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TITLE	<b>Application for a Type A Land Use Permit in the DCR</b>
SECTION	7: Facility Sites
SUBJECT	1: Summary

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## INTRODUCTION

This section supports an application for facility sites on lands within the DCR. It contains:

- an overview map with site locations (see [Figure 7-1](#))
- an estimate of the personnel requirements
- a summary of the operations
- a description of potential environmental and resource effects
- construction equipment estimates

For the DCR, there are three pipeline facilities being proposed – the Blackwater River and Trail River compressor stations and the Trout River heater station. These facilities are described next in general terms and in detail in the following subjects.

Compressor stations are required to increase the pressure of the gas in the pipeline to offset pressure losses caused by friction. They will be located at intervals of about 225 km along the gas pipeline route.

The Trout River heater station is required to maintain the gas pipeline operating temperatures within the design requirements. It will be located between the Trail River compressor station and the interconnection with the NGTL system, about 100 km north of the boundary between the NWT and Alberta.

The locations of these facility sites are shown in the site-specific maps and the site photographs in the following subjects.

## PERSONNEL (PART 3)

Personnel requirements during the construction phase are addressed in the site-specific subjects that follow. After construction, the commissioning of each facility will require a relatively high level of on-site operations and maintenance activity. A workforce of up to eight personnel might be required for about three months.

When each facility is commissioned and operations of have reached steady state, the main control centre will remotely monitor, control and diagnose functions, including starting and stopping compressor units and changing control set points.

Routine operations and maintenance activities will likely require two to four personnel to be on each site intermittently, depending on the level of activity. Periodically, major maintenance or repair activities, or scheduled maintenance

will be required. This type of activity might normally require about eight to 12 personnel on site for short periods.

Maintenance personnel at the facility sites might also support pipeline operations, as required.

### **Preconstruction Activities**

Before development at each facility site begins:

- a preconstruction survey will be conducted to finalize the location and site-specific layout
- geotechnical evaluations might be conducted, as required, to support engineering of the various aspects of the facility, as required

### **Development Activities**

#### **Site Development**

Terrain, soil type and the extent of permafrost will influence development at each site. Site preparation activities might include:

- fencing or flagging to define site boundaries and areas to be avoided
- clearing vegetation and storing merchantable timber
- grading and placing fill to provide a supporting surface for installing, operating and maintaining the facilities
- sloping the surface to direct runoff away from the facility site

The degree of grading will depend on the amount of permafrost at each site and on soil conditions.

Borrow material will be placed in varying thickness up to 1.5 m around each site. The thickness will depend on soil conditions, soil temperatures, and its intended use within the site.

#### **Module Transportation**

To reduce installation personnel requirements and length of time on site, most facility components will be fabricated into transportable modules in off-site shops. To the extent practical, pre-testing of the modules will be performed at these fabrication shops.

The modules will be transported by truck or rail to a staging area in Hay River where additional assembly and testing might be performed.

Figure 7.1 has been moved to reduce file size. To view it, click on the link to the figure in the web page List of Figures for this document.

### **Module Installation**

When the modules are received at the site, they will either be initially stored at an infrastructure site or cranes will be used to set the modules onto previously installed pile foundations. Structural, piping, mechanical, electrical and instrumentation interconnections will be completed. Other facility components, such as yard piping and vessels, will be installed.

### **Buildings and Equipment**

Buildings and equipment will be constructed mainly on piles that are driven steel, or on cast-in-place concrete with pile caps. Slap-on-grade foundations might be considered for some buildings.

The gas compression equipment required at the Blackwater River and Trail River compressor stations is described in [Section 3](#). Heater station compressor equipment is addressed in [Subject 3](#) in this section.

High pressure sodium lights will be used for process buildings and external yard lighting. White lights will be installed in the control and maintenance buildings.

### **Safety and Control Systems**

The safety systems will include gas and smoke detection, shutdown capability, and a blowdown valve to depressurize and vent gas from the stations.

### **Site Testing and Commissioning**

Testing will include pressure-testing facilities to ensure that they are free of leaks. Testing media being considered for the compressor stations and heater station include heated water, water and freeze depressant mixture, air, and nitrogen.

Commissioning and start up activities are scheduled to begin in 2009 and be completed by year-end. Commissioning activities verify that equipment and systems are functioning according to the design and that the system is ready for operation. This includes energizing selected equipment and systems.

Disturbed parts of each site that are not required during operations will be reclaimed.

## **SUMMARY OF POTENTIAL ENVIRONMENTAL AND RESOURCE EFFECTS (PART 6)**

A summary of the biophysical and human environment setting, effects and primary mitigation strategies is provided for the region in [Section 8](#). Specific information for each individual facility site is included in the site-specific subjects that follow.

The site-specific information in Part 6 is based on environmental studies that centred on individual sites and were conducted during the 2002 to 2004 field seasons in accordance with protocols established for the project. These protocols included:

- an evaluation of habitat type, particularly vegetation and terrain
- species signs and the age of those signs
- visual observations during site surveys
- generate site descriptions

The information obtained from these studies will be considered in the development of the facility site mitigation plans.

## PUBLIC INVOLVEMENT

[Section 10](#) describes the public involvement program for the project and for the proposed development activities in the DCR. Site-specific information is provided in the following subjects.

The environmental information in the site-specific subjects was provided by community residents, describes the general vicinity of the individual facility sites and reflects local knowledge and experience in hunting, trapping and fishing in these areas. It will be considered in the development of the facility site mitigation plans.

## EQUIPMENT (PART 10)

Estimates of the equipment that might be required at each facility site are provided in the site-specific subjects to follow. An exact list and numbers will not be known until immediately before construction. [Table 7-1](#) lists the site operations equipment.

**Table 7-1: Estimated Site Construction Equipment**

Type and Approximate Number per Site	Size/ Model or Equivalent	Proposed Use
Trucks – 8	4x4 Pick-up and Crew cab	Personnel transport
Trucks – 2	4x4 Mechanic rig	Field mechanic
Ambulance – 1	4x4 and 4x2	First aid, med-evac
Trucks – 2	Fuel and Service S/A and T/A	Equipment fuelling
Truck – 1	Tandem water	Water hauling
Cranes – 2	Mobile 65 ton	Lifting and loading
Cranes – 1	Mobile 150 ton	Lifting and loading
Trucks – 20	Tandem dump – 18 m <sup>3</sup>	Hauling earth

**Table 7-1: Estimated Site Construction Equipment (cont'd)**

<b>Type and Approximate Number per Site</b>	<b>Size/ Model or Equivalent</b>	<b>Proposed Use</b>
Trailers – 4	Warehouse van	Parts and supplies
Trailers – 4	Office skid	Administration
Trailers – 2	Mechanics/welders setup	Pipe welding and equipment repair
Buses – 3	36, 24 and 12 Pass. 4x2 and mini-bus	Personnel transport
Bulldozers – 2	Large sized bulldozer (405 HP)	Earth moving
Mechanical ditchers – 1	Medium sized excavator	Excavation
Shelters – 4	Shelter for mechanical welders	Shelter welders
Loaders – 5	Large sized loader (5.5 m <sup>3</sup> bucket loader)	Loading and excavation
Grader – 1	Large sized grader (4.3 m blade)	Road and pad grading
Pumps – 4	Ditch, 3"	Ditch dewatering
Pumps – 4	Ditch, 2"	Ditch dewatering
Compressors – 10	150, 185, 350, 1,600 cfm	Pipe work, dewatering and testing
Radio – 1	Base	Communications
Radios – 45	Mobile	Communications
Propane tanks – 6	500 gallon	Propane storage
Light towers – 10	As required	Work area lighting
Generators – 8	25 kW	Power for hand tools, lighting and pumps
Tool cribs – 6	25-person	Tool storage
Welders – 6	300 amp portable diesel	Welding
Welders – 4	8 pack, with generators	Welding
Vibratory roller/packers – 2	As required	Compaction
Portable shelters – 4	20' by 20'	Shelter workers

**Table 7-2: Estimated Site Operations Equipment**

Type and Approximate Number per Site	Size/ Model or Equivalent	Proposed Use
Truck – 1	4x4 utility vehicle	Personnel transport and hauling
Loader – 1	Large sized loader (5.5 m <sup>3</sup> bucket loader)	Loading and excavation
Crane – 1	As required	Lifting and loading
Truck – 1	Utility welder	Maintenance and repair
Mechanical ditcher – 1	Medium sized backhoe and loader	Loading and excavation

**FUELS (PARTS 11 AND 13)**

Fuel storage during the construction phase is addressed in [Section 4](#).

**FEES (PART 18)**

The total land area required for activities contained in this section is 74.7 ha.

The land requirements are shown in [Appendix A](#).



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TITLE	<b>Application for a Type A Land Use Permit in the DCR</b>
SECTION	7: Facility Sites
SUBJECT	2: Blackwater River Compressor Station

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## INTRODUCTION

This subject supports an application for land use activities and operations associated with the Blackwater River compressor station. It contains:

- an overview map showing the facility location (see [Figure 7-2](#))
- an estimate of personnel requirements
- a summary of the operations
- a description of potential environmental and resource effects

The location of the Blackwater River compressor station is shown in the photographs and site-specific map in [Figure 7-3](#) and [Figure 7-4](#).

## PERSONNEL (PART 3)

The construction of the Blackwater River compressor station will involve three major steps. The first step is preparing the site and installing the site pad. This will require a crew size of about 60. The second step is the piling activity, which will require a crew size of about 60. The third step is installing the prefabricated compression facility modules followed by pre-commissioning activities. This step requires about 120 personnel, including camp staff.

Construction plans require the installation of a 120-person camp within the footprint of the Blackwater River compressor station for the construction period. A description of this activity is contained in [Section 4](#).

## SUMMARY OF OPERATION (PART 5)

The land use activities and operations associated with this site include:

- developing and maintaining a 9.5 ha site
- developing and maintaining a 20 m wide, 900 m long all-weather access road from the airstrip to the Blackwater River compressor station
- abandoning and reclaiming the site at the end of the operational life of the facility

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## Development Activities

Construction of the Blackwater River compressor station site is scheduled to start in the summer of 2006. The facilities are scheduled for start up in 2009. Construction activities will take place year-round and are scheduled to be complete in the summer of 2010.

## Site Development

Pad materials will be excavated from approved borrow site locations as close as practical to the Blackwater River compressor station. These materials will be transported to the facility on the new 900 m all-weather access road and various winter roads. They might be hauled and placed while frozen, and allowed to thaw during the following summer season. This might require compacting at a later date.

## Module Transportation

The modules will be transported by truck or rail to a staging area in Hay River where additional assembly and testing might be performed. The modules might be as large as 350 tonnes for the Blackwater River compressor station. Modules and other components will then be barged from Hay River to the Blackwater compressor station. After unloading, the modules will be staged in the nearby barge landing or equipment storage location and then transported to the Blackwater River compressor station.

## Access

An all-weather access road (D-F-A-702.1), about 900 m long, will be built to the site from the airstrip. [Table 7-3](#) contains access road details. Access from the Blackwater River barge landing will be along all-weather access road D-BL-A-702.1 (see [Section 4](#)).

The access roads will be constructed to accommodate the transportation of large facility modules, construction equipment and materials. See [Section 3](#) for a cross-section of an all-weather access road. See the site-specific map in [Figure 7-3](#) for access road alignment.

**Table 7-3: Access Roads**

Access Road Name	Kilometre Post (KP)	Land Use			Estimated Length (km)
		Municipal Length (km)	Private Length (km)	Crown Length (km)	
D-F-A-702.1	702.1			0.9	0.9
Total length of facility access roads on Crown lands:				0.9	

## ENVIRONMENT

The following topics provide specific biophysical and human environment setting, effects and mitigation information for the Blackwater River compressor station site. This information includes data gathered during 2004 field studies.

### Biophysical Environment

#### Air Quality Setting

The air quality setting for this site is expected to be similar to the regional setting for the DCR described in [Section 8](#).

#### Air Quality Potential Effects and Mitigation

One of the primary sources of project emissions in the DCR will be the continuous operation of emissions-producing equipment at the Blackwater River compressor station. Emissions from the Blackwater compressor station predicted during peak operations are summarized in [Table 7-4](#).

Ground-level concentrations were predicted using air dispersion models. Dispersion models consider various site-specific meteorological and topographical conditions to predict ground-level concentrations, based on facility configuration and emission rates.

**Table 7-4: Predicted Emissions from the Blackwater River Compressor Station**

Activity	Emissions (t/ d)					
	SO <sub>2</sub> <sup>a</sup>	NO <sub>x</sub> <sup>b</sup>	CO <sup>c</sup>	PM <sub>2.5</sub> <sup>d</sup>	Benzene	BTEX
Compression	<0.01	0.40	0.19	0.01	<0.001	<0.01
Power generation	<0.01	0.13	0.06	<0.01	<0.001	<0.01
Ancillary equipment	<0.01	0.03	0.03	<0.01	<0.001	<0.01
Total <sup>e</sup>	<0.01	0.57	0.27	0.02	<0.001	<0.01

NOTES:  
<sup>a</sup>SO<sub>2</sub> – sulphur dioxide  
<sup>b</sup>NO<sub>x</sub> – oxides of nitrogen  
<sup>c</sup>CO – carbon monoxide  
<sup>d</sup>PM<sub>2.5</sub> – fine particulate matter  
<sup>e</sup>Numbers in this table have been rounded for presentation purposes. Therefore, the sum of the presented numbers might add up to values different than the totals.

