Within the entirety of the RSA (excluding the LSA), there were 100 ROW dispositions. Details of location, landowner and those granted rights are available in Appendix III.

2.6.6.2 LSA

Two Husky Oil facilities are located within the LSA – one battery and one non-operational injection facility. There are three abandoned wellsites within the LSA, two of which were operated by Husky Oil and the third by Pensionfund Energy Resources Ltd. Figure 2.6-2 shows the location of facilities and active and abandoned wellsites.

The Project LSA has a total of 48 ROW dispositions. Of these, 17 were granted to NSM Resources Ltd. and 14 to Lamco Gas Co-op Ltd. These dispositions are detailed in Appendix III. As the LSA crosses sections of land, there are instances where the exact location of the activity was difficult to determine. In these cases the activity for the entire quadrant or section of land was included in the LSA.

2.6.7 Forestry

There are no forests located in the LSA. Lamont County is predominantly an agricultural zone.

2.6.8 Agriculture

2.6.8.1 County and General Information

Lamont County is situated in a productive agricultural area within Agroecoregion 10 (Padbury et al. 2002). The Agroecoregions within the Northern Great Plains are distinguished based on similarities in soil, climate, landscape and uniform crop production, among others (Padbury et al. 2002). Agroecoregion 10 is characterized by arable lands suitable for the production of cereals. The climate is predominantly cool and moist and in combination with black soils, provides some of the most productive agricultural land in the Northern Great Plains (Padbury et al. 2002).

The RSA is identical to the ASP boundary provided by the Alberta Industrial Heartland Association. Sections 25, 26, 34 and 35 of 55-20 W4M comprise the IPA with the APA (the buffer zone providing one section of land circumference around the IPA) making up the ASP boundary. Figure 2.5-1 details the land use boundaries.

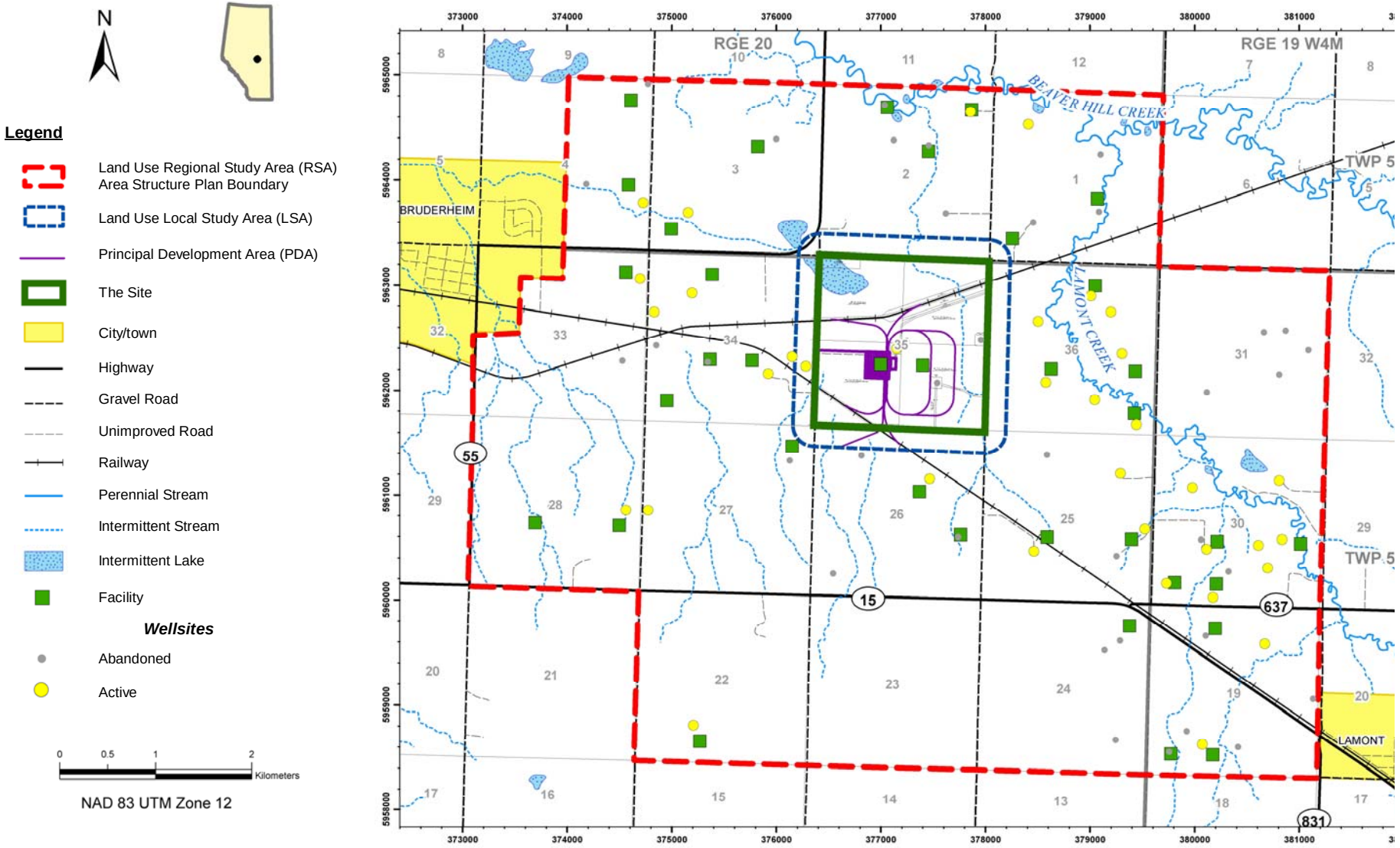

Figure 2.6-2: Wellsites and Oil and Gas Facilities

The APA, although bordering the IPA, will not accommodate any heavy or medium industry (ASP 2001). The APA is privately owned land that has been classified as A1 Agricultural District, which signifies that the area is valued for higher capability agricultural production and thus is promoted for such use. It also allows light industry development. The only other Agricultural District, A2, has one small section within the RSA (see Figure 2.5-1) and is classified as containing lower capability agriculture (MDPB 2002).

Lamont County's main crops are cereals, such as oats, barley and wheat with some oil grains (Eleniak 2006, pers. comm). A full list of crops for the County is presented in Table 2.6-2.

Table 2.6-2: Crop Types – Lamont County

Crop	Type	Specific (i)	Specific (ii)
Cereals	Oats		
	Barley	Feed	2-year old
		Feed	6-year old
		Malt	2-year old
		Malt	6-year old
	Wheat	Winter	
		Hardwood	
		Canada Prairies Spring	
	Oil grains	Canola	Argentine
		Canola	Polish
Forage	Alfalfa		
	Red clover		
Grasses	Timothy		
	Smooth bromegrass		
	Crested wheat grass		
Pulse crops	Peas		
Grazing/pasture land	Seeded		
	Undisturbed		

Source: Eleniak 2006, pers. comm.

2.6.8.2 RSA

The Agricultural Financial Services Corporation (AFSC) was contacted for a detailed description of crops existing within the RSA to determine the type and amount of insured crops (see Table 2.6-3). The majority of farmers insure their crops with the AFSC. Their data indicates that wheat (Hard Red Spring) followed by canola, then barley cover the greatest acreage within the RSA (see Table 2.6-3). This crop data was gathered for a large area that included and surrounded the RSA. The area is for a nine township block centered on Twp 55, Rge 20 W4M.

Table 2.6-3: Crops within the RSA

Crop	Number of Farms	Number of Land Locations	Size (ha)
Barley	4	9	257
Oats	3	4	67
Wheat – Hard Red Spring	10	18	642
Wheat – Canadian Prairie Spring	2	3	142
Canola	8	18	557
Peas, Field	3	4	83
Total	**30**	**56**	**1,747**
Source: Cruickshank 2007, pers. comm.			

2.6.8.3 LSA

Perennial crops comprise 53.21% or 216.75 ha of the LSA. Perennial crops consist mostly of forage on the leased area of the land. Table 2.6-4 provides the land cover class areas for the LSA based on Alberta Vegetation Inventory (AVI) anthropogenic cover classes and the Alberta Wetland Inventory (AWI) class for the LSA.

Table 2.6-4: LSA Vegetation Inventory

Code	Land Cover Class	AVI Agriculture (ha)	% of LSA
AVI Agriculture			
CA	Annual Crops	111.29	27.32
CP	Perennial forage crops	216.75	53.21
CPR	Rough Pasture	17.65	4.33
AVI Anthropogenic Non-vegetated			
AIF	Farmsteads	7.80	1.92
AIH	Permanent ROW; roads, highways, railroads, dam sites, reservoirs	24.46	6.00
AII	Industrial (plant sites), sewage lagoons	14.77	3.63
AWI Classification			
WL/FONG	Wetland	14.66	3.60
Total		**407.38**	**100.00**

See Volume IIC, Section 3: Vegetation for detailed information.

2.6.9 Hunting and Wildlife

2.6.9.1 County and General Information

The RSA lies within Wildlife Management Unit (WMU) 250. Hunting is permitted on privately-owned land with the owner's permission. Sunday hunting is prohibited in the area with the exception of white geese. Table 2.6-5 provides the hunting seasons for WMU 250.

Table 2.6-5: Hunting Season WMU 250

Species	Type	Season (Archery Only)	Season (General)
White-tailed deer	Antlered and antlerless	September 6–October 31	November 1–November 30
Mule deer	Antlered and antlerless	September 6–October 31	November 1–November 30
Moose	Antlered and antlerless	September 6–October 31	November 1–November 30
Black bear			April 1–May 31
Male pheasants			October 15–November 15
Ruffed and spruce grouse			September 15–November 30
Sharp-tailed grouse			October 1–October 31
Gray partridge			September 15–November 30
Ducks, coots, common snipe, white-fronted and Canada geese, snow and ross geese (including falconry hunting)			September 1–December 16

Source: Alberta Outdoorsmen 2006b, Internet site.

2.6.9.1.1 Outfitters

There are very few outfitters working within Lamont County or the RSA. Only eight operate within WMU 250 and hold a total of 43 allocations/privileges (APOS 2006, Internet site). Of these 43 permits, 27 were allocated to Ryk Visscher's Hunting Adventures Ltd. (APOS 2006, Internet site).

As shown in Table 2.6-6, these outfitters hold licenses for white-tailed deer and waterfowl.

Table 2.6-6: Outfitters in WMU 250

Allocation Holder	Number of Allocations Held by Type in WMU 250			Total Allocations
	White-tailed Deer (Open)	White-tailed Deer (Bow)	Waterfowl	
Ryk Visscher's Hunting Adventures Ltd.	22	4	1	27
Mercier, James	3	6	0	9
Cossey, Grant	2	0	0	2
Diamond Willow Trophy Hunts	0	0	1	1
Raven Outfitters Ltd.	0	0	1	1
Black Dog Outfitters	0	0	1	1
Venture North Outfitting	0	0	1	1
Taiga Outdoor Adventures Inc.	0	0	1	1
Total Allocations	27	10	6	43

Source: Alberta Outdoorsmen 2006b, Internet site.

2.6.9.2 RSA

Ryk Visscher, one of the few outfitters who works within Lamont County, states that hunting is not very popular in the area (2006 pers. comm). Mr. Visscher believes that hunting opportunities have decreased over the years due to increased development in the area. Geese (Canada, white-fronted, snow and ross), deer (white-tail and mule) are the most commonly hunted fowl and game in Lamont County. As of 2006, there were a combined 121 hunting permits issued for WMU 250.

2.6.9.3 LSA

Hunting is permitted on the private land that surrounds the Site, sections of which are located within the LSA. Although land owners were not contacted on an individual basis to determine if they hunted or allowed hunting on their premises, it is understood that the potential for hunting exists. Hunters and outfitters require permission from the landowners before hunting is permitted on their premises. Land owners are not permitted to charge for use of their land.

2.6.10 Trapping

There are no RFMAs located in the RSA. According to the ASRD trapping is not a known activity within the RSA (Fetter 2006, pers. comm.).

2.6.11 Fishing

2.6.11.1 County and General Information

The LSA and RSA lie within the Parkland Region (Watershed Unit PP2) of Fish Management Zone 2 (ASRD 2006, Internet site). According to ASRD, Zone 2 is known for its warm, silty rivers in the summer as well as shallow reservoirs and ponds throughout the area. Although four major rivers run through the Parkland Region, only the North Saskatchewan River runs near Lamont County, serving as its northern border between Sturgeon and Smokey Lake Counties (ASRD 2006, Internet site).

The ASRD (2006) web site lists a large variety of fish that are common to Watershed Unit PP 2, including:

- yellow perch
- northern pike
- rainbow trout
- brook trout
- brown trout
- mountain whitefish
- lake whitefish
- walleye
- goldeye
- cutthroat trout
- burbot
- bull trout

Fish common to the North Saskatchewan River, the closest principal fishing area to the RSA, include:

- walleye
- sauger
- pike
- goldeye

Fishing licenses for sturgeon have been suspended since 2005 to allow stocks to recover (Veldkamp 2006, pers. comm.). Lamont Pond (27-55-19-W4M), situated approximately 8 km from the LSA, is stocked annually with rainbow trout. It is the only fish stocking project in Lamont County (Alberta Outdoorsmen 2006a, Internet site). Fishing is not popular in Lamont County (Janssen 2006, pers. comm.).

Fishing seasons and limits for Watershed Unit PP2 are specified in Table 2.6-7. Limits include all fish in one's possession, at home or on person. All fish caught are included in the provincial wide maximum that is not to be exceeded (ASRD 2006, Internet site).

Table 2.6-7: Fish Limits and Seasons

Fish	Season	Limit
Mountain whitefish	Open all year	5 over 30 cm
Walleye	April 1–May 18 (currently closed all year to replenish stock)	0
Sauger	April 1–May 18	0
Sauger	May 19–March 31	1 over 63 cm
Burbot	All year	10
Goldeye	All year	10
Sturgeon	All year	0
Trout (rainbow, lake)	All year	5 (in total combined all trout and grayling)
Goldeye and mooneye	All year	10 (total)
Non-game fish	All year	No limit
Source: Bjorkland 2006, pers. comm.		

Elk Island National Park does not permit standard Alberta Sportfishing Licenses within the park. A distinct National Park Fishing Permit must be purchased for any sportfishing within National Park borders (Alberta Outdoorsmen 2006a, Internet site). However, due to the depth of the lakes and winter temperatures, the lakes contain virtually no fish apart from bottom-dwelling suckers (Carr-Wiggin 2006, pers. comm.).

Bordering the south central section of the County, some 30 km away from the proposed facility, is Beaverhill Lake. Recent droughts have left the area almost totally dry and incapable of supporting fish (Veldkamp 2006, pers. comm.).

2.6.11.2 RSA

There are no fishing opportunities within the RSA borders (Veldkamp 2006, pers. comm.)

2.6.11.3 LSA

There are no fishing possibilities within the LSA. A wetland is located in the LSA on the northwest portion of the Site. There are two types of fish, brook stickleback and fathead minnow that exist within this wetland neither are game fish (Clarke 2007, pers. comm.).

2.6.12 Parks and Protected Areas

2.6.12.1 RSA

There are no parks within the RSA.

2.6.12.2 LSA

There are no parks within the LSA.

2.6.12.3 County and General Information

Lamont County is one of nine counties comprising Kalyna Country, a tourism region located east of Edmonton and continuing to the Lloydminster border (Kisilevich 2006, pers. comm.). Although Lamont County is promoted as an ecomuseum (Kalyna Country 2007, Internet site), no parks or protected lands are located in the LSA or RSA (Hunter 2006, pers. comm.). For the purpose of this study, three of the nearest parks and natural areas have been included to indicate that they have been considered and to illustrate their distance from the LSA and RSA. Their inclusion in no way implies that Project impacts extend to these areas. These areas are; North Bruderheim Natural Area (sometimes referred to as the Sand Hills), located approximately 6.4 km north of Bruderheim and two Environmental Significant Areas (ESA), Elk Island National Park and Beaverhill Lake (ESA) (ANHIC 2006, Internet site). Beaverhill Lake is the only Special Places designation in Lamont County. The proximity of the RSA to these parks is illustrated in Figure 2.6-3.

2.6.12.4 Elk Island National Park

Elk Island National Park is located almost 9 km due south of the LSA. Elk Island National Park is 194 km^2, rises 60 m above the surrounding prairie and consists of boreal mixed forest and aspen parkland vegetation (Great Canadian National Parks 2006, Internet site). The park protects a remnant of the transition area between the grasslands of the south and the forests to the north and contains vegetation communities including black spruce bogs, muskeg vegetation and Sandhill vegetation (Great Canadian National Parks 2006, Internet site). It contains species such as:

- white spruce
- white birch
- trembling aspen
- paper birch
- orchids
- Indian pipe
- yellow pond lily
- white water lily
- dogwood
- goldeye
- saskatoon
- hawthorn
- buckbean
- buckbrush
- prairie sage
- black-eyed Susan

Elk Island National Park was formed primarily as a sanctuary for the protection of 3,000 head of hoofed mammals. It serves as habitat for one of the largest concentrations of big game animals in the world (Great Canadian National Parks 2006, Internet site). There are 44 species of mammals residing in the Park which include:

- plains and wood bison
- bear
- moose
- elk
- deer
- coyote
- snowshoe hare
- mink
- weasel
- ground squirrel

Elk Island also boasts over 250 species of birds and has more than 230 lakes, ponds and wetlands (Great Canadian National Parks 2006, Internet site).

An estimated 350,000–400,000 visitors enter the park each year and it is a popular location for birdwatching, cross-country skiing, hiking and wildlife viewing. Snowmobiling is prohibited within the park boundaries (Carr-Wiggin 2006, pers. comm.).

2.6.12.5 Beaverhill Lake Heritage Rangeland Natural Area

This protected natural area is situated approximately 43 km to the southeast of the LSA. The area is protected by the *Wilderness Areas, Ecological Reserves, Natural Areas and Heritage Rangelands Act* (Landals 2007, pers. comm.) and is located predominantly within Beaver County with a smaller portion located in the south central area of Lamont County (Hunter, 2006, pers. comm.). This natural area is internationally recognized for its wetlands and diverse bird populations; more that 270 species of birds have been reported, with 145 known to breed locally. Beaverhill Lake was designated a RAMSAR site (wetland of international significance) in 1987. The two-day long Beaverhill Lake Snow Goose Festival once attracted 6,000 people to the site each year (Alberta Community Development 2006, Internet site). Recent drought has led to the cancellation of the event for the past few years due to a dramatic decrease in migratory birds (Bowden 2006, pers. comm.).

2.6.12.6 North Bruderheim (Sand Hills) Natural Area

The North Bruderheim Natural Area is located approximately 10 km northwest of the LSA. Although it is not classified as an ESA, it has been designated a Natural Area by the *Wilderness Areas, Ecological Reserves, Natural Areas and Heritage Rangelands Act* (Landals 2007, pers. comm.). The area provides space for berry picking, hiking, birdwatching, wildlife viewing, cross-country skiing and horseback riding. Primary recreation activities for the area include the use of all terrain vehicles and snowmobiling (Johnson 2007, pers. comm.).The natural area is also an excellent place to see wildflowers (Kalyna Country 2007, Internet site). The area east of the natural area is well known for hunting (Halisky 2007, pers. comm.).

2.6.13 Recreation

2.6.13.1 Birdwatching

2.6.13.1.1 County and General Information

Birdwatching is a popular past time within the County, particularly in Elk Island National Park, Beaverhill Lake and the North Bruderheim Natural Area. Numerous species can also be spotted in the wetlands and thickets that line country roadways (Lamont County 2006, Internet site).

Birdwatching is done year round, but the most popular time is during the spring and fall migrations (Lamont County 2006, Internet site). A list of birds and their common sighting seasons are provided by the Lamont County website (Lamont County 2006, Internet site) and are detailed in Appendix IV. After years of drought, some wetland migratory resting places for birds have dried, thus affecting migratory patterns (Veldkamp 2006, pers. comm.).

2.6.13.1.2 RSA

A small portion of Beaverhill Creek runs through the private lands in the northern most area of the RSA. Beaverhill Creek is a an area where birdwatching has occurred but most birdwatching generally takes place in the North Bruderheim Natural Area further northwest and outside of the RSA (Kalyna Country 2007, Internet site).

2.6.13.1.3 LSA

There is a wetland area that is located on the northwest quarter of the Site that crosses Highway 45 and continues into the private land of Section 3-56-20 W4M and onto Section 34-55-20 W4M. Although this area is a known staging place for birds (Halisky 2007, pers. comm.), it was not confirmed if this particular wetland was an area where birdwatching occurred. The area does have characteristics that are common to birdwatching locations, specifically: it is a wetland and has close access from a rural road (Lamont County 2006, Internet site).

2.6.13.2 Additional Recreational Activities

2.6.13.2.1 County and General Information

In the MDBP (2002), the Municipality of Lamont County recognizes the limited amount of recreational opportunities available, stating that residents utilize facilities in nearby towns.

Due to the presence of private land throughout the RSA, outdoor recreational activities usually occur in parks and natural areas (see Section 2.7.7). Activities such as horse sleigh rides and snowmobiling occur on public roads as well as private lands. Snowmobiling is prohibited in Elk Island National Park, as are horse sleigh rides without the use of park horses (Johnson 2007, pers. comm.). Table 2.6-8 shows recreational activities and where they most frequently occur.

Table 2.6-8: Recreational Activities in Lamont County

Activity	Location
ATV	North Bruderheim Natural Area (Sand Hills)
Snowmobiling	Banks of North Saskatchewan River, North Bruderheim Natural Area
Hiking	Elk Island National Park, North Bruderheim Natural Area
Horse sleighing	Rural Roads, Elk Island National Park (no outside horses allowed)
Wildlife viewing	Elk Island National Park, North Bruderheim Natural Area
Cross-country skiing	North Bruderheim Natural Area, Elk Island National Park
Wildflower and plant identification	North Bruderheim Natural Area
Golf	Elk Island National Park (9-hole golf course)
Berry picking	North Bruderheim Natural Area
Horseback riding	North Bruderheim Natural Area

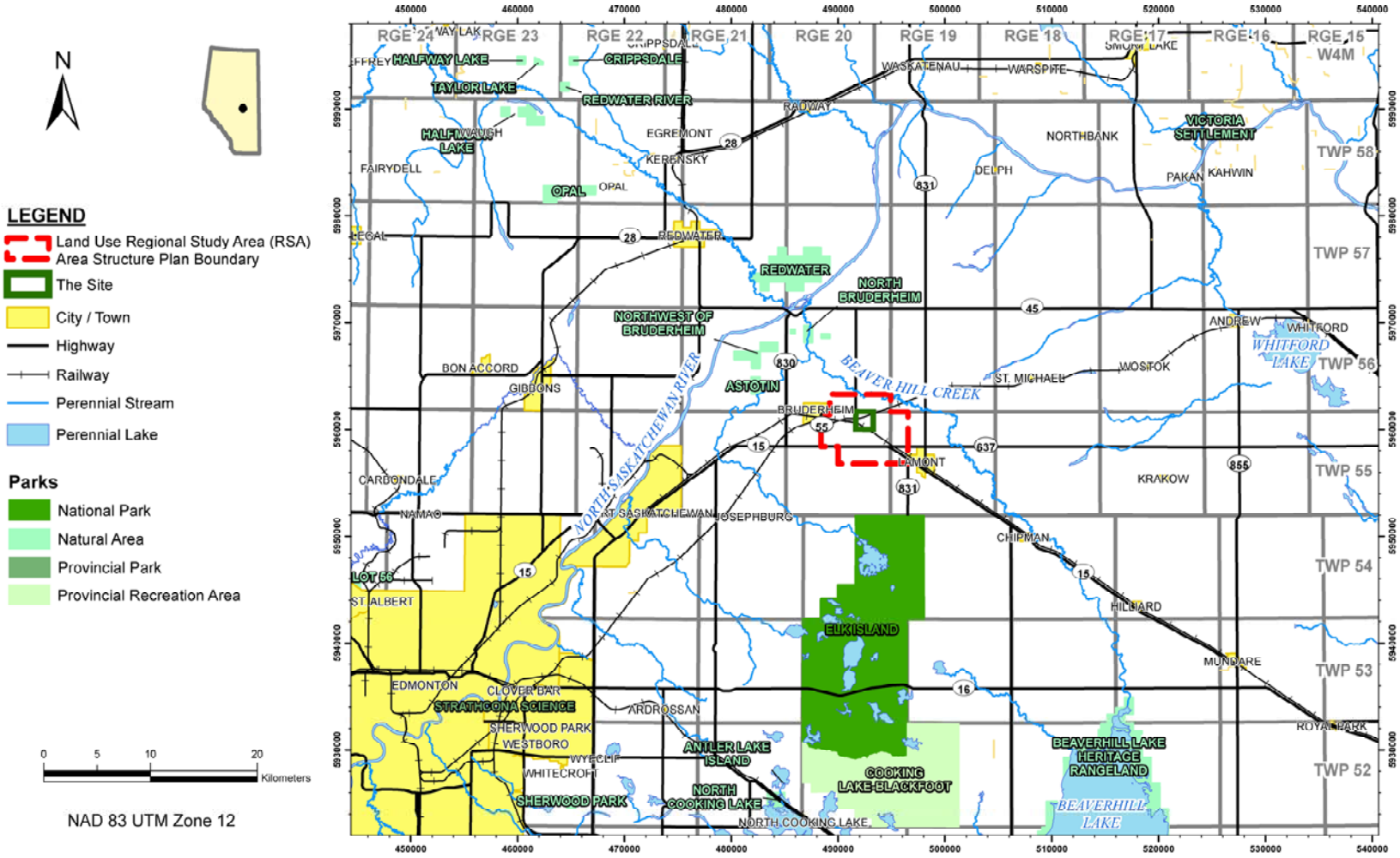

Figure 2.6-3: Lamont County Parks and Natural Areas

2.6.13.2.2 LSA and RSA

The APA and IPA are not zoned for recreational development (MDPB 2002). Residents within the LSA and RSA were not contacted on an individual level to determine if additional recreational activities occur within their property borders. Recreational activities found to be common within Lamont County as a whole (see Table 2.6-8) were not found to be common within the LSA or RSA.

2.6.13.3 Residency

2.6.13.3.1 RSA

The RSA is located between two urban centres, Bruderheim to the northwest and Lamont to the southeast. Population growth within the County has been relatively small with an estimated 2.1% increase from 1996–2001 (StatsCan 2006a). The rate of growth for Bruderheim is even smaller at 0.3% over the same time period (StatsCan 2006b). However, the Town of Lamont's growth rate is significantly larger at 6.6% (StatsCan 2006c).

The RSA contains mostly agricultural land categorized as A1, high capacity. The Lamont County Ownership Map shows that within the RSA, predominantly in the APA, there are 71 private owners of land with 51 permanent residences and manufactured homes (Accurate Assessment Group 2006). Seven of these privately held lands are within the IPA with a total of nine residences distributed amongst them. Table 2.6-9 details landowners and number of residences within the IPA as well as those residences that are not in the IPA but still located within the LSA.

The Urban Fringe area located in the RSA is also within 1.6 km of the Industrial Heartland Area. Therefore, new permanent dwellings and permanent manufactured homes are not permitted in this area without special permission from Lamont County Council. Table 2.6-9 shows the number of residences (including manufactured homes) in the County.

Table 2.6-9: Residences in Lamont County Industrial Heartland and LSA

Location	Number of Residences in the IPA	Number of Residences in the LSA
SW-34-55-20 W4M	0	0
NE-34-55-20 W4M	1	1
SW-26-55-20 W4M	1	0
SE-26-55-20 W4M	2	0
NE-26-55-20 W4M	1	0
SW-25-55-20 W4M	2	0
SE-25-55-20 W4M	0	0
NE-25-55-20 W4M	1	0
SE-2-56-20 W4M	0	1
SW corner of NW-25-55-20	1	0

2.6.13.3.2 LSA

There is one residence located outside of the IPA but within the LSA at 2-56-20 W4M and an additional residence that is in the IPA as well as the LSA at 34-55-20 W4M (Accurate Assessment Group 2006).

2.7 Application Case and Policy Compliance

The application case is considered for applicable land use categories in the LSA and RSA. Due to the length and size of the Project's construction phase, it has been combined with the operation phase when determining impact and mitigation measures.

Project closure is included within the application case in the 'duration' and 'reversibility' categories.

2.7.1 Agriculture

2.7.1.1 Impact (Construction and Operation)

There will be a decrease in the annual and perennial crop land in the LSA due to the Project footprint (see Table 2.7-1). The 200 m buffer around the Site is not expected to be impacted by the Project. This decrease in crop lands is within the heavy/medium IPA within the Industrial Heartland. Decreases in agriculture and vegetation cover are anticipated by the Municipality in the IPA as is further development for industry. The impact of the Project on agriculture outside the LSA, based on air modeling, is expected to be minimal and well within provincial standards (see Volume IIA, Section 2: Climate and Air Quality). Table 2.7-1 details the direct modification that will occur to the agricultural land cover within the LSA. A comparison can be made with Table 2.6-2 and the Baseline conditions.

Table 2.7-1: Residual Impacts to AWI Wetland Classes and AVI Land Cover Classes at Application and Closure in the LSA

Land Cover Class	Baseline		Application			Closure		
	Area (ha)	% of LSA	Area (ha)	Change from Baseline		Area (ha)	Change from Baseline	
				(ha)	(%)		(ha)	(%)
AWI Wetland								
FONG – graminoid fen	14.66	3.60	14.66	0.0	0.0	14.66	0.0	0.0
AVI Agriculture								
CA/CP – annual/perennial crop	328.04	80.52	303.21	-24.83	-4.93	328.04	0.0	0.0
CRP – rough pasture	17.65	4.33	17.65	0.0	0.0	17.65	0.0	0.0
AVI Anthropogenic Non-vegetated								
AIF – farmstead	7.80	1.91	7.80	0.0	0.0	7.80	0.0	0.0
AIH – ROW	24.46	6.00	40.96	16.50	2.90	24.46	0.0	0.0
AII – industrial	14.77	3.63	21.01	6.24	1.53	14.77	0.0	0.0
AIW – water reservoir, dugout	0.0	0.0	0.72	0.72	0.18	0.0	0.0	0.0
CIP – pipeline	0.0	0.0	1.37	1.37	0.34	0.0	0.0	0.0
Total	**407.38**	**100.00**	**407.38**	**0.0**	**0.0**	**407.38**	**0.0**	**0.0**

2.7.1.2 Conformity with County Land Use Objectives and Planning Parameters

The MDPB (2002) strives to minimize the disruption of farm operation by incompatible land uses. This interpretation is at the discretion of the LCC. However, the MDBP's policy is directed more towards agricultural land development conflicting with present agriculture. The Site, although once considered agricultural land, is now solely within the Heavy/Medium IPA.

The agricultural impact is predicted to be negative in direction and is classified as a Class 3 impact; negative in direction, local in geographic extent, low to moderate in magnitude, mid-term duration and reversible after closure (see Table 2.7-2).

Table 2.7-2: Agriculture Impact

Phase	Direction	Geographical Extent	Magnitude	Duration	Confidence	Reversibility
Construction + Operation	Negative	LSA	Low to moderate	Mid-term	High	Reversible

2.7.1.3 Mitigation

Using existing ROW, road and rail allowances reduces the need for additional surface disturbance and minimizes impacts to agriculture in the LSA. At closure, the land can be reclaimed for agricultural use.

2.7.1.4 Residual Impact

There are no residual effects expected to the adjoining APA of the IPA. Existing agriculture land use within the LSA will have residual effects but these will be confined to the PDA. Development will be in conformance with ASP strategy and MDPB and LUB policy.

2.7.2 Hunting and Wildlife

2.7.2.1 Impact (Construction and Operation)

2.7.2.1.1 RSA

Potential impacts may be caused by the obstruction of wildlife corridors that cross the Site, thus limiting access or changing access routes to privately-owned lands that are hunted.

2.7.2.1.2 LSA

Hunting in the LSA will be modified by the Project and hunting will not be permitted on the Site. The lands north and west of the Site within the 200 m boundary of the LSA are privately owned and located within the APA Zone of the Industrial Heartland. The Project has the potential to impact hunting slightly within these privately-owned lands.

There is a wetland in the northwest corner of the Site that partridge, grouse and water fowl frequent. The wetland crosses into privately-owned land in the APA of the LSA where hunting occurs at the discretion of the owner. Expected noise levels will be within EUB permissible sound levels outside of the Site. However, noise within the Site may affect the numbers and periods of time in which birds reside in this area.

2.7.2.2 Conformity with County Land Use Objectives and Planning Parameters

The buffer around the IPA that stands as the ASP boundary and that has been incorporated as the RSA, provides a significant area to comply with existing policies regarding wildlife. Wildlife designated areas, as addressed in the MDPB (2002), are not located within the LSA.

The hunting and wildlife impact of the Project is classified as a Class 3 impact. Construction and operation of the Project on hunting and wildlife is negative in direction, local in

geographic extent, low to moderate in magnitude, mid-term in duration and reversible, with a moderate confidence in these predictions (see Table 2.7-3).

Table 2.7-3: Hunting Impact

Phase	Direction	Geographical Extent LSA	Magnitude	Duration	Confidence	Reversibility
Construction + operation	Negative	LSA	Low to moderate	Mid-term	Moderate	Reversible

2.7.2.3 Mitigation Measures

No specific mitigation measures are proposed respecting land use. Mitigation measures respecting wildlife were presented in Volume IIC, Section 4: Wildlife.

2.7.2.4 Residual Impact

Residual impacts to hunting in the LSA are expected to be minimal as hunting of wildlife (including birds) is not common.

2.7.3 Trapping

2.7.3.1 Impact (Construction and Operation)

Due to the absence of RFMAs within Lamont County there are no direct impacts to trapping. Impacts on trapping are not applicable for this investigation.

2.7.4 Fishing

2.7.4.1 Impact (Construction and Operation)

Due to the absence of fishing opportunities within the RSA there are not direct impacts to fishing.

2.7.5 Parks and Protected Areas

2.7.5.1 Impact (Construction and Operation)

Due to the distance of the Parks and Protected Areas from the LSA and RSA impacts are non-existent.

2.7.6 Recreational Activity

2.7.6.1 Impact (Construction and Operation)

2.7.6.1.1 Birdwatching

Construction and operation impacts are predicted to be of similar nature in all aspects except duration.

RSA

Rural highways and a small portion of Beaverhill Creek are located within the RSA. Both are potential sites for birdwatching. These areas, due to their distance from the Site, are not expected to be affected by the Project.

LSA

There is a wetland on the northwest corner of the LSA which is frequented by partridge, grouse and waterfowl. Birdwatching at wetland areas is common within the County; however, it was not determined if this particular wetland was frequented by birdwatchers. The popularity of this activity within the County should still be considered and the potential of this site as a birdwatching area is present.

The increased activity, particularly related to traffic noise associated with the construction and operation of the Project, may affect some bird activity of the LSA. The increase in traffic due to the Project, in combination with already increasing traffic growth, should not greatly diminish the avian population. Further detail on birdwatching and wildlife impacts are outlined in Volume IIC, Section 4: Wildlife of this assessment.

2.7.6.1.2 Conformity with County Land Use Objectives and Planning Parameters

There are no specific land use objectives and planning parameters regarding birdwatching. It is noted that measures are being taken to protect the integrity of the wetlands located in the northwest corner of the LSA.

2.7.6.1.3 Birdwatching Impacts

The birdwatching impact of the Project is classified as a Class 3 impact. Project impact on birdwatching is negative in direction, local in geographical extent, low to moderate in magnitude, mid-term in duration and reversible after closure with a moderate confidence in these predictions (see Table 2.7-4).

Table 2.7-4: Birdwatching Impacts

Phase	Direction	Geographical Extent	Magnitude	Duration	Confidence	Reversibility
Construction + Operation	Negative	Local	Low to moderate	Mid-term	Moderate	Reversible

2.7.6.1.4 Mitigation

No additional mitigation measures are proposed related to bird watching.

2.7.6.1.5 Residual Impact

Residual impacts may occur in the form of decreased levels of potential birdwatching in the northwest quarter of the LSA. A minor decrease in bird activity in the LSA is probable due to increased noise.

2.7.6.2 Recreation Activity/Other Impact (Construction and Operation)

Construction and operation impacts are predicted to be of similar nature in all aspects except duration.

With recreational development designated for lower capability agricultural land, there is little likelihood the Project will impact any activities. Regarding the small section of A2 land within the RSA borders, recreational development will not occur here due to its location within the ASP boundaries. Other recreational activities will not be impacted by the Project. The majority of the recreational activities that occur in the County occur in the North Bruderheim Natural Area and Elk Island National Park. The zoning of the IPA along with the buffer zone has prevented the development of recreation close to the Project's location.

2.7.6.3 Conformity with County Land Use Objectives and Planning Parameters

There is no risk of non-conformance with land use objectives and planning parameters regarding recreational activities as the ASP/LSA boundaries are not appropriate for recreational development.

The recreation activity impact of the Project is classified as a Class 4 impact. No mitigation measures are required (see Table 2.7-5).

Table 2.7-5: Additional Recreational Activity Impacts

Phase	Direction	Geographical Extent	Magnitude	Duration	Confidence	Reversibility
Construction and operation	Neutral	n/a	n/a	n/a	Moderate	n/a
Note: n/a – not applicable.						

2.7.6.4 Mitigation Measures

A community enhancement program geared towards participation in the development of recreational activities in Lamont County has been recommended. Collaboration in the Bruderheim Vision 2020 strategy in regards to recreational development is being considered.

2.7.7 Residency

2.7.7.1 Construction and Operation

2.7.7.1.1 RSA

Residency within the ASP boundary is already regulated by both the MDPB (2002) and LUB (2002). Because the RSA mimics the ASP boundaries, residences within the area are already regulated in regard to future development. Impact on land values is detailed within Volume IID, Section 4: Socio-Economic Assessment of this EIA.

The IPA boundaries are currently under review by the Municipality and may in fact expand.

2.7.7.1.2 LSA

There are two residences that exist within the LSA. Noise impact of the Project on these residents is dealt with in Volume IIA, Section 3: Noise and Light. The Project does not affect APA land on the north and west borders of the LSA within the 200 m buffer zone.

2.7.7.2 Conformity with County Land Use Objectives and Planning Parameters

The Municipality is mandating no further residence development within the Industrial Heartland. The Project's location within the Industrial Heartland is not within 600 m of the nearest residence and the Project's emissions are in conformance with land use objectives and planning parameters.

The Residency Impact of the Project is classified as a Class 4 impact. The impact of the construction and operation of the Project on residency is neutral in direction, with a moderate-to-high confidence in these predictions (see Table 2.7-6).

Table 2.7-6: Residency Impact

Phase	Direction	Geographical Extent	Magnitude	Duration	Confidence	Reversibility
Construction and operation	Neutral	n/a	n/a	n/a	Moderate-to-high	n/a
Note: n/a – not applicable.						

2.7.7.3 Mitigation Measures (Corporate Responsibility to Residents)

No mitigation measures related to land use are proposed.

2.7.8 Heavy/Medium Industry Development

2.7.8.1 Impact (Construction and Operation)

The impact for this section is considered as an accumulation from all sections included within the land use study.

2.7.8.1.1 Conformity with County Land Use Objectives and Planning Parameters

Within the guidelines of the three key policy documents for the Municipality, the conformity of the Project appears to be at the discretion of the Lamont County Council. The Site is proposed in an area that is zoned for Industrial and Commercial Development and is not A1, (higher capability agricultural land). The MDBP maintains that the County is to encourage appropriate industries to locate in the County but the definition of 'appropriate' is at the discretion of the Council. The Industrial Heartland seeks businesses that supply support services to the oil and gas industry. The Project certainly qualifies since it processes sulphur, a by-product of the oil and gas industry. There is a shortage of sulphur processing capacity in Alberta, as discussed in Volume I: Project Description and Volume IID, Section 4: Socio-Economic Assessment of this EIA.

Municipal policy has a clear objective to minimize conflict between industry and other land uses in the area. Preliminary modelling shows that an acceptable level of noxious emissions and noise are projected to come from the Project. Dust emissions from the facility will meet the Ambient Air Quality Guidelines in Alberta (Leahey et al. 2005) and the predicted sound levels of the Project are considered to be acceptable.

Finally, the LUB (2002) states that no industrial use shall be allowed in the district if the Development Authority considers it to possess objectionable, dangerous or potentially hazardous conditions. Again, the decision making process can be subjective. The Development Authority, who can relay such matters to the Municipal Planning Council, has

the discretion to determine what is deemed objectionable. When asked what criteria these decisions are based on for the Council and what was deemed appropriate, Debbie Hamilton, the Director of Planning and Community Services for Lamont County stated, *It depended on the Council of the Day*. The policy exists as a guideline but is not constricting in its definition so the Council's hands will not be tied when making decisions (Hamilton 2007, pers. comm.).

2.8 Cumulative Effects Assessment

Cumulative effects are evaluated solely for those impacts that received a rating of 1, 2 or 3 for the application case.

2.8.1 Introduction

The IPA within Lamont County currently has two functioning facilities within its boundaries: the Canexus Chemical Plant and the Triton Fabrication Plant. The third facility in the area, the ERCO Worldwide (Albchem Chemicals), is no longer operational.

