COMPREHENSIVE STUDY REPORT

WOLLASTON LAKE ROAD

SASKATCHEWAN DEPARTMENT OF HIGHWAYS AND TRANSPORTATION

Indian and Northern Affairs Canada
Affaires Indiennes et du Nord Canada

Canada

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FOREWORD

Sections of the following document may have been reproduced during the preparation of this report:

> Stantec Consulting Ltd. Wollaston Lake Road Environmental Impact Statement. Submitted to Saskatchewan Environment – Environmental Assessment Branch by the Athabasca Economic Development & Training Corporation. January 2006.

Executive Summary

Saskatchewan Highways and Transportation (DHT), the proponent of the Wollaston Lake Road, has proposed the construction of the 100 kilometre, all-weather road from Highway 905 in northern Saskatchewan to the settlement of Wollaston Lake and the Hatchet Lake Denesuline First Nation community. The primary purpose of the all-weather road is to provide year-round access for passenger vehicles and trucks to the growing communities in the Wollaston Lake area. The road would provide a reliable connection to the south for the people of the area via Highway 905 of the provincial highway system. Currently, access to the settlement of Wollaston Lake and Hatchet Lake is provided on an ice road during the winter months and by barge in summer or air year-round.

Indian and Northern Affairs Canada (INAC) and Western Economic Diversification (WD) may provide financial assistance to the proponent for the purpose of enabling the construction of the project to proceed. The decision to provide financial support to the project triggers the requirement for an environmental assessment of the proposal in accordance with the *Canadian Environmental Assessment Act*. Pursuant to subsection 29(b) of the Comprehensive Study List Regulations under the Act, the proposed project will be the subject of a comprehensive study. A comprehensive study for a project is required when it involves the construction of an all-season public highway that will be more than 50 kilometres in length and will either be located on a new right-of-way or will lead to a community that lacks all-season public highway access. The Canadian Environmental Assessment Agency is the Federal Environmental Assessment Coordinator for the federal assessment of the project.

The Wollaston Lake Road proposal has triggered the requirement for an environmental impact assessment under Saskatchewan's *The Environmental Assessment Act*. In accordance with the *Canada-Saskatchewan Agreement on Environmental Assessment Cooperation* (Cooperative Agreement), a cooperative environmental assessment involving both jurisdictions has been conducted. The Environmental Assessment Branch of Saskatchewan Environment has undertaken the role of Lead Party for the cooperative assessment process.

The comprehensive study report (CSR) for the Wollaston Lake Road proposal was prepared by INAC, in consultation with WD, following a technical review of the DHT proposal and an evaluation of the environmental effects of the project. Expert advice on the potential environmental effects of the project was provided by Fisheries and Oceans Canada (DFO), Transport Canada (TC), Environment Canada (EC), Health Canada (HC), and Natural Resources Canada (NRCan).

Specific potentially affected valued ecosystem components (VECs) were examined during the environmental assessment process. At the scoping step, it was determined by the responsible authorities that the following would be the project VECs: geology, soils, natural vegetation, rare and endangered flora, water quality, fish habitat, fish, birds, aquatic furbearing mammals, ungulates and other mammals.

Potentially significant environmental effects of the project on the VECs include: disturbance and loss of terrestrial habitat that would be affected by the project; disruption of spawning, rearing and incubation of aquatic species; increased vulnerability of the VECs to expanding commercial and sport exploitation; vehicle accidents involving wildlife and humans; disturbance of drainage patterns in the region; adverse effects to water quality; soil erosion; loss of vegetation communities; and the loss of watercourse navigability.

Mitigation measures have been proposed to reduce the predicted adverse effects of the project to a level of insignificance. These measures were considered in the context of the determinations reached in the comprehensive study report. Examples of these measures would include:

- minimizing the geographic extent of the project
- incorporating the recommended design criteria and construction practices for culvert installations
- applying best management practices for controlling soil erosion during and after construction, including silt fencing
- planning bridge design and placement to minimize habitat disturbance
- incorporating the appropriate safety protocols and procedures during construction, and
- undertaking extensive environmental monitoring programs to verify the determinations reached as part of the comprehensive study.

Following the analysis of the nature of the project, the description of work, the infrastructure associated with the project and the proposed changes to the VECs, INAC and WD have assessed the potential impacts that the Wollaston Road Project is likely to have on the environment. This review was completed on the basis of the information provided by the proponent in its environmental impact study and supplemental material, expert advice provided by federal authorities, results of discussions with provincial regulatory agencies and advice from provincial experts provided through the cooperative review process, and comments provided by Aboriginal groups and public stakeholders through various consultation exercises.

Taking into account implementation of the mitigation that was considered to be appropriate, including the proposed compensation measures, as well as the follow-up programs and the proponent's commitments, Indian and Northern Affairs Canada and Western Economic Diversification Canada have determined that the proposed project, as defined by the scope of the study, is not likely to cause significant adverse environmental effects.

General Project Information

Project Name: All-Season Road to Wollaston Lake

Project Location: The project includes construction of a 100 km all-weather road in Saskatchewan from the communities of Wollaston Lake and Hatchet Lake (the communities) to Highway 905.

Purpose of the Project: The primary purpose of the all-weather road is to provide year round access to the growing communities for passenger vehicles and trucks. The all-weather road is intended to provide a reliable means of transportation for the settlement of Wollaston Lake and the Hatchet Lake Denesuline Nation (Hatchet Lake) and will connect Highway 905 to Wollaston Lake. Currently, access to the settlement of Wollaston Lake and Hatchet Lake is by ice road, barge and by air.

Project Proponent: Saskatchewan Department of Highways

Responsible Authorities: Indian and Northern Affairs Canada (INAC)
Western Economic Diversification (WD)

Environmental Assessment Triggers: Indian and Northern Affairs Canada and Western Economic Diversification may provide financial assistance to the proponent for the purpose of enabling the project. The project as proposed is described in Section 29(b) of the Comprehensive Study List Regulations.

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List of Abbreviations

AEDTC	Athabasca Economic Development & Training Corporation
Agency	Canadian Environmental Assessment Agency
CEAA	*Canadian Environmental Assessment Act*
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CSR	Comprehensive Study Report
CWS	Canadian Wildlife Service
DFO	Fisheries and Oceans Canada
WD	Western Economic Diversification
DHT	Saskatchewan Highways and Transportation
EA	Environmental Assessment
EAB	Saskatchewan Environmental Assessment Branch
EC	Environment Canada
EEM	Environmental Effects Monitoring
FA	Federal Authority
GHG	Greenhouse Gas
HC	Health Canada
HADD	Harmful Alteration, Disruption or Destruction
INAC	Indian and Northern Affairs Canada
NRCAN	Natural Resources Canada
NWPA	*Navigable Waters Protection Act*
PAT	Project Administration Team
PAGC	Prince Albert Grand Council
ppm	parts per million
RA	Responsible Authority
ROW	Right of Way
SAR	Species at Risk
SARA	*Species at Risk Act*
SE	Saskatchewan Environment
SEAA	*Saskatchewan Environmental Assessment Act*
SKCDC	Saskatchewan Conservation Data Centre
TC	Transport Canada
TEK	Traditional Ecological Knowledge
VEC	Valued Ecosystem Component
vpd	Vehicles per day

1.0 INTRODUCTION

1.1 Background

Saskatchewan Highways and Transportation (DHT) proposed the construction of a 100 kilometre, all-weather road from Highway 905 to the settlement of Wollaston Lake and the Hatchet Lake Denesuline First Nation. The proposed road will improve existing service and alleviate safety concerns of the existing transportation service to the growing communities. Currently, access to the community is by ice road in winter, provincial ferry (barge) in summer, and by air from the provincial airstrip at Wollaston Lake year-round.

The proposed project is subject to environmental assessment under both the *Saskatchewan Environmental Assessment Act* (SEAA) and the federal *Canadian Environmental Assessment Act* (CEAA). The project is subject to a comprehensive study under CEAA. The Province of Saskatchewan and the Government of Canada have agreed to review the project cooperatively as per the Canada-Saskatchewan Agreement on Environmental Assessment Cooperation.

1.1.1 Proponent

The primary proponent for the Wollaston Lake Road is DHT. However, the project is guided by a project steering committee comprised of representatives from Athabasca Economic Development and Training Corporation (AEDTC), which represents the First Nation and non-First Nation communities of the Athabasca Region, Saskatchewan Highways and Transportation (DHT), the Prince Albert Grand Council (PAGC), and Indian and Northern Affairs Canada (INAC). For the purposes of this report, the proponent will be referred to as DHT

1.2 Need for and Purpose of the Project

1.2.1 Need

Currently, access to the settlement of Wollaston Lake and Hatchet Lake is by ice road, barge and by air. The ice road operates from early January to the end of March. The barge serves the community from early June to early October. Wollaston Lake and Hatchet Lake rely heavily on air transportation for both time-sensitive freight and passenger transportation as air transportation is the only mode available year-round. Improved transportation services are needed to service the growing communities. The all-weather road would provide an alternative, year-round supply route for freight to the communities and would support economic development opportunities such as tourism, commercial fishing and other small businesses.

A study conducted by the Athabasca All-Weather Road Steering Committee found major concerns with the existing level of transportation service to Wollaston Lake, including:

- The limited capacity of the Wollaston Lake ferry creates bottlenecks for both passenger vehicles and freight during busy periods and the ferry's length and carrying capacity do not allow for fully loaded semi-trailers.
- Safe use of the ice road created from Hidden Bay to Wollaston Lake, which operates from January through to the end of March, depends upon the ice thickness being at least 50cm. However, in some years (e.g., 2005-06) this thickness is not attained and the road either is not open, or driveable only by light trucks.

- Freight and passenger service is limited to air transportation in the fall and spring when neither the ferry nor ice road is available. Total reliance on air transportation during these periods results in high transportation cost and severe capacity limitations.

The communities of the Athabasca region, including Wollaston Lake, believe that their social and economic future is dependent on the development of all-weather road access (Athabasca All-Weather Road Steering Committee, 2002). Transportation is required for the community to re-supply groceries, fuel, construction materials and equipment, which enables the community to continue major projects, passenger transportation for community residents, visitors, tourists and those undertaking various types of business activities.

1.2.2 **Purpose**

The primary purpose of the all-weather road is to provide year-round access for passenger vehicles and trucks to the growing Wollaston Lake communities. The all-weather road is intended to provide a reliable means of transportation for the settlement of Wollaston Lake and the Hatchet Lake Denesuline First Nation by connecting Highway 905 to Wollaston Lake and will replace the existing ice road and barge service. The Wollaston Lake community is one of the fastest growing First Nations communities in Saskatchewan. The expanding population will place high demands on the existing regional transportation system for re-supply and the proposed all-weather gravel road will allow the region meet these growing needs to the year 2025.

1.3 Environmental Assessment

The proposed road project is an undertaking in relation to a physical work, and as such, is defined as a project under Subsection 2(1) of the CEAA and is not listed within the CEAA Exclusion List Regulations. Indian and Northern Affairs Canada (INAC) and Western Economic Diversification (WD) may provide financial assistance to enable the project to proceed. Pursuant to paragraph 5(1)(b) of the CEAA, an environmental assessment must be conducted before a funding decision can be made. INAC and WD are therefore responsible authorities under the Act.

The project will require approval from Transport Canada (TC) pursuant to paragraph 5(1)(a) of the *Navigable Waters Protection Act* (NWPA), which allows for an interference to navigation. The issuance of this approval is described in the Law List Regulations, and is a trigger under paragraph 5(1)(d) of the CEAA; therefore TC is a responsible authority under the Act. In accordance with TC's department mandate and regulatory responsibility, TC has identified its scope of project to include the proposed construction, operation, and maintenance of the bridge crossing Redman River, along with any related works, accesses, storage areas or other undertakings directly associated within this project. Pursuant to the CEAA, the above referenced scope of the project is not included in the comprehensive study regulations of CEAA and will be conducted as a screening. TC will be participating in the comprehensive study as an expert FA and will be providing advice in regards to the NWPA.

DFO will issue subsection 35(2) *Fisheries Act* authorizations for the harmful alteration, disruption or destruction of fish habitat associated with certain components of the proposed development. DFO's scope of project is limited to aspects of the project which will impact fish and fish habitat (i.e. stream crossings), and DFO's review of this proposal will be undertaken as a screening level assessment. DFO supports the implementation of a single federal process allowing all RAs to fulfill their obligations pursuant to CEAA and will therefore use the documentation generated for the comprehensive study and

provincial process to serve the purposes of the screening level environmental assessment. DFO will be participating in the comprehensive study as an expert FA and will be providing advice in regards to its departmental mandate.

Environment Canada (EC), Natural Resources Canada (NRCan), and Health Canada (HC) have identified themselves as federal authorities and have provided expert advice in relation to the environmental assessment. The Agency is the federal environmental assessment coordinator (FEAC) for the proposed project and is responsible for coordinating the review activities of the responsible authorities and expert federal authorities in accordance with Section 12 of the CEAA.

The proposed project is subject to a comprehensive study under the CEAA, pursuant to paragraph 29(b) of the Comprehensive Study List Regulations, because the project consists of the proposed construction of an all-weather public highway that will be more than 50 km in length and will lead to a community that lacks all-season public highway access.

In addition, the project requires an environmental assessment as per the Province of Saskatchewan *Environmental Assessment Act*. In accordance with the Canada-Saskatchewan Agreement of Environmental Assessment Cooperation (Agreement), a cooperative environmental assessment between both jurisdictions has been conducted. As per the Agreement, the Province of Saskatchewan has taken the lead on the environmental assessment. A Project Administration Team (PAT) has been established to direct the environmental assessment process. Team members include a representative from the Province of Saskatchewan, the Agency, INAC, WD, TC and DFO.

1.3.1 Comprehensive Study

The purpose of this comprehensive study is to describe the project, the environmental setting, the potential project-environment interactions, the predicted environmental effects, the proposed mitigation measures, and the significance of any residual environmental effects. After completion of the CSR by the RAs, the report is distributed to the public for review and comment. Following the public review, public comments are forwarded to the federal Minster of Environment to be considered in a decision. The Minster of the Environment reviews the CSR and any public comments filed in relation to its contents. If the Minister is of the opinion that additional information is necessary or actions are needed to address public concerns, the Minister may request the RAs to address these concerns. Once the concerns are addressed, the Minister will issue an environmental assessment decision statement that includes:

- The Minister's opinion as to whether the project is likely to cause significant adverse environmental effects; and
- Any additional mitigation measures or follow-up program that the Minister considers appropriate.

If it has been determined that the project is not likely to cause significant adverse environmental effects, an RA may exercise any power or perform any duty or function that would permit the project, or part of the project, to be carried out, such as funding or issuing a permit or authorization.

Table 1.3.1 ***Approvals Required for the Proposed All-Season Road***	
Authorization	***Responsible Agency***
Fisheries Act Authorizations DFO Letters of Advice	Fisheries and Oceans Canada
Navigable Waters Protection Act Approval	Transport Canada
Species at Risk Act 79(1) and 79(2)	Environment Canada
Work Authorization Permit	Saskatchewan Environment
Temporary Work Camp Permit(s)	Saskatchewan Environment
Aquatic Habitat Protection Permits	Saskatchewan Environment
Gravel Quarry Dispositions	Saskatchewan Environment
Land Tenure	Saskatchewan Environment
Hazardous Substances and Spill Control	Saskatchewan Environment
Temporary water use permits	Saskatchewan Watershed Authority
Forest Product Permit	Saskatchewan Environment
Permits for work camps (e.g. sewage disposal)	Mamawetan Churchill River Health Region

1.3.2 Comprehensive Study Report Organization

The comprehensive study report summarizes the results of the environmental assessment conducted for this proposed project and draws information from the Environmental Impact Statement(EIS) prepared by Stantec Consulting Inc. This report is divided into seven (7) sections with each section providing a summary of the results of the EIS. The sections are arranged at described below.

- Section 1.0 presents an introduction to the project
- Section 2.0 presents a project description
- Section 3.0 presents information on the scope of the project and the environmental assessment
- Section 4.0 presents a description of the current environment.
- Section 5.0 presents information on the public consultation program and participation conducted for this project.
- Section 6.0 presents the environmental effects of the project, mitigation measures proposed for any potentially significant adverse environmental effect, the residual effects significance assessment and final RA conclusions.
- Section 7.0 presents the required follow-up program and the significance decision for this project.

2.0 PROJECT DESCRIPTION

2.1 Project Overview

The project includes construction of a 100 km all-weather road in Saskatchewan from Highway 905 to the Wollaston Lake community and the Hatchet Lake reserve (Figure 1). The principal project is the construction, operation, and maintenance of the all-season Wollaston Lake Road. Ancillary projects include the set-up and operation of temporary work camps along the road, a roadway maintenance depot, and borrow pits.

The road will be a public road as defined in the provincial *Highways and Transportation Act* (1992). It will be open to tourists, mining companies, regional residents and the general public. Use by private vehicles is expected to be 40 to 60 vehicles per day. Passenger vehicles will be the primary use, although it will also serve many freight-hauling vehicles.

Following the construction of the all-weather road, ongoing operation and maintenance of this section of roadway will be the responsibility of DHT.

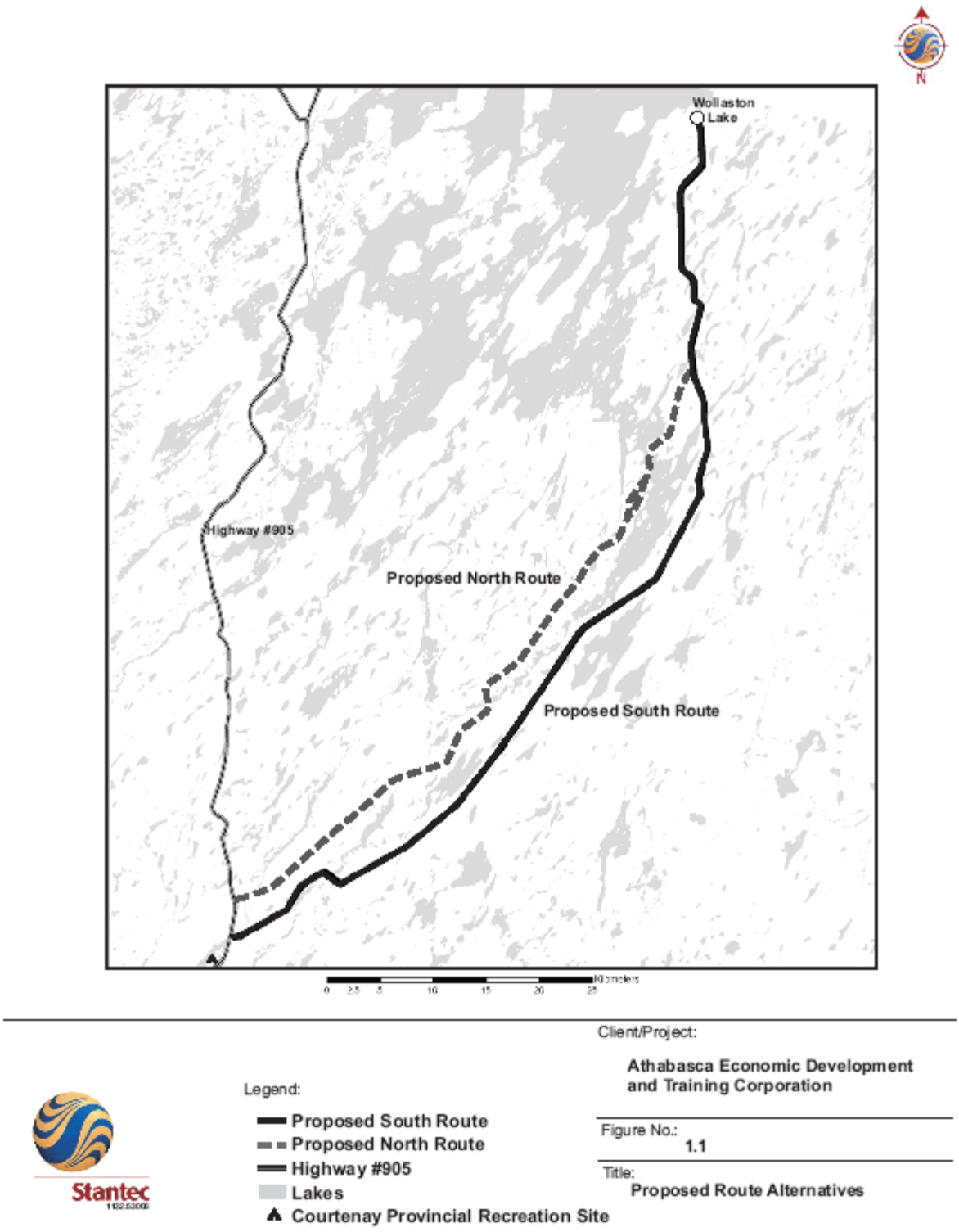

Figure 1 - Project Location for Wollaston Lake All-Season Road

2.2 Project Alternatives

Subsection 16(1)(e) of the CEAA provides the ability of RAs to consider other relevant matters, such as alternatives to the project. Also, subsection 16(2)(b) of the CEAA specifies that every comprehensive study of a project shall include consideration of alternative means of carrying out the project that are technically and economically feasible and the potential environmental effects of any such alternative means.

2.2.1 Alternatives to the Project

Alternatives to the project are defined as functionally different ways of achieving the same end (Agency 1997). The two alternatives reviewed during the comprehensive study include:

- Access Wollaston Lake and Hatchet Lake via ice road from January to March, barge from June to October and by air year-round (status quo)
- Access Wollaston Lake and Hatchet Lake via an all-weather road.

2.2.2 Alternative Means of Carrying Out the Project

Two alternative all-weather road routes were identified between Highway 905 and the Wollaston Lake settlement based on detailed terrain evaluations. The location of the two alternative routes, the South Route and the North Route, is presented in Figure 1. The two routes, which are the only technically feasible means of accessing the community, were evaluated in the environmental impact statement developed by DHT. The South Route commences at Highway 905 at approximately 57º25' latitude and 104º longitude and runs northeast past Dunnett Lake, along the eastern shore of Compulsion Bay to the settlement of Wollaston Lake and would contain a single bridge located at the Redman River crossing. The North Route commences at Highway 905, a few kilometres to the north of the South Route alternative, and runs along the west shore of Compulsion Bay and would require a bridge at Compulsion Bay as well as 2 to 3 other stream crossings, depending on the final design.

The South Route is preferred over the North Route based on terrain evaluation, topographical analysis, stream crossings, total construction costs and the effect on environmentally sensitive areas. Terrain types, such as peat landforms, that may result in excessive fill requirements or be susceptible to excessive frost heave and thaw settlement were avoided with the South Route. The South Route minimizes excavation and side-hill locations which are complicating factors to drainage and the thaw of ground ice. In addition to the South route being preferred by local communities and slightly less expensive than the North Route, the South Route is favoured based on the reduced number of stream crossings and therefore potentially reduced effect on established fisheries. For the above stated reasons, the Project Steering Committee proposes construction of the South Route. Although the general route has been laid out, minor changes to the exact route may be required following centreline surveying.

2.3 The All-Weather Road

2.3.1 Construction and Maintenance

Centreline location (surveying and designing)

Clearing and grubbing - The road right-of-way (ROW) will generally be 46 m wide. Clearing and grubbing will be done by crawler dozers and salvaging will be done manually assisted by chainsaws. Hand clearing will be conducted on trees outside of but overhanging the ROW, as well as adjacent to watercourses, in sensitive areas, and in terrain too rugged to permit the use of mechanical clearing.

Muskeg, Permafrost and Bedrock Padding - The alignment will be chosen to minimize the crossing of muskeg terrain; however, a certain amount may be unavoidable. Muskeg areas will be padded with fill material to facilitate summer access. Excavated material for muskeg padding will be taken from the ROW or from borrow pits in close proximity to the site. The proponent expects to route the ROW to avoid areas of permafrost.

Roadway Subgrade Construction – The road will be designed to DHT functional design Grid Road Standard, as a gravel surface road with a design speed of 80 km/h, a surface width of 7.6 to 8.0 m, ROW width of 46 m. Grading will be done to reduce the steepness of the grades if the gradient is more than 9%. Embankments will be 7 m wide at the top and have sideslopes no steeper than 2:1.

Borrow Pits - Borrow pits will be located at various locations along the route corridor as they are required as a source of embankment material for the roadway subgrade, for granular material for subgrade stabilization material and potentially for future traffic gravel production. Exact locations of future borrow pits are unknown as specific site surveys must be conducted to determine the viability of each location. In general, borrow pits will not be located in water course reservations and gravel will not be taken from streams. Clearing of borrow pits will be carried out immediately prior to opening the pit. Once depleted, the cleared brush and trees will be buried or burned in the pit and the pit contoured to blend into the surrounding landscape and/or function as a pond.