The figures in [Table 7-4](#) represent the likely emissions following the implementation of mitigation measures. During the life of the project, there might be brief periods when it will be necessary to release gas into the atmosphere as a result of upsets and routine maintenance at the Blackwater compressor station. There is also the potential for small volumes of gases, known as fugitive

emissions, to be released from valves and fittings during project operations. As such, fugitive emissions are usually restricted to older operations and are expected to be very small given the modern design and configuration of this project. Therefore, fugitive emissions were not quantified in the air assessment described in this application.

### ***Sulphur Dioxide***

The natural gas that will be transported through the gas pipeline in the DCR is sweet gas that is effectively free of sulphur compounds. Therefore, project sulphur dioxide (SO<sub>2</sub>) emissions will be small. The air quality assessment has included SO<sub>2</sub> as a parameter to ensure regulator and stakeholder concerns are addressed.

Table 7-5 summarizes ground-level SO<sub>2</sub> concentrations predicted by dispersion models in the area of the Blackwater River compressor station, following implementation of mitigation measures. The predicted one-hour, 24-hour and annual SO<sub>2</sub> concentrations were well below Northwest Territories ambient air standards.

**Table 7-5: Sulphur Dioxide Ground-Level Concentration Predictions for the Blackwater River Compressor Station**

Parameter	Maximum Average Period Predictions <sup>a</sup>		
	One-hour	24-hour	Annual
Maximum SO <sub>2</sub> concentration (µg/m <sup>3</sup> )	3.8	1.2	0.2
Distance to maximum <sup>b</sup> (km)	0.1	0.1	0.1
Direction to maximum <sup>b</sup>	S <sup>f</sup>	S <sup>f</sup>	S <sup>f</sup>
Expected occurrences exceeding standard <sup>c</sup>	0	0	0
Area exceeding standard <sup>d</sup> (ha)	0	0	0
SO <sub>2</sub> standards <sup>e</sup> (µg/m <sup>3</sup> )	450	150	30
NOTES: <sup>a</sup> The predictions in the table include the effects of combined emissions from project sources in the southern airshed. <sup>b</sup> Distance and direction are relative to the facilities. <sup>c</sup> The expected occurrences exceeding standard is the number of hours, days or years with predicted concentrations exceeding the applicable standards. It is the average of five years of modeling data, so it might not be a whole number. <sup>d</sup> The area exceeding standard is the total area over which the predicted one-hour, 24-hour or annual concentrations exceeded the applicable standards. <sup>e</sup> Northwest Territories Ambient Air Standards (RWED 2002) <sup>f</sup> S – south			

### ***Nitrogen Dioxide and Oxides of Nitrogen***

Nitrogen dioxide (NO<sub>2</sub>) and nitric oxide (NO) will be the primary oxides of nitrogen (NO<sub>x</sub>) emitted from the combustion sources at the Blackwater compressor station. The NO emissions can undergo chemical reactions in the atmosphere to form additional NO<sub>2</sub>. Nitrogen dioxide is addressed because it is the only oxide of nitrogen that is regulated in Canada. However, the assessment does present predicted total NO<sub>x</sub> concentrations, as these are required to determine NO<sub>2</sub> concentrations. There are no air quality guideline values or objectives for NO<sub>x</sub>.

Table 7-6 summarizes the NO<sub>x</sub> and NO<sub>2</sub> concentrations predicted in the area of Blackwater River compressor station following implementation of mitigation measures. None of the maximum one-hour, 24-hour or annual NO<sub>2</sub> predictions exceeds federal ambient air quality objectives.

**Table 7-6: Nitrogen Dioxide and Oxides of Nitrogen Ground-Level Concentration Predictions for the Blackwater River Compressor Station**

Parameter	Maximum Average Period Predictions <sup>a</sup>		
	One-hour	24-hour	Annual
Maximum NO <sub>x</sub> concentration (µg/m <sup>3</sup> )	1,213.9	336.7	48.4
Maximum NO <sub>2</sub> concentration (µg/m <sup>3</sup> )	132.6	38.9	5.8
Distance to maximum <sup>b</sup> (km)	7.2	1.4	0.1
Direction to maximum <sup>b</sup>	SSW <sup>i</sup>	SE <sup>h</sup>	S <sup>g</sup>
Expected occurrences exceeding objective <sup>c</sup>	0	0	0
Area exceeding objective <sup>d</sup> (ha)	0	0	0
NO <sub>2</sub> objectives <sup>e,f</sup> (µg/m <sup>3</sup> )	400	200	100
NOTES: <sup>a</sup> The predictions in the table include the effects of combined emissions from project sources in the southern airshed. <sup>b</sup> Distance and direction are relative to the facilities. <sup>c</sup> The expected occurrences exceeding objective is the number of hours, days or years with predicted concentrations exceeding the applicable objectives. It is the average of five years of modelling data, so it might not be a whole number. <sup>d</sup> The area exceeding objective is the total area over which the predicted one-hour, 24-hour or annual concentrations exceeded the applicable objectives. <sup>e</sup> Federal <i>Ambient Air Quality Objectives</i> from <i>The Clean Air Act</i> (Environment Canada 1981) <sup>f</sup> There are no Northwest Territories standards for NO <sub>2</sub> . <sup>g</sup> S – south <sup>h</sup> SE – southeast <sup>i</sup> SSW – south-southwest			

### ***Carbon Monoxide***

Carbon monoxide can result from the incomplete combustion of fuels used at the Blackwater compressor station. It is also a regulated compound.

Table 7-7 summarizes the ground-level CO concentrations predicted by dispersion models in the area of the Blackwater River compressor station following implementation of mitigation measures. None of the predicted one-hour and eight-hour CO concentrations exceeds the federal ambient air quality objectives.

**Table 7-7: Carbon Monoxide Ground-Level Concentration Predictions for the Blackwater River Compressor Station**

Parameter	Maximum Average Period Predictions <sup>a</sup>	
	One-hour	Eight-hour
Maximum CO concentration ( $\mu\text{g}/\text{m}^3$ )	585.0	316.2
Distance to maximum <sup>b</sup> (km)	0.1	0.1
Direction to maximum <sup>b</sup>	SE <sup>g</sup>	SE <sup>g</sup>
Expected occurrences exceeding objective <sup>c</sup>	0	0
Area exceeding objective <sup>d</sup> (ha)	0	0
CO objectives <sup>e,f</sup> ( $\mu\text{g}/\text{m}^3$ )	15,000	6,000
NOTES: <sup>a</sup> The predictions in the table include the effects of combined emissions from project sources in the southern airshed. <sup>b</sup> Distance and direction are relative to the facilities. <sup>c</sup> The expected occurrences exceeding objective is the number of one-hour or eight-hour periods with predicted concentrations exceeding the applicable objectives. It is the average of five years of modelling data, so it might not be a whole number. <sup>d</sup> The area exceeding objective is the total area over which the predicted one-hour or eight-hour concentrations exceeded the applicable objectives. <sup>e</sup> Federal <i>Ambient Air Quality Objectives</i> from <i>The Clean Air Act</i> (Environment Canada 1981) <sup>f</sup> There are no Northwest Territories standards for CO. <sup>g</sup> SE – southeast		

### ***Fine Particulate Matter***

Most airborne particles emitted from the Blackwater compressor station during peak operations will be in the smallest size ranges. Therefore they will be assessed using PM<sub>2.5</sub> as an indicator.

Table 7-8 shows the maximum ground-level PM<sub>2.5</sub> concentrations predicted by dispersion models in the area of the Blackwater River compressor station,

following implementation of mitigation measures. All values are below the Northwest Territories ambient air standards.

**Table 7-8: Fine Particulate Matter Ground-Level Concentration Predictions for the Blackwater River Compressor Station**

Parameter	Maximum Average Period Predictions <sup>a</sup>	
	24-hour	Annual
Maximum PM <sub>2.5</sub> concentration (µg/m <sup>3</sup> )	9.5	2.5
Distance to maximum <sup>b</sup> (km)	0.1	0.1
Direction to maximum <sup>b</sup>	S	S
Expected occurrences exceeding standard <sup>c</sup>	0	0
Area exceeding standard <sup>d</sup> (ha)	0	0
PM <sub>2.5</sub> standards <sup>e</sup> (µg/m <sup>3</sup> )	30	0
NOTES: <sup>a</sup> The predictions in the table include the effects of combined emissions from project sources in the southern airshed. <sup>b</sup> Distance and direction are relative to the facilities. <sup>c</sup> The expected occurrences exceeding standard is the number of days or years with predicted concentrations exceeding the applicable standards. It is the average of five years of modeling data, so it might not be a whole number. <sup>d</sup> The area exceeding standard is the total area over which the predicted 24-hour or annual concentrations exceeded the applicable standards. <sup>e</sup> Northwest Territories <i>Ambient Air Standards</i> (RWED 2002) <sup>f</sup> S - south		

### ***Benzene and BTEX Compounds***

Volatile organic compounds (VOCs) can be released in small quantities from the incomplete combustion of fuel at facilities. Of the VOCs that could be released, this assessment focused specifically on benzene and BTEX, that is, the combination of benzene, toluene, ethylbenzene, and xylene. Benzene and BTEX concentrations were included because of the perceived association between oil and gas operations and benzene and BTEX levels in the air.

Table 7-9 shows ground-level concentrations of benzene and total BTEX concentrations predicted by dispersion models in the area of the Blackwater River compressor station, following implementation of mitigation measures. None of the predicted benzene or BTEX concentrations exceed the defined criteria.

**Table 7-9: Benzene and Total BTEX Ground-Level Concentration Predictions for the Blackwater River Compressor Station**

Parameter	Predicted Maximum Concentrations <sup>a</sup>	
	Benzene	BTEX
Maximum one-hour concentration ( $\mu\text{g}/\text{m}^3$ )	0.4	1.0
Distance to maximum <sup>d</sup> (km)	0.1	0.1
Direction to maximum <sup>d</sup>	SE <sup>h</sup>	SE <sup>h</sup>
Expected occurrences exceeding criteria <sup>e</sup>	0	0
Area exceeding standard <sup>f</sup> (ha)	0	0
Available criteria <sup>g</sup> ( $\mu\text{g}/\text{m}^3$ )	30 <sup>b</sup>	30 <sup>c</sup>

NOTES:  
<sup>a</sup>The predictions in the table include the effects of combined emissions from project sources in the southern airshed.  
<sup>b</sup>Alberta *Ambient Air Quality Guidelines* (AENV 2000)  
<sup>c</sup>The Alberta *Ambient Air Quality Guidelines* (AENV 2000) value for benzene was used for BTEX because it is the most stringent of the available criteria for benzene, toluene, ethylbenzene and xylene.  
<sup>d</sup>Distance and direction are relative to the facilities.  
<sup>e</sup>The expected occurrences exceeding criteria is the number of hours with predicted concentrations exceeding the applicable criteria. It is the average of five years of modelling data, so it might not be a whole number.  
<sup>f</sup>The area exceeding criteria is the total area over which the predicted one-hour concentrations exceeded the applicable criteria.  
<sup>g</sup>There are no Northwest Territories standards for benzene or total BTEX.  
<sup>h</sup>SE – southeast

### ***Increased Acid Input***

Emissions of SO<sub>2</sub> and NO<sub>x</sub> from the Blackwater compressor station operations have the potential to react in the atmosphere to form acid compounds that could affect the environment when deposited on soils, vegetation or into waterbodies. Potential increases in acid deposition, because of the project, has been evaluated by determining the expected sulphate and nitrate deposition and, from that, area potential acid input (PAI).

[Table 7-10](#) summarizes predicted PAI values associated with Blackwater River compressor station emissions. Since the PAI levels predicted over the study area are below threshold for the most sensitive ecosystems, no detectable effects are expected because of PAI.

**Table 7-10: Potential Acid Input Predictions for the Blackwater River Compressor Station**

Parameter	Results <sup>a</sup>
Maximum PAI (keq/ha/a)	1.20
Area PAI (keq/ha/a) <sup>d</sup>	0.009
Maximum sulphate deposition (kg/ha/a)	0.41
Maximum nitrate deposition (kg/ha/a)	73.73
Area with PAI >0.17 keq/ha/a <sup>b</sup> (ha)	23
Area with PAI >0.25 keq/ha/a <sup>c</sup> (ha)	10
NOTES: <sup>a</sup> The predictions in the table include the effects of combined emissions from project sources in the southern airshed. <sup>b</sup> 0.17 keq/ha/a represents the monitoring load value for sensitive ecosystems as defined by CASA. <sup>c</sup> 0.25 keq/ha/a represents the critical load value for sensitive ecosystems. <sup>d</sup> Area PAI represents integrated PAI levels over the entire 40,000 ha study area.	

### ***Increased Dust Deposition***

Increased dust deposition will be caused by:

- facilities and right-of-way construction
- extraction of borrow materials during construction
- vehicle movement along unpaved roadways

Dust deposition will be a localized effect, as most of the dust particles will be deposited quickly and near their sources.

### ***Greenhouse Gas Emissions***

Greenhouse gas (GHG) emissions are mostly CO<sub>2</sub>, methane (CH<sub>4</sub>), and N<sub>2</sub>O, which can all be expressed as ECO<sub>2</sub>, that is equivalent carbon dioxide values. Facility operations, project infrastructure and associated traffic will all contribute to GHG emissions, but the contribution of the Blackwater compressor station to GHG emissions is expected to be small and short-term.

GHG emissions in the DCR will primarily come from the operation of the Blackwater River and the Trail River compressor stations and the Trout River heater station.