The limited size of the Lamont County Industrial Heartland may limit the operations that are attracted to the region. The size of the area is currently under review and may increase.

EIAs for these three facilities were unavailable. Although all three businesses were contacted they were unable to produce an EIA for their facilities. This section will study the potential impacts of the development on the Industrial Heartland.

2.8.2 Study Area and Justification

The study area for the cumulative effects analysis remains as the RSA but incorporates the effects of the aforementioned operations currently existing within this zone. The ASP is seeking to attract more operations and there is the likelihood of expansion of existing and proposed operations. All operations considered for the cumulative effects analysis are located within the Industrial Heartland of Lamont County and operate within the same framework and guidelines as outlined within the MDBP (2002) and LUB (2002), the basis for the ASP for the Heartland. For consistency in policy and to include the 1.6 km buffer zone surrounding all operations in the Heartland, the RSA was determined as an appropriate border for the cumulative effects analysis.

2.8.3 Cumulative Impact

Currently, industrial activities in the RSA are limited to the production of sodium chlorate and steel fabrication. With the goal of attracting support services for the oil and gas sector there is a possibility that the Municipality of Lamont may expand the IPA of the Heartland.

Where an impact was assessed as local no CEA is required, categories where a reasonable prediction could be made regarding cumulative effects are discussed below.

2.8.3.1 Agriculture

With no detailed reports on existing operations it is difficult to apply a multiplier effect to these impacts and then apply them to the surrounding agriculture zones bordering the IPA. With the effects of Project application confined to the PDA the Project will not add to the cumulative effects in the RSA.

2.8.3.2 Hunting and Wildlife

With only limited development occurring within the RSA, a decrease in wildlife in the area has been noted (Ryk Visscher 2006, pers. comm.). Thus a greater impact on hunting and wildlife could potentially occur with each new industrial development and the expansion of existing operations. Hunting in an area of industrial development and operation is unwise and is typically not permitted. No significant impact to wildlife (and thus hunting) is anticipated outside of the IPA (see Table 2.8-1).

Table 2.8-1: Cumulative Hunting and Wildlife Impact

Phase	Direction	Geographical Extent	Magnitude	Duration	Confidence	Reversibility
Construction and operation	Negative	RSA	Low to moderate	Mid-term	Moderate-to-high	Reversible

2.8.3.3 Birdwatching

Although traffic noise can affect bird populations, traffic of less than 5,000 vehicles per day has been shown to have little impact (see Volume IIC, Section 4: Wildlife). The possible birdwatching site located in the northwest corner of the Site is at the north end of R.R. 202 as well as Highway 45. The predicted traffic resulting from the Project on these two roadways is expected to be below 5,000 vehicles per day (see Volume I: Project Description – Appendix III: Traffic Impact Assessment). The impact and, therefore, the cumulative impact on birdwatching is expected to be low (see Table 2.8-2). A noise study for the Project, and other surrounding facilities, was only conducted for residences in the area and did not take into account the avian population. The cumulative effects of noise are above the EUB permissible levels for three of the surrounding residences. There is little information available for the effects of chronic noise on bird population. The Canexus Plant is on the quarter section of land immediately southwest of the Project while the wetlands of the Project Site are on the northwest quadrant. With the close proximity of the two sites, the avian population should remain strong in the wetland area (Halisky 2007 pers. comm)

Table 2.8-2: Cumulative Birdwatching Impact

Phase	Direction	Geographical Extent	Magnitude	Duration	Confidence	Reversibility
Construction and operation	Neutral	n/a	n/a	n/a	Moderate	n/a
Note: n/a – not applicable.						

2.8.3.4 Residences

The cumulative effects impact on residences is referred to in Volume IIA, Section 3: Noise and Light.

2.9 Summary of Impacts and Conclusion

Impacts within the LSA on agriculture will be limited. The surface disturbance of the Project will reduce the annual and perennial crop total and this reduction will be confined to the PDA. The reduction is annual and perennial crops will be a 4.93% decrease from baseline conditions.

Impacts on hunting and wildlife will be regional in geographical extent. Impacts to hunting will be confined to the IPA.

Birdwatching potential is primarily limited to the wetland in the northwest corner of the Site. The impact to birdwatching, caused mainly by traffic noise, is expected to be low to moderate with the Project slightly increasing traffic on Highway 45 (running close to the wetland).

All impacts are projected to be mid-term in length, lasting the duration of the Project's operation. Therefore, impacts at closure and beyond are not expected. Table 2.9-1 and Table 2.9-2 detail the impacts at Project application and for the cumulative effects case. Only criteria that were projected to be impacted are included in the tables.

Table 2.9-1: Final Impact Rating Summary Table for the Application Case

Impact	Geographic Extent	Magnitude	Direction	Duration	Reversibility	Confidence	Rating
Agriculture	Local	Low to moderate	Negative	Mid-term	Reversible	High	3
Hunting and wildlife	Regional	Low to moderate	Negative	Mid-term	Reversible	Moderate	3
Birdwatching	Local	Low to moderate	Negative	Mid-term	Reversible	Moderate	3

Table 2.9-2: Final Impact Rating Summary Table for the Cumulative Effects

Impact	Geographic Extent	Magnitude	Direction	Duration	Reversibility	Confidence	Rating
Agriculture	Local	n/a	Neutral	n/a	n/a	High	4
Hunting and wildlife	Regional	Low to moderate	Negative	Mid-term	Reversible	Moderate	3
Birdwatching	Local	n/a	Neutral	n/a	n/a	Moderate	4
Note: n/a – not applicable.							

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Volume IID, Section 2: Land Use and Reclamation
Appendix I: Conservation and Reclamation Plan

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1. Introduction

This document describes the proposed Conservation and Reclamation (C&R) Plan for the proposed Bruderheim Sulphur Forming and Shipping Facility (the Project). The C&R plan describes how lands affected by the project will be reclaimed after decommissioning.

1.1 Objective

The proposed reclamation and closure measures for the Project have been developed to allow reclamation of lands to equivalent land capability (as defined by Alberta Environment (AENV), Conservation and Reclamation Regulation A/R 115/93; AENV, 1994) after project closure. For the purposes of this document, it is assumed that land will be returned to the current land use of agricultural production upon project closure. A more detailed discussion of current and possible future land uses is provided in Volume IID Section 2: Land Use and Reclamation. All phases of the Project have been designed to limit impacts.

1.2 Terms of Reference

This C&R Plan has been developed to meet the requirements outlined in the EIA Terms of Reference (TOR) as issued by AENV. The C&R plan is addressed in Sections 4.8 and 4.9.2 of the TOR as follows:

TOR Section 4.8:

Discuss how the reclamation/closure plan design will:

e) assess for and mitigate/remediate on site contamination;

f) return equivalent land capability as compared to pre-disturbance conditions;

g) integrate the proposed landscape with the surrounding landscapes including inter-connectivity to the surrounding landscapes;

h) integrate surface- and near-surface drainage within the Principle Development Area (PDA); and

i) be incorporated into planning and development of the Project.

Provide and discuss:

j) the anticipated timeframes for completion of reclamation activities;

k) the applicable parameters that should be used to monitor and evaluate the reclaimed land;

l) any constraints to reclamation such as timing of activities, availability of materials and influence of natural processes and cycles;

m) any soil-related constraints or limitations that may affect reclamation; and

n) specifically discuss the feasibility of the methods prescribed for reclamation (i.e., their proven success in trials or other locations).

TOR Section 4.9.2:

c) develop a soil conservation and reclamation plan for the PDA including re-vegetation and weed management plans. Describe the suitability and availability of soil materials within the Study Areas for reclamation. Outline the criteria to be used in salvaging and storing soils. Describe the procedures for soil handling storage and long-term management of soil intended for reclamation within the PDA. Provide location of soil stockpiles and how they will be managed.

1.3 Facility Overview and Study Area Definition

The Project is contained in a portion of Section 35-55-20 W4M (the Site) and comprises the area of proposed disturbance and development as illustrated in Figure I-1. For the study, the PDA was defined as the area within the Site that will contain the Project including rail and road access, unloading facilities, sulphur forming facilities and the temporary sulphur pastilles storage area. The local study area (LSA) was defined as the Site plus a 200 m buffer area. Details of the plant design and operation are provided in Volume I. The expected lifetime of the Project is 25 years.

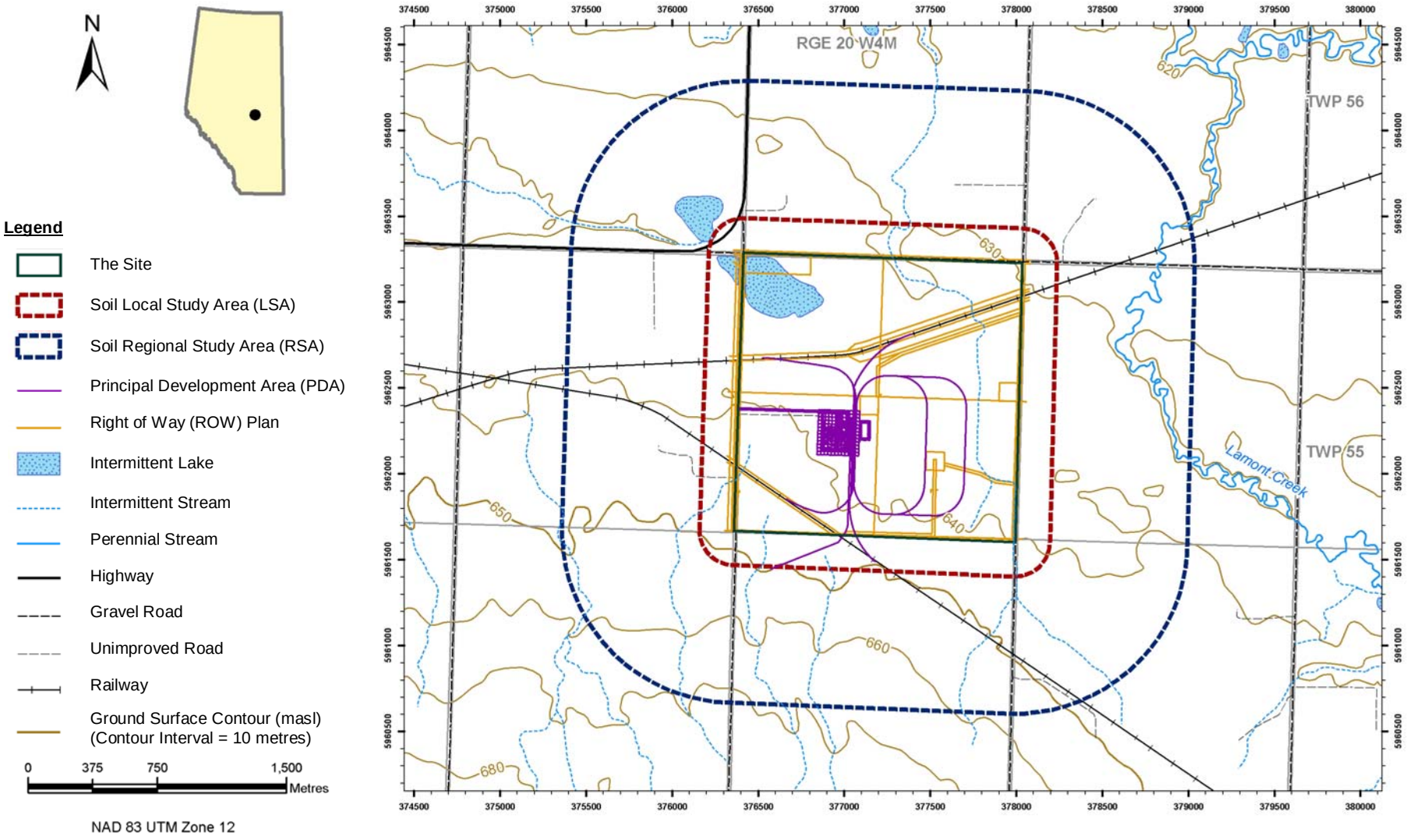

Figure I-1: Soil PDA, LSA and RSA

2. Project Construction and Operation

2.1 Predisturbance Characterization

Predisturbance soil, terrain and vegetation characterization of the LSA and the PDA has been conducted and is detailed in Volume IIC, Section 2: Soil, Volume IIC, Section 3: Vegetation. These sections include reclamation suitability classification of soil materials in the PDA, as well as baseline soil physical and chemical data and vegetation classifications which are summarized below.

2.1.1 Soil Characterization

Soils in the PDA and LSA were described and mapped using the methodology outlined in the TOR Section 4.9.2. A total of 20 inspection sites were undertaken in the PDA; some inspections were completed within 50 m of the PDA boundary because a final PDA location was not available at the time the field survey was completed. The resultant inspection intensity was approximately one inspection per 1.2 ha, slightly less than the expected SIL required (approximately 1 per ha; Agriculture Canada 1987). The LSA was surveyed at SIL 2 with one inspection per 6.8 ha. Soils in the LSA were mapped at a 1:20,000 scale (see Figure I-2).

Soils in the LSA were primarily solonetzic and chernozemic. Solonetzic soils are formed on fine-textured till or glaciolacustrine deposits that are saline and sodic. Solonetzic subsoils have chemical exchange complexes dominated by sodium, are very hard when dry and swell to a sticky mass of low permeability when wet. Chernozemic soils are formed on a wide variety of parent materials, and are imperfectly to well-drained grassland soils having surface horizons darkened by accumulation of xerophytic and mesophytic grasses and forbs. Significant portions of the LSA (25.5%) and PDA (73.4%) are underlain by soils which are known to have been previously disturbed (i.e., stripped) and reclaimed during previous proposed industrial activity at the Site. Reclaimed soils were assumed to be derived from either chernozemic or solonetzic soils. Characteristics of both soil types were found in the reclaimed profiles investigated in the LSA. The reclaimed profiles had very little structure or lacked structure in the horizons below the topsoil layer. Saline parent material was present in the majority of profiles. Reclaimed soils were associated with imperfectly to well-drained moisture regimes and a mix of vegetation types including:

- forage crops (hay)
- annual crops
- improved pasture

Other key soil types in the LSA included Gleysols, soils formed under periodic or permanent flooding, and Organic soils, where the dominant soil matrix is decomposed vegetation.

Pre-disturbance soil capability classes were assessed using a classification system for agricultural capability. Soils in the LSA were classified as having agricultural capability ranging from Class 2 (having slight limitations that may restrict the growth of agricultural crops) to Class 7 (unsuitable for agriculture) with the majority of the LSA (56.5%) falling into Class 4 (Severe limitations that restrict the growth of crops). In addition to the pre-disturbance agricultural suitability classes, soils were also rated for sensitivity to wind and water erosion (see Section 2.4.1.5).

Pre-disturbance reclamation suitability of soils in the LSA was determined for both topsoil and subsoil. For areas of the LSA that were rated, topsoil reclamation suitability ratings were:

- fair (43.9% of the LSA)
- poor (39.9%)
- unsuitable (1.9%)

Subsoil reclamation suitability was rated as:

- fair (14.4% of the LSA)
- poor (6.2%)
- unsuitable (65.2%)

Sensitivity of soils to acid deposition in the LSA was evaluated using the guidelines set out in the TOR. The AENV Air Monitoring Directive – Appendix A-7 (Soil Monitoring Guidelines) sets out a baseline data collection framework which allows for future reference to baseline chemical and physical data. These data were collected for representative soils in the LSA and are summarized in Volume IIC, Section 2: Soil – Appendix V.

Soils in the LSA were rated for sensitivity to acid deposition using currently accepted methodology. Mineral soils were rated with respect to sensitivity to base loss, acidification and aluminum solubilization. Organic soils were rated for overall sensitivity to acid deposition. Soils in the LSA were rated as having low-to-moderate sensitivity to acid deposition. No sensitive soil units were identified in the LSA.

An analysis of potential dry sulphur deposition effects of the Project on soil quality was also conducted. Based on the Project design and mitigation measures to limit aerial dispersal of elemental sulphur it is assumed that the majority of impacts to soil from dry deposition of elemental sulphur will occur within the PDA, where soils are rated as having a low sensitivity to acid deposition. Based on the sulphur deposition modelling data presented in Volume IIA, Section 2: Climate and Air Quality – Figure 2.5-14 the maximum average predicted annual deposition of sulphur at the Site boundary will be 1.1 kg/(ha•y). This rate of deposition is expected to be negligible when compared to the acidifying effects of current agricultural ammonia-based fertilizer application in the region. For soils within the PDA, where dry deposition effects are expected to be significant, changes to the chemical composition of the soils will occur within timescales (i.e., years) that allow for detection by a periodic soil monitoring program and the changes may be reversed by an appropriate soil treatment such as lime application.

2.1.2 Vegetation Characterization

Pre-disturbance land units were delineated using two vegetation inventories. The Central Parkland Native Vegetation Inventory Version 1.2 (CPNVI; ASRD 2003) was used to map the native grassland, native deciduous and human modified cover classes in the LSA. According to the CPNVI, 97.0% of the LSA is human modified, therefore, the human modified polygon of the CPNVI, was further delineated on aerial photographs (October 1998, 1:30,000) into Alberta Vegetation Inventory (AVI) agriculture and anthropogenic non-vegetated land classes. Agricultural land classes cover 84.86% of the LSA and anthropogenic non-vegetated land classes cover 11.55% of the LSA.

The construction of the Project is anticipated to reduce agricultural land classes by 6.10% and increase the following anthropogenic non-vegetated land classes: right of ways (4.05%), industrial facilities (1.53%), water reservoir (0.18%) and pipeline (0.34%).

Field surveys were conducted on June 19 and 20, 2006, and August 17 and 18, 2006, as part of the rare plant surveys. Surveys were conducted along shelterbelts, seasonal drainage channels, right of ways (ROW), wetland and rough pasture land units within the LSA. Trees, shrubs, forbs, graminoids, mosses and lichens encountered at each survey point were recorded. Notes were also taken on non-native and invasive species encountered. A range health assessment was conducted on the rough pasture in the northwest quarter of the Site.

Five noxious weeds, eleven nuisance weeds and eleven non-native or agronomic invasive species were identified in the LSA. The potential for weed encroachment to increase during the construction and operation of the Project is possible.

The PDA will impact underlying agricultural lands during the construction and operation of the facility. Potential impacts that were assessed include:

- surface disturbance
- dust deposition
- contaminant spills
- introduction of non-native and invasive species
- air emissions

All impacts will affect the underlying agricultural lands negatively; however, the impacts are predicted to be local in extent, negligible to low-to-moderate in magnitude, short-term to mid-term in duration and reversible.

Acid sensitivity ratings of vegetation communities within the LSA were also assessed. The majority of the LSA (67.9%) is rated as low to moderate acid sensitivity. This includes all of the annual and perennial croplands within the Site, portions of the west and north border, and the entire east border located within the 200 m buffer zone surrounding the Site. The remaining area of the LSA is rated as low (13.6%) or moderate (7.0%). The vegetation communities rated as low sensitivity are the rough pasture north of the railway and the wetland in the northwest corner of the LSA. A small amount of perennial cropland in the northeast corner of the LSA is also associated with low sensitivity soils. The annual and perennial croplands located along the west and south border of the LSA within the 200 m buffer zone are rated as moderately sensitive. The disturbed area (11.5% of the LSA) was not rated and includes the industrial facilities, farmsteads and ROW located within the LSA.

2.2 Soil Conservation

2.2.1 Topsoil Salvage

Topsoil will be stripped from all areas to be developed including areas where grading, excavation or tilling is to be conducted. Table I-1 indicates the distribution of soils within the PDA, and their respective topsoil and subsoil reclamation suitabilites. In the PDA, 7.2% is classified as *disturbed*. These are mainly the areas where the proposed rail spurs associated with the Project meet existing rail lines.

Table I-1: Soil Series Distribution in the PDA

Soil Series Name/Description	Soil Code	Area (ha)	Area (%)	Topsoil Reclamation Suitability	Subsoil Reclamation Suitability
Chernozemic					
Angus Ridge	AGS	0.21	0.8	Fair	Unsuitable
Peace Hills	PHS	0.40	1.6	Fair	Fair
Gleysolic					
Hairy Hill	HYL	0.23	0.9	Fair	Poor
Solonetzic[1]					
Camrose	CMO	3.1	12.5	Poor	Unsuitable
Wetaskiwin	WKN	0.9	3.5	Fair	Unsuitable
Reclaimed	RS	18.2	73.4	Poor	Unsuitable
Subtotal	--	23.04	92.7		
Disturbed	--	1.78	7.2		
Total		**24.78**	**100.0**		

Note:
[1] Solonetzic soils area assumed to include the reclaimed soils identified in the PDA.

The majority of soils in the PDA are solonetzic or are assumed to originate from solonetzic soils (in the case of reclaimed soil profiles). These soils comprise approximately 89% of the PDA, and have topsoil reclamation suitabilities of *poor*. Salvage of solonetzic soils requires care to avoid overstripping and admixing of topsoil and subsoil materials. Solonetzic soils are characterized with enriched sodium concentrations in the subsoil, which can lead to significant reduction in topsoil quality if admixing occurs during soil salvage. To ensure proper topsoil salvage, a qualified soil inspector (i.e., a soil scientist) should be present during salvage of all topsoil, to provide support to construction personnel and to document that the appropriate salvage procedures have been followed.

Previous reclamation at the Site makes it difficult to predict topsoil depth across polygons, and observed topsoil depths range widely across the PDA from 0.1 m to 2.3 m (see Figure I-2). For this reason, a detailed topsoil depth map has not been created for the C&R plan. A detailed topsoil depth profile for the PDA will be generated prior to stripping activities. This will involve a grid survey of topsoil depths within the PDA and any other areas to be stripped. Based on previous field observations, there is an obvious colour change between topsoil and subsoil at the Site, which should allow for fine-tuning of salvage depths by the soil inspector during construction. As an estimate for planning stockpile sizes and locations, a topsoil volume of 0.25 m depth across the entire 24.8 ha PDA area or 62,000 m^3 of topsoil is assumed.

2.2.2 Subsoil Salvage

The majority of subsoils in the PDA are classified as *unsuitable* for reclamation. Therefore, stripping of subsoil should be avoided as much as possible and should be limited only to areas where excavation is required. There are several locations in the PDA which may require subsoil stripping including the surface water runoff pond (see Figure I-3). The area of the proposed surface water runoff pond is approximately 7,800 m^2 or 0.78 ha. Soils salvaged from these areas will require separate stockpiling and handling from topsoil. If possible, subsoil exposed by topsoil stripping should be protected from erosion. Excessive subsoil compaction will need to be prevented by limiting traffic to established roadways.

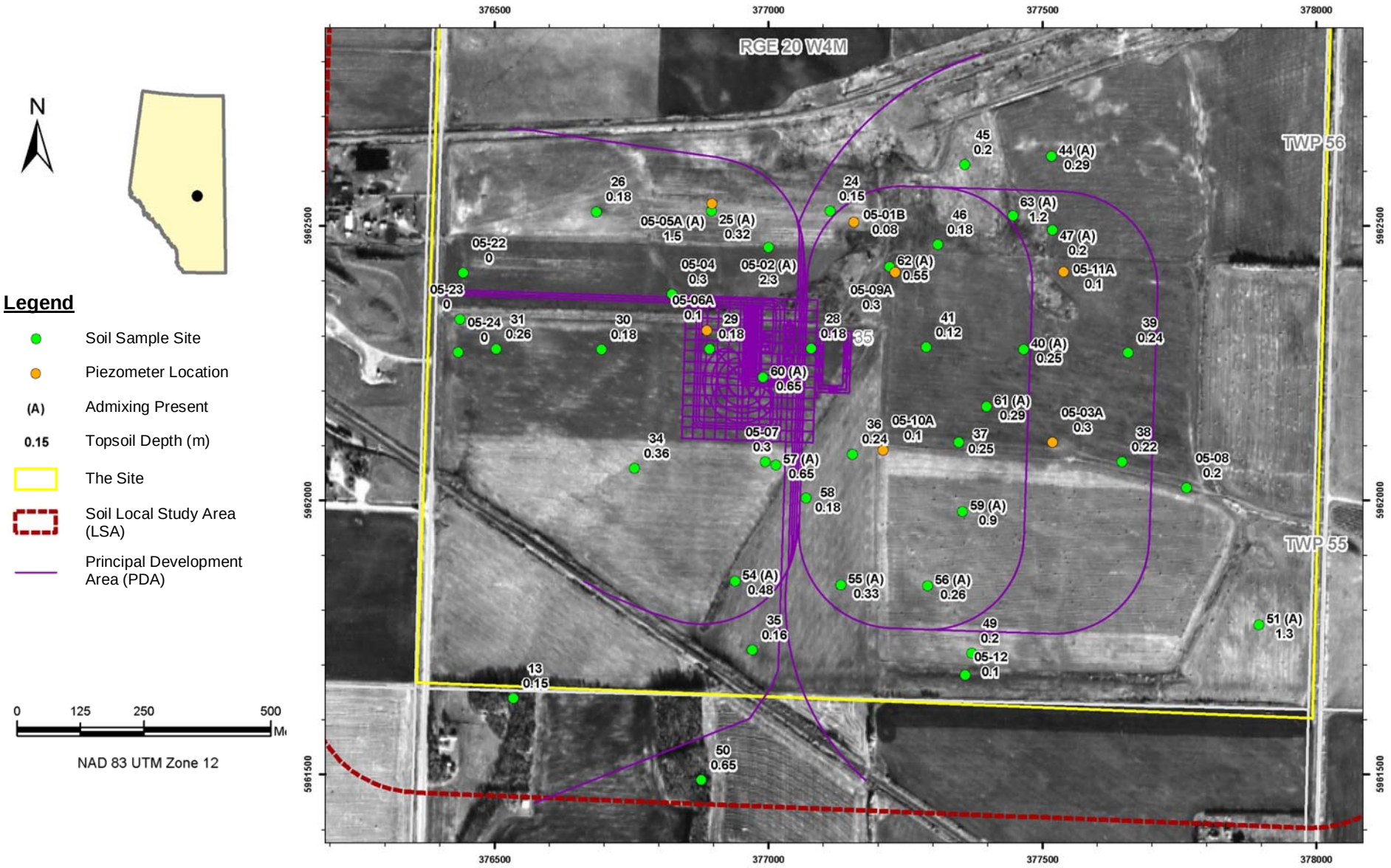

Figure I-2: Observed Topsoil Depths in the PDA and LSA

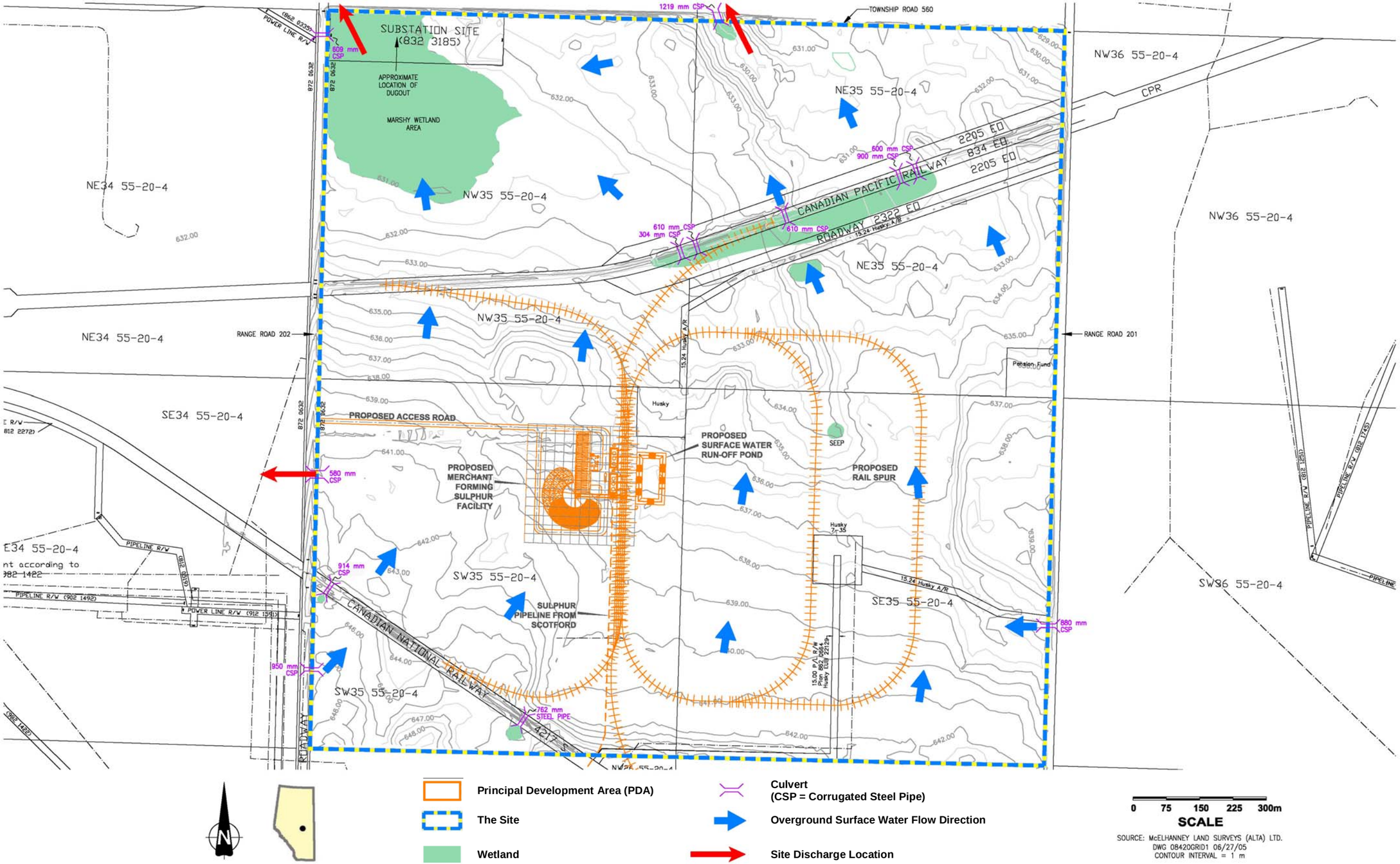

Figure I-3: Surface Water Drainage

2.2.3 Soil Stockpile Construction

Soil stockpiles will be placed in areas that are level and provide stable foundations for long-term soil storage. They will be placed at least 30 m from water bodies and at least 250 m from any portion of the Project which may be a source of acidifying emissions. Separate stockpiles will be constructed for topsoil originating from solonetzic soils and chernozemic soils as well as for subsoil. Each soil stockpile will have setbacks to ensure that admixing of materials does not occur. The approximate area in which the stockpiles will be constructed is shown in Figure I-4. The final locations of stockpiles may change from the C&R plan; however, they will meet the guidelines outlined above, and accurate stockpile locations and soil types will be recorded on as-built drawings.

In general, the soil stockpiles will be constructed with side slopes not exceeding a 3:1 ratio of length to height and with an average height of 2 m.

2.2.4 Erosion Prevention

Measures for controlling soil erosion of stockpiles and disturbed areas of the PDA may include, but are not limited to the following:

- spraying dry soil surfaces with water or tackifying agents to reduce potential for wind erosion loss
- installing water erosion control matting or geotextile fabrics
- applying crop residue matting such as straw or mulch

These measures are intended to temporarily limit erosion losses or are to be applied to vulnerable soils or areas. The measures will be implemented by the Soil Inspector and the Construction Supervisor based on their experience.

Baseline soil data indicates that approximately 0.4 ha of the soil in the PDA is rated as having a high risk for wind erosion (Peace Hills soil series). Handling of this soil will require additional caution and should not be conducted during high winds. The remaining surface soils in the PDA are rated as having low wind erosion risk. All soils in the PDA have low water erosion risk on low slopes.

Longer-term erosion control measures will include vegetation of soil stockpiles and any areas which can be reclaimed immediately following construction. The soil stockpiles will be seeded with a mix that is salt and drought tolerant and contains short growth habit species to minimize requirements for watering and mowing but maximize erosion prevention. The pre-disturbance land use of the PDA is agricultural; therefore, it is recommended that the Drylands pasture mix blended by Pickseed be used on the soil stockpiles (see Table I-2). The seed mix will be analyzed for weed content prior to seeding and the certificate of seed analysis will be kept on record at the facility and a copy will be provided to the Lamont County Agricultural Service Board.

Figure I-4: Proposed Soil Stockpile Location

Table I-2: Reclamation Seed Mix for Stockpiled Topsoil, Subsoil and Reclaimed Areas Following Construction of the Facility

Species[1]	Content (%)
BromePro bromegrass	40
Kirk crested wheatgrass	20
Pubescent wheatgrass	20
Dahurian wild ryegrass	10
PICKSEED 3006 alfalfa	10

Note:
[1] PICKSEED Canada Inc. Drylands Pasture Mix.

2.2.5 Potential Effects of Stockpiling on Soil Quality

Stockpiling soil for reclamation at a later date can impact soil quality and its suitability for use in reclamation. Although some studies have indicated that topsoil storage does not have any severe or long-term effects on soil quality, potential impacts to soil quality can be mitigated by minimizing stockpiling time and soil handling by stockpiling once and allowing revegetation of the pile until it can be used. Changes to chemical properties are short-term and can be rectified by incorporating a nutrient (e.g., fertilizer) or organic amendment following use of the topsoil for reclamation. Soil physical changes are negligible relative to the changes which can take place during salvage and placement operations. (Abdul-Kareem and McRae 1984, Stark and Redente 1987, Thurber Consultants Ltd. et al. 1990).

2.3 Surface Runoff and Drainage Management

Surface water management including runoff and drainage management are discussed in detail in Volume IIB, Section 3: Surface Water Quantity. Several surface water management mitigation measures will be implemented to minimize possible changes to water level and flow, erosion potential and possible changes to basin sediment yield and loading to receiving watercourses. The mitigation measures described in Volume IIB, Section 3: Surface Water Quantity are suitable to reclamation planning:

- using stormwater management facilities, such as berms, drainage ditches and a collection pond to collect, convey and contain surface water runoff from the Project plant areas. These will be designed to provide full on-Project area storage of local runoff and excess plant process water. The capacity of the stormwater management pond will be approximately 11,000 m^3, which exceeds the run-off generated by the 1 in 25 year, 24 hour rainfall event. Surface water within the stormwater management pond will be stored and used as process water. In a flood situation where runoff exceeds the design criteria of the pond, the water would be tested for quality, treated (if required) and released to the environment provided that the water quality meets Surface Water Quality Guidelines for Use in Alberta (AENV 1999). Water will be released in the natural grassed swale immediately east of the PDA where it will discharge into the wetland in the northwest quadrant of the property. This wetland will provide additional natural filtration and impoundment before being discharged downstream to Beaverhill Creek.
- siting the facilities back at least 100 m from waterbodies where practicable, to minimize potential disturbances to riparian conditions and effects on local flow patterns. This will also provide an area for attenuation and dispersal of stormwater runoff before entering any natural waterbodies.

- providing culverts or bridges at defined watercourse crossings, ephemeral drainages and low points along road alignments. These will eliminate potential flow restrictions and maintain natural drainage patterns. Culverts will be provided as required to maintain local drainage with a typical maximum spacing of 300 m.
- establishing a minimum culvert size of 500 mm in diameter. Although larger than required for flood drainage in many cases, this will reduce the potential blockage from ice, sediment and vegetation growth.
- sizing culverts to convey the 1:25 year peak discharge at a water level not exceeding the crown of the culvert (no surcharging). This capacity should also accommodate partial blockage by vegetation or sediment where culverts are installed in wetland environments.
- installing culverts, where required, at natural grade to prevent impoundment upstream of the inlet and to maintain equal water levels and natural flow patterns on both sides of the road. This will help control excessive ponding or drying of wetland areas.
- developing and implementing an erosion and sediment control plan for the site before construction. The natural low gradient terrain of the Project area means potential erosion concerns will be minimized. The use of best management practices will also minimize erosion and provide runoff control during construction of the plant, roads, railways and drainage ditches. These will include:
    - appropriate sediment control planning to minimize sediment generation caused by surface water runoff from newly excavated areas
    - scheduling and layout of works
    - installing sediment and runoff retention structures, such as silt fences
    - incorporating biotechnical erosion control measures
    - directing local road runoff away from crossing locations into the adjacent vegetation
    - maintaining buffers and minimizing disturbances
    - minimizing the extent of surficial soil compaction during construction
    - re-establishing a vegetative cover as soon as practicable after construction

2.4 Spill Control and Cleanup Procedures

Soil contamination might occur during the construction and operational phases of the Project. All phases of the Project will operate with spill control and waste management procedures in place. These procedures are discussed in Volume I: Project Description.

2.5 Weed Management

Weed management on the Site will be implemented in accordance with the *Weed Control Act* (Alberta Agriculture and Food 1980). Weed species defined as restricted or noxious in the Weed Regulation (Alberta Agriculture and Food 2001, Internet site) will be removed or controlled throughout all phases of the Project. Recommended weed management practices include:

- requiring equipment to arrive onsite clean and free of soil and vegetative material
- using weed-free straw bales or rolled erosion control products for erosion control
- ensuring harvested weeds are handled and disposed in a manner to reduce spread of seeds and potential for regrowth

- addressing weed issues quickly and developing and implementing a preventative management plan

Weed control will be monitored and updated according to regulatory input. The Lamont County Agricultural Service Board recommends developing a weed management strategy for scentless chamomile and white cockle (Eleniak 2007, pers. comm.).

Noxious and restricted weeds may be treated with residual herbicides during the construction and early operation phases of the Project. If noxious and restricted weeds persist throughout the operational phase of the Project, nonresidual herbicides will be applied during the last five years of the operations phase to allow residual herbicides to breakdown before decommissioning.

All weed control involving pesticide application will be contracted to a licensed practitioner. It is recommended that AST coordinate weed control with CN Rail and CP Rail to effectively manage weeds on the Site and along the railway right-of-ways.

Weed management will be implemented during the construction phase of the Project and will be maintained throughout the operations phase and closure until a reclamation certification is issued.

3. Conceptual Closure Plan

3.1 Decommissioning

At the end of the Project (25 years), infrastructure, including buildings, foundations, paved areas, rail lines and roads will be removed from the Site. Concrete and pavement will be broken up and disposed of at approved facilities and graveled areas will be assessed for contaminants and separated into uncontaminated and chemically contaminated fractions. Uncontaminated gravel may be re-used locally.

3.2 Soil Remediation

It is expected that periodic soil monitoring and spill and release response activities during the lifetime of the Project will be used to identify any potentially contaminated areas at the Site. Any areas in which identified contamination was not remediated during Project operation will be remediated upon decommissioning to within accepted regulatory guidelines at the time of closure. Soil monitoring and assessment of contamination are discussed further in (Volume I and in Volume IIC, Section 2: Soil).

3.3 Land Reclamation

The objective of surface reclamation at the Site will be to achieve equivalent land capability to the predisturbance condition.

3.3.1 Reclamation Process

The expected process for reclamation at the Site is as follows:

1. Remove the stormwater retention pond and berms and raised pads at the Site.
2. Re-contour the subsoil at the Site to achieve a final grade similar to pre-disturbance conditions. It should be noted that pre-Project contours at the Site are largely a product of previous reclamation activities undertaken across the site some time after 1981. Surface contours should, as much as possible, allow for integration into the surrounding terrain and establish interconnectivity with surrounding landscapes and established drainage patterns. Pre-disturbance drainage patterns are described in Volume IIB, Section 3: Surface Water Quantity and topographic mapping of the PDA and LSA indicated that pre-disturbance slopes in the PDA are generally less than 10% (see Figure I-3). These data may be used as a guideline to establish final grades during reclamation. The PDA will be reclaimed by grading and re-vegetating to restore natural drainage patterns as soon as practical following decommissioning. All culverts will be removed to facilitate restoration of natural drainage patterns and runoff conditions.
3. Relieve any residual compaction of the subsoil by ripping and, if necessary, by adding calcium amendments. Since subsoils at the Site are mainly classified *unsuitable* for reclamation due to sodic conditions, relieving compaction in these subsoils will likely require multiple amendment and ripping and cultivation treatments, as well as a detailed evaluation by a qualified soil scientist prior to placement of topsoil and final grading.
4. Replace topsoil to appropriate depths to achieve final elevation grades at the Site. Topsoil replacement will take place during appropriate times of the year when soil temperatures and moisture conditions allow for even topsoil placement and potential erosion losses of placed topsoil are limited.

5. Soil quality will be assessed and if necessary, liming treatments will be applied to ensure the pH of the soil is suitable for plant growth and within acceptable limits. As noted in item 3, above, lime, and other calcium amendments are useful, not only in reversing depressed pH levels, but in alleviating naturally occurring soil sodicity issues. It is expected that naturally sodic subsoils will benefit from lime application and that this will result in improved reclamation suitability of these materials.
6. Re-vegetation plans will be developed in consultation with the appropriate regulatory bodies and with reference to future land uses. It is predicted that the Site will return to agriculture land use. The applicable reclamation criteria will be applied to ensure the revegetation strategy meets the criteria and that a reclamation certificate will be issued. A forage mix or annual crop species will most likely be seeded, which will result in the establishment of a cover crop and prevent weed infestations. Weed management practices will continue throughout the revegetation phase until a reclamation certificate is issued.