Drainage Culvert Installation – Culverts will be installed to allow for natural cross-drainage where the road will pass over low wet areas, intermittent streams and creeks. Culverts will also be installed at all stream crossings where bridges are not required. On the South Route, 21 culverts will be used on stream crossings to provide the necessary capacity or provide adequately for fish passage or navigation (Table 2.3.1). Culverts will be installed a minimum of 20 cm below normal streambed elevation (or 20% of the culvert diameter, whichever is greater) to ensure fish movement is not impeded during low flow periods and so that a substrate of natural material may develop if conditions permit. Where multiple culverts are required, they will be separated at least 1.8 m when allowed by channel width. The final culvert sizing and design will be provided to the regulatory agencies for approval following the survey and design phase of this project.

River Crossings/Bridge Construction - The proposed South Route will require one bridge crossing, located at the Redman River. The bridge will consist of a 3-15m span bridge with an 8.5m deck, allowing for two way traffic. The bridge will include steep piles, concrete cap, and concrete bridge units.

Inspection and Maintenance - Once constructed, ongoing inspection and maintenance of the roadway will be the responsibility of DHT. Delivery of the work will involve a combination of department crews, local contractors, and others. Routine maintenance will consist of snow and ice control, surface blading, surface stabilization, and drainage structure maintenance.

Temporary Work Camps - It is anticipated that temporary work camps will be utilized during the construction phase of the seasonal road (clearing, grading and bridge construction activities) and that these camps will be of the 'ATCO trailer' variety. The camps will consist of a cook trailer, wash trailer and bunk trailers. The number of bunk trailers will vary according to the crew size required for the various operations. The camps will be stand alone and will produce their own electrical power needs. The camp operator will be required to obtain the appropriate permit from SE. Locations of temporary work camps are highly variable and will be determined by the contractor(s) in accordance with the provincial guidelines for such facilities. The contractor(s) may choose to establish camp in association with the community of Wollaston Lake. Alternatively, and quite probably for certain operations (e.g. bridge construction), the contractor(s) may decide to locate independent camps along the road.

Roadway Maintenance Depot – DHT currently operates a small maintenance depot in the village of Wollaston Lake and will be used to maintain the proposed road; no further developments of the maintenance depot are needed and therefore not evaluated within the CSR.

Table 2.3.1
Watercourse Crossings Information Table

Route	*Crossing ID*	*Crossing Type*	*Fisheries potential*	*Navigability*
Shared	1	Culvert	YES (Low)	
Shared	2	Culvert	None	
Shared	3	Culvert	None	
Shared	4	Culvert	None	
Shared	5	Culvert	YES (Moderate)	
Shared	6	Culvert	YES (low)	
Shared	7	Culvert	YES (Moderate)	
South	8	Culvert	None	
South	9	Bridge	YES (High)	YES
South	10	Culvert	YES (Low)	
South	11	Culvert	YES (Low)	
South	12	Culvert	YES (Moderate)	
South	13	Culvert	YES (Low)	
South	14	Culvert	Low	
South	15	Culvert	None	
South	16	Culvert	None	
South	17	Culvert	None	
South	18	Culvert	None	
South	19	Culvert	YES (Low)	
South	20	Culvert	None	
South	21	Culvert	YES (Low)	
South	22	Culvert	YES (Low)	
North	23	Culvert	Low	
North	24	Culvert	High	YES
North	25	Culvert	Low	
North	26	Culvert	Low	
North	27	Culvert	Moderate	

Table 2.3.1 ***Watercourse Crossings Information Table***				
Route	***Crossing ID***	***Crossing Type***	***Fisheries potential***	***Navigability***
North	28	Culvert	None	
North	29	Culvert	Low	YES
North	30	Culvert	None	
North	31	Culvert	Low	
North	32	Culvert	None	
North	33	Culvert	Low	
North	34	Culvert	None	
North	35	Culvert	None	
North	36	Culvert	Moderate	
North	37	Culvert	High	YES
North	38	Culvert	High	YES
North	39	Culvert	None	
North	40	Culvert	Low	
North	41	Culvert	High	YES
North	42	Culvert	Low	
North	43	Culvert	Low	
North	44	Culvert	None	
North	45	Culvert	High	YES
NOTE: See Figure 2 for locations of proposed crossings.				

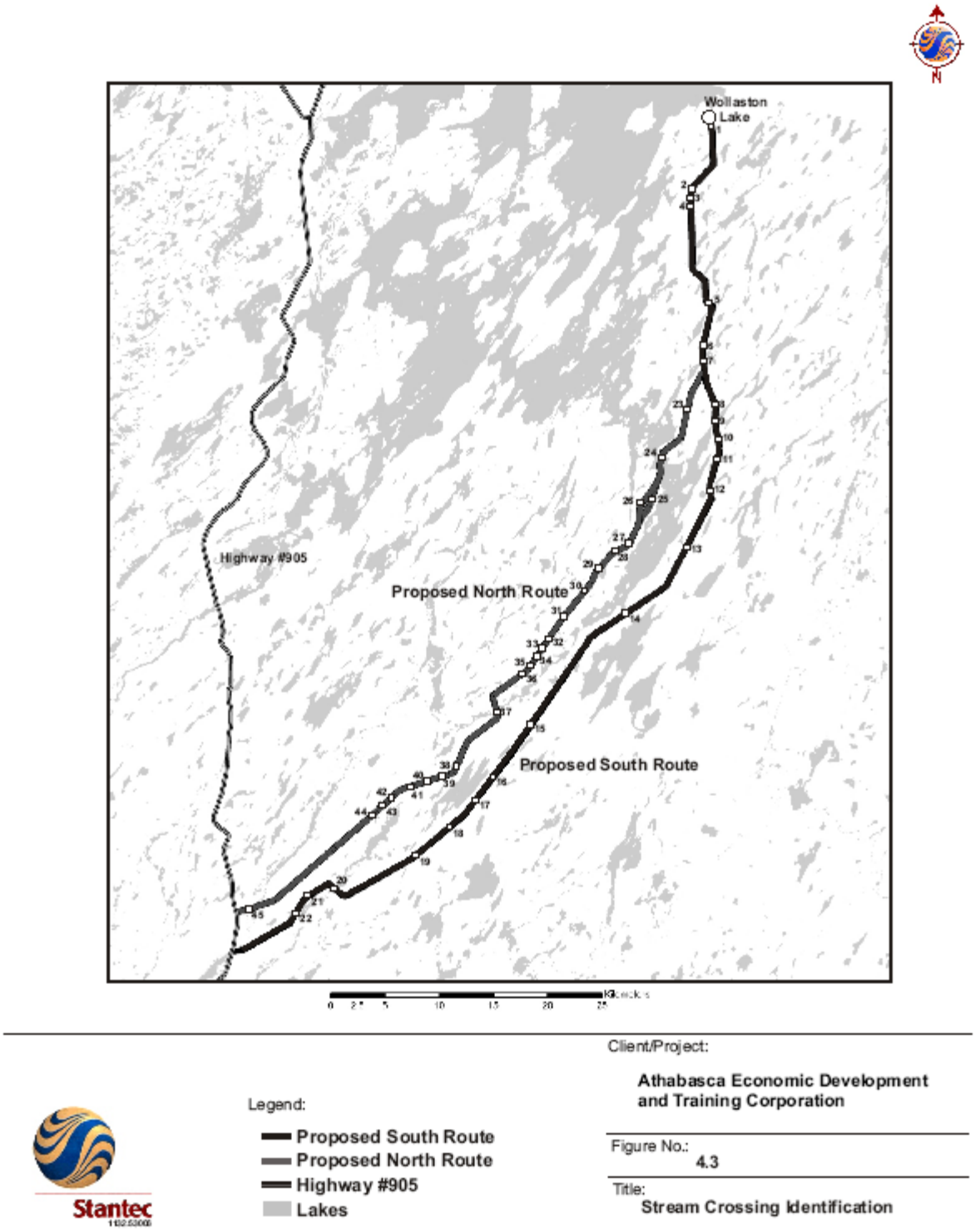

Figure 2 – Proposed Watercourse Crossings for Wollaston Lake All-Season Road

2.3.2 **Manpower and Contracting Policies**

Construction Employment

There will be employment opportunities for surveyors, survey assistants, labourers, heavy equipment operators, truck drivers, camp cooks and camp attendants, mechanics, as well as supervisors. It is anticipated that contractor requirements for many of these positions may be met from within northern communities, to the extent that trained people are available.

Total employment created is estimated to be approximately 330 to 350 FTE (Full Time Employee equivalent) for the construction period and includes spin-off employment and work at other sites. The project would be subject to an extensive capacity building and procurement initiative that would ensure significant benefit to northern businesses and northerners.

Long-term Employment

Long-term employment associated with the all-season road will result from the maintenance requirement. Requirements are estimated to be an addition of one or two staff. Spin-off employment is estimated to be equivalent to an additional person-year per year.

Northern Employment Policies

The Department of Highways and Transportation (DHT) will public tender with construction companies and other organizations for all activities associated with construction of the all-season road. As such, each contractor will be directly responsible for acquiring the necessary staff.

Bidding Procedures

The major construction activities involved in the access road will require a certain level of management, expertise and capitalization. It is expected that bidding will be very competitive. To maximize northern benefits, DHT will encourage northern and southern contractors to consider joint venture bidding.

2.3.3 **Skills Training**

It is expected that the majority of northern residents who gain employment on the road construction contracts will bring required skills to the job, having obtained these through previous training programs and employment. For survey assistants and general labourers, any training will be on-the-job training directed towards the specific duties of the position and work safety practices.

2.3.4 **Employment Monitoring**

DHT will undertake to monitor the employment policies of the contractor(s) hired for the project. This will be accomplished by requiring monthly reports by employee name and permanent address of northern residents employed. In the event that contractors do not comply with the employment conditions contained in their contract, DHT would maintain the right to cancel any contract.

2.3.5 Roadway Management Plan

The road will be a public road as defined in the *Highways and Transportation Act* (1992). It will be open to tourists, mining companies, regional residents and the general public. Use by private vehicles is expected to be 40 vehicles per day (vpd) up to a maximum of 60 vpd. Passenger vehicles will be the primary use, although it will also serve many freight-hauling vehicles.

2.3.6 Reclamation Plan

The project as currently planned is for the construction of an all-weather road. The operating life of the roadway is expected to carry on indefinitely. However, should the roadway cease to be required, decommissioning of the roadway would be undertaken. Decommissioning and abandonment would be carried out in accordance with provincial guidelines. Reclamation of any areas would be completed in a similar manner. Generally, abandonment would involve the removal of bridges and culverts and allowing the ROW and road surface to naturally revegetate.

2.4 Schedule

The all-weather road will take approximately 2.5 years to complete. The tentative schedule for the proposed project is as follows:

Table 2.4

Project Schedule

Activity	Tentative Schedule
Geotechnical and Granular testing	Feb-April, 2006
Roadway and Crossing Design	April-August, 2006
Right-of-Way acquisition and surveying	Summer/fall 2006
Establish Route Centreline	Winter, 2006-2007
Right-of-way clearing	Winter, 2006-2007
Install drainage structures	Winter, 2006-2007, or summer, 2007 (within approved DFO/SE fisheries window)
Grading and road bed construction	Year-round following clearing and drainage structure installation
Bridge Construction (Redman River)	Summer, 2007
Operation	Spring, 2009
Cleanup and Remediation	Summer, 2010

2.5 Project Costs

The all-season road along the South Route is estimated to cost $16.6 million to construct, and have an annual operating cost of $350,000. The North Route is estimated to cost $20.7 million to construct and have an annual operating cost of $310,000.

3.0 SCOPE OF THE PROJECT

The scope of the project refers to components of the proposed undertaking that are to be considered part of the project for the purposes of the environmental assessment. The project includes the principal undertaking (construction and operation and maintenance of the all-season road) and any accessory activities or works that are directly linked to or interconnected with the principal project (work camps, roadway and borrow pits).

3.1 Scope of the Factors to be Considered

The terms “environment” and “environmental effect” are defined in Section 2 of the CEAA.

Based on the information contained in the proponent’s project description, the RAs and SE prepared a document entitled “Final Project-Specific Guidelines for the Preparation of an Environmental Impact Statement and *Canadian Environmental Assessment Act* Comprehensive Study Scoping Consultation Document”. This document contains the requirements of the federal scoping document as well as the provincial project-specific guidelines.

The scoping document portion of the joint document directs the preparation of the comprehensive study to determine whether or not the project is likely to cause significant adverse environmental effects. In developing the scoping document, the RAs consulted with DFO, EC, HC, the Agency, and SE.

The scope of the assessment includes a consideration of factors set out under subsection 16(1) and 16(2) of the CEAA. The scope of the factors to be considered includes:

- Timing/scheduling of project activities
- Natural variations of each VEC
- The time required for recovery from an impact
- Cumulative effects, including effects from other activities likely to occur as a result of road construction and improved access to new areas.
- Valued Ecosystem Components (VECs) of interest in this area may include but were not limited to the following:
- Migratory birds, raptors etc. along the road right-of-way (ROW),
- Fish habitat in watercourses along the ROW, including spawning, rearing, feeding and migratory habitat,
- Water quality along the ROW and receiving waters downstream (down slope) of the ROW,
- Amphibian and reptile populations along the ROW,
- Wetlands,
- Plant or animal species identified under the *Species at Risk Act* (SARA) and/or from the Provincial Wild Species at Risk Regulation and Provincial Conservation Data Centre,
- Geological resources or features encountered along the ROW,
- First Nations lands,
- Traditional lifestyles in the area, including hunting, trapping and traditional plant gathering activities,

- Archaeological sites along the ROW and associated work spaces,
- Commercial and recreational fisheries on Wollaston Lake and nearby waterbodies,
- Mineral claims potentially affected by the project,
- Outfitters, sport fishing camps, and other recreational uses affected by the project, and
- Human health and safety

3.2 Spatial and Temporal Boundaries of the Project Area

The spatial boundaries of the assessment vary on a VEC-specific basis. The site-specific concerns related to rare flora, heritage resources, stream crossings, wildlife habitat, traplines, road right-of-way, borrow pits, sport fishing lakes, etc., are addressed within a relatively narrow spatial framework that extends for the length of the road from Highway 905 to the community of Wollaston Lake, and extending for 2000 metres west and east of each route. Therefore, considering for example, the South Route, the project area is approximately 100 km long and 4 km wide, for a total area of about 400 km^2 (Figure 3) . This project area includes the right-of-way and ancillary features such as borrow pits.

Socio-economic discussions are based upon a larger study area that encompasses the proposed all-weather road area (North and South routes), the existing ice road, and the portion of Highway 905 between the ice road and the intersection with the proposed Wollaston Road. This regional study area is more than 5000 km^2 in size.

Temporal boundaries of the project are for the construction, operation and maintenance periods of the proposed road.

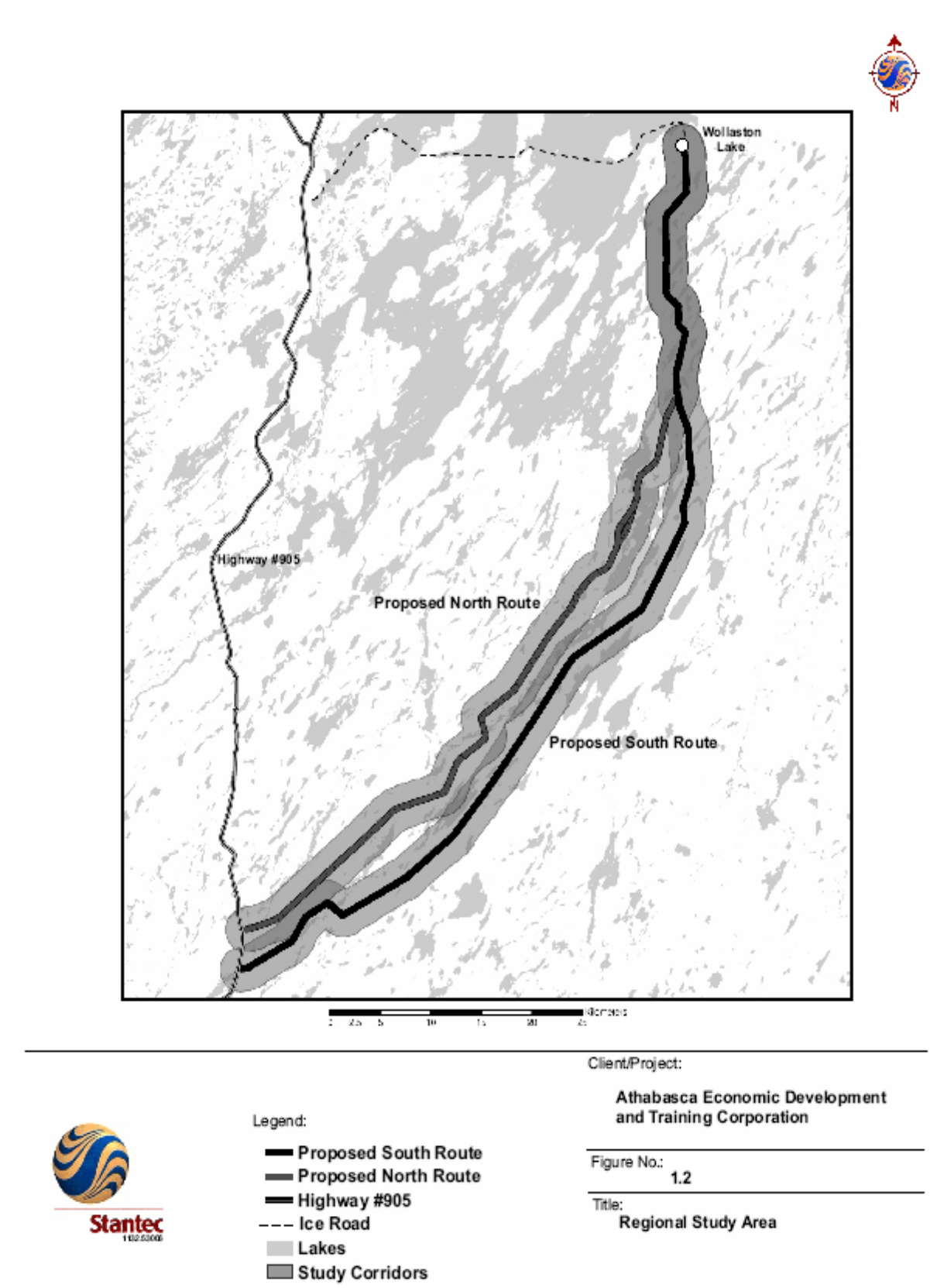

Figure 3 – Project Study Areas for the Wollaston Lake All-Season Road

4.0 DESCRIPTION OF THE ENVIRONMENT

4.1 Physical Environment

This section provides a description of the biophysical characteristics of the study region. Topics are discussed at a regional scale, with some topics being more focused on the road corridor area (i.e., the two route options).

4.1.1 Physiography

The project study area straddles two ecozones. The southern portion is located in the Wollaston Lake Plain landscape area within the Churchill River Upland ecoregion of the Boreal Shield ecozone. The northern portion is located in the Nueltin Lake Plain landscape area within the Selwyn Lake Upland ecoregion of the Taiga Shield ecozone.

Wollaston Lake is located in the sub-continental sub-arctic region of northern Saskatchewan within the Churchill Province of the Canadian Shield, in a terrain of metamorphosed sediments which forms part of the Wollaston lithostructure domain. The most recent glaciation resulted in a regional surficial geology dominated by Quaternary glacial deposits of till and sand in rolling hills, prominent drumlins and outwash plains. Sandstone and Precambrian granite are the primary parent materials of the deposits consisting of very sandy glacial till with high amounts of cobbles and boulders. The proposed construction areas are characterized by rocky outcroppings, numerous lakes, bog wetlands, and thin muskeg materials.

The climate comprises long, cold winters and short, warm summers. Wollaston Lake freezes over in mid-November and break-up does not occur until mid-June. The mean daily temperature in the area is -4°C with the mean temperature of the warmest months below 20°C and the mean daily temperatures of the coldest months below -20°C. Average annual precipitation for the area is approximately 550 mm, of which 65% is rain, with highest values occurring in late May or early June.

4.2 Biological Environment

4.2.1 Soils

Soils within the project area are characterized as Luvisols and Brunisols. Luvisols are forest soils characterized by the presence of a leafy, humus surface horizon that is separated from the mineral horizon. Brunisols are found on the lower and upper foothills, the Montane and Sub-alpine sub-regions. In the Montane and Sub-alpine regions, brunisols usually occur under forests and are normally found on calcareous till and glacio-fluvial deposits.

4.2.2 Vegetation

The vegetation within the project area primarily consists of coniferous species including black spruce (*Picea mariana*), jack pine (*Pinus banksiana*), white spruce (*Picea glauca*), and tamarack (*Larix laricina*). Exposed rock areas are dominated by shrub and lichen species. Wetlands and bog areas contain a wide range of moss, sedge, and fern species.

Coniferous forests that are regenerating following a burn are dominated by jack pine, among which grow Canada blueberry, Labrador tea, bog cranberry, bearberry and crowberry as well as several species of ground lichens, including reindeer lichens.

Searches for rare flora using the Saskatchewan Conservation Data Centre (SKCDC) and Rare Plant Database of Saskatchewan (W.P. Fraser Herbarium, University of Saskatchewan) yielded 42 species (Table 4.3.2) within the region of the proposed routes (57.00-58.50 N 102.00-104.00 W), none of which are federally protected by the *Species at Risk Act* (SARA).

In the spring and summer of 2005, field studies were conducted primarily near stream crossings along both proposed routes. A total of eleven rare species were identified, with five or six species occurring along the South and North routes, respectively.

The table below summarizes the rare species identified during the field studies.

Table 4.2.2

Rare Plant Inventory, Wollaston Lake Road

Rare flora #	Species	Habitat	Route	Nearest stream crossing	UTM location
RF 1	Northern Labrador tea (*Ledum palustre spp. Decumbens)*	Black spruce bog.	South	12	0608071 E 6407382 N
			South	21	0571557 E 6370047 N
					0571520 E 6370014 N
					0571474 E 6369933 N
RF 2	Few-flowered sedge (*Carex pauciflora*)	Margin of black spruce bog.	South	15	0594384 E 6389639 N
RF 3	Purple lousewort (*Pedicularis macrodonta*)	Open bog.	South	15	0594045 E 6388525 N
RF 4	Horned bladderwort (*Utricularia cornuta*)	Graminoid fen.	South	21	0571481 E 6369900 N
RF 5	Oblong-leaved sundew (*Drosera anglica*)	Graminoid fen.	South	21	0571471 E 6369968 N
					0571475 E 6369926 N
					0571481 E 6369901 N
RF 6	Alaskan clubmoss (*Lycopodium sitchense*)	Regenerating burn.	North	25	0602597 E 6406206 N
					0602519 E 6405936 N
				28	0599459 E 6401046 N
RF 6 (cont.)	Alaskan clubmoss (*Lycopodium sitchense*)	Regenerating burn.	North	32	0593139 E 6393237 N
					0593141 E 6393221 N
					0593266 E

Table 4.2.2

Rare Plant Inventory, Wollaston Lake Road

Rare flora #	Species	Habitat	Route	Nearest stream crossing	UTM location
					6392932 N
				33	0592884 E 6392658 N
				39	0583429 E 6380513 N
					0583404 E 6380457 N
				43	0577729 E 6377816 N
RF 7	Clustered bur-reed (*Sparganium glomeratum*)	Stream margin.	North	38	0584581 E 6381408 N
RF 8	Floating bur-reed (*Sparganium fluctuans*)	Lake margin.	North		On Brakewell Lake
RF 9	Arctic starwort (*Trientalis europaea ssp. arctica*)	Lush riparian woods.	North	42	0578631 E 6378643 N
		Riparian woods.	North	43	0577920 E 6377900 N
RF 10	Long beech-fern (*Phegopteris connectilis*)	Lush riparian woods.	North	42	0578631 E 6378643 N
RF11	Northern lady-fern (*Athyrium felix-femina ssp. angustum*)	Lush riparian woods.	North	42	0578631 E 6378643 N

Note: Use the Rare Flora # (e.g., RF 1) to identify site locations on the vegetation maps presented in Appendix C. The UTM locations refer to the Universal Transverse Mercator Grid Zone 13.

4.2.3 Wildlife

A number of references were used to identify and describe the occurrence of birds, mammals, reptiles, and amphibians within the region of the proposed Wollaston Lake all-season road. These sources are listed in the reference section of this document and the proponent's EIS.

Mammals

Large mammals known to occur in the region include moose (*Alces alces*), barren-ground caribou (*Rangifer tarandus*, Beverley herd), woodland caribou (*Rangifer tarandus*, boreal population), grey wolf (*Canis lupus*), wolverine (*Gulo gulo*) and black bear (*Ursus americanus*). Other species may include red fox (*Vulpes vulpes*), Canada lynx (*Lynx*

canadensis), beaver (*Castor canadensis*), mink (*Mustela vison*) and river otter (*Lontra canadensis*).