Table 7-11 shows annual predicted GHG emissions from the Blackwater River compressor station.

Although the operation of the pipeline facilities in the DCR will result in noticeably increased GHG emissions in the NWT (about 15% based on year 2000 GHG levels), the increase in GHG emissions on a national level will be very low (about 0.03% based on year 2000 GHG levels).

**Table 7-11: Annual Predicted Greenhouse Gas Emissions from the Blackwater River Compressor Station**

Activity	Emissions (kt/ a) <sup>f</sup>			
	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	ECO <sub>2</sub> <sup>a,b</sup>
Compression	87.28	0.01	<0.01	88.60
Power generation	4.17	0.05	<0.01	5.88
Ancillary equipment	13.08	<0.01	<0.01	13.16
Total <sup>c</sup>	104.53	0.05	0.01	107.64
NOTES: <sup>a</sup> ECO <sub>2</sub> – equivalent carbon dioxide <sup>b</sup> ECO <sub>2</sub> emissions were calculated using greenhouse potentials of one for CO <sub>2</sub> , 21 for CH <sub>4</sub> and 310 for N <sub>2</sub> O (Environment Canada 2002). <sup>c</sup> Numbers in this table have been rounded for presentation purposes. Therefore, the sum of the presented numbers might add up to values different than the totals.				

### Noise Setting

Aside from any noise associated with traffic on the existing Wrigley to Fort Good Hope winter road, the noise setting information for this site is expected to be similar to the regional setting information for the DCR described in [Section 8](#).

Due to the remote nature of the proposed facility sites in the DCR, no site-specific noise studies were conducted.

### Noise Potential Effects and Mitigation

Construction noise will be centred at the facility sites, including Blackwater River compressor station.

During operations, there might be intermittent, short duration events that would cause an increase in noise levels above normal operational levels. Examples include the occasional venting of natural gas as a result of station upset conditions or for maintenance. Another example is the testing or use of emergency generator sets. These occurrences are expected to be uncommon and limited in duration.

Operations will raise sound levels near the compressor station. Noise caused by operations is continuous sound, from constantly operating machinery. Models were used to predict sound levels at various distances up to 1.5 km from each of the facility fence lines based on normal operations.

The Blackwater River compressor station includes:

- pipeline compressor buildings with associated equipment
- compressor suction and discharge pipes
- compressor discharge aerial cooler fans
- utility building with associated equipment
- power generator building

Table 7-12 shows the predicted maximum levels of noise from normal operations from the Blackwater River compressor station site.

**Table 7-12: Predicted Maximum Noise Levels at 1.5 km, Normal Operations – Blackwater River Compressor Station**

Season	Predicted Maximum Noise Level (dBA) <sup>b</sup>	Noise Guideline Limit (dBA) <sup>a</sup>
Summer	38	40
Winter	38	40

NOTES:  
<sup>a</sup>Alberta Energy and Utilities Board (AEUB) *Noise Control Directive User Guide-4<sup>th</sup> Edition* (Guide 38).  
<sup>b</sup>Operations noise is continuous. Therefore, average maximum sound exposure values are the same, that is,  $L_{eq}(1)$ ,  $L_{eq}$  day,  $L_{eq}$  night and  $L_{eq}(24)$ .  $L_{eq}$  values, expressed in dBA, are the energy-averaged, weighted sound levels for a complete measurement interval.

With the exception of intermittent noise, the effects of noise during operations at the Blackwater River compressor station are expected to be limited, as sound levels at a distance of 1.5 km from the site will be less than 40 dBA.

### Soils, Landforms and Permafrost Setting

The Blackwater River compressor station site is located on a large glaciofluvial terrace, adjacent to the Mackenzie River, in the extensive discontinuous permafrost zone. The upper surface of the terrace is level and contains ancient bars and river channels. Surficial materials are well drained and have developed Brunisolic soils. Low-lying areas are locally overlain by organic veneers.

Permafrost might be present in the glaciofluvial terrace (5.0 to 10% of the area) within mossy and poorly drained wet depressions containing clayey soils. Where present in permafrost, ice content might range from 5.0 to 20%, by weight. Moderate to strong slopes are locally found on the bank of the Mackenzie River.

### Soils, Landforms and Permafrost Potential Effects and Mitigation

Terrain-related effects are not predicted for this facility site. The construction of pads for the site will result in soil loss because of burial.

General mitigation strategies to offset potential effects are outlined in [Section 8](#).

### **Vegetation Setting**

Vegetation at this site is a mix of black spruce/Labrador tea/mountain cranberry and black spruce–tamarack in the northern half of the site, and white spruce–trembling aspen–jack pine in the southern half.

The black spruce/Labrador tea/mountain cranberry type occurs in lowlands and has scattered black spruce in the tree layer. Labrador tea, willow species and ground birch are common shrubs, and mountain cranberry, red bearberry and dwarf scouring rush are common ground covers. Stair-step, golden and peat mosses are common.

The black spruce–tamarack type has an open canopy of black spruce and tamarack. Common shrubs include Labrador tea, green alder and willow. Sedge species, mountain cranberry and red bearberry are common in the ground cover. Stair-step moss is common.

The white spruce–trembling aspen–jack pine type is a mixedwood tree canopy. Shrub cover is abundant and includes green alder, prickly rose and soapberry. Ground cover includes bunchberry, northern comandra and twinflower. Stair-step moss is abundant.

All vegetation types at the site are common in the study area.

### **Vegetation Potential Effects and Mitigation**

The development of the Blackwater River compressor station and its associated all-weather access road will affect vegetation through clearing and mechanical damage of trees and shrubs, burial of vegetation on the site by gravel, permanent changes in substrate with construction of pads, and potential changes in drainage around the site. Alteration of vegetation health through effects of dust will occur during construction, to a limited localized extent, primarily along the all-weather access roads to the facility.

Effects on vegetation resulting from facility construction activities will persist for the operations phase and are likely to extend into the far future (effect extends beyond 30 years past decommissioning and abandonment) given the slow rates of vegetation growth in the North. Vegetation growing in association with gravel pads will likely develop into plant communities differing from those existing before development. In addition, introductions of reclamation species and potential accidental introductions of invasive non-native plant species might occur.

Implementation of primary mitigation measures, as described in [Section 8](#), will help reduce effects on vegetation at this facility site.

### **Wildlife Setting**

Regional wildlife setting information is described in [Section 8](#).

### **Wildlife Potential Effects and Mitigation**

Regional wildlife effects and mitigation are described in [Section 8](#).

### **Hydrology Setting**

Changes in runoff coefficients might occur because of the development of the Blackwater River compressor station. Runoff discharge and velocity will be greater in areas where vegetation has been removed and the land surface graded.

The Blackwater River compressor station site is located east of the airstrip and adjacent to the existing Wrigley to Fort Good Hope winter road. The runoff from the compressor station site will flow directly toward the Mackenzie River about 800 m downslope. The area encompassing the compressor station site that contributes runoff to the Mackenzie River is about 2.6 km<sup>2</sup>.

### **Hydrology Potential Effects and Mitigation**

Effects of any potential increase in mean annual runoff due to the higher runoff coefficient of the disturbed area, and an increase in mean sediment concentration on the Mackenzie River, are expected to be limited because of the river's large flow and dilution capacity.

### **Groundwater Setting**

Surface materials are expected to include sand, gravel and some silt. Groundwater is expected to flow in a generally southwest direction toward a nearby watercourse.

### **Groundwater Potential Effects and Mitigation**

Groundwater data for this site is expected to be similar to the regional DCR data described in [Section 8](#).

### **Water Quality Setting**

Water quality data for this site is expected to be similar to regional DCR data described in [Section 8](#).

### **Water Quality Potential Effects and Mitigation**

The Blackwater River compressor station could affect water quality through acid deposition, leaks and spills, sediment releases from disturbed land, and changes in surface water flow and level resulting from surface runoff or water withdrawals.

Modelled acid deposition rates resulting from compressor station emissions will be limited and waterbodies in the DCR are typically not sensitive to acid deposition. Therefore, based on available information, no effects on water quality because of acid deposition are predicted.

Effects of domestic wastewater deposits will be managed using water treatment and disposal techniques that will reduce effects on water quality. There will be no untreated process water released to surface waters from the facility.

Effects of small-scale leaks will be reduced through the use of best practices, and application of the ERP (see [Section 11](#)).

Some localized effects on water quality because of sediment releases are expected. However, these effects are expected to be limited to small increases in concentrations of sediment-associated parameters, such as nutrients and metals. These increases are not expected to result in concentrations above water quality guidelines for the protection of aquatic life or drinking water quality.

### **Fish and Fish Habitat Setting**

There are no surface water features within the boundaries of the Blackwater River compressor station. An unnamed watercourse is located about 100 m upslope and northeast of the site. The unnamed watercourse is crossed by the pipeline right-of-way and has been classified as a vegetated channel. Vegetated channels are characterized by ephemeral or intermittent flow and are expected to be dry or frozen to the bed in winter. As such, these channels do not provide overwintering habitat and can only be used by fish during brief periods when they are flowing, in the spring.

### **Fish and Fish Habitat Potential Effects and Mitigation**

Potential effects on fish and fish habitat resulting from the Blackwater River compressor station would be primarily related to direct disturbance of fish habitat by activities associated with the development of the site and indirect effects resulting from sediment in runoff. However, the Blackwater River compressor station is located sufficiently far away from any local fish-bearing waterbodies that there will likely be no direct effects on fish habitat, or effects related to runoff and sediment yield.

The topography at the site, maintaining a vegetated buffer zone between the site and local waterbodies, if required, and implementation of site-specific erosion and sediment control plans will prevent sediment from the site reaching nearby surface waters.

## **Human Environment**

This topic describes information on the protected areas and heritage resource aspects of the human environment for the Blackwater River compressor station. Regional information on the human environment setting, effects and mitigation is provided in [Section 8](#).

### **Protected Areas Setting**

This facility site and its access road are located within the boundaries proposed for the Pehdzéh Ki Deh conservation zone in the June 2005 draft land use plan. The site and its road are not currently subject to a time-limited withdrawal from new surface or subsurface interests under P.C. 2003-1230. Nor are there any existing protected areas in the immediate vicinity of the site.

### **Protected Areas Potential Effects and Mitigation**

The June 2005 draft land use plan is in the preparation and comment phase, and there are no time-limited restrictions on new surface interests currently in place at this site.

In the event that the land use designation of the proposed conservation zone is approved, the protected area effects might include a slight decrease in the land base available for other land uses within the Pehdzéh Ki Deh area and a permanent change to the landscape.

The potential effects of the proposed development on other aspects of the human environment, as well as on the biophysical environment, will be reduced by the mitigation strategies described in [Section 8](#) and by the management and protection plans outlined in [Section 11](#).

### **Heritage Resources Setting**

This site was inspected as part of the field reconnaissance program. The location was considered to have moderate potential for the discovery of heritage resources. Previously recorded heritage resource sites are located within 2.0 km of the development area, indicating prior use of this region. No heritage resource sites were recorded during the surface reconnaissance.

The nature of the heritage resource potential and results of the investigations at this location was provided in a report to the PWNHC under permit 2004-956.

### **Heritage Resource Potential Effects and Mitigation**

Before development of this site, and if required, a Historical Resources Impact Assessment will be conducted and provided to the PWNHC. If it is determined

that the development will affect any heritage resources, mitigation plans will be prepared.

## **PUBLIC INVOLVEMENT**

The Pehdzéh Ki First Nation has indicated that this area includes a moose pasture and has good wildlife habitat and denning sites. It has indicated that the area is a cultural meeting place and there are spiritual sites (sacred rock, people turn to stone). Local residents use the area to hunt bear, caribou and moose.

Additional information on public involvement activities is provided in [Section 10](#).

## **PERIOD OF OPERATION (PART 14)**

Construction activities will take place year-round, at varying levels of activity, from 2006 to 2010 (see [Section 3](#)). The Blackwater River compressor station is expected to be in operation for 25 years or more.

## **LOCATION OF ACTIVITIES BY MAP COORDINATES (PART 16)**

Map coordinates of the northwest corner of the facility site are given in [Table 7-13](#) and a map showing the location of the site is in [Figure 7-3](#).

**Table 7-13: Location of Activities by Map Coordinates**

<b>Site</b>	<b>Latitude (DD)</b>	<b>Longitude (DD)</b>	<b>UTM Easting (m)</b>	<b>UTM Northing (m)</b>	<b>UTM Zone</b>
Blackwater facility site	63.9225	-124.1274	444707	7088866	10

## **FEES (PART 18)**

The total land area required for activities contained in this subject is 11.3 ha.

The land requirements are shown in [Appendix A](#).

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Figure 7.4 has been moved to reduce file size. To view it, click on the link to the figure in the web page List of Figures for this document.



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TITLE	<b>Application for a Type A Land Use Permit in the DCR</b>
SECTION	7: Facility Sites
SUBJECT	3: Trail River Compressor Station

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## INTRODUCTION

This subject supports an application for land use activities and operations associated with the Trail River compressor station. It contains:

- an overview map showing the facility location ([Figure 7-5](#))
- an estimate of personnel requirements
- a summary of the operations
- a description of potential environmental and resource effects

The location of the Trail River compressor station is shown in the photographs and site-specific maps in [Figure 7-7](#), [Figure 7-8](#), [Figure 7-9](#) and [Figure 7-10](#).