3.3.2 Reclamation Timing and Evaluation

Reclamation will commence as soon as possible within one year of decommissioning of all or a portion of the facility. It is expected that the reclamation, as outlined above, will be complete within five years of the complete decommissioning of the facility. Upon completion of reclamation, the following assessments will be conducted to evaluate reclamation success:

- topography and drainage pattern survey to ensure that drainage patterns have been returned to pre-disturbance conditions
- weed surveys to evaluate the success of weed management and vegetation reclamation programs
- soil monitoring event within the former PDA to evaluate any residual soil impacts
- collection of soil analytical data from areas where subsoil was previously removed or disturbed as part of the Project, to determine if reclamation suitability of the material has been improved through de-compaction and amendment applications
- a detailed topsoil depth assessment, to ensure that topsoil depths are appropriate in reclaimed areas

3.3.3 Potential Limitations to Reclamation

In general, success in achieving equivalent land capability through reclamation is dependent on the quality of reclamation materials and the care which is taken in maintaining the quality of those materials through the reclamation process. Topsoils in the PDA are rated as fair to poor in reclamation suitability, with main limitations to suitability being sodicity and consistency. Successful reclamation with these topsoil materials should be possible with proper management programs in place. Successful reclamation of topsoil disturbances in Central Alberta has been demonstrated at hundreds of oil and gas and industrial facilities, and the procedures for reclamation success are well documented and understood. Similarly, amelioration of soil acidity and sodicity by lime application is a well understood and accepted practice in Alberta and worldwide. Subsoil suitability in the PDA is generally rated as *unsuitable*. While these soil types are difficult to use as reclamation materials, successful reclamation can be achieved by limiting removal and replacement of subsoil materials to only those areas where excavation is required, by applying compaction controls during construction and operation of the Project, and by soil tillage and amendment application as part of the reclamation process for affected areas. The use of proper reclamation practices with these materials is anticipated to return soil to better quality than currently exists in the previously reclaimed area.

4. References

4.1 Literature Cited

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Volume IID, Section 2: Land Use and Reclamation

Appendix II: Land Use Dispositions, Leases and Wellsites in the RSA

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Table II–1: Land Use Dispositions and Leases in RSA

Source ID	Operator	Name	Location	Facility Type
500090	ATCO Pipelines (North TN8263923)	Bruderheim	04-34-055-20W4	Meter Station
90560	Canadian Natural Resources Limited	Redwater 03-22-55-20W4 GGS	03-22-055-20W4	Gas Gathering System
90550	Canadian Natural Resources Limited	Redwater 3-22-55-20W4	03-22-055-20W4	Battery
3012924	Comstate Resources Ltd.	Comstate Resources Ltd.	16-02-056-20W4	Satellite
7700033	Dantel Resources Ltd.	Dantel Redwater 7-1	07-01-056-20W4	Battery
55409	Dominion Exploration Canada Ltd.	Archer Redwater 10-26-055	10-26-055-20W4	Battery
7700065	Enermark Inc.	Wellore Redwater 6-28-55-20	06-28-055-20W4	Battery
7700021	Gerwatoski Brothers Enterprises Ltd.	Cabre Redwater 04-01	04-01-056-20W4	Battery
1407765	Gulf Canada Limited	NSM Lamont	08-25-055-20W4	Injections
1408144 LSA	Husky Oil Operations Limited	Perl Redwater	07-35-055-20W4	Injections
1409006	Husky Oil Operations Limited	Renaissance Elk Island 14-19	14-19-055-19W4	Injections
84510	Husky Oil Operations Limited	Husky Redwater 8-30 Water Source BTY	06-30-055-19W4	Injections
8104640	Husky Oil Operations Limited		07-34-055-20W4	Meter Station
3033936	Husky Oil Operations Limited	Husky Oil Operations Limited	08-30-055-19W4	Injections
3012682	Husky Oil Operations Limited	Husky Oil Operations Limited	06-36-055-20W4	Satellite
46690	Husky Oil Operations Limited	Chancellor Redwater 14-2	14-02-056-20W4	Battery
47860 LSA	Husky Oil Operations Limited	Perl CS Lamont 06-35	06-35-055-20W4	Battery
48057	Husky Oil Operations Limited	HCO et al Redwater 16-04	16-04-056-20W4	Battery
48777	Husky Oil Operations Limited	Chancellor Redwater 10-2	10-02-056-20W4	Battery
54551	Husky Oil Operations Limited	Renaissance Redwater 4-30	04-30-055-19W4	Battery
54908	Husky Oil Operations Limited	Redwater	01-36-055-20W4	Battery
55899	Husky Oil Operations Limited	Renaissance Lamont 16-24	16-24-055-20W4	Battery
56296	Husky Oil Operations Limited	Renaissance Redwater 8-36-55-20	08-36-055-20W4	Battery
56404	Husky Oil Operations Limited	Renaissance Redwater 8-25-055	08-25-055-20W4	Battery
56675	Husky Oil Operations Limited	Renaissance Redwater 8-30-55-19	08-30-055-19W4	Battery
60022	Husky Oil Operations Limited	Renaissance et al Redwater 4-3	04-03-056-20W4	Battery
68948	Husky Oil Operations Limited	Husky Redwater 15-36	15-36-055-20W4	Battery
79934	Husky Oil Operations Limited	Husky Redwater 6-25	06-25-055-20W4	Battery

Source: IHS Canada 2007. EGIS Oil and Gas Facilities and Pipeline Search. Retrieved Jan. 18, 2007 from IHS Canada EGIS V.8.0 database.

Table II–1: Land Use Dispositions and Leases in RSA (Cont'd)

Source ID	Operator	Name	Location	Facility Type
82663	Husky Oil Operations Limited	Husky Redwater 3-30 SWB	03-30-055-19W4	Battery
7700011	Husky Oil Operations Limited	NSM Redwater BTY 2	08-25-055-20W4	Battery
7700013	Husky Oil Operations Limited	Intensity et al Redwater 16-33-55-20	16-33-055-20W4	Battery
7700014	Husky Oil Operations Limited	Renaissance Redwater 8-26	08-26-055-20W4	Battery
7700020	Husky Oil Operations Limited	Intensity Redwater 8-4-56-20	08-04-056-20W4	Battery
7700023	Husky Oil Operations Limited	NSM Redwater 14-34	14-34-055-20W4	Battery
7700028	Husky Oil Operations Limited	NSM Redwater 6-34	06-34-055-20W4	Battery
7700090	Husky Oil Operations Limited	NSM Redwater 4-3	04-03-056-20W4	Battery
1408817	Nexen Inc.	CXY Chemicals Redwater	07-34-055-20W4	Injections
1407112	NSM Resources Ltd	NSM Bruderheim	16-27-055-20W4	Injections
7700019	NSM Resources Ltd	Ruperts CS Redwater 10-3-56-20	10-03-056-20W4	Battery
66345	Penn West Petroleum Ltd.	Redwater 8-28	08-28-055-20W4	Battery
45128	Talisman Energy Inc.	Poco Redwater 4-19	04-19-055-19W4	Battery
45890	Westbow Energy Inc.	Poco Redwater 3-19	03-19-055-19W4	Battery

Source: IHS Canada 2007. EGIS Oil and Gas Facilities and Pipeline Search. Retrieved Jan. 18, 2007 from IHS Canada EGIS V.8.0 database.

Table II-2: Wellsites in RSA

Well Name	License Number	Operator	Oper CD
Joss Redwater 6-30-55-19	158465	ARC Resources Ltd.	0G30
Joss CNWE Redwater 3-30-55-19	160423	ARC Resources Ltd.	0G30
HB UGAS Redwater 14-26-55-20	72244	BP Canada Energy Company	0060
Amoco Redwater 4-1-56-20	84776	BP Canada Energy Company	0060
Poco Redwater 2-19-55-19	156076	Burlington Resources Canada Ltd.	0BL1
Voyager et al. Redwater 8-19-55-19	129804	Burlington Resources Canada Ltd.	0BL1
CNRL Redwater 3-22-55-20	85308	Canadian Natural Resources Limited	0HE9
Perl CS Redwater 10-3-56-20	66503	Canetic Resources Inc.	A1T7
Voyager et al. Redwater 10-31-55-19	85164	Comaplex Resources International Ltd.	0L35
Voyager et al. Redwater 10-31-55-19	85164	Comaplex Resources International Ltd.	0L35
Voyager et al. Redwater 10-31-55-19	85164	Comaplex Resources International Ltd.	0L35
Comstate et al. Redwater 16-2-56-20	83282	Comstate Resources Ltd.	0NP5
Comstate et al. Redwater 13-1-56-20	78491	Comstate Resources Ltd.	0NP5
Comstate et al. Redwater 7-2-56-20	69533	Comstate Resources Ltd.	0NP5
Culane Redwater 11-2-56-20	286635	Culane Energy CORP.	A0L3
Dantel Redwater 7-1-56-20	97670	Dantel Resources Ltd.	0KG3
Daylight Redwater 12-34-55-20	320299	Daylight Energy Ltd.	A162
AVIVA Redwater 6-28-55-20	110493	Gerwatoski Brothers Enterprises Ltd.	0JB8
Voyager et al. Redwater 1-24-55-20	81780	Graystone Corporation	0AH3
Rock Creek REDW 5-27-55-20	314282	Great Plains Exploration Inc.	A0T7
CCR Redwater 14-2-56-20	156174	Husky Oil Operations Limited	0R46
CCR Redwater 14-2-56-20	156174	Husky Oil Operations Limited	0R46
Renaissance Redwater 6-25-55-20	73485	Husky Oil Operations Limited	0R46
Renaissance Redwater 8-30-55-19	202016	Husky Oil Operations Limited	0R46
Renaissance Redwater 10-2-56-20	164286	Husky Oil Operations Limited	0R46
Husky Redwater 15-36-55-20	260834	Husky Oil Operations Limited	0R46
CCR Redwater 14-2-56-20	156174	Husky Oil Operations Limited	0R46
Husky Redwater 7-30-55-19	260630	Husky Oil Operations Limited	0R46
Renaissance et al. Redwater 6-36-55-20	65301	Husky Oil Operations Limited	0R46
Renaissance et al. REDW 16-24-55-20	67572	Husky Oil Operations Limited	0R46
Renaissance et al. REDW 10-36-55-20	85932	Husky Oil Operations Limited	0R46
Renaissance et al. REDW 12-30-55-19	82915	Husky Oil Operations Limited	0R46
Renaissance et al. REDW 11-36-55-20	86114	Husky Oil Operations Limited	0R46
Renaissance et al. REDW 14-34-55-20	91595	Husky Oil Operations Limited	0R46
Renaissance et al. REDW 16-25-55-20	85949	Husky Oil Operations Limited	0R46
Renaissance Redwater 16-4-56-20	156772	Husky Oil Operations Limited	0R46
Renaissance et al. Redwater 2-36-55-20	82914	Husky Oil Operations Limited	0R46
Renaissance Redwater 1-36-55-20	194123	Husky Oil Operations Limited	0R46
Renaissance et al. Redwater 2-30-55-19	85933	Husky Oil Operations Limited	0R46
Renaissance et al. Redwater 7-35-55-20	66897	Husky Oil Operations Limited *Abandoned	0R46
Renaissance et al. Redwater 6-34-55-20	93718	Husky Oil Operations Limited	0R46

Source: IHS Canada 2007. EGIS Oil and Gas Facilities and Pipeline Search. Retrieved Jan. 18, 2007 from IHS Canada EGIS V.8.0 database.

Table II-1: Wellsites in RSA (Cont'd)

Well Name	License Number	Operator	Oper CD
Renaissance et al. REDW 14-19-55-19	69136	Husky Oil Operations Limited	0R46
Renaissance Redwater 14-25-55-20	66971	Husky Oil Operations Limited	0R46
Renaissance et al. REDW 16-27-55-20	66784	Husky Oil Operations Limited	0R46
Renaissance Redwater 8-36-55-20	201787	Husky Oil Operations Limited	0R46
Renaissance Redwater 8-30-55-19	202016	Husky Oil Operations Limited	0R46
Renaissance Redwater 4-30-55-19	192464	Husky Oil Operations Limited	0R46
Renaissance Redwater 8-25-55-20	199453	Husky Oil Operations Limited	0R46
Shaker 02 REDW 3-30-55-19	296917	Husky Oil Operations Limited	0R46
Renaissance Redwater 10-2-56-20	101317	Husky Oil Operations Limited	0R46
Renaissance et al. Redwater 4-3-56-20	109503	Husky Oil Operations Limited	0R46
Renaissance Redwater 16-33-55-20	99961	Husky Oil Operations Limited	0R46
Renaissance et al. Redwater 6-30-55-19	66412	Husky Oil Operations Limited	0R46
Renaissance et al. REDW 15-19-55-19	85948	Husky Oil Operations Limited	0R46
Renaissance et al. REDW 10-30-55-19	85931	Husky Oil Operations Limited	0R46
Renaissance Redwater 10-26-55-20	69799	Husky Oil Operations Limited	0R46
Renaissance Redwater 8-26-55-20	74232	Husky Oil Operations Limited	0R46
Renaissance et al. Redwater 6-35-55-20	69560	Husky Oil Operations Limited *Abandoned	0R46
Renaissance Redwater 6-25-55-20	73485	Husky Oil Operations Limited	0R46
Renaissance Redwater 7-31-55-19	201786	Husky Oil Operations Limited	0R46
Shaker 02 REDW 3-30-55-19	296917	Husky Oil Operations Limited	0R46
Renaissance Redwater 9-31-55-19	215701	Husky Oil Operations Limited	0R46
Ruperts et al. Lamont 8-25-55-20	69351	Kandahar Resources Limited	0W03
Parker Hudson's Bay 4-26	12377	Nabors Drilling Limited	0X84
Cdnoxy Bruderheim 7-34-55-20 LSA	52195	Nexen Inc. Active	0226
Cdnoxy Bruderheim 7-34-55-20 LSA	52195	Nexen Inc. Active	0226
Cdnoxy Bruderheim 7-34-55-20	52195	Nexen Inc.	0226
Cdnoxy 02 Redwater 8-34-55-20	146933	Nexen Inc.	0226
Cdnoxy Redwater 8-34-55-20	143416	Nexen Inc.	0226
Petroy CS et al. Redwater 10-1-56-20	82480	Nexen Inc.	0226
Oak Ridge et al. Lamont 6-30-55-19	44356	Oak Ridge Oil & Minerals Ltd	0M99
Penn West Petr Redw 8-28-55-20	258968	Penn West Petroleum Ltd.	0BP8
Perl et al. Redwater 9-35-55-20	89110	Pensionfund Energy Resources Limited *Abandoned	0HE2
Petroy et al. Lamont 6-31-55-19	69246	Petroleum Royalties Limited	0L46
Ruperts CS Bruderheim 8-33-55-20	67082	Rup Resources Ltd.	0W07
Albchem BW #1 REDW 9-33-55-20	144632	Superior Plus Inc.	A2CJ
Albchem BW #1 REDW 9-33-55-20	144632	Superior Plus Inc.	A2CJ
North Continental #1	B002562	Taylor Petroleum Operators Limited	0C09
Voyager et al. Redwater 5-19-55-19	87018	Voyager Petroleums Ltd	0J88
Westbow BPX Redwater 3-19-55-19	153873	Westbow Energy Inc.	0ZR2
Westbow Bpx Redwater 4-19-55-19	152708	Westbow Energy Inc.	0ZR2
White Shield Lamont 10-24-55-20	35086	White Shield Oil And Gas (Canada) Limited	0K19

Source: IHS Canada 2007. EGIS Oil and Gas Facilities and Pipeline Search. Retrieved Jan. 18, 2007 from IHS Canada EGIS V.8.0 database.

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Appendix III: LSA Surface Dispositions

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Table III-1: RSA Surface Dispositions

Purpose	Location	Reg. #
Utility Right-of-Way	4-20-55-24 NW	2310KU
Grantee – ATCO Gas and Pipeline Ltd.		
Utility Right-of-Way	4-20-55-24 NW	752 136 193
Grantee – Lamco Gas Co-op Ltd.		
Utility Right-of-Way	4-20-55-24 NW	752 139 801
Grantee – Lamco Gas Co-op Ltd.		
Utility Right-of-Way	4-20-55-24 SE	3605KR
Grantee – ATCO Gas and Pipelines Ltd.		
Utility Right-of-Way	4-20-55-24 SE	772 111 086
Grantee – Lamco Gas Co-op Ltd.		
Utility Right-of-Way	4-20-55-24 NE	772 105 036
Grantee – ATCO Gas and Pipeline Ltd.		
Utility Right-of-Way	4-20-55-24 NE	782 021 710
Grantee – Lamco Gas Co-op Ltd.		
Utility Right-of-Way	4-20-55-24 NE	812 091 621
Grantee – Capital Region Vegreville Corridor Water Service Commission.		
Utility Right-of-Way	4-20-55-23 NE	822 002 702
Grantee – Lamco Gas Co-op Ltd.		
Utility Right-of-Way	4-20-55-23 NE	922 322 057
Grantee – Josephburg Water Co-op Ltd.		
Utility Right-of-Way	4-20-55-22 NE	752 139 167
Grantee – Lamco Gas Co-op Ltd.		
Utility Right-of-Way	4-20-55-22 NE	922 355 289
Grantee – Josephburg Water Co-op Ltd.		
Utility Right-of-Way	4-20-55-22 SE	772 127 937
Grantee – Lamco Gas Co-op Ltd.		
Utility Right-of-Way	4-20-55-22 SE	922 355 106
Grantee - Josephburg Water Co-op Ltd.		
Utility Right-of-Way	4-20-55-22 SW	772 124 220
Grantee – Lamco Gas Co-op Ltd.		
Utility Right-of-Way	4-20-55-22 SW	922 330 479
Grantee – Josephburg Water Co-op Ltd.		
Utility Right-of-Way	4-20-55-22 NW	752 139 031
Grantee – Lamco Gas Co-op Ltd.		
Source - Registrar of Land Titles, January 3 and 5, 2007 (Land Status Automated System).		

Table III-1: RSA Surface Dispositions (Cont'd)

Purpose	Location	Reg. #
Utility Right-of-Way	4-20-55-22 NW	922 332 988
Grantee – Josephburg Water Co-op Ltd.		
Utility Right-of-Way	4-20-55-33 NE	762 035 512
Grantee – Renaissance Energy Ltd.		
Utility Right-of-Way	4-20-55-33 SE	3086KR
Grantee – ATCO Gas and Pipelines Ltd.		
Utility Right-of-Way	4-20-55-33 SE	762 035 510
Grantee – Renaissance Energy Ltd.		
Utility Right-of-Way	4-20-55-33 SW	7401KQ
Grantee – ATCO Gas and Pipeline Ltd.		
Utility Right-of-Way	4-20-55-33 SW	752 002 544
Grantee – Village of Bruderheim		
Utility Right-of-Way	4-20-55-33 SW	752 121 907
Grantee – Lamco Gas Co-op Ltd.		
Utility Right-of-Way	4-19-33-31 NW	772 144 659
Grantee – Lamco Gas Co-op Ltd.		
Utility Right-of-Way	4-19-33-31 NW	802 204 954
Grantee – NSM Resources Ltd.		
Utility of Right-of-Way	4-19-55-31 SW	752 115 018
Grantee – Lamco Gas Co-op Ltd.		
Utility Right-of-Way	4-19-55-31 SW	802 204 955
Grantee – NSM Resources Ltd.		
Utility Right-of-Way	4-19-55-30 NE	752 115 519
Grantee – Lamco Gas Co-op Ltd.		
Utility Right-of-Way	4-19-55-30 NE	752 115 520
Grantee – Lamco Gas Co-op Ltd.		
Utility Right-of-Way	4-19-55-30 NE	812 038 672
Grantee – NSM Resources Ltd.		
Utility Right-of-Way	4-19-55-30 NE	812 050 615
Grantee – NSM Resources Ltd.		
Utility Right-of-Way	4-20-55-28 NW	752 125 481
Grantee – Lamco Gas Co-op Ltd.		
Utility Right-of-Way	4-20-55-28 NE	762 006 645
Grantee – Lamco Gas Co-op Ltd.		
Utility Right-of-Way	4-20-55-28 SE	812 154 719
Grantee – Capital Region Vegreville Corridor Water Services Commission		
Source - Registrar of Land Titles, January 3 and 5, 2007 (Land Status Automated System).		

Table III-1: RSA Surface Dispositions (Cont'd)

Purpose	Location	Reg. #
Utility Right-of-Way	4-19-55-31 NW	772 144 659
Grantee – Lamco Gas Co-op Ltd.		
Utility Right-of-Way	4-19-55-31 NW	782 072 012
Grantee – Lamco Gas Co-op Ltd.		
Utility Right-of-Way	4-19-55-31 NW	802 221 782
Grantee – NSM Resources Ltd.		
Utility Right-of-Way	4-19-55-31 NW	812 272 342
Grantee – NSM Resources Ltd.		
Utility Right-of-Way	4-19-55-31 NW	882 235 786
Grantee – Bruderheim Water Co-op Ltd.		
Utility Right-of-Way	4-19-55-30 NW	802 204 951
Grantee – NSM Resources Ltd.		
Utility Right-of-Way	4-19-55-30 SW	752 141 993
Grantee – Lamco Gas Co-op Ltd.		
Utility Right-of-Way	4-19-55-30 SW	802 230 684
Grantee – Renaissance Energy Ltd.		
Utility Right-of-Way	4-19-55-30 SW	812 277 010
Grantee – Renaissance Energy Ltd.		
Utility Right-of-Way	4-19-55-30 SW	842 260 968
Grantee – TransAlta Utilities Corporation		
Utility Right-of-Way	4-19-55-19 SE	84KW
Grantee – ATCO GAS and Pipelines Ltd.		
Utility Right-of-Way	4-19-55-19 SE	772 104 205
Grantee – Lamco Gas Co-op Ltd.		
Utility Right-of-Way	4-19-55-19 SW	2332KU
Grantee – ATCO Gas and Pipelines Ltd.		
Utility Right-of-Way	4-19-55-19 SW	932 223 572
Grantee – Lamco Gas Co-op Ltd.		
Utility Right-of-Way	4-19-55-19 SE	752 120 922
Grantee – Lamco Gas Co-op Ltd.		
Utility Right-of-Way	4-19-55-19 NE,	812 042 160
Grantee – NSM Resources Ltd.		
Utility Right-of-Way	4-19-55-19 NE,	862 079 215
Grantee – Her Majesty the Queen in the Right of Alberta		
Utility Right-of-Way	4-19-55-19 NE,	982 235 696
Grantee – Lamco Gas Co-op Ltd.		
Source - Registrar of Land Titles, January 3 and 5, 2007 (Land Status Automated System).		

Table III-1: RSA Surface Dispositions (Cont'd)

Purpose	Location	Reg. #
Utility Right-of-Way	4-20-55-25 SW	2311 KU
Grantee – ATCO Gas and Pipelines Ltd.		
Utility Right-of-Way	4-20-55-25 SW	732 114 838
Grantee – Lamco Gas Co-op Ltd.		
Utility Right-of-Way	4-20-55-25 SW	802 266 586
Grantee – NSM Resources Ltd.		
Utility Right-of-Way	4-20-55-25 SW	832 072 254
Grantee - Her Majesty The Queen in Right of Alberta as Represented by Minster of Environment as to portion 8122005		
Utility Right-of-Way	4-20-55-25 NE	752 135 587
Grantee – Lamco Gas Co-op Ltd.		
Utility Right-of-Way	4-20-55-25 NE	802 204 947
Grantee – NSM Resources Ltd.		
Utility Right-of-Way	4-20-55-25 SE	752 141 983
Grantee – Lamco Gas Co-op Ltd.		
Utility Right-of-Way	4-20-55-25 SE	822 134 809
Grantee – The Capital Region Vegreville Corridor Water Services Commission.		
Utility Right-of-Way	4-20-55-25 SE	752 141 983
Grantee – Lamco Gas Co-op Ltd.		
Utility Right-of-Way	4-20-55-25 SE	802 230 684
Grantee – NSM Resources Ltd.		
Utility Right-of-Way	4-20-55-25 SE	802 266 589
Grantee – NSM Resources		
Utility Right-of-Way	4-20-55-25 SE	842 112 058
Grantee – The Capital Region Vegreville Corridor		
Utility Right-of-Way	4-20-55-25 NE	782 210 962
Grantee – Lamco Gas Co-op Ltd.		
Utility Right-of-Way	4-20-55-25 NE	812 038 670
Grantee – NSM Resources Ltd.		
Utility Right-of-Way	4-20-55-34 SW	2146KT
Grantee – ATCO Gas and Pipelines Ltd.		
Utility Right-of-Way	4-20-55-34 SW	752 145 887
Grantee – Lamco Gas Co-op Ltd.		
Utility Right-of-Way	4-20-55-34 SW	752 176 206
Grantee – Laurentian Petroleum Ltd.		
Utility Right-of-Way	4-20-55-34 SW	762 040 958
Source - Registrar of Land Titles, January 3 and 5, 2007 (Land Status Automated System).		

Table III-1: RSA Surface Dispositions (Cont'd)

Purpose	Location	Reg. #
Grantee – ATCO Gas and Pipelines Ltd.		
Utility Right-of-Way	4-20-55-34 SW	792 021 268
Grantee – Redco Exploration Ltd.		
Utility Right-of-Way	4-20-55-34 SW	902 301 547
Grantee – ATCO Gas and Pipeline Ltd.		
Utility Right-of-Way	4-20-55-36 SE	802 204 946
Grantee – NSM Resources Ltd.		
Utility Right-of-Way	4-20-55-36 SE	822 090 851
Grantee – Fortisalberta Inc.		
Utility Right-of-Way	4-20-55-36 NE	812 031 422
Grantee – ISM Resources Ltd.		
Utility Right-of-Way	4-20-55-36 NE	812 272 345
Grantee – NSM Resources Ltd.		
Utility Right-of-Way	4-20-55-27 SW	812 124 088
Grantee -		
Utility Right-of-Way	4-20-55-27 SW	862 102 379
Grantee – Lamco Gas Co-op Ltd.		
Utility Right-of-Way	4-20-55-27 SW	862 102 380
Grantee - Lamco Gas Co-op Ltd.		
Utility Right-of-Way	4-20-55-27 NW	3087KR
Grantee – ATCO Gas Pipelines Ltd.		
Utility Right-of-Way	4-20-56-3 NE	812 050 610
Grantee – NSM Resources Ltd.		
Utility Right-of-Way	4-20-56-3 NW	772 132 567
Grantee – Lamco Gas Co-op Ltd.		
Utility Right-of-Way	4-20-56-3 NE	812 050 609
Grantee – NSM Resources Ltd.		
Utility Right-of-Way	4-20-56-3 SW	822 003 554
Grantee – Lamco Gas Co-op Ltd.		
Utility Right-of-Way	4-20-55-34 NW	822 082 023
Grantee – Lamco Gas Co-op Ltd.		
Utility Right-of-Way	4-20-55-34 NW	832 045 170
Grantee – Renaissance Energy Ltd.		
Utility Right-of-Way	4-20-55-34 NW	902 309 673
Grantee – ATCO Gas and Pipelines Ltd.		
Source - Registrar of Land Titles, January 3 and 5, 2007 (Land Status Automated System).		

Table III-1: RSA Surface Dispositions (Cont'd)

Purpose	Location	Reg. #
Utility Right-of-Way	4-20-55-34 NW	912 175 431
Grantee – Altalink Management Ltd.		
Utility Right-of-Way	4-20-55-34 NW	912 175 436
Grantee – Altalink Management Ltd.		
Utility Right-of-Way	4-20-55-34 NW	912 175 440
Grantee – Altalink Management Ltd.		
Utility Right-of-Way	4-20-56-3 SW	822 003 554
Grantee – Lamco Gas Co-op Ltd.		
Utility Right-of-Way	4-20-56-3 SW	902 334 059
Grantee – Altalink Management Ltd.		
Utility Right-of-Way	4-20-56-2 SW	882 126 789
Grantee – Altalink Management Ltd.		
Utility Right-of-Way	4-20-56-1 NW	752 139 170
Grantee – Lamco Gas Co-op Ltd.		
Utility Right-of-Way	4-20-56-1 NW	882 226 141
Grantee – Bruderheim Water Co-op Ltd.		
Utility Right-of-Way	4-20-56-1 NE	752 139 035
Grantee – Lamco Gas Co-op Ltd.		
Utility Right-of-Way	4-20-56-1 NE	882 226 140
Grantee – Bruderheim Water Co-op Ltd.		
Utility Right-of-Way	4-20-56-4 NE	762 035 369
Grantee – Renaissance Energy Ltd.		
Utility Right Board Order	4-20-56-4 NE	882 226 126
Source - Registrar of Land Titles, January 3 and 5, 2007 (Land Status Automated System).		

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Appendix IV: Lamont County Birds and Seasons

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Table IV–1: Lamont County Birds and Seasons

Species	Season
Black-billed magpie	Winter
Black-capped chickadee	Winter
Blue jay	Winter
Bohemian waxwing	Winter
Canada goose	Early spring
Eastern bluebird	Spring
Evening grosbeak	Winter
Golden-eye	Winter
Hairy woodpecker	Winter
House wren	April–May
Mallard duck	Winter
Mountain bluebird	March
Northern mockingbird	Spring
Pacific loon	Spring
Pileated woodpecker	Winter
Pine grosbeak	Winter
Red-capped downy	Winter
Red-eyed vireo	April–May
Red-necked grebe	April–May
Red-tailed hawk	Spring
Red-winged blackbird	April–May
Ruby-throated hummingbird	Spring (May)
Ruffed grouse	Spring
Sandhill crane	Early spring
Snow bunting	Winter
Snowy owl	Winter
Swainson hawk	Spring
Tree swallow	March
White-breasted nuthatch	Winter
White-throated sparrow	April–May
Yellow warbler	April–May
Yellow-bellied sapsucker	April–May
Yellow-headed blackbird	April–May
Yellow-rumped warbler	April–May
Source: Lamont County 2006, Internet site.	

WorleyParsons Komex

resources & energy

Alberta Sulphur Terminals Ltd.
Bruderheim Sulphur Forming and Shipping Facility

Volume IID – Land, Historical, Socio-Economics and Consultation

3. Historical Resources

Project Number 62720000
June 2007

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Executive Summary

A Historical Resources Overview was conducted for Alberta Sulphur Terminals Ltd. (AST), a division of HAZCO Environmental Services (HAZCO), which in turn, is a division of CCS Income Trust (CCS), for the proposed Sulphur Forming and Shipping Facility (the Project). The Project will include:

- construction of rail and road access for shipping and receiving sulphur
- liquid sulphur unloading and transfer facilities
- sulphur forming facilities
- loading and shipping facilities for formed sulphur

The purpose of the Overview is to provide background information regarding potential conflicts with historical resources and make recommendations regarding the need for a Historical Resources Impact Assessment.

The Terms of Reference for the Environmental Impact Assessment (EIA) state:

Provide the following:

a) evidence of consultation with and clearance from Alberta Community Development; and

Discussions with regulators concerning historical resources and the proposed Project resulted in the agreement that, due to data gathered during a previous field assessment in the Principal Development Area, an Overview covering the entirety of Section 35-55-20-W4M would suffice, in lieu of a Historical Resources Impact Assessment (Ronaghan 2006). This Historic Resources Overview was submitted to the Heritage Resource Management Branch, Alberta Tourism, Parks, Recreation and Culture for review on March 6, 2007 with a recommendation for *Historic Resources Act* clearance.

b) a general overview of the results of any previous historical resource studies that have been conducted in the historical resources Study Area, including archaeological resources, palaeontological resources, historic period sites, and any other historical resources as defined within the Historical Resources Act.

Previous studies conducted in Section 35-55-20-W4M, the Site and the Historical Resources Local Study Area (LSA), and the immediate surrounding area, have recorded 14 archaeological sites. These sites were observed on the surface of previously cultivated fields. Subsequent shovel testing at each site failed to reveal the presence of intact subsurface cultural materials. In addition to previous cultivation, large portions of the LSA were stripped of topsoil in 1981 in anticipation of development. The possibility of intact archaeological resources remaining in the LSA is low. No historic or palaeontological resources are recorded in the LSA.

The potential for intact historical resources, including palaeontological materials, to be impacted by the Project is low. The Site was previously assessed and no undisturbed cultural materials were observed. The findings of this Overview pertain only to the development as outlined in this EIA. Any changes or additions to the Project, resulting in development outside of Section 35-55-20-W4M, must be reviewed in terms of historical resource concerns and the potential need for further assessment.

On March 6, 2007, it was recommended that AST had satisfied its historical resources concerns and this Overview was submitted to Alberta Tourism, Parks, Recreation and Culture for review, in an application for *Historical Resources Act* clearance. On April 11, 2007, clearance for the Project was received and the clearance letter stated a Historical Resources Impact Assessment was not required

.

3. Historical Resources

The Historical Resources Overview of the Environmental Impact Assessment (EIA) was conducted for Alberta Sulphur Terminals Ltd. (AST) and its proposed Sulphur Forming and Shipping Facility (the Project) in Section 35-55-20-W4M (the Site). The proposed Project will include:

- rail and road access for receiving and shipping sulphur
- molten sulphur unloading and transfer facilities
- sulphur forming facilities to produce sulphur pastilles
- loading and shipping facilities for formed sulphur
- sulphur pastilles temporary storage area

All proposed facilities will be located within the Site, which currently has existing Canadian National and Canadian Pacific Railway facilities. The purpose of the Overview is to provide background information regarding potential conflicts with historical resources and make recommendations regarding the need for a Historical Resources Impact Assessment (HRIA).

3.1 Objectives

The objectives of the Overview are to examine the potential for impact to previously recorded historical resources arising from construction and operation of the proposed Project and identify the potential for impact to unrecorded historical resources.

3.2 Terms of Reference

The Terms of Reference (AENV 2007) for the EIA state:

Provide the following:

a) evidence of consultation with and clearance from Alberta Community Development; and

b) a general overview of the results of any previous historical resource studies that have been conducted in the historical resources Study Area, including archaeological resources, palaeontological resources, historic period sites, and any other historical resources as defined within the Historical Resources Act.

3.3 Methods

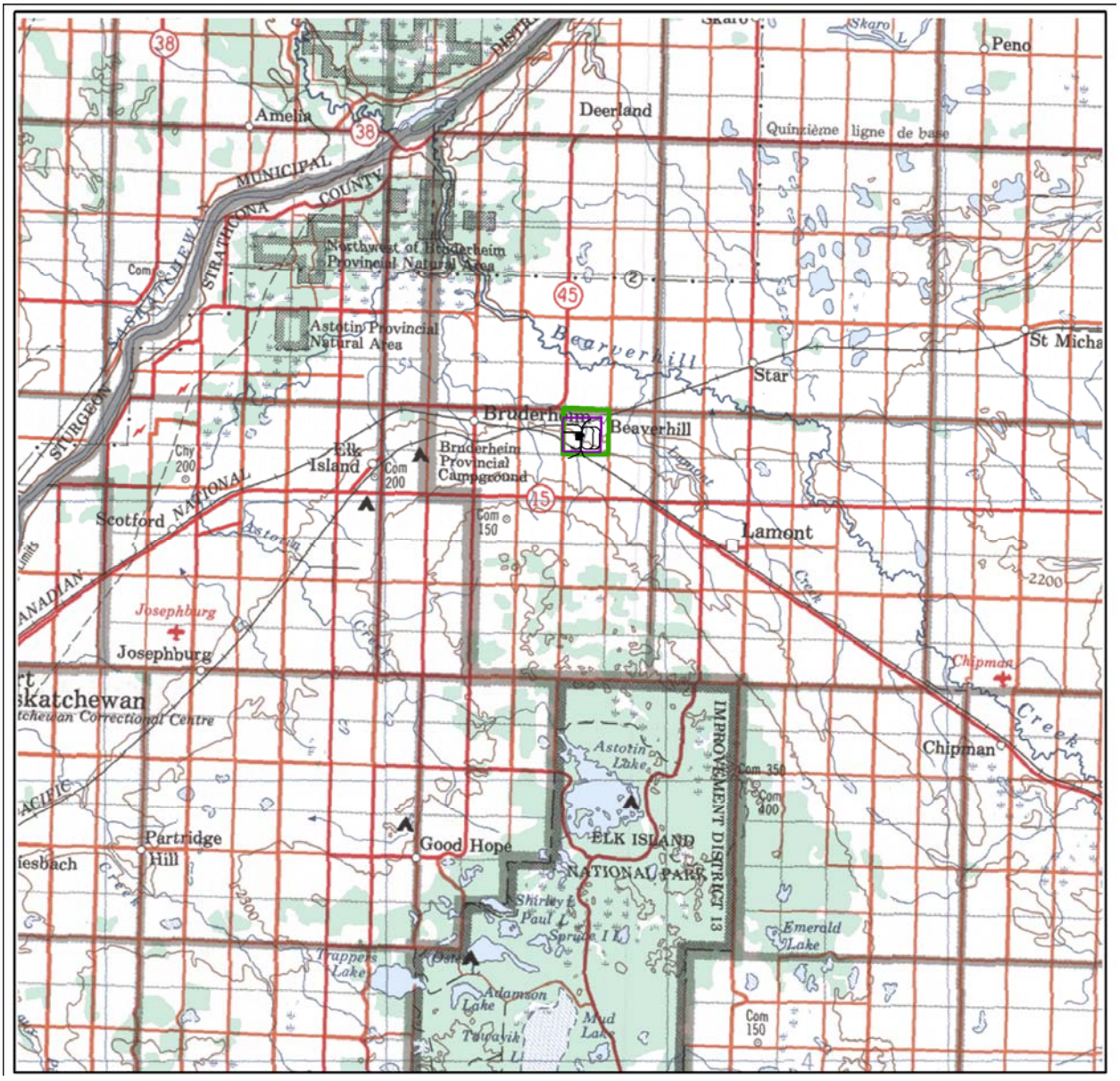
3.3.1 Spatial Boundaries

3.3.1.1 Principal Development Area

The Principal Development Area (PDA) includes the direct footprint of the proposed facility and associated infrastructure and is 24.8 ha. The PDA is shown in Figure 3.3-1.

3.3.1.2 Local Study Area

The Historical Resources Local Study Area (LSA) includes the Project footprint and PDA, and uses the same borders as the Site (Section 35-55-20 W4). The LSA is also shown in Figure 3.3-1.



N

Legend

Principal Development Area (PDA)

Historical Resources Local Study Area (LSA

SCALE 1:250,000

0 10

Kilometers

Data Source: 1:250,000, Department of Energy, Mines and Resources, 83H Edmonton Version 1873_250_v3

Figure 3.3-1: Historical Resources Study Areas

No Regional Study Area was defined as all impacts are contained within the LSA.

To meet the objectives of the Overview, the following tasks were conducted:

- site file search
- limited literature review
- evaluation of historical resources potential

Data on file at Alberta Parks, Recreation, Tourism and Culture were reviewed to determine the number and nature of previously recorded sites in the LSA. The Listing of Significant Historical Sites and Areas (Sixth Edition) (ACD 2006) was also consulted to identify previously-recorded historical resources and identify the potential for unrecorded historical resources in the LSA. Subsequently, a review of relevant literature pertaining to historical resources in the LSA was completed to provide an archaeological and historical context for previously recorded and currently unrecorded historical resources. The literature search and review of data on file at Alberta Tourism, Parks, Recreation and Culture were combined to evaluate the LSA's potential for previously unrecorded historical resources.

The site file search, literature review and evaluation of historical resource potential were used to form recommendations related to historical resources within the LSA.