Three mammal species that are designated as provincially rare within the project area: wolverine (S3S4), barren-ground caribou (S3) and woodland caribou (S3). The wolverine is further designated as a Special Concern by the Committee on Endangered Wildlife in Canada (COSEWIC), whereas woodland caribou is considered Threatened on Schedule 1 of SARA.

In order to assess the occurrence of large mammals in the project area, aerial surveys were conducted in February 2005. Tracks of moose and woodland caribou were common along both of the proposed routes, with evidence of woodland caribou being found only south of the southern end of Wollaston Lake. Less frequent were the tracks of Canada lynx, grey wolf and river otter, which were similarly recorded along both proposed routes. In contrast, wolverine tracks were found only along the South Route. Observations of animals during the winter survey and incidental sightings during the spring (late May-early June 2005) and summer (August 2005) were infrequent and included moose, caribou, grey wolf and black bear.

Few tracks and no evidence of caribou were recorded within 10 km of the settlement of Wollaston Lake. Stantec Consulting Inc. suggested the absence of caribou activity may be the result of hunting and/or disturbance from snow machines. Grey wolf tracks were also observed in this region, despite a lack of evidence of ungulate kills in the immediate area.

Both proposed routes will affect the woodland caribou population. Due to woodland caribou habitat needs, and the disturbance of these habitats that will occur during road construction, the caribou will be susceptible to increased predation by wolves and hunting by humans. In addition to habitat disturbance and increased predation, the presence of roads and cut-line clearings also endanger the population through collisions with moving vehicles. Woodland Caribou herds traditionally have slow recovery rates from declines in population due to low reproduction rates.

Although the presence of barren-ground caribou was not documented during the aerial survey, the Beverly and/or Qamanirjuag migratory herds have been known to migrate as far south as the Wollaston Lake area as recently as late 2003 or early 2004 (Kent England, pers. comm., cited in CanNorth, 2005).

Evidence of wolverines was found only along the South Route. Wolverines are known to occupy a wide variety of habitat types, with habitat selection mostly dependant upon available food sources. Their need for remote habitat and desirable pelts will leave the wolverine susceptible to population impacts as a result of the Wollaston Lake road project. In addition, recovery of wolverine populations is problematic due to the low densities and low reproductive rates.

Birds

Bird species known to frequent the project area include northern goshawk, spruce grouse, black-backed and three-toed woodpeckers, gray jay, common raven, boreal chickadee and white-winged crossbill. Migratory species that breed in the region may include bald eagle, osprey, American kestrel, common nighthawk, northern flicker, alder and olive-sided flycatchers as well as a variety of songbirds [e.g., tree swallow, red-breasted nuthatch, hermit and Swainson's thrushes, American robin, northern waterthrush, dark-eyed junco, rusty blackbird, pine siskin, several species of sparrows (chipping, Lincoln's, white-throated) and warblers (orange-crowned, palm, Tennessee, yellow-rumped)]. Migratory breeders observed on or near waterbodies may include common loon, mallard,

green-winged teal, ring-necked duck, common and red-breasted mergansers, greater yellowlegs, common tern and Bonaparte's and herring gulls.

The two species of particular concern are the bald eagle and osprey since they are known to be sensitive to habitat disturbance (Anderson et al. 1990). Bald eagles nest primarily in aspen and jack pine trees within 100 m of lakes and rivers, whereas osprey typically nest on wind-topped spruce trees that are often far from water. However, both species may nest on the ground, large rocks or cliffs.

Migratory species are also of interest since they are protected under the federal Migratory Bird Convention Act. Common nesting habitats of these songbirds are coniferous forests, bogs and riparian areas.

Raptor survey

An aerial survey for bald eagle and osprey nests was performed along both routes from May 26 to June 4, 2005. The pattern width of the survey area often extended beyond one kilometre of the routes and was dependent on the availability of potential nesting habitat.

As a result of the survey two osprey nests were identified atop rock outcrops located approximately 1.8 and 1.3 km from the South Route, in Brakewell and Spence Lakes. A single bald eagle nest was identified in a treetop located approximately 950 m from the North Route, near Compulsion River. All nests appeared to be active. Individuals of both species were occasionally observed in flight during the course of the survey. In February 2005, one great grey owl was also observed in flight during the mammal survey.

Colonial Nesting Birds

No colonial nesting bird colonies were observed during any of the field investigations.

Reptiles and Amphibians

There is the potential for three species of amphibians to be present in the general project area. The boreal chorus frog, northern leopard frog and the wood frog all have population distributions that extend into northeastern Saskatchewan. However, only two, the boreal chorus frog (*Pseudarcis maculate*) and the wood frog (*Rana sylvatica*), are expected to occur in the region of the two proposed routes. Neither species is federally protected by the SARA, with populations presumed to be stable in Saskatchewan. The western boreal/prairie population of the northern leopard frog (Rana pipens), which is designated as a Special Concern on Schedule 1 of SARA, is not likely to occur in the region of the proposed routes. There are no species of reptiles in the northeastern region of the province.

Aquatic Resources

Wollaston Lake

The gross drainage area for Wollaston Lake is 16,400 km^2, with an estimated 94% of the outflow of Wollaston Lake occurring via the Cochraine River and some outflow occurring through the Fond du Lac River. Flows from Wollaston Lake enter these two rivers which each drain into separate continental drainages (Cochraine River is part of the Churchill watershed, while the Fond du Lac flows into the McKenzie Delta and into the Artic Ocean). Wollaston Lake has a surface area of about 2250 km^2, with an average depth of 17.4 m. The deepest point in Wollaston Lake is 97 m, approximately 3 km south of Blue Island. About 20% of the surface of Wollaston Lake is islands which make up approximately 50% of the shoreline (River Basin Scoping Initiative Area 22, Reindeer River, Wollaston Lake report, Integrated Resources Branch Sask. Water, July 1993).

Wollaston Lake is known to contain approximately 20 different species of fish (Table 4.2.3). Many of the tributaries flowing into Wollaston Lake will likely support a number of these species, although many have not yet been specifically inventoried for fish presence. Stream size and distance to the lake (or other larger waterbody) will partially determine what species are able to use the smaller tributaries. Larger tributaries will likely support one or more life stages of large bodied fish such as pike, walleye, sucker species and other smaller minnow species. In some streams spawning may be limited to a few particular species of fish depending on the habitat availability in each stream. Streams with limited vegetation or flood plain habitat for example may not provide high quality pike habitat, but may provide spawning habitat for sucker species or walleye.

A number of lakes in the area have been identified by Saskatchewan Environment (SE) Fisheries Branch as requiring inventory and fish population work. These lakes are; Brakewell, Cairns, Causier, Spence and Compulsion Bay of Wollaston Lake. Information collected for this would be used in fisheries management decisions as access to fish populations may increase with improved land access from road construction.

An environmental survey conducted on Wollaston Lake in the early 1970's provides some information on water chemistry and fish populations in the lake. Some fish spawning activities of Wollaston Lake fish populations appear to occur in tributaries to the lake. For example, spawning in Collins Creek and the Umpherville River was observed for lake whitefish, artic grayling, suckers, pike and walleye (W.W. Sawchyn. Environmental Survey of Wollaston Lake, Saskatchewan: Chemistry Division, Saskatchewan Research Division. C 73-5. September 1973).

Table 4.2.3

Fish Species in Wollaston Lake

Common Name	**Scientific Name**
Northern pike	*Esox lucius*
Walleye	*Sander vitreus*
Yellow perch	*Perca flavescens*
Arctic grayling	*Thymallus arcticus*
Lake trout	*Salvelinus namaycush*
Lake whitefish	*Coregonus clupeaformis*
Round whitefish	*Prosopium cylindraceium*
Cisco	*Coregonus artedii*
Burbot	*Lota lota*
White sucker	*Catostomus commersoni*
Longnose sucker	*Catostomus catostumus*
Lake chub	*Couesius plumbeus*
Pearl dace	*Margariscus margarita*
Trout-perch	*Notropis hudsonius*
Ninespine stickleback	*Pungitius pungitius*
Emerald shiner	*Nortropis atherinoides*

Table 4.2.3 ***Fish Species in Wollaston Lake***	
Common Name	**Scientific Name**
Spottail shiner	*Notropis heterolepis*
Slimy sculpin	*Cottus cognatus*
Spoonhead Sculpin	*Cottus ricei*
Deepwater sculpin	*Myoxocephalus quadricornis*
From: Fish Species Distribution in Saskatchewan Technical Report 91-7	

4.3 Human Environment

The communities of Wollaston Lake and Hatchet Lake Denesuline First Nation are located on the eastern side of Wollaston Lake. The Hatchet Lake Denesuline Nation is located approximately 450 km north of La Ronge, and is 11,020 hectares in size.

The Hatchet Lake community has a total population of approximately 1,200 people residing on-reserve (AEDTC per. comm., 2005). The main language spoken is Dene.

The principle sources of income and employment for residents of the Athabasca region include:

- direct employment in mining operations adjacent to the region;
- public sector employment in health, education, and municipal and Indian/First Nations band management and services; and
- transfer payments from governments to individuals.

Since 1999, there has been significant advancement in terms of business development. The Athabasca Economic Development and Training Corporation (AEDTC), as well as other community development corporations have been involved in construction, road maintenance, laundry, catering, and other services that support the area's residents and mining operations. This and other developments demonstrate both the interest and ability of the region to take advantage of the available development opportunities.

4.3.1 Health

Public health services are expensive to deliver in the Wollaston Lake area due to its remoteness and lack of all-season road access. The Athabasca region also has the highest food cost in Saskatchewan. This is of particular concern due to the well-established links between proper nutrition, health and the ability to be productive in school and the workforce. The Athabasca population is beginning to exhibit a number of health conditions associated with poor nutrition such as diabetes, heart disease, stroke, some types of cancers, and some bowel diseases.

Health Canada funds a number of health programs for the members of the three First Nations communities in the Athabasca region. These include the operation of nursing stations, community visits by doctors, dental care, and transportation services to access medical services. Health Canada works with the Prince Albert Grand Council and the First Nations to deliver these programs.

Medical services are provided by regular doctor visits from La Ronge and community services are shared with residents of Wollaston Lake, the majority of which are owned by Hatchet Lake Denesuline Nation.

4.3.2 Transportation Economics

Wollaston Lake is connected to Highway 905 by a small barge during the summer months and an ice road during the winter months. Between the barge and winter road, access to the community is available only six to seven months a year. Therefore, the Wollaston Lake and Hatchet Lake communities are currently heavily reliant on air transportation to provide year-round access for both passengers and freight, resulting in high economic costs to the community and its residents.

The barge service poses its own economic challenges to the community. The lack of financial stability in the barge industry within the Athabasca region is attributed to the fixed cost nature of barging. This means that the costs of providing service for a season are largely independent of tonnage handled (i.e. a barge operator must incur the major costs of owning the equipment, crewing the vessel, and buying insurance independent of the number of trips that are made or the tonnes that are handled). The major variable cost is fuel which accounts for only 10 – 15% of total costs. Revenues are totally variable in that rates are set at the beginning of the barging season on the basis of cost per tonne. The combined cost of winter road maintenance and ferry service operation is approximately $390,000 per year. Saskatchewan Highways and Transportation funds the operation of the winter road and contracts most of the work out to Hatchet Lake Denesuline Nation.

4.3.3 Safety

Current transportation systems pose significant safety concerns for the Wollaston Lake and Hatchet Lake communities. Winter travel across the ice road from Hidden Bay to Wollaston Lake is dangerous as ice thickness fluctuates over the season. Bad weather and unexpected storms can make travel by boat or barge across the lake equally dangerous. The proposed route does not pass near any occupied dwellings, residential areas, or other similar land uses; therefore the construction activity will have no effect (noise, dust etc.) on local residents. The connection to the community of Wollaston Lake will occur at the south end at an existing road which contains no residential land uses.

All phases of the project (pre-construction, construction, operation and decommissioning) could produce potential safety hazards for workers (e.g. use of heavy equipment, blasting, work near waterbodies, exposure to dangerous animals and weather conditions, etc.) and could affect the health and safety of the workers. Safety concerns will be reduced or avoided by strictly adhering to the *Occupational Health and Safety Guidelines* set out by the province of Saskatchewan and adherence to DHT safety requirements, which will be included in the tender documents and communicated to all contractors.

4.4 Land/Resource Use

The following sections describe the land use and resource use characteristics of the study area with particular emphasis on the region near the proposed road.

4.4.1 Trapping and Hunting

Trapping and hunting is an important traditional resource used and is central to the Athabascan society and way of life. Species trapped in the Athabasca Region include arctic fox, badger, bear, beaver, coyote, fisher, fox (cross), red fox, silver fox, lynx, marten, mink, muskrat, otter, raccoon, skunk, squirrel, weasel, wolf and wolverine. A number of

area residents supplement their income through trapping and the selling of pelts and hides, though a drop in fur prices over the past decade has resulted in less trapping activity. Recent values (2001 to 2005) for Fur Block N-26, which the road will pass through, show a steady decline in the numbers of trappers within the area since 1980. The number of trappers in the block has fluctuated between 9 and 29 over the past five years, and the cash value per trapper has varied from $268 to $700. The adjacent Block N-68, located to the east of Block N26, has fewer trappers (fluctuating from 1 to 6) and higher cash value per trapper ($875 to $5600). The Block to the south (N-10) has the most registered trappers (89 to 160), but the lowest value per trapper ($91 to $261) over the same five year period.

4.4.2 Fisheries

The Wollaston Lake fishery, which is operated by the Wollaston Lake Commercial Fishermen's Co-op, is well-established and is currently undergoing expansion in the form of a packing facility which was constructed in 2000. However, it faces high transportation costs due to its remote location and reliance on a marginal ferry service. The proposed road will enable the fishery to have a stable means of transporting its product to the Freshwater Fish Marketing Corporation which operates out of Winnipeg and supplies national demand as well as exporting fish to the U.S. and European markets.

The Wollaston Lake community and Hatchet Lake First Nation have taken a long-term approach to developing and sustaining its commercial fishery. Concerted effort has been made to introduce youth to this activity through a program that assists fishermen to hire youth helpers. The packing plant in the community has improved the efficiency of both the fishing and packing operations. The Co-op is also investigating opportunities to establish lakeside processing as well as serving local markets such as the mines and restaurants.

4.4.3 Ecotourism

Ecotourism within the region comprises low-impact guiding services for recreation activities such as canoeing, hiking, and photography. Non-guided recreation within the region does occur but there are no specific statistics available regarding the level of use.

4.4.4 Mineral Development

Currently, no mining developments are active along the proposed route. The nearest mining activity is within the Athabasca basin to the north and west, related to uranium deposits, but there are active claims near the Wollaston Lake Road, including two companies that are investigating the platinum potential near Peter Lake, and other potential interests in zinc exploration near Brakewell Lake.

4.5 Protected Areas

There are no protected areas or heritage rivers within or in close proximity to the study area.

4.6 Heritage Resources

Following the direction of the Saskatchewan Heritage Resource Unit, a Heritage Resources Impact Assessment (HRIA) was completed during the spring and summer of 2005 under provincial permit 05-077. A report was prepared and submitted to the Heritage Resources Unit of Saskatchewan Culture, Youth and Recreation.

Stantec Consulting Ltd. conducted the HRIA in May, June and July of 2005. Over 75 km of the route was examined and nine archaeological resources were recorded. None of the heritage resources located in the project area are in conflict with the proposed road and can be easily avoided at the time of construction planning or are not significant resources and require no further study.

The sites discovered and the recommendations for development are provided in Table 4.6.

Table 4.6

Heritage Resources Site and Development Recommendations

Site	*Type*	*Significance*	*Recommendation*
HiMx-1	Disturbed precontact site Historic trail/winter road	Precontact: Insignificant Winter Road: Significant to historic commerce.	Precontact: No concern Winter Road: Locating the all-season road near this section may simply extend its useful life and allows the road to be a piece of living heritage.
HiMx-2	Precontact quartz quarry site	High	Avoid by 50 m
HiMw-1	Artefact scatter, partially disturbed	Moderate to High	Not Threatened
HjMu-1	Artefact (quartz flakes) scatter	Moderate to High	Avoid by 50 m
HkMt-2	Historic and current portage site	High significance to historic commerce and modern access to resources (furs).	No concern, perhaps place stop signs on the portage for snowmobiles and warning signs of a snowmobile crossing on the road.
HkMt-1	Artefact (quartz flakes) scatter	Moderate to High	Avoid by 50 m
HkMt-4	Historic portage and current winter access route	High significance to historic commerce and modern access to resources (furs).	No concern, perhaps place stop signs on the portage for snowmobiles and warning signs of a snowmobile crossing on the road.
HkMt-3	Artefact (quartz flakes) scatter	Low to Moderate	Avoid or, if unavoidable, conduct more testing and possible mitigation in advance of road construction.
IaMs-1	Artefact (quartz flakes) scatter	Moderate to High	Avoid by 50 m

4.7 Valued Ecosystem and Social Components

A valued ecosystem component (VEC) is defined as a component of the natural ecosystem which is perceived to be of social, cultural, economic or ecological significance as identified through consultation with affected people and through scientific opinion.

Table 4.7
Valued Ecosystem Components

Ecosystem Component	*Value*
Human Health and Safety	Socio-economic
Geology (minerals)	Economic
Soils	Ecological
Natural Vegetation	Ecological; Socio-Economic
Rare and Endangered Flora	Ecological
Water Quality	Ecological; Socio-Economic
Fish Habitat	Ecological
Fish	Socio-Economic: Ecological
Reptiles and Amphibians	Ecological
Birds	Ecological; Socio-Economic
Furbearers	Ecological; Socio-Economic
Ungulates	Ecological; Socio-Economic

All these components are valued for their importance to the functioning of a healthy ecosystem. This was emphasized during the public participation program. The geology, soils and water provide the foundation for the vegetation, wildlife and fish which occur throughout the region. The traditional economy of the area is highly dependent upon caribou, moose, fish and furbearers, while the wage economy includes commercial fishing. As well, a variety of natural vegetation species, play a major role in the culture of the local people (e.g. berries, medicinal plants).

5.0 CONSULTATION AND PUBLIC PARTICIPATION

The public is provided with opportunities to participate in the environmental assessment during three distinct stages of the comprehensive study process: during the preparation of the scope of the environmental assessment; while conducting the comprehensive study, and during the comment period administered by the Agency on the completed CSR.

In addition to listing the project on the CEAR (reference number 05-03-8729), the project was listed on the provincial Environmental Assessment Branch website (http://www.se.gov.sk.ca/environment/assessment/notices/). All documents related to the environmental review of the project are listed and available electronically or by contacting the Saskatchewan Regional office of Indian and Northern Affairs Canada.

5.1 Expert Federal Departments

INAC and WD consulted the following federal authorities to obtain specialist information and expert advice during the development of the PSGSD. These departments were also requested to review the draft environmental impact assessment report and comprehensive study report:

- Fisheries and Oceans Canada
- Transport Canada
- Environment Canada
- Natural Resources Canada
- Health Canada

5.2 Provincial Departments

Consultation with provincial departments was coordinated through the Agency. SE Environmental Assessment Branch consulted the following provincial departments to obtain specialist information and expert advice during the conduct of the environmental assessment:

- Saskatchewan Health
- Saskatchewan Industry and Resources
- Saskatchewan Government Relations
- Saskatchewan Culture, Youth and Recreation
- Saskatchewan Department of Northern Affairs
- Saskatchewan Watershed Authority
- Saskatchewan Environment

5.3 Public and First Nations

In addition to the required public participation during the comprehensive study process, the proponent also conducted public consultation. The initial public consultation program began prior to the actual commissioning of the environmental impact assessment. Numerous meetings were held with local and regional First Nations members, AEDTC, and Hatchet Lake Band 220 Chief and Councillors to discuss economic spin-offs. Once

the proponent's EA began, two more meetings were conducted focusing on traditional knowledge and a general open house.

An interview with a Senior Environmental consultant from Stantec was conducted to increase awareness of the proposed road development. The interview was broadcast on Missinipe Broadcasting Network, which provides radio service in the Wollaston Lake area.

INAC placed a public notice in the Prince Albert Herald, the La Ronge Northerner and l'Eau Vive inviting comment on any outstanding environmental issues or concerns. The comment period ended on December 20th, 2006 and no comments were received.

5.4 Traditional Knowledge Gathering

The traditional knowledge component of the environmental assessment took place May 18 to 20, 2005. A total of 33 members of the community were consulted by Stantec staff. All members were over 50 years of age. The majority of those interviewed were male (31) and two were female. Participants included band councillors, community residents, trappers, hunters, and fishermen. A Dene translator was present throughout the meetings.

Numerous regions and locations were pinpointed that had cultural or economic significance to the community. These included trap lines, locations of traditional hunting activity, and locations of important fishing areas. A possible archaeological site was identified on the south side of the narrows crossing on Compulsion Bay, but no evidence of the site was found during a field visit to the area and no spiritual places or medicinal plant gathering sites were identified by any of the respondents.

5.5 Wollaston Lake Open House

A general public meeting was held on June 22, 2005 at the Band hall in Wollaston Lake. Representatives from Stantec, INAC, DHT, and SE hosted the meetings. The purpose of the open house was to provide project information to the public and to ensure views from concerns citizens were integrated into the design, construction and operation of the road. It also provided information on potential employment and economic opportunities associated with the road. Approximately 42 people attended the meeting.

A questionnaire was circulated to gain a better understanding of the interest and concern regarding the proposed road development. In total, 27 surveys were completed or partially completed. The results indicate that those who completed the survey are in favour of the road development, specifically the south route. The south route appears to be preferred because they felt the north route was too rocky and therefore would be difficult to construct and drive on. Interviews were conducted with local and regional governments and letters were received from local sport fishing operators. Concerns were raised ranging from the high cost of supplies to the safety of the existing barge service.

Wollaston Lake and Hatchet Lake Denesuline Nation residents started a petition in show of support for the road development. In total, 201 people signed the petition presented to Stantec at the June open house meeting.

5.6 Sport Fishing Operators

A sport fishing outfitter and several of his clients are not in favour of an all-season road in the region. Neither of the proposed routes was deemed acceptable to this group.

6.0 ENVIRONMENTAL EFFECTS ANALYSIS

Unless otherwise specified, the compilation and summary of data was undertaken by the proponent and its consultants. The federal and provincial authorities relied on the accuracy of the information provided by the proponent in providing specialist and expert information and knowledge.

6.1 Overview

6.1.1 Consideration of Effects in the EIS

The Proponent's assessment for the proposed Wollaston Lake Road project was structured to address effects on distinct biophysical (e.g., physiographic, aquatic and terrestrial), and socio-economic (e.g., resource use, health and safety, transportation and other socio-economic) components of the environment. The project's potential environmental effects were identified by the proponent using the information gathered on the project's technical aspects, basic data for the receiving environment, experience and lessons learned from similar projects, traditional knowledge, and the scientific literature. The analysis of this information allows for the identification of the project's environmental effects by specifying the interconnections among the various physical, biological and human components of the environment into which the project would be inserted. This analysis takes into account all of the physical works set up and the various phases of the project, from construction through decommissioning. The impact assessment takes into account the systematic application of proposed mitigation measures, as well as a number of mitigation measures that have been incorporated into the project's design.

The proponent's approach to determining significance of effects is detailed in Section 7 of the EIS. The Proponent determined the significance of potential impacts on VEC's on the basis of the following criteria:

- spatial boundaries or geographical extent of the effect (local, regional, or provincial/national effects)
- duration of the effect
- frequency and timing of the effect (constant, isolated or accidental)
- magnitude of the effect
- likelihood of the effect occurring
- nature of the effect (positive, neutral, or negative/adverse).

6.1.2 Consideration of Effects in the CSR

Within the CSR, the identification of the project's environmental effects and the determination of their significance are based on information provided by the proponent and the expert advice of the various federal authorities, as well as input from provincial reviewers that participated in the technical review of the project. In some cases, the RAs augmented the effects analysis provided by the proponent. In other cases, such as the discussion of socioeconomic effects, the RAs did not consider all of the effects identified by the proponent. Under the CEAA, environmental effects include socio-economic effects caused by a change in the biophysical environment which in turn is caused by the project (e.g., resource use or job losses due to a loss of fish habitat). However, if a socioeconomic change is not caused by a change in the environment, but by another mechanism related

to the project (e.g., effects caused by employment or purchasing related to the project), the socio-economic effect is not an environmental effect under the definition of the CEAA.

Section 6 of the CSR documents the analysis of project-related effects on VECs. For each VEC, the analysis of effects is structured under the following headings:

- Environmental Effect
- Mitigation
- Significance

The environmental effects section provides a summary of the project-related environmental effects on a given VEC, taking into consideration the proponent's original EIS documentation, relevant project updates and modifications, comments and concerns provided by the federal and provincial technical review team, and the proponent's responses to these comments and concerns.

Mitigation refers to any measures that the proponent has proposed to eliminate, reduce or control potential adverse environmental effects of the project, and includes elements inherent in the project design to prevent effects from occurring. Mitigation within the context of CEAA also includes restitution for any damage to the environment caused by such effects through replacement, restoration, compensation or other means.