## PERSONNEL (PART 3)

The construction of the Trail River compressor station will involve three major steps. The first step is preparing the site and installing the site pad. This will require a crew size of about 60. The second step is the piling activity, which will require a crew size of about 60. The third step is installing the prefabricated processing facility modules followed by pre-commissioning activities. This step requires about 120 personnel, including camp staff.

Construction plans require the installation of a 120-person camp within the footprint of the Trail River compressor station for the construction period. A description of this activity is contained in [Section 4](#).

## SUMMARY OF OPERATION (PART 5)

The land use activities and operations associated with this site include:

- developing and maintaining a 9.5 ha site
- developing and maintaining a 20 m wide, 24.9 km winter access road from the Mackenzie Highway to the Trail River compressor station
- developing and maintaining a new airstrip to support construction and operations activities
- abandoning and reclaiming the site at the end of the operational life of the facility

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## **Development Activities**

Construction of the Trail River compressor station site is scheduled to start in late 2006. The facilities are scheduled for start up in late 2009. Construction activities will take place year-round and are scheduled to be complete in the summer of 2010.

### **Site Development**

Pad materials will be excavated from approved borrow site locations as close as practical to the Trail River compressor station. These materials will be transported to the facility on the new 24.9 km winter access road and various other winter roads. They might be hauled and placed while frozen, and allowed to thaw during the following summer season. This might require compacting at a later date.

### **Module Transportation**

The modules will be transported by truck or rail to a staging area in Hay River where additional assembly and testing might be performed. The modules might be as large as 350 tonnes for the Trail River compressor station.

Modules and other components will then be barged from Hay River to the Camsell Bend barge landing. After unloading, the modules will be staged in the nearby barge landing or equipment storage location and then transported to the Trail River compressor station.

## **Access**

The new winter access road (D-F-W-927.8), about 24.9 km long, will be built to the facility site from the Mackenzie Highway (see [Section 4](#)). Access from the Camsell Bend barge landing will be along all-weather access road D-BL-A-927.8 and the Mackenzie Highway (see [Section 4](#)).

The access roads will be constructed to accommodate the transportation of large facility modules, construction equipment and materials. See [Section 3](#) for a cross-section of an all-weather access road. See the site-specific map in [Figure 7-7](#) for access road alignment.

## **ENVIRONMENT**

The following topics provide specific biophysical and human environment setting, effects and mitigation information for the Trail River compressor site. This information includes data gathered during 2004 field studies.

## Biophysical Environment

### Air Quality Setting

The air quality setting for this site is expected to be similar to the regional setting for the DCR described in [Section 8](#).

### Air Quality Potential Effects and Mitigation

One of the primary sources of project emissions in the DCR will be the continuous operation of emission producing equipment at the Trail River compressor station. Emissions from the Trail River compressor station predicted during peak operations are summarized in [Table 7-14](#).

Ground-level concentrations were predicted using air dispersion models. Dispersion models consider various site-specific meteorological and topographical conditions to predict ground-level concentrations, based on facility configuration and emission rates.

**Table 7-14: Predicted Emissions from the Trail River Compressor Station**

Activity	Emissions					
	SO <sub>2</sub> <sup>a</sup> (t/ d)	NO <sub>x</sub> <sup>b</sup> (t/ d)	CO <sup>c</sup> (t/ d)	PM <sub>2.5</sub> <sup>d</sup> (t/ d)	Benzene (t/ d)	BTEX (t/ d)
Compression	<0.01	0.40	0.19	0.01	<0.001	<0.01
Power generation	<0.01	0.13	0.06	<0.01	<0.001	<0.01
Ancillary equipment	<0.01	0.03	0.03	<0.01	<0.001	<0.01
Total <sup>e</sup>	<0.01	0.57	0.27	0.02	<0.001	<0.01
NOTES: <sup>a</sup> SO <sub>2</sub> – sulphur dioxide <sup>b</sup> NO <sub>x</sub> – oxides of nitrogen <sup>c</sup> CO – carbon monoxide <sup>d</sup> PM <sub>2.5</sub> – fine particulate matter <sup>e</sup> Numbers in this table have been rounded for presentation purposes. Therefore, the sum of the presented numbers might add up to values different than the totals.						

The figures in [Table 7-14](#) represent the likely emissions following the implementation of mitigation measures. During the life of the project, there might be brief periods when it will be necessary to release gas into the atmosphere as a result of upsets and routine maintenance at the Trail River compressor station. There is also the potential for small volumes of gases, known as fugitive emissions, to be released from valves and fittings during project operations. As such, fugitive emissions are usually restricted to older operations and are expected to be very small given the modern design and configuration of this project. Therefore, fugitive emissions were not quantified in the air assessment described in this application.

### ***Sulphur Dioxide***

The natural gas that will be transported through the gas pipeline in the DCR is sweet gas that is effectively free of sulphur compounds. Therefore, project SO<sub>2</sub> emissions will be small. The air quality assessment has included SO<sub>2</sub> as a parameter to ensure regulator and stakeholder concerns are addressed.

Table 7-15 summarizes ground-level SO<sub>2</sub> concentrations predicted by dispersion models in the area of the Trail River compressor station, following implementation of mitigation measures. The predicted one-hour, 24-hour and annual SO<sub>2</sub> concentrations were below Northwest Territories ambient air standards.

**Table 7-15: Sulphur Dioxide Ground-Level Concentration Predictions for the Trail River Compressor Station**

Parameter	Maximum Average Period Predictions <sup>a</sup>		
	One-hour	24-hour	Annual
Maximum SO <sub>2</sub> concentration (µg/m <sup>3</sup> )	5.9	1.8	0.2
Distance to maximum <sup>b</sup> (km)	0.1	0.1	0.1
Direction to maximum <sup>b</sup>	W	W	W
Expected occurrences exceeding standard <sup>c</sup>	0	0	0
Area exceeding standard <sup>d</sup> (ha)	0	0	0
SO <sub>2</sub> standards <sup>e</sup> (µg/m <sup>3</sup> )	450	150	30
NOTES: <sup>a</sup> The predictions in the table include the effects of combined emissions from project sources in the southern airshed. <sup>b</sup> Distance and direction are relative to the facilities. <sup>c</sup> The expected occurrences exceeding standard is the number of hours, days or years with predicted concentrations exceeding the applicable standards. It is the average of five years of modeling data, so it might not be a whole number. <sup>d</sup> The area exceeding standard is the total area over which the predicted one-hour, 24-hour or annual concentrations exceeded the applicable standards. <sup>e</sup> Northwest Territories Ambient Air Standards (RWED 2002) <sup>f</sup> W – west			

### ***Nitrogen Dioxide and Oxides of Nitrogen***

Nitrogen dioxide and nitric oxide will be the primary NO<sub>x</sub> emitted from the combustion sources at the Trail River compressor station. The NO emissions can undergo chemical reactions in the atmosphere to form additional NO<sub>2</sub>. Nitrogen dioxide is addressed because it is the only oxide of nitrogen that is regulated in Canada. Total predicted NO<sub>x</sub> concentrations are addressed, as these are required to determine NO<sub>2</sub> concentrations. There are no air quality guideline values or objectives for NO<sub>x</sub>.

Table 7-16 summarizes the NO<sub>x</sub> and NO<sub>2</sub> concentrations predicted in the area of the Trail River compressor station following implementation of mitigation measures. None of the maximum one-hour, 24-hour or annual NO<sub>2</sub> predictions exceeds federal ambient air quality objectives.

**Table 7-16: Nitrogen Dioxide and Oxides of Nitrogen Ground-Level Concentration Predictions for the Trail River Compressor Station**

Parameter	Maximum Average Period Predictions <sup>a</sup>		
	One-hour	24-hour	Annual
Maximum NO <sub>x</sub> concentration (µg/m <sup>3</sup> )	1,468.6	336.8	45.5
Maximum NO <sub>2</sub> concentration (µg/m <sup>3</sup> )	150.4	41.9	5.4
Distance to maximum <sup>b</sup> (km)	6.7	1.5	0.1
Direction to maximum <sup>b</sup>	NNE	NNW	S
Expected occurrences exceeding objective <sup>c</sup>	0	0	0
Area exceeding objective <sup>d</sup> (ha)	0	0	0
NO <sub>2</sub> objectives <sup>e,f</sup> (µg/m <sup>3</sup> )	400	200	100
NOTES: <sup>a</sup> The predictions in the table include the effects of combined emissions from project sources in the southern airshed. <sup>b</sup> Distance and direction are relative to the facilities. <sup>c</sup> The expected occurrences exceeding objective is the number of hours, days or years with predicted concentrations exceeding the applicable objectives. It is the average of five years of modelling data, so it might not be a whole number. <sup>d</sup> The area exceeding objective is the total area over which the predicted one-hour, 24-hour or annual concentrations exceeded the applicable objectives. <sup>e</sup> Federal <i>Ambient Air Quality Objectives</i> from <i>The Clean Air Act</i> (Environment Canada 1981) <sup>f</sup> There are no Northwest Territories standards for NO <sub>2</sub> . <sup>g</sup> NNE – north-northeast <sup>h</sup> NNW – north-northwest <sup>i</sup> S – south			

### ***Carbon Monoxide***

Carbon monoxide can result from the incomplete combustion of fuels used at the Trail River compressor station. It is also a regulated compound.

Table 7-17 summarizes the ground-level CO concentrations predicted by dispersion models in the area of the Trail River compressor station following implementation of mitigation measures. None of the predicted one-hour and eight-hour CO concentrations exceeds the federal ambient air quality objectives.

**Table 7-17: Carbon Monoxide Ground-Level Concentration Predictions for the Trail River Compressor Station**

Parameter	Maximum Average Period Predictions <sup>a</sup>	
	One-hour	Eight-hour
Maximum CO concentration ( $\mu\text{g}/\text{m}^3$ )	751.3	368.6
Distance to maximum <sup>b</sup> (km)	0.1	0.1
Direction to maximum <sup>b</sup>	W <sup>g</sup>	W <sup>g</sup>
Expected occurrences exceeding objective <sup>c</sup>	0	0
Area exceeding objective <sup>d</sup> (ha)	0	0
CO objectives <sup>e,f</sup> ( $\mu\text{g}/\text{m}^3$ )	15,000	6,000
NOTES: <sup>a</sup> The predictions in the table include the effects of combined emissions from project sources in the southern airshed. <sup>b</sup> Distance and direction are relative to the facilities. <sup>c</sup> The expected occurrences exceeding objective is the number of one-hour or eight-hour periods with predicted concentrations exceeding the applicable objectives. It is the average of five years of modelling data, so it might not be a whole number. <sup>d</sup> The area exceeding objective is the total area over which the predicted one-hour or eight-hour concentrations exceeded the applicable objectives. <sup>e</sup> Federal <i>Ambient Air Quality Objectives</i> from <i>The Clean Air Act</i> (Environment Canada 1981) <sup>f</sup> There are no Northwest Territories standards for CO. <sup>g</sup> W – west		

***Fine Particulate Matter***

Most airborne particles emitted from the Trail River compressor station during peak operations will be in the smallest size ranges. Therefore, they have been assessed using PM<sub>2.5</sub> as an indicator.

Table 7-18 shows the maximum ground-level PM<sub>2.5</sub> concentrations predicted by dispersion models in the area of the Trail River compressor station, following implementation of mitigation measures. All values are below the Northwest Territories ambient air standards.

**Table 7-18: Fine Particulate Matter Ground-Level Concentration Predictions for the Trail River Compressor Station**

Parameter	Maximum Average Period Predictions <sup>a</sup>	
	24-hour	Annual
Maximum PM <sub>2.5</sub> concentration ( $\mu\text{g}/\text{m}^3$ )	12.1	2.8
Distance to maximum <sup>b</sup> (km)	0.1	0.1

**Table 7-18: Fine Particulate Matter Ground-Level Concentration Predictions for the Trail River Compressor Station (cont'd)**

Parameter	Maximum Average Period Predictions <sup>a</sup>	
	24-hour	Annual
Direction to maximum <sup>b</sup>	W	W
Expected occurrences exceeding standard <sup>c</sup>	0	-
Area exceeding standard <sup>d</sup> (ha)	0	-
PM <sub>2.5</sub> standards <sup>e</sup> (µg/m <sup>3</sup> )	30	-
NOTES: <sup>a</sup> The predictions in the table include the effects of combined emissions from project sources in the southern airshed. <sup>b</sup> Distance and direction are relative to the facilities. <sup>c</sup> The expected occurrences exceeding standard is the number of days or years with predicted concentrations exceeding the applicable standards. It is the average of five years of modeling data, so it might not be a whole number. <sup>d</sup> The area exceeding standard is the total area over which the predicted 24-hour or annual concentrations exceeded the applicable standards. <sup>e</sup> Northwest Territories <i>Ambient Air Standards</i> (RWED 2002) <sup>f</sup> W – west		

### ***Benzene and BTEX Compounds***

Volatile organic compounds can be released in small quantities from the incomplete combustion of fuel at facilities. Of the VOCs that could be released, this assessment focused specifically on benzene and BTEX, that is, the combination of benzene, toluene, ethylbenzene, and xylene. Benzene and BTEX concentrations were included because of the perceived association between oil and gas operations and benzene and BTEX levels in the air.

Table 7-19 shows ground-level concentrations of benzene and total BTEX concentrations predicted by dispersion models in the area of the Trail River compressor station, following implementation of mitigation measures. None of the predicted benzene or BTEX concentrations exceed the defined criteria.