3.4 Results

3.4.1 Site File Search

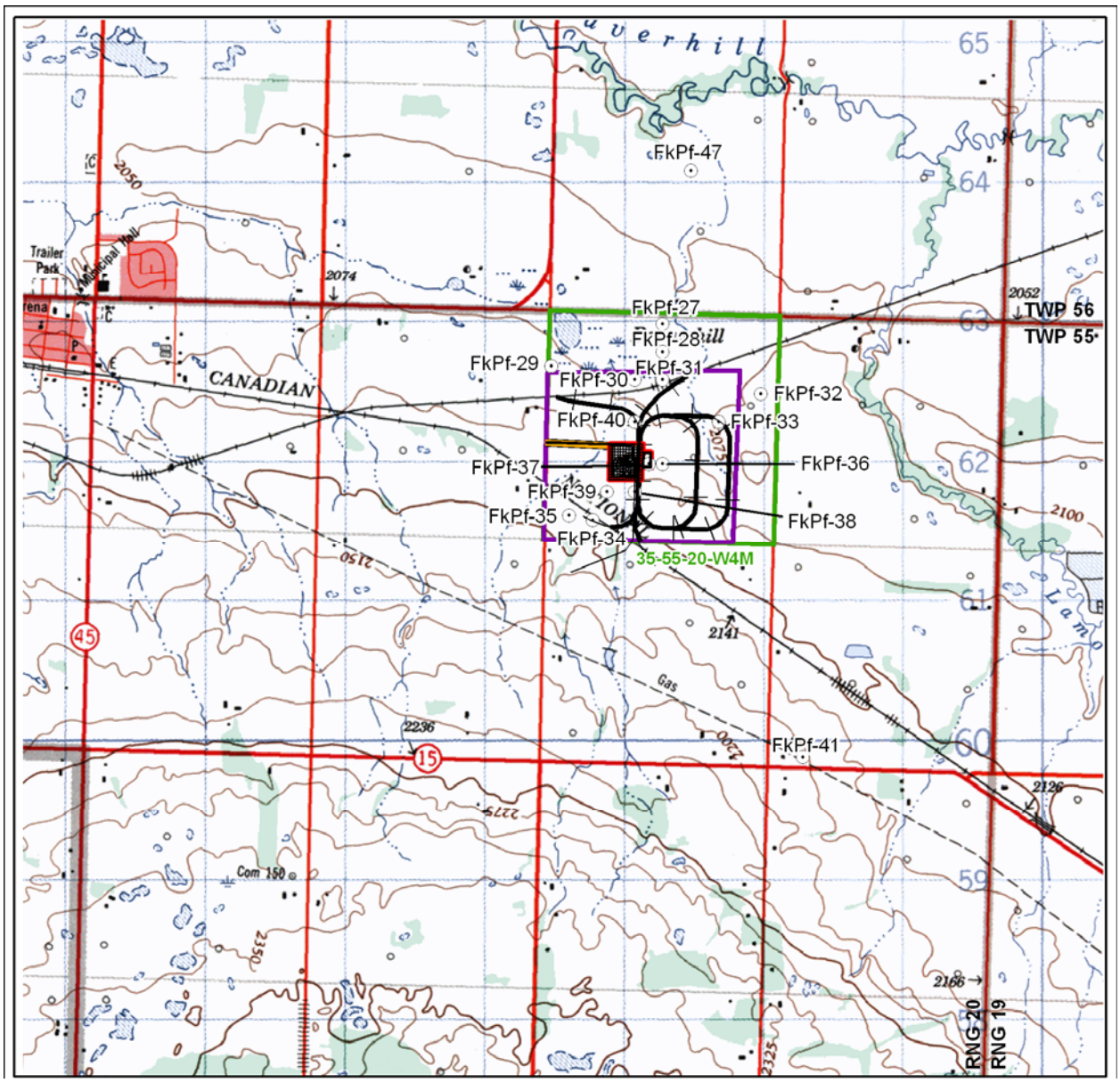
The Listing of Significant Historical Sites and Areas (Sixth Edition) (ACD 2006) lists no Historical Resources Value (HRV) for Section 35-55-20-W4M. The nearest HRV to the proposed Project is in Section 5-56-20-W4M, where a historic school dating to 1929 is recorded.

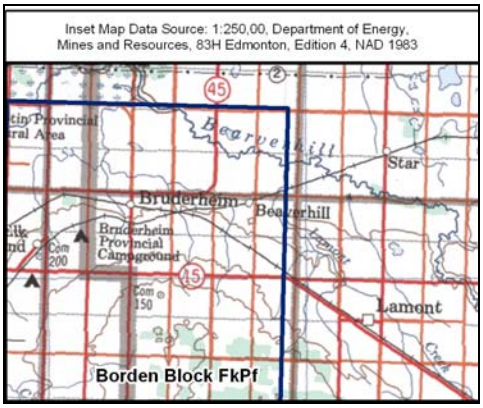
Section 35-55-20-W4M lies entirely within Borden Block FkPf (see Figure 3.4-1). There are a total of 52 previously-recorded precontact archaeological sites in FkPf, 14 of which are within Section 35-55-20-W4M. HRVs of N/A are recorded for 29 of the archaeological sites (an HRV of N/A indicates a site over which the Province of Alberta has no jurisdiction, such as in nearby Elk Island National Park. The remainder of archaeological sites in the Borden Block (N=26) have HRVs of 0 (zero), indicating low archaeological significance.

3.4.2 Precontact Archaeological Sites

Campsites (N=15), artifact scatters (N=14) and isolated find sites (N=12) are the most well represented site types in FkPf. However, quarry sites (N=9) and workshop sites (N=1) have also been documented. A single artifact collection from an undetermined site type is also included.

The predominant site type recorded in 35-55-20-W4M is artifact scatters (N=7). However, campsites (N=2) and isolated find sites (N=5) were also recorded. All 14 of the sites have been previously disturbed by cultivation and were identified on the basis of artifacts observed in cultivated fields. Subsequent shovel testing at each of the identified sites failed to recover cultural materials in subsurface deposits. In addition to disturbance through cultivation, the topsoil was removed from large portions of the section in 1981 in anticipation of development and subsequently replaced at a later date (Johnson 2006, pers. comm.)





N

Legend

- Archaeological sites
- Proposed Access Road
- Proposed Railway Line
- Proposed Facilities
- Principal Development Area (PDA)
- Historical Resources Local Study Area (LSA)

Data Source: 1:50,000, Department of Energy, Mines and Resources, 83H15 Lamont, Edition 3, NAD 1927 Version 1873_50_v3

Figure 3.4-1: Historical Resources LSA in Relation to Borden Block FkPf

An additional two precontact archaeological sites are located in the sections surrounding the LSA. Both sites were recorded on the surfaces of cultivated fields and at the time of recording, no further work was recommended.

3.4.3 Historic Period Sites

No previously recorded historic period sites are located within the LSA. As Fedirchuk (1981) notes in a description of the Project environment for an earlier assessment"*…except for a remnant stand of trees and pasture in the northeast quarter, the section had been entirely cleared and cultivated…..".* Numerous historic structures are recorded on the sections surrounding the LSA, but will not be impacted.

3.4.4 Palaeontological Sites

No previously recorded palaeontological sites are located within the LSA.

3.5 Literature Search

3.5.1 Natural Environment

The LSA is located within the Central Parkland Subregion of the Parkland Natural Region (AEP 1994) (Figure 3.5-1). In general terms, the Parkland Natural Region is a climatic and ecological transition zone between the grasslands to the south and forests to the north. Landforms in the area vary from broad plains with deeply incised river valleys in the northern portion, to rolling moraine in the south-central and western portions of Alberta. The Central Parkland Subregion is characterized by surficial deposits that include hummocky and ground moraines, glacial lake beds, kame moraines and dune fields that produce an undulating topography. Within the Subregion, lakes and permanent wetlands are common and provide some of the most important waterfowl habitat in Alberta. The dominant climatic regime of the area is Prairie-Boreal, defined on the basis of greater amounts of summer and winter precipitation which last for longer periods of time than in adjacent grasslands areas. During winter, this is expressed in the longer duration of snow cover that results from colder temperatures and less frequent removal by Chinook winds (AEP 1994, Strong 1992).

Vegetation of the Central Parkland Subregion consists of fescue grasses and aspen (*Populus tremuloides*) and balsam poplar (*Populus balsamifera*) forests, which are found in black and dark brown Chernozem soils. The forests are characterized by a lush, species-rich understory, which may include shrub communities with snowberry (*Symphoricarpos* spp.), rose (*Rosa* sp.), choke cherry (*Prunus virginiana*) and saskatoons (*Amelanchier alnifolia*). In most cases, however, native vegetation has been replaced by cultivation. Like the other characteristics of this subregion, the animal life represents a mixture of species from the grasslands to the south and forests to the north.

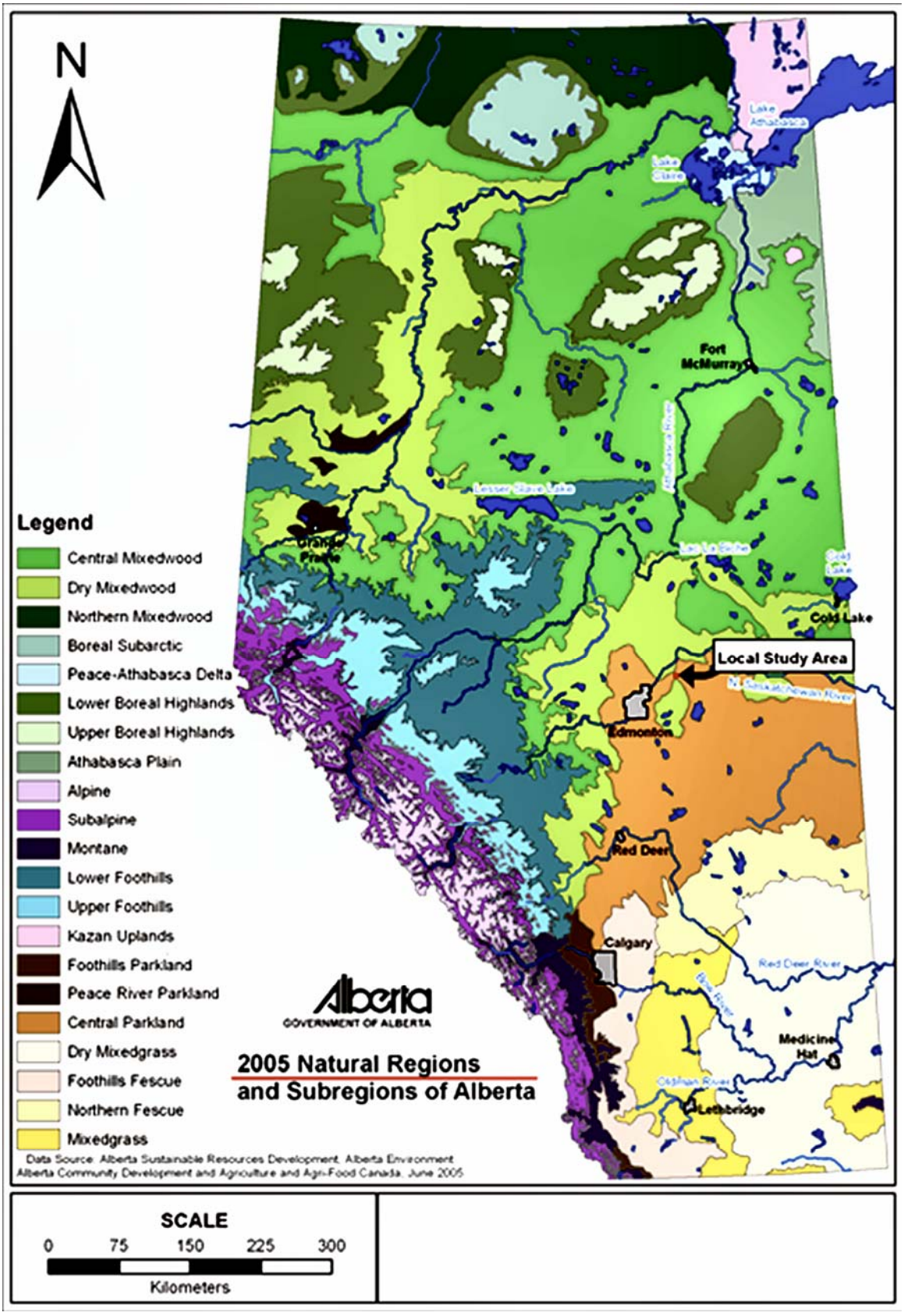


Figure 3.5-1: Natural Regions of Alberta

3.5.2 Historical Resources

Because human hunters have, historically, rarely limited their range to include only one environmental region (Syms 1977), *ecotonal* environments such as the parkland attracted groups from one or more neighbouring regions for at least seasonal exploitation of local resources.

The parkland lies within the potential exploitive range of the inhabitants of the Northwestern Plains cultural area. Ethnographic evidence indicates the parkland played a dominant role in the seasonal round of Plains people. Their subsistence focused strongly on bison and when the bison herds migrated into the parkland, as they often did in the late winter, the people would follow (Kidd 1986, Losey 1978, Ray 1974).

At times when the bison were scarce or dispersed, people would likewise break up into smaller groups and take other game to supplement their diet (Kidd 1986, Syms 1977). This is reflected in the archaeological record. For example, while faunal components of archaeological sites in the parkland regularly include bison remains, other species are also represented. Depending on local availability, these included deer, elk, sheep, antelope, porcupine, beaver, bear, hare and other small game, as well as ducks, geese and fish (Doll 1982, Kidd 1986, Losey 1978). In the Northwestern Plains cultural area, Plains adapted people followed a more generalized subsistence strategy while occupying the parkland.

The known archaeological record of the western parkland is dominated by artifacts diagnostic of Plains adapted people. This suggests that Plains adapted people have been the major occupants of the area for the last 10,000 years (McCullough and Kulle 1992). It is unlikely, however, that the parkland area was exploited exclusively by Plains groups. Woodland-adapted groups have historically been drawn into the parkland zones (Doll 1982, Syms 1977) and this pattern of movement can likely be extrapolated back to earlier times (Losey 1978).

Groups of people occupying forested areas tend to practise a seasonal round of resource exploitation, habitually employing a generalized subsistence economy in order to meet subsistence needs (Hamilton and Larcombe 1994, McCullough 1982, Nicholson 1987). Seasonal resource exploitation in a variety of locales was conducted in response to the changing abundance of local resources. In the northwestern plains, this may have included the seasonal movement of people between the forest and the parkland, a cultural practise better documented in the eastern parkland (Graham 2005, Pettipas 1980, Ray 1974, Syms 1977). Seasonal resource abundance in the Parkland during the spring and summer, such as migratory waterfowl clustered around water sources, may have attracted hunters from the neighbouring woodlands in this season (Losey 1978).

The previously recorded archaeological sites in Section 35-55-20-W4M were all identified during a HRIA conducted for the proposed Petalta project (ASA Permit 1981–69) (Fedirchuk 1981). Section 35-55-20 was assessed in its entirety. Although 14 archaeological sites were discovered, no further work was recommended at any of these sites due to previous site disturbance resulting from cultivation. During the assessment, Fedirchuk (1981) noted an association between precontact site location and sloughs or minor drainage systems. Fedirchuk contrasted this with data from Elk Island Park, which suggests an association between precontact site location and lake systems. The former, suggests Fedirchuk, is reflective of short-term hunting camps, while the latter represents base or maintenance camps, occupied over a longer period of time. The areas around the lakes in Elk Island Park appear to be more intensively utilized (Fedirchuk 1981). Previous research has also identified an association between precontact site location and watercourses in the parkland region (Graham 2005). During the HRIA, Fedirchuk recovered an assortment of tools, bifaces, preforms and lithic debitage. Additionally, a projectile point *reminiscent of Agate Basin*

projectile point morphology (Fedirchuk 1981) was recovered, suggesting a date of 7,500 years or older for the site.

The LSA was initially homesteaded by a number of Moravians who emigrated from Russia to escape Czarist oppression and religious intolerance. They chose Alberta, determined to obtain free homesteads in the unoccupied land beyond Fort Saskatchewan on the Victoria Trail. In the late Nineteenth Century, the colony of Bruederheim was established. In 1895, Reverend Morris W. Leibert visited the community and commented on the settlement:

The other congregation Bruederheim… was reached after a days journey by farm wagon… The route taken was over the Victoria Trail which winds, after the fashion of highways, in pleasing lines through and around copses, up the hillocks and down the hollows, over the ridges and across the prairie, scarcely ever for a hundred yards ahead in sight… traces of bear and deer are not infrequent, which with an occasional glimpse of either a coyote or an Indian looking on the intruder with puzzled yet harmless mien, impresses a person with a lively sense of the frontier depths to which his journey has extended… . (Leibert 1896).

At the time of Leibert's visit, Bruederheim was the northernmost post of the Canadian Mounted Police and boasted a post office and membership of some twenty families. As a result of Leibert's visit, the colonies were authorized by the Provincial Elders Conference to *effect the formal organization of two full-fledged Moravian congregations* in 1895 (Hoyler 1945). Clement Hoyler was appointed the first home missionary to the colonies in the same year, to be assisted by Brother Lilge who was 'licensed to preach'. Hoyler settled initially in Bruderfeld, on Papaschase Reserve and almost immediately initiated construction of a parsonage and later a church at Bruederheim. Some of Hoyler's observations serve to emphasize the rich and varied environment of the general area:

> *…coyote, lynx, muskrat, hare, mink, otter … and other animals, big and little were encountered everywhere on my first long winter drives… Myriads of waterfowl of every description winged their way northward. Every slough and pond and lake became the home of breeding ducks and the feeding ground of numerous shorebirds.* (Hoyler 1945).

3.5.3 Historical Resource Potential

A review of the Alberta Culture, Historical Resources Division and Palaeontological Resource Sensitivity Zones map (Tyrell Museum of Palaeontology 1984) indicates that the status of palaeontological materials in the LSA is *unknown*. A review of surficial geology finds that most of the LSA is covered with ground moraine, generally to a depth of less than 12 m. Portions of the northwest quarter of Section 35-55-20-W4M are covered in lake or slough deposits of silt and clay.

The 14 previously recorded archaeological sites recorded in Section 35-55-20-W4M indicate that the LSA has high archaeological potential. The 1:50,000 topographic map of the LSA shows a slough in the northwest quarter of the section and, in general, the entire northwest quarter of the section is covered with marshy wet areas. The slough is fed by two intermittent creeks, including one feeding the southwest side of the slough and another along the eastern edge of the slough. This creek demarcates the eastern edge of the slough and continues north from the slough to Beaverhill Creek. An elevated knoll is located in the southeast quarter of the section, overlooking the slough area in the northwest quarter. These topographic features combine to create an area of high archaeological potential in Section 35-55-20-W4M, as evidenced by the previous recording of 14 archaeological sites in the section. The entire section, however, has previously been cultivated, resulting in the disturbance of these sites. As mentioned, shovel testing conducted in 1981 at each of the recorded archaeological sites on the section failed to result in the recovery of cultural

materials (Fedirchuk 1981). In addition to disturbance through cultivation, in 1981 the topsoil was removed from large portions of the section in anticipation of development and subsequently replaced (Johnson 2006, pers. comm.).

3.6 Previous Studies

In 1981, the entirety of Section 35-55-20-W4M, which is the LSA for the current Project, was subject to an HRIA (Fedirchuk 1981). During the assessment, Fedirchuk recorded 14 archaeological sites in the cultivated fields across the section. Shovel testing at each of the sites failed to reveal the presence of intact subsurface cultural deposits.

3.7 Historical Resource Recommendations

The previously recorded archaeological sites in Section 35-55-20-W4M, combined with an evaluation of the topography, indicate that the LSA is of high archaeological potential. However, the literature review of recorded sites indicates there is a low possibility of cultural materials remaining undisturbed by cultivation activities.

The literature review of available palaeontological data indicates that the potential for intact palaeontological resources is low. Palaeontological materials are more likely to be recovered northwest of the LSA in the North Saskatchewan River Valley.

The potential for intact historical resources, including palaeontological materials, to be impacted by the proposed Project is low. The area proposed for development, the Project's LSA, was previously assessed and no undisturbed cultural materials were observed (Fedirchuk 1981). Therefore, it is recommended that AST and their agent, Worley Parsons Komex, have satisfied their historical resources concerns with respect to the Historical Resources Act (Government of Alberta 2000). It is further recommended that Alberta Sulphur Terminals be granted Historical Resources Act clearance for the proposed Sulphur Forming and Shipping Facility in Section 35-55-20-W4M.

An HRIA is not required; however, pursuant to Section 31 of the Historical Resources Act, should historic resources be discovered during construction the HRMB is to be contacted immediately. (ACD 2004)

This Historic Resources Overview was submitted to Alberta Parks, Recreation, Tourism and Culture for review, in an application for *Historical Resources Act* clearance on March 6, 2007. Clearance was received April 11, 2007.

The findings of this Historic Resources Overview pertain only to the Project as outlined in this EIA. Any changes or additions to the Project, resulting in development outside Section 35-55-20-W4M, must be reviewed in terms of historical resource concerns and the potential need for further assessment.

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3.8.2 Personal Communications

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Ronaghan, Brian. 2006. Head, Archaeological Survey, Alberta Tourism, Parks, Recreation and Culture, Edmonton, AB. Phone call, November 3, 2006.

WorleyParsons Komex

resources & energy

Alberta Sulphur Terminals Ltd.
Bruderheim Sulphur Forming and Shipping Facility

Volume IID – Land, Historical, Socio-Economics and Consultation

4. Socio-Economic Assessment

Project Number 62720000
June 2007

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APPENDICES

Executive Summary

Alberta Sulphur Terminals Ltd. (AST), a division of HAZCO Environmental Services (HAZCO), which in turn, is a division of CCS Income Trust (CCS), retained WorleyParsons Komex to complete a socio-economic assessment of the proposed Bruderheim Sulphur Forming and Shipping Facility (the Project) located in a portion of Section 35-55-20 W4M (the Site). The objectives of the assessment were as follows:

- satisfy the relevant section of the Terms of Reference (TOR) of the Environmental Impact Assessment (EIA)
- assess the socio-economic impact of the proposed Project
- when possible, provide mitigation strategies for socio-economic impacts

Results of the assessment suggest the Project will have a socio-economic impact to the Socio-Economic Local Study Area (LSA), consisting of all locations within 5 km of the Site as well as the Towns of Bruderheim and Lamont, and the Socio-Economic Regional Study Area (RSA), consisting of Lamont County. The TOR for the socio-economic assessment are summarized as follows.

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

a) the number and distribution of people who may be affected by the Project;

The LSA includes all areas within 5 km of the Site and the Towns of Bruderheim and Lamont. The RSA is Lamont County. The LSA and RSA contain the people who are most likely to be affected by the Project. The population of the RSA, based on the 2001 Canadian Census (the most current completed census available), was 8,473 people.

b) information on the economic status of the area and the contribution of the proposed development;

According to the 2001 census, median household incomes for the RSA were as follows:

- Bruderheim – $52,599
- Town of Lamont – $31,079
- Lamont County – $38,232

When compared with the median household income for the Province of Alberta – $52,524, only Bruderheim's economic status is in line with the province at large. The manufacturing and construction sectors make up 28.1% of employment in Bruderheim and 23.2% in Lamont. The agricultural sector represents 25.9% of employment in Lamont County.

The Project's economic impact was calculated using the Alberta Economic Multipliers model developed by Alberta Finance (2006). Most of these economic contributions are expected to occur outside of the RSA (see Table ES-1).

Table ES–1: Economic Impacts to Alberta during Construction

Component	Economic Impact
Construction	$22.9 million
Labour	$16.3 million
Machinery and equipment	$9.5 million
Machinery and equipment labour	$4.8 million
Total Economic Impact	**$53.5 million**

Economic impacts from operations were based on production levels of 3,000 tonnes per day (t/d) and 6,000 t/d (see Table ES-2).

Table ES–2: Economic Impacts from Operations

Component	3,000 t/d	6,000 t/d
Yearly contribution to Provincial GDP	$20.7 million/y	$41.4 million/y
Yearly labour income impact	$14.3 million/y	$28.5 million/y
Yearly tax impact	$460,007/y	$460,007/y
Total Economic Impact/y	**$35.5 million/y**	**$70.5 million/y**

Most of these economic contributions are expected to occur outside of the RSA.

c) information on the social impacts of the Project on the Study Area and on Alberta including:

i) local employment and training;

The Project will employ a construction force of 45 people for 6–9 months. When the facility is operational, it will directly employ 22 people and create an estimated 23 indirect employment opportunities. Work-related training will be provided by AST. A minimum of 4 of the 22 crew members will require 4th class steam tickets.

ii) local procurement;

The Project is responsible for its own procurement. Local suppliers of goods, services, materials and equipment should be given primary consideration as long as quality and safety are maintained.

iii) population changes;

During construction, a temporary population increase of 0–93 people, or a maximum change of 1.1%, may occur in the RSA. When the facility is operational, a population increase of 0–68 people may occur, representing a permanent maximum population increase of 0.8% to the RSA.

iv) demands on local services and infrastructure

Demands on local infrastructure are based on the estimated population increase during construction and operations. It is expected that the infrastructure currently in place will meet this level of demand during both of these phases.

iv) regional and provincial economic benefits;

Almost all economic impacts associated with the operations phase will occur in Alberta. The majority of operations labour revenues ($14.3 million/y – 3,000 t/d production scenario; $28.5 million/y – 6,000 t/d production scenario) will occur in the LSA and RSA. Roughly 14% of

taxes will be paid to the Provincial Government and 86% of taxes will go to authorities within the LSA and RSA.

d) identify components of the Project that may be considered a nuisance and negatively impact to individuals identified in a) and AST's plans to mitigate these nuisances;

Concerns about the Project were determined through interviews with local residents, elected officials, leaders and service providers. Potential negative impacts and AST's plans for mitigation are addressed in Volume IID, Section 5: Public Consultation.

e) the impacts of the Project during construction and operation phases, to transportation planning, traffic and local services;

Project impacts during the construction and operations phases to transportation, planning and traffic were evaluated by Bundt and Associates (see Volume I, Appendix III: Traffic Impact Assessment). The assessment determined that turning movement delay on the Highway 15/R.R. 202 intersection will be high enough in future to warrant a left turn lane. It was also determined that the volume of traffic anticipated at this intersection with Project traffic does not warrant traffic control changes to serve the Project's access requirements. The lesser use of access from the north and the predicted minor change in traffic flows does not warrant changes to the existing intersection of Highway 45 and R.R. 202.

f) the economic impacts of the Project on the Study Area and on Alberta, having regard for capital, labor, and other operating costs and revenue from services;

Construction phase – total cost of the construction phase was estimated to be $37.5 million including contingency fees. This includes an estimated $25.4 million for construction costs, which are a combination of capital and labour, and roughly $12.1 million for plant machinery and equipment, which are capital costs. Direct, indirect and induced economic impacts were calculated using the Alberta Economic Multipliers model developed by Alberta Finance (2006). Using the Alberta Economic Multipliers it is estimated that the impacts of the $37.5 million in costs will be $53.5 million to the province of Alberta during the construction phase.

Operations phase – the economic impact of the facility's operations on the province of Alberta was estimated to be between $35.5 million/y and $70.5 million/y.

The labour impact during operations will be spread around Alberta. However, it is expected that the majority of labour impacts associated with the operations phase will occur within the RSA. It is expected that the operations phases will generate 22 direct employment opportunities and 23 indirect employment opportunities. AST's commitment to procure goods and services and employ locally would suggest that the Project will have a positive economic impact on the LSA and RSA. It was not possible to fully disaggregate the impact between the LSA, RSA and Alberta. However, a few observations were possible. Namely, most of the labour impacts (approximately $21.1 million/y for construction and $14.3–$28.5 million/y for operations) will likely occur in the LSA and RSA.

A portion of sulphur transportation, storage and shipping will occur in British Columbia (pastilles will be shipped by rail to the west coast of British Columbia and overseas). Therefore, there will be some economic impact to British Columbia during the operations phase. Alberta Economic Multipliers could not be used to determine the geographic distribution of the impact of the operating costs between the two provinces.

Construction and operation of the Project will generate sales of $19.7–39.4 million of sulphur pastilles annually.

g) AST's policies and programs respecting the use of local, Alberta, and Canadian goods and services;

The Project is responsible for its own procurement. Local suppliers of goods, services, material or equipment will be given primary consideration for the supply of goods and services. If suppliers cannot be found in the LSA or RSA, other suppliers in Alberta will be sought out whenever possible.

h) an estimated breakdown of Alberta, other Canadian and non-Canadian industrial benefits for Project management/engineering; equipment and materials; construction labor and total overall Project;

Canadian economic benefits will occur in western Canada, primarily in Alberta with some impacts occurring in British Columbia. One exception is the purchase of equipment ($12.1 million) partially manufactured outside of Alberta.

i) the employment and business development opportunities the Project may create for local communities and the region;

Ancillary industries may benefit from the operations phase of the Project. AST plans to outsource a portion of its maintenance and will require chemicals, other supplies and consulting services. Other opportunities may arise in areas such as meals and entertainment for AST staff. Also, it is expected the Project will create 23 spin-off employment opportunities during operations.

j) any existing employment and business opportunities that may be negatively affected as a result of the Project;

Few negative impacts are expected to occur to existing businesses as a result of the Project. Canexus Chemicals (a sodium chlorate manufacturer) voiced health and safety concerns regarding sodium chlorate and sulphur mixing. Testing is underway to compare the potential reactivity of sulphur and chlorate to that of other common organic particulates. Results of these tests will be reported to the NRCB and AENV independently, and communicated to interested stakeholders.

k) a breakdown of the labor force, type of employment, and number of employees with respect for the construction and operational workforces. Identify when the peaks in labor requirements will occur, the extent of the peaks and the source of labor for the Project;

The Project will employ a labour force of 45 people throughout the construction phase. It is unlikely this small workforce will require a work camp. There are no expected peaks or troughs in employment during the construction phase.

The Project will employ 22 people during the operations phase. AST will train +22 staff members in areas such as health and safety and equipment operation. Additionally, a minimum of 4 of the 22 staff members must have 4th class steam tickets. It is estimated that the Project will create 23 spin-off employment opportunities during its operation.

l) impacts of the proposed Project on potential shortages of affordable housing and the quality of health care services. Identify and discuss the mitigation plans to address these issues. Provide a summary of any discussions that have taken place with the Municipality and the Regional Health Authority concerning potential housing shortages and health care services respectively.

Housing availability in the in LSA and RSA was extremely low at baseline levels with owned dwellings being 100% occupied in Bruderheim and Lamont, and 95% in the RSA generally. Both rentals and ownership opportunities were rare; however, prices of dwellings were lower than the Alberta average. The Project would require 0–22 new dwelling in the RSA representing a maximum increase of approximately 0.7% in the RSA. While the Project may increase demands on housing, the increase will be minor.

According to health care service providers, the Project will have a minor impact on medical and emergency services.

Discussions have occurred with elected officials, leaders and service providers as they relate to the Project. Key points from these discussions are available in Volume IID, Section 5: Public Consultation.

4. Socio-Economic Assessment

4.1 Introduction

Sulphur is a by-product of the oil and gas industry and is primarily used in the production of fertilizer. Increased activity in the heavy oil sector in Alberta has resulted in more sulphur production; this is occurring in conjunction with a growth in demand for sulphur worldwide (Dowling 2006, pers. comm.; Pentasul 2006). However, there is a shortage of sulphur processing capacity in Alberta.

Alberta Sulphur Terminals Ltd. (AST), a division of HAZCO Environmental Services Ltd. (HAZCO), which in turn is a division of CCS Income Trust, is developing plans to build a sulphur forming and shipping facility (the Project) to process elemental sulphur generated by the oil and gas industry. The proposed site is located on a portion of Section 35-55-20 W4M (the Site) which is approximately 2.2 km east of the Town of Bruderheim and approximately 6 km northwest of the Town of Lamont. The Site is within the Industrial Heartland of Lamont County.

The Site is surrounded mainly by agricultural and residential development with an operating sodium chlorate manufacturing plant situated to the southwest of the proposed site.

4.1.1 Sulphur Production and Consumption Patterns

In Western Canada, elemental sulphur production is experiencing a net increase. While sulphur produced from natural gas has been decreasing, the expansion of oil sands development in Alberta has increased elemental sulphur production. Canada's 2005 sulphur balance is shown in Table 4.1-1.

Table 4.1-1: Canada Sulphur Balance (2005)

	Sulphur (Millions of Tonnes)
Opening inventory	13.2
Production	7.7
Domestic consumption	(0.8)
U.S. consumption	(2.0)
Offshore consumption	(6.0)
Closing inventory	12.1
Source: Pentasul 2006.	

Canada's sulphur balance is decreasing, but with several new upgrading facilities in various stages of construction and approval, it is expected that Canada's sulphur production and Canada's sulphur balance will increase.

4.1.2 Description of Project

The Project will encompass construction and operation of a facility for sulphur pastille forming, temporary sulphur pastille storage and shipment for export. The facility will be developed in the Principle Development Area (PDA), a portion of Section 35-55-20 W4M, which comprises the area of disturbance and development. All infrastructure and activities will be confined to the Site.

The Project includes plans for the following:

- rail and road access for receiving molten sulphur
- molten sulphur unloading, storage and transfer facilities
- sulphur forming facilities to produce sulphur pastilles
- loading and shipping facilities for sulphur pastilles
- sulphur pastilles temporary storage area

4.2 Scope of Work

4.2.1 Terms of Reference

The Socio-Economic Assessment for the proposed Project satisfies the specific conditions of the Terms of Reference (TOR) (AENV 2007). The elements of the TOR that specifically deal with socio-economic issues are summarized as follows:

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

a) the number and distribution of people who may be affected by the Project;

b) information on the economic status of the area and the contribution of the proposed development;

c) information on the social impacts of the Project on the Study Area and on Alberta including:

i) local employment and training;

ii) local procurement;

iii) population changes;

iv) demands on local services and infrastructure; and

v) regional and provincial economic benefits;

d) identify components of the Project that may be considered a nuisance and negatively impact to individuals identified in a) and AST's plans to mitigate these nuisances;

e) the impacts of the Project during construction and operation phases, to transportation planning, traffic and local services;

f) the economic impacts of the Project on the Study Area and on Alberta, having regard for capital, labor, and other operating costs and revenue from services;

g) AST's policies and programs respecting the use of local, Alberta, and Canadian goods and services;

h) an estimated breakdown of Alberta, other Canadian and non-Canadian industrial benefits for Project management/engineering; equipment and materials; construction labor, and total overall Project;

i) the employment and business development opportunities the Project may create for local communities and the region;

j) any existing employment and business opportunities that may be negatively affected as a result of the Project;

k) a breakdown of the labor force, type of employment, and number of employees with respect for the construction and operational workforces. Identify when the peaks in labor requirements will occur, the extent of the peaks and the source of labor for the Project; and

l) impacts of the proposed Project on potential shortages of affordable housing and the quality of health care services. Identify and discuss the mitigation plans to address these issues. Provide a summary of any discussions that have taken place with the Municipality and the Regional Health Authority concerning potential housing shortages and health care services respectively.

4.2.2 Scope of this Report

The TOR (AENV 2007) are addressed throughout this report. However, the following issues will not be part of this report:

- decommissioning is not part of this report since it is not in the scope of the TOR
- traffic studies are also not part of this socio-economic assessment and have been completed by Bundt and Associates as a separate volume (see Volume I: Project Description – Appendix III)
- nuisances and potential negative impacts resulting from the Project were determined through interviews with local residents, Elected Officials, Key Opinion Leaders and Service Providers; potential negative impacts and AST's plans to mitigate these impacts, have been recorded and addressed in Volume IID, Section 5: Public Consultation

4.2.3 Study Area and Justification

The socio-economic assessment study areas were determined using the Alberta Energy and Utilities Board Directive 056 (EUB 2005) and the Government of Canada National Energy Board Filing Manual (Natural Resources Canada 2006, Internet site).

Directive 056 (EUB 2005) states that for a facility that included sulphur recovery, residents, landowners and occupants within 1.5 km of the project area are classified as directly affected parties. This Directive also states that landowners, occupants and urban authorities within 5 km of the project are indirectly affected.

The Filing Manual Section 4A-38: Filing Requirements – Evaluation of Significance suggests that significance of impacts should be analyzed using the following criteria:

- direction
- magnitude
- duration
- frequency
- spatial extent
- reversibility
- probability of occurrence
- permanence
- ecological context

Using the requirements of Directive 056 and the Filing Manual, the geographic scope of the impacted areas were determined as follows:

4.2.3.1 Principal Development Area and Project Footprint

The PDA is equal to the Project footprint, which includes the direct footprint of the proposed facility and associated infrastructure, and is approximately 24.8 ha.

4.2.3.2 Local Study Area

Using Directive 056 as a guide, a 5 km radius from the PDA was used as the criteria for a direct socio-economic impact. It was determined that the rural area around the PDA, which includes the Town of Bruderheim, would be directly affected and was therefore designated the Socio-Economic Local Study Area (LSA). Since the magnitude of the impact, duration, permanence and irreversibility of impacts are similar in Lamont and Bruderheim, the Town of Lamont was also included in the LSA. Therefore, the LSA was determined to be anywhere within 5 km of the proposed PDA and includes the Town of Lamont (see Figure 4.2-1). Other than Bruderheim and Lamont, no other towns are within the LSA. The majority of the LSA is in Lamont County; however, a small rural section in Strathcona County was also included in the LSA.

4.2.3.3 Regional Study Area

Almost all farmland surrounding the PDA and Towns of Bruderheim and Lamont fall within the County of Lamont. The Project falls under Lamont County's tax systems, zoning and utilities jurisdiction, therefore, the County is significant to the socio-economic conditions of the area and was analyzed as the Socio-Economic Regional Study Area (RSA) (see Figure 4.2-2).

Information regarding the province of Alberta is used frequently throughout the study for the purposes of comparative and baseline analysis.

In defining the LSA and RSA according to Directive 056 and the Filing Manual, several geographic areas were excluded. For example, Fort Saskatchewan, the Industrial Heartland and Edmonton were not specifically defined or included in the LSA or the RSA. While the Project may impact these areas (for example, it may draw construction workers from Fort Saskatchewan or Edmonton) these effects will be highly reversible, non-permanent, of a small social and economic magnitude and of short duration. Therefore, these areas are less significant than the defined areas for the RSA and LSA. However, the scope of the cumulative effects analysis (CEA) includes both Alberta and British Columbia and these areas are included in the CEA.

4.2.4 Methodology

This report has employed Burdge's comparative social impact model (Burdge 2004 a,b) which compares the current socio-economic status of an area to the predicted socio-economic status of the same area after a certain project, policy or action has occurred. These impacts are then put into a larger context through a cumulative effects assessment. As such, this study starts with a baseline analysis. This is followed by a socio-economic impact assessment (SEIA) based on the construction and operation of the project and a CEA.