The significance of residual adverse environmental effects, or those adverse effects that remain after the application of appropriate mitigation measures, was evaluated on the basis of the following criteria: magnitude/geographic extent, scale, duration and frequency, reversibility, ecological/socio-economic context, and likelihood that the effect will occur.

6.1.3 RA Conclusions

The RA conclusions section at the end of the effects discussion for each VEC summarizes the collective opinion of the RA's regarding the overall effects assessment for the specific VEC. Summary tables documenting significance ratings for each effect are provided at the end of the section.

INAC and WD note that, under the CEAA, the RAs are not bound by the proponent's conclusions concerning the significance of the effects and ultimately must draw their own conclusions. In coming to their conclusions on the significance of the potential environmental effects, INAC and WD considered the proponent's analysis and opinion, but also their own expertise, the expertise of other federal authorities and provincial reviewers, views provided by the public, and any other information at their disposal that was relevant to those conclusions.

6.2 Biophysical Environment

A summary of the potential effects on biophysical environmental components is provided in Table 6.2.

6.2.1 Terrain and soils

Construction activity will disturb the terrain along the entire route of the proposed road. Potential effects are expected to occur along the road itself, as well as at staging areas, temporary work camps, stream crossings and borrow pit locations. The areas where road and stream crossing construction, and quarrying occur, or where temporary work camps and staging areas are established, will be physically disturbed. The extent of disturbance will be a function of the road design and construction methods and will be related to type

of surficial material, terrain type, presence of permafrost, proximity of waterbodies, and drainage regimes. There are no planned activities that will result in physical disturbance during operation.

The potential issues and concerns which will require planning and management include slumping and erosion of soil, removal of fill material, and potential disturbance to areas of permafrost.

Adverse effects to terrain and soils from project related activities could potentially occur as a result of the following:

- Increased loss of soil due to erosion
- Change in landscape features
- Disturbance of permafrost

Increased loss of soil to erosion

Construction activity will disturb the terrain along the entire route, including staging areas, temporary work camps, stream crossings with steep slopes, and borrow pit locations. Loss of vegetation and disruption of the surface layer by grading, bedrock blasting, and other construction activities may lead to increased erosion; these are localized effects generally associated with sandy soils, steeper slopes, and areas near watercourses. Soil loss due to erosion will be minimal and is estimated that 75m^3 of soil will be lost without proper mitigation strategies. The possibility exists that changes could be long term if proper construction techniques and/or appropriate mitigation measures are not employed.

Mitigation

DHT has developed a field reference manual for Best Management Practices (BMPs) for Erosion and Sediment Control. Typical BMP's include: use of erosion control blankets and/or mats to protect disturbed soils or slopes, re-vegetation techniques, and hydro-mulching. In addition to the BMPs, DHT has committed to minimize the aerial extent of the project area, avoid steep slopes where possible, use cross-ditching and terracing where practical, and limiting blasting areas to reduce the potential for soil erosion.

Erodable soils will be stabilized as soon as practical by seeding, spreading of mulch, or installing erosion control mats. Re-vegetation techniques will be utilized using self-sustaining plant communities to reduce soil erosion during the construction and operational phases of the proposed road. The use of native plant species is preferable, however, non-native species may be used initially if they are short-lived or competitively weak and therefore not persistent in the long-term. Seed mixtures particularly suitable for use in a revegetation program along a northern road corridor may include strains of annual or perennial rye grasses, Nugget Kentucky bluegrass, Canada Bluegrass, red fescue, hard fescue and sheeps fescue. A follow-up program will evaluate the success of slope restoration and revegetation and recommend further actions where required. Refer to Section 8.8 of the EIS for further information on site reclamation.

Construction equipment will be confined to the road right-of-way and the ancillary development areas. Vegetation clearing will be confined to the road right-of-way and the ancillary development areas and restricted to hand methods adjacent to watercourses, in areas of sensitive terrain, and in terrain too rugged to permit the use of mechanical clearing.

Steep slopes will be avoided where possible, but if slope gradients greater than 9% are encountered, and cannot be avoided, grading will be done to reduce the steepness. Sideslopes will be no steeper than 2:1.

Pursuant to The Resource Lands Regulations, DHT will obtain the necessary permits for sand and gravel exploration and use prior to borrow pit development. Borrow pits will be located and constructed so that surface water flow toward the pit does not cause erosion. The number of borrow pits and areal extent of each pit will be minimized as much as possible. Pit slopes will be left with slope angles less than the angle of repose of the given material. Slash and topsoil will be stock-piled and spread over the exposed pit surface to encourage revegetation. In some cases, revegetation will include planting of species to supplement the natural processes. The reclamation procedure will be in accordance with SE's "Reclamation Guidelines for Sand and Gravel Operators".

Significance

With proper construction practises such as, avoiding steep slopes, using best management practises, and the use of seeding, mulching and erosion control mats, soils within the project area will experience a negligible increase in erosion. If erosion to soils does occur, the extent of the effect will be localized to the road corridor and ancillary features thus making the adverse residual effect insignificant.

Change in Landscape Features

In order to meet the requirements for the design grade of an all-season road, landforms may be altered or removed (e.g. eskers may be used for quarry or borrow material). The change in landscape features will occur within the road corridor and will be irreversible. Until ground-truthing can be completed, the exact location of the right-of-way and associated borrow pits cannot be determined. The possibility exists that some borrow pits developed during construction may continue to be used during operation and maintenance; however there are no plans for additional landforms to be altered or removed during highway operation.

Mitigation

The final siting of the right-of way and all associated ancillary features will be completed following additional field investigations. In order to reduce the magnitude and frequency of the potential effect on landscape features, DHT will plan the route and ancillary features to minimize the disturbance of special landscape features as much as possible; this will include minimizing the number of borrow pits established and, where practical, depleting resources of borrow pits before establishing new ones. An independent environmental monitor will provide on-site guidance to DHT and the contractors regarding suitability of sites, avoidance of sensitive locations and activity within sensitive areas. The monitor will have authority from DHT to halt construction if necessary.

Significance

The removal or alteration of landscape features will occur only within the road corridor and ancillary features thus localizing the effect. The proposed mitigation measures will reduce the overall magnitude of the effect by minimizing the contact construction activities will encounter special landscape features. No significant adverse environmental effect will occur following implementation of mitigation.

Disturbance of permafrost

The project area is within a zone of discontinuous permafrost zone. DHT has stated that permafrost locations were avoided as much as possible during the preliminary route selection. However, as the final route selection has not been made, there is a potential for encountering permafrost along the route. The potential of encountering permafrost will be re-assessed during the final design stage but prior to construction. Road construction over permafrost can lead to thawing, which could in turn lead to soil instability and subsequent damage to the road bed, altered drainage patterns in the area, or increased siltation to nearby waterbodies. The proponent has indicated that the likelihood of this effect occurring is low due to the sporadic nature of the permafrost. In addition, DHT has indicated that the road design is such that there would be little to no thawing of permafrost if it was encountered. Measures to further reduce this risk are provided below.

Mitigation

The final siting of the right-of way and all associated ancillary features will be completed following additional field investigations. Potential permafrost locations will be identified during the field investigations by the construction staff and environmental monitor. Where possible, permafrost locations will be avoided; where unavoidable, no cuts into the permafrost will be made. If necessary, the permafrost will be padded using locally available fill.

Significance

The disturbance of permafrost within the project area is unlikely to occur due to the discontinuous areal extent within the project area. If permafrost is encountered the effect will be minimal due to padding of permafrost. No significant adverse environmental effect will occur following implementation of mitigation measures.

RA Conclusions – Terrain and Soils

Based on the preceding discussion and proposed mitigations such as implementation of appropriate pre-construction investigations, design specifications, and construction methods, INAC and WD conclude that significant adverse environmental effects to terrain and soils are not likely (Table 6.1).

6.2.2 Aquatic Resources

The project area consists of a wide range of aquatic resources, varying from numerous major, medium and minor streams that interconnect the different lakes in the area. Major lakes within the project include: Brakewell, Cairns, Causier, Spence and Wollaston Lake (Compulsion Bay). Construction through fish-bearing waterway areas has the potential to cause primary impacts to aquatic life and the surrounding habitat through loss of habitat (infilling), changes in stream flow, erosion, sedimentation, and the release of deleterious substances.

Adverse effects to aquatic resources from project related activities could potentially occur as a result of the following:

- Disturbance of drainage patterns due to road construction.
- Decreased flow of local streams due to water use at temporary work camps.

- Reduction of water quality of local streams, rivers and lakes resulting from increased Total Suspended Solids (TSS).
- Disturbance of streambed and in-stream habitat.
- Loss of riparian and flood plain habitat (approach road construction etc)
- Increased fishing pressure due to improved access.
- Interference of fish passage (during stream crossing construction and possibly from crossing design itself)
- Interference to navigation

Disturbance of drainage patterns due to road construction

The proposed road will pass over low wet areas, intermittent streams and creeks. Earthen fills will be built across normal local drainage draws to permit summer use, and fills will be used to cross water courses which will impede natural drainage. The South Route option will require one bridge located at the Redman River which could affect stream flow within the project area. The bridge will consist of a 3-15m span bridge with an 8.5m width, allowing for two way traffic. The bridge will include steep piles, concrete cap, and concrete bridge units. There is a possibility for disturbance of drainage patterns (stream channels and overland flow) resulting from creation of a road right-of-way. The effects could include ponding of water upstream of culverts which would cause localized flooding and subsequent changes to the natural ecosystems at these sites. These effects will be local, but could be of long-term duration. The effects may occur sporadically, depending upon rainfall events or snowmelt volumes.

Mitigation

To accommodate the natural drainage of the project area, culverts and ditches will be designed to not impede the natural flow of water. Culverts of sufficient size and/or numbers will be installed to ensure that a 1:25 year flood can be managed and is the proponent's standard policy for drainage design. Riprap and energy dissipation structures will be installed where required, and DHT will provide stream crossing designs to the Saskatchewan Watershed Authority (SWA) and DFO to obtain their approval ensuring that the designs are adequate to avoid drainage problems. Culverts will be installed a minimum of 20cm below the streambed elevation or a minimum of 20% of the culvert diameter below the streambed, whichever is greater, so that substrate of natural material develops. Where multiple culverts are required, they will be separated by at least 1.8m when allowed by channel width. DHT will conduct spring and fall monitoring at culvert locations to ensure beaver activity has not impeded water flow. A long-term monitoring program to assess ponding of water and drainage problems will be established. The program will identify when to recommend additional cross drainage culverts (non-fish bearing) as required to prevent problems. Culverts will be cleaned as necessary to ensure unimpeded flow.

In regards to the bridge at the Redman River crossing, design requirements will ensure that not more then one-third of the river is restricted by approaches and will be high enough so that anticipated flood volumes plus debris can be passed as well as to provide clearance for navigation. In addition, if infilling up to 1/3 of the channel is necessary to construct the bridge, a hydraulic assessment will be undertaken to include potential impacts that could arise from channel constriction to the geomorphology of the stream

channel, stream flows and benthic habitat (caused by scouring etc.) during high flow events.

Significance

There will be a minimal change in the drainage patterns of the project area with proper use of drainage culverts and bridges. With proper mitigations and extensive monitoring programs, a change in drainage patterns is not likely to occur. If monitoring identifies concerns, additional drainage capacity will be constructed. No significant adverse environmental effect will occur following implementation of mitigation measures.

Decreased flow of local streams due to water use at temporary work camps

Temporary work camps will likely be utilized during certain construction phases of road construction including clearing, grading, and bridge construction and will be of the "Atco trailer" variety. Locations of the temporary work camps will be determined by the contractor in accordance with provincial guidelines. Water removal (for domestic use) at temporary work camps during construction could exceed the capacity of local streams which would affect normal flow of local streams and drainage areas (e.g. muskeg) and is, for the most part, only a risk to smaller streams with low volumes.

Mitigation

Temporary work camps will be sited and treated sewage and solid wastes will be disposed of in accordance with the provincial Guidelines and Operation of Temporary Work Camps. Locations will be selected in areas with an adequate water supply such that water removal will not impact the instream flow needs of that stream. DFO will limit the amount of water taken from fish bearing waters to prevent dewatering effects to fish. Most camps will be placed on lakes or larger streams to mitigate the effects of reduced water flow. A guideline DFO follows is to limit withdrawal of water to no more than 10% of the instantaneous flows to ensure impacts are minimized. Following completion of construction, the temporary camps will be removed and restored in accordance to the above mentioned guidelines.

Significance

Watercourses adjacent to temporary work camps being used as a source of water for the camp will experience a change in water volume downstream of the camp. As site selection for the camps will be completed with input from SWA and the environmental monitor, the changes in water quantity of local watercourses will be minor, local in extent and short term and will no longer occur when the work camps are removed after construction is complete. No significant adverse environmental effect will occur following implementation of mitigation measures.

Reduction of water quality of local streams, rivers and lakes resulting from increased Total Suspended Solids

Water quality could be adversely affected by the addition of suspended solids through runoff from the roadway following rain and snowmelt events, and surface run-off of salt and calcium chloride used for ice and dust control. These effects would be localized to the

road right-of-way at stream crossing areas and for a variable distance downstream and will be occurring in small quantities sporadically for the operation of the road.

Construction activities that remove vegetation and topsoil without proper erosion control measures can cause increased stream sediment loads. Erosion is the natural process of wearing away land by water, wind, ice and gravity. Construction activities may expose soils to the action of these forces. Grading of the road and approaches, in-stream work for crossings, and flow diversions can concentrate water flow and speed which increases local scour and erosion of banks that would result in sediment loading of the watercourses. Improper storage of spoil and fill materials within the flood plain could also increase turbidity of the water courses. The increase in turbidity could decrease habitat suitability, reduce productivity of aquatic organisms, and impair feeding efficiency.

Water quality can be adversely affected during routine operation and maintenance activities on and adjacent to watercourse crossings. Calcium chloride, salt and/or sand deposited on or adjacent to watercourse crossings to combat dust generation, and/or icing can runoff the roadway and/or bridge deck into the river and increase the local salinity and/or turbidity of the water which could pose a risk to aquatic plant life. Mitigation is required to minimize the potential for water quality effects.

Mitigation

During the construction phase of the proposed project, sediment control plans will be developed and implemented to eliminate or reduce the effects of erosion along the right-of-way, specifically at and adjacent to watercourse crossings. Sediment control measures will be installed by the contractor and inspected by the Environmental Monitor prior to the commencement of work and during work activities within the area. These measures will be site-specific, but may include erosion control blankets, silt fences, holding ponds and grading soil away from the watercourse crossing.

Topsoil from the right-of-way will be stockpiled outside of the active floodplain. Run-off containing sediment will be directed away from streams into vegetated areas. Post construction road/site maintenance and monitoring will ensure adequate re-vegetation has occurred near stream crossings to reduce long-term erosion concerns. As concerns are observed or identified, efforts will be made to eliminate any sediment/erosion problems adjacent to fish bearing waters. To reduce the potential effects of temporary work camps on water quality of local watercourses, no camp will be located within 100 meters of a waterbody or watercourse. Camps will be situated and operated so as not to pollute surface or groundwater. All site plans for temporary work camps including locations of buildings, water sources and sewage disposal will be submitted for approval by Saskatchewan Public Health prior to construction.

Significance

The total reduction of water quality will be minimal during the construction and operational phases of the proposed road. During construction the reduction of water quality due to an increase in TSS will be temporal in nature and will be localized to the adjacent watercourse crossing. Any sediment reaching the watercourse will be diluted as it travels through the natural drainage patterns of the area. With post construction monitoring water quality will improve after construction activity is complete. Impacts to water quality are expected to be negligible over the long-term operation of the proposed road. No significant adverse environmental effect will occur following implementation of mitigation measures.

Disturbance of streambed and in-stream habitat

Streambeds may be altered by construction activities at watercourse crossings through physical disturbance or removal of materials, infilling and/or through the loss of edge habitat. Channel morphology may be altered by the physical structure of the crossing through upstream and downstream channel realignment, and the covering of bottom substrates which would result in loss of habitat at the crossing site.

From May 26 to June 4, 2005, areas of critical habitat (spawning, rearing, feeding habitat, fish passage) were assessed within a 1 km corridor of each proposed stream crossing. DFO has indicated that 12 of the 22 total crossings on the preferred south route have direct fish habitat potential (confirmed or suspected) and include crossings 1, 5, 6, 7, 9, 10, 11, 12, 13, 19, 21, and 22 (Table 2.3.1, Figure 2).

At this time, other than a multi-span bridge for the Redman River crossing (crossing #9), specific crossing designs for each stream have not been completed, therefore it is not possible to precisely quantify impacts to fish habitat, however, DHT has indicated that culverts will be used for the majority of stream crossings which will include open bottom arch structures (at crossings #5, 7, 12, 19, and 21). Installation of the open bottom arch structures may still disrupt fish habitat if installation requires flows to be redirected. The proponent predicts that there will be no HADD occurring at these locations with the exception of crossing #7 where it is estimated that 45m^2 of disturbance may occur. The Redman River Bridge (crossing #9) will consist of 3-15m spans and, based on preliminary design information, is anticipated to have no infilling associated with its installation. Therefore the proponent predicts that there will not be a HADD at this location.

Crossings 6, 10, 11, and 13 will utilize closed culverts and therefore will disturb the streambeds at these locations. The proponent has indicated that there is no significant fish habitat or passage evidence for crossings 6, 10, 11 and 13 based on the site surveys..

The proponent will submit final crossing designs for each stream crossing to DFO for final approval under the Fisheries Act. DFO has indicated that some, or all, of the proposed works for at least the 12 crossings listed above may result in the harmful alteration, disruption, or destruction (HADD) of fish habitat and require a Section 35(2) Fisheries Act Authorization. The proponent has indicated that stream crossings will be designed for fish passage, with redesign or relocation to avoid the loss of critical habitat. Losses of non-critical habitat will be compensated for through the creation of additional habitat or the enhancement of existing habitat. Habitat compensation plans, if necessary, will be developed by the proponent in consultation with DFO.

Mitigation

The proponent will avoid construction activities at water crossings during the critical spawning periods for fish. This period extends from early April to late July, with the exception of lake whitefish (September to June). Therefore, stream crossing construction will be conducted during the winter months or during the period from late July to early September where lake whitefish is a concern.

Open bottom arch structures will be used to clear span all of the stream crossings determined by DFO as having fish potential. Open bottom arches provide crossings that leave the natural stream bottom undisturbed, and thus preserve natural conditions at the site. Installation of the arches will most likely take place during winter months to help minimize work near flowing water. Design reports for open span arches will be provided to DFO with adequate time to inspect the reports prior to installation.

If infilling is required for any crossing, including the Redman River Bridge, an assessment of the local habitat within the area proposed for infilling will be undertaken to ensure critical habitat is not impacted. Infilling of fish habitat may require compensation as determined by DFO.

High quality habitat within 500m downstream of a stream crossing will be monitored annually by DHT until revegetation and other erosion control measures are firmly established. An Aquatic Habitat Protection Permit(s) will be obtained from SE for each culvert and bridge crossing and the requirements of the permits will be adhered to. DFO requirements, identified in Fisheries Act Authorizations, and/or Letters of Advice will also be adhered to. Monitoring will be performed as required by any Fisheries Act Authorizations issued for this project.

Significance

Disturbance of the streambeds and resulting net loss of fish habitat within the project area will be negligible because of the proposed use of open-bottom arch culverts to span the watercourse crossings, and compensation by undertaking fish habitat restoration / improvement projects at or near the site of impact. The extent of the disturbance will be limited to the watercourses adjacent to the road corridor. No significant adverse environmental effects will occur following implementation of mitigation measures.

Loss of riparian and flood plain habitat

Vegetation is important to terrestrial and aquatic ecosystems by stabilizing soils, banks and slopes. Riparian and aquatic vegetation is likely to be disturbed during site preparation activities including installation of the coffer dams, etc. within the crossing area. The removal of the vegetation could reduce riparian food sources and input of nutrients into the watercourses. Riparian vegetation also regulates water temperature, oxygen content and traps sediment. In addition to increased sediment loading, the loss of riparian vegetation could increase the amount of sunlight that reaches the stream, thus causing an increase in water temperature. The increased temperature can directly cause stress in some fish species as well as reduce the amount of dissolved oxygen available to fish. Removal of vegetation also reduces the number of food sources entering the stream which could reduce overall watercourse productivity.

The proponent has indicated that DFO and SE stream crossing guidelines will be adhered to during the construction process. These guidelines identify the requirements for reservations around streams, varying from 15 m to 90 m, depending on the type of watercourse. With the exception of the Redman River (90 m zone), the streams in the study area are generally very small and the reservation zones will be predominantly 15 - 30 m in width. Using a conservative average of 25 m on each side of the 22 stream crossings on the south route, an estimate of 850 m^2 of riparian habitat will be permanently altered or lost for each stream crossing. Since there are 22 crossings, then there is a potential to lose up to 0.018 km^2 of habitat.

Mitigation

Clearing of riparian vegetation will be minimized during watercourse crossing construction activities. Where clearing is unavoidable, hand-clearing near the water will be used to remove vegetation which will help to protect the shoreline and soils within the riparian zones. Vegetation reservations near watercourses will be observed according to established guidelines (i.e., DFO and SE Stream Crossing Guidelines). A revegetation

plan will be implemented to ensure that the riparian area (outside of the road base) is re-vegetated with native species and that reestablishment is successful.

Significance

The functionality of the riparian habitat will be reduced or destroyed at the watercourse crossings. Permanent riparian habitat loss will be limited to the area occupied by the road right-of-way. Mitigations during site preparation and vegetation clearing will be followed to minimize impacts to riparian habitat. Some of the riparian habitat to be permanently lost may provide fish habitat. Following review of the final designs for each crossing, DFO will determine whether compensation for lost riparian habitat will be required and will make this compensation a condition of a Fisheries Act Authorization, if required. With the proposed mitigation/compensation strategies, the extent of the effect will be minimized and limited to the watercourses adjacent to the road right-of-way. Given the limited extent of riparian habitat loss (road right-of-way), no significant adverse environmental effect are expected to occur following implementation of mitigation/compensation measures.

Increased fishing pressure due to improved access

Road construction into previously inaccessible areas typically results in an increase in resource use; stream crossings along the route will provide new access to fisheries resources which could affect sport and commercial fish populations because of increased fishing pressures. An even greater effect could be experienced if stream crossings are located near active spawning grounds, as increased exploitation of spawning populations can result in the long term reduction of local and regional fish populations. Commercial fishing is a regulated activity and it is not anticipated to increase as a result of the new access to the project area.

A recent report commissioned by SE entitled “Economic Evaluation of Saskatchewan's Commercial and Non-Outfitted Sport Fishing” (Derek Murray Consulting Ltd., December, 2006) states that the fisheries management of individual lakes can be difficult, especially when a lake is used for sport fishing. Sport fishing is sometimes difficult to monitor as sport fishers are allocated a daily limit with no limit on the number of anglers or angling days. As access to specific lakes improves, the number of sport anglers on a specific lake may increase. The total sustainable harvest from that lake may have to be adjusted accordingly. Sport fishing is regulated by license, but there may be increased fishing pressures at lakes and fish-bearing streams adjacent to the proposed road.

Most fishing in the area will be conducted by area residents and First Nations members who traditionally use the area resources by boat. Most Saskatchewan residents tend to fish close to home when they are fishing within the province, with the average license purchaser traveling over 200 km to fish only 1.4 times per year. However, local residents will likely make use of the improved access (Derek Murray Consulting Ltd., 2006).

Increased fishing pressure, either in compliance with all pertinent regulations, or in combination with increased potential poaching activities, can selectively remove reproductive adults from localized fish populations which will reduce overall spawning activity and subsequent recruitment, to the detriment of the population. Recovery of fish populations usually follows a wilful reduction in fishing effort, based on low success rates, or due to resource management practices. Reversing the effects of ‘over-fishing’ may take an extended period of time depending on the species, and environmental circumstances.

Mitigation

DHT will be responsible, in consultation with SE Conservation officers, for monitoring visitor activity at stream crossings on an ongoing basis. Fishing from the Redman River Bridge, or any bridge in Saskatchewan, is illegal and DHT will post signs to inform the public that fishing in this location is prohibited. Commercial and sport fishing activity (catch) will be obtained from the resource users (commercial, outfitting camps) for subsequent evaluation by SE to determine if changes to resource allocations are required

Significance

Although SE will not initiate a formal monitoring program of the lakes along the proposed Wollaston Lake Road, SE will continue to monitor commercial and sport fishing activity through the existing processes. With proper fisheries management strategies and enforcement of no-fishing laws, no significant adverse environmental effect will occur following implementation of mitigation measures.

Interference of fish passage due to culvert installation

Interference of fish passage at stream crossings is likely to occur during the construction phase of the project and will affect local populations for a short period of time. Fish passage can be impeded by improperly constructed crossings that increase water velocity of the watercourses to levels that exceed the fish species swimming ability. Improperly installed culverts could decrease water levels to improper depths for fish passage and alter flow regimes that could alter the species makeup and increase predation. Blockages within properly designed culverts such as sediment, gravel, ice, timber, and beaver activity may result in fish being delayed during migration activity which would lead to reduced fish productivity.