**Table 7-19: Benzene and Total BTEX Ground-Level Concentration Predictions for the Trail River Compressor Station**

Parameter	Predicted Maximum Concentrations <sup>a</sup>	
	Benzene	BTEX
Maximum one-hour concentration (µg/m <sup>3</sup> )	0.5	0.3
Distance to maximum <sup>d</sup> (km)	0.1	0.1
Direction to maximum <sup>d</sup>	S	S

**Table 7-19: Benzene and Total BTEX Ground-Level Concentration Predictions for the Trail River Compressor Station (cont'd)**

Parameter	Predicted Maximum Concentrations <sup>a</sup>	
	Benzene	BTEX
Expected occurrences exceeding criteria <sup>e</sup>	0	0
Area exceeding standard <sup>f</sup> (ha)	0	0
Available criteria <sup>g</sup> ( $\mu\text{g}/\text{m}^3$ )	30 <sup>b</sup>	30 <sup>c</sup>

NOTES:  
<sup>a</sup>The predictions in the table include the effects of combined emissions from project sources in the southern airshed.  
<sup>b</sup>Alberta *Ambient Air Quality Guidelines* (AENV 2000)  
<sup>c</sup>The Alberta *Ambient Air Quality Guidelines* (AENV 2000) value for benzene was used for BTEX because it is the most stringent of the available criteria for benzene, toluene, ethylbenzene and xylene.  
<sup>d</sup>Distance and direction are relative to the facilities.  
<sup>e</sup>The expected occurrences exceeding criteria is the number of hours with predicted concentrations exceeding the applicable criteria. It is the average of five years of modelling data, so it might not be a whole number.  
<sup>f</sup>The area exceeding criteria is the total area over which the predicted one-hour concentrations exceeded the applicable criteria.  
<sup>g</sup>There are no Northwest Territories standards for benzene or total BTEX.  
<sup>h</sup>S – south

### ***Increased Acid Input***

Emissions of SO<sub>2</sub> and NO<sub>x</sub> from the Trail River compressor station operations have the potential to react in the atmosphere to form acid compounds that could affect the environment when deposited on soils, vegetation or into waterbodies. Potential increases in acid deposition, because of the project, has been evaluated by determining the expected sulphate and nitrate deposition and, from that, area PAI.

Table 7-21 summarizes predicted PAI values associated with Trail River compressor station emissions. Since the PAI levels predicted over the study area are below threshold for the most sensitive ecosystems, no detectable effects are expected because of PAI.

**Table 7-20: Potential Acid Input Predictions for the Trail River Compressor Station**

Parameter	Results <sup>a</sup>
Maximum PAI (keq/ha/a)	1.11
Area PAI (keq/ha/a) <sup>d</sup>	0.008
Maximum sulphate deposition (kg/ha/a)	0.46
Maximum nitrate deposition (kg/ha/a)	68.05

**Table 7-20: Potential Acid Input Predictions for the Trail River Compressor Station (cont'd)**

Parameter	Results <sup>a</sup>
Area with PAI >0.17 keq/ha/a <sup>b</sup> (ha)	23
Area with PAI >0.25 keq/ha/a <sup>c</sup> (ha)	10
NOTES: <sup>a</sup> The predictions in the table include the effects of combined emissions from project sources in the southern airshed. <sup>b</sup> 0.17 keq/ha/a represents the monitoring load value for sensitive ecosystems as defined by CASA. <sup>c</sup> 0.25 keq/ha/a represents the critical load value for sensitive ecosystems. <sup>d</sup> Area PAI represents integrated PAI levels over the entire 40,000 ha study area.	

### ***Increased Dust Deposition***

Increased dust deposition will be caused by:

- facilities and right-of-way construction
- extraction of borrow materials during construction
- vehicle movement along unpaved roadways

Dust deposition will be a localized effect, as most of the dust particles will be deposited quickly and near their sources.

### ***Greenhouse Gas Emissions***

Greenhouse gas emissions in the DCR will primarily come from the operation of the Blackwater River and the Trail River compressor stations and the Trout River heater station.

GHG emissions are mostly CO<sub>2</sub>, (CH<sub>4</sub>, and N<sub>2</sub>O, which can all be expressed as ECO<sub>2</sub>, that is equivalent carbon dioxide values. Facility operations, project infrastructure and associated traffic will all contribute to GHG emissions, but the contribution of the Trail River compressor station to GHG emissions is expected to be small and short-term. [Table 7-21](#) shows annual predicted GHG emissions for the Trail River compressor station.

Although the operation of the pipeline facilities in the DCR will result in noticeably increased GHG emissions in the NWT (about 15% based on year 2000 GHG levels), the increase in GHG emissions on a national level will be very low (about 0.03% based on year 2000 GHG levels).

**Table 7-21: Annual Greenhouse Gas Emissions from the Trail River Compressor Station**

Activity	Emissions (kt/ a)			
	CO <sub>2</sub>	CH <sub>4</sub> <sup>a</sup>	N <sub>2</sub> O	ECO <sub>2</sub> <sup>b,c</sup>
Compression	87.28	0.01	<0.01	88.60
Power generation	4.17	0.05	<0.01	5.88
Ancillary equipment	13.08	<0.01	<0.01	13.16
Total <sup>d</sup>	104.53	0.06	0.01	107.64
NOTES: <sup>a</sup> A hyphen signifies values that are below the kt/a limit. <sup>b</sup> ECO <sub>2</sub> – equivalent carbon dioxide <sup>c</sup> ECO <sub>2</sub> emissions were calculated using greenhouse potentials of one for CO <sub>2</sub> , 21 for CH <sub>4</sub> and 310 for N <sub>2</sub> O (Environment Canada 2002). <sup>d</sup> Numbers in this table have been rounded for presentation purposes. Therefore, the sum of the presented numbers might add up to values different than the totals.				

### Noise Setting

Noise setting information for this site is expected to be similar to the regional setting information for the DCR described in [Section 8](#).

Due to the remote nature of the proposed facility sites in the DCR, no site-specific noise studies were conducted.

### Noise Potential Effects and Mitigation

Construction noise will be centred at the facility sites, including the Trail River compressor station.

During operations, there might be intermittent, short duration events that could cause an increase in noise levels above normal operational levels. Examples include the occasional venting of natural gas as a result of station upset conditions or for maintenance. Another example is the testing or use of emergency generator sets. These occurrences are expected to be uncommon and limited in duration.

Operations will raise sound levels near the compressor station. Noise caused by operations is continuous sound, from constantly operating machinery. Models were used to predict sound levels at various distances up to 1.5 km from each of the facility fence lines based on normal operations.

The Trail River compressor station includes:

- pipeline compressor buildings with associated equipment

- compressor suction and discharge pipes
- compressor discharge aerial cooler fans
- utility building with associated equipment
- power generator building

Table 7-22 shows the predicted maximum levels of noise from normal operations from the Trail River compressor station site.

**Table 7-22: Predicted Maximum Noise Levels at 1.5 km, Normal Operations – Trail River Compressor Station**

Season	Predicted Maximum Noise Level <sup>b</sup> (dBA)	Noise Guideline Limit <sup>a</sup> (dBA)
Summer	38	40
Winter	38	40

NOTE:  
<sup>a</sup>AEUB *Noise Control Directive User Guide-4<sup>th</sup> Edition* (Guide 38).  
<sup>b</sup>Operations noise is continuous. Therefore, average maximum sound exposure values are the same, that is,  $L_{eq}(1)$ ,  $L_{eq}$  day,  $L_{eq}$  night and  $L_{eq}(24)$ .  $L_{eq}$  values, expressed in dBA, are the energy-averaged, weighted sound levels for a complete measurement interval.

With the exception of intermittent noise, the effects of noise during operations at the Trail River compressor station are expected to be limited, as sound levels at a distance of 1.5 km from the site will be less than 40 dBA.

### Soils, Landforms and Permafrost Setting

The Trail River compressor station is located on a level to very gently sloping moraine plain in the sporadic discontinuous permafrost zone. Several types of surficial materials overlie the moraine plain in the compressor station area.

A veneer of Aeolian sand overlies the moraine plain at the compressor station site. The surficial materials are well to moderately well drained and have likely Brunisolic developed soils. The aeolian veneer over moraine is expected to be free of permafrost.

A blanket of organic sediments overlies the moraine plain north and south of the compressor. The surficial materials are poorly to very poorly drained and have developed Organic and Cryosolic soils. In general, permafrost will likely be encountered only in thick moss areas containing clay, and in less than 15% of the moraine area.

### Soils, Landforms and Permafrost Potential Effects and Mitigation

The Aeolian veneer-covered moraine plain at the compressor station is susceptible to wind erosion. Organic-covered areas north and south of the compressor station

are potentially prone to thaw settlement and drainage disruption, although these areas are outside the compressor station footprint. The construction of pads for the site will result in soil loss because of burial.

General mitigation strategies to offset potential effects are outlined in [Section 8](#).

### **Vegetation Setting**

The Trail River compressor station site is a mosaic of Alaska birch–white spruce on upland areas and black spruce/Labrador tea/mountain cranberry in lowland areas (see [Figure 7-6](#)). Vegetation surveys were conducted in the area.



**Figure 7-6: Example of Vegetation at the Trail River Compressor Station**

The Alaska birch–white spruce areas are dominated by a mature tree canopy of Alaska birch and white spruce with some tamarack and black spruce. Dominant shrubs are willow, prickly rose, green alder and Labrador tea. Ground covers include mountain cranberry, northern comandra, bunchberry and twinflower. Stair-step moss is abundant. There is very little lichen present.

The black spruce/Labrador tea/mountain cranberry areas are dominated by mature black spruce in the tree layer, and Labrador tea, willow, ground birch and shrubby cinquefoil in the shrub layer. Ground covers include mountain cranberry, red bearberry and myrtle-leaved willow. Stair-step moss and golden moss cover is high.

All vegetation types are common in the study area.

### **Vegetation Potential Effects and Mitigation**

The development of the Trail River compressor station and its associated winter access road will affect vegetation through clearing and mechanical damage of trees and shrubs, burial of vegetation on the site by gravel, permanent changes in substrate with construction of pads, and potential changes in drainage around the site. Alteration of vegetation health through effects of dust will occur during construction, to a limited localized extent, primarily along the access road to the facility.

Effects on vegetation resulting from facility construction activities will persist for the operations phase and are likely to extend into the far future (effect extends beyond 30 years past decommissioning and abandonment) given the slow rates of vegetation growth in the North. Vegetation growing in association with gravel pads will likely develop into plant communities differing from those existing before development. In addition, introductions of reclamation species and potential accidental introductions of invasive non-native plant species might occur.

Implementation of primary mitigation measures, as described in [Section 8](#), will help reduce effects on vegetation at this facility site.

### **Wildlife Setting**

Regional wildlife setting information is described in see [Section 8](#).

### **Wildlife Potential Effects and Mitigation**

Regional wildlife effects and mitigation are described in [Section 8](#).

### **Hydrology Setting**

The Trail River compressor station site is located between two unnamed watercourses that flow into the Trail River, one about 1.5 km to the west and the other about 1.7 km to the east. Runoff from the site could flow to either watercourse. The area encompassing the site that contributes runoff to the mouths of the unnamed watercourses is about 130 km<sup>2</sup> for the west watercourse and about 61 km<sup>2</sup> for the east watercourse.

### **Hydrology Potential Effects and Mitigation**

Effects of any potential increase in mean annual runoff due to the higher runoff coefficient of the disturbed area, and an increase in mean sediment concentration on both unnamed watercourses, are expected to be limited because of the large area contributing runoff.

### **Groundwater Setting**

Low rates of groundwater flow are expected in this area as a result of the fine-grained surface deposits and flat to gently sloping topography.

### **Groundwater Potential Effects and Mitigation**

Groundwater effects and mitigation for this site is expected to be similar to the regional effects and mitigation described in [Section 8](#).

### **Water Quality Setting**

The two unnamed watercourses near this compressor site enter the Trail River about 8.0 km downstream of the compressor station.

Water quality data for this site is expected to be similar to regional data described in [Section 8](#).

### **Water Quality Potential Effects and Mitigation**

The Trail River compressor station could affect water quality through acid deposition, leaks and spills, sediment releases from disturbed land, and changes in surface water flow and level resulting from surface runoff and water withdrawals.

Modelled acid deposition rates resulting from the compressor station emissions will be limited, and there are no sensitive waterbodies in the area of elevated acid deposition. Therefore, based on available information, no effects on water quality because of acid deposition are predicted.

Effects of domestic wastewater releases will be managed using water treatment and disposal techniques that will reduce effects on water quality. There will be no untreated process water released to surface waters from the facility.

Effects of small-scale leaks will be reduced through the use of best practices, and application of the ERP (see [Section 11](#)).

Some localized effects on water quality because of sediment releases are expected. However, these effects are expected to be limited to small increases in concentrations of sediment-associated parameters, such as nutrients and metals. These increases are not expected to result in concentrations above water quality guidelines for the protection of aquatic life, or drinking water quality.

### **Fish and Fish Habitat Setting**

There are no surface water features within the proposed site boundaries. A new access road will connect the Trail River compressor station with the infrastructure facilities at Camsell Bend. The proposed route for the road will likely cross a

number of watercourses. The majority of these watercourses are vegetated channels, although some Active I channels will also be crossed.

Vegetated channels exhibit ephemeral or intermittent flows and are typically dry or frozen to the bottom in winter. As such, they do not provide fish with overwintering habitat and are unlikely to be used by fish except for the brief period when they flow in the spring.