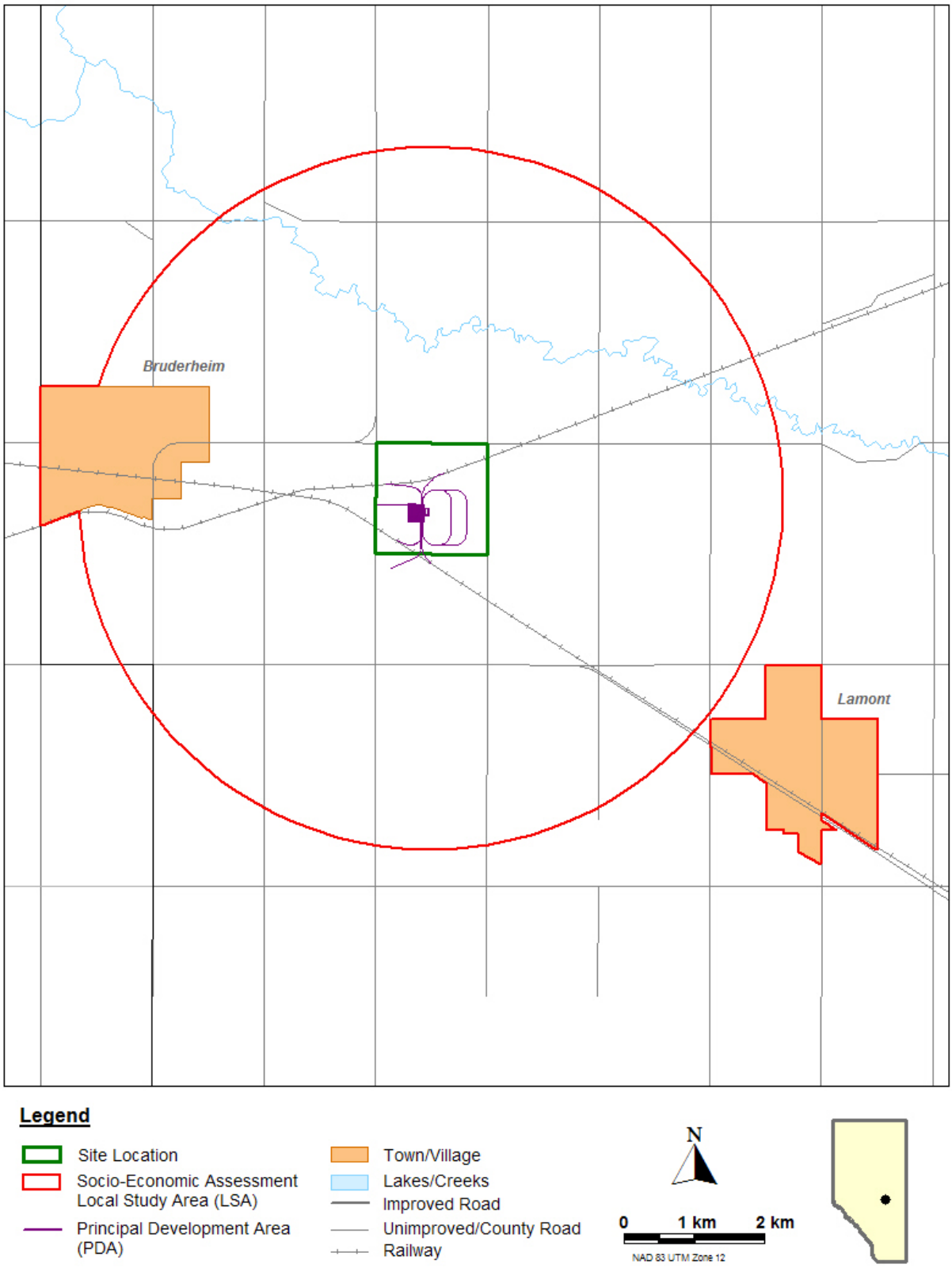

Figure 4.2-1: Socio-Economic Assessment LSA

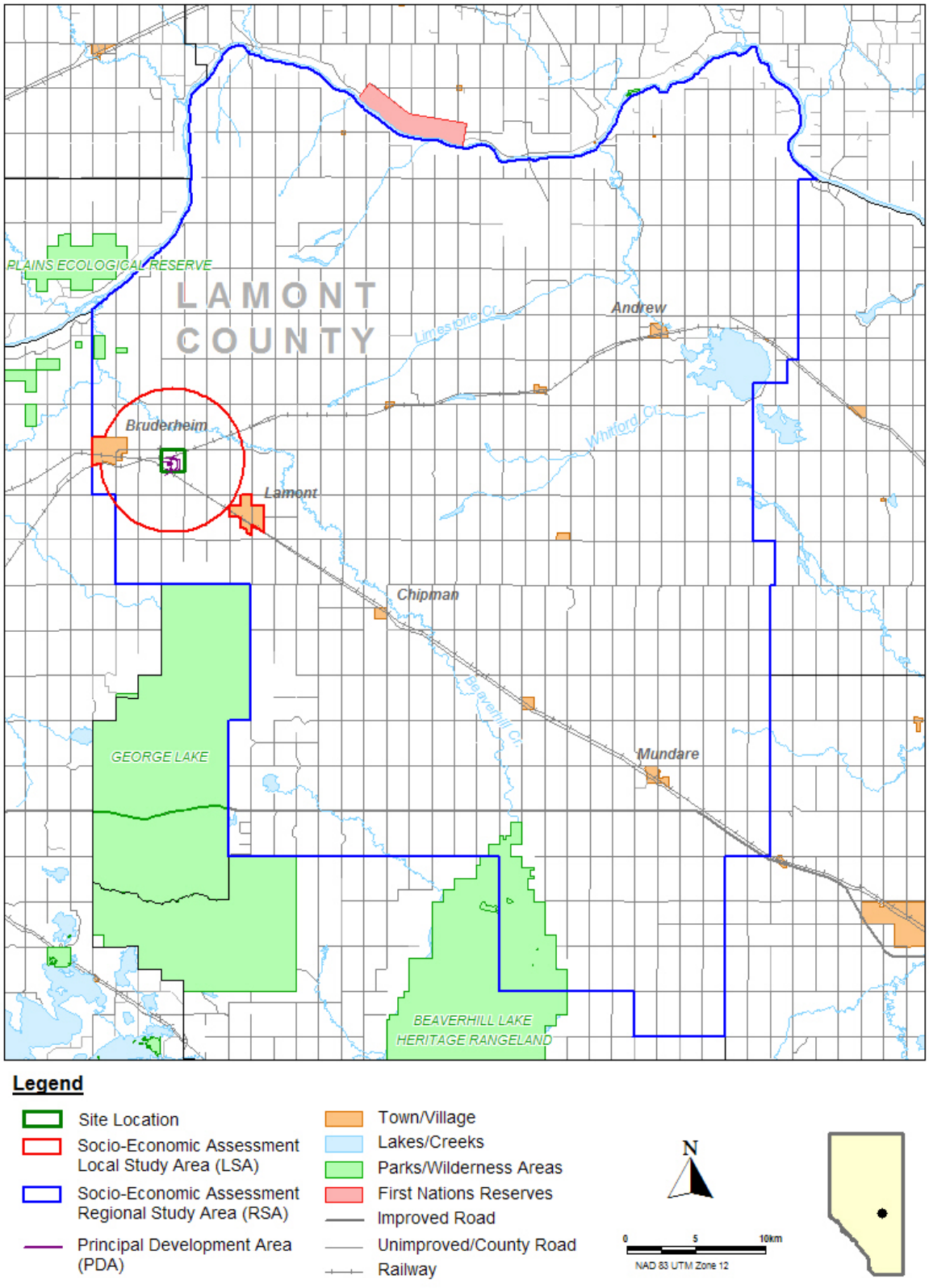

Figure 4.2-2: Socio-Economic Assessment RSA

The SEIA study has been based on a combination of published information, secondary information, field observations and interviews or discussions with key stakeholders and authorities. Unless otherwise noted, the following steps were followed to produce this report:

- obtained published reports from federal, provincial and regional agencies involved in administering or regulating a specified area or resource
- conducted Internet and literature searches and investigations
- ran appropriate statistical and economic models (where necessary)
- interviewed relevant regulators, landowners, service providers, interest group representatives etc. to identify potential issues associated with the Project

The following people were interviewed for this report:

- Stuart Barthelette, Paramedic CAO, Prairie Emergency Medical Services Inc.
- Norman I. Dowling, Senior Research Scientist, Alberta Sulphur Research Ltd.
- George Hargesheimer, Fire Chief, Town of Bruderheim Fire Department
- John Helton, Fire Chief, Town of Lamont Fire Department
- Sam Hewson, Sergeant, RCMP Fort Saskatchewan Detachment
- Harold James, Executive Director, Lamont Health Care Centre
- Jack Lambert, Mayor, Town of Bruderheim
- Robert Mann, Project Manager, AST/HAZCO Environmental Services
- Fred Pewarchuk, Mayor, Town of Lamont
- Bruce Stubbs, Realtor, Torode Realty

Additionally, some interview findings from the Volume IID, Section 5: Public Consultation and the Volume IID, Section 2 – Land Use and Reclamation were used and cited in this document.

4.3 Baseline Assessment

Throughout this baseline assessment data from the 2001 Canadian Census (conducted by Statistics Canada) will be used. The 2001 data represents the most recent and complete data set available through Statistics Canada. While a Census has been taken in 2006, data from the 2006 Canadian Census is being rolled out in stages and a complete data set on the LSA and RSA will not be available until 2008. All 2001 Canadian Census information was accessed in 2006, and is cited as follows Statistics Canada 2006, Internet site. However, all Census information reflects the 2001 Canadian Census.

4.3.1 Bruderheim, Lamont and Lamont County

4.3.1.1 Bruderheim

The Town of Bruderheim is located north of the Highway 15 and Highway 45 junction in Alberta. The area around Bruderheim was first settled in 1894, when a colony of German Moravians established homesteads. Under the leadership of Andreas Lilge, they organized

the first congregation of the Moravian Church in Western Canada, naming it Bruederheim – Home of the Brethren.

In 1974, Bruderheim was a village of about 350, and in the period since, the population has more than tripled. The most recent census recorded a population in Bruderheim of 1,202 people (Statistics Canada 2006a, Internet site).

4.3.1.2 The Town of Lamont

The Town of Lamont (Lamont) is located approximately 6 km southeast of the Project site. Lamont was settled in the late 1800s by Ukrainian immigrants who first landed in eastern Canada. In March 1944, Lamont Municipal District No. 516 was incorporated, uniting the three districts of Pines, Wostoc and Leslie to form modern day Lamont. Lamont is home to several churches, a high school and elementary school, nursing home and the first full service hospital in Canada located outside of a city.

The Town of Lamont is the largest population centre in Lamont County, with a population of 1,692 (Statistics Canada 2006b, Internet site).

4.3.1.3 Lamont County

The Consolidated Census Subdivision of Lamont County (Lamont County) is situated 63 km northeast of Edmonton. The County is bounded on the southwest by Elk Island National Park, on the south by Beaverhill Lake and to the north by the North Saskatchewan River. Lamont County consists of five towns and villages: Andrew, Mundare, Chipman, Lamont and Bruderheim as well as several hamlets. However, a sizable portion of the population in the area lives in rural or semi-rural settings. Statistics Canada includes these populations as part of Lamont County along with the population of Improvement District No. 13 (Statistics Canada 2006).

Lamont County lays claim to having the most churches per capita of any other area in North America (Lamont County 2006, Internet site).

The population of Lamont County as of the 2001 census was 8,473. Table 4.3-1 and Figure 4.3-1 shows the population breakdown.

Table 4.3-1: Lamont County Population Breakdown (2001)

Residents	Type of Community	Population
Rural/semi rural county residents	Rural/semi rural/hamlet	4,167
Andrew	Village	485
Mundare	Town	653
Chipman	Village	247
Lamont	Town	1,692
Bruderheim	Town	1,202
Improvement District No. 13	Improvement District	27
Source: Statistics Canada 2006.		

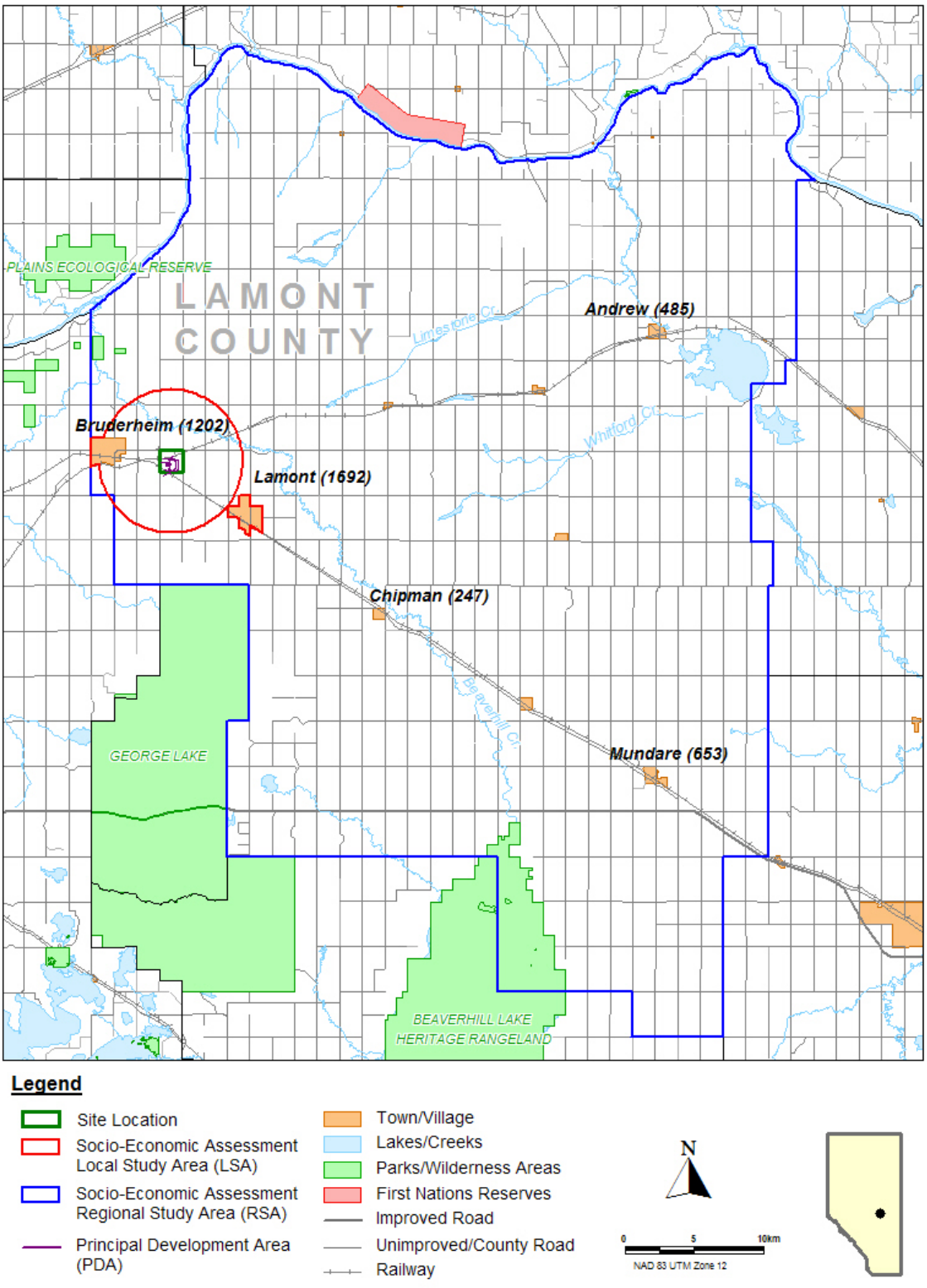

Figure 4.3-1: Lamont County 2001 Population Data

4.3.2 Alberta's Industrial Heartland

In September 1999, Strathcona County, the City of Fort Saskatchewan, Sturgeon County and Lamont County decided to coordinate regional growth and development. This process was coordinated through the Alberta's Industrial Heartland Association (the Heartland). The Heartland's mandate is to:

- ensure effective land-use development for the next 25 years
- ensure local industrial growth is handled in a safe, consistent, coordinated manner
- ensure safe and environmentally sound development
- ensure continued growth and diversity in the region to sustain its economic viability

To this end, 330 km^2 in the 3 counties and Fort Saskatchewan has been zoned for industrial and heavy industrial use. Over $11 billion in petroleum, petrochemical and chemical processing facilities have been established in the area to date and the Heartland is now home to one of Canada's largest concentrations of petroleum, refining, petrochemical and chemical processors. The Project falls in an area zoned for heavy industrial use in Lamont County as part of the Heartland's plan (Alberta's Industrial Heartland 2006, Internet site).

4.3.3 Population

The most recent completed census data available for Bruderheim, Lamont and Lamont County is the Canadian Census conducted by Statistics Canada data in 2001 (Statistics Canada 2006; Statistic Canada 2006 a,b, Internet sites). According to this data, shown in Table 4.3-2, there was little change in Bruderheim and Lamont County's population between 1996 and 2001. However, the Town of Lamont saw a population increase of 6.6% which was more inline with Alberta's population growth of 9.3% over this period.

Table 4.3-2: Population (1996, 2001)

Population	Bruderheim	Lamont	Lamont County	Alberta
2001	1,202	1,692	8,473	2,974,807
1996	1,198	1,581	8,293	2,696,826
Change (1996–2001)	4	111	180	277,981
% Change (1996–2001)	0.3%	6.6%	2.1%	9.3%
Source: Statistics Canada 2006; Statistics Canada 2006 a,b, Internet sites.				

Unofficial sources estimate the population in Bruderheim to be 1,300 (Lambert 2006, pers. comm.) and 1,800 in Lamont (Pewarchuk 2006, pers. comm.). However, since these numbers are only slightly higher than 2001 data and the 2001 data is verified by the Canadian Census, the 2001 Census population numbers are used throughout this report.

It should also be noted that the Alberta Municipal Affairs Official Alberta Population Lists (Alberta Municipal Affairs 2006, Internet site) published in 2005 notes that the population of Alberta has increased to 3,242,110 in 2005, representing a further 8.24% increase in population from 2001. This same Population List recorded Bruderheim, Lamont and Lamont County's population based on the 2001 census. Therefore, the population growth in these areas is not consistent to population growth in Alberta since 2001. Updated verified population figures will only be available when the 2006 Canadian Census is published. Data from the 2006 Canadian Census is being rolled out in stages and a completed data set on the LSA and RSA will not be available until 2008. The age characterization of the LSA and RSA is provided, in Figure 4.3-2 and Table 4.3-3.

Table 4.3-3: Age Characterization as a Percentage of Total (2001)

Ages	Bruderheim	Lamont	Lamont County	Alberta
Age 0–4	7.5%	4.1%	4.9%	6.3%
Age 5–14	15.8%	13.1%	14.4%	14.5%
Age 15–19	8.3%	6.2%	6.7%	7.5%
Age 20–24	5.0%	4.1%	3.8%	7.2%
Age 25–44	31.9%	22.9%	24.6%	31.9%
Age 45–54	14.1%	14.5%	15.4%	14.2%
Age 55–64	8.3%	9.8%	11.6%	8.1%
Age 65–74	5.8%	11.0%	9.9%	5.8%
Age 75+	3.3%	14.2%	8.7%	4.6%

Note:
Numbers may not add up due to rounding.
Source: Statistics Canada 2006; Statistics Canada 2006 a,b, Internet sites.

The data demonstrate that the Town of Lamont and Lamont County generally have an older population compared with the Alberta average. Furthermore, population growth between 1996 and 2001 in the LSA and RSA was slower than Alberta's average population growth.

4.3.4 Housing and Services

4.3.4.1 Housing

The most recent housing data available for Bruderheim is Statistics Canada's 2001 census information. According to this data, Bruderheim has 410 dwellings. There were 320 (74%) dwellings that were owned and 90 (26%) dwellings were rented. All owned dwellings were occupied and all rental properties in Bruderheim were occupied. Occupancy rates in Bruderheim were 100%. Average rental costs were $770/month. The average value of a dwelling was $94,804 and the median income to all households in 2000 was $52,599 (Statistics Canada 2006a, Internet site).

According to Statistics Canada (2006), there were 635 dwellings in the Town of Lamont. Of these dwellings, 485 (76%) were owned while 150 (24%) were rented. All owned dwellings were occupied while 3% of rental dwelling were available for rent (145 of the 150 rental properties were occupied). Average rental rates were $504/month. The average value of a dwelling was $86,605. The median household income as at 2000 was $31,079 (Statistics Canada 2006b, Internet site).

As of 2001, there were 3,215 dwellings in Lamont County. Of these dwellings, 2,710 (74%) were owned while 510 (16%) were rented. Occupancy was 95% for owned property, while rental occupancy was 99% in Lamont County (2,580 occupied owned dwellings and 505 rental dwellings). Average rental rates were $534/month, while the median value of a dwelling was $89,310. Median household income as of 2000 was $38,232 (Statistics Canada 2006).

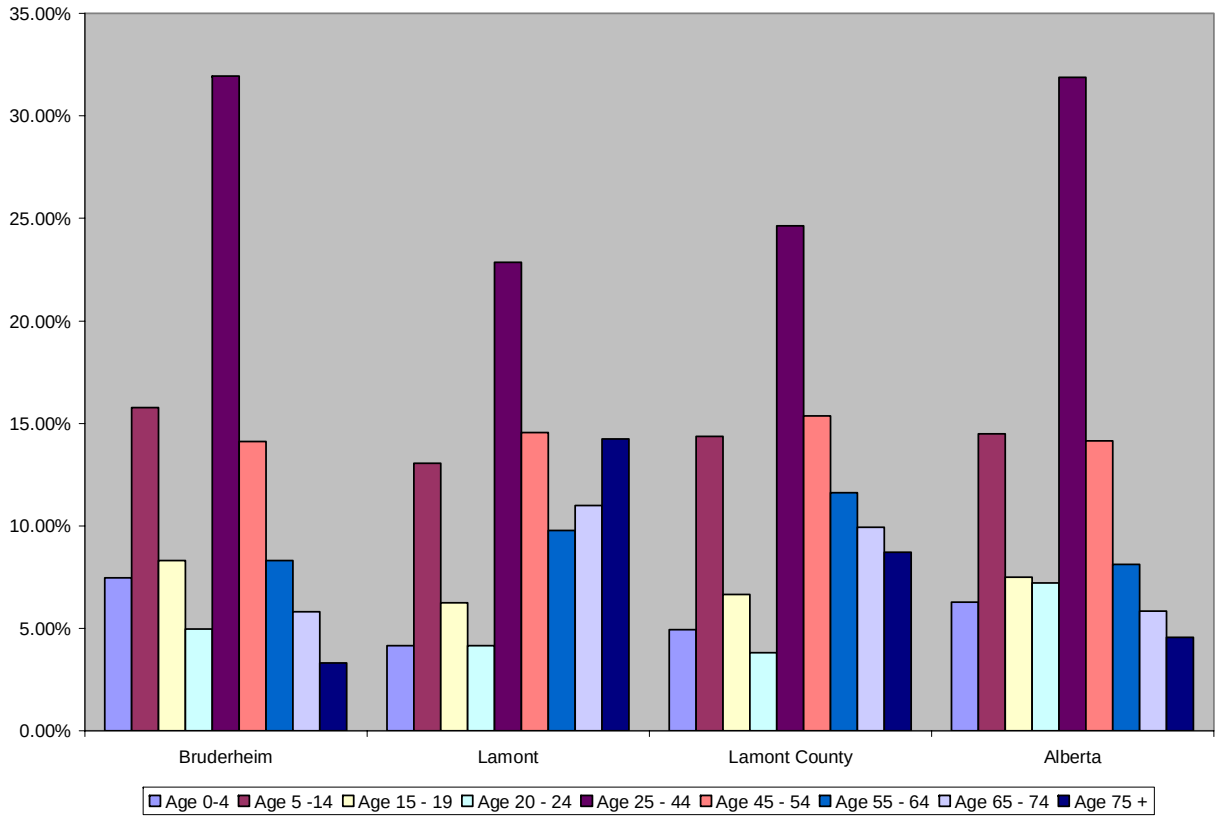

Figure 4.3-2 Age Characterization as a Percentage of Total (2001)

In 2001, Alberta had a total of 1,104,100 dwellings. Of these dwellings 777,480 (70%) were owned while 319,090 (30%) were rented; 736,065 (95%) of owned dwellings were occupied in Alberta and 316,645 (99%) were rented. Average rental prices in Alberta were 674/month and the average value of a dwelling was $159,698. The median household income in Alberta in 2000 was $52,524 (Statistics Canada 2006). Housing statistics are summarized in Table 4.3-4.

Table 4.3-4: Key Housing Statistics (2001)

2001	Bruderheim	Lamont	Lamont County	Alberta
Owned dwelling occupancy	100%	100%	95%	95%
rental occupancy	100%	97%	99%	99%
Average rental payment	$770	$504	$534	$674
Average value of dwellings	$94,804	$86,605	$89,310	$159,698
Median household income	$52,599	$31,079	$38,232	$52,524
Source: Statistics Canada 2006; Statistics Canada 2006 a,b, Internet sites.				

The average value of a dwelling in the LSA increased dramatically between 1996 and 2001. This data is provided in Table 4.3-5.

Table 4.3-5: Dwelling Values (1996-2001)

	Bruderheim	Lamont	Alberta
1996 Value	$66,931	$71,389	$126,979
2001 Value	$94,804	$86,605	$159,698
Percentage change	29.5%	17.6%	20.5%
Source: Statistics Canada 2006; Statistics Canada 2006 a,b, Internet sites.			

Housing prices have been rising in Alberta over the past few years. Following an increase of 7.1% in 2005, Alberta's new house price index spiked 26% in the first four months of 2006, compared to the same period the year prior, well above the national rate of 7.5% (Alberta Finance 2006). The demand for housing in Alberta and associated price increase for dwellings in the province has likely been a factor in the price increase for dwellings in the LSA and RSA.

4.3.4.2 Education

Bruderheim and Lamont are part of the Elk Island Public School Regional Division #14, headquartered in Sherwood Park. Bruderheim Community School provides education for children in kindergarten through Grade 6. The Town of Lamont Elementary School also provides education for children in kindergarten through Grade 6. High school students attend Lamont Junior High School or Lamont Senior High School depending on their age, or attend to schools outside of Lamont.

Lamont County's schools are administered by Elk Island Regional School Divisions #14. Kindergarten to Grade 12 programs are offered at schools in Andrew and Lamont with kindergarten through Grade 6 offered in Mundare. In addition to regular high school programs, high schools in Lamont County offer a wide variety of distance learning programs.

Few post secondary education services are available in Bruderheim, Lamont or Lamont County. A Community Adult Learning Council offers a wide variety of programs and courses including computer skills, business and administration training and workplace health and

safety certifications (Lamont County 2006, Internet site). A detailed education breakdown is provided in Appendix I. Education characterization is shown in Table 4.3-6.

Table 4.3-6: Education Characterization (2001)

Level	Bruderheim	Lamont	Lamont County	Alberta
Less than high school	30.0%	35.4%	36.1%	21.5%
High school certificate	21.3%	19.5%	13.9%	26.3%
Trades certificate	18.6%	22.0%	19.7%	14.0%
College certificate	24.2%	16.9%	18.5%	18.0%
University diploma	4.9%	4.9%	11.8%	20.3%

Notes:
Percentages based on labour force – age 15 and up.
Numbers may not add up due to rounding.
Source: Statistics Canada 2006; Statistics Canada 2006 a,b, Internet sites.

As compared to the rest of Alberta, levels of education in the LSA and RSA are lower, with 36.1% of the population in Lamont County having less than high school education as compared to 21.5% of all Albertans. Approximately the same percentage has college education: 18.5% in Lamont County as compared to 18.0% in Alberta. Training in trades in Lamont County is high compared to the rest of Alberta: 19.7% versus 14.0%.

4.3.4.3 Health Services

All towns in Lamont County, including the Town of Lamont and Bruderheim, fall within the East Central Health Region boundaries. Medical services for residents of Bruderheim and Lamont are provided by the Lamont Health Care Centre, located in the Town of Lamont. Facilities include:

- acute care – 14 beds
- community care – 2 respite, 2 palliative
- long-term care – 101 beds
- Morley Young Manor (assisted living) – 20 units
- Beaver Hill Pioneer Lodge (assisted living) – 36 units

The Health Care Centre has limited evening and weekend hours. Residents use the Fort Saskatchewan General Hospital in Fort Saskatchewan in conjunction with the Health Care Centre (James 2006, pers. comm.). In addition to the Health Care Centre's facilities, there is an active acute care hospital in the Town of Lamont and a health care centre in Mundare. There are additional senior's facilities and assisted living units in various towns in Lamont County.

Ambulance service for Bruderheim and Lamont is provided by Prairie Emergency Medical Systems Inc. Ambulances are based out of Fort Saskatchewan, the Town of Lamont and the Village of Andrew. There are two ambulances in Fort Saskatchewan with advanced life support capabilities and one with basic life support capabilities. The ambulance stationed in Lamont has advanced life support services and the ambulance in Andrew has basic life support capabilities (Barthelette 2006, pers. comm.).

4.3.4.4 Protection Services

Both Bruderheim and Lamont are served by volunteer fire departments. Lamont County is served by five volunteer fire departments located in the Villages of Andrew and Chipman and the Towns of Bruderheim, Lamont and Mundare. Lamont County is covered by three Royal Canadian Mounted Police (RCMP) detachments, as follows:

- Fort Saskatchewan detachment covers the western portion of Lamont County including Bruderheim and Lamont
- Two Hills/Andrew detachment covers a large north-eastern portion of Lamont County
- Vegreville detachment covers the southeastern portion of Lamont County

The Towns of Bruderheim and Lamont are served by the Fort Saskatchewan detachment of the RCMP.

4.3.4.5 Family and Community Services

Bruderheim has several recreational and community facilities including an arena, skateboard park, library, boys and girls club, seniors' drop in center, as well as baseball, soccer and football facilities.

The Town of Lamont is home to an arena, curling club, Town Hall, library, town meeting space, health centre, seniors' drop in center, parks, recreational centre, soccer, football and baseball facilities.

Both towns have active community groups including Block Parent Associations, the Agricultural Society and a variety of sports and recreational clubs. Similar facilities and associations exist in most of the Towns in Lamont County. The Village of Andrew has a joint use facility which combines the library, bowling alley, exercise facilities, village office and school.

As previously mentioned, Lamont County is also known for having more churches per capita than any other area in North America. There are 47 churches in Lamont County. There are two churches in Bruderheim and three churches in Lamont. The majority of the Churches are Ukrainian Catholic, however, there are several Roman Catholic churches, United Churches of Canada, Ukrainian Orthodox churches, Orthodox Churches of America, Russo Greek Orthodox churches and other denominations.

4.3.4.6 Infrastructure

The Lamont County Water Utility runs along Highway 15 and is also accessible within 3.2–16 km of Highway 16. This water corridor serves the populations of Bruderheim and Lamont and is capable of providing water to additional populations (Lambert 2006, pers. comm.).

Lamco Gas Co-op Ltd. serves the rural area in Lamont County. Bruderheim and the Town of Lamont are served by ATCO Gas.

Battle River REA, Fortis Alberta and ATCO Electric provide electrical power depending on the service area. Three phase power is concentrated in the Bruderheim area to serve existing plants, 2.5 km north of Highway 15.

4.3.5 Labour Force and Employment

The available labour force (ALF) is determined by summing the population from age 15 and older. This is the same methodology used by Statistics Canada.

The ALF of Bruderheim is 925 out of a population of 1,202 or 77%. In the Town of Lamont, 1,395 out of a population of 1,692 make up the ALF, representing 86% of the population. In Lamont County, the ALF is 80.3%. The average ALF rate is 79% in Alberta. These data are summarized in Table 4.3-7

Table 4.3-7: Available Labour Force Characterization

Ages	Bruderheim	Lamont	Lamont County	Alberta
Age 15–19	10.8%	11.2%	8.3%	9.5%
Age 20–24	6.5%	23.2%	4.9%	9.1%
Age 25–44	41.6%	23.2%	31.6%	40.2%
Age 45–54	18.4%	12.5%	19.6%	17.9%
Age 55–64	10.8%	8.4%	14.7%	10.2%
Age 65–75	7.6%	9.4%	12.3%	7.3%
Age 75+	4.3%	12.2%	8.6%	5.7%
Note: Numbers may not add up due to rounding. Source: Statistics Canada 2006; Statistics Canada 2006 a,b, Internet sites.				

Since the ALF was calculated using 2001 census data, participation rates were determined using the same data set. The participation rate of the Labour Force refers to persons 15 years and over, excluding institutional residents, who last worked for pay or in self-employment in either 2000 or 2001, expressed as a percentage. Unemployment rates were calculated using 2001 census data.

Table 4.3-8: Key Labour Force Indicators (2001)

Area	Bruderheim	Lamont	Lamont County	Alberta
Participation rate	68%	54%	63%	73%
Unemployment rate	7%	4%	5%	5%
Source: Statistics Canada 2006; Statistics Canada 2006 a,b, Internet sites.				

Statistics Canada considers 4% employment full employment. Therefore, there is almost full employment in the LSA, RSA and Alberta. Bruderheim has higher levels of unemployment compared to other areas in the LSA.

4.3.6 Local Industry

Lamont County's land use is:

- 91% agricultural
- 5% residential
- 2% parkland
- 2% industrial and commercial

Bruderheim and Lamont's local industry is heavily reliant on its manufacturing and construction sector. The two largest industrial facilities are ERCO Worldwide (formerly Albchem) and Canexus Chemicals (formerly Nexen Chemicals).

Canexus Chemicals employs roughly 25 people and produces sodium chlorate, an intermediate pulp bleaching chemical, (Alberta's Industrial Heartland 2006, Internet site).

On July 10, 2006, Superior Plus Income Fund, the majority owner of ERCO Worldwide, announced it will shut down its sodium chlorate facility in Bruderheim (Superior Plus Income Fund 2006, Internet site).

Other industries in the area include Triton Fabrication, a metals fabricator and some farming facilities. Many sections of land in the LSA are owned by corporations but are not yet developed.

Table 4.3-9: Employment by Industry

Industry	Bruderheim	Lamont	Lamont County	Alberta
Agriculture and resource based	8.3%	12.7%	25.9%	10.9%
Manufacturing and construction	28.1%	23.2%	17.8%	15.8%
Wholesale and retail	10.7%	11.3%	18.5%	15.4%
Finance and real estate	0.0%	6.3%	3.2%	5.0%
Health and education	13.2%	16.2%	14.1%	15.4%
Business services	18.2%	14.8%	11.2%	18.8%
Other	20.7%	14.8%	9.3%	18.7%

Note:
Numbers may not add up due to rounding.
Source: Statistics Canada 2006; Statistics Canada 2006 a,b, Internet sites.

4.3.7 Comparative Impact Model

The comparative social impact model (Burdge 2004a) requires a baseline assessment followed by an impact assessment based both on construction and operational phases. What follows is an assessment of the possible and probable socio-economic impacts of the Project on this baseline.

4.4 Application Assessment

Section 4.4 of this impact assessment aims to determine the possible and probable socio-economic impacts of the Project on the LSA and RSA. Section 4.4.1 discusses AST's pre-Project policies. Section 4.4.2 is an assessment of the socio-economic impacts during construction and Section 4.4.3 assesses the socio-economic impacts during operations.

4.4.1 Policies Regarding Goods and Services

The Project in Lamont County will be responsible for procuring its own goods and services. AST recognizes the technical and commercial benefits of having long term agreements with local suppliers of goods and services. Local suppliers of any goods, services, materials, or equipment will be given primary consideration. When appropriate, AST will support the development of dependable and competitive local and regional suppliers while not sacrificing product quality, safety, competitiveness or cost (Mann 2006, pers. comm.).

4.4.1.1 Procurement

AST's procurement practices are shaped by its viewpoint on goods and services outlined in Section 4.4.1. AST's procurement division will buy locally whenever practical throughout construction and operation of the Project (Mann 2006, pers. comm.).

4.4.2 Construction Phase

Construction (construction phase) is expected to require approximately 36,000 person hours and will take between 6–9 months of full-time construction. It is expected that a 45 person construction force will be hired throughout the construction phase. There will be no dramatic peaks or troughs in labour requirements at any point in the construction phase.

4.4.2.1 Population

The Project will employ a labour force of 45 people throughout the construction phase. It is unlikely this small workforce will require a work camp. Therefore, three population scenarios can occur. The first is that the construction labour force would come directly from within Lamont County. There would be no population impact in the LSA and no population impact in the RSA, as the majority of labourers would be day labourers living in the RSA.

The second scenario is that a labour force will be brought in to construct the Project and no labour camp will be constructed. Since the labour force is small, AST plans to house the construction crew in local hotels and motels for the span of the construction phase. According to the Atlas of Canada, the average Canadian family has 3.1 members (Natural Resources Canada 2006). Assuming that half the construction crew brought their families with them for the entire duration of the construction phase, the population impact would be as follows:

- 45/2 construction crew without family + (45/2 x 3.1) construction crew with family = 93 people

Since the RSA had a population of 8,473 in 2001, a 93 person increase in population for 6–9 months represents roughly a 1.10% temporary population increase. Therefore, even if all the labourers were brought from outside the LSA and RSA, there would be a low population impact during the construction phase. The third scenario is a blend of the first and second scenario with some labourers from the LSA and RSA and some from outside of the RSA. The percentage of local to non-local labourers cannot be predicted.

Throughout the assessment of the construction, two scenarios will be presented when discussing spin-off effects related to population. The first scenario presented above is a zero population change. The second scenario is the maximum change scenario where a 93 person increase will occur, for 6–9 months and these people will be housed in hotels and motels. It should be noted that these two scenarios represent the two extremes of the possible population impact during the construction phase. A blend of the two is more likely.

4.4.2.2 Economic Effects of Construction

The economic effects of the construction phase have been determined using the Alberta Economic Multipliers produced by Alberta Finance (Alberta Finance 2006). A brief synopsis of this methodology is provided in Appendix II and the methodological limitations are presented in Appendix III. Since the Alberta Economic Multipliers is an input output model, impacts are based on capital inputs and outputs and these impacts can be direct, indirect or induced. Impacts should not be confused with spending.

The total cost of the construction phase is estimated to be $37.5 million. Of the $37.5 million total cost of construction, $25.4 million is expected to go to construction costs (capital and labour) while roughly $12.1 million will be plant machinery and equipment costs (capital).

Since the construction phase refers to the construction of a plant that processes sulphur, the commodity intensity ratios used are the ratios for non-residential construction. This commodity table was used because the activity would be completed in Alberta by contractors whose output/commodity is construction. Multipliers for non-residential construction are shown in Table 4.4-1.

Table 4.4-1: Non-residential Construction Multipliers

GDP at Basic Prices	Labour Income	Employment 2002	Employment 2005	Gross Output
0.902	0.641	0.121	0.111	2.023

Therefore, the economic impacts will be as follows:

- GDP at basic prices would increase by 0.902 x $25.4 million = $22.9 million
- labour income would increase by 0.641 x $25.4 million = $16.3 million

The impact of purchasing machinery and equipment are calculated using machinery and equipment multipliers as shown in Table 4.4-2.

Table 4.4-2: Machinery and Equipment Multipliers

GDP at Basic Prices	Labour Income	Employment 2002	Employment 2005	Gross Output
0.786	0.393	0.076	0.070	1.625

The calculated impacts due to machinery and equipment purchases are as follows:

- GDP at basic prices would grow by 0.786 X $12.1 million = $9.5 million
- labour income would rise by 0.393 x $12.1 million = $4.8 million

Typically, Alberta derives more economic benefit from construction activity associated with projects than it does from the purchase of machinery and equipment. This is mostly due to the high content of Alberta workers in the construction force compared to equipment which can be produced outside of the province. The economic impact to Alberta during the construction phase is shown in Table 4.4-3.

Table 4.4-3: Economic Impact of Construction Phase to the Province of Alberta

Component	Economic Impact
Non-residential construction	$22.9 million
Non-residential labour	$16.3 million
Machinery and equipment	$9.5 million
Machinery and equipment labour	$4.8 million
Total Economic Impact	**$53.5 million**

The approximately $53.5 million impact captures the direct and indirect economic impact of the construction phase on Alberta based on $37.5 million in construction costs. However, it does not include the additional direct impact from local spending in the RSA and LSA during construction. The impact to the LSA and RSA will come mostly in the form of spending from construction crews (as construction and labour is already incorporated). If construction crews are brought in from outside of the LSA and RSA, they will be accommodated in hotels and motels in Lamont County. Average cost of accommodation is expected to be roughly $55 per night and average daily spending in the area is estimated at $50 per day for food and incidentals. Therefore, the additional economic impact is estimated to be:

- local construction: 180–270 nights (6–9 months) x $50 x 45 people = $405,000–607,500
- 45 construction workers and related family brought in: 180–270 nights (6–9 months) x [($55 x 45 hotel spaces) + ($50 x 93 people)] = $1.3 million–$1.9 million

It is difficult to disaggregate the percentage of the roughly $53.5 million impact to the LSA and RSA. However, it is certainly the case that a portion of this impact will occur in the LSA and RSA. The majority of the $16.3 million and $4.8 million in labour impacts will be in the LSA and RSA. Spending in the LSA and RSA by construction crews is estimated at between $405,000 and $1.9 million, over the 6–9 months of the construction phase.

4.4.2.3 Employment and Training during Construction

As mentioned earlier, a small labour force of roughly 45 people will be employed during construction and the construction phase will take 6–9 months. Since construction of the Project does not require specific skills or training beyond what a typical construction workers require (equipment training, health and safety training), significant additional training during the construction phase will not be needed.

4.4.2.4 Demands on Services and Infrastructure

The construction phase of the Project will require little water. Potable water for labourers will be trucked to the Project site. Water needs for construction will be minimal and can either be trucked in or accessed through the onsite groundwater well.

Electrical energy required for the construction phase will be minimal and will be provided by a combination of generators and electrical energy utilities. Adequate electricity is available for this phase.

Emergency services will not be significantly impacted during construction. There is a risk of road accidents when accessing the site from Highway 15 (Hewson 2006, pers. comm.). Additionally, there are risks of accidents and injuries occurring during construction. Emergency response, fire response and hospital capacity are all able to deal with incidents and accidents during the construction phase as long as adequate health and safety protocols, procedures and policies are developed and communicated to the health care centre, fire departments, RCMP and Prairie Emergency Medical Services Inc. (Hargesheimer 2006, pers. comm.; James 2006, pers. comm.; Hewson 2006, pers. comm.; Helton 2006, pers. comm.; Barthelette 2006, pers. comm.). Additionally, AST has created an Emergency Response Plan (ERP) (see Volume I: Project Description – Appendix V) and is a member of Northeast Region Community Awareness and Emergency Response (NR CAER).

4.4.2.5 Housing and Community Services

As discussed in Section 4.4.2.1, the two extremes of population impacts to the LSA and RSA during the construction phase are: there will be no population impact during the construction phase, or 93 people will move to LSA and RSA for 6–9 months. These people will be housed in local hotels and motels throughout the construction phase. There are several motels in the LSA including Archie's Motel, Lamont Hotel and the Rail Motel and the Bruderheim Hotel. There are many more hotels outside of the LSA but within the RSA and there will be enough beds to house the construction crews and families. These construction workers would not be moving permanently to the area. Therefore, there will be no long-term housing impact to the area.

However, a small, temporary, reversible impact to community services may be possible due to a small construction crew (and family members) staying in local hotels and motels. There may be an impact to community services such as schools, libraries and community centres. However, these impacts are temporary and reversible.

In summation, the impact of the construction phase to housing and community services is varied. If there is no population change from the construction phase then there will be no impact to housing or community services. If there are 93 people brought in from outside of the LSA and RSA, there will be no impact to housing as the construction crew (45 people) and related family (48 people) will be housed in hotels and motels for the 6–9 month construction phase. There may be an impact to schools and community services; however, this impact will be temporary and reversible.

Neither the 0 person scenario, nor the 93 person scenario, is likely to occur. Rather these two scenarios represent opposite extremes of the possible population impact and subsequent impact to the housing and community services in the LSA and RSA.

4.4.3 Operations Phase

The Project's operation phase is expected to start 6–9 months after the start of construction, when construction ends. Initially, the plant will run two shifts, 365 days a year. It is estimated that 3,000–6,000 t/d of sulphur will processed and formed. The different production levels will not require additional staff or a change in the shift structure. All data regarding the operations phase are based on 3,000 t/d as the lowest production level and 6,000 t/d as the highest level of production.

4.4.3.1 Population

The Project will employ 22 people during the operations phase. AST will train $^{+}$22 crew members in areas such as health and safety and equipment operation. Additionally, a minimum of 4 of the 22 crew members must have 4th class steam tickets.

As in the construction phase, three population scenarios are possible. The first scenario is that the entire operations crew of 22 people comes from the LSA and RSA, resulting in no change to the population.

The second scenario is that the 22 crew members and their families would move to the LSA and RSA. Since the average Canadian family has 3.1 members (Natural Resources Canada 2006), the maximum population impact is a 68 person increase to the LSA and RSA, or a 0.8% population increase to the population of the RSA.