Mitigation

To minimize impacts to migrating fish during construction activities, in-stream work will only occur during the open water work window. Impacts to fish passage from culvert installation on streams will be addressed through proper culvert design, including adequate culvert sizing and energy dissipation structures. Each crossing structure will be designed to accommodate fish passage of the poorest performing species present in system at the 1:10 year - 3 day delay discharge. Designs for crossings will be submitted to DFO to allow for proper analysis and approval. Culverts will be routinely monitored and maintained to allow for free movement of water and fish through the crossing.

Significance

If fish passage is blocked during construction the effect would be limited to the local stream and would be short term. Effects would be fully reversed once construction is complete. Long-term interference of fish passage at watercourse crossings is unlikely to occur if in-stream work windows are followed and proper culvert design recommendations are followed. The effects on fish passage are not expected to be significant.

Interference to Navigation

The watercourses within the project area are used as a transportation medium for local trappers and residents of the region in the pursuit of traditional, leisure and subsistence activities. The navigation of the watercourses within the region of the proposed project may be affected during all phases of the project such as construction of coffer dams, diversion of flow and all in-stream work. During operation of the crossings, navigation may not be viable if the crossings are improperly designed. Construction activities may also impose an increased public safety risk during navigation of the watercourses by boaters.

Mitigation

The Redman River Bridge (the principle effector to impede navigation) will be designed to account for the requirements of the *Navigable Waters Protection Act*. Transport Canada – Navigable Waters Protection Program has informed INAC and WD that the following mitigation measures would be included in any future approval under paragraph 5(1)(a) of the *Navigable Waters Protection Act*:

- No person shall permit any tools, equipment, vehicles, temporary structures or parts thereof used or maintained for the purpose of building or placing a work in a navigable water to remain in such water after the completion of the project.
- Where a work or a portion of a work that is being constructed or maintained in a navigable water causes debris or other material to accumulate on the bed or on the surface of such water, the owner of that work or portion of that work shall cause the debris or other material to be removed to the satisfaction of the Minister.

Significance

With the above noted mitigations, the navigability of the Redman River will be impeded minimally and will remain navigable to local residents. No significant adverse environmental effects related to navigation within the project area are anticipated.

RA Conclusions – Aquatic Resources

A number of potential effects to aquatic resources can occur as a result of the proposed project. These effects include changes to local drainage patterns, stream flows, water quality and effects to fish and fish habitat. In general, effects to aquatic resources are expected to be local in nature. Following the implementation of the proposed mitigation measures described in the sections above, INAC and WD, in consultation with DFO, conclude that significant adverse environmental effects to aquatic resources are not likely.

6.2.3 Atmosphere

Adverse effects to the atmosphere from project related activities could potentially occur as a result of the following:

- Reduction of air quality due to vehicle emissions.
- Reduction of air quality due to the production of dust from construction and operational activities.

- Reduction in air quality due to smoke and particulate matter released during burning of slash.

Reduction of air quality due to vehicle emissions

Air quality will be affected by emissions released from vehicles and equipment during the construction phase, as well as vehicles using the road during the operational phase.

Emissions from construction vehicles will enter the atmosphere for the duration of construction activities. In general, construction equipment use is expected to be restricted to the project study area, with the exception of mobilization and demobilization activities, which will occur in the regional study area. The proponent provided an estimate of the types and number of pieces of construction equipment to be used during the construction period, as well as the mass of CO_2, CH_4 and N_2O emissions that will be generated during that period (Table 6.2.3). Calculations are based on the relationship between fuel consumption and exhaust gas production (Environment Canada, 2006, http://www.ec.gc.ca/pdb/ghg/inventory_report/2004_report/toc_e.cfm).

An additional analysis was conducted to assess the greenhouse gas potential of the project (CO_2 equivalent emissions). The results are provided in Table 6.2.3. In total, the project is estimated to produce 1.9 kilotonnes of CO_2 equivalents during the construction phase. In 2004, Canadians contributed about 758 megatonnes of greenhouse gas equivalents (Mt CO_2 eq.) to the atmosphere, while the whole province of Saskatchewan contributed 6.5 megatonnes (Environment Canada, 2006). In comparison, the estimated contribution of greenhouse gases from the proposed Wollaston Lake Road project is insignificant, accounting for less than 0.003% of the provincial total.

Although no modelling was conducted because of the relatively small magnitude of the project and its relatively short duration, the proponent anticipates that any changes to air quality will be local and transient. Further, the proponent indicates that effects to human health will not occur as communities or other sensitive residential areas (e.g. hospitals, schools, etc.) are not within the project area.

Table 6.2.3
Project Emissions and Greenhouse Gas Production During Construction

Equipment	*Est. Fuel Consumption (l/day)*	*Construction Days*	*Total Fuel Consumption (l)*	*CO_2 (tonnes)*	*CH_4 (Kg)*	*N_20 (Kg)*
4 Bulldozers[1]	200	450	360,000	853	47	29
2 Graders[1]	150	180	54,000	128	7	4
4 Rock Trucks[1]	150	360	216,000	512	28	17
2 Loaders[1]	200	100	40,000	95	5	3
2 Trackhoes[1]	150	360	108,000	256	14	8
2 Snowmobile / ATV's[2]	20	360	14,400	34	39	1.2
2 Chainsaws[2]	2	120	480	1	1.5	0.03
TOTAL	**872**		**792880**	**1879**	**141.5**	**1.2**
Global Warming Potential (CO_2 equivalents factor)				**1**	**21**	**310**
Total in CO_2 Equivalents (kt)				**1.8790**	**0.0030**	**0.0004**

Total Project Construction Greenhouse Gas Production (kt CO_2 Equivalents) (CO_2, CH_4, N_2O)	**1.8823**
Note: 1. Diesel powered 2. Gasoline powered 3. Saskatchewan greenhouse gas emissions 2004 = 65 000 kilotonnes CO_2 equivalent 4. Canadian greenhouse gas emissions 2004 = 758 000 kilotonnes CO_2 equivalent	

The operation phase will see an estimated 60 vehicles per day driving along the road. It is very likely that many of these vehicles will be half-ton trucks and SUVs. These vehicles are less efficient than automobiles and may emit 30 to 35 kg of carbon dioxide for every 100 km driven (cars may be half this value). Assuming 60 vehicles per day for the approximately 100 km highway, the total amount of emitted carbon dioxide will be approximately 2000 kg per day or 0.73 kilotonnes CO_2 equivalents per year. This equates to approximately 0.001% of the provincial total. Compared to any urban environment or most highways in Saskatchewan, this is an insignificant value as the traffic volumes are so small. No additional mitigation is required for the operational phase.

Mitigation

To further reduce the amount of emissions released from vehicles and equipment during construction activities, the proponent will ensure that all equipment onsite will be maintained in proper operating conditions and will utilize standard emission control equipment. Where possible, vehicles will not be left idling when not in use.

Significance

Construction activities will produce vehicle emissions in the project study area. Implementation of mitigation measures such as routine maintenance and ensuring equipment has emission controls will reduce the magnitude of the effect of the emissions on air quality. Due to the location of the project, residual emissions will not affect any residential communities. In the local and regional context, the estimated mass of emissions resulting from the project will be insignificant. No significant adverse environmental effect on air quality is anticipated following the implementation of mitigation.

The operational phase of the project will see an estimated 60 vehicles per day driving along the road. The estimated vehicle emissions during operation will be long term, but because of the low traffic volume, the emissions will be of low magnitude, especially when compared to urban environments or other highways in Saskatchewan. No significant adverse environmental effect to air quality will occur.

Reduction of air quality due to the production of dust from construction and operational activities

The construction phase of the proposed project will produce fugitive emissions of dust along the entire route during a number of activities, including movement and use of construction vehicles and equipment and aggregate dumping activities. Mitigation measures may be required to reduce the magnitude of the effect of dust on air quality. Bedrock blasting during construction will also produce dust, but this activity is anticipated to occur sporadically and the effects are expected to be of such short duration that no mitigation measures are proposed by the proponent.

As the proposed road will be constructed as an all-weather gravel road, dust will be produced during the operational phase, particularly during dry conditions in the summer. The volume of dust that may be generated during construction and/or operational activities will vary depending on soil moisture conditions, the level of activity at a particular location and meteorological conditions such as wind and precipitation. However, it is anticipated that excessive dust can result in decreased local air quality, reduced visibility leading to potentially unsafe driving conditions (which is experienced along Saskatchewan Highway 905), and adverse effects to vegetation once it settles.

Mitigation

Dust suppressants such as calcium chloride and/or water may be applied on critical areas of the road during periods of heavy activity or during dry periods to reduce dust generation. Application can be during both the construction and operational phases of the proposed project.

Significance

Construction and operational activities will produce dust within the road right-of-way. The effects will be local in nature, and will depend on soil moisture and meteorological conditions at the specific location. No significant adverse environmental effect will occur following implementation of mitigation measures.

Reduction in air quality due to smoke and particulate matter released during burning of slash

The construction phase will involve burning of slash (excess vegetative matter) which will release smoke and particulate matter into the atmosphere. Smoke generated during burning activities will reduce local air quality over the short-term (i.e. during burning), and may lead to reduced visibility in the project area.

Mitigation

Burning of slash will generate smoke and release particulate matter into the atmosphere. The proponent will ensure that slash piles are burned in windrows in accordance with the *Prairie and Forest Fires Act*, which includes limiting the size of windrows to 60 m in length, with 8 m between the ends of each windrow and 16 m between parallel windrows. Where possible, burning will be conducted in low-wind conditions.

Significance

Slash burning during construction activities will release smoke and particulate matter, resulting in reduced air quality in the project area. The amount of smoke and particulate matter to be generated is expected to have minimal effect in the ecological context. The area has been subject to major forest fires in the past. In comparison, the burning of slash will be of short duration and the effects of smoke and particulate matter will remain the local project area. No significant adverse environmental effects will occur.

RA Conclusions – Atmosphere

In consideration of the proponent's analysis, additional analysis conducted by INAC during the completion of the comprehensive study, and proposed mitigation, INAC and WD conclude that significant adverse effects to the atmosphere as a result of the project are not likely.

6.2.4 Vegetation

In the spring and summer of 2005, field studies were conducted primarily near stream crossings along both proposed routes. A total of eleven rare species were identified, with five and six rare or endangered species occurring along the South and North routes, respectively. The vegetation within the project area primarily consists of coniferous species including black spruce (*Picea mariana*), jack pine (*Pinus banksiana*), white spruce (*Picea glauca*), and tamarack (*Larix laricina*).

Adverse effects to vegetation from project related activities could potentially occur as a result of the following:

- Destruction of rare flora within project area due to clearing activities.
- Removal of vegetation due to clearing activities.
- Introduction of non-native (exotic and noxious) species into project area by construction activities
- Increased vulnerability of vegetation communities to fire
- Destruction of wild berry habitat due to construction activities

Destruction of rare flora within project area due to clearing activities

In the spring and summer of 2005, field studies were conducted to locate potentially rare and endangered flora within the project area. A total of eleven rare species were identified, with five and six species occurring along the South and North routes, respectively.

Northern Labrador tea (*Ledum palustre* ssp. decumbens) was found along the South Route, near stream crossings 12 and 21, where it grew among patches of common Labrador tea. This plant of open and treed bogs was restricted in distribution to a few hummocks of peat moss at stream crossing 12, but was abundant at crossing 21.

Few-flowered sedge (*Carex pauciflora*) was identified at a sole location along the South Route near crossing 15. This species was rare in distribution, and was found only on a few sphagnum hummocks at the edge of a black spruce bog.

Also found near crossing 15 was purple lousewort (*Pedicularis macrodonta*), which grew in an open bog in association with two species of carnivorous plants, round-leaved sundew and pitcher-plant. Distribution was locally abundant.

Two rare species of carnivorous plants, horned bladderwort (*Utricularia cornuta*) and oblong-leaved sundew (*Drosera anglica*), were found growing in a graminoid fen near crossing 21 on the South Route. Both species grew among the more common flat-leaved bladderwort, with horned bladderwort being rare in occurrence whereas oblong-leaved sundew was abundant; immediately west of this fen was an area containing round-leaved sundews and pitcher-plants, as at crossing 15.

Construction activities including blasting, clearing, borrow pit development and spur roads could potentially destroy rare flora within the project area. Depending upon the species involved, the destruction of rare flora within the project area could be significant in a local, regional and provincial context. If certain species are endemic to the road area, the removal of such plant might affect the total population of the species.

Mitigation

During the pre-planning stages of route selection, all locations of rare or endangered flora were avoided. As the exact locations of ancillary activities (i.e. borrow pits and spur road development) have not been determined, there is the potential for additional locations containing rare flora to be encountered during the construction phase. The environmental monitor will provide on-site guidance to the contractors and DHT, regarding avoidance of sites (rare flora locations and sensitive habitat), and activity within sensitive areas (e.g., near streams, etc.). The monitor will be empowered by DHT to halt construction, if necessary, until compliance with environmental protection measures is fully achieved. The monitor will also examine ancillary sites (e.g., borrow sites) and make recommendations regarding the suitability of the site and the mitigation measures required for each situation. Information about these locations, and their site-specific conditions (e.g., vegetation, presence/absence of rare flora), will be reported to SE prior to borrow being removed. If rare flora is identified, the environmental monitor, in consultation with the SE plant ecologist, will determine if relocation is necessary or feasible. If it is determined, by the site assessment, that the species is locally abundant and can withstand the right-of-way clearing, no relocation will be conducted. If relocation is necessary, a relocation plan will be developed on a species specific basis.

Significance

The destruction of rare flora within the project area could adversely affect the local and regional rare flora populations. If a species is endemic to the project area, the species could be lost and therefore the loss would be irrevocable. Due to extensive surveys and site specific surveys to be conducted during construction by the environmental monitor, the loss of rare flora is unlikely to occur. Therefore, no significant adverse environmental effect will occur following implementation of mitigation measures.

Removal of vegetation due to clearing activities

Vegetation is important to terrestrial ecosystems in terms of providing habitat, stabilizing soils, stream banks and slopes. Vegetation also provides for habitat for all species of wildlife within the project area. Approximately 7 km^2 of vegetation will be removed during clearing operations of the proposed road. The estimated area of forest cover types lost by the right-of-way construction along the South route will be approximately 1.62 km^2 of open conifer forest, 0.57 km^2 of closed conifer forest, 0.06km^2 of deciduous forest, 1.55 km^2 of treed wetland, 0.12 km^2 of open wetland, 0.87 km^2 of regenerating burn, 0.41 km^2 of shrubs and 0.09 km^2 of bare ground. During construction operations of the proposed road, there is a small likelihood that vegetation communities having a small areal extent will be fragmented. Overall fragmentation will be minimal due to the proposed road being the first development within the region.

Mitigation

To minimize the effect of vegetation removal within the project area, DHT will limit the areal footprint of the project on a whole and will utilize minimal clearing techniques. Vehicle use will be restricted to designated roadways and access routes. Re-vegetation practises will be used at ancillary sites and within the ditches of the road corridor to reduce the overall impact of vegetation removed during construction activities.

Significance

The removal of vegetation communities due to clearing will occur within the project area. There will be approximately 7 km^2 of vegetation removed from the road right-of-way and ancillary sites. The effect will be local in nature and negligible on a regional scale. Limiting the project footprint and applying re-vegetation techniques will reduce the overall magnitude of the effect of vegetation loss. The effect is not considered to be significant following implementation of mitigation measures.

Introduction of non-native (exotic and noxious) species into project area by construction activities

Construction activities have the potential of introducing exotic vegetation species into the project area. Exotic species could be introduced into the project area by construction equipment that has been previously used in other regions and moved into the project area without appropriate cleaning. The spread of exotic species is an issue of local as well as international importance. The United Nations Environmental Programme (UNEP) Convention on Biological Diversity calls for the control and monitoring of exotic species that threaten ecosystems, habitats and species (Haber, Erich, 2001 as cited in UNEP, 1994). The introduction of exotic species may result in the natural cover type being modified that could potentially lead to the exotic species out-competing the native species of the project area. Exotic species could also have a negative impact on species that are recognized nationally at risk by COSEWIC. Exotic species are commonly found in disturbed areas. Modifications to the soil organic layer and top soil may also modify the cover type and result in slower natural regeneration of native species or even provide a competitive advantage for exotic species.

Mitigation

To minimize the likelihood of the introduction of exotic species into the project area by construction activities, the proponent will ensure that all equipment will be cleaned prior to beginning work on the proposed project. Post-construction monitoring will include a survey for exotic species. Should they be found, consultation with SE will be conducted regarding potential methods for site restoration using native species.

Significance

The introduction of an exotic or noxious vegetation species is potentially detrimental to native plant communities within the project area. Exotic or noxious species introduction could have local and regional implications to the vegetation communities that could persist indefinitely. With proper cleaning procedures of equipment and safety precautions, the effect is unlikely to occur. The proponent has also committed to post-construction monitoring for exotic species; therefore a site restoration plan would be developed in consultation with SE and implemented as required. Development of the restoration plan will begin immediately following construction and will continue based on the response of

the vegetation communities to the mitigation measures. The effect is not considered to be significant following implementation of mitigation measures.

Increased vulnerability of vegetation communities to fire

Construction activities will increase the potential for loss of vegetation to fire. Construction and work camp activities will require the use of potentially flammable and heat producing products which could initiate fires. Construction will primarily occur during the winter months which will reduce the risk of fire due to snow cover.

Mitigation

The proposed timing of construction activities (winter construction) will greatly reduce the vulnerability of vegetation communities to fire. In the unlikely event of a fire, contractors will be required to have a fire protection plan and to have on hand the necessary safety equipment. This plan and equipment will meet the requirements of the *Prairie and Forest Fires Act, 1982*, and Forest Management Requirements for Independent Forest Operations.

Significance

Fire has the potential to be detrimental to the viability of vegetation resources within the project area. Fire could have local and regional implications that could have short and long term effects. Recent burn activity within the project area has reduced the probability of a wild fire, but with a proper fire protection plan and safety equipment a fire event is unlikely to occur.

RA Conclusions - Vegetation

A number of potential effects to vegetation can occur as a result of the proposed project. These effects include removal and/or destruction of vegetation and habitat, including rare species and increased risk for fire. While not all of the effects can be completely avoided due to the nature and location of the proposed road, they can be minimized by implementation of the proposed mitigation measures described in the sections above. INAC and WD conclude that significant adverse environmental effects to vegetation are not likely.

6.2.5 Wildlife

Large mammals known to occur in the region include moose (*Alces alces*), barren-ground caribou (*Rangifer tarandus*; Beverley herd), woodland caribou *(Rangifer tarandus* caribou; boreal population), grey wolf (*Canis lupus*), wolverine (*Gulo gulo*) and black bear (*Ursus americanus*). Other species may include red fox (*Vulpes vulpes*), Canada lynx (*Lynx canadensis*), beaver (*Castor canadensis*), mink (*Mustela vison*) and river otter (*Lontra canadensis*).

To assess the occurrence of large mammals in the vicinity of the proposed routes, an aerial survey was conducted in February 2005, during which both animal tracks and incidental sightings were recorded. Tracks of moose and woodland caribou were common, with evidence of woodland caribou being found only south of the southern end of Wollaston Lake. Less frequent were the tracks of Canada lynx, grey wolf and river otter. Wolverine tracks were also evident. Observations of animals during the winter survey and incidental sightings during the spring (late May-early June 2005) and summer (August 2005) were infrequent and included moose, caribou, grey wolf and black bear. Relatively

few tracks and no evidence of caribou were recorded within 10 km of the settlement of Wollaston Lake. Grey wolf tracks were also observed in this region, despite a lack of evidence of ungulate kills in the immediate area.

Although the presence of barren-ground caribou was not documented during the aerial survey, the Beverly and/or Qamanirjuag migratory herds have been known to migrate as far south as the Wollaston Lake area as recently as late 2003 / early 2004). These migratory herds prefer habitats comparable to that of woodland caribou and thus are subject to similar detrimental impacts resulting from habitat disturbance. Such disruption may also alter the migration route of this species.

No denning sites for wolves, wolverines, or black bears were noted during the wildlife surveys, the variety of field studies completed in the spring/summer of 2005, or during the traditional knowledge gathering meetings.

Ungulates

Woodland Caribou, moose and barren-ground caribou are found throughout the project study area and have been determined to be Value Ecosystem Components (VECs). Woodland Caribou and moose are permanent residents of the region. Woodland Caribou are designated as a "threatened" species (Schedule 1) and are protected by the Federal *Species at Risk Act*.

Adverse effects to ungulates from project related activities could potentially occur as a result of the following:

- Disturbance to habitats utilized by ungulates.
- Increased vulnerability to hunting (legal and illegal) due to improved hunter access along the all-season road.
- Disturbance of calving season from construction activity and hunting or harassment of construction workers.

Disturbance of habitat utilized by ungulates

Woodland caribou and moose are permanent residents of the region and occur in relatively low numbers. An assessment of the occurrence of large mammals occurring within the project area was conducted via an aerial survey in February 2005. Moose and Woodland Caribou tracks were common with evidence of Woodland Caribou concentrating their activity to the South of Wollaston Lake. It follows then that the entire project area is considered ungulate habitat.

Woodland Caribou require a large area of habitat, with the median area occupied by a herd being approximately 9,000 km^2. In winter, Woodland Caribou use mature and old-growth coniferous forests that contain large quantities of terrestrial and arboreal (tree-inhabiting) lichens. These forests are generally associated with marshes, bogs, lakes, and rivers. In summer, the caribou occasionally feed in young stands, after fire or logging. The proponent has made attempts to limit disturbance to ungulate habitat by minimizing right-of-way width and proposing revegetation of ancillary construction features. Woodland caribou prefer older growth forests, compared to the younger forests favoured by moose. Therefore, removal of vegetation during construction will result in the removal or modification of approximately 5 km^2 of habitat preferred by Woodland Caribou. Moose will also experience a partial loss of habitat due to the roadbed construction (1.5km^2), but the clearing of the right-of-way will increase the quality of moose habitat by creating more browsing habitat which moose use to feed.

Construction and general traffic noise could affect the habitat utilized by local populations of ungulates. Construction activities will be short-term in duration, but traffic noise will be long term (operational phase) and could extend for up to 1km away from the road corridor but is expected to be light and will occur only sporadically during the day and very minimally during the night.

Mitigation

Environmentally sound construction techniques (e.g. minimal clearing, location and design of the bridge and culverts, reclamation and revegetation of disturbed sensitive sites such as stream crossings or steep slopes, etc.) will be utilized to reduce the footprint of habitat disturbance within the project area.

Some of the disturbed ungulate habitat will be reclaimed following abandonment and reclamation of the ancillary developments (gravel and borrow pits). Reclamation will be recognized as an integral portion of extraction and will be included in pre-extraction planning. Reclamation of ancillary developments will include the trimming of all pits to a 3 to 1 slope and the levelling of all over-burdens to facilitate revegetation. Shallow pits will be back-filled with clean fill and previously stripped and stockpiled topsoil will be applied as evenly as possible to the newly recontoured slopes.

Revegetation will be undertaken using native plant species to ensure no exotic species will occur within revegetate areas. Seed mixes used to revegetate ancillary developments will be approved by the Forest Service and the Fish and Wildlife Branch of SE.

Significance

There will be a total loss of function of the habitat utilized by ungulates within the road right-of-way and a partial loss within the ancillary sites. The effect will be localized to the road corridor and ancillary sites which will limit the loss of habitat to approximately 7km^2 within the project area of approximately 9000 km^2 available for use prior to development. Overall there will be a 0.05% reduction in habitat utilized by ungulates within the project area.

Woodland caribou will experience a small loss and alteration of habitat within the project footprint but this is within a large area that these animals use. Thus, during the construction phase of the project, the impact of habitat disturbance on Woodland Caribou in this region of Saskatchewan can be considered local, short-term and reversible. No significant adverse environmental effects to the regional population of Woodland Caribou are anticipated due to habitat disturbance if the proposed mitigations are implemented.

Increased vulnerability of ungulates to hunting due to improved access

Potential effects on the barren-ground caribou populations are of concern during the operation and maintenance phase of the proposed project. Effects are related to over hunting of the population during those times when the herds winter near the proposed road. Over hunting can occasionally occur, as was the case in 1980 when the herd came near some northern communities. This can be considered as a nationally important issue as the herds are monitored by an interprovincial-territorial board.

Illegal hunting of ungulates may accompany improved access into the project area. Illegal hunting of ungulates is a major concern and could affect the regional wildlife populations as long as the road is in operation.

During the proponent's consultation program, concern for resource sustainability was evident. Specifically, the public expressed concern for the sustainability of the Beverly-Qamanirjuag barren-ground caribou herd should over-harvesting occur. The proponent responded that proper resource management and implementation of mitigation measures would be required to minimize this potentially significant effect.