Active I channels have perennial flows and are not expected to freeze to the bed during winter. As such, they might provide overwintering habitat and can be used by fish throughout the year.

### **Fish and Fish Habitat Potential Effects and Mitigation**

Effects resulting from the Trail River compressor station on fish and fish habitat would be primarily related to direct disturbance of fish habitat by activities associated with development of the site, and indirect effects resulting from sediment in runoff.

The Trail River compressor station is located sufficiently far away from any local fish-bearing waterbodies that there will likely be no direct effects on fish habitat or effects related to runoff and sediment yields.

The topography at the site, maintaining a vegetated buffer zone between the site and local waterbodies, if required, and implementation of site-specific erosion and sediment control plans will prevent sediment from the site reaching nearby surface waters.

## **Human Environment**

This topic describes the protected areas and heritage resource aspects of the human environment at the Trail River compressor station. Regional aspects of the human environment are addressed in [Section 8](#).

### **Protected Areas Setting**

This facility site and part of its access road are located within an area proposed for the Fort Simpson Special Management Zone in the June 2005 draft land use plan. Part of the road also crosses lands within a proposed conservation area, Sibbeston Plains. There are no time-limited withdrawals from new subsurface, or surface and subsurface, interests at the facility site or along the access road. Nor are there any existing protected areas in the immediate vicinity of this development.

### **Protected Areas Potential Effects and Mitigation**

The June 2005 draft land use plan is in the preparation and comment phase, and there are no time-limited restrictions on new surface interests currently in place at the facility site or along the access road.

In the event that the land use designations of the proposed special management and conservation zones are approved, the protected area effects might include a permanent change to the landscape and a slight decrease in the land base available for other land uses within the Fort Simpson and Sibbeston Plains area.

The potential effects of the proposed development on other aspects of the human environment, as well as on the biophysical environment, will be reduced by the mitigation strategies described in [Section 8](#) and by the management and protection plans outlined in [Section 11](#).

### **Heritage Resources Setting**

This site was inspected as part of the field reconnaissance program. The location was considered to have low potential for the discovery of heritage resources. No heritage sites were recorded during surface reconnaissance, and no heritage resource sites have been recorded in the immediate area.

The nature of the heritage resource potential and results of the investigations at this location was provided to the PWNHC in a report under permit 2004-956.

### **Heritage Resource Potential Effects and Mitigation**

Before development of this site, and if required, a Historical Resources Impact Assessment will be conducted and provided to the PWNHC. If it is determined that the development will affect any heritage resources, mitigation plans will be prepared.

## **PUBLIC INVOLVEMENT**

No concerns regarding development of this infrastructure site have been expressed by the local DCR communities in meetings or discussions held to date with Imperial. The public involvement activities are documented in [Section 10](#).

## **PERIOD OF OPERATION (PART 14)**

Construction activities will take place year-round, at varying levels of activity, from 2006 to 2010 (see [Section 3](#)). The Trail River compressor station is expected to be in operation for 25 years or more.

## LOCATION OF ACTIVITIES BY MAP COORDINATES (PART 16)

Map coordinates of the northwest corner of the facility site are given in [Table 7-23](#) and maps showing the location of the site are in [Figure 7-7](#), [Figure 7-8](#), and [Figure 7-9](#).

**Table 7-23: Location of Activities by Map Coordinates**

Site	Latitude (DD)	Longitude (DD)	UTM Easting (m)	UTM Northing (m)	UTM Zone
Trail River facility site	62.2321	-122.1643	543439	6900320	10

## FEES (PART 18)

The total land area required for the facility site contained in this subject is 59.3 ha. The area associated with the new airstrip is provided in [Section 4](#).

The land requirements are shown in [Appendix A](#).

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Figure 7.8 has been moved to reduce file size. To view it, click on the link to the figure in the web page List of Figures for this document.

Figure 7.9 has been moved to reduce file size. To view it, click on the link to the figure in the web page List of Figures for this document.

Figure 7.10 has been moved to reduce file size. To view it, click on the link to the figure in the web page List of Figures for this document.

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TITLE	<b>Application for a Type A Land Use Permit in the DCR</b>
SECTION	7: Facility Sites
SUBJECT	4: Trout River Heater Station

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## INTRODUCTION

This subject supports an application for land use activities and operations associated with the Trout River heater station. It contains:

- an overview map showing the facility location ([Figure 7-11](#))
- an estimate of personnel requirements
- a summary of the operations
- a description of potential environmental and resource effects

An artist's impression of the Trout River heater station is shown in [Figure 7-12](#).

The location of the Trout River heater station is shown in the photographs and site-specific maps in [Figure 7-14](#) and [Figure 7-15](#).

## PERSONNEL (PART 3)

The construction of the Trout River heater station will involve three major steps. The first step is preparing the site and installing the site pad. This will require a crew size of about 40. The second step is the piling activity, which will require a crew size of about 30. The third step is installing the prefabricated processing facility modules followed by pre-commissioning activities. This step requires about 60 personnel, including camp staff.

Construction plans require the installation of a 40-person camp within the footprint of the Trout River heater station for the construction period. A description of this activity is contained in [Section 4](#).

## SUMMARY OF OPERATION (PART 5)

The land use activities and operations associated with this site include:

- developing and maintaining a 4.1 ha site
- abandoning and reclaiming the site at the end of the operational life of the facility

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## **Development Activities**

Construction of the Trout River heater station site is scheduled to start in 2007. The facilities are scheduled for start up in late 2009. Construction activities will take place year-round and are scheduled to be complete in the summer of 2010.

### **Site Development**

Pad materials will be excavated from approved borrow site locations as close as practical to the Trout River heater station. These materials will be transported to the facility along the existing Trout Lake winter road, the pipeline right-of-way, and various winter roads. They might be hauled and placed while frozen, and allowed to thaw during the following summer season. This might require compacting at a later date.

### **Module Transportation**

The modules will be transported by truck or rail to a staging area in Hay River where additional assembly and testing might be performed. The modules might be as large as 122 tonnes for the Trout River heater station.

Modules and other components will be trucked from Hay River to the facility site along the Trout Lake winter road and then staged in the equipment storage location at the Trout River heater station.

### **Equipment and Buildings**

The equipment and buildings at the heater station will be modular to facilitate construction at the site. The equipment will include:

- line heaters
- glycol storage tanks
- safety and controls systems
- utility systems, including:
  - fuel gas equipment, including metering
  - electrical power generation equipment
  - controls and communications equipment
  - safety equipment

Pipeline facilities and appurtenances will also be situated at the heater station, including block valves.

Figure 7.12 has been moved to reduce file size. To view it, click on the link to the figure in the web page List of Figures for this document.

## **Access**

Access to the facility will be along the existing Trout Lake winter road and the pipeline right-of-way. This section of the pipeline right-of-way will be constructed to accommodate the transportation of large facility modules, construction equipment and materials. See [Section 3](#) for a cross-section of a pipeline right-of-way. See the site-specific map in [Figure 7-14](#) for road alignment.

## **ENVIRONMENT**

The following topics provide specific biophysical and human environment setting, effects and mitigation information for the Trout River heater station. This information includes data gathered during 2004 field studies.

### **Biophysical Environment**

#### **Air Quality Setting**

The air quality setting for this site is expected to be similar to the regional setting for the DCR described in [Section 8](#).

#### **Air Quality Potential Effects and Mitigation**

One of the primary sources of project emissions in the DCR will be the continuous operation of emission-producing equipment at Trout River heater station. Emissions from the Trout River heater station predicted during peak operations are summarized in [Table 7-24](#).

Ground-level concentrations were predicted using air dispersion models. Dispersion models consider various site-specific meteorological and topographical conditions to predict ground-level concentrations, based on facility configuration and emission rates.

The figures in [Table 7-24](#) represent the likely emissions following the implementation of mitigation measures. During the life of the project, there might be brief periods when it will be necessary to release gas into the atmosphere as a result of upsets and routine maintenance at the Trout River heater station. There is also the potential for small volumes of gases, known as fugitive emissions, to be released from valves and fittings during project operations. As such, fugitive emissions are usually restricted to older operations and are expected to be very small given the modern design and configuration of this project. Therefore, fugitive emissions were not quantified in the air assessment described in this application.

**Table 7-24: Predicted Emissions from the Trout River Heater Station**

Activity	Emissions (t/ d)					
	SO <sub>2</sub> <sup>a</sup>	NO <sub>x</sub> <sup>b</sup>	CO <sup>c</sup>	PM <sub>2.5</sub> <sup>d</sup>	Benzene	BTEX
Power generation	<0.01	0.14	0.02	<0.01	<0.001	<0.01
Ancillary equipment	<0.01	0.05	0.07	0.01	<0.001	<0.01
Total <sup>e</sup>	<0.01	0.19	0.09	0.01	<0.001	<0.01

NOTES:  
<sup>a</sup>SO<sub>2</sub> – sulphur dioxide  
<sup>b</sup>NO<sub>x</sub> – oxides of nitrogen  
<sup>c</sup>CO – carbon monoxide  
<sup>d</sup>PM<sub>2.5</sub> – fine particulate matter  
<sup>e</sup>Numbers in this table have been rounded for presentation purposes. Therefore, the sum of the presented numbers might add up to values different than the totals.

### ***Sulphur Dioxide***

The natural gas that will be transported through the gas pipeline in the DCR is sweet gas that is effectively free of sulphur compounds. Therefore, project SO<sub>2</sub> emissions will be small. The air quality assessment has included SO<sub>2</sub> as a parameter to ensure regulator and stakeholder concerns are addressed.

[Table 7-25](#) summarizes ground-level SO<sub>2</sub> predictions predicted by dispersion models in the area of the Trout River heater station, following implementation of mitigation measures. All of the predicted one-hour, 24-hour and annual SO<sub>2</sub> concentrations were below Northwest Territories ambient air standards.

**Table 7-25: Sulphur Dioxide Ground-Level Concentration Predictions for the Trout River Heater Station**

Parameter	Maximum Average Period Predictions <sup>a</sup>		
	One-hour	24-hour	Annual
Maximum sulphur dioxide (SO <sub>2</sub> ) concentration (µg/m <sup>3</sup> )	1.5	0.4	0.1
Distance to maximum <sup>b</sup> (km)	0.2	0.1	0.3
Direction to maximum <sup>b</sup>	S <sup>f</sup>	SE <sup>g</sup>	SE <sup>g</sup>
Expected occurrences exceeding standard <sup>c</sup>	0	0	0
Area exceeding standard <sup>d</sup> (ha)	0	0	0

**Table 7-25: Sulphur Dioxide Ground-Level Concentration Predictions for the Trout River Heater Station (cont'd)**

Parameter	Maximum Average Period Predictions <sup>a</sup>		
	One-hour	24-hour	Annual
SO <sub>2</sub> standards <sup>e</sup> (µg/m <sup>3</sup> )	450	150	30
NOTES: <sup>a</sup> The predictions in the table include the effects of combined emissions from project sources in the southern airshed. <sup>b</sup> Distance and direction are relative to the facilities. <sup>c</sup> The expected occurrences exceeding standard is the number of hours, days or years with predicted concentrations exceeding the applicable standards. It is the average of five years of modeling data, so it might not be a whole number. <sup>d</sup> The area exceeding standard is the total area over which the predicted one-hour, 24-hour or annual concentrations exceeded the applicable standards. <sup>e</sup> Northwest Territories Ambient Air Standards (RWED 2002) <sup>f</sup> S – south <sup>g</sup> SE – southeast			

### ***Nitrogen Dioxide and Oxides of Nitrogen***

Nitrogen dioxide and nitric oxide will be the primary NO<sub>x</sub> emitted from the combustion sources at the Trout River heater station. The NO emissions can undergo chemical reactions in the atmosphere to form additional NO<sub>2</sub>. Nitrogen dioxide is addressed because it is the only oxide of nitrogen that is regulated in Canada. However, the assessment does present predicted total NO<sub>x</sub> concentrations, as these are required to determine NO<sub>2</sub> concentrations. There are no air quality guideline values or objectives for NO<sub>x</sub>.

Table 7-26 summarizes the NO<sub>x</sub> and NO<sub>2</sub> concentrations predicted in the area of Trout River heater station following implementation of mitigation measures. None of the maximum one-hour, 24-hour or annual NO<sub>2</sub> predictions exceeds objectives.

**Table 7-26: Nitrogen Dioxide and Oxides of Nitrogen Ground-Level Concentration Predictions for the Trout River Heater Station**

Parameter	Averaging Period Predictions <sup>a</sup>		
	One-hour	24-hour	Annual
Maximum NO <sub>x</sub> concentration (µg/m <sup>3</sup> )	305.7	135.8	21.6
Maximum NO <sub>2</sub> concentration (µg/m <sup>3</sup> )	91.2	41.5	3.1
Distance to maximum <sup>b</sup> (km)	5.2	1.4	0.3
Direction to maximum <sup>b</sup>	SSE <sup>h</sup>	SE <sup>g</sup>	WNW <sup>i</sup>
Expected occurrences exceeding objective <sup>c</sup>	0	0	0

**Table 7-26: Nitrogen Dioxide and Oxides of Nitrogen Ground-Level Concentration Predictions for the Trout River Heater Station (cont'd)**

Parameter	Averaging Period Predictions <sup>a</sup>		
	One-hour	24-hour	Annual
Area exceeding objective <sup>d</sup> (ha)	0	0	0
NO <sub>2</sub> objectives <sup>e,f</sup> (µg/m <sup>3</sup> )	400	200	100
NOTES: <sup>a</sup> The predictions in the table include the effects of combined emissions from project sources in the southern airshed. <sup>b</sup> Distance and direction are relative to the facilities. <sup>c</sup> The expected occurrences exceeding objective is the number of hours, days or years with predicted concentrations exceeding the applicable objectives. It is the average of five years of modelling data, so it might not be a whole number. <sup>d</sup> The area exceeding objective is the total area over which the predicted one-hour, 24-hour or annual concentrations exceeded the applicable objectives. <sup>e</sup> Federal <i>Ambient Air Quality Objectives</i> from <i>The Clean Air Act</i> (Environment Canada 1981) <sup>f</sup> There are no Northwest Territories standards for NO <sub>2</sub> . <sup>g</sup> SE – southeast <sup>h</sup> SSE – south-southeast <sup>i</sup> WNW – west-northwest			

### ***Carbon Monoxide***

Carbon monoxide can result from the incomplete combustion of fuels used at the Trout River heater station. It is also a regulated compound.