The third scenario is a combination of scenario one and two and is the most likely population impact during the operations phase. It is unlikely the entire operations crew will come from within LSA and RSA and live with the LSA and RSA. Some crew members might live outside of the LSA and RSA and commute to work daily. Some may move into the LSA and RSA and others will already reside there.

A population change of 0–68 people is possible. Throughout the assessment of the operations phase, two scenarios are presented when discussing impacts related to population. The first scenario is a 0 population change and the second scenario is a permanent increase of 68 people in the LSA and RSA. These two scenarios represent the extremes of possible population impacts to the LSA and RSA throughout the operations phase.

4.4.3.2 Economic Effects of Operations

The economic effects of the operations phase were calculated using the Alberta Economic Multipliers model (Alberta Finance 2006) and tax data provided by AST. All impacts are presented in per year economic impacts.

For the operations phase, industry-based tables from Alberta Economic Multipliers for Support Activities for Mining and Oil and Gas Extraction (see Table 4.4-4) were used.

Table 4.4-4: Support Activities for Mining and Oil and Gas Extraction

GDP at Basic Prices	Labour Income	Employment 2002	Employment 2005	Gross Output
1.050	0.724	0.123	0.105	1.909

Annual sales are used in the Alberta Finance methodology for determining the economic impacts of the operating phase. This plant will have annual sales of about $19.7 million at the 3,000 t/d level (Mann 2006, pers. comm.). Sales at the 6,000 t/d level will be $39.4 million (Mann 2006, pers. comm.). The economic effects of the operations phase are as follows:

- at the 3,000 t/d level, provincial GDP at basic prices would grow by 1.050 x $19.7 million/y = $20.7 million/y
- at the 3,000 t/d level, labour income would increase by 0.724 x $19.7 million/y = $14.3 million/y
- at the 6,000 t/d level, provincial GDP at basic prices would grow by 1.050 x $39.4 million/y = $41.4 million/y
- at the 6,000 t/d level, labour income would increase by 0.724 x $39.4 million/y = $28.5 million/y

The GDP and labour impact do not include yearly taxes on land and equipment that AST would pay estimated at $460,077/y (see Figure 4.4-1):

AST estimates it will pay the following taxes:

- land, buildings and structures = $240,001/y
- machinery and equipment = $220,076/y

AST's total taxes from land, buildings, machinery, structures, machinery and equipment are projected to be $460,077/y with an estimated $62,387 paid to the Alberta School Foundation;

$388,128 in municipal taxes; and $9,562 paid to the County of Lamont Foundation. Other than the Alberta School Foundation, all taxes (roughly 86%) will be paid to authorities in the LSA and RSA. Projected taxes provided by AST, reflect taxes on assets only, not taxes on income.

The projected economic impacts during the Project's operations phase are shown in Table 4.4-5.

Table 4.4-5: Total Economic Impact from Operations Phase

Impact	3,000 t/d	6,000 t/d
Yearly contribution to Provincial GDP	$20.7 million/y	$41.4 million/y
Labour income impact	$14.3 million/y	$28.5 million/y
Tax impact	$460,007/y	$460,007/y
Total Economic Impact	**$35.5 million/y**	**$70.5 million/y**

It is difficult to determine the exact distribution of GDP or labour impact. However, some relevant points on the distribution of economic impacts from the operations phase are:

- the majority of the labour impact ($14.3 million/y under the 3,000 t/d scenario and $28.5 million/y under the 6,000 t/d scenario) will be in the LSA and RSA
- almost all economic impacts associated with the operations phase will occur in Alberta
- tax impacts will be roughly 14% to the province of Alberta and 86% of taxes will go to authorities within the LSA and RSA

4.4.3.3 Employment and Training During Operations

During the operations phase of the Project, 22 full-time staff will be required to run the plant. A minimum of 4 of these staff members will require 4th class steam tickets. All 22 will be trained by AST and receive the appropriate job-related skills to staff this phase of the Project.

Direct economic activity in one industry also generates activity in other industries. For example, the Project will create employment in the transport industry; in metal fabrication for parts and replacements parts; and in welding and other related services. These are the indirect and induced effects discussed in Section 4.4.2.2. The Alberta Economic Multipliers use 2.052 as the 2005 employment multiplier for *Support Activities for Mining and Oil and Gas Extraction*. Therefore, the total employment impact is expected to be as follows:

- total employment impact: 22 people hired by the Project x 2.052 = 45 people

	Total	Bldgs & Struct. (B&S)	Machinery & Equipment (M&E)	Total Taxable Assessment
Improvements	$ 30,000,000.00	$ 5,400,000.00	$ 24,600,000.00	
Less Non-Assessables	-20%	$ 1,080,000.00	$ 4,920,000.00	
Total Assessable		$ 4,320,000.00	$ 19,680,000.00	
Depreciation (% Remaining)		100%	75%	
Total After Depreciation		$ 4,320,000.00	$ 14,760,000.00	
Regulated Level		100.00%	77.00%	
Total Assessessment		$ 4,320,000.00	$ 11,365,200.00	$ 15,685,200.00
Land	$ 1,800,000.00			$ 1,800,000.00
Total				$ 17,485,200.00

Tax Calculation			Rate per $1000.00	Total	
Land	$ 1,800,000.00	Alberta School Foundation	6.175	$	37,791.00
Buildings & Structures	$ 4,320,000.00	Municipal	17.1574	$	105,003.29
		County of Lamont Foundation	0.4227	$	2,586.92
Total	$ 6,120,000.00	Total	23.7551	$	145,381.21
Machinery & Equipment Total	$ 11,365,200.00	Municipal	17.1574	$	194,997.28
		County of Lamont Foundation	0.4227	$	4,804.07
		Total	17.5801	$	199,801.35
Estimated Taxes Due 2006	$ 345,182.56				

Note:

Represents a tax estimate on land, buildings, structures, machinery and equipment only.

Represents an estimate only, and subject to assessment by Lamont County.

Source: Estimates provided by Alberta Sulphur Terminals Ltd.

Figure 4.4-1: AST Projected Taxes

The operations phase of the Project is expected to directly employ 22 people and have an indirect and induced *spin-off* effects that will employ an estimated 23 people in other industries. These industries provide goods and services to the Project, such as truck and rail transport, but are not employed by AST.

From a demographic point of view, the LSA and RSA are well suited to provide 22 employees for the Project. About 77% of Bruderheim's population, 67% of Lamont's population and 71% of Lamont County's population are between the ages of 20 and 64 (see Section 4.3). This is the age bracket deemed most desirable to staff the Project. Furthermore, 28% of Bruderheim's population, 23% of Lamont's population and 18% of Lamont County's population work in manufacturing and construction already. Therefore, a large portion of the population in the LSA and RSA are demographically appropriate to staff the Project during the operations phase.

AST has stated that they have a strong preference to hiring staff that live within the RSA (Mann 2006, pers. comm.).

New upgraders are being built in Fort Saskatchewan and Shell's Scotford Upgrader is increasing its capacity. Many new employment opportunities will be created in the LSA and RSA due to the increase in upgrading capacity in Fort Saskatchewan. However, Alberta is presently experiencing a labour shortage and staffing these operations may be difficult. The demand for labour has resulted in massive inter-provincial in-migration into Alberta, which is expected to continue and may somewhat ease pressure for hiring appropriate staff (Association for Canadian Studies 2004, Internet site).

4.4.3.4 Impact on Local Business

Ancillary industries may benefit from the operations phase of the Project. AST plans to outsource a portion of its maintenance and will require chemicals and other supplies, meals and entertainment for staff, as well as consulting services (i.e., health and safety training). The majority of the economic spin-offs associated with these ancillary industries have been captured through using the Alberta Economic Multipliers in Section 4.4.3.2.

4.4.3.5 Potential Negative Impact to Existing Businesses

Interviews with local businesses in the LSA resulted in mixed findings regarding the Project's impact on existing local businesses. Interviews were conducted with business representatives within the area zoned for heavy industrial use. Interview results are summarized here, but more detail is available in Volume IID, Section 5: Public Consultation.

The following people were interviewed as representatives of businesses:

- Sharon Brissette, Shriners Hospital for Children
- Jeremy Buck, CP Rail
- Andrea Clarke, AltaLink Management Ltd.
- Pat Dietric, 1038103 Alberta Ltd.
- John Kirichenko, Canexus
- Bob MacLeod, ERCO Worldwide
- Michael Marianicz, Marion Investment
- Yoshiki Nakamura, Conserve Oil Corporation

- Kelly Smith, Triton Projects Inc.
- Roger Stenvold, CN Engineering

Of these businesses, only Triton and Canexus have operating plants on their land. ERCO has closed its Bruderheim operation. The other businesses within own land but are not currently operating plants or projects. CN and CP both have active rail lines operating on their respective sections of land.

The interviews reveal that the majority of existing businesses in the immediate vicinity of the Project do not have socio-economic concerns regarding the Project and most concerns are related to health and safety. The most significant concern came from Canexus regarding health and safety of sodium chlorate and sulphur mixing. Testing is underway to compare the potential reactivity of sulphur and chlorate to that of other common organic particulates. Results of these tests will be reported to the NRCB and AENV independently and communicated to interested stakeholders. Laboratory studies are currently being conducted to determine the reaction of the two chemicals. If these chemicals are reactive, then health and safety concerns could have a material negative socio-economic impact. However, if lab studies reveal that sulphur and chloride are not reactive, few negative socio-economic impacts are predicted for existing businesses.

The agricultural industry currently leases many sites surrounding the proposed Project. Some interviewees voiced perceived health and safety concerns regarding farming sections of land near an exposed sulphur pile, which could translate into a downturn in agricultural productivity (see Volume IID, Section 5: Public Consultation) (Bartz 2006, pers. comm.; Harrold 2006, pers. comm.). Existing ancillary services to the agricultural sector in the LSA and RSA may be negatively impacted if there is a downturn in farming inside of the land zoned for industrial usage.

4.4.3.6 Housing

As discussed in Section 4.4.3.1, a population change of 0–68 people is possible. While neither scenario is likely, a 0 person population change requiring no new dwellings and a 68 person population change requiring 22 dwellings represents the two extremes of possible housing impacts.

A 68 person increase represents a population increase of 0.8% in the RSA and a 0.7% increase in the number of dwellings (based on 2001 information presented in Section 4.3.4.1).

Bruderheim's development plan, called Vision 20/20 (Town of Bruderheim 2004), is focused on population growth and housing development. Mayor Lambert sees housing as a key issue and expects the Town's population to nearly double within the next five years (Lambert 2006, pers. comm.). To accommodate further population growth, developers have approached both Bruderheim and Lamont to build more housing, with a specific focus on high-density housing and prefabricated homes (Pewarchuk 2006, pers. comm.; Lambert 2006, pers. comm.).

The rest of the RSA is also expected to increase its capacity to house residents. However, the construction labour market in Alberta is stretched and the speed with which any construction can be completed is difficult to predict.

Three factors suggest that housing impacts will be very minor during the operations phase:

- a 68 person increase representing 22 dwellings is the highest level of population change likely, which represents a 0.8% population change in the RSA

- both the Town of Bruderheim and Lamont are planning to increase housing capacities and developers have approached both towns to increase housing, specifically high density housing
- the rest of the RSA is also expected to increase housing

It seems unlikely that a permanent increase of 68 people representing 22 new dwellings will occur or that housing will be significantly impacted by the Project during the operations phase.

4.4.3.7 Property Values in the LSA

Property values in the LSA are highly variable and not predictable for the following reasons:

- property values can be assessed several different ways. For example, residential properties near an industrial zone may find their value reduced due to this proximity. The motivation for this assumption is that noise, traffic, pollution and other externalities make the residential property a less desirable place to live. However, this model does not factor in option value, which is what the land might be worth in a different context. The option value may result in a rise of property values depending on the type of development. For example, an industry may buy land at a premium if it is located close to a complementary industry, such as a supplier of raw product.
- in the Heartland, some land in the LSA is zoned heavy industry, some is in the buffer zone located next to heavy industry and some remains zoned residential and agricultural. Zoning can greatly determine if property values will rise or fall in value.
- property prices in the LSA, RSA and Alberta have increased dramatically in last five years, making any changes in land values difficult to disaggregate from the constantly changing value of land in Alberta
- heavy/medium industry siting is at the discretion of the Lamont County Council and need not necessarily be proposed for land that is zoned for industrial use. Heavy/medium industrial siting can occur throughout Lamont even outside the Heartland, upon permission from the Lamont County Council (see Volume IID, Section 2: Land Use and Reclamation) (Hamilton 2006, pers. comm.).

Through personal communications with a real-estate expert specializing in industrial land in the Heartland certain findings were discovered. It should be noted, that due to the above points these findings are variable and predictions of actual land values are not possible.

The following property values for land zoned as heavy industrial use in the LSA were provided by Stubbs 2006, pers. comm.:

- farmland in the Lamont County sold for $1,000–1,500 per acre for several years
- unserviced land in the LSA zoned for heavy industry use is being bought for $12,000–$15,000 per acre by speculators
- speculator pricing is based on contingency values and is not expected to rise unless there is a dramatic change in demand, such as a large amount of industry moving into the area
- end users are not the largest buyers of unserviced industrial land in the LSA

Based on these findings, unserviced industrial land is unlikely to lose value with the Project's construction and operation.

Due to the fact that the Lamont County Council has discretionary power over where industrial facilities are sited, and these plants can be established anywhere in the county including land that is in the buffer zone, predicting impacts to land value in the Heartland's buffer zone is not possible. It should be noted that some landowners who have homes in the buffer zone near the proposed Project are concerned about a downturn in land values. Land in the buffer zone is subject to the Alberta Industrial Heartland's Voluntary Property Purchase Program and landowners in the area may receive fair value for their land, if appropriate if they choose to move based on the Project.

Property value forecasting for land in the LSA that does not fall into either the heavy industrial or buffer zone is not possible to predict.

4.4.3.8 Emergency Services

The capacity of emergency services to respond to incidents will not be significantly impacted during the operations phase. According to Sgt. Hewson, the risk of road accidents is high with an estimated 75 trucks accessing the site daily from Highway 15 and 45 (Hewson 2006, pers. comm.). However, the RCMP in Fort Saskatchewan deems this impact as manageable and a typical by-product of industrial development in the area. These incidents are not expected to significantly reduce the RCMP's capacity to respond to emergencies in the LSA or RSA (Hewson 2006, pers. comm.). Furthermore, AST has committed to adding a left turning lane on Highway 15 to mitigate the possibility for road accidents associated with the Project (Mann 2006, pers. comm.).

Emergency response, fire response and hospital staff will be able to respond to accidents and injuries on site as long as adequate health and safety protocols, procedures and policies are developed and communicated to the Health Care Centre, fire departments and Prairie Emergency Medical Services Inc. (Hargesheimer 2006, pers. comm.; James 2006, pers. comm.; Hewson 2006, pers. comm.; Helton 2006, pers. comm.; Barthelette 2006, pers. comm.). In the event of a large scale incident such as a fire, the Health Care Centre, fire departments and Prairie Emergency Medical Services Inc. would be able to respond, provided proper training, protocols, procedures and policies are provided. AST has joined NR CAER and has developed an ERP (see Volume I: Project Description – Appendix V) for appropriate response to emergencies.

With the correct knowledge and planning, the fire departments, Health Care Centre, ambulance services and RCMP should be able to provide the emergency services required by the Project (Hargesheimer 2006, pers. comm.; James 2006, pers. comm.; Helton 2006, pers. comm.; Barthelette 2006, pers. comm.).

It should be noted that both fire departments in Bruderheim and Lamont are voluntary and can experience day-time staff shortages. However, the Project is not expected to exacerbate this problem.

4.4.3.9 Community Services

As discussed in Section 4.4.3.1, a population change of 0–68 people is possible and the demands placed on community services will be proportional to the population change. If the population change is 0, there will be no impact to community services. However, a 0 population change is not likely.

In a maximum population change scenario, community services will have to accommodate 68 new people in the LSA and RSA. This population change represents a 0.8% population increase in the RSA. As noted in Section 4.3.3, the population change between 1996 and

2001 in the RSA was 2.1% and all community services were able to accommodate this growth. Since this growth was accommodated and planning is underway to meet further growth, population growth of 0.8% in the RSA is not expected to significantly impact community services. It should be noted that while impacts to community services (i.e., libraries, schools health care services) are likely be minor and the capacity exists to accommodate them, these impacts will be permanent.

4.4.3.10 Infrastructure

Infrastructure needs during operations are as follows (Mann 2006, pers. comm.):

- potable water: potable water will be trucked to the Project site
- industrial grade water: total water usage is approximately 0.38–0.76 L/s during full scale operation
- electrical energy: anticipated maximum electrical consumption 298.3 Kw. Approximately half of this power is associated with the sulphur forming process and the remaining half is associated with support facilities and sulphur handling infrastructure. Electrical power is provided by the general electrical supply grid, which is appropriate given the relatively small size of the proposed Project.
- natural gas: maximum natural gas consumption is approximately 20,000 gigajoules per month for the operations phase

These water, electrical energy and natural gas demands can be met without a major impact to infrastructure in the LSA and RSA.

4.5 Cumulative Effects Analysis

4.5.1 Introduction

Other industrial developments and projects that are occurring or are projected to occur in the near future will impact the socio-economic status of the LSA and RSA. Many of these developments will occur outside of Lamont County in Sturgeon County, Strathcona County and further north in the Athabasca Oil Sands near Fort McMurray. To provide a more complete picture of the Project's socio-economic impact, this assessment will study it in a larger context through a CEA.

4.5.2 Study Area and Justification

Since the CEA is designed to assess impacts in a broader context, the study area is much larger than the one previously used for direct and indirect impacts. The upgraders that produce the elemental sulphur inputted into the Project are located in Alberta, as is the proposed Project itself. The pastilles will be shipped by rail to the west coast of British Columbia and then shipped overseas. Therefore, Alberta and British Columbia will be used as the study area for the CEA; however, special attention will be given to industrial developments in the Heartland.

4.5.3 Cumulative Context

There are two key developments relevant to cumulative impacts to the Project:

- five upgraders are planned in the Heartland and are at different stages of construction from application through to construction (see Appendix IV)
- Alberta's oil sands development and extraction has grown dramatically

These two developments mean elemental sulphur supply will continue to grow in Western Canada and population growth in the LSA and RSA is likely to continue as more industry moves into the Heartland.

4.5.4 Cumulative Economic Impact

4.5.4.1 Transport

The Project will generate 3,000–6,000 t/d of elemental sulphur pastilles. These pastilles will be shipped to the port of Vancouver at an estimated cost of $25/t (Pentasul 2006). Since the Project will operate 365 days per year, the economic impact of shipping pastilles will be as follows:

3,000 t x $25 x 365 days = $27.4 million/y

6,000 t x $25 x 365 days = $54.8 million/y

Therefore the economic impact of transporting finished pastilles will be between $27.4 million/y and $54.8 million/y.

It should be noted this economic impact will be spread over Alberta and British Columbia as trains will transport the formed sulphur across both provinces. Therefore, a portion of this economic impact is already captured by using the Economic Multipliers in Section 4.4.3.

4.5.4.2 Port of Vancouver

Sulphur storage at the Port of Vancouver totals approximately 175,000 t at one time. Agriproducts storage includes 10 bins that hold approximately 30,000 t in total. An additional large land base is available for more storage (portofvancouver.com 2006, Internet site). The port has capacity to handle the sulphur produced throughout the operations phase. Economic impacts associated with bulk cargo wharfage are estimated to be $9.11/t loading and administration (Pentasul 2006). The economic impacts at the Port of Vancouver are therefore estimated to be:

3,000 t/d x 365 days x $9.11/t = $10.0 million

6,000 t/d x 365 days x $9.11/t = $20.0 million

The impact in the Port of Vancouver will be between $10.0 million and $20.0 million dollars. This impact does not include berthage fees which are determined on a vessel-by-vessel basis based on the size of the ship.

4.5.5 Population Growth

The growth of Canada's oil sands extraction and refining industry has been a key population driver in the LSA and RSA. Demographic analysis in Sections 4.3.5 and 4.3.6 demonstrate that the major industries in Bruderheim and Lamont are related to heavy industry and construction, most of which support the oil and gas sectors. Furthermore, a portion of the population living in the LSA and RSA also work in and around Fort McMurray which is 4–5 hours away by car. Most of these labourers work for several days and return home for several days. Population growth is expected to rise in the LSA because more labourers from the Fort McMurray area are expected to move into the LSA and RSA. Workers choosing to commute to Fort McMurray do so for numerous reasons, including the shortage of housing, infrastructure and services in Fort McMurray; the high cost of living and rising property values in and around Fort McMurray; and life-style choices for families. Furthermore, with new upgraders being built in the Heartland, some construction workers are likely to move to the LSA and RSA (Lambert 2006, pers. comm.). The exact amount of population growth is difficult to predict.

4.5.5.1 Housing

As discussed in Section 4.3.4.1, housing is already in high demand in the LSA and RSA and the price per dwelling has increased. Both Bruderheim and Lamont have received proposals to provide more high-density housing. The Town of Bruderheim is actively exploring this option and it is likely population growth in the LSA will increase when housing development moves forward.

The cumulative effects of the proposed upgraders and growth of Alberta's oil sands has increased the demand for housing and real estate prices have increased. The Project will add to this pressure; however, its demands will be significantly smaller compared with extraction and processing industries. Upgraders employ hundreds of staff and as the dramatic population growth in Fort McMurray demonstrates, oil and gas extraction has a large impact on housing availability and pricing. Since the Project will require at most 22 new dwellings to accommodate operations staff, the demands on housing required by the Project are minor when compared to the cumulative context.

4.5.5.2 Emergency and Community Services

The demands on emergency and community services are proportionate to population growth in the LSA and RSA. As previously discussed, population growth due to upgraders and oil sands developments will have a large impact on emergency and community services. The Project will add to this pressure since, at most, 68 people will move into the RSA. However, the scale of impact to emergency services will be determined by the general cumulative population growth and the Project is expected to contribute only a fraction of the cumulative population growth expected in the LSA and RSA.

4.6 Summary of Socio-Economic Impacts and Mitigations

Table 4.6-1: Final Impact Rating

Rating	Level of Action
Class 1	The predicted trend in an indicator under projected land use development could threaten the long-term sustainability of the quantity or quality of the indicator in the LSA and RSA. An action plan, developed jointly by regional stakeholders, is required to monitor the affected indicator, identify and implement further mitigation measures to reduce any impact and promote recovery of the indicator, where appropriate. This class of impact might also be applicable to an exceedance of a regulatory guideline, or where the impact will have long-term effects.
Class 2	The predicted trend in an indicator under projected land use development will likely result in decline in the quantity or quality of the indicator. The decline could be to lower-than-baseline but stable levels in the LSA and RSA after closure and into the foreseeable future. In addition to responsible industrial operational practices, monitoring and recovery initiatives could be required if additional land use activities occur in the study area before closure of the projected land use development. This class of impact might also be applicable to an exceedance of a regulatory guideline, or where the impact is expected to have mid-term effects, but where recovery will take place shortly after closure of the projected land use development.
Class 3	The predicted trend in an indicator under projected land use development could result in a slight decline in the quantity or quality of the indicator in the LSA and RSA during the life of the projected land use development, but resource levels should recover to baseline after closure. In some cases, a short-term, low to moderate magnitude impact could occur, but recovery will take place within five years. No new resource management initiatives are necessary. Responsible industrial operational practices should continue. This class of impact could also be applicable where regulatory guidelines are not exceeded, but where a relative change in magnitude of an indicator occurs.
Class 4	The projected land use development results in no change and no contribution toward affecting the quantity or quality of the indicator in the LSA and RSA during the life of the projected land use development. Responsible industrial operational practices should continue. Therefore, no cumulative effects result from the Project.

4.6.1 Construction Impacts

4.6.1.1 Population Change

Population change during the construction phase will range between 0–93 people moving to the LSA and RSA. The impact rating is described in Table 4.6-2. The population change during the construction phase is classified as a Class 4 impact. No mitigation measures are required.

Table 4.6-2: Population Impact during the Construction Phase

Direction	Geographical Extent	Magnitude	Duration	Confidence	Reversibility
Neutral	Regional	Low to moderate	Short-term	High	Reversible
Neutral impact to population	Populations will be housed in hotels and motels in the LSA and RSA	Represents a maximum 1.1% change to population in the RSA	Impact will occur for 6–9 months	Impact is likely to occur during the construction phase	Impact will be reversed once construction is completed

4.6.1.2 Economic Impact of Construction

The total economic impact of the construction phase is estimated to be approximately $53.5 million in Alberta, with additional spending of $405,000–$1.9 million by construction workers. The impact rating is shown in Table 4.6-3. The economic impact of the construction phase is a Class 4 impact. No mitigation measures are required.

Table 4.6-3: Economic Impact during the Construction Phase

Direction	Geographical Extent	Magnitude	Duration	Confidence	Reversibility
Positive	Regional	Not applicable	Short-term	Moderate	Permanent
Construction will add to GDP in the LSA, RSA and Alberta	Economic impacts of construction will occur in largely in the LSA, RSA and Alberta	GDP of the LSA and RSA not available to determine magnitude of impact	Construction will take 6–9 months	Projections based on the Alberta Economic Multipliers	Infrastructure will be built

4.6.1.3 Employment

The construction of the Project is expected to directly employ 45 people and will require approximately 36,000 person hours of construction time. The impact rating is described in Table 4.6-4. The employment impact during the construction phase is a Class 4 impact. The impact to employment will be low, but will require some planning in order to secure a construction crew since levels of employment in the LSA, RSA and Alberta are very high and labour is in high demand in Alberta. No mitigation measures are required.

Table 4.6-4: Employment Impact during the Construction Phase

Direction	Geographical Extent	Magnitude	Duration	Confidence	Reversibility
Positive	Regional	Negligible	Short-term	Moderate	N/A
The Project will add to employment in the LSA, RSA and Alberta	Construction crews are expected to come from within Alberta and a percentage may be from the LSA and RSA	Construction employment represents a negligible addition to employment in the RSA and Alberta	Construction will take 6–9 months	Employment based on AST's construction plan	Construction crews will be contractors not hired by AST
Note: N/A – not applicable.					

4.6.1.4 Emergency Services

Road accidents are the most likely impact on emergency services during construction and additional onsite incidents are also possible. Emergency services will not be significantly impacted by the construction phase. The impact rating is described in Table 4.6-5. The impact on emergency services during the construction phase is a Class 3 impact. AST will mitigate potential impacts on emergency services providers through their role in NR CAER

and through their ERP (see Volume I: Project Description – Appendix V), policies and protocols.

Table 4.6-5: Emergency Services Impact during the Construction Phase

Direction	Geographical Extent	Magnitude	Duration	Confidence	Reversibility
Negative	Regional	Negligible	Short-term	Moderate	Permanent
The Project will add to demands on emergency services throughout the construction phase	Affects emergency services providers in Bruderheim, Lamont and the RCMP in Fort Saskatchewan	Based on interviews with emergency services providers	Construction will take 6–9 months	Likelihood and frequency of accidents difficult to determine	Impacts will occur throughout the construction phase

4.6.1.5 Infrastructure

Potable water will be trucked to site and water for construction will either be trucked onsite or accessed through a well. Natural gas will not be required for construction. Electrical energy will be provided through a combination of electrical utilities and generators. The impact rating is shown in Table 4.6-6. The infrastructure impact during the construction phase is a Class 4 impact. No mitigation measures are required.

Table 4.6-6: Infrastructure Impact during the Construction Phase

Direction	Geographical Extent	Magnitude	Duration	Confidence	Reversibility
Neutral	Local	Negligible	Short-term	High	N/A
Neutral impact to infrastructure	Impact will be in the PDA only	Infrastructure needs during construction are not challenging to meet	Infrastructure needs for construction will last 6–9 months	Infrastructure needs based on AST's construction plan	Construction infrastructure needs will be replaced by operations phase infrastructure needs
Note: N/A – not applicable.					

4.6.1.6 Housing

There will be no impact to housing during the construction phase of the Project, as all construction crews and family will be housed in hotels and motels for the duration of the construction phase. The impact rating is shown in Table 4.6-7. The housing impact during the construction phase is a Class 4 impact. No mitigation measures are required.

Table 4.6-7: Housing Impact during the Construction Phase

Direction	Geographical Extent	Magnitude	Duration	Confidence	Reversibility
Neutral	Regional	Negligible	Short-term	High	Reversible
Neutral impact to housing	Construction crews and families will be housed in hotels/motels in the LSA and RSA	No impact to housing	Impacts will last 6–9 months	Housing impact based on AST's construction plan	Once construction is complete this impact is no longer present

4.6.1.7 Community Services

Impacts on community services during construction are minor as a maximum of 93 people, representing a 1.1% increase to the population of the RSA, can be supported by current community services. The impact rating is shown in Table 4.6-8. The community services impact during construction is a Class 4 impact. No mitigation measures are required.

Table 4.6-8: Community Services Impact during the Construction Phase

Direction	Geographical Extent	Magnitude	Duration	Confidence	Reversibility
Negative	Regional	Negligible	Short-term	High	Reversible
More demands will be put on community services	Impacts will be in the LSA and RSA	A maximum of 93 people will move into the RSA and some will access community services	Impacts will last 6–9 months	Impacts on community services based on AST's construction plan	Impact on community services due to construction will not be present after construction phase

4.6.2 Operations Impacts

4.6.2.1 Population

The Project will change the population of the LSA and RSA by 0–68 people. The impact rating is shown in Table 4.6-9. The population impact during the operations phase is a Class 4 impact. No mitigation measures are required.

Table 4.6-9: Population Impact during the Operations Phase

Direction	Geographical Extent	Magnitude	Duration	Confidence	Reversibility
Neutral	Regional	Negligible	Mid-term	Moderate	Permanent
Neutral impact to population	Population may move to LSA and RSA	Population change represents a maximum of 0.8% change in the RSA	Population change will be present for life of the Project	Exact level of population change is difficult to determine	Represents potentially permanent change in population

4.6.2.2 Economic Impact

The economic impact of the operations phase of the Project will be between approximately $35.5–$70.5 million/y. The impact rating is shown in Table 4.6-10. The economic impact during the operations phase is a Class 4 impact. No mitigation measures are required.

Table 4.6-10: Economic Impact during the Operations Phase

Direction	Geographical Extent	Magnitude	Duration	Confidence	Reversibility
Positive	Regional	Not Applicable	Mid-term	Moderate	N/A
The Project will have a positive impact on GDP in the LSA, RSA and Alberta	Economic impacts will occur in the LSA, RSA and Alberta	GDP of the LSA and RSA not available to determine magnitude of impact	Impacts will occur throughout the operations phase	Based on the Alberta Economic Multipliers and AST tax data	
Note: N/A – not applicable.					

4.6.2.3 Employment

Total employment throughout the Project's operations phase will be 45 people. Of these 45 people, 22 staff members will be directly employed and 23 indirect employment opportunities will be created. The impact rating is shown in Table 4.6-11. The employment impact during the operations phase is a Class 4 impact. The impact to employment will be low, but will require some planning in order to hire operations staff since levels of employment in the LSA, RSA and Alberta are very high. No mitigation measures are required.

Table 4.6-11: Employment Impact during the Operations Phase

Direction	Geographical Extent	Magnitude	Duration	Confidence	Reversibility
Positive	Regional	Negligible	Mid-term	High	Permanent
Project will add to employment in the LSA, RSA and Alberta	Employment will occur in the LSA and RSA and spin-off employment will occur elsewhere in the province	The operations phase of the Project does not add significantly to employment	Employment will be present throughout the operations phase of the Project	Based on the Project's employment needs	Impacts will occur throughout the Project's operations phase

4.6.2.4 Potential Negative Impact to Existing Businesses

Negative impacts beyond the heavy industrial zone to existing businesses are expected to be negligible. However, there is potential for a small negative impact to the agricultural industry within the land zoned for heavy industry, due to perceived health and safety risks. Health and safety concerns voiced by Canexus are being addressed through a lab study. However, should the study show there is a reaction between the sodium chlorate product it produces and sulphur, impacts to existing businesses will have to be addressed. Impacts beyond the heavy industrial zone to other industrial sectors are expected to be negligible. The impact rating is shown in Table 4.6-12. The impact to existing business during the operations phase is a Class 3 impact. No mitigation measures are required.

Table 4.6-12: Potential Negative Impact to Existing Businesses

Direction	Geographical Extent	Magnitude	Duration	Confidence	Reversibility
Negative	Local	Low to Moderate – Moderate to High	Mid-term	Low	Permanent
Negative impact to the agricultural sector, possible impact to Canexus	Site and lands zoned for industrial use in Lamont County	Operations phase expected to negatively impact agricultural sector businesses, effect on Canuxes being determined	Impacts will be present throughout the operations phase of the Project	Likelihood of this impact is difficult to determine	Impact will exist through the operations phase and possibly beyond

4.6.2.5 Housing

The Project's operations phase will require between 0–22 new dwellings to be built in the LSA and RSA. The impact rating is shown in Table 4.6-13. The housing impact during the operations phase is a Class 4 impact. No mitigation measures are required.

Table 4.6-13: Housing Impact during the Operations Phase

Direction	Geographical Extent	Magnitude	Duration	Confidence	Reversibility
Neutral	Regional	Negligible	Long-term	Moderate	Permanent
Neutral impact to housing	Housing will be required in the LSA and possibly the RSA and beyond	22 new dwellings represent a 0.8% increase in the number of dwellings in the RSA	Dwellings will exist past the operations phase of the Project	The exact number of new dwellings is difficult to determine	Housing will exist through the operations phase and beyond.

4.6.2.6 Property Value in the LSA

Throughout the operations phase of the Project, property values in the LSA will change as follows:

- industrial land is not expected to decrease in value
- property values in the buffer zone were not predicted
- effects to pricing in Bruderheim and Lamont were not predicted

The impact rating is shown in Table 4.6-14. The property value impact during the operations phase is classified as a Class 3 impact. Since AST has no control over property values in the area, no mitigation measures are possible. It should also be noted that Alberta Industrial Heartland Association does have a Voluntary Property Purchase Program in place for homes within the buffer zone or areas zoned for industrial development with the Heartland.

Table 4.6-14: Property Value Impact during the Operations Phase

Direction	Geographical Extent	Magnitude	Duration	Confidence	Reversibility
Positive, negative and neutral	Local	Low to Moderate – Moderate to High	Mid-term	Low	N/A
Direction depends on zoning and several other factors	Property values in the LSA affected	The degree of change in property value could be high	Impact to property values will be present throughout the operations phase	Confidence in property value predictions low	

Note:
N/A – not applicable.

4.6.2.7 Emergency Services

The capacity of emergency services to respond to incidents will not be significantly impacted during the operations phase. Road accidents and industrial incidents are of concern to all emergency services. However, capacity to respond to the Project during the operations phase is adequate. The impact rating is shown in Table 4.6-15. The emergency services impact during the operations phase is a Class 3 impact. AST will mitigate potential impacts on emergency services through their role in NR CAER, installing a left hand turning lane and their ERP (see Volume I: Project Description – Appendix V).

Table 4.6-15: Emergency Services Impact during the Operations Phase

Direction	Geographical Extent	Magnitude	Duration	Confidence	Reversibility
Negative	Regional	Negligible	Mid-term	Moderate	Permanent
The Project will add to the demand placed on emergency services throughout the operations phase	Emergency services will be impacted in the LSA, RSA and Fort Saskatchewan	Based on interviews with emergency services providers	Impact to emergency services will be present throughout the operations phase	Likelihood and frequency of accidents difficult to determine	Impacts will be present throughout operation phase

4.6.2.8 Community Services

The maximum population growth during the operations phase is 0.8% which community services can adequately manage. The impact rating is detailed in Table 4.6-16. The community services impact during the operations phase is a Class 4 impact. No mitigation measures are required.

Table 4.6-16: Community Services Impact during the Operations Phase

Direction	Geographical Extent	Magnitude	Duration	Confidence	Reversibility
Neutral	Regional	Negligible	Mid-term	Moderate	Permanent
Neutral impact to community services	Impacts to community services will occur in the LSA and RSA	Community services will experience negligible impact	Impact will occur throughout the operations phase	Exact pressure on community services and size of population growth difficult to determine	Impacts will be present throughout operation phase

4.6.3 Cumulative Effects Assessment

4.6.3.1 Economic Impact

The Project will spend $27.4–54.8 million/y in rail transit to send sulphur to the Port of Vancouver. The impact on rail transportation is captured somewhat through the Alberta Economic Multipliers used in the operations phase economic assessment. The Port of Vancouver will receive an estimated $10.0–20.0 million/y in wharfage fees. Spending on berthage and storage is not included in this assessment. The impact rating is shown in Table 4.6-17. The cumulative economic impact is a Class 4 impact. No mitigation measures are required.

Table 4.6-17: Cumulative Economic Impact

Direction	Geographical Extent	Magnitude	Duration	Confidence	Reversibility
Positive	Regional	Negligible	Mid-term	Moderate	Permanent
Positive economic impact on rail transit and Port of Vancouver	Alberta and British Columbia	Does not significantly impact economies of Alberta and British Columbia	Impact will occur throughout the operations phase	Exact impact is difficult to determine	Impacts will be present throughout operation phase

4.6.3.2 Population

It is expected that the development of Alberta's oil sands coupled with the five proposed upgraders moving into the Heartland will lead to an increase in the population of the LSA and RSA. However, the added presence of 0–68 permanent residents to the LSA and RSA due to the Project is not expected to add significantly to this population growth. The impact rating is shown in Table 4.6-18. The cumulative population impact is a Class 4 impact. No mitigation measures are required.

Table 4.6-18: Cumulative Population Impact

Direction	Geographical Extent	Magnitude	Duration	Confidence	Reversibility
Neutral	Regional	Negligible	Medium term	Moderate	Permanent
Neutral impact to population	Impact will be present in the LSA and RSA	Less than 1% maximum population change to the RSA due to the Project	Impact will be present throughout the operations phase	Exact population growth will be determined by several factors including upgraders and oil sand development	Impact will be present throughout the operations phase

4.6.3.3 Housing

The five proposed upgraders and development of Alberta's oils sands are expected to add to the housing demand in the LSA and RSA. The Project will require a maximum of 22 new dwellings, and therefore, is not considered to add significantly to the cumulative housing impact. The impact rating is shown in Table 4.6-19. The cumulative housing impact is a Class 4 impact. No mitigation measures are required

Table 4.6-19: Cumulative Housing Impact

Direction	Geographical Extent	Magnitude	Duration	Confidence	Reversibility
Neutral	Regional	Negligible	Medium-term	Moderate	Permanent
Neutral impact to housing	Impact will be present in the LSA and RSA	Less than 1% maximum change to the number of dwellings in the RSA due to the Project	Impact will be present throughout the operations phase	Exact demand will be determined by several factors including oil sands development, proposed upgraders and housing availability	Impact will be present throughout the operations phase

4.6.3.4 Community and Emergency Services

With the population growth expected in the LSA and RSA, demands for community and emergency services are expected to rise proportionally. However, population change of a maximum of 68 people does not add significantly to the cumulative impacts on community and emergency services. The impact rating is shown in Table 4.6-20. The cumulative community and emergency services impact is a Class 4 impact. No mitigation measures are required.

Table 4.6-20: Cumulative Community and Emergency Services Impact

Direction	Geographical Extent	Magnitude	Duration	Confidence	Reversibility
Negative	Regional	Low to Moderate	Medium-term	Moderate	Permanent
Increased demands on community and emergency services	Impact will be present in the LSA and RSA	Small cumulative impact to community and emergency services	Impact will be present throughout the operations phase	Exact demand will be determined largely by population change	Impact will be present throughout the operations phase

4.6.4 Summary Table

Table 4.6-21 summarizes the construction impacts and Table 4.6-22 summarizes the cumulative impacts.

Table 4.6-21: Summary Table of Construction Impacts

Construction Phase		
Impact	**Impact Rating**	**Mitigation**
Population	Class 4	None
Economic	Class 4	None
Employment	Class 4	None
Emergency services	Class 3	Emergency Response Plan (see Volume I: Project Description – Appendix V)
Infrastructure	Class 4	None
Housing	Class 4	None
Community services	Class 4	None
Population	Class 4	None
Employment	Class 4	None
Housing	Class 4	None
Ancillary business	Class 4	None
Potential negative impacts to existing businesses	Class 3	None
Property values	Class 3	None, Heartland Voluntary Property Purchase Program
Emergency services	Class 3	Left turn lane, Membership in NR CAER, Emergency Response Plan (see Volume I: Project Description – Appendix V)
Community services	Class 4	None

Table 4.6-22: Summary Table of Cumulative Impacts

Cumulative Impact		
Impact	**Impact Rating**	**Mitigation**
Economic	Class 4	None
Population	Class 4	None
Housing	Class 4	None
Community Services	Class 4	None
Emergency Services	Class 4	None

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Appendix I: Detailed Education Breakdown

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Table I-1: Detailed Education Breakdown

	Bruderheim	Lamont	Lamont County	Alberta
Age 20 – 34: less than high school certificate	27.8%	38.5%	N/A	18.2%
Age 20 – 34: high school certificate	22.2%	15.4%	N/A	32.2%
Age 20 – 34: trades certificate or diploma	16.7%	17.9%	N/A	11.6%
Age 20 – 34: college certificate	22.2%	20.5%	N/A	18.0%
Age 20 – 34: university diploma	11.1%	5.1%	N/A	20.0%
Age 35 – 44: less than high school certificate	27.5%	26.3%	N/A	20.3%
Age 35 – 44: high school certificate	22.5%	31.6%	N/A	23.8%
Age 35 – 44: trades certificate or diploma	15.0%	17.5%	N/A	16.4%
Age 35 – 44: college certificate	25.0%	19.3%	N/A	19.7%
Age 35 – 44: university diploma	5.0%	3.5%	N/A	19.8%
Age 45 – 64: less than high school certificate	33.9%	36.0%	N/A	26.2%
Age 45 – 64: high school certificate	19.6%	18.7%	N/A	20.1%
Age 45 – 64: trades certificate or diploma	23.2%	26.7%	N/A	15.8%
Age 45 – 64: college certificate	25.0%	13.3%	N/A	17.1%
Age 45 – 64: university diploma	-	5.3%	N/A	20.9%

Note:
N/A – not available.
Source: Statistics Canada 2006; Statistics Canada 2006a and 2006b, Internet sites.