Mitigation

The proponent has proposed that annual advice be requested from the Beverly and Qamanirjuaq Caribou Management Board, as well as SE to determine the habitat utilization patterns of the caribou herds (if they are coming near the proposed road). If it is determined that the caribou herds are coming near to the proposed road, temporary mitigation measures will be implemented, as determined by SE, such as restricting vehicles access during critical periods. Meetings have been proposed to discuss the need for a local caribou management strategy that considers ecological issues such as distribution of recent burns, and the availability of useable habitat within the Northeast corner of Saskatchewan and into the Northwest Territories and Manitoba will help to mitigate over-hunting of the Beverly and Qamanirjuaq Caribou herds. The proposed strategy should include regulations for annual access to the herds, as well as contingency plans and regulation for future mass migration into the proposed road corridor. It will be the responsibility of SE to place hunting restrictions on non-region hunters should the measure be needed.

As a follow-up program to mitigate the increased vulnerability of caribou herds due to improved hunter access, the proponent commits to developing a "State of the Road" report to be developed annually, for the life of the road, and will include discussions of hunting practises within the road corridor.

Significance

Current regional access is provided by ice road and snowmobile trails in the winter and barge in the summer. As the proposed project is considered a safer replacement to the existing transportation system, the proponent has proposed that there will be no net change in hunting within the project area. The province will continue to have jurisdiction over management of wildlife on provincial Crown land. Through proper management strategies and a monitoring program, any changes to ungulate populations will be managed to sustainable levels. The effect will be localized to the project area population of ungulates and if the effect is increasing in severity the road can be temporarily closed to reverse the increased hunting trend. No significant adverse environmental effects are anticipated following implementation of mitigation measures.

Disruption of calving activities due to construction activity and hunting or harassment by construction workers

Noise generated during use of heavy equipment may result in ungulate avoidance and disruption of breeding and feeding activities in the project area. Due to the slow reproductive rate of ungulates within the project area, disturbances during the calving season could be detrimental to the population. Although no calving sites were identified during the wildlife survey, the existing habitat within the project area could support calving sites and therefore could be potentially affected.

Concerns have been raised pertaining to the harassment or hunting of wildlife by construction workers. The improved and continuous access of construction workers to the project area could adversely affect local populations.

Noise (traffic, construction and blasting) could affect the local populations of ungulates during calving periods. No activity will occur, including noise creating activities, during the critical periods of ungulates. Blasting noise will be short term and could extend for up to 3km away from the blasting site. General construction noise will be short-term in nature and could extend up to 1km away from the construction areas depending on atmospheric conditions (cold temperatures) and local forest density. Traffic noise will last for the life of the road, but is expected to be light and will occur only sporadically during the day and very minimally during the night.

Mitigation

Hunting or harassment of animals will not be permitted by construction staff while actively employed on the project and it will be the responsibility of the contractor to ensure compliance with this condition.

Construction noise will be limited during spring which is essential for rearing and calving of ungulate young. Noise reduction mechanisms such as properly maintained construction equipment and noise baffling mechanisms such as mufflers will be utilized to reduce noise production. If calving or migration activities are identified, the environmental monitor, in consultation with SE, will assess the short-term effects of noise and determine if a temporary shut-down is necessary.

Significance

Current regulations, together with the policies of the proponent, will not allow for the disturbance of the calving season during construction activity and/or hunt or harassment by construction workers. If a disturbance does occur, the effect will be localized to construction areas and occur for a short period of time. No significant adverse environmental effect will occur following implementation of mitigation measures.

RA Conclusions - Ungulates

A number of potential effects to ungulates can occur as a result of the proposed project. These effects include loss of habitat, increased hunting pressure, and general disturbance, especially during the calving season. Mitigation measures to limit the areal extent of habitat affected, restrictions on hunting activity by construction workers, and through application and enforcement of provincial hunting regulations, the magnitude of the potential effects will be reduced. DHT's "State of the Road" report will provide information on the sustainability of the ungulate populations and habitat utilized within the proposed road corridor. This information will allow provincial resource managers to determine whether the mitigation measures have been effective and whether additional management strategies are required. Following the implementation of the proposed mitigation measures and follow-up program described in the sections above, INAC and WD conclude that significant adverse environmental effects to ungulates are not likely.

Other Mammals

A variety of wildlife species are known to occur within the project area including grey wolf (*Canis lupus*), wolverine (*Gulo gulo*), black bear (*Ursus americanus*), red fox (*Vulpes vulpes*), and Canada lynx (*Lynx canadensis*). Aquatic furbearer mammals include beaver (*Castor canadensis*), mink (*Mustela vison*) and river otter (*Lontra canadensis*). The wolverine is further designated as a Special Concern by the Committee on Endangered Wildlife in Canada (COSEWIC). The above listed mammals have been determined to be Value Ecosystem Components (VEC).

Adverse effects to other mammals from project related activities could potentially occur as a result of the following:

- Disturbance of habitat utilized by aquatic furbearers.
- Increased vulnerability of other mammals to mortality due to vehicle collisions.

Disturbance of habitat utilized by aquatic furbearers

Watercourse crossings will require the clearing and preparation of the work area and trimming and stabilization of slopes which will disturb habitat utilized by aquatic furbearers. In total, approximately 45m^2 of land will be disturbed and, therefore, will be modified as aquatic furbearer habitat. The proponent has made attempts to limit disturbance to habitat utilized by aquatic furbearers by minimizing right-of-way width and proposing revegetation of watercourse crossing sites.

Mitigation

Destruction of aquatic furbearer habitat will be reduced through the proper installation of stream crossings and subsequent follow-up monitoring to ensure success of revegetation, erosion control measures and culvert operation.

Significance

With the proper installation of stream crossings, subsequent follow-up monitoring to ensure success of revegetation, erosion control measures and culvert operation, the disturbance to habitat utilized by aquatic furbearers will be minimized. The effect will be localized to habitat which is immediately adjacent to watercourse crossings, further reducing the overall extent of the effect. No significant adverse environmental effects will occur following implementation of mitigation measures.

Increased vulnerability of other mammals to mortality due to vehicle collisions

Mammals may be attracted to garbage (at construction sites and picnic sites created during operation and maintenance of the proposed road) which will increase the vulnerability of the population within the project area to vehicle collisions. For instance, mammals often have to cross roads in order to get from one place to another; also if the surrounding environment is difficult to move through (i.e. bogs, fens or dense forests), medium to large mammals often make use of road rights-of-way because of their relatively flat and clear terrain. The presence of animals in these areas puts them at a higher risk of being hit by passing vehicles.

Mitigation

Although it is possible to locate areas where there are significant numbers of animal tracks over road crossings, it is nearly impossible to predict the location of every road crossing point. To reduce vehicle-animal collisions, a wide ditch area with short vegetation and a shallow slope on either side of the road will be utilized. This typically affords vehicle drivers the opportunity to see large animals in advance, which provides them with enough warning time to slow down and successfully avoid collisions. Ungulate densities in northern Saskatchewan are typically low compared to ungulate populations in southern areas, therefore, the probability of collisions is reduced.

Significance

Through proper monitoring programs and the naturally low Ungulate population density within the project area, the total loss of Ungulates due to vehicle collisions will be minimal. The effect will be localized to the population of mammals utilizing the road corridor as habitat. Collisions of vehicles with mammals within the vehicle corridor will be sporadic and will not likely occur on a frequent basis. No significant adverse environmental effect will occur following implementation of mitigation measures.

RA Conclusions – Other Mammals

The potential effects to other mammals include loss of habitat and increased vulnerability of collision with vehicles. Although these effects cannot be completely avoided, following the implementation of the proposed mitigation measures described in the sections above, INAC and WD conclude that the potential adverse environmental effects to other mammals will not be significant.

Birds (Raptors, Migratory Birds, Colonial Nesting Birds and Other birds)

All permanent bird residents within the project area, as well as the habitat therein have been established as a VEC.

Adverse effects to birds and their habitat from project related activities could potentially occur as a result of the following:

- Disturbance of habitat utilized by birds.
- Disturbance of nesting, incubation, and rearing of young birds.

Disturbance of habitat utilized by birds

Clearing activities will physically disturb and/or remove habitat for permanent resident and migratory birds within the project area. In total, the initial loss of bird habitat will be due to clearing which can be up to 7 km^2 of habitat. Habitat will return almost immediately following construction and may be improved in some areas of re-vegetation. The re-vegetated ditches will provide better habitat then some of the land-cover currently does.

Birds can also be affected by sensory disturbance through the physical presence of equipment and people, and generation of noise. Construction and traffic noise has been shown to impact avian communities near busy roads (Forman 2001). Studies of the ecological effects of highways on avian communities in the Netherlands point to an important pattern. In both woodlands and grasslands adjacent to roads, 60% of the bird

species present had a lower density near a highway (Reijnen R. et al. 1996, Reijnen et al. 1995 cited in Forman et al. 1998). Although the proposed all-season road is not likely to be "busy" compared to roadways in the south, there is still the potential for sensory impacts.

Linear road projects will also result in the creation of edge habitat, which can have both positive and negative implications for birds. Edge habitat often supports a large number and variety of bird species, but edges also tend to attract generalist predators. Therefore, edge habitats can have a large number of birds attempting to breed but with overall poor breeding success.

Mitigation

Pre-identified nesting sites will be avoided by the centerline or road construction activity. The footprint of the project will be limited to designated areas and the contractor will be restricted to designated roadways and areas. The environmental monitor will provide on-site guidance to the contractors and DHT regarding avoidance of sites, activity within sensitive areas (e.g., near streams, etc.). The monitor will be empowered by DHT to halt construction, if necessary, until compliance with environmental protection measures is fully achieved. The monitor will also examine ancillary sites (e.g., borrow sites) and make recommendations regarding the suitability of the site and the mitigation measures required for each situation.

Significance

Disturbance of habitat utilized by birds will be negligible due to re-vegetation techniques. Of the 7km^2 lost due to construction activity, the majority of habitat will be reutilized by birds following construction activity. The loss of habitat will be localized to the immediate construction area and will only affect a small amount of the total population of birds on a regional perspective.

Disturbance of nesting, incubation, and rearing of young by birds

Construction activities may result in the destruction and/or temporary or permanent abandonment of nests. Increased predation of eggs and young can also occur during temporary nest abandonment. The breeding season is generally the most critical as eggs and nestlings cannot move from sources of disturbance.

Environmental effects on migratory birds are most likely to occur when construction activities are conducted during the period when most migratory birds are breeding (April to August). These effects will be greatest during egg laying and incubation periods between April and June. The need for parental attention decreases significantly as the young mature throughout the season (June to early August). Clearing and grubbing activities during this time may result in the direct mortality of eggs and unfledged nestlings. The killing of migratory birds or the destruction of their nests, eggs, or young is an offence under the *Migratory Birds Convention Act* (MBCA).

Noise (traffic, construction and blasting) could affect the local populations of birds during nesting, incubation and rearing of young. No activity will occur, including noise generating activities, during critical periods. Blasting noise will be short term and could extend for up to 3km away from the blasting site. General construction noise will be short-term in nature and could extend up to 1km away from the construction sites depending on atmospheric conditions (cold temperatures) and forest density. Traffic noise will last for the life of the

road, but is expected to be light and will occur only sporadically during the day and minimally during the night.

Mitigation

Right-of-way clearing will be scheduled for winter months and will avoid the sensitive nesting periods of migratory birds, to meet the requirements or Environment Canada and the *Migratory Birds Convention Act*. If right-of-way clearing and grubbing activities are not completed by April 15th, they will cease until August 1st, or a migratory bird survey will be conducted first and permission will be obtained from Environment Canada prior to activity during this period. Noise suppressors will be utilized on equipment during construction periods to minimize noise disturbance and blasting will not occur during critical periods.

Significance

Nesting, incubation and rearing activities will be affected within 3km adjacent to the road corridor and negligibly on a regional scale. The magnitude of disturbance could range from minor nuisance noise to the total disruption of nesting, incubation and rearing of your birds. Overall, the amount of habitat cleared by road construction is considered low compared to the amount of habitat available to birds in the project area; therefore, the impacts of clearing activities on bird populations is anticipated to be low. In addition, the proponent will implement mitigation measures such as limiting construction activities to non-critical periods for bird development. Therefore, disruption of nesting, incubation and rearing activities is not likely to occur and is therefore insignificant.

RA Conclusions - Birds

The potential effects to birds include loss of habitat and disturbance during sensitive life stages. The proponent will minimize the potential effects through implementation of the mitigation measures described above. Following the implementation of the proposed mitigation measures described in the sections above, INAC and WD, in consultation with EC, conclude that the potential adverse environmental effects to birds will not be significant.

Table 6.2 *Environmental Effects Analysis – Biophysical Environment*										
VEC	**Effect**	**Mitigation**	**Residual Effects**							**Significance**
			Likelihood	**Direction**	**Geographic Extent**	**Magnitude**	**Duration**	**Frequency**	**Reversibility**	
Terrain and Soils	Increased loss of soil to erosion	Use of erosion control blankets and/or mats, re-vegetation techniques, hydro-mulching and steep slopes will be avoided	Will Occur	Negative	Local; will be restricted to right-of-way.	Will totally remove all productive soils within road corridor.	Life of the project	Continuous for the life of the project	Irreversible	If erosion to soils does occur, the extent of the effect will be localized to the road corridor and ancillary features thus making the effect insignificant.
	Change in landscape features	Routing of road will minimize the disturbance of special landscape features. An environmental monitor will provide on-site guidance to DHT and the contractors and will have authority to halt construction.	Will Occur	Negative	Local; will be restricted to right-of-way.	Will occur minimally during road construction and will not occur during operation.	Life of the project	Continuous for the life of the project	Irreversible	The removal or alteration of landscape features will occur only within the road corridor and ancillary features thus localizing the effect. The proposed mitigation measures will reduce the overall magnitude of the effect by minimizing the contact construction activities will encounter special landscape features. No significant adverse environmental effect will occur following implementation of mitigation.

Table 6.2 *Environmental Effects Analysis – Biophysical Environment*										
VEC	**Effect**	**Mitigation**	**Residual Effects**							**Significance**
			Likelihood	**Direction**	**Geographic Extent**	**Magnitude**	**Duration**	**Frequency**	**Reversibility**	
	Disturbance of permafrost	Avoidance of permafrost, padding of permafrost where construction activities will occur.	Not likely to occur	Negative	Local; will be restricted to right-of-way.	Small effect of permafrost within the project area	During construction periods.	Discontinuous for the construction phase of project	Irreversible	Based on proposed mitigations such as implementation of appropriate pre-construction investigations, design specifications, and construction methods, the residual effects of the project on permafrost will not be significant.
Aquatic Resources	Disturbance of drainage patterns due to road construction	Culverts and ditches, rip-rapping and energy dissipation structures, proper stream crossing designs, spring and fall monitoring at culvert locations.	Not likely to occur	Negative	Large in geographical extent	Large effect on local and regional drainage patterns	Life of the project	Continuous for the life of the project	Reversible	There will be a minimal change in the drainage patterns of the project area with proper use of drainage culverts. With proper mitigations and extensive monitoring programs, a change in drainage patterns is not likely to occur. If monitoring identifies concerns, additional drainage capacity will be constructed. No significant adverse environmental effect will occur following implementation of mitigation measures.

Table 6.2 *Environmental Effects Analysis – Biophysical Environment*										
VEC	**Effect**	**Mitigation**	**Residual Effects**							**Significance**
			Likelihood	**Direction**	**Geographic Extent**	**Magnitude**	**Duration**	**Frequency**	**Reversibility**	
	Decreased flow of local streams due to water use at temporary work camps	Proper sited locations, proper sewage and solid wastes disposal proper removal and restoration procedures	Not likely to occur	Negative	Local to camp sites	Small effect on local streams and watercourses	Life of the project	Discontinuous for the construction phase of project	Reversible	With proper sitting of camps and following proper operation guidelines the effect is unlikely to occur and will have a small effect in a geographical context, therefore the effect is insignificant.
	Reduction of water quality of local streams, rivers and lakes resulting from increased TSS	Sediment control plans, sediment control measures, topsoil stockpiled outside of floodplain, silt fences, holding ponds, run-off directed away from streams	Likely to occur	Negative	Locally restricted to construction areas.	Small effect on local streams and watercourses	During construction periods.	Discontinuous for the construction phase of project	Reversible	There is likely to be an adverse effect on water quality of local streams and watercourses through an increase in TSS due to the construction, operation and decommissioning of the proposed road, but due to its small magnitude, as a result of the proposed mitigations, local extent and full reversibility over the long term the effect is insignificant.

Table 6.2 *Environmental Effects Analysis – Biophysical Environment*										
VEC	**Effect**	**Mitigation**	**Residual Effects**							**Significance**
			Likelihood	**Direction**	**Geographic Extent**	**Magnitude**	**Duration**	**Frequency**	**Reversibility**	
	Disturbance of streambed and in-stream habitat	Avoid construction activities during critical periods, open-bottom arch culverts, compensation of any infilled habitat.	Not likely to occur	Negative	Local effect to habitat near watercourse crossings	Effect magnitude can range from total loss of function to negligible reduction of productivity.	Life of the project	Continuous for the life of the proposed road.	Reversible, due to compensation	Disturbance will be negligible because of the proposed use of open-bottom arch culverts and compensation by undertaking fish habitat restoration/improvement projects at or near the site of impact. No significant adverse environmental effects will occur following implementation of mitigation measures.
	Loss of riparian and flood plain habitat	Clearing of riparian vegetation will be minimized, where unavoidable, hand-clearing will be used. Vegetation reservations near watercourses will be observed according to established guidelines, revegetation will occur.	Will Occur	Negative	Local effect to watercourse crossing.	0.018 km^2 of riparian habitat will be removed or altered as a result of construction activities.	Life of the project	Continuous for the life of the proposed road.	Irreversible	With the proposed mitigation/compensation strategies, the extent of the effect will be minimized and limited to the watercourses adjacent to the road right-of-way. Given the limited extent of riparian habitat loss (road right-of-way), no significant adverse environmental effect are expected to occur following implementation of mitigation/compensation measures.

Table 6.2 *Environmental Effects Analysis – Biophysical Environment*										
VEC	**Effect**	**Mitigation**	**Residual Effects**							**Significance**
			Likelihood	**Direction**	**Geographic Extent**	**Magnitude**	**Duration**	**Frequency**	**Reversibility**	
	Increased fishing pressure due to improved access	Monitoring visitor activity at stream crossings, fishing from any bridge in Saskatchewan, is illegal, regulation of commercial and sport fishing activity by SE.	Not likely to occur	Negative	Local effect to watercourse crossing	Minimal, due to in place management strategies	Life of the project	Continuous for the life of the project	Irreversible	SE will continue to monitor commercial and sport fishing activity through the existing processes. With proper fisheries management strategies and enforcement of no-fishing laws, no significant adverse environmental effect will occur following implementation of mitigation measures.
	Interference of fish passage due to culvert installation	Proper culvert sizing and design approved by DFO. Monitoring will occur to ensure culverts will not become blocked.	Not likely to occur	Negative	Local effect to watercourse crossing	Ranging from total blockage of fish passage to a slowing of fish passage	Life of the project	Continuous for the life of the proposed road.	Reversible	Interference of fish passage at watercourse crossings is unlikely to occur due to proper design requirements for the crossings. If fish passage is blocked the effect would only extend to the local watercourse and can be fully reversed through monitoring programs and proper maintenance procedures.

Table 6.2 ***Environmental Effects Analysis – Biophysical Environment***										
VEC	**Effect**	**Mitigation**	**Residual Effects**							**Significance**
			Likelihood	**Direction**	**Geographic Extent**	**Magnitude**	**Duration**	**Frequency**	**Reversibility**	
	Interference to Navigation	*Navigable Waters Protection Act* as administered by TC	Not likely to occur	Negative	Local effect to watercourse crossing	Ranging from total blockage of navigability to reduction of navigable channel	Life of the project	Continuous for the life of the proposed road.	Reversible	With the above noted mitigations, the navigability of the Redman River will be impeded minimally and will remain navigable to local residents. No significant adverse environmental effects related to navigation within the project area are anticipated.
Atmosphere	Reduction of air quality due to vehicle emissions	Equipment onsite will be maintained in proper operating conditions and will utilize standard emission control equipment. Minimal idling will occur.	Will Occur	Negative	Local effect to project area	Construction activities will produce vehicle emissions but in small quantities.	During construction periods	Continuous for construction activity	Reversible	There is likely to be an adverse effect on atmospheric conditions due to construction vehicle emissions but due to the small quantities released and full reversibility after construction the effect is considered to be insignificant.
	Reduction of air quality due to the production of dust from construction and operational activities	Dust suppressants (chloride and/or water)	Will Occur	Negative	Local; will be restricted to right-of-way.	Small effect due to low traffic volumes	Life of the project	Discontinuous for the life of the road	Reversible	There is likely to be an adverse effect on atmospheric conditions due to the creation of dust from road traffic but due to the small quantities because of the dust control measures, full reversibility and

Table 6.2 *Environmental Effects Analysis – Biophysical Environment*										
VEC	**Effect**	**Mitigation**	**Residual Effects**							**Significance**
			Likelihood	**Direction**	**Geographic Extent**	**Magnitude**	**Duration**	**Frequency**	**Reversibility**	
										intermittent occurrences the effect is deemed to be insignificant.
	Reduction in air quality due to smoke and particulate matter released during burning of slash	Slash piles are burned in windrows in accordance with Provincial recommendations, where possible, burning will be conducted in low-wind conditions.	Will Occur	Negative	Local	Due to small amount of burning material the effect is minimal	During construction periods.	Discontinuous for the duration of construction activity	Reversible	The amount of smoke and particulate matter to be generated is expected to have minimal effect in the ecological context. No significant adverse environmental effects will occur.
Vegetation	Destruction of rare flora within project area due to clearing activities	Proper route selection to avoid endangered flora, environmental monitoring and site-specific rare flora studies at ancillary sites. Monitor will provide onsite guidance on rare plant avoidance and preservation procedures	Not likely to occur	Negative	Local; and Regional implications	Large effect on local and regional rare flora populations	During construction periods.	Discontinuous for the construction phase of project	Irreversible	Thou an adverse effect, with proper route sitting, continuing monitoring and site specific rare flora surveys the destruction of rare flora in the project area will not likely occur, therefore the effect is not significant.

Table 6.2 *Environmental Effects Analysis – Biophysical Environment*										
VEC	**Effect**	**Mitigation**	**Residual Effects**							**Significance**
			Likelihood	**Direction**	**Geographic Extent**	**Magnitude**	**Duration**	**Frequency**	**Reversibility**	
	Removal of vegetation due to clearing activities	Minimal clearing, reclamation and revegetation of cleared sites such as stream crossings or steep slopes, reclamation of the ancillary developments, revegetation techniques	Will Occur	Negative	Local removal of vegetation	5km^2 of vegetation will be removed due to clearing activities.	Life of the project	Continuous for the life of the project	Partially reversible due to reclamation and re-vegetation techniques	The removal of vegetation communities due to clearing will occur within the project area. There will be approximately 5km^2 of vegetation removed from the road right-of-way and ancillary sites. The effect will local in nature and negligible on a regional scale. Limiting the project footprint and applying re-vegetation techniques will reduce the overall magnitude of the effect of vegetation loss. The effect is not considered to be significant following implementation of mitigation and follow-up.
	Introduction of non-native (exotic) species into project area by construction activities	Equipment will be cleaned and in proper working condition	Not likely to occur	Negative	Local; and possible Regional implications	Large effect on local and regional vegetation communities	Life of the project	Continuous	Irreversible	Thou an adverse effect, with mitigation measures such as proper equipment maintenance, the introduction of exotic flora into the project area will not likely occur; therefore the effect is not significant.

Table 6.2 *Environmental Effects Analysis – Biophysical Environment*										
VEC	**Effect**	**Mitigation**	**Residual Effects**							**Significance**
			Likelihood	**Direction**	**Geographic Extent**	**Magnitude**	**Duration**	**Frequency**	**Reversibility**	
	Increased vulnerability of vegetation communities to fire	Winter construction timing to fire hazard, fire protection plan, and the necessary safety equipment	Not likely to occur	Negative	Local and Regional implications	Possibility of total loss within burn area	During construction periods.	Continuous	Irreversible	Thou an adverse effect, with mitigation measures such as a fire protection plan and proper safety equipment, the disturbance will not likely occur within the project area and therefore the effect is not significant.
Wildlife	Disturbance of habitat utilized by ungulates	Minimal clearing, location and design of the bridge and culverts, reclamation and revegetation of disturbed sensitive sites such as stream crossings or steep slopes, reclamation and revegetation techniques	Will Occur	Negative	A reduction of 0.05% or habitat is minimal in an ecological context.	Estimated removal of 5km2 of the 9000km2 is available within the project area. Therefore, there is an overall decease of 0.05%.	Life of the project	Continuous for the life of the project	Irreversible	Ungulates will experience a small loss and alteration of habitat within the project footprint but this is within a large area that these animals use. Direct long-term habitat losses are associated with permanently clearing or altering vegetation in the right-of-way. No significant adverse environmental effect will occur following implementation of mitigation measures.