[Table 7-27](#) summarizes the ground-level CO concentrations predicted by dispersion models in the area of the Trout River heater station following implementation of mitigation measures. None of the predicted one-hour and eight-hour CO concentrations exceeds the federal ambient air quality objectives.

**Table 7-27: Carbon Monoxide Ground-Level Concentration Predictions for the Trout River Heater Station**

Parameter	Averaging Period Predictions <sup>a</sup>	
	One-hour	Eight-hour
Maximum CO concentration (µg/m <sup>3</sup> )	197.2	83.2
Distance to maximum <sup>b</sup> (km)	0.2	0.2
Direction to maximum <sup>b</sup>	W <sup>g</sup>	WNW <sup>h</sup>
Expected occurrences exceeding objective <sup>c</sup>	0	0
Area exceeding objective <sup>d</sup> (ha)	0	0

**Table 7-27: Carbon Monoxide Ground-Level Concentration Predictions for the Trout River Heater Station (cont'd)**

Parameter	Averaging Period Predictions <sup>a</sup>	
	One-hour	Eight-hour
CO objectives <sup>e,f</sup> ( $\mu\text{g}/\text{m}^3$ )	15,000	6,000
NOTES: <sup>a</sup> The predictions in the table include the effects of combined emissions from project sources in the southern airshed. <sup>b</sup> Distance and direction are relative to the facilities. <sup>c</sup> The expected occurrences exceeding objective is the number of one-hour or eight-hour periods with predicted concentrations exceeding the applicable objectives. It is the average of five years of modelling data, so it might not be a whole number. <sup>d</sup> The area exceeding objective is the total area over which the predicted one-hour or eight-hour concentrations exceeded the applicable objectives. <sup>e</sup> Federal <i>Ambient Air Quality Objectives</i> from <i>The Clean Air Act</i> (Environment Canada 1981) <sup>f</sup> There are no Northwest Territories standards for CO. <sup>g</sup> W – west <sup>h</sup> WNW – west-northwest		

***Fine Particulate Matter***

Most airborne particles emitted from the Trout River heater station during peak operations will be in the smallest size ranges. Therefore they will be assessed using  $\text{PM}_{2.5}$  as an indicator.

Table 7-28 shows the maximum ground-level  $\text{PM}_{2.5}$  concentrations predicted by dispersion models in the area of the Trout River heater station, following implementation of mitigation measures. All values are below the Northwest Territories ambient air standards.

**Table 7-28: Fine Particulate Matter Ground-Level Concentration Predictions for the Trout River Heater Station**

Parameter	Averaging Period Predictions <sup>a</sup>	
	24-hour	Annual
Maximum fine $\text{PM}_{2.5}$ concentration ( $\mu\text{g}/\text{m}^3$ )	2.8	0.7
Distance to maximum <sup>b</sup> (km)	0.1	0.3
Direction to maximum <sup>b</sup>	SE <sup>f</sup>	SE <sup>f</sup>
Expected occurrences exceeding standard <sup>c</sup>	0	-
Area exceeding standard <sup>d</sup> (ha)	0	-

**Table 7-28: Fine Particulate Matter Ground-Level Concentration Predictions for the Trout River Heater Station (cont'd)**

Parameter	Averaging Period Predictions <sup>a</sup>	
	24-hour	Annual
PM <sub>2.5</sub> standards <sup>e</sup> (µg/m <sup>3</sup> )	30	-
NOTES: <sup>a</sup> The predictions in the table include the effects of combined emissions from project sources in the southern airshed. <sup>b</sup> Distance and direction are relative to the facilities. <sup>c</sup> The expected occurrences exceeding standard is the number of days or years with predicted concentrations exceeding the applicable standards. It is the average of five years of modelling data, so it might not be a whole number. <sup>d</sup> The area exceeding standard is the total area over which the predicted 24-hour or annual concentrations exceeded the applicable standards. <sup>e</sup> Northwest Territories <i>Ambient Air Standards</i> (RWED 2002) <sup>f</sup> SE — southeast		

### ***Benzene and BTEX Compounds***

Volatile organic compounds can be released in small quantities from the incomplete combustion of fuel at facilities. Of the VOCs that could be released, this assessment focused specifically on benzene and BTEX, that is, the combination of benzene, toluene, ethylbenzene, and xylene. Benzene and BTEX concentrations were included because of the perceived association between oil and gas operations and benzene and BTEX levels in the air.

Table 7-29 shows ground-level concentrations of benzene and total BTEX concentrations predicted by dispersion models in the area of the Trout River heater station, following implementation of mitigation measures. None of the predicted benzene or BTEX concentrations exceed the defined criteria.

**Table 7-29: Benzene and Total BTEX Ground-Level Concentration Predictions for the Trout River Heater Station**

Parameter	Predicted Maximum Concentrations <sup>a</sup>	
	Benzene	BTEX
Maximum one-hour concentration (µg/m <sup>3</sup> )	0.0	0.1
Distance to maximum <sup>d</sup> (km)	0.2	0.2
Direction to maximum <sup>d</sup>	W <sup>h</sup>	WNW <sup>i</sup>
Expected occurrences exceeding criteria <sup>e</sup>	0	0
Area exceeding standard <sup>f</sup> (ha)	0	0

**Table 7-29: Benzene and Total BTEX Ground-Level Concentration Predictions for the Trout River Heater Station (cont'd)**

Parameter	Predicted Maximum Concentrations <sup>a</sup>	
	Benzene	BTEX
Available criteria <sup>g</sup> ( $\mu\text{g}/\text{m}^3$ )	30 <sup>b</sup>	30 <sup>c</sup>
<p>NOTES:</p> <p><sup>a</sup>The predictions in the table include the effects of combined emissions from project sources in the southern airshed.</p> <p><sup>b</sup>Alberta <i>Ambient Air Quality Guidelines</i> (AENV 2000)</p> <p><sup>c</sup>The Alberta <i>Ambient Air Quality Guidelines</i> (AENV 2000) value for benzene was used for BTEX because it is the most stringent of the available criteria for benzene, toluene, ethylbenzene and xylene.</p> <p><sup>d</sup>Distance and direction are relative to the facilities.</p> <p><sup>e</sup>The expected occurrences exceeding criteria is the number of hours with predicted concentrations exceeding the applicable criteria. It is the average of five years of modelling data, so it might not be a whole number.</p> <p><sup>f</sup>The area exceeding criteria is the total area over which the predicted 1-hour concentrations exceeded the applicable criteria.</p> <p><sup>g</sup>There are no Northwest Territories standards for benzene or total BTEX.</p> <p><sup>h</sup>W – west</p> <p><sup>i</sup>WNW – west-northwest</p>		

### ***Increased Acid Input***

Emissions of SO<sub>2</sub> and NO<sub>x</sub> from the Trout River heater station operations have the potential to react in the atmosphere to form acid compounds that could affect the environment when deposited on soils, vegetation or into waterbodies. Potential increases in acid deposition, because of the project, has been evaluated by determining the expected sulphate and nitrate deposition and, from that, area potential acid input (PAI).

[Table 7-30](#) summarizes predicted PAI values associated with Trout River heater station emissions. Since the PAI levels predicted over the study area are below threshold for the most sensitive ecosystems, no detectable effects are expected because of PAI.

**Table 7-30: Potential Acid Input Predictions for the Trout River Heater Station**

Parameter	Results <sup>a</sup>
Maximum PAI (keq/ha/a)	0.49
Area PAI (keq/ha/a) <sup>d</sup>	0.006
Maximum sulphate deposition (kg/ha/a)	0.10
Maximum nitrate deposition (kg/ha/a)	30.39
Area with PAI >0.17 keq/ha/a <sup>b</sup> (ha)	35

**Table 7-30: Potential Acid Input Predictions for the Trout River Heater Station (cont'd)**

Parameter	Results <sup>a</sup>
Area with PAI >0.25 keq/ha/a <sup>c</sup> (ha)	14
NOTES: <sup>a</sup> The predictions in the table include the effects of combined emissions from project sources in the southern airshed. <sup>b</sup> 0.17 keq/ha/a represents the monitoring load value for sensitive ecosystems as defined by CASA. <sup>c</sup> 0.25 keq/ha/a represents the critical load value for sensitive ecosystems. <sup>d</sup> Area PAI represents integrated PAI levels over the entire 40,000 ha study area.	

***Increased Dust Deposition***

Increased dust deposition will be caused by:

- facilities and right-of-way construction
- extraction of borrow materials during construction
- vehicle movement along unpaved roadways

Dust deposition will be a localized effect, as most of the dust particles will be deposited quickly and near their sources.

***Greenhouse Gas Emissions***

Greenhouse gas emissions in the DCR will primarily come from the operation of the Blackwater River and the Trail River compressor stations and the Trout River heater station.

GHG emissions are mostly CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O, which can all be expressed as ECO<sub>2</sub>, that is equivalent carbon dioxide values. Facility operations, project infrastructure and associated traffic will all contribute to GHG emissions, but the contribution of the Trout River heater station to GHG emissions is expected to be small and short-term.

Table 7-31 shows annual predicted GHG emissions for Trout River heater station.

Although the operation of the pipeline facilities in the DCR will result in noticeably increased GHG emissions in the NWT (about 15% based on year 2000 GHG levels), the increase in GHG emissions on a national level will be very low (about 0.03% based on year 2000 GHG levels).

**Table 7-31: Annual Predicted Greenhouse Gas Emissions from the Trout River Heater Station**

Activity	Emissions (kt/ a)			
	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	ECO <sub>2</sub> <sup>a,b</sup>
Power generation	1.36	0.02	<0.01	1.92
Ancillary equipment	32.76	<0.01	<0.01	32.96
Total <sup>c</sup>	34.12	0.02	<0.01	34.88
NOTES: <sup>a</sup> ECO <sub>2</sub> – equivalent carbon dioxide <sup>b</sup> ECO <sub>2</sub> emissions were calculated using greenhouse potentials of one for CO <sub>2</sub> , 21 for CH <sub>4</sub> and 310 for N <sub>2</sub> O (Environment Canada 2002). <sup>c</sup> Numbers in this table have been rounded for presentation purposes. Therefore, the sum of the presented numbers might add up to values different than the totals.				

### Noise Setting

Noise setting information for this site is expected to similar to the regional setting information for the DCR described in [Section 8](#).

Due to the remote nature of the proposed facility sites in the DCR, no site-specific noise studies were conducted.

### Noise Potential Effects and Mitigation

Construction noise will be centred at the facility sites, including the Trout River heater station.

During operations, there may be intermittent, short duration events that would cause an increase in noise level above normal operational levels. Examples include the occasional venting of natural gas as a result of station upset conditions or for maintenance. Another example is the testing or use of emergency generator sets. These occurrences are expected to be uncommon and limited in duration.

Operations will raise sound levels near the heater station. Noise caused by operations is continuous sound, from constantly operating machinery. Models were used to predict sound levels at various distances up to 1.5 km from each of the facility fence lines based on normal operations.

The Trout River heater station includes:

- above-ground piping
- fuel gas equipment
- line heaters
- power generator building

Table 7-32 shows the predicted maximum levels of noise from normal operations from the Trout River heater station site.

**Table 7-32: Maximum Noise Levels at 1.5 km, Normal Operations – Trout River Heater Station**

Season	Predicted Maximum Noise Level <sup>b</sup> (dBA)	Noise Guideline Limit <sup>a</sup> (dBA)
Summer	23	40
Winter	25	40
NOTE: <sup>a</sup> AEUB <i>Noise Control Directive User Guide-4<sup>th</sup> Edition</i> (Guide 38). <sup>b</sup> Operations noise is continuous. Therefore, average maximum sound exposure values are the same, that is, $L_{eq}(1)$ , $L_{eq}$ day, $L_{eq}$ night and $L_{eq}(24)$ . $L_{eq}$ values, expressed in dBA, are the energy-averaged, weighted sound levels for a complete measurement interval.		

With the exception of intermittent noise, the effects of noise during operations at the Trout River heater station are expected to be limited, as sound levels at a distance of 1.5 km from the site will be less than 40 dBA.

### Soils, Landforms and Permafrost Setting

The Trout River heater station lies in a region of sporadic discontinuous permafrost, in an area of undulating moraine, locally covered by thin organic veneers and thicker units of organic bog and fen. The moraine is moderately well to imperfectly drained, and has commonly developed Brunisolic soils. Less than 15% of the undulating moraine likely contains permafrost.