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Appendix II: Economic Impact Methodology

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1. Economic Impact Methodology

Economic impacts are determined using the methodology outlined in the Alberta Economic Multipliers. There are three basic forms of economic impacts:

- direct impacts – impacts on industry that expand production to satisfy demand
- indirect impacts – there is a ripple effect as firms purchase inputs from other firms and/or industries to satisfy demand
- induced effects – as firms expand production, they hire staff and pay wages, thereby increasing income to employees. After taxes and wages, employees spend this income on other good and services

By using the Alberta Economic Multipliers, all three forms of impacts are captured, but within the province only. For example, only a portion of the construction material will come from within the province. Similarly, some of the labour may come from outside of the province.

The impact of paying labourers is larger than just the salaries the labourers receive. Construction staff will spend some of their salaries, pay taxes and/or put some money into savings. Similarly the economic impact from buying equipment will also include spin-off economic impacts in the province such as transport costs.

Economic impacts are not normative in nature, and a determination of whether an impact is good versus bad are not presented through this model. Rather, the Alberta Economic Multipliers methodology is an input-output model that attempts to project the total impact of an action or policy based on its capital inputs and outputs. Methodological limitations of such a model are discussed in Section 5.6.

1.1 Example

A wood mill will cost $5 million to construct in Alberta – $4 million for the goods and services associated with the plant, and $1 million for goods and services associated with the plant's machinery and equipment. The plant is projected to have annual sales of $3 million.

Since this project involves the construction of a plant, the ratio for non-residential construction is appropriate:

GDP at Basic Prices	Labour Income	Employment 2002	Employment 2005	Gross Output
0.675	0.521	0.092	0.083	1.663

Therefore:

GDP at basic prices would increase by 0.675 x $4 million = $2.7 million

Labour income would increase by 0.521 x $4 million = 2.1 million

Machinery and equipment is calculations would use the machinery and equipment multipliers:

GDP at Basic Prices	Labour Income	Employment 2002	Employment 2005	Gross Output
0.637	0.307	0.055	0.051	1.369

Therefore:

GDP at basic prices would grow by 0.637 x $1 million = $637,000

Labour income would rise by 0.307 x $1 million = $307,000

Since this plant is a wood mill the ratios for lumber and wood products are used:

GDP at Basic Prices	Labour Income	Employment 2002	Employment 2005	Gross Output
0.640	0.336	0.072	0.070	1.600

Therefore:

GDP at basic prices would grow by 0.640 x $3 million = $1.9 million

Labour income would grow by 0.336 x $3 million = $1 million

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Appendix III: Economic Impact – Methodological Limitations

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1. Economic Impact – Methodological Limitations

- The relationships of input-output models are simple proportionalities which imply that marginal changes are equal to average changes. This feature makes input-output models convenient to use. Proportional relationships may not always present, even if they are represented as such by the Multipliers. Therefore economies or diseconomies of scale cannot be represented.
- Increases and decreases show the same proportional impact whereas, in reality, the disappearance of a particular expenditure does not generate a slowdown in the economy equal to its total economic impact, unless all funds originate from abroad. This is because at least some of the amount saved will be re-injected into the domestic economy.
- Input-output models are static models – time is not explicitly represented. Input-output methodology measures the total economic impacts on major economic variables after an exogenous event has taken place. The model does not calculate the amount of time required for the propagation of all effects.
- Input-output models are exclusively flow models and stocks are not represented. Indeed, the introduction of the concept of stocks would require explicit representation of time. As a result, it is necessary to assume that all intermediate goods can be produced without additions to capital stock.
- Supply and demand factors cannot be handled simultaneously. Implicit in input-output models is the assumption that supply is perfectly elastic. Thus, any increase in demand for goods and services would lead the producing industries to increase their output by an equal amount to satisfy that demand. It is also assumed that these producing industries have no difficulty in obtaining the necessary inputs for their new level of output. These inputs include not only the intermediate inputs of domestic goods and services but also labour and imports. If a shortage or bottleneck of economic resources develops in one or more sectors, this may precipitate inflationary activity (i.e. relative price changes), substitution effects or changes in import proportions. Any one of these results could subsequently change the overall economic impact.
- Another basic assumption is that all industries are operating at full capacity with regard to employment. Hence, any increase in output would require a further proportional demand for labour services. This assumption implies that no industry will meet a new demand for its goods and services with its existing labour force. Therefore, the employment level in the economy is assumed to change in proportion to the increased output in each industry.
- Although input-output analysis incorporates the provincial economic structure and linkages, it often ignores any economic displacement that may occur in existing industries as new projects are completed. Economic gains in these new projects should be tempered by an estimation of subsequent contractions or losses in existing plants or industries. Further contraction effects on economic activity may result from the recovery of funds used to finance a particular project, either through increased taxation or repayment of borrowed capital. Any displacement effects arising from financing a project should be taken into account in an overall project cost-benefit analysis.
- Input-output models do not consider the nature of the expenditure, its social impact, nor the externalities that may be generated. Hence, one cannot conclude about the social/economic profitability of an investment solely on the basis of the results provided by input-output simulations.
- The industrial structure and linkages are based on 2001 preliminary data. The choice of year was dictated by the availability of provincial statistics and the database developed by Statistics Canada for the Canadian Interprovincial Model. Use of this data base implicitly assumes that the technology of producing goods and services, input patterns

and the relative prices of various goods and services remain unchanged from values in the base year of 2001. It further assumes that there are no new products that might require a different production technology or input mix.

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Appendix IV: Planned Upgraders for the Heartland

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1. Planned Upgraders for the Heartland

The following five upgraders are planned for the Heartland:

- BA Energy Heartland Upgrader
- Fort Hills Energy Sturgeon Upgrader
- North West Upgrading
- Northern Lights Upgrader
- Shell Scotford Upgrader Expansion

BA Energy Inc., a subsidiary of Value Creation Inc., is already moving forward with its Strathcona County project. Site work started in 2005, with three phases of construction planned for the period between 2006 and 2012. The projected startup date for Phase I is 2008 with production of 77,500 b/d (barrels per day).

The Fort Hills Energy Upgrader, to be located in Sturgeon County, is scheduled to have its first phase online in 2011 and will process 170,000 b/d of bitumen. The supply will come from the Fort Hills oil sands mine, 90 km north of Fort McMurray. Additional phases could increase production to between 350,000–400,000 b/d for Fort Hills Energy Corp., a partnership between Petro-Canada (55%), UTS Energy (30%) and Teck Cominco (15%).

By 2010, North West Upgrading's facility, immediately west of Agrium's fertilizer operation in Sturgeon County, will bring a capacity of 50,000 b/d of bitumen onto the market in its first phase. Two additional phases are projected, increasing that amount to 250,000 b/d. The Foundation Energy and Northwest Investment Trust project's initial capital costs are estimated at more than $2.4 billion for the first phase.

1.1.1 Expected Upgraders in the Heartland

The Northern Lights Upgrader, also set for the Sturgeon County portion of the Heartland, will take bitumen from the Northern Lights Oilsands project. Plans call for production of 50,000 b/d by late 2010, rising a further 50,000 b/d in another two years. The upgrader was announced in late 2005 by Synenco Energy, in conjunction with its partner SinoCanada Petroleum Corp., the Canadian subsidiary of China-based Sinopec International Petroleum Exploration and Production Corporation.

Shell's Scotford Upgrader expansion program will bring production levels to 500,000 b/d and also enable it to process the production stream into lighter, higher value crude blends. Construction is planned for the 2006–2010 period. The expansion also includes a third hydro-conversion unit and associated utilities at the Scotford site near Fort Saskatchewan. Investors are Shell Canada, Chevron and Western Oil Sands at a cost of $2.5 billion.

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WorleyParsons Komex

resources & energy

Alberta Sulphur Terminals Ltd.
Bruderheim Sulphur Forming and Shipping Facility

Volume IID – Land, Historical, Socio-Economics and Consultation

5. Public Consultation

Project Number 62720000
June 2007

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APPENDICES AVAILABLE AT WWW.HAZCO.COM

Executive Summary

Alberta Sulphur Terminals Ltd. (AST), a division of HAZCO Environmental Services (HAZCO), which in turn is a division of CCS Income Trust (CCS), has conducted an extensive Environmental Impact Assessment (EIA) public consultation program for the proposed Bruderheim Sulphur Forming and Shipping Facility (the Project). WorleyParsons Komex and RMC & Associates supported AST in the development and implementation of the public consultation program. The overall goals of the program were to:

- provide an opportunity for potentially affected parties to become informed about the Project, EIA and provide input as appropriate
- address specific stakeholder information and consultation needs, particularly given the level of stakeholder concerns, issues and questions about the Project
- facilitate community input for Project design and development
- meet or exceed the Natural Resources Conservation Board (NRCB), and Alberta Environment (AENV) regulatory and filing requirements
- meet the Terms of Reference (TOR) for the Project (AENV 2007)

Specifically, the TOR state that:

AST shall undertake a consultation program during the preparation of the EIA report and within all of the communities, in the Study Area.

Describe and document in detail the public consultation program implemented with respect to the Project, record any concerns or suggestions made by the public and demonstrate how these concerns have been addressed, including:

a) the type of information provided and the issues discussed, differentiating between those which have been resolved and any outstanding issues;

Although consultation activities were conducted before the EIA phase, AST launched a formal public consultation program in June 2006 during preparation of the EIA. The program was developed to meet both regulatory requirements and stakeholder expectations. It involved key stakeholder groups (including landowners, occupants, non-governmental organizations, elected officials and service providers) and the neighbouring Towns of Lamont and Bruderheim. The public's concerns and suggestions were documented by AST throughout the course of the consultation program. AST also made efforts to address concerns throughout the EIA process.

The methods of communication and type of information provided are as follows:

1. **Open house, June 6, 2006**: the purpose of the open house was to provide information about AST, HAZCO, CCS, the Project and EIA process. Questions raised by the public were answered in an open public forum.

2. **Information mail-out, October 26, 2006**: an information package was mailed to all stakeholders. It included a cover letter; Public Disclosure Document; Draft TOR; Stakeholder Comments and Concerns; and Q&A sheet concerning the EIA process.

3. **One-on-one interviews with stakeholders within 1.5 km of the Principal Development Area (PDA**): landowners (including industry), residents and occupants within 1.5 km of the PDA (located in a portion of Section 35-55-20-W4 in Lamont County) were contacted in-person with a personal interview. Those not available for a personal meeting were interviewed by phone. The

aim of the personal interviews was to discuss and document stakeholder concerns, answer questions concerning the Project and TOR and record stakeholders' recommendations regarding how the longer-term consultation process should be structured. The personal interviews were extensively documented and a copy of the conversation was provided to each stakeholder.

4. **One-on-one interviews with local government officials and service providers**: these people were met in person and/or contacted by phone and email to discuss and document their concerns, answer questions concerning the Project and TOR and record recommendations regarding how the longer-term consultation process could be structured. In addition, they were updated on activities and current plans with respect to consultation plans and regulatory filings. Service providers included professionals in the public service sector who could be impacted by the Project, such as the fire departments, RCMP, ambulance services and school board trustees.

5. **Individuals residing beyond 1.5 km but within 5 km of the PDA who expressed formal objections and/or interest in the Project**: residents beyond 1.5 km, but within 5 km of the PDA, who had initiated a formal notice of objection to the Project and/or expressed interest in the Project, were contacted by phone with the same objectives as stated above (3 and 4). Their concerns and questions were documented. Efforts were made to responds to questions and concerns.

6. **Project objectors, petition signers and/or those who expressed formal objections or interest in the Project who reside beyond 5 km of the proposed PDA**: formal objectors and petition signatories as well as other interested parties who were not captured within the three above-noted groups were contacted by phone with the same objective as the groups above. They were added to the mailing list for future communications. Their concerns and questions were documented, and efforts were made to respond to them.

7. **Newsletter – Volume 1, December 2006**: during the above consultation process of one-on-one and phone interviews, many individuals expressed interest in being updated on the Project by newsletter. The first issue was mailed to all stakeholders in December 2006.

8. **AST/Community EIA Consultation Committee Meeting, January 31, 2007**: the possibility of forming a community group to enhance communication on the EIA process was presented to stakeholders during the interviews and phone calls. Individuals who expressed interest were polled for the most convenient date, time and location for the initial meeting. Facilitated by RMC & Associates, the AST/Community EIA Consultation Committee meeting was held the evening of January 31, 2007 at the Lamont Recreation Centre.

9. **Newsletter – Volume 2, March 2007:** a second information newsletter was mailed March 5, 2007 to all stakeholders.

10. **AST/Community EIA Consultation Committee Meeting, April 3, 2007:** a second 'working group' meeting was held with interested stakeholders to collectively develop ideas and recommendations for AST regarding the mandate, structure and operating norms for a community committee to enhance communication regarding the Project.

11. **AST & Community Committee Meeting, May 3, 2007:** The purpose of the meeting was to determine which issues the committee would address first.

12. **AST & Community Committee Meeting, June 7, 2007:** The purpose of the meeting was to review and finalize the proposed air-related work plan and to identify the best process to distribute air-related information to the broader community.

The TOR requested that AST report on the type of information provided and the issues discussed, differentiating between resolved and outstanding issues. Table ES-1 lists the issues and concerns

identified in the public consultation process, the measures AST will take to mitigate them and the corresponding section of the EIA in which they are addressed.

Table ES-1: AST Measures to Address Stakeholder Issues

Stated Issues	AST Measures to Address Issues: EIA Section Cross-reference
1. Negative impacts on water in terms of quality and/or quantity	Detailed evaluations of potential impacts to surface and ground water are provided in Volume IIB, Section 2: Groundwater Quantity and Quality; Section 3: Surface Water Quantity; and Section 4: Surface Water Quality. Potential for impacts to surface water quality will be effectively mitigated by collecting, containing and using runoff from the sulphur processing area that could be impacted by elemental sulphur. The runoff water collected and used in this manner represents only a minor proportion of runoff in the catchment area; hence, the potential impact to surface water quantity is insignificant. Potential impacts to groundwater quality will be effectively mitigated by double-lining all sulphur and chemical storage and water containment facilities. These facilities will also be equipped with leak detection capability. Groundwater will be used to provide make-up water for cooling. The yield of the aquifer beneath the Site is marginal relative to the Project's needs. Detailed monitoring of groundwater withdrawal will be implemented to identify potential impacts to adjacent groundwater users. If unacceptable impacts are observed, groundwater diversion will be stopped and an alternative water supply (Lamont County Water Utility) will be used.
2. Air contamination and sulphur dust	Potential air quality impacts are evaluated in Volume IIA, Section 2: Climate and Air Quality. Analysis included assessment of H_2S, SO_2, NO_x, particulate, etc. under normal and emergency operating conditions. These evaluations concluded that all parameter concentrations remain below 10% of the AAAQO at the fence line of the Site. Potential impacts to soil pH associated with elemental sulphur dust are predicted to be confined to the area immediately surrounding the process facilities and to the Site proper. Potential impacts related to fugitive sulphur dust are effectively mitigated by implementing good management practices, using sulphur dust suppressants and selecting forming technology that minimizes the generation of dust. Potential for air emissions is mitigated by treating air vented from liquid sulphur storage tanks and transfer points and implementing best safety and site management practices, including reliable emergency response capability.
3. Increased road traffic	A traffic study completed to support the Project (Volume I: Project Description, Appendix III) concludes that impacts to traffic volume are relatively minor in comparison to current and predicted traffic volumes. An upgrade to the intersection of Highway 15 and R.R. 202 was recommended and will be implemented as part of Project construction.
4. Impact on land values	Potential impacts to land values were evaluated as part of Volume IID, Section 4: Socio-Economic Assessment. This evaluation found that the Project is not expected to decrease land values in the area already zoned for heavy industrial use. It was not possible to project land values in the buffer zone or Towns of Bruderheim and Lamont. Some interviewees voiced concerns about the potential for a decrease in land values, especially for areas in the buffer zone. Land in the buffer zone is also subject to the Alberta Industrial Heartland's Voluntary Property Purchase Program and landowners in the area have the potential, where appropriate, to receive fair value for their land if they choose to move as a result of the Project.
5. Sulphur fires/ Emergency Response Plan (ERP)	Potential for sulphur fires and related emergency response planning is addressed in Volume I, Appendix V: Emergency Response Plan. While the risk of sulphur fires exists, sulphur burns very slowly and can be easily extinguished. The consequences of typical sulphur fires are not significant. The potential impacts of sulphur fires are best managed by developing and maintaining vigilant fire monitoring and response capability. AST will belong to NR CAER, the emergency response cooperative of industries operating in the Industrial Heartland.

Table ES-1: AST Measures to Address Stakeholder Issues (Cont'd)

Stated Issues	AST Measures to Address Issues: EIA Section Cross-reference
6. Impact on human health	Public Health and Safety (Volume IIA, Section 4) concludes no unacceptable risks to human health occur during either normal operating conditions or sulphur fires. The primary human health risk occurs during sulphur fires (see above) and is associated with SO_2 emissions. These risks will be mitigated by diligently monitoring for fires, H_2S and SO_2; implementing an effective Health and Safety Plan (see Appendix IV of Volume I); and by the implementation and maintenance of effective fire detection and response capabilities (see Item 5).
7. Soil contamination	The primary risk of soil contamination is associated with deposition of fugitive sulphur dust. Volume IIC, Section 2: Soil concludes that significant impacts to soil quality will be limited to the Site and area immediately surrounding the facility. Mitigation will include minimizing fugitive sulphur dust emissions (see Item 2 above), monitoring and, if necessary, neutralizing potential soil acidity.
8. Impact on health of livestock	No impacts to domestic livestock are anticipated. According to Volume 2A, Section 2: Climate and Air Quality, all air emission concentrations of chemicals of potential concern are well below the threshold of concern for human health. Therefore, the concentrations are not expected to harm domestic stock. Sulphur compounds do not bioaccumulate and are not a concern from the perspective of ingestion by livestock. As well, no significant impacts to water quality are anticipated and, therefore, no ingestion concerns are anticipated. Results of The Caroline Livestock Study (Waldner 2004, Internet Site) indicate that the average herd health of 1300 cattle monitored between 1991 and 2003 in the Caroline sour gas plant area did not change after sour gas plant operations began in 1991. A second study, conducted by the Western Inter-Provincial Scientific Studies Association (WISSA) found few associations between oil and gas facility emissions and the overall health of cattle (WISSA 2006, Internet Site). The WISSA study collected and analysed data from 33,000 cattle in Alberta, Saskatchewan and northeast British Columbia. Based on the findings of these studies and the results of the air quality modelling presented in Volume IIA, Section 2: Climate and Air Quality, no impacts on livestock are expected due to the Project.
9. Increased rail traffic and decreased safety	According to Volume I, Appendix III: Traffic Impact Assessment, the increase in rail traffic outside of the Site and the potential for safety issues related to rail traffic is not significant. During peak operations, one daily liquid sulphur train and one formed sulphur train every two days are anticipated.
10. Sulphur blocking will happen in the future	In response to this public concern, AST's initial intention to block sulphur was removed from the Project design. Sulphur blocking is not included in this Application and it is not AST's intention to implement sulphur blocking at this Site now or in the future. Any plans to block sulphur would require a separate application, public consultation and approval under EPEA (see Volume I, Section 3.1.1). Should sulphur markets deteriorate to the extent that sulphur marketing is no longer viable, the Bruderheim facility could reduce its operations or become idle. AST has the financial and operational capability to operate, expand or idle the facility as market conditions demand (see Volume I, Section 2.4.4).
11. Sulphur smells	Potential for odours associated with the Project were evaluated in Volume IIA, Section 2: Climate and Air Quality. It concluded no unusual or obnoxious sulphur odours are expected outside of the boundaries of the Site.
12. Inadequate Emergency Response Plan (ERP)/ Project proximity to Bruderheim and Lamont	The ERP (Volume I, Appendix V) was reviewed and approved by a local emergency response expert and complies with the requirements of EUB Directive 071: Emergency Preparedness and Response Requirements for the Upstream Petroleum Industry. Further, AST will become an active member of NR CAER, an emergency response cooperative of industrial operators in the Industrial Heartland.
13. Lack of trust in AST	AST continues to implement its public consultation program as detailed in Volume I and Volume IID, Section 5: Public Consultation. A public consultation committee has been established to improve communication, establish trust with the local community and facilitate public input into the Project's design and operation.
14. Impact on wildlife	Volume IIC, Section 4: Wildlife and Section 5: Biodiversity addresses potential impacts to wildlife, which are expected to be minor. The area's primary natural feature, the wetland in the northwest corner of the Site, will be conserved as part of the Project.

Table ES-1: AST Measures to Address Stakeholder Issues (Cont'd)

Stated Issues	AST Measures to Address Issues: EIA Section Cross-reference
15. Negative visual impact	According to Volume IIA, Section 3: Noise and Light, the proposed facilities are relatively low lying (maximum height 15 m) and set back a considerable distance from access roads and rural residences (500 m from the nearest residence). They occupy a maximum of 3% of the field of vision above the horizon (assuming flat ground and unimpeded view). Visibility is also reduced by shrubs and trees surrounding the Site. Further development of trees and natural visual buffers is possible if specific views are compromised.
16. Light pollution	The facility will operate 24 hours/day and will be lit to allow nighttime operation, resulting in a light impact similar in nature to the Canexus chlorate plant located to the southwest of the Project. Light associated with the Project will diminish with distance through adsorption and dissipation and will be directed into the process area (rather than the surrounding ground). Vegetation and buildings will also act as barriers to light travel.
17. Lamont County will become a hazardous waste area	No hazardous wastes will be generated by the Project.
18. Increased noise	The predicted sound levels of the Project alone are well below EUB permissible sound levels (PSLs) and will remain below the PSLs even when transportation sources are added. AST will investigate any noise concerns expressed by surrounding residents.
19. Overall loss of farmland to industry in the area	Volume IID, Section 2: Land Use and Reclamation assesses land use in the area and the Project's impacts on land use. The Project will result in a small reduction in agricultural land in the area, but the reduction is limited to lands zoned for industrial use and farmland that, on balance, is rated as poor quality.
20. Impedes future economic development	The socio-economic and social impacts associated with the Project are assessed in Volume IID, Section 4: Socio-Economic Assessment. There is no evidence the Project's development has the potential to impede future economic development.
21. Negative impact on vegetation	Potential impacts to vegetation are addressed in Volume IIC, Section 3: Vegetation. Vegetation in the potentially impacted area surrounding the PDA will be protected as a result of the proposed soil monitoring and mitigation program described in Vegetation and in Items 2 and 7. The results of the monitoring programs will be evaluated to determine if modifications to mitigation plans are required to reduce impacts. Additional mitigation steps will be taken to reduce the potential for establishment of noxious weeds that may occur as part of the industrial development.
22. Ensure AST complies with regulatory standards, including highest Safety and Environmental Stewardship standards	AST/HAZCO intends to comply with all regulatory standards and has demonstrated its commitment through the compliant operation of more than 20 industrial facilities in Alberta.
23. Possible hazardous effects of mixing sulphur with chlorate	Testing is underway to compare the potential reactivity of sulphur and chlorate to that of other common organic particulates. Results will be reported to the NRCB and AENV independently, and communicated to interested stakeholders.
24. Concern over AST's public relations in the area	AST continues to implement its public consultation program as detailed in Volume I and Volume IID, Section 5: Public Consultation. A public consultation committee has been established to improve communication, establish trust with the local community and facilitate public input into the Project's design and operation.
25. Adequate use of local labour	The Project will employ an estimated 22 people during the operations phase. AST has stated that local labour is preferred and will be given primary consideration for employment, providing work quality and safety are not compromised.
26. Construction quality	AST will follow standard engineering practices.

Table ES-1: AST Measures to Address Stakeholder Issues (Cont'd)

Stated Issues	AST Measures to Address Issues: EIA Section Cross-reference
27. Tax revenue and benefits for the County	Projected taxes on AST assets are approximately $460,000 with an estimated $388,128 in municipal taxes, $62,387 to the Alberta School Foundation and $9,562 to the County of Lamont Foundation.
28. Plant location not appropriate due to its proximity to two towns and rural populations; should be a remote area	Although Lamont County is largely an agricultural area and the proposed AST facility is near the Towns of Lamont and Bruderheim, the facility will be located in a zone approved by the County for heavy industrial use. The facility's proximity to the Towns of Lamont and Bruderheim and the rural population is addressed in AST's ERP (Volume I, Appendix V) and Item 5 above.

b) the key alternatives which have been identified by AST and stakeholders in the consideration of unresolved issues; and,

AST has implemented significant changes in response to issues and concerns raised by stakeholders, as follows:

- temporary sulphur blocking has been removed from the Project scope
- air emissions from tank vents and transfer points will be treated to remove residual hydrogen sulphide, should it be present
- truck traffic to and from the facility will be limited to specific periods to reduce nighttime noise and its related disturbances to nearby residents
- the AST/Community EIA Consultation Committee has been established to improve communications and increase trust between AST and stakeholders

c) any plans for ongoing consultations.

The AST & Community Committee has been established. It is anticipated that this committee will continue to operate throughout the duration of the EIA process. It is likely that more newsletters will be mailed to stakeholders to provide current information concerning the Project. In addition, information will be posted on AST's website.

5. Public Consultation

5.1 Introduction

Alberta Sulphur Terminals Ltd. (AST), a division of HAZCO Environmental Services (HAZCO), which in turn is a division of CCS Income Trust (CCS), has conducted an extensive Environmental Impact Assessment (EIA) public consultation program for the proposed Bruderheim Sulphur Forming and Shipping Facility (the Project). WorleyParsons Komex and RMC & Associates supported AST in the development and implementation of the public consultation program for the EIA. The consultation team met on a regular basis to coordinate consultation activities and review information needs, commitments and actions required to address public concerns and issues.

Although consultation activities were conducted before the EIA phase, a more formal public consultation program was initiated in June 2006. It consisted of a variety of consultation methods, including an open-house, information mail-outs, one-on-one interviews, telephone interviews, e-mail correspondence, newsletters, community meetings and the formation of a community consultation committee.

The overall goals of the public consultation program were to:

- provide an opportunity for potentially affected parties to become informed about the Project and EIA process and provide input as appropriate
- address specific stakeholder information and consultation needs, particularly given the level of stakeholder concerns, issues and questions about the Project
- identify input for decisions in Project design
- meet or exceed Natural Resources Conservation Board (NRCB) and Alberta Environment (AENV) filing requirements

This report provides a brief background section to contextualize the public consultation program. Pre-EIA public consultation activities are summarized. Phases I and II of the formal EIA consultation program design are described and a summary of consultation activities, analysis of findings and description of the anticipated ongoing consultation program is provided. Supporting documentation can be found in Appendices I through V on the HAZCO website (www.HAZCO.com – click on the Alberta Sulphur Terminals link).

5.2 Project Background

5.2.1 Brief Project Description

The proposed Project will process sulphur generated by the oil and gas industry and include the following facilities:

- molten sulphur unloading, transfer and storage facilities
- rail and road access for receiving and shipping sulphur
- sulphur forming facilities to produce sulphur pastilles
- loading and shipping facilities for formed sulphur
- a sulphur pastilles temporary storage area

Liquid sulphur will be received by truck, rail tank car or future pipeline and will be stored in insulated, heated tanks before being pumped to the forming process. AST plans to use environmentally friendly technology, provided by Sandvik Process Systems, to process the liquid sulphur into a solid formed product (pastilles) that is suitable for export. The product will be stored on engineered storage pads and loaded onto rail car unit trains on a regular basis.

The Principal Development Area (PDA) and footprint for the Project will be located in a portion of Section 35-55-20-W4M (the Site) in Lamont County, 63 km northeast of Edmonton. The County is bordered by Elk Island National Park to the south, Beaverhill Lake to the southeast and the North Saskatchewan River to the north. Lamont County consists of three towns (Bruderheim, Mundare and Lamont), two villages (Andrew and Chipman) and three hamlets (Star, Wostok and Hilliard).

The Project is approximately 2.2 km east of the Town of Bruderheim and approximately 6 km northwest of the Town of Lamont. Although Lamont County is largely an agricultural area, the County also has a zone that is designated for heavy industrial use. The Project is located within this zone, in the Industrial Heartland of Lamont County (see Section 5.2.2 below).

For a more detailed description of the Project, see Volume I: Project Description.

5.2.2 Industrial Heartland

The Alberta Industrial Heartland (Heartland) consists of Strathcona County, City of Fort Saskatchewan, Sturgeon County and Lamont County. In September 1999, the counties and Fort Saskatchewan coordinated their regional growth and development plans with a mandate to ensure:

- effective land-use development for the next 25 years
- safe and environmentally sound development
- continued growth and diversity in the region to sustain its economic viability
- local industrial growth in a safe, consistent, coordinated manner

Approximately 330 km^2 in the three counties and Ft. Saskatawan have been zoned for industrial and heavy industrial use. Over $11 billion in petroleum, petrochemical and chemical processing facilities have been established in the area to date and the Heartland is now home to one of Canada's largest concentrations of petroleum, refining, petrochemical and chemical processors. The proposed Project falls in an area that has been zoned for heavy industry within Lamont County as part of the Heartland's Area Structure Plan (Alberta's Industrial Heartland 2006, Internet site).

5.3 Characteristics of the Project Area

A sizable portion of the population in Lamont County lives in rural or semi-rural settings. According to the most recent census (2001), the population of Lamont County is 8,473. The Town of Lamont is the largest population centre in the County, with a population of 1,692 people (StatsCan 2001). Bruderheim has a population of 1,202 people.

The population breakdown for Lamont County is shown in Table 5.3-1.

Table 5.3-1: Lamont County Population Breakdown (2001)

Community	Type of Community	Population: 2001
Rural/semi-rural county residents	Rural/semi-rural/hamlet	4,167
Andrew	Village	485
Mundare	Town	653
Chipman	Village	247
Lamont	Town	1,692
Bruderheim	Town	1,202
Improvement District No. 13	Improvement District	27
Total		**8,473**
Source: Statistics Canada 2001.		

A more detailed description of the demographics of Lamont County is found in Volume IID, Section 5: Socio-Economic Assessment (i.e., housing, education, services, infrastructure, labour force and employment).

5.4 Pre-EIA Public Consultation Program

Consultation activities were initiated by AST prior to the formal EIA process, from May 2005 – June 2006. The main goals during this period were to provide information to the public about the Project and initiate discussions with key stakeholders. Activities included:

April 2005:

An information brochure entitled Proposed HAZCO Bruderheim Sulphur Management Facility was published. It provided a Project overview and company contacts and was used in subsequent consultation activities.

May 2005:

AST initiated the public consultation process by making a presentation to the County Council on May 10, 2005. In addition, AST contacted neighboring landowners, residents and occupants by phone and in one-to-one meetings. A local meeting with 21 stakeholders was held on May 17, 2005 in a local landowner's barn. During these meetings, the details for the proposed AST facility were discussed.

June 2005:

An open house was held on June 21, 2005 in Bruderheim and 63 people attended. The forum consisted of story boards, with AST personnel available to answer questions on a one-on-one basis (for information on the presentation, see Appendix I on the HAZCO website at www.HAZCO.com – click on the Alberta Sulphur Terminals link).

August–November 2005:

An information package was mailed to those who attended the open house. In addition, the package was posted on the HAZCO website. The information package included:

- April 2005, 2005 Brochure (Proposed HAZCO Bruderheim Sulphur Management Facility)
- Project overview pamphlet with a brief summary of environmental controls (including air, soil and water quality, traffic, noise levels and facility safety)

- comprehensive Q and A information sheet which responded to questions frequently raised by stakeholders

The information package was updated on a regular basis throughout the four months.

September 2005:

A local HAZCO office was opened in the Town of Lamont on September 14, 2005 and staffed by a local project administrator to provide information to stakeholders, conduct public consultation and provide overall administrative support to the Project.

November 2005:

An open house was held in Lamont on November 17, 2005. The forum consisted of story boards for viewing in the late afternoon and early evening. This provided individuals with an opportunity to have one-on-one discussions with Project personnel. In the evening, slide presentations were made by:

- Don Friesen, President of HAZCO
- Dr. Peter Clark, Technical Manager for Alberta Sulphur Research Ltd.
- Rob Mann, Project Manager and Sulphur Specialist, AST
- Corey Higham, Senior Environment and Regulatory Planner, CCS
- Dr. Doug Leahey, Air Quality Impact Specialist, DM Leahey & Associates Ltd.
- Paul Kaethler, Project Engineer, CCS

The open house was moderated by John Szumlas (Activation Analysis Group Inc.). Topics discussed included HAZCO's corporate profile, community involvement, sulphur chemistry, world sulphur markets, sulphur uses, Lamont County (Bruderheim) Project, logistical information, agricultural benefits, AENV regulatory process, Project overview, regulatory update, air quality and CCS Energy Services Ltd.

Approximately 129 people attended the open house.

May 2005–June 2006:

Throughout the pre-EIA phase, stakeholder concerns and comments were communicated in numerous ways:

- formal written letters and e-mails were sent to AENV and AST
- verbal comments were received and documented by AST during open houses and public meetings
- personal meetings were conducted between AST staff and local residents, community groups and elected officials

These comments and concerns were voiced by the following stakeholders: area residents and landowners, adjacent industries, local community groups, local government representatives, service providers and concerned and interested citizens of Lamont County. AST responded to each stakeholder's letter in writing and each response letter addressed the individual concerns of the stakeholder.

The main concerns voiced by Lamont County residents, groups and elected officials during the pre-EIA phase were:

- potential human health effects of the AST facility
- emergency response capability
- clarity and definition of Project scope
- nature and extent of air emissions
- potential social impacts and land value concerns
- general impact on ecology and wildlife
- water quality and potential impacts on aquatic life
- sight, noise and light pollution
- sulphur deposition and its impact on vegetation
- potential health impact on domestic animals
- site suitability and traffic
- corporate capacity and capability

The consultation process leading up to the EIA phase was characterized by vocal, organized opposition on the part of local residents and the formation of a local group known as the Friends of Lamont County (formally known as the Friends of Lamont County for Responsible Industrial and Community Development), who have led an organized opposition to the Project.

5.5 Phase I: Public Consultation Program

The EIA public consultation program was divided into two phases: June 2006–December 2006 and January 1, 2007 to the present. Phase I consisted of all activities that met the Project needs and goals and fulfilled regulatory requirements. Phase II, discussed in Section 5.6, consists of the follow-up activities that have resulted from Phase I, including the formation of the AST & Community Committee.

This section provides details about the regulatory requirements, stakeholder groups and consultation activities conducted in Phase I.

5.5.1 Public Consultation Program Regulatory Requirements

The consultation program was designed according to the unique characteristics of the communities and the level of existing stakeholder issues and concerns. It was also designed to meet regulatory requirements and expectations. A review of both AENV and NRCB consultation requirements was conducted.

The consultation program was also designed to meet the TOR for the Project (AENV 2007). Specifically, the TOR states that:

AST shall undertake a consultation program during the preparation of the EIA report and within all of the communities, in the Study Area.

Describe and document in detail the public consultation program implemented with respect to the Project, record any concerns or suggestions made by the public and demonstrate how these concerns have been addressed, including:

a) the type of information provided and the issues discussed, differentiating between those which have been resolved and any outstanding issues;

b) the key alternatives which have been identified by AST and stakeholders in the consideration of unresolved issues; and,

c) any plans for ongoing consultations.

In addition to meeting AENV and NRCB requirements, the consultation team took into consideration the requirements and expectations laid out in Alberta Energy and Utilities Board (EUB) Directive 056: Energy Development Applications and Schedules, in particular Section 2: Participant Involvement and Table 5.1: Facility category type and minimum consultation and notification requirements.

5.5.2 Public Consultation Program Goals

During the EIA phase, AST engaged WorleyParsons Komex and RMC & Associates Ltd. to conduct a formal public consultation program. The objective was to ensure local area residents were adequately informed about the Project and given the opportunity to provide both feedback on the Project and input into evaluating the environmental and socio-economic impacts of the AST facility. The public consultation program goals were to:

- fulfill regulatory requirements and, where possible, surpass them
- notify all potential stakeholders about the Project and EIA process and provide an opportunity to participate in a manner appropriate to their needs and interests
- provide clear and pertinent information about the Project and EIA process to facilitate informed stakeholder feedback
- provide a variety of communication methods to make information readily available to stakeholders and interested parties
- enhance the relationship between AST and stakeholders
- initiate processes to facilitate the resolution of issues and concerns by residents
- build confidence with regulators, elected officials, stakeholders and non-governmental organizations.

In order to achieve these goals, the EIA public consultation program was initiated in June 2006 and is still in progress. It has included:

- an open house
- one-on-one interviews
- phone call interviews
- newsletters
- information from the local AST office
- e-mail correspondence
- community meetings resulting in the formation of the AST & Community Committee
- posting of information on the HAZCO website

5.5.3 Stakeholder Identification

Based on AENV practice and EUB guidelines, the public consultation program during the EIA phase identified the following stakeholder groups:

- landowners and occupants, including businesses and industries, within 1.5 km of the PDA
- local elected officials and service providers
- individuals residing beyond 1.5 km but within 5 km of the PDA who expressed formal objections and/or interest in the Project
- objectors, petition signers and those who expressed formal objections or interest in the Project residing beyond 5 km of the PDA (for the purpose of this report, the stakeholder group and individuals living beyond 1.5 km but within 5 km were treated the same)

5.5.4 EIA Public Consultation Activities

The following is a brief summary of the approaches developed to meet anticipated stakeholder requirements and expectations. More detailed information and analysis of these activities is found in Sections 5.5.6–5.5.10.

1. Open house – June 6, 2006: provided information about AST, HAZCO, CCS, the Project and EIA process.
2. Information mail-out – October 26, 2006: an information package was sent to identified stakeholders and included:
    - stakeholder cover letter
    - Public Disclosure Document
    - Draft EIA Terms of Reference
    - Stakeholder Comments and Concerns
    - Q & A sheet concerning the EIA process
3. One-on-one interviews with stakeholders within 1.5 km of the PDA: landowners (including local industry), residents and renters within 1.5 km of the PDA were contacted in person with a one-on-one visit. Those not available for a personal meeting were interviewed by phone. The aim of the personal interviews was to discuss and document stakeholder concerns; answer questions concerning the Project and the Draft TOR; and record stakeholders' recommendations regarding how the longer-term consultation process should be structured. The one-on-one meetings were extensively documented and a copy of the conversation was provided to stakeholders.
4. One-on-one interviews with elected officials and service providers: representatives were met in person or contacted by phone and/or e-mail to discuss and document their concerns, answer questions concerning the Project and Draft TOR and record recommendations for how the longer-term consultation process should be structured. In addition, they were updated on activities with respect to consultation plans and regulatory filings. Key service providers included professionals in the public service sector who may be impacted by the Project such as the fire departments, RCMP, ambulance services and school board trustees.
5. Individuals residing beyond 1.5 km but within 5 km of the PDA who expressed formal objections or interest in the Project: these residents were contacted by phone with the

same objectives as stated above (3 and 4). Concerns were documented and questions were clarified. Follow-up calls were made to address concerns.

6. Project objectors, petition signers or those who expressed formal objections or interest in the Project but reside beyond 5 km of the PDA: objectors and petition signatories as well as other interested parties not captured in the three above-noted groups were contacted by phone with the same objective. Their questions and concerns were documented and efforts were made to address them.
7. Mail-out newsletter – Volume 1 – December 2006: during the consultation process of one-on-one and phone interviews, many individuals expressed interest in being updated by newsletter.
8. Proposed AST/Community EIA Consultation Committee meeting, January 31, 2007: forming a community group to enhance communication on the EIA process was presented to stakeholders during the interviews and phone calls. There was considerable interest in the formation of a locally based committee. Follow-up calls were made to interested stakeholders as well as other potentially interested parties identified by the consultant team. Facilitated by RMC & Associates, the meeting was held the evening of January 31, 2007 at the Lamont Recreation Centre.
9. Mail-out newsletter – Volume 2 – March 2007: a second information newsletter was mailed March 5, 2007 to all stakeholders.
10. Working Group Meeting, April 3, 2007: Given that the majority of individuals who attended the January 31 meeting expressed interest in establishing a local committee, a follow-up working group was established. The purpose of this working group was to provide feedback and advice about the committee's purpose and structure.
11. AST & Community Committee Meeting, May 3, 2007: The purpose of the meeting was to determine which issues the committee would address first.
12. AST & Community Committee Meeting, June 7, 2007: The purpose of the meeting was to review and finalize the proposed air-related work plan and to identify the best process to distribute air-related information to the broader community.