Table 6.2 *Environmental Effects Analysis – Biophysical Environment*										
VEC	**Effect**	**Mitigation**	**Residual Effects**							**Significance**
			Likelihood	**Direction**	**Geographic Extent**	**Magnitude**	**Duration**	**Frequency**	**Reversibility**	
	Increased vulnerability of ungulates to hunting due to improved access	Population of Ungulates will be tracked and vehicles can be restricted during critical periods; follow-up program to analyze effects	Likely to occur	Negative	Based on the project area, the effect will have little to no effect on the regional populations of Ungulates.	It is estimated that only a minimal to no net change in hunting will occur as a result of the proposed project.	Life of the project	Discontinuous for the life of the project, as the road may be closed during critical times		As the proposed project is considered a safer replacement to the existing transportation system, the proponent has proposed that there will be no net change in hunting within the project area. The province will continue to have jurisdiction over management of wildlife on provincial Crown land. Through proper management strategies and monitoring program, any changes to ungulate populations will be managed to sustainable levels. No significant adverse environmental effects are anticipated following implementation of mitigation measures.

Table 6.2 *Environmental Effects Analysis – Biophysical Environment*										
VEC	**Effect**	**Mitigation**	**Residual Effects**							**Significance**
			Likelihood	**Direction**	**Geographic Extent**	**Magnitude**	**Duration**	**Frequency**	**Reversibility**	
	Disruption of calving activities due to construction activity and hunting or harassment by construction workers	Hunting or harassment of animals will not be permitted by construction staff while actively employed on the project and it will be the responsibility of the contractor to ensure compliance with this condition.	Not likely to occur	Negative	Local in extent to construction area	Adversely effect population in local area.	During construction periods.	Discontinuous for the construction phase of project		Though this effect could adversely affect the local Ungulate population, mitigation measures, such as the contractors regulations on no firearms or harassment of wildlife by construction staff will make the effect not likely to occur, there for the effect is insignificant.
Other Mammals	Disturbance of habitat utilized by aquatic furbearers	Proper installation of stream crossings, follow-up monitoring program	Will Occur	Negative	Localized to watercourse crossings within road corridor	In total, approximately 45m^2 of land will be disturbed and, therefore, will be modified as aquatic furbearer habitat.	Life of the project	Continuous for the life of the project	Reversible in long term	Effect of the project on aquatic furbearer habitat will be relatively small in a geographical context; therefore the effect is considered to be insignificant.
	Increased Vulnerability of other mammals to mortality due to vehicle collisions	Animal crossing signs, annually reported stats on the road kill problems and the need for signage or speed reduction zones	Will Occur	Negative	Localized to road corridor	Low population densities and proper vegetation cutback and signage will minimize the effect.	Life of the project	Discontinuous for the life of the project	Irreversible	Adverse effect on the vulnerability of other mammals to mortality due to vehicle collisions. With mitigation measures, the loss of population will be small in an ecological context, therefore the effect is not significant.

Table 6.2 *Environmental Effects Analysis – Biophysical Environment*										
VEC	**Effect**	**Mitigation**	**Residual Effects**							**Significance**
			Likelihood	**Direction**	**Geographic Extent**	**Magnitude**	**Duration**	**Frequency**	**Reversibility**	
Birds	Disturbance of habitat utilized by birds	Pre-identified nesting sites will be avoided by the centerline or road construction activity.	Not likely to occur	Negative	Localized to right-of-way	In total, the initial loss of bird habitat will be due to clearing which can be up to 7 km^2 of habitat.	Life of the project	Continuous for the life of the project	Irreversible	Disturbance of habitat utilized by birds will be negligible due to re-vegetation techniques; of the 7km^2 lost due to construction activity, the majority of habitat will be reutilized by birds following construction activity. The loss of habitat will be localized to the immediate construction area and will only affect a small amount of the total population of birds on a regional perspective.
	Disturbance of nesting, incubation, and rearing of young by birds	Right-of-way clearing will be scheduled for winter months and will avoid the sensitive nesting periods of migratory birds; noise suppressors will be utilized on equipment during construction periods; blasting will not occur during critical periods.	Not likely to occur	Negative	Affect local population of avian species which include raptors, migratory birds, colonial nesting birds and other avians.	Ranging from minor nuisance noise to total disruption of nesting, incubation and rearing of young.	Life of the project	Discontinuous for the life of the proposed road.	Irreversible	Overall, the amount of habitat cleared by road construction is considered low compared to the amount of habitat available to birds in the project area; therefore, the impacts of clearing activities on bird populations is anticipated to low. Disruption of nesting, incubation and rearing activities is not likely to occur and is therefore insignificant.

6.3 Human Environment

Under the CEAA, a comprehensive study must consider any change on health and socio-economic conditions due to a change that the project may cause on the environment.

A summary of the potential effects on human environmental components is provided in Table 6.3.

6.3.1 Current Use of Lands and Resources for Traditional Purposes by Aboriginal Persons

The proponent has identified environmental effects resulting from increased access into the project area and terrestrial habitat change and/or loss as having the potential to affect resource use for traditional purposes by Aboriginal people during construction and operation of the Project.

Changes to traditional hunting, fishing and trapping

Current use of lands and resources for traditional purposes can be impacted by environmental effects resulting from the provision of easier access, and the effects of over-harvesting of barren-ground caribou, woodland caribou, moose, furbearers, and commercial and sport fisheries. During the proponent's traditional knowledge meetings, participants indicated concerns that the road would open up the area to tourism and increased tourist fishing, and improved hunting access for non-locals which could compete with local use of the area. Although it was noted that the road would provide better access to the trapping areas for local trappers, it was also noted that the road could also provide access to trappers from other locations and may result in disturbance to existing traplines.

The proponent indicated that the potential effects of increased access to traditional resources (fish, barren-ground caribou, and woodland caribou) are difficult to quantify. Over-harvesting could result in reduced opportunities for traditional resource use due to diminished fish and wildlife populations, and increased potential for conflict between traditional resource users and others.

Changes to habitat related to construction of the proposed road may result in the potential for wildlife to avoid the project area during the construction phase. The proponent expects this effect to be small and short-term, and therefore not likely to have a significant effect on the long-term abundance of animals in the area available to resource harvesters. In addition, the proponent expects that effects on wildlife due to loss of terrestrial habitat will be small and should have no noticeable effect on resource use.

Mitigation

Please refer to sections 6.2.2 and 6.2.4 for mitigation measures related to fish and wildlife resources.

Significance and RA Conclusion

Although SE will not initiate a formal monitoring program of the traditional resources along the proposed Wollaston Lake Road, SE will continue to monitor resource use (commercial and sport fishing and hunting activity) through established processes. With proper management and enforcement of regulations, INAC and WD conclude that significant adverse effects to traditional fishing, hunting and trapping are not likely.

Changes to traditional gathering of wild berries

The removal of wild berry habitat may occur during construction of the proposed road right-of way and associated ancillary sites. During the proponent's consultation sessions with local first nation and non-first nation community members during the conduct of the EIS, it was concluded that the identified proposed routes will not interfere with wild berry picking locations currently used by community residents. However, the location of additional suitable berry habitat within the project area was not completed as part of the EIS process. It is possible that some wild berry habitat that is not currently being utilized by the community will be lost, although the total extent will not be known until further ground-truthing has been completed.

Mitigation

Community discussions (traditional use meetings, and the open houses) did not identify any wild berry habitats (traditional use areas) of concern within the project area, therefore no mitigation is required. Any removal of wild-berry habitat will be restricted to the highway right-of-way and ancillary facilities.

Significance and RA Conclusion

The removal of wild berry communities, if present, will be localized to the right-of-way and ancillary sites. During the vegetation survey, no wild berry communities were identified thus reducing the probability of wild berry habitat being lost. During siting of ancillary activities, an environmental monitor will conduct site specific surveys of probable ancillary sites to minimize the loss of wild berry communities. No significant adverse environmental effect will occur following implementation of mitigation measures.

Loss of heritage resources

Construction activity within the project area could potentially destroy identified and previously undiscovered heritage resources. The proponent conducted historic resource studies in spring 2005, following standard methodology provided by the provincial Heritage Resources Unit, to identify potential heritage resources within the project area. Additional locations of potential heritage or cultural importance were identified by local residents during the proponent's consultation activities and were included in the historic resource studies. A total of six archaeological resources were recorded on the proposed route, however, the proponent has indicated that all of the resources can be easily avoided at the time of construction planning. Any destruction or alteration of heritage resources within the project area would be detrimental to the history of the region.

Mitigation

This effect is unlikely to occur based upon the results of the Heritage Resource Impact Assessment. Additionally, DHT proposes to conduct appropriate heritage studies at ancillary sites, once they have been determined. In the event that cultural heritage resources are encountered, or additional information regarding cultural heritage resources becomes available, site-specific mitigation measures will be developed. The TEK studies have identified a number of such sites, and the project design has been adjusted to ensure that such sites are as well away from planned infrastructure as practical. The

Saskatchewan Ministry of Culture/ Youth and Recreation will be notified if archaeological features are discovered during site construction.

Significance and RA Conclusion

There are no expected project effects on cultural heritage resources. The RA concludes that there will not likely be any significant adverse environmental effects on heritage resources.

6.3.2 Use of Renewable Resources

Commercial Fishing and Trapping

The impacts from project construction and operation to commercial fishing and trapping in the project area are similar to those described for fishing and trapping for traditional purposes. The potential positive effects include improved access to fish, wildlife and plant resources and reduced transportation costs for commercial fishery operations on some lakes as well as to some traplines. However, the combined effect of increased domestic, commercial and recreational fishing pressure in the local area has the potential to have a long-term negative effect on the fish population and, ultimately, on the commercial fishery.

Other potential effects on commercial fishing, such loss of fish habitat during construction of watercourse crossings, are expected to be offset by the enhancement of habitat detailed in a compensation plan to be submitted to DFO once the details of the crossing designs are available.

Mitigation

Please refer to sections 6.2.2 and 6.2.4 for mitigation measures related to fish and wildlife resources.

Significance and RA Conclusion

Although SE will not initiate a formal monitoring program of the fish and wildlife resources along the proposed Wollaston Lake Road, SE will continue to monitor resource use (commercial and sport fishing and hunting activity) through the established processes. With proper management and enforcement of regulations, INAC and WD conclude that significant adverse effects to fishing, hunting and trapping are not likely.

Loss of wilderness character on sport fishing activities

The loss of wilderness character (e.g., remoteness, quiet, inaccessibility, natural environment) as a consequence of construction activities may affect sport fishing activity (sport fishing outfitters) within the project area. Brakewell, Spence, Causier lakes and the Compulsion Bay area are used by a “fly-in” sport fishing outfitter. While the road does not come within several hundred meters of any of the above noted sites, with the exception of the Redman River crossing which flows into Compulsion Bay, there is the potential for increased access to these remote lakes. This could reduce the overall isolated character of the lakes and thereby reduce the wilderness experience. There is a potential that the local “fly-in” outfitter may experience a reduction in business due to this loss of wilderness character. However, the net effect is difficult to determine as there are outfitters in the nearby region that are successfully operating their businesses on lakes near existing highways.

Mitigation

All mitigations proposed for all of the environmental effects will work in a synergistic fashion to reduce the magnitude of the effect of loss of wilderness character within the project area.

Significance and RA Conclusion

With increased access into a remote area, some loss of wilderness character is inevitable. The proponent will implement a number of mitigation measures such as minimizing the areal extent of the road and re-vegetation techniques to reduce the magnitude of this effect. INAC and WD conclude that the adverse environmental effects related to loss of wilderness character are not likely to be significant.

Increased resource use due to spur road development

The presence of the proposed Wollaston Lake Road may stimulate the desire for other roads to be developed from this road, both legal and illegal. Increasing road density could have adverse effects upon the natural and socioeconomic environments of the region, including increased access to natural resources and reduction of terrestrial habitat.

Mitigation

DHT will implement an access control policy that will prevent unauthorized road development. DHT has guidelines in place to control access to any section of highway within the provincial highway network. Control of access is performed through an access management program that necessitates any individual requiring access to the highway network to obtain a permit from DHT. Access management is a comprehensive process through which the Department effectively manages the provision of access to the provincial highway system for new development or re-development by exercising control over access location, frequency, spacing and design. The primary objective is to provide collision free and orderly access consistent with the functional and operational requirements of the provincial highway system and the accessibility needs of the adjacent land uses.

Significance and RA Conclusion

Reliability of all-season access is considered to be effects that the community of Wollaston Lake will benefit from beyond the life of the project. The RA concludes that there will not likely be any significant adverse environmental effects on the environment as a result of spur road development in the project area.

Table 6.3
Environmental Effects Analysis – Human Environment

VEC	Effect	Mitigation	Residual Effects							Significance
			Likelihood	Direction	Geographic Extent	Magnitude	Duration	Frequency	Reversibility	
Current Use of Land and Resources for Traditional Purposes	Changes to traditional hunting, fishing and trapping	Please refer to sections 6.2.2 and 6.2.4 for mitigation measures related to fish and wildlife resources.	Not likely to occur	Negative	Local	Minor overall change in traditional hunting and fishing	Life of the Road	Continuous	Reversible	SE will continue to monitor resource use (commercial and sport fishing and hunting activity) through established processes. With proper management and enforcement of regulations, therefore significant adverse effects to traditional fishing, hunting and trapping are not likely.
	Changes to traditional gathering of wild berries	No identified wild berry habitats (traditional use areas) of concern within the project area, therefore no mitigation is required.	Not likely to occur	Negative	Local	Minor loss of total wildberry habitat within the project area	Life of the Road	Continuous	Irreversible	During siting of ancillary activities, an environmental monitor will conduct site specific surveys of probable ancillary sites to minimize the loss of wild berry communities. No significant adverse environmental effect will occur following implementation of mitigation measures.
	Loss of heritage resources	HRIA survey conducted and route is to avoid areas of concern. Site specific surveys and discovery contingency plan	Not likely to occur	Negative	Local	Destruction of resources could have major socioeconomic effect of residents or the project area	Life of the Road	Discontinuous	Irreversible	There are no expected project effects on cultural heritage resources. The RA concludes that there will not likely be any significant adverse environmental effects on heritage resources.

Table 6.3 *Environmental Effects Analysis – Human Environment*										
VEC	**Effect**	**Mitigation**	**Residual Effects**							**Significance**
			Likelihood	**Direction**	**Geographic Extent**	**Magnitude**	**Duration**	**Frequency**	**Reversibility**	
Use of Renewable Resources	Commercial Fishing and Trapping	Please refer to sections 6.2.2 and 6.2.4 for mitigation measures related to fish and wildlife.	Not likely to occur	Negative	Local	Minor change in traditional hunting and fishing	Life of the Road	Continuous	Reversible	With proper management and enforcement of regulations, INAC and WD conclude that significant adverse effects to fishing, hunting and trapping are not likely.
	Loss of wilderness character on sport fishing activities	All mitigations proposed for all of the environmental effects will work in a synergistic fashion to reduce the magnitude of the effect of loss of wilderness character within the project area.	Will Occur	Negative	Local	Minor loss of wilderness character used by regional companies to attract tourists	Life of the Road	Continuous	Irreversible	Minimizing the areal extent of the road and re-vegetation techniques will reduce the magnitude of this effect. INAC and WD conclude that the adverse environmental effects related to loss of wilderness character are not likely to be significant.
	Increased resource use due to spur road development	DHT will implement an access control policy that will prevent unauthorized road development	Not likely to occur	Negative	Local	Minor effect as DHT has direct control over authorizations to road development	Life of the Road	Discontinuous	Reversible	The RA concludes that there will not likely be any significant adverse environmental effects on the environment as a result of spur road development in the project area.

6.4 Accidents and Malfunctions

During all phases of the proposed project there is the potential for malfunctions and accidental events to occur. Such events may include spills and/or releases of fuels, vehicular collisions and fires.

Fuel spills and releases

Accidental spills and releases of fuels, oils and lubricants are possible during all phases of the project. Releases can occur as a result of equipment malfunctions and/or vehicular collisions, and depending on the location of the accident, can affect the health and safety of individuals, air quality, local surface water, terrestrial or aquatic habitat (including soil and/or sediment quality). The proponent has indicated that although the likelihood of this type of accident occurring would be low, any accidental spills occurring are predicted to be mainly contained within the right-of-way. The proponent will apply mitigation measures to reduce the potential for this type of occurrence.

Mitigation

The proponent will implement good management practices such as fuel safety and handling procedures, emergency response plans, and spill containment measures throughout the project. The proponent will ensure that the contractor(s) working on the project adhere to the provincial Hazardous Substances and Waste Dangerous Goods (HSWDG) Regulations; these regulations provide the requirements for the proper storage and handling of fuels and requirements for spill mitigation plans. This includes requirements for secondary containment of all HSWDG materials, siting in proximity to water courses, occupational health and safety considerations, accessibility of spill kits, and spill reporting requirements. The proponent provides additional detail on each requirement in the EIS.

Significance and RA Conclusion

Accidental release of fuels could adversely affect the quality and productivity of water bodies, sediment, and soils within the project area. The likelihood of a major accident occurring is expected to be low. However, should this type of accident occur, the potential effects are anticipated to be local, low in magnitude, and reversible with the implementation of mitigation measures and contingency planning. INAC and WD conclude that significant adverse environmental effects to surface water, sediment and soils as a result of spills and accidents in the project area are not likely.

Fire

An increased risk for forest fires will accompany the right-of-way clearing and road construction activities, including activities related to set-up and operation of work camps within the construction area. In addition, the proponent plans to manage slash material through controlled burns within the road right-of-way and at ancillary sites (e.g., borrow pit). The proponent indicates construction activities such as clearing are planned to occur primarily during winter months, therefore the forest fire risk is expected to be relatively low. The risk of forest fire starts during the operation and maintenance phases of the project and is a long-term concern, but this risk is no greater than for any other roadway in northern Saskatchewan.

Mitigation

The proponent has indicated that a fire contingency plan will be a requirement of the construction contract. The plan will require that the contractor monitor all fires, have basic fire-fighting equipment on-site, as well as a communication system with which to notify SE should a fire become out of control. The proponent will contact SE Fire Management prior to burning operations for proper burning guidance and permits, if applicable.

Significance and RA Conclusion

Loss of control of burning operations during construction could have long-term, major effects on the local and regional environment within the project area. The effects of a forest fire are reversible due to forest regeneration, but would take 20 – 30 years to regenerate. With mitigation measures such as obtaining proper burning permits, following the established burn contingency plans and proper monitoring procedures, the potential for forest fires is greatly reduced. INAC and WD conclude that significant adverse environmental effects to the environment as a result of project-related fires are not likely.

Vehicle accidents

Statistics indicate that vehicle accidents will likely occur at some time during road operation. Accidents are a health and safety issue and are potentially very significant from a social perspective. It is predicted that accidents would be most likely to occur at bridge crossings, curves, hills, at the intersection with Highway 905, and during icy or foggy conditions. The incidence of these will be highly localized and sporadic for the life of the road operation phase.

Research was performed to determine accident rates on Highway 905, between the community and the proposed junction with the Wollaston Lake Road. Accident information obtained through the Traffic Accident Information System database maintained by Saskatchewan Government Insurance (SGI) was used in this analysis. Over the last 10-year period accident rates on the 100 km section of Highway 905 nearest the proposed junction have averaged 3.5 accidents per year. It is assumed that the concentration of heavy vehicles on this section may have helped to slightly inflate the accident rate. The proponent expects that due to the operational nature of the Wollaston Lake Road (i.e., community access with limited truck traffic) the accident rate would be slightly lower than currently experienced on Highway 905, and would be in the range of 2 accidents per year.

An average of 0.4 accidents per year on the Wollaston Lake ice road and at the ferry site have been reported to SGI in the last 10-year period, although several recent accident reports have been submitted to DHT that have not shown up in the SGI database. It is estimated that due to the nature of travel on the ice road, the true value of accidents is probably 1-2 per year. Comparing this value to the estimated accident value of 2 per year, it is anticipated that there should not be a significant increase in accident rates on the new road, compared to what is currently being experienced on the ice road and along portions of Highway 905.

Mitigation

The proponent will design the road using an access management plan that is based on the anticipated traffic volume. The primary objective of this plan is to provide collision free and orderly access to the road consistent with the functional and operational requirements of the provincial highway system and the accessibility needs of the adjacent land uses. The

Wollaston Lake Road will be classified as having an R-5 access management level because of low traffic flow (less than 1000 vehicles annual average daily traffic), no urban centres and limited public development potential. DHT will regularly patrol the proposed road and make decisions on the need for increased road signage and road closures based upon conditions of the road.

Significance and RA Conclusion

Vehicle accidents will likely occur during the operation phase of the proposed road. With implementation of the access management plan, which will include proper road signage, monitoring and enforcement procedures, the number of vehicle accidents occurring along the proposed road should be minimal. The proponent has indicated that access management is one of the most important factors in collision reduction, and that analysis of collision data continues to show that many collisions are attributable to conflicts resulting from lack of access management. INAC and WD conclude that significant adverse environmental effects to the environment as a result of vehicle accidents are not likely.

Table 6.4 *Environmental Effects Analysis – Accidents and Malfunctions*										
VEC	**Effect**	**Mitigation**	**Residual Effects**							**Significance**
			Likelihood	**Direction**	**Geographic Extent**	**Magnitude**	**Duration**	**Frequency**	**Reversibility**	
Accidents and Malfunctions	Fuel spills and releases	Fuel safety and handling procedures, emergency response plans, and spill containment measures, Hazardous Substances and Waste Dangerous Goods (HSWDG)	Not likely to occur	Negative	Localized to spill area	Ranging from minor spill to a large spill of products	Life of the project	Discontinuous for the life of the proposed road.	Reversible	The likelihood of a major accident occurring is expected to be low. The potential effects are anticipated to be local, low in magnitude, and reversible with the implementation of mitigation measures and contingency planning. INAC and WD conclude that significant adverse environmental effects are not likely.
	Fire	Fire contingency plan, basic fire-fighting equipment on-site, communication system, SE Fire proper burning guidance and permits, if applicable.	Not likely to occur	Negative	Local and Regional implications	Ranging from small fire to large regional fire	During construction periods.	Discontinuous for construction periods	Irreversible	Loss of control of burning operations during construction could have long-term, major effects on the local and regional environment within the project area. With mitigation measures, the potential for forest fires is greatly reduced. INAC and WD conclude that significant adverse environmental effects to the environment as a result of project-related fires are not likely.

Table 6.4 *Environmental Effects Analysis – Accidents and Malfunctions*										
VEC	**Effect**	**Mitigation**	**Residual Effects**							**Significance**
			Likelihood	**Direction**	**Geographic Extent**	**Magnitude**	**Duration**	**Frequency**	**Reversibility**	
	Vehicle accidents	Proper design and management plan based on the anticipated traffic volume. Proper road signage	Will Occur	Negative	Local	Small accidents due to low traffic volumes	Life of the project	Discontinuous for the life of the project	Irreversible	Vehicle accidents will likely occur during the operation phase of the proposed road. With implementation of the access management plan, which will include proper road signage, monitoring and enforcement procedures, the number of vehicle accidents occurring along the proposed road should be minimal. INAC and WD conclude that significant adverse environmental effects to the environment as a result of vehicle accidents are not likely.

6.5 Effects of the Environment on the Project

Wildlife

The proponent indicated that evidence of woodland caribou was found throughout the study area during wildlife surveys, although in low numbers, and it is known that barren-ground caribou occasionally visit the northern part of the study area. A mass migration of barren-ground caribou along the proposed road may lead to temporary road closure to vehicle traffic. This effect would be temporary until the migration moved away from the proposed road.

Mitigation

The proponent has proposed that annual advice be requested from the Beverly and Qamanirjuaq Caribou Management Board, as well as SE to determine the habitat utilization patterns of the caribou herds and whether or not the herds are encroaching on the road. If it is determined that the caribou herds are coming near to the proposed road, DHT, in consultation with SE, will implement mitigation measures such as placing temporary restrictions on vehicles access, especially during critical periods. Advisory signage will be set up in accordance with DHT guidelines and where appropriate flag-persons may be used. It will be the responsibility of SE to place hunting restrictions on non-region hunters should the herds approach the road.

Significance and RA Conclusion

Caribou herds have been known to migrate into the proposed project area, therefore there is the potential for herds to encroach on the proposed road. Temporary road closures would have regional social implications (access to the communities, and provision of goods and services), the magnitude of which would depend on the timing and duration of a closure.

The proponent's annual "State of the Road Report", which will be reviewed by SE and federal responsible authorities, will discuss the issue of caribou movement in relation to the road, and mitigation measures and contingency plans to deal with this type of event will be reviewed. INAC and WD conclude that the effects of the environment on the project will not be significant taking into account the implementation of the proposed mitigation measures.