Permafrost might be encountered in thick moss areas containing saturated clay, and ice content likely ranges from 80 to 100%. Organic veneers over moraine are imperfectly to poorly drained and have developed Organic, Gleysolic and Cryosolic soils. Organic bogs and fens are very poorly drained, and have commonly developed Organic soils. Between 30 and 40% of the organic veneer over moraine likely contains permafrost and permafrost is likely absent in poorly drained shallow fens. In permafrost areas, ice content might range from 1,000 to 2,000%, by weight, in organic units, and 80 to 100%, by weight, in moraine.

The heater station will be located in a unit of undulating moraine with very gentle slopes. A soil test pit was excavated in the lower slope position of undulating moraine. An Orthic Grey Luvisol was developed over well-drained surficial materials. Till in the soil pit locally contained 10% coarse fragments up to 2.0 cm in diameter. The permafrost table was not encountered within 1.0 m of the surface in August 2004.

## Soils, Landforms and Permafrost Potential Effects and Mitigation

The site could be susceptible to drainage disruption and the construction of granular pads for the site could result in soil loss because of burial.

General mitigation strategies to offset potential effects are outlined in [Section 8](#).

## Vegetation Setting

The north half of the heater station site is dominated by a mix of upland jack pine stands and trembling aspen/prickly rose stands. The south half of the site is dominated by black spruce/Labrador tea/mountain cranberry in low areas (see [Figure 7-13](#)).



**Figure 7-13: Example of Vegetation at the Trout River Heater Station**

Jack pine dominates the tree canopy in upland areas, with green alder, willow and prickly rose in the shrub layer. Mountain cranberry and common bearberry dominate the ground cover. Knight's plume moss and reindeer lichen are common.

Trembling aspen/prickly rose areas have trembling aspen in the tree canopy and often, white spruce in the subcanopy. Shrub cover is abundant and includes soapberry, green alder and low-bush cranberry. Common ground covers are prickly rose, bunchberry and stair-step moss.

The black spruce/Labrador tea/mountain cranberry association has scattered black spruce and tamarack in the tree canopy. Common shrubs include Labrador tea,

willow and ground birch. Ground covers include mountain cranberry, myrtle-leaved willow and red bearberry. Stair-step moss, golden moss and peat moss are abundant.

All vegetation types at the site are common in the study area.

### **Vegetation Potential Effects and Mitigation**

The development of the Trout River heater station will affect vegetation through clearing and mechanical damage of trees and shrubs, burial of vegetation on the site by gravel, permanent changes in substrate with construction of pads, and potential changes in drainage around the site. Alteration of vegetation health through effects of dust will occur during construction, to a limited localized extent.

Effects on vegetation resulting from facility construction activities will persist for the operations phase and are likely to extend into the far future (effect extends beyond 30 years past decommissioning and abandonment) given the slow rates of vegetation growth in the North. Vegetation growing in association with gravel pads will likely develop into plant communities differing from those existing before development. In addition, introductions of reclamation species and potential accidental introductions of invasive non-native plant species might occur.

Implementation of primary mitigation measures, as described in [Section 8](#), will help reduce effects on vegetation and this facility site.

### **Wildlife Setting**

Wildlife habitat at the Trout River heater station is composed of closed mature jack pine forest. Alder dominates the closed shrub layer. The edge of the site has been disturbed by the Enbridge Norman Wells pipeline right-of-way. This habitat type is considered uncommon in the region.

Important wildlife features at the site include the thick alder shrub layer, which provides foraging habitat for snowshoe hare, the primary prey species of lynx.

No key wildlife species were detected at the site (by sign or visual observation). Key species were selected because of their importance in the subsistence economy or because they are listed as species of conservation concern or as species of particular ecological relevance. Other wildlife species observed included black bear and snowshoe hare tracks.

An assessment of key habitat features, such as percent cover of forage species, indicated that the site provides year-round, high quality foraging habitat for lynx. (see [Table 7-33](#)). Habitat quality was generally rated as low for other wildlife species.

Overall habitat quality for wildlife at Trout River heater station, based on habitat type and proximity to disturbance, was considered low for both bird and mammal key species. The habitat types at the site are uncommon in the region, indicating they might be a limiting resource for wildlife. The site has been disturbed by the existing Enbridge Norman Wells pipeline right-of-way along the edge of the site.

**Table 7-33: Habitat Quality for Key Species at Trout River Heater Station**

Group	Species	Habitat Use	Habitat Quality <sup>a</sup>
Mammals	Woodland caribou	Winter foraging	Low
	Moose	Foraging	Moderate
	Grizzly bear	Denning	Low
		Fall foraging	Low
		Spring foraging	Low
	Marten	Foraging	Low
	Lynx	Foraging	High
	Beaver	Cover	Low
Foraging		Low	
Birds	Scaup	Nesting	Low
	Peregrine falcon	Nesting	Low
	Lesser yellowlegs	Nesting	Moderate
	Boreal chickadee	Nesting	Moderate
NOTE: <sup>a</sup> Habitat quality was determined by comparing the vegetation and terrain characteristics at each site to each species' habitat requirements (such as shrub availability for moose).			

Some special status species, such as sensitive or threatened species, might occur at the Trout River facility site. Special status species that might occur, based on habitat availability, are summarized in [Table 7-34](#).

Special status species are those that either COSEWIC or the GNWT ranks as being sensitive to disturbance. They also include species listed under SARA and the IUCN – *Red List of Threatened Species*.

**Table 7-34: Special Status Species That Were Observed or That Might Occur at the Trout River Heater Station**

Species	Status <sup>a</sup>			
	ENR <sup>b</sup>	COSEWIC <sup>c</sup>	SARA <sup>d</sup>	IUCN <sup>e</sup>
Fisher	May be at risk	-	-	Lower risk- least concern

**Table 7-34: Special Status Species That Were Observed or That Might Occur at the Trout River Heater Station (cont'd)**

Species	Status <sup>a</sup>			
	ENR <sup>b</sup>	COSEWIC <sup>c</sup>	SARA <sup>d</sup>	IUCN <sup>e</sup>
Little brown bat	Sensitive	-	-	Lower risk – least concern
Northern flying squirrel	Sensitive	-	-	Lower risk –least concern
Wolverine	Secure	Special concern	Schedule 3 – special concern <sup>f</sup>	Vulnerable
Woodland caribou (boreal population)	Sensitive	Threatened	Schedule 1 – Threatened	Lower risk – least concern
Golden eagle	Sensitive	Not at risk	-	-
Rock ptarmigan	Sensitive	-	-	-
Northern flicker	Sensitive	-	-	-
Olive-sided flycatcher	Sensitive	-	-	-
Boreal chickadee	Sensitive	-	-	-
White-throated sparrow	Sensitive	-	-	-

NOTES:

<sup>a</sup>A hyphen indicates no status has been assigned for that species.

<sup>b</sup>IUCN – IUCN-The World Conservation Union

<sup>c</sup>ENR – Environment and Natural Resources

<sup>d</sup>COSEWIC – Committee on the Status of Endangered Wildlife in Canada

<sup>e</sup>SARA – *Species at Risk Act*

<sup>f</sup>Indicates status is to be reassigned (i.e., potentially added to Schedule 1) pending results of public consultations, stakeholder consultation and final ministerial approval.

### Wildlife Potential Effects and Mitigation

Trout River heater station site is composed of low quality habitat for wildlife. Habitat types at the site are uncommon in the region, indicating they might be a limiting resource for wildlife. The site provides year-round high quality foraging habitat for lynx.

Effects on wildlife from development and operation of the Trout River heater station include the potential for sensory disturbance during development activities, direct and indirect habitat loss, and disruption of wildlife movements. Animals could also be killed or injured in vehicle collisions. However, the small footprint of disturbance relative to regional habitat availability, suggests that the magnitude of potential effects on birds and mammals, including those with special status designation, will be within the normal range of variability.

A specific concern at the Trout River heater station is the potential disturbance of foraging lynx, year-round.

Implementation of general mitigation measures, as outlined in [Section 8](#), will reduce effects on wildlife during site development and operations.

### **Hydrology Setting**

The Trout River heater station site is located in the headwaters of small watercourses that flow toward Trout River, the nearest being an unnamed watercourse about 1.0 km upslope of the site. The area encompassing the heater station site, that contributes runoff to an unnamed watercourse is about 57 km<sup>2</sup>.

### **Hydrology Potential Effects and Mitigation**

With the implementation of appropriate sediment control measures, effects of any potential increase in mean annual flow due to the higher runoff coefficient of the disturbed area, and an increase in mean sediment concentration on the unnamed watercourse are expected to be limited because of the large area contributing runoff.

### **Groundwater Setting**

Low rates of groundwater flow toward the northeast are expected at this site because of fine-grained surface materials and flat to gently rolling terrain.

### **Groundwater Potential Effects and Mitigation**

Groundwater effects and mitigation for this site is expected to be similar to the DCR regional information described in [Section 8](#).

### **Water Quality Setting**

Water quality for this site is expected to be similar to regional data described in [Section 8](#).

### **Water Quality Potential Effects and Mitigation**

The Trout River heater facility site might affect water quality through acid deposition, leaks and spills, sediment releases from disturbed land, changes in surface water flow and level resulting from surface runoff and water withdrawals. There will be no untreated process water released to surface waters from the facility.

Modeled acid deposition rates resulting from the heater facility emissions will be limited and waterbodies in the DCR are typically not sensitive to acid deposition. Therefore, based on available information, no effects on water quality because of acid deposition are predicted.

Effects of the releases of domestic wastewater will be managed using water treatment and disposal techniques that will meet regulatory requirements.

Effects of small-scale leaks will be reduced through the use of best practices, and application of the ERP (see [Section 11](#)).

Some localized effects on water quality because of sediment releases are expected. However, these effects are expected to be limited to small increases in concentrations of sediment-associated parameters, such as nutrients and metals. These increases are not expected to result in concentrations above water quality guidelines for the protection of aquatic life or drinking water quality.

### **Fish and Fish Habitat Setting**

There are no surface water features within the site boundaries or within a 1.0 km radius of the site.

### **Fish and Fish Habitat Potential Effects and Mitigation**

Effects on fish and fish habitat resulting from the Trout River heater station would be primarily related to direct disturbance of fish habitat by activities associated with development of the site and indirect effects resulting from sediment in runoff. However, the Trout Lake heater station site is located sufficiently far away from any local fish-bearing waterbodies that there will likely be no direct effects on fish habitat or effects related to runoff and sediment yields.

The topography at the site, maintaining a vegetated buffer zone between the site and local waterbodies, if required, and implementation of site-specific erosion and sediment control plans will prevent sediment from the site reaching nearby surface waters.

## **Human Environment**

This topic describes the protected areas and heritage resource aspects of the human environment for the Trout River heater station. Regional aspects of the human environment are addressed in [Section 8](#).

### **Protected Areas Setting**

This facility site is located within the boundaries that are proposed in the June 2005 draft land use plan for both the Trout River special management zone and the Mackenzie Valley Pipeline special infrastructure corridor. It is not currently subject to a time-limited withdrawal of new subsurface, or surface and subsurface, interests under P.C. 2003-1230. Nor are there any existing protected areas in the immediate vicinity of this site.

### **Protected Areas Potential Effects and Mitigation**

The June 2005 draft land use plan is in the preparation and comment phase, and there are no time-limited restrictions on new surface interests currently in place at this site.

In the event that the land use designation of the proposed special management zone is approved, the protected area effects might include a permanent change to the landscape and a slight decrease in the land base available for other land uses within the Trout River area.

The potential effects of the proposed development on other aspects of the human environment, as well as on the biophysical environment, will be reduced by the mitigation strategies described in [Section 8](#) and by the management and protection plans outlined in [Section 11](#).

### **Heritage Resources Setting**

The Trout River heater station was inspected as part of the field reconnaissance program. The location was considered to have low potential for the discovery of heritage resources. No heritage sites were recorded during the surface reconnaissance, and no heritage resource sites have been recorded in the immediate area.

The nature of the heritage resource potential and results of the investigations at this location was provided to the Prince of Wales Northern Heritage Centre in a report under permit 2004-956.

### **Heritage Resource Potential Effects and Mitigation**

Before development of this site, and if required, a Historical Resources Impact Assessment will be conducted and provided to the PWNHC. If it is determined that the development will affect any heritage resources, mitigation plans will be prepared.

## **PUBLIC INVOLVEMENT**

The community of Trout Lake has expressed concerns regarding the proximity of K'eotsee to a location that was originally proposed for the Trout River heater station. As a result of community input, the Trout River heater station was moved approximately 3.0 km to a site proposed by the SKDB. Additional information on public involvement activities is provided in [Section 10](#).

### PERIOD OF OPERATION (PART 14)

Construction activities will take place year-round, at varying levels of activity, from 2007 to 2010 (see [Section 3](#)). The Trout River heater station is expected to be in operation for 25 years or more.

### LOCATION OF ACTIVITIES BY MAP COORDINATES (PART 16)

Map coordinates of the northwest corner of the facility site are given in [Table 7-35](#) and a map showing the location of the site is in [Figure 7-14](#).

**Table 7-35: Location of Activities by Map Coordinates**

Site	Latitude (DD)	Longitude (DD)	UTM Easting (m)	UTM Northing (m)	UTM Zone
Trout River Heater Station	60.8096	-120.4726	637493	6744230	10

### FEES (PART 18)

The total land area required for activities contained in this section is 4.1 ha.

The land requirements are shown in [Appendix A](#).

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Figure 7.15 has been moved to reduce file size. To view it, click on the link to the figure in the web page List of Figures for this document.