5.5.5 Consultation Program Timeframe

The consultation timeframe is shown in Table 5.5-1:

Table 5.5-1: Consultation Timeframe

Stakeholder Group	Consultation Timeframe
Landowners, residents and renters (including local industry) within 1.5 km of the PDA	June 2006 (open house); November 2006 (field work); November 2006 – January 2007 (phone calls)
Residents beyond 1.5 km but within 5 km of the PDA who initiated a formal notice of objection and/or letters of interest	June 2006 (open house), November 2006 to February 2007 (phone calls)
Local government officials, key opinion leaders and key service providers	June 2006 (open house); October 2006 (visits and phone calls) to February 2007
Project objectors, petition signers and/or those who expressed formal objections and/or interest in the Project who reside beyond 5 km of the PDA	June 2006 (open house), November 2006 (phone calls) to February 2007
AST and Community Committee meetings	January 31, April 3, May 3, and June 7, 2007 and ongoing

5.5.6 June 2006 Open House

An open house was held on June 6, 2006 at the Lamont Recreation Centre.

A public notice of the open house was advertised in three local papers:

- The Review: May 23–29 and May 30–June 6
- Fort Record: May 26–June 1 and June 2–6
- Lamont Leader: May 23–29 and May 30–June 6

Personal invitations were also mailed to all adjacent landowners residing within the Heartland and buffer zone, elected local officials (Lamont County, Town of Lamont and Town of Bruderheim), service providers (i.e., hospital personnel, fire departments, schools) and Friends of Lamont County for the Responsible Industrial and Community Development (FOLC).

The purpose of the open house was to:

- initiate the public consultation process related to the EIA and prepare the TOR
- describe the proposed Project
- explain the Draft TOR and the EIA process, objectives and scope
- obtain feedback from stakeholders and document concerns, comments and suggestions so that they could be incorporated into the TOR

The open house consisted of formal presentations by Don Friesen from HAZCO, Rob Mann from AST and Gord Johnson from WorleyParsons Komex. Don Freisen provided an overview of Hazco, AST and CCS. Rob Mann gave a presentation concerning the Project, public concerns to date and where the concerns were being addressed in the Draft TOR. Gord Johnson discussed WorleyParsons Komex's role in the EIA studies and the EIA process itself. The presentations were followed by questions from the floor. In addition, individual conversations were held between the proponents and community members before and after the formal meeting.

A total of 23 people from the community attended the open house. Themes raised during the question and answer session included the following:

- length of time to adequately collect baseline data
- AST's Emergency Response Plan
- possibility of future sulphur blocking
- location of the plant and its proximity to Bruderheim and Lamont
- health impacts
- socio-economic study
- tax revenue
- increased rail traffic and safety
- filing concerns with AENV

For more information about the open house, see Appendix I on the HAZCO website (www.HAZCO.com – click on the AST link)

5.5.7 Mail-out

An information package was prepared by AST, in conjunction with WorleyParsons Komex and RMC & Associates, to provide stakeholders with current information concerning the Project and EIA process. The information package, mailed October 26, 2006, included:

- stakeholder letter: cover letter for each stakeholder group
- public disclosure document: provided information concerning the Project overview, environmental considerations, regulatory process and opportunities for stakeholder input
- Draft Terms of Reference: the TOR was drafted August 29, 2006 and submitted to AENV for final approval (the Final Terms of Reference were approved March 13, 2007)
- stakeholder comments and concerns: summary of the concerns and comments voiced by Project stakeholders through written submissions to Alberta Environment, verbal comments received during open houses and public meetings, e-mail submissions and personal consultations
- EIA Q&A sheet: a public friendly information sheet which addressed questions that are typically raised by the public

The information packages were mailed to the four stakeholder groups previously described in Section 5.5.3. For a copy of the information package, see Appendix II on the HAZCO website at www.HAZCO.com and click on the AST link.

5.5.8 One-on-one Interviews with Stakeholders within 1.5 km of the PDA

One-on-one interviews were offered to landowners, renters and residents, including industry, within 1.5 km of the PDA. The process involved an initial phone call to ensure the stakeholder had received the information package and arrange a meeting if they wanted a face-to-face discussion. Telephone conversations were conducted with individuals who did not want personal visits. The interviews were summarized on stakeholder contact forms.

Members of the consultation team were in the field November 5–10, 2006. Telephone interviews and follow-up commitments resulting from the field work were completed by January 31, 2007.

The aim of the one-on-one interviews was to give stakeholders an opportunity to discuss the Project with the WorleyParsons Komex members of the consultation team. During the meetings, they recorded stakeholder concerns and questions about the Project, feedback on the TOR and ideas/preferences concerning future communications and consultation processes.

The total number of stakeholders is 56, as shown on Table 5.5-2. Eleven were industrial/ business owners, eight were renters (two business, six residents) and 37 were landowners. Of the 37, married and common-law couples were recorded as a single stakeholder. In some cases, both individuals were present for the interviews. In others, one person was the spokesperson for the couple. The breakdown by group is noted in Table 5.5-2.

Table 5.5-2: Breakdown of Stakeholders within 1.5 km of the PDA

Category	Number
Landowners/acreage owners	37
Business/industrial landowners	11
Occupants	8 (2 are industry)
Total number of stakeholders within 1.5 km of the PDA	**56**

Of the 56 landowners, acreage owners and occupants, WorleyParsons Komex staff met with 27 in one-on-one interviews (see Table 5.5-3). Of these, two stakeholders spoke on behalf of a relative who did not reside in the household. Telephone interviews or e-mail correspondence were conducted with 17. Five stakeholders were asked if they wanted a face-to-face or telephone interview and they declined. Five stakeholders did not return phone messages.

Table 5.5-3: Consultation Activities with Stakeholders within 1.5 km of PDA

Type of Consultation	Number
One-on-one visits	27
Spoke for a relative on their behalf	2
Telephone interviews/e-mail	17
Declined comment	5
No response to voice mail message	5
Total number of directly impacted stakeholders	**56**

Concerns raised by landowners and renters, excluding business and industry, are as follows (in order of importance):

- negative impacts on water quality or quantity
- air contamination and sulphur dust
- increased road traffic
- impact on land values
- sulphur fires
- impact on human health
- soil contamination
- impact on health of livestock
- increased rail traffic and decreased safety
- sulphur blocking will eventually happen
- sulphur smells
- inadequate Emergency Response Plan
- lack of trust in AST
- impact on wildlife

- negative visual impact
- light pollution
- Lamont County will become a hazardous waste area
- increased noise
- overall loss of farmland to industry in the area
- impedes future economic development
- negative impact on vegetation

The concerns and interests of business and industry landowners and occupants were as follows.

- two businesses expressed having no problem with the Project, as long as operations were in compliance with regulatory standards and their specific concerns were addressed. These concerns pertained to their proximity to AST's land and included:
  - air emissions and sulphur dust
  - potential health impacts
  - land devaluation
  - seepage
  - dust
  - spillage
  - water use
  - negative visual aesthetics
- one industry was concerned with a road crossing
- one industry representative was concerned about the possible hazardous effects of mixing sulphur with chlorate, as well as increased rail traffic which could prevent access along R.R. 202 and seriously jeopardize their emergency response capability
- another industry representative said their main concern was that AST conform to the highest standards in safety and environmental stewardship. This company also expressed that AST has a "*long ways to go with public relations"* and they had worked hard to establish good relations with their neighbours.
- a large farming/cattle operation expressed concern over:
  - air and water contamination
  - sulphur blocking (long term)
  - the health impact of sulphur dust particles
  - venting of sulphur and air quality
  - increased traffic
  - decline in land values
  - possibility of a sulphur fire
  - trust issue with AST
- four people had no problem with the Project

- three declined to comment

5.5.9 Interviews with Elected Officials and Service Providers

One-on-one interviews were offered and made to elected local officials and service providers. As with the other two groups, this process involved an initial phone call to arrange a meeting and e-mail the Project information. Telephone conversations were conducted with those individuals who were not available for a personal interview. One-on-one interviews were conducted at the same time as the other field work, November 5–10, 2006. Telephone interviews and follow-up commitments resulting from this were completed by February 13, 2007.

The goal of these visits and telephone interviews was similar to those of the other stakeholder groups: the opportunity to discuss the Project and TOR, articulate questions and concerns, provide feedback on the TOR and express ideas/preferences concerning future communications and consultation processes. Interview findings were recorded on contact forms.

The consultation process involved the following individuals, with the key comments summarized in Table 5.5-4.

Table 5.5-4: Elected Officials and Service Providers

Organization	Title	Communication	Key Comments
Lamont County/Elk Island School Board	Trustee	Detailed message left	None
Prairie Emergency Medical Systems (PEMS)	Paramedic CAO	One-on-one meeting	PEMS has the capacity to deal with hazards associated with the plant PEMS will need to have some information in advance (i.e., protocols during and after construction)
East Capital Health		Telephone conversations, one-on-one meeting and e-mail communications	expressed interested in being involved in the EIA; sent representative to AST/Community EIA Consultation Committee meeting
Elk Island Nation Park	Conservation Biologist	Telephone conversation	Elk Island National Park is aware of the Project and would like to be part of the information loop; no comments at this time
Lamont County	County Manager	Telephone Conversation	reserved comments on behalf of Lamont County Council
Town of Bruderheim	Fire Chief, Volunteer Fire Department	One-on-one meeting	manpower for the fire department is an issue and the Project would stretch their resources need training and supplies another air monitoring station would be beneficial need to develop constructive dialogue and ongoing monitoring for health and safety
Town of Lamont	Fire Chief, Volunteer Fire Department	One-on-one meeting	shortage of volunteer staff need training and drills that are specific for this type of industry would like to be involved in health and safety planning along with emergency medical services, NR CAER and other services

Note:
NA CAER – the Northeast Region Community Awareness and Emergency Response is a health and safety association which represents the Industrial Heartland as a whole.

Table 5.5-4: Elected Officials and Service Providers (Cont'd)

Organization	Title	Communication	Key Comments
RCMP Fort Saskatchewan Detachment	Sergeant	One-on-one meeting	control of heavy truck traffic and the associated increased risk of vehicle accidents are main concerns
Lamont Healthcare Centre	Executive Director	One-on-one meeting	community health is their primary concern would need training concerning sulphur and chemicals in case of accidents would respond to accidents in the same way that they do for all facilities/plants in the area need a clear understanding of potential health impacts such as respiratory problems and asthma
Lamont Hospital Board	Chairman Board Member	One-on-one meeting	concerned about potential respiratory illnesses due to air contamination training for hospital staff that relates to the facility concern about environmental degradation and its impact on health need better air monitoring stations in the area need for improved communications between AST and the local community, especially regarding H&S
Friends of Elk Island National Park	Chairman	One-on-one meeting	environmental degradation and impact on wildlife need to contact and discuss with Elk Island National Park personnel directly
Town of Bruderheim	Mayor	One-on-one meeting	sulphur facility does not fit with their present development plan entitled *Vision 20/20* proximity of the facility to the town is a concern concerned about risks associated with sulphur: stockpiles; environmental contamination; H&S hazards (fire); inadequate Emergency Response Plan; devaluation of land prices; negative visual impact tax revenue and benefits for the County and the town are low
Town of Lamont	Mayor	One-on-one meeting	main concern is possibility of a sulphur fire need for AST to improve their communications with the local community
Alberta Industrial Heartland	Executive Director	Telephone conversation and e-mail communications	assessing their interest in participating in consultation activities

Notes:
H&S – health and safety.
NA CAER – the Northeast Region Community Awareness and Emergency Response is a health and safety association which represents the Industrial Heartland as a whole.

5.5.10 Phone Calls with Formal Project Objectors and Other Interested Parties

Phone calls were made to individuals who expressed a formal objection and/or an interest in the Project by writing to AENV and/or AST. The individuals were divided into two groups – those who reside within 1.5–5 km of the PDA and those living beyond 5 km. These phone calls were initiated on November 21, 2006 and the majority was completed by December 20, 2006.

The aim of the phone call interviews was to:

- ensure that individuals who had written formal letters of objection and/or interest received the mail-out information package

- gain feedback on the Draft TOR
- document stakeholder concerns and questions
- record stakeholder preferences for future communications and consultation processes
- ask individuals if they were interested in exploring the idea of the AST/Community EIA Consultation Committee to determine level of stakeholder interest in this concept

Detailed messages with a call back number were left on answering machines when individuals were not home. A minimum of two messages were left in cases where no return phone call was made by the stakeholder. As seen in Table 5.5-5, a total of 217 phone calls were made. Of these, 140 or approximately 64.5% were reached in person. Fifty-nine individuals, or approximately 27.2%, did not respond to detailed messages that were left on their answering machines. Eight (3.7%) did not have an answering machine; 6 (2.8%) were an incorrect phone number; and 2 had moved (.92%). Two are categorized as other because they were unique: in one case, a child's name was on the letter and the phone call clarified that a child had signed a letter sent to AENV. The child was subsequently not interviewed. In the other case the individual had passed away since writing the letter to AENV.

Table 5.5-5: Phone Call Results

Contact Method	Number	Percentage
Total number of individuals interviewed on the phone	140	64.5
Total who did not return message	59	27.2
No answering machine	8	3.7
Wrong phone number	6	2.8
Moved	2	0.9
Other	2	0.9
Total phone calls made	**217**	**100.0**

Table 5.5-6 indicates where individuals reside in regard to the PDA. Approximately 35.5% reside in the Town of Bruderheim; 27.6% in the Town of Lamont; 4.6% in rural areas within 5 km; 29.9% in rural areas beyond 5 km; and 2.3% are deceased, moved or have an unknown address.

Table 5.5-6: Location of Formal Objectors or People Who Expressed Interest in the Project

Location	Number	Percentage
Town of Bruderheim (2.2 km)	77	35.5
Town of Lamont (6 km)	60	27.6
Rural within 5 km	10	4.6
Rural beyond 5 km	65	29.9
Moved	2	0.9
Other	2	0.9
Unknown address	1	0.6
Total	**217**	**100.0**

Primary concerns mentioned in the phone interviews were as follows (in order of importance):

- air pollution

- health and safety
- increased road traffic and possibility of accidents
- devaluation of property values
- water contamination
- soil contamination
- sulphur fires
- inadequate Emergency Response Plan
- smells
- increased rail traffic

Other concerns that were expressed, but with less frequency, were (in order of importance):

- proximity to towns
- distrust in AST
- minor economic benefit to the County
- possibility of long-term sulphur blocking on the site
- site location
- negative visual impacts
- cumulative impacts of increasing industry in the area
- Lamont County becoming a "*toxic dump"* for oil and gas by-products
- noise
- negative impact on wildlife and vegetation
- loss of farmland
- adequate use of local labour
- construction quality
- negative impact on quality of life

The information gathered during Phase I of the public consultation process was used to plan go-forward activities in a number of ways:

- stakeholder concerns were documented with the intent of addressing them in the EIA studies
- follow-up to particular questions was made in consultation with AST experts, involving phone calls or e-mail responses to individual stakeholders
- the majority of individuals indicated they wanted to be informed by newsletter as the preferred method of communication. Therefore, a newsletter was drafted based on questions asked by stakeholders during Phase I of the consultation program and mailed out in late December 2006 and early January 2007.
- a number of individuals expressed interest in attending a meeting to discuss establishing a community consultation committee; the meeting was held January 31, 2007
- a second newsletter was mailed to all stakeholders on March 5, 2007

- continued interest in forming a locally-based committee led to subsequent meetings and the formation of the AST & Community Committee

5.6 Phase II: EIA Public Consultation Program

Phase II activities consist of the follow-up activities that developed over the course of Phase I, including newsletters and the formation of the AST & Community Committee.

5.6.1 Newsletter: Volume 1, December 2006

In response to what was heard during Phase I consultation activities, AST, WorleyParsons Komex and RMC & Associates wrote and mailed out an information newsletter. This method of communication was chosen by the majority of stakeholders who expressed interest in receiving ongoing communication in this form, rather than having another open house (at this time) or receiving a lengthy technical information package.

The stated objective of the newsletter was as follows:

This newsletter is part of AST's commitment to respond to the request by community members for more information about the proposed Project. It responds to a number of the concerns and questions which were identified in recent consultations with community area residents. Topics addressed in this newsletter include:

- *the current status of the regulatory review process for the Proposed Bruderheim Sulphur Forming and Shipping Facility*
- *the Alberta Environment Draft Terms of Reference (TOR) for the Proposed Bruderheim Sulphur Forming and Shipping Facility*
- *answers to some frequent questions identified during consultations on the Alberta Environment Draft TOR for the Project*

The newsletter (Appendix III on the HAZCO website at www.HAZCO.com – click on the AST link) was mailed to the following stakeholders:

- residents and landowners (including local industry) within 1.5 km of the PDA
- those that reside within 5 km of the PDA who initiated formal notice of objection to the Project
- local government officials, leaders and service providers
- other objectors, petition signatories and other interested parties
- interested individuals who wrote letters to AENV early to mid-December, who had previously not submitted a formal letter of objection

5.6.2 AST/Community EIA Consultation Committee: January 31, 2007 Meeting

During the one-on-one interviews and phone calls, stakeholders were asked how they would like to be consulted in the future. In addition to probing stakeholder interest on a variety of traditional consultation approaches such as open houses, newsletters and one-on-one meetings, the idea of forming a community consultation committee to enhance communication on the prop`osed Project EIA process was presented. There was considerable stakeholder interest in exploring this idea and as such, follow-up calls were

made to interested individuals as well as to any other potentially interested parties identified by the consultation team. Interested parties were polled for the most convenient date, time and location for this initial meeting to take place. Four possible meeting dates were offered to stakeholders. In addition, information about forming a locally-based committee and an invitation to participate was also in the December 2006 Newsletter.

Drawing on past experience in facilitating these types of groups in other Alberta communities, the facilitation team (RMC & Associates) developed a proposed mandate and structure document for stakeholder consideration. This document, along with a proposed agenda, was sent to interested parties in advance of the meeting.

Facilitated by Rob McManus and Susan Davis Schuetz from RMC & Associates, the Proposed AST/Community EIA Consultation Committee meeting was held the evening of January 31, 2007 at the Lamont Recreation Centre to explore the feasibility of setting up a community committee (see Appendix IV on the HAZCO website at www.HAZCO.com – click on the AST link).

Rob Mann and Sylvia Holowach from AST and Gord Johnson from WorleyParsons Komex attended. Approximately 35 stakeholders were present. In addition, a number of individuals expressed interest in coming to the meeting but were not able to attend due to a prior commitment.

Rob McManus and Susan Davis Schuetz facilitated a dialogue with meeting participants on ideas around preferred communication and consultation processes. The following is a summary of meeting outcomes:

- Rob McManus discussed the collaborative process, including some of the opportunities and challenges there are with these types of processes
- the majority of meeting participants expressed an interest in forming a committee
- the possible aims and structure of the committee were discussed
- feedback on the level of interest in forming some sort of locally-based committee was provided verbally by participants near the end of the meeting and through completed feedback forms
- as anticipated, a number of questions regarding the EIA regulatory process arose. RMC & Associates had discussed this possibility with both AENV and the NRCB, who offered to present a regulatory process workshop if there was stakeholder interest. Rob McManus extended this offer and meeting participants asked for the workshop.

The following go-forward actions were taken as follow-up to the AST/Community EIA Consultation Committee meeting:

- a follow-up letter was sent to AENV and copied to the NRCB expressing stakeholder interest in attending a regulatory process workshop to improve their understanding of the regulatory process for the local community
- Newsletter – Volume II – March 2007 (see Appendix V on the HAZCO website at www.HAZCO.com – click on the AST link) was mailed in early March 2007 to all stakeholders and contained the following:
    - an update on EIA public consultation activities to date
    - description of the community meeting held on January 31, 2007 at the Lamont Recreation Center to discuss forming a community consultation committee
    - update on the current status of the EIA

- a mail-out package containing: the Newsletter – Volume II – March 2007, the Draft January 31, 2007 AST/Community EIA Consultation Committee meeting notes and a copy of the follow-up letter to AENV (and copied to the NRCB) was sent to the following:
    - January 31, 2007 AST/Community EIA Consultation Committee meeting participants
    - stakeholders who had expressed interest in attending the January 31, 2007 AST/Community EIA Consultation Committee meeting but were unable to attend
    - stakeholders who had indicated they would attend the January 31, 2007 AST/Community EIA Consultation Committee meeting but did not

The March newsletter and Draft January 31, 2007 AST/Community EIA Consultation Committee meeting notes and power point presentation were posted on the website (www.HAZCO.com – click on AST link).

5.6.3 Working Group Meeting: April 3, 2007

The majority of participants at the January 31, 2007 meeting expressed interest (either verbally or through written meeting evaluation forms) in establishing a committee. A follow-up working group was established with these interested parties to seek further input on forming a committee. The follow-up working group discussed the proposed committee's mandate and structure. Individuals were polled for the most convenient time, date and location, which resulted in the working group meeting being held on April 3, 2007 in Lamont. In advance of the April 3, 2007 meeting, RMC & Associates provided a proposed agenda and work plan with background information on the different committee element options to participants. The meeting was held on April 3, 2007 in Lamont and was facilitated by RMC & Associates. Fourteen meeting participants (12 community members and 2 AST representatives) attended. Three community members were absent with regrets.

Meeting participants provided feedback and advice on the following:

- principles used to guide meeting discussions
- ground rules to create a framework for constructive dialogue
- proposed committee mandate, structure and processes:
    - committee size
    - other stakeholder 'group' participants
    - committee member roles and responsibilities
    - decision-making method
    - frequency of meetings
    - process to provide committee information to the broader community
    - meeting minutes development
    - the role of media in meetings
    - meeting location

Working group participants recommended establishing a committee for the purpose of:

- enhancing communication through the sharing of credible information to clarify questions about the proposed project and find effective ways to share information

- problem-solving/issue resolution when these opportunities present themselves
- building a more positive, go-forward relationship amongst all

Meeting participants collectively identified April 25, 2007 as the date for the next meeting. However, the Lamont County Municipal Development Plan & Land Use Bylaw Review Public Meeting was subsequently scheduled on the same evening. Due to community interest in attending the County meeting, the next committee meeting date was collectively moved to May 3, 2007.

The following go-forward actions were taken as follow-up to the April 3, 2007 Working Group Meeting:

- draft April 3, 2007 Working Group Meeting notes were sent to meeting participants for review
- an invitation to the May 3, 2007 meeting was made to representatives from the additional stakeholder 'groups' identified by April 3, 2007 meeting participants
- a proposed agenda for the upcoming May 3, 2007 meeting was developed and sent to all April 3, 2007 meeting participants as well as representatives from other stakeholder 'groups' identified by April 3, 2007 meeting participants for review
- a proposed work plan for the upcoming May 3, 2007 meeting was developed and sent to all April 3, 2007 meeting participants as well as representatives from other stakeholder 'groups' identified by April 3, 2007 meeting participants with a request for comment by April 27, 2007

5.6.4 AST & Community Committee: May 3, 2007 Meeting

As follow-up to the April 3, 2007 meeting, RMC & Associates sent a proposed agenda and work plan for the next meeting on May 3, 2007 by email, fax or in person to the following people:

- April 3, 2007 meeting participants
- those absent with regrets from the April 3, 2007 meeting
- representatives of the additional stakeholder groups identified by April 3, 2007 meeting participants

The meeting was held the evening of May 3, 2007 in Bruderheim and was facilitated by RMC & Associates. There were 14 meeting participants: 12 community members from the Lamont and Bruderheim areas and two AST representatives. Six community members from the Lamont and Bruderheim areas were absent with regrets.

The purpose of the proposed work plan was to determine which issues the committee should address first. The priority was addressing community information needs and not about limiting the number of issues or questions to be addressed.

The following is a summary of meeting outcomes:

- AST & Community Committee was formally adopted as the committee's name
- members revised their mandate as follows:

  - enhance communication through sharing credible information – clarify questions about the proposed Project and find effective ways to share information to *create a more informed dialogue in the community*
  - problem-solve/issue resolve when opportunities present themselves
  - build more positive, go-forward relationships amongst all
- the principle of transparency among committee members and with the broader community was discussed and additional processes were put into place to achieve transparency
- the facilitation team summarized the questions, issues and concerns raised by local residents according to residents living within 1.5 km of the proposed facility site and people residing beyond. After reviewing these summaries, committee members decided their initial focus would be in the following order:
  - air
  - water
  - health
  - emergency response
  - vehicle and rail traffic
  - soil
  - property values
- committee members agreed to the following meeting dates:
  - Thursday evening, June 7, 2007
  - Thursday evening, July 5, 2007
  - Thursday evening, August 2, 2007
- committee members requested that the facilitation team draft a series of key questions around air issues that would form a work plan for review at the next committee meeting
- two new stakeholders were to be invited to join the committee: the mayor of Bruderheim and Lamont Fire Chief

The following go-forward actions have been taken as follow-up:

- draft May 3, 2007 AST & Community Committee meeting notes were developed and sent to members for review
- an invitation to the next meeting has been extended by the facilitation team by letter to representatives from two additional stakeholder ‘groups’ identified during the May 3 meeting.
- a proposed agenda for the upcoming June 7 meeting was developed and sent to committee members as well as representatives from the two additional stakeholder ‘groups’ identified for review
- the proposed work plan for the upcoming June 7 meeting was developed and sent to committee members as well as representatives from the two additional stakeholder ‘groups’ identified for review. The facilitation team, working with WorleyParsons Komex, proposed a series of key questions around air issues that formed the work plan for review at the next committee meeting.

5.6.5 AST & Community Committee: June 7, 2007 Meeting

As follow-up to the May 3 meeting, RMC & Associates sent a proposed agenda and work plan (air related) for the June 7 meeting by email, fax or in person to the following people:

- May 3, 2007 meeting participants
- those absent with regrets from the May 3, 2007 meeting

The June 7, 2007 meeting was held in Lamont and was facilitated by RMC & Associates. There were 13 meeting participants: 10 community members from the Lamont and Bruderheim areas, 2 AST representatives and one WorleyParsons Komex representative. Eight community members from the Lamont and Bruderheim areas were absent with regrets.

The purpose of the meeting was to review and finalize the proposed air quality related work plan and identify the best process and/or forum to get air-related information out to broader community members. Gord Johnson from WorleyParsons Komex presented the process used to assess air quality. The following was presented and subsequently discussed:

- air quality issues
    - emission of criteria pollutants
    - acidification caused by sulphur deposition
    - emissions related to a sulphur fire
- review of criteria pollutants
- background air quality - Fort Air Partnership
- air emissions relative to ambient air quality
- emissions sources
- results of air emissions modeling
- special considerations
    - adjacent chlorate plant
    - worst case scenario
    - public and worker health, livestock
    - impacts to water and soil quality
- Gord Johnson offered to develop a summary of the key areas of air quality for committee members. It was suggested that this summary might assist committee members in deciding what would be the best process and/or forum to share this information with the broader community members. Committee members agreed a summary would be helpful and accepted this offer.
- Committee members re-confirmed the following upcoming meeting dates:
    - Thursday evening, July 5, 2007
    - Thursday evening, August 2, 2007

The following go-forward actions have been or are being taken as follow-up:

- draft June 7, 2007 AST & Community Committee meeting notes were developed and sent to committee members for review along with the WorleyParsons Komex power point presentation on air quality

- a proposed agenda for the upcoming July 5, 2007 meeting will be developed and sent in advance of the upcoming meeting to committee members for review
- WorleyParsons Komex will develop a summary of the key areas of air quality
- This summary will be sent to committee members in advance of the upcoming July 5, 2007 meeting for review

It should be noted that while the draft AST & Community Committee meeting notes have been developed and distributed to committee members for the April 3, May 3, and June 7, 2007 meetings, these documents have not been included as part of this submission out of respect for the committee process. Committee members have reached an agreement whereby meeting notes would not be available for public perusal until formally adopted by committee members first.

5.6.6 Ongoing Consultation Program

The consultation program will be ongoing throughout the EIA process and will unfold dependent on stakeholder needs. It is anticipated that the AST & Community Committee will be a vehicle to improve communications and understanding between AST and its stakeholders. It is expected that AST will also continue to use periodic newsletters to communicate with stakeholders, given the stakeholder interest in this consultation method.

5.7 Summary of Outcomes of the EIA Consultation Program

During the public consultation process, significant stakeholder concerns were expressed to AENV and AST representatives. There was considerable community reaction to the Project.

As previously noted in Section 5.5.2, the public consultation program aimed to:

- fulfill regulatory requirements and where possible, surpass them
- notify all potential stakeholders about the Project and EIA process and provide an opportunity to participate in a manner appropriate to their needs and interests
- provide clear and pertinent information about the Project and EIA process to facilitate informed stakeholder feedback
- provide various communication methods to make information readily available to stakeholders and interested parties
- enhance the relationship between AST and stakeholders
- initiate processes to facilitate the resolution of issues and concerns by residents
- build confidence with regulators, local municipal and county elected officials, stakeholders, community opinion leaders and Non Governmental Organizations (NGO) to demonstrate that AST is proactive and capable of managing a major project development

It is believed that the EIA public consultation program has met regulatory requirements and expectations. Project information was made available to all stakeholders and the consultation process ensured stakeholders had an opportunity to express their concerns and opinions about the Project. Various communication methods were used, including an open house, one-on-one interviews, telephone interviews, e-mail correspondence, newsletters and community meeting. Progress has been made on fostering better communication with stakeholders and developing processes to facilitate the resolution of issues and concerns.

The relationship between AST and stakeholders is still, in some cases, contentious. However, the mechanisms are in place to build bridges between AST and stakeholders in an

endeavour to foster a more positive relationship. It is anticipated that progress will continue to be made throughout the EIA process through ongoing communication with stakeholders. Table 5.7-1 lists the issues and concerns identified in the public consultation process, the measures AST will take to mitigate them and the corresponding section of the EIA in which they are addressed.

Table 5.7-1: AST Measures to Address Stakeholder Issues

Stated Issues	AST Measures to Address Issues: EIA Section Cross-reference
1. Negative impacts on water in terms of quality and/or quantity	Detailed evaluations of potential impacts to surface and ground water are provided in Volume IIB, Section 2: Groundwater Quantity and Quality; Section 3: Surface Water Quantity; and Section 4: Surface Water Quality. Potential for impacts to surface water quality will be effectively mitigated by collecting, containing and using runoff from the sulphur processing area that could be impacted by elemental sulphur. The runoff water collected and used in this manner represents only a minor proportion of runoff in the catchment area; hence, the potential impact to surface water quantity is insignificant. Potential impacts to groundwater quality will be effectively mitigated by double-lining all sulphur and chemical storage and water containment facilities. These facilities will also be equipped with leak detection capability. Groundwater will be used to provide make-up water for cooling. The yield of the aquifer beneath the Site is marginal relative to the Project's needs. Detailed monitoring of groundwater withdrawal will be implemented to identify potential impacts to adjacent groundwater users. If unacceptable impacts are observed, groundwater diversion will be stopped and an alternative water supply (Lamont County Water Utility) will be used.
2. Air contamination and sulphur dust	Potential air quality impacts are evaluated in Volume IIA, Section 2: Climate and Air Quality. Analysis included assessment of H_2S, SO_2, NO_x, particulate, etc. under normal and emergency operating conditions. These evaluations concluded that all parameter concentrations remain below 10% of the AAAQO at the fence line of the Site. Potential impacts to soil pH associated with elemental sulphur dust are predicted to be confined to the area immediately surrounding the process facilities and to the Site proper. Potential impacts related to fugitive sulphur dust are effectively mitigated by implementing good management practices, using sulphur dust suppressants and selecting forming technology that minimizes the generation of dust. Potential for air emissions is mitigated by treating air vented from liquid sulphur storage tanks and transfer points and implementing best safety and site management practices, including reliable emergency response capability.
3. Increased road traffic	A traffic study completed to support the Project (Volume I: Project Description, Appendix III) concludes that impacts to traffic volume are relatively minor in comparison to current and predicted traffic volumes. An upgrade to the intersection of Highway 15 and R.R. 202 was recommended and will be implemented as part of Project construction.
4. Impact on land values	Potential impacts to land values were evaluated as part of Volume IID, Section 4: Socio-Economic Assessment. This evaluation found that the Project is not expected to decrease land values in the area already zoned for heavy industrial use. It was not possible to project land values in the buffer zone or Towns of Bruderheim and Lamont. Some interviewees voiced concerns about the potential for a decrease in land values, especially for areas in the buffer zone. Land in the buffer zone is subject to the Alberta Industrial Heartland's Voluntary Property Purchase Program and landowners in the area will receive fair value for their land if they choose to move based on the Project.
5. Sulphur fires/ Emergency Response Plan (ERP)	Potential for sulphur fires and related emergency response planning is addressed in Volume I, Appendix V: Emergency Response Plan. While the risk of sulphur fires exists, sulphur burns very slowly and can be easily extinguished. The consequences of typical sulphur fires are not significant. The potential impacts of sulphur fires are best managed by developing and maintaining vigilant fire monitoring and response capability. AST will belong to NR CAER, the emergency response cooperative of industries operating in the Industrial Heartland.

Table 5.7-1: AST Measures to Address Stakeholder Issues (Cont'd)

Stated Issues	AST Measures to Address Issues: Sections of the EIA
6. Impact on human health	Public Health and Safety (Volume IIA, Section 4) concludes no unacceptable risks to human health occur during either normal operating conditions or sulphur fires. The primary human health risk occurs during sulphur fires (see above) and is associated with SO_2 emissions. These risks will be mitigated by diligently monitoring for fires, H_2S and SO_2; implementing an effective Health and Safety Plan (see Appendix IV of Volume I); and by the implication and maintenance of effective fire detection and response capabilities (see Item 5).
7. Soil contamination	The primary risk of soil contamination is associated with deposition of fugitive sulphur dust. Volume IIC, Section 2: Soil concludes that significant impacts to soil quality will be limited to the Site and area immediately surrounding the facility. Mitigation will include minimizing fugitive sulphur dust emissions (see Item 2 above), monitoring and, if necessary, neutralizing potential soil acidity.
8. Impact on health of livestock	No impacts to domestic livestock are anticipated. According to Volume 2A, Section 2: Climate and Air Quality, all air emission concentrations of chemicals of potential concern are well below the threshold of concern for human health. Therefore, the concentrations are not expected to harm domestic stock. Sulphur compounds do not bioaccumulate and are not a concern from the perspective of ingestion by livestock. As well, no significant impacts to water quality are anticipated and, therefore, no ingestion concerns are anticipated. Results of The Caroline Livestock Study (Waldner 2004, Internet Site) indicate that the average herd health of 1300 cattle monitored between 1991 and 2003 in the Caroline sour gas plant area did not change after sour gas plant operations began in 1991. A second study, conducted by the Western Inter-Provincial Scientific Studies Association (WISSA) found few associations between oil and gas facility emissions and the overall health of cattle (WISSA 2006, Internet Site). The WISSA study collected and analysed data from 33,000 cattle in Alberta, Saskatchewan and northeast British Columbia. Based on the findings of these studies and the results of the air quality modelling presented in Volume IIA, Section 2: Climate and Air Quality, no impacts on livestock are expected due to the Project.
9. Increased rail traffic and decreased safety	According to Volume I, Appendix III: Traffic Impact Assessment, the increase in rail traffic outside of the Site and the potential for safety issues related to rail traffic is not significant. During peak operations, one daily liquid sulphur train and one formed sulphur train every two days are anticipated.
10. Sulphur blocking will be happen in the future	In response to this public concern, AST's initial intention to block sulphur was removed from the Project design. Sulphur blocking is not included in this Application and it is not AST's intention to implement sulphur blocking at this Site now or in the future. Any plans to block sulphur would require a separate application, public consultation and approval under EPEA (see Volume I, Section 3.1.1). Should sulphur markets deteriorate to the extent that sulphur marketing is no longer viable, the Bruderheim facility could reduce its operations or become idle. AST has the financial and operational capability to operate, expand or idle the facility as market conditions demand (see Volume I, Section 2.4.4).
11. Sulphur smells	Potential for odours associated with the Project were evaluated in Volume IIA, Section 2: Climate and Air Quality. It concluded no unusual or obnoxious sulphur odours are expected outside of the boundaries of the Site.
12. Inadequate Emergency Response Plan (ERP)/ Project proximity to Bruderheim and Lamont	The ERP (Volume I, Appendix V) was reviewed and approved by a local emergency response expert and complies with the requirements of EUB Directive 071: Emergency Preparedness and Response Requirements for the Upstream Petroleum Industry. Further, AST will become an active member of NR CAER, an emergency response cooperative of industrial operators in the Industrial Heartland.
13. Lack of trust in AST	AST continues to implement its public consultation program as detailed in Volume I and Volume IID, Section 5: Public Consultation. A public consultation committee has been established to improve communication, establish trust with the local community and facilitate public input into the Project's design and operation.
14. Impact on wildlife	Volume IIC, Section 4: Wildlife and Section 5: Biodiversity addresses potential impacts to wildlife, which are expected to be minor. The area's primary natural feature, the wetland in the northwest corner of the Site, will be conserved as part of the Project.

Table 5.7-1: AST Measures to Address Stakeholder Issues (Cont'd)

Stated Issues	AST Measures to Address Issues: Sections of the EIA
15. Negative visual impact	According to Volume IIA, Section 3: Noise and Light, the proposed facilities are relatively low lying (maximum height 15 m) and set back a considerable distance from access roads and rural residences (500 m from the nearest residence). They occupy a maximum of 3% of the field of vision above the horizon (assuming flat ground and unimpeded view). Visibility is also reduced by shrubs and trees surrounding the Site. Further development of trees and natural visual buffers is possible if specific views are compromised.
16. Light pollution	The facility will operate 24 hours/day and will be lit to allow nighttime operation, resulting in a light impact similar in nature to the Canexus chlorate plant located to the southwest of the Project. Light associated with the Project will diminish with distance through adsorption and dissipation and will be directed into the process area (rather than the surrounding ground). Vegetation and buildings will also act as barriers to light travel.
17. Lamont County will become a hazardous waste area	No hazardous wastes will be generated by the Project.
18. Increased noise	The predicted sound levels of the Project alone are well below EUB permissible sound levels (PSLs) and will remain below the PSLs even when transportation sources are added. AST will investigate any noise concerns expressed by surrounding residents.
19. Overall loss of farmland to industry in the area	Volume IID, Section 2: Land Use and Reclamation assesses land use in the area and the Project's impacts on land use. The Project will result in a small reduction in agricultural land in the area, but the reduction is limited to lands zoned for industrial use and farmland that, on balance, is rated as poor quality.
20. Impedes future economic development	The socio-economic and social impacts associated with the Project are assessed in Volume IID, Section 4: Socio-Economic Assessment. There is no evidence the Project's development has the potential to impede future economic development.
21. Negative impact on vegetation	Potential impacts to vegetation are addressed in Volume IIC, Section 3: Vegetation. Vegetation in the potentially impacted area surrounding the PDA will be protected as a result of the proposed soil monitoring and mitigation program described in Vegetation and in Items 2 and 7. The results of the monitoring programs will be evaluated to determine if modifications to mitigation plans are required to reduce impacts. Additional mitigation steps will be taken to reduce the potential for establishment of noxious weeds that may occur as part of the industrial development.
22. Ensure AST complies with regulatory standards, including highest Safety and Environmental Stewardship standards	AST/HAZCO intends to comply with all regulatory standards and has demonstrated its commitment through the compliant operation of more than 20 industrial facilities in Alberta.
23. Possible hazardous effects of mixing sulphur with chlorate	Testing is underway to compare the potential reactivity of sulphur and chlorate to that of other common organic particulates. Results will be reported to the NRCB and AENV independently, and communicated to interested stakeholders.
24. Concern over AST's public relations in the area	AST continues to implement its public consultation program as detailed in Volume I and Volume IID, Section 5: Public Consultation. A public consultation committee has been established to improve communication, establish trust with the local community and facilitate public input into the Project's design and operation.
25. Adequate use of local labour	The Project will employ an estimated 22 people during the operations phase. AST has stated that local labour is preferred and will be given primary consideration for employment, providing work quality and safety are not compromised.
26. Construction quality	AST will follow standard engineering practices.
27. Tax revenue and benefits for the County	Projected taxes on AST assets are approximately $460,000 with an estimated $388,128 in municipal taxes, $62,387 to the Alberta School Foundation and $9,562 to the County of Lamont Foundation.

Table 5.7-1: AST Measures to Address Stakeholder Issues (Cont'd)

Stated Issues	AST Measures to Address Issues: Sections of the EIA
28. Plant location not appropriate due to its proximity to two towns and rural populations; should be a remote area	Although Lamont County is largely an agricultural area and the proposed AST facility is near the Towns of Lamont and Bruderheim, the facility will be located in a zone approved by the County for heavy industrial use. The facility's proximity to the Towns of Lamont and Bruderheim and the rural population is addressed in AST's ERP (Volume I, Appendix V) and Item 5 above.

5.8 References

5.8.1 Literature Cited

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Statistics Canada. 2001. *Custom Research: the Consolidated Census Subdivision of Lamont County (2001).* Provided July 2006.

5.8.2 Internet Sites

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