Weather Conditions

Ground fog may reduce visibility along the road, particularly near stream crossings. This effect might result in transportation delays and increased risk of accident. The risk would be local, short term, and potentially significant if human life is put at risk.

Excessive snowfall can affect winter construction and operational activities and can result in local flooding during melt events. Heavy snowfall could delay construction activities and result in additional time and resources required for snow clearing. Local flooding along the road could delay vehicle movements, although this would likely be short term.

Mitigation

DHT, in consultation with the Royal Canadian Mounted Police (RCMP), will make decisions on temporary road closures resulting from adverse weather conditions. DHT maintenance crews will monitor roadway conditions and will keep roads clear as long as it is safe to do so. In the case of highway closure both the RCMP and the Highway Hotline will be notified. The Highway Hotline service is provided to inform motorists of possible hazardous driving conditions. In the case of temporary road closures, advisory signage will be set up in accordance with DHT guidelines and where appropriate flag-persons may be used. DHT will place precautionary signage to warn motorists in potential fog or flood-prone hazard zones.

Significance and RA Conclusion

Adverse weather conditions can affect construction activities and operation of the proposed road, which could ultimately lead to increased project construction and operation costs and increased risk of vehicle accidents. This effect would be the same as on any other roadway in northern Saskatchewan. INAC and WD conclude that the effects of the environment on the project will not be significant taking into account the implementation of the proposed mitigation measures.

Forest Fires

Forest fires within the project area are a natural, reoccurring event that will likely happen during the operation of the proposed road. Forest fires may reduce visibility (smoke) and endanger commuters which would ultimately result in temporary road closures. Forest fires can affect a local portion of the proposed road or, in the event of a large fire, result in a total road closure. Fires would have a major short term effect (days to weeks) on the road, but would be fully reversible once the fire has been extinguished.

Mitigation

Forest fires are handled in the same manner as adverse weather conditions. DHT, in consultation with Saskatchewan Environment and/or the RCMP, will determine when and if temporary road closure due to forest fire is required. In the case of highway closure due to forest fire both the hotline and SE will be notified and informed of the details. Advisory signage will be set up in accordance with DHT guidelines and where appropriate flag-persons may be used.

Significance and RA Conclusion

Natural disasters, such as forest fires, are unlikely to occur within the project area due to recent burn activity. When forest conditions are conducive to forest fire activity, the effects will be long term and could have local and regional impacts. Large forest fires occur on an infrequent basis (approximately 1 in 20 years) and could be human or nature initiated.

Table 6.5 *Environmental Effects Analysis – Effect of Environment on the Project*										
VEC	**Effect**	**Mitigation**	**Residual Effects**							**Significance**
			Likelihood	**Direction**	**Geographic Extent**	**Magnitude**	**Duration**	**Frequency**	**Reversibility**	
Effect of the Environment on the Project	Wildlife	Annual advice from the Beverly and Qamanirjuaq Caribou Management Board, as well as SE to determine the habitat utilization patterns of the caribou herds, temporary restrictions on vehicles access, proper road signage.	Not likely to occur	Negative	Local and Regional implications	Complete closure of the road for an undetermined period of time	Life of the project	Discontinuous for the life of the project	Reversible	The proponent's annual "State of the Road Report", will discuss caribou movement in relation to the road, mitigation measures and contingency plans to deal with this type of event. INAC and WD conclude that the effects of the environment on the project will not be significant.
	Weather Conditions	DHT, in consultation with the RCMP, will make decisions on temporary road closures resulting from adverse weather conditions.	Will Occur	Negative	Local and Regional implications	Complete closure of the road for an undetermined period of time	Life of the project	Discontinuous for the life of the project	Reversible	Adverse weather conditions can affect construction activities and operation of the proposed road, which could ultimately lead to increased project construction and operation costs and increased risk of vehicle accidents. The project will not be significant taking into account the implementation of the proposed mitigation measures.

Table 6.5 *Environmental Effects Analysis – Effect of Environment on the Project*										
VEC	**Effect**	**Mitigation**	**Residual Effects**							**Significance**
			Likelihood	**Direction**	**Geographic Extent**	**Magnitude**	**Duration**	**Frequency**	**Reversibility**	
	Forest Fires	Forest fires are handled in the same manner as adverse weather conditions. DHT, in consultation with Saskatchewan Environment and/or the RCMP, will determine when and if temporary road closure.	Will Occur	Negative	Local and Regional implications	Complete closure of the road for an undetermined period of time	Life of the project	Discontinuous for the life of the project	Reversible	Natural disasters, such as forest fires, are unlikely to occur within the project area due to recent burn activity. When forest conditions are conducive to forest fire activity the effects will be long term and could have local and regional impacts. Large forest fires occur on an infrequent basis (approximately 1 in 20 years) and could be human or nature initiated.

6.6 Cumulative Effects

Section 16(1)(a) of CEAA requires that every environmental assessment of a project shall include a consideration of any cumulative environmental effects that are likely to result from the project in combination with other projects or activities that have been or will be carried out. The following framework was used for the assessment of cumulative environmental effects:

- **Scoping** - Identification of issues of regional concern; selection of VECs on which to focus the cumulative environmental effects assessment; and identification of past, present and future projects and activities that will be carried out in the region.
- **Evaluation for Inclusion/Exclusion** - Analysis and evaluation of identified issues of regional concern; and past, present, and future projects and activities for a cumulative effect assessment
- **Analysis of Effects** – The potential environmental effects of each past, present and future action/project that overlap spatially and/or temporally with project-specific effects were identified and assessed. The analysis considered the following requirements:
  - An environmental effect must exist for the project being assessed (i.e. the proposed Wollaston Lake Road).
  - The environmental effect must be demonstrated to operate cumulatively with the environmental effects of other projects/activities.
  - The other projects/activities have been or will be carried out and are not hypothetical.
- **Mitigation** – Specific mitigation strategies to eliminate, reduce, or otherwise control potential adverse cumulative environmental effects were identified.
- **Significance** – The significance of residual cumulative effects was determined using the following criteria:
  - Whether the potential environmental effects are adverse.
  - Whether the adverse environmental effects are significant.
  - Whether the significant adverse effects are likely to occur.

6.6.1 Scoping

Issues of Concern

Potential issues of concern were identified by the proponent during the public consultation and traditional knowledge sessions. These issues include access to traditional resources through fishing, trapping and hunting; transportation economics and safety; and loss of the wilderness character of the area.

Selection of Valued Ecological Components

The selection of cumulative environmental assessment VECs represent the concerns of the proponent, the public and the RAs as were identified in the EIS. The VECs are described in Section 4 of the CSR and include: geology (minerals) and soils, vegetation, including rare and endangered flora, water quality, fish and fish habitat, reptiles and amphibians, birds, furbearers, and ungulates.

Identification of Past, Present and Future Projects and Activities

A limited number of activities occur in this remote location of the province. These project/activities include hunting and trapping; fishing; road operation and maintenance (Highway 905); and mineral exploration.

Hunting and Trapping (Current)

Trapping currently does not provide sufficient returns to support either families or individuals in the region, although a number supplement their income through the production of pelts and hides. All-weather roads that allow the transport of pelts and hides to market could result in slightly higher net returns to trappers. However, the impact would be relatively small, and it is not likely that there would be any increase in either the number of trappers or the economic value of trapping, regardless of the existence or not of all-weather roads in the region.

Trapping in northern Saskatchewan has been generally depressed for the past several years. A review of the Saskatchewan Wild Fur Harvest and Cash Values 2000-2001 (Saskatchewan Environment 2002) has shown that the number of trappers has declined significantly since 1980. Recent values (2001 to 2005) for Fur Block N-26, within which the road will pass, and nearby blocks N-68 and N-10, show similar trends. Trappers in N-26 have fluctuated between 9 and 29 over the past five years, and cash value per trapper has varied from approximately $268 to $700. The adjacent Block N-68 has many fewer trappers (fluctuating from 1 to 6) and higher cash value per trapper ($875 to $5600). This block is located to the east. The block to the south (N-10) has the most registered trappers (89 to 160), but the lowest value per trapper ($91 to $261) over the same five year period.

During the Traditional Knowledge gathering meetings, trappers from the region (both directly affected by the routes and from within the general area) commented on the road relative to their industry. The consensus was that the road may provide better access for the trappers wanting to reach their traplines. However, they also expressed concern that it may encourage others to come into the region and begin trapping.

Hunting is an important activity for the residents of Hatchet Lake and Wollaston Lake. The region provides caribou, moose, and a variety of waterfowl hunting opportunities. Hunting provides an important food source and is a traditionally important activity. Hunters from outside the region come to the Wollaston Lake area in winter and hunt barren-ground caribou, particularly to the north of the community.

Fishing (Current)

The Wollaston Lake fishery is well established and is currently undergoing expansion due to its new packing facility. However, it faces high transportation costs ($0.27 per kg) due to its remote location and reliance on a marginal ferry service. An all-weather road to Wollaston Lake would clearly be a boost to the local fishery and improve returns to the fishermen. A modest freight cost reduction is included in the benefit cost analysis. However, the more significant impact would be the opportunity to expand the fishery, improve the quality of the delivered product and expand markets.

Wollaston Lake has taken a long-term approach to developing and sustaining its commercial fishery. Special effort has been made to introduce youth to this activity through a program that assists fishermen to hire youth helpers. It has built a new packing plant in the community, which improves the efficiency of both the fishing and packing

operations. It is also pursuing opportunities to establish some lakeside processing as well as serving local markets such as the mines, restaurants, etc.

Road Operation and Maintenance (Current and Future)

The Athabasca region is currently anticipating some substantial road development. In addition to the Wollaston Lake road currently being assessed, the Athabasca Road from Points North to Stony Rapids will soon be assessed for up-grading to an all-season road. Other smaller roads are also being proposed within the region to provide access to mineral deposits. Effects that could arise from current and future road projects are similar to the effects identified for the proposed road, such as: increased sediment loading of local watercourses, disruption of wildlife migration and habitat utilization, reduction of local water quality and drainage patterns, and disruption of riparian and fish habitat.

Mineral Exploration (Future)

The economy of the Athabasca region is dominated by mining and mining exploration activities. The majority of mineral claims and exploration are to the west of the project area within the Athabasca sandstone formation (the formation in which Saskatchewan's uranium mines is located). The proposed Wollaston Lake Road Project area lays several kilometres east of the Athabasca sandstone formation boundary; however, there are currently six mineral claims within the project area. The proponent has indicated that at least two companies are investigating the platinum potential near Peter Lake, and another company has potential interests in zinc exploration near Brakewell Lake. One company (Trend Mining Company), in its report on 2005 exploration results, noted that (for the Peter Lake area) the "sulfide mineralization could host economic concentrations of any of copper, nickel, platinum, palladium, and gold." The company's statement also noted that the exploration costs in this remote region were high. It is likely that mineral exploration activities will increase as a result of better ground access off of the proposed road; however, it will also depend on international commodities prices, corporate plans and strategies, and government regulation and incentives. No active mining is occurring or has been proposed within the project study area.

Initial mineral exploration requires large land areas where the exploration activities, usually aerial surveys, have little impact on the landscape. Successive stages of exploration target progressively smaller areas where some impact on the landscape may occur. These stages of exploration require surface exploration permits issued by SE, with specific regulations governing activities and the reclamation of disturbed sites.

6.6.2 **Action Inclusion List for Cumulative Effects Assessment**

In order for a past, present or future activity or project to be considered within the cumulative effects analysis, the effects of that project or activity must also exist for the proposed Wollaston Lake project. The projects and activities and associated effects considered in the cumulative effects analysis, along with the rationale for their consideration, are provided in Table 6.6.2.

Table 6.6.2

Project / Activity Inclusion List for Cumulative Effects Assessment

Project / Activity	Potential Effects on VECs	Potential Cumulative Effect	Rationale for Inclusion/Exclusion in Cumulative Effects Assessment
Hunting and Trapping		No	As hunting and trapping activities are occurring at sustainable levels within the project area, no adverse environmental effects are occurring. Hunting and trapping are not likely to cause a cumulative effect.
Fishing (Traditional, Sport, Commercial)		No	As current fishing activities (traditional, sport and commercial) are occurring at sustainable levels within the project area, no adverse environmental effects are occurring. Fishing is not likely to cause a cumulative effect.
Road operation and maintenance	– Reduction in water quality due to sediment loading – Wildlife – migration pattern alteration, habitat removal – Drainage pattern disruption – Disruption of Riparian and fish habitat at watercourse crossings	Yes	Highway 905 is located within the proposed project area. The effects of highway operation and maintenance have the potential to overlap spatially and/or temporally with the residual effects of the proposed project. – Sediment loading during operation and maintenance of Highway 905 and during all phases of the proposed project can have a cumulative effect on VECs. – Noise and habitat alteration generated from operation and maintenance of Highway 905 and the proposed road can have a cumulative effect on wildlife within the project area. – Operation of Highway 905 and the proposed road can have a cumulative effect on drainage patterns within the project area. – Road operation and maintenance of Highway 905 and the proposed road has the potential cause cumulative effects on Riparian and fish habitat within the project area.
Future Road Developments		No	There are no current or potential road developments within the project area.

Table 6.6.2 *Project / Activity Inclusion List for Cumulative Effects Assessment*			
Project / Activity	**Potential Effects on VECs**	**Potential Cumulative Effect**	**Rationale for Inclusion/Exclusion in Cumulative Effects Assessment**
			Any further road developments will be regulated / reviewed by DHT, the proponent.
Mineral Exploration		No	There are no current or potential mining developments within the project area. Initial mineral exploration occurs aerially and has minimal impact on the environment. Any further exploration will be regulated / reviewed by SE or federal departments.

6.6.3 Analysis of Cumulative Effects

Four potential cumulative effects were identified through this process. These effects of current and future projects and activities within the project area could potentially act cumulatively with the identified environmental effects of the proposed project. These include:

- Decreased surface water quality due to sediment loading
- Disruption of wildlife, wildlife migration and habitat utilization
- Disruption of drainage patterns
- Disruption of riparian and fish habitat

Decreased Surface Water Quality - Sediment Loading

Cumulative water quality effects may result from sediment loading as a result of the operation of and maintenance activities on Highway 905 and construction and operation of the proposed Wollaston Lake Road. Maintenance activities such as snow plowing and grading can contribute sediment to adjacent watercourses. The only area where cumulative effects could occur is where potential effects from Highway 905 and the proposed road could overlap in space and time, likely at the intersection of the two roadways. The likelihood and magnitude of such an occurrence would be low and is expected to be insignificant.

Disruption of Wildlife, Wildlife Migration and Habitat Utilization

Operation and maintenance of roads can result in disruption of migration and habitat utilization by wildlife. For the purpose of the cumulative effects assessment for the proposed Wollaston Lake Road, the analysis focuses on those areas where the effects of Highway 905 overlap in space and time with the potential residual effects of the proposed road. This area is expected to be centered on the intersection of the two roads, covering a total area of approximately 12km^2. The potential cumulative effects to wildlife and wildlife

habitat, taking into consideration the implementation of mitigation measures for this project, and the small spatial extent of the cumulative effects, are expected to be insignificant.

Disruption of Drainage Patterns

Highway 905 and the proposed road could disrupt the regional drainage patterns of the project area. Improper construction and maintenance of drainage structures within the proposed road, and the existing structures of Highway 905, could block drainage flow and create pooling and alteration of flow regimes within the project area. Following the implementation of mitigation measures, such as proper installation and monitoring protocols, the cumulative effect of disruption of drainage patterns is expected to be insignificant.

Disruption of Riparian and Fish Habitat

Road operation and maintenance of Highway 905 and the proposed road has the potential to cause cumulative effects on Riparian and fish habitat within the project area. The residual environmental effects of Highway 905 do not overlap spatially with the proposed project except for where the proposed road and Highway 905 intersect. Proposed mitigations, such as habitat compensation, as prescribed by DFO, will ensure the disruption of Riparian and fish habitat is negligible and insignificant.

6.6.4 Mitigation

A number of mitigation measures have been proposed by the proponent to reduce the overall environmental effect of the proposed Wollaston Lake Road. Due to the remote nature of the proposed road and the limited amount of activity in the area, the potential for the residual effects of the project to combine in a cumulative fashion with the effects of past, current or future planned projects is small. Therefore, the mitigation measures proposed by the proponent for the Wollaston Lake Road are deemed to be appropriate.

6.6.5 Significance and RA conclusions

Future and current road developments will not have a significant environmental effect on the environment. No current plans are being proposed for any mineral exploration roads or any other road developments. DHT has the ability to control access to the proposed road and will control the amount of road developments within the region. If any unauthorized spur road developments are found, DHT will remove the access to the unauthorized road by removing the connection of the unauthorized road to the proposed road. By limiting future developments within the project area and restricting resource use (e.g. limiting licenses) the cumulative environmental effects will be insignificant.

7.0 MITIGATION AND FOLLOW-UP

7.1 Mitigation Summary

Section 6 identified and discussed mitigation measures that will be used to prevent or minimize adverse environmental effects associated with the project. A summary of the mitigation measures utilized during construction, operation, maintenance, and decommissioning and abandonment, as well as their associated environmental effect, are summarized in Table 6.6.

7.1.1 Environmental Monitor

DHT must contract an experienced, independent environmental monitor. The environmental monitor will provide on-site guidance to the contractors and DHT regarding avoidance of sensitive sites and activities within sensitive areas (e.g., near streams, etc.). The monitor must be empowered by DHT to halt construction, if necessary, until compliance with environmental protection measures is fully achieved. The monitor will make regular reports to SE regarding construction progress, and will liaise in the field with SE Conservation Officers and other staff regarding the project's progress.

7.1.2 Commitments Register

Responsibility for implementing measures during the pre-construction and construction phases will be described within a Project Commitments Register which is the responsibility of DHT to construct. **This document will be submitted to SE and the RAs for review and approval prior to construction.**

The commitments register will include:

- a description of each mitigation measure, including reference to where the mitigation measure is documented (EIS, CSR, provincial approvals, etc.)
- details on who is responsible for implementing the prescribed mitigation measure
- required timing for the implementation of the mitigation measure, including details on all phases of use of the mitigation measure (implementation, maintenance, removal, etc.)
- "sign-off" by the responsible party as well as the environmental monitor to indicate that the work was completed (when and by whom)
- Details of any further action required related to the mitigation measure.

The commitments register will become a component of a larger follow-up program that will be used to verify the accuracy of the EA and to evaluate the effectiveness of proposed mitigation measures.

7.1.3 Additional Permits and Approvals

In addition to the mitigation measures described in the previous sections, DHT must ensure all required permits and approvals from various regulatory agencies are obtained prior to construction. These include:

- *Fisheries Act* Authorization
- *Navigable Waters Protection Act* approval

- *Species at Risk Act* – Section 79(1) and 79(2) Notification letter to Environment Canada t
- Work Authorization Permit - from Saskatchewan Environment (Southend office) before any construction is initiated.
- Temporary Work Camp Permit(s) - form Saskatchewan Environment (Southend office) for the establishment of any temporary camps for construction.
- Aquatic Habitat Protection Permits – form Saskatchewan Environment (La Ronge office) for carrying out any work within or adjacent to aquatic resources.
- Gravel Quarry Dispositions – from Saskatchewan Environment Resource Registry in Prince Albert for al quarry sites.
- Land Tenure – transfer of the new ROW to Saskatchewan Highways and Transportation required upon completion of the road. An as-built survey plan will be submitted to Saskatchewan Environment Resource Registry in Regina.
- Hazardous Substances and Spill Control – it is important that employees and contractors are fully trained in the proper handling of hazardous substances and waste dangerous goods and in emergency spill response, and that provincial legislation is followed.
- Temporary Water Use Permits – from Saskatchewan Watershed Authority for any surface water used during construction.
- Forest Product Permit – from Saskatchewan Environment will be required for clearing forest vegetation.
- Fisheries and Oceans Canada Letters of Advice and Fisheries Act Authorizations. The crossing details for all streams identified will be provided to DFO as part of the permitting and approval process. Stream crossing construction will not commence until compensation for impacts to fish habitat are agreed to and approvals are in place.
- Approvals form Transport Canada, Navigable Waters Protection Program.
- Permits for some aspects of the work camps (e.g. sewage disposal) from the Mamawatan Churchill River Health Region in La Ronge.

7.2 Follow-up

The RAs have delegated the conduct of follow-up program activities to DHT. This follow-up program will be undertaken throughout each phase of the project in the form of a “State of the Road” report. The purpose of the follow-up program is to verify the accuracy of the EA and to evaluate the effectiveness of the proposed mitigation measures. The follow-up program will provide an opportunity to adapt to in-field conditions during the construction and operational phases of the proposed project. The follow-up program will include but not limited to:

- A description of revegetation success including photos
- A description of the year’s maintenance activities (e.g., culvert maintenance)
- An identification of issues and areas of concern (e.g., is garbage accumulating at one location, are animal collisions or vehicle accidents occurring in particular locations, etc.)

- Evaluation of the effectiveness of the environmental assessment to predict and mitigate adverse environmental effects;
- Identification of any unauthorized spur road development
- Other issues (e.g., have barren ground caribou been moving into the corridor? Have there been incidents of illegal hunting reported?).
- Traffic and accident statistics
- Plans for the future. For example, this may include such things as revised revegetation efforts at problem locations, or more regular culvert maintenance at some locations.
- Summary of comments received from the public and government (local, provincial, federal) representatives regarding their concerns about the road operation.
- An update and discussion of any relevant or outstanding issues from the Project Commitments Register. The purpose of the Project Commitments Register is to ensure the mitigation measures are implemented at the appropriate time, and by the appropriate personnel;

DHT will develop topics included in the report, in consultation with the Federal Authorities involved with the proposed project and Saskatchewan Environment. The report will be provided to First Nations leadership, local community leadership, the public, and federal and provincial government departments.

The following activities will be undertaken as part of the follow-up program:

Table 9.1.1

Follow-up Program: State of the Road Report

Topic	***Follow-up Program***	***Responsibility***
Potential Erosion Sites	Recontouring and revegetation of borrow sites, stream crossings, and other disturbed, erosion prone areas will be used as mitigation. The success of mitigation will be evaluated annually for at least five years. If revegetation is unsuccessful in some locations, new procedures (new planting, erosion control blankets, etc.) will be attempted. Monitoring will continue until the sites are stabilized.	DHT with assistance and advice from revegetation and erosion control consultants, as required.
Barren-ground Caribou Populations	Caribou herd locations will be obtained from the appropriate authorities during the winter months. The road may be closed temporarily if, upon the advice of the Caribou Management Board or SE, it is deemed necessary to protect the herds from potential over-harvesting. This program will be in effect for the life of the road.	DHT, in consultation with SE and the Beverly-Qamanirjuaq Management Board. The Minister of Highways, if the road needs to be temporarily closed.
Wildlife Populations	Follow-up studies on ungulate and raptor populations and resource use of ungulates and furbearers should be completed 3-5 years after the road opens. These studies could focus on whether resource harvesting was increasing and, if so, what effects were being felt by the wildlife populations.	DHT will work with SE to define needs.

Table 9.1.1 ***Follow-up Program: State of the Road Report***		
Topic	***Follow-up Program***	***Responsibility***
Stream Crossings and Fish Habitat Stream Crossings	High quality habitat within 500 m downstream of stream crossings will be monitored annually until revegetation and other erosion control measures are firmly established. Monitoring will also be performed as required by any Fisheries Act authorizations issued for the project. Monitoring of visitor activity at stream crossings will be conducted on an ongoing basis. Topics to be addressed include garbage accumulation, fishing intensity, and maintenance of culverts.	DHT
Vegetation	Post-construction monitoring will include a survey for exotic species. Should they be found, consultation with SE will be conducted regarding potential methods for site restoration using native species. Monitoring will also examine the effectiveness of natural revegetation. If not successful, a reclamation plan will be developed and implemented using species native to the area. The native species will be selected in consultation with SE and EC.	DHT
Sport and Commercial Fisheries Harvest	Commercial and sport fishing activity (catch) should be obtained from the resource users (commercial, outfitting camps) for subsequent evaluation by SE.	SE Fisheries Branch
Social and Cultural Change	The road may modify the social and cultural environment of the communities of Wollaston Lake and Hatchet Lake. Now is the time to begin monitoring this change and developing mitigation measures and/or programs to respond to any negative issues and capitalize on the positive benefits.	AEDTC

8.0 SIGNIFICANCE DECISION

Indian and Northern Affairs Canada and Western Economic Diversification Canada, as responsible authorities as defined under the *Canadian Environmental Assessment Act*, have assessed the potential environmental effects of the proposed All-Season Wollaston Lake Road. The review was completed on the basis of the information provided by the proponent in their Environmental Impact Statement, expert advice provided by federal authorities, results of discussions with provincial regulatory agencies, advice provided through the cooperative review process.

Taking into account the implementation of any mitigation that was considered to be appropriate and the proposed follow-up program, Indian and Northern Affairs Canada and Western Economic Diversification have determined that the project is not likely to cause significant adverse environmental effects.